



# **Configuring the MetroCluster hardware components**

## **ONTAP MetroCluster**

NetApp  
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# Configuring the MetroCluster hardware components

The MetroCluster components must be physically installed, cabled, and configured at both geographic sites.

## Parts of a MetroCluster IP configuration

As you plan your MetroCluster IP configuration, you should understand the hardware components and how they interconnect.

### Key hardware elements

A MetroCluster IP configuration includes the following key hardware elements:

- Storage controllers

The storage controllers are configured as two two-node clusters.

- IP network

This back-end IP network provides connectivity for two distinct uses:

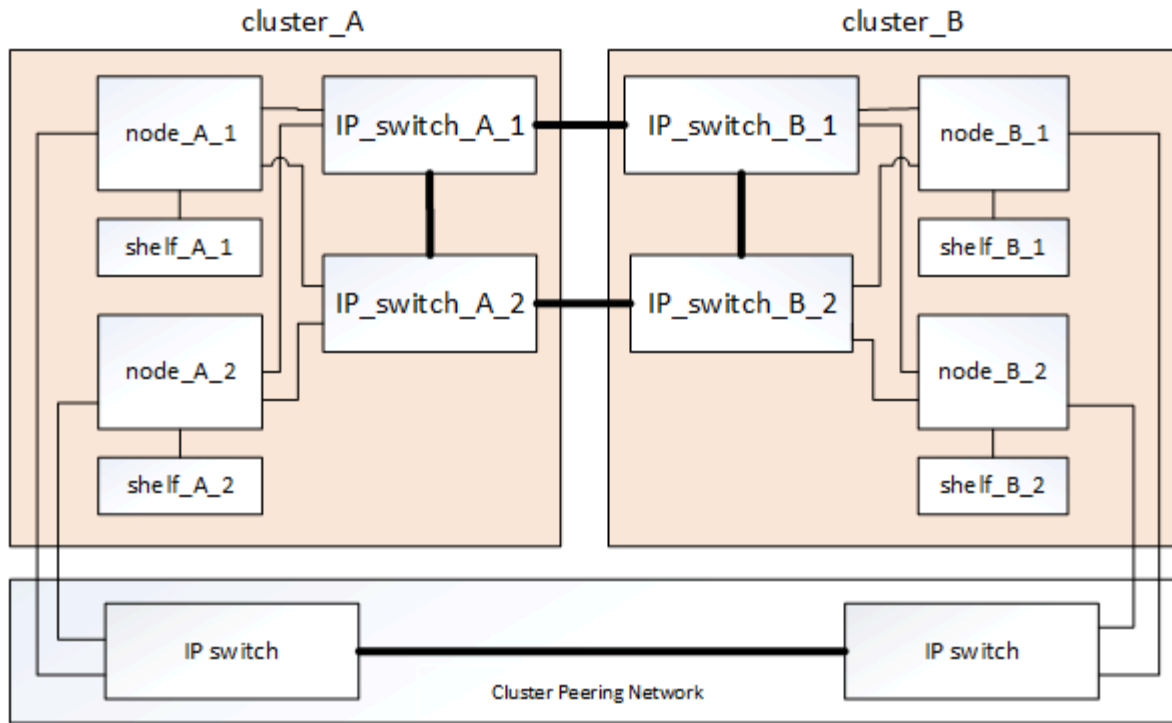
- Standard cluster connectivity for intra-cluster communications.

This is the same cluster switch functionality used in non-MetroCluster switched ONTAP clusters.

- MetroCluster back-end connectivity for replication of storage data and non-volatile cache.

- Cluster peering network

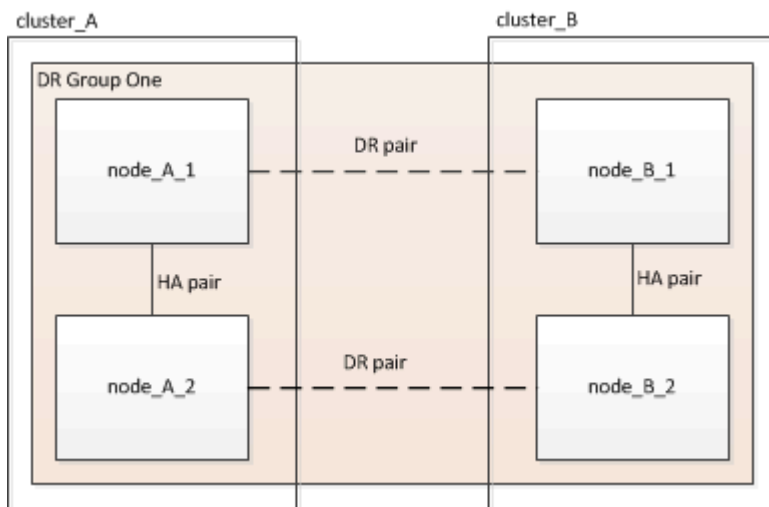
The cluster peering network provides connectivity for mirroring of the cluster configuration, which includes storage virtual machine (SVM) configuration. The configuration of all of the SVMs on one cluster is mirrored to the partner cluster.



## Disaster Recovery (DR) groups

A MetroCluster IP configuration consists of one DR group of four nodes.

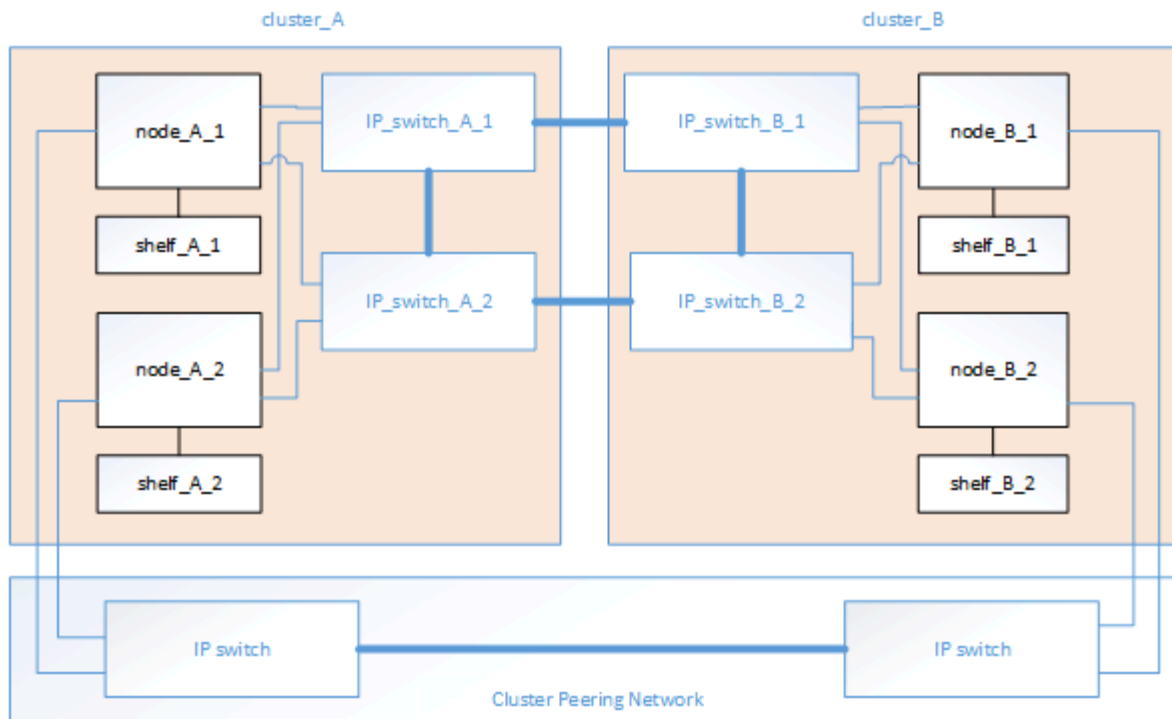
The following illustration shows the organization of nodes in a four-node MetroCluster configuration:



## Illustration of the local HA pairs in a MetroCluster configuration

Each MetroCluster site consists of storage controllers configured as an HA pair. This allows local redundancy so that if one storage controller fails, its local HA partner can take over. Such failures can be handled without a MetroCluster switchover operation.

Local HA failover and giveback operations are performed with the storage failover commands, in the same manner as a non-MetroCluster configuration.

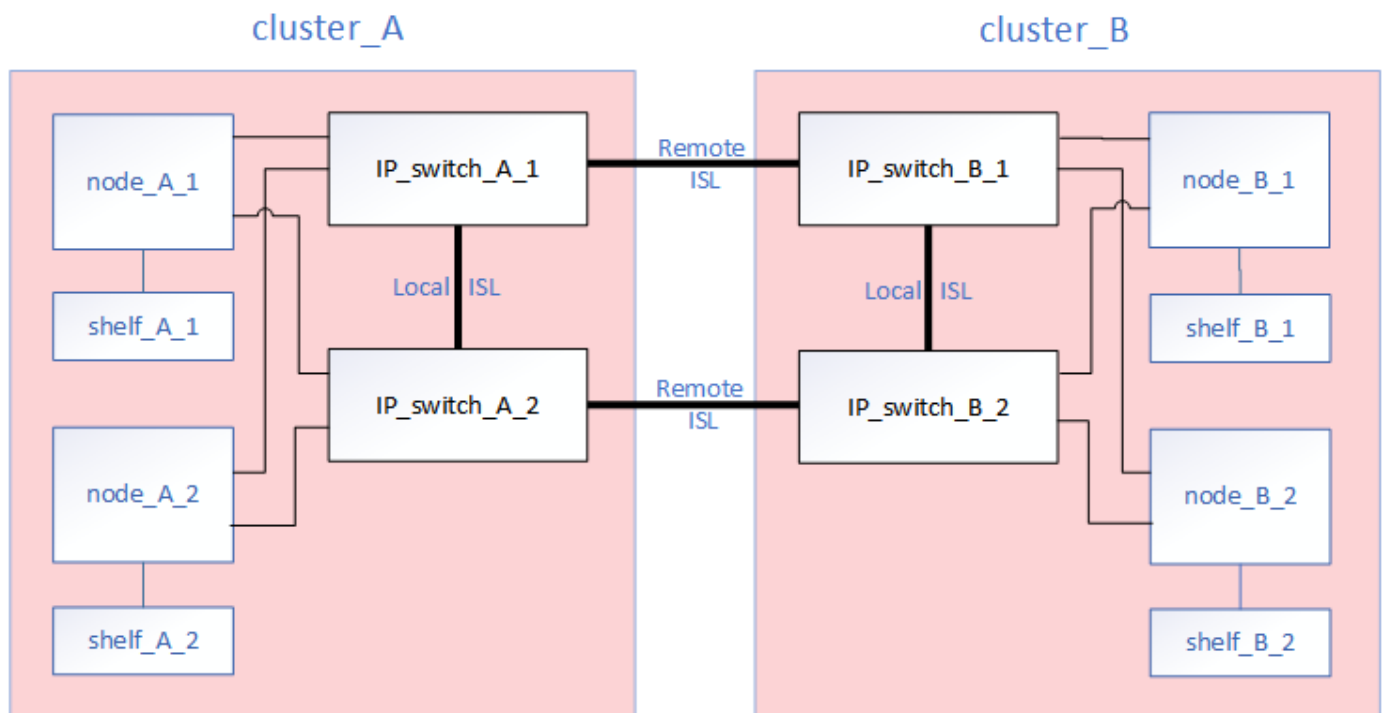


## Related information

[ONTAP concepts](#)

## Illustration of the MetroCluster IP and cluster interconnect network

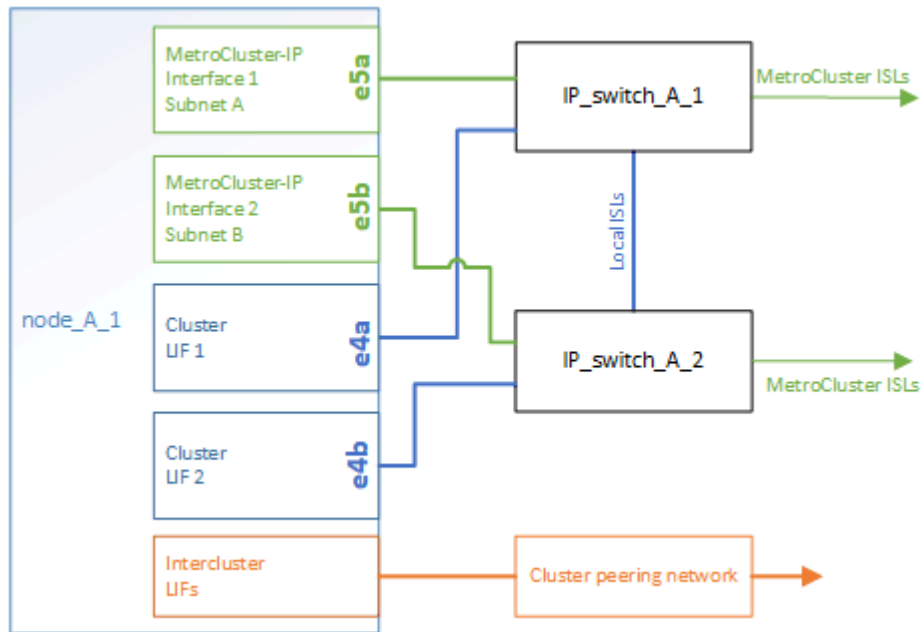
ONTAP clusters typically include a cluster interconnect network for traffic between the nodes in the cluster. In MetroCluster IP configurations, this network is also used for carrying data replication traffic between the MetroCluster sites.



Each node in the MetroCluster IP configuration has specialized LIFs for connection to the back-end IP network:

- Two MetroCluster IP interfaces
- One intercluster LIF

The following illustration shows these interfaces. The port usage shown is for an AFF A700 or FAS9000 system.



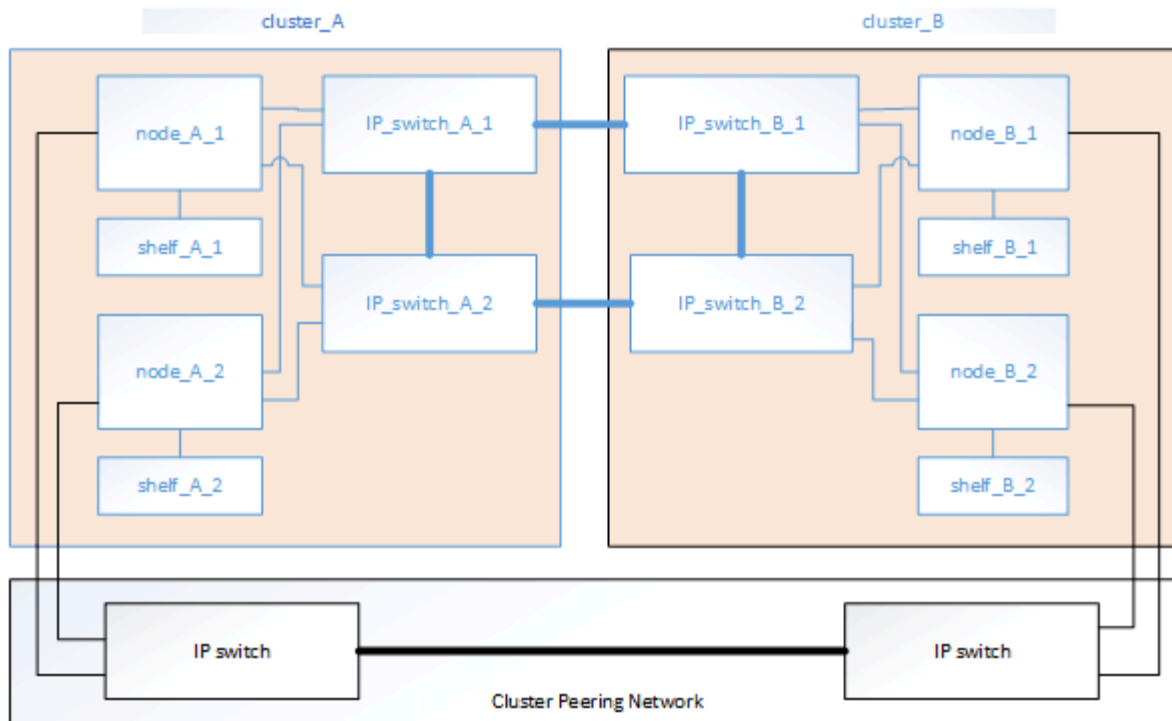
## Related information

[Considerations for MetroCluster IP configuration](#)

## Illustration of the cluster peering network

The two clusters in the MetroCluster configuration are peered through a customer-provided cluster peering network. Cluster peering supports the synchronous mirroring of storage virtual machines (SVMs, formerly known as Vservers) between the sites.

Intercluster LIFs must be configured on each node in the MetroCluster configuration, and the clusters must be configured for peering. The ports with the intercluster LIFs are connected to the customer-provided cluster peering network. Replication of the SVM configuration is carried out over this network through the Configuration Replication Service.



## Related information

[Cluster and SVM peering express configuration](#)

[Considerations for configuring cluster peering](#)

[Cabling the cluster peering connections](#)

[Peering the clusters](#)

## Required MetroCluster IP components and naming conventions

When planning your MetroCluster IP configuration, you must understand the required and supported hardware and software components. For convenience and clarity, you should also understand the naming conventions used for components in examples throughout the documentation.

### Supported software and hardware

The hardware and software must be supported for the MetroCluster IP configuration.

[NetApp Hardware Universe](#)

When using AFF systems, all controller modules in the MetroCluster configuration must be configured as AFF systems.

### Hardware redundancy requirements in a MetroCluster IP configuration

Because of the hardware redundancy in the MetroCluster IP configuration, there are two of each component at

each site. The sites are arbitrarily assigned the letters A and B, and the individual components are arbitrarily assigned the numbers 1 and 2.

## **ONTAP cluster requirements in a MetroCluster IP configuration**

MetroCluster IP configurations require two ONTAP clusters, one at each MetroCluster site.

Naming must be unique within the MetroCluster configuration.

Example names:

- Site A: cluster\_A
- Site B: cluster\_B

## **IP switch requirements in a MetroCluster IP configuration**

MetroCluster IP configurations require four IP switches. The four switches form two switch storage fabrics that provide the ISL between each of the clusters in the MetroCluster IP configuration.

The IP switches also provide intracluster communication among the controller modules in each cluster.

Naming must be unique within the MetroCluster configuration.

Example names:

- Site A: cluster\_A
  - IP\_switch\_A\_1
  - IP\_switch\_A\_2
- Site B: cluster\_B
  - IP\_switch\_B\_1
  - IP\_switch\_B\_2

## **Controller module requirements in a MetroCluster IP configuration**

MetroCluster IP configurations require four or eight controller modules.

The controller modules at each site form an HA pair. Each controller module has a DR partner at the other site.

Each controller module must be running the same ONTAP version. Supported platform models depend on the ONTAP version:

- New MetroCluster IP installations on FAS systems are not supported in ONTAP 9.4.

Existing MetroCluster IP configurations on FAS systems can be upgraded to ONTAP 9.4.

- Starting with ONTAP 9.5, new MetroCluster IP installations on FAS systems are supported.
- Starting with ONTAP 9.4, controller modules configured for ADP are supported.

## **Controller models limited to four-node configurations**

These models are limited to four in a MetroCluster configuration.



- AFF A220
- AFF A250
- FAS500f

For example, the following configurations are not supported:

- An eight-node configuration consisting of eight AFF A250 controllers.
- An eight-node configuration consisting of four AFF 220 controllers and four FAS500f controllers.
- Two four-node MetroCluster IP configurations each consisting of AFF A250 controllers and sharing the same back-end switches.
- An eight-node configuration consisting of DR Group 1 with AFF A250 controllers and DR Group 2 with FAS9000 controllers.

You can configure two separate four-node MetroCluster IP configurations with the same back-end switches if the second MetroCluster does not include any of the above models.

### Example names

The following example names are used in the documentation:

- Site A: cluster\_A
  - controller\_A\_1
  - controller\_A\_2
- Site B: cluster\_B
  - controller\_B\_1
  - controller\_B\_2

### Gigabit Ethernet adapter requirements in a MetroCluster IP configuration

MetroCluster IP configurations use a 40/100 Gbps or 10/25 Gbps Ethernet adapter for the IP interfaces to the IP switches used for the MetroCluster IP fabric.

Platform model	Required Gigabit Ethernet adapter	Required slot for adapter	Ports
AFF A700 and FAS9000	X91146A-C	Slot 5	e5a, e5b
AFF A800	X1146A/onboard ports	Slot 1	e0b, e1b
AFF A400 and FAS8300	X1146A	Slot 1	e0b, e1b
AFF A300 and FAS8200	X1116A	Slot 1	e1a, e1b
AFF A220, and FAS2750	Onboard ports	Slot 0	e0a, e0b
AFF A250 and FAS500f	Onboard ports	Slot 0	e0c, e0d

Platform model	Required Gigabit Ethernet adapter	Required slot for adapter	Ports
AFF A320	Onboard ports	Slot 0	e0g, e0h

## Pool and drive requirements (minimum supported)

Eight SAS disk shelves are recommended (four shelves at each site) to allow disk ownership on a per-shelf basis.

A four-node MetroCluster IP configuration requires the minimum configuration at each site:

- Each node has at least one local pool and one remote pool at the site.
- At least seven drives in each pool.

In a four-node MetroCluster configuration with a single mirrored data aggregate per node, the minimum configuration requires 24 disks at the site.

In a minimum supported configuration, each pool has the following drive layout:

- Three root drives
- Three data drives
- One spare drive

In a minimum supported configuration, at least one shelf is needed per site.

MetroCluster configurations support RAID-DP and RAID4.

## Drive location considerations for partially populated shelves

For correct auto-assignment of drives when using shelves that are half populated (12 drives in a 24-drive shelf), drives should be located in slots 0-5 and 18-23.

In a configuration with a partially populated shelf, the drives must be evenly distributed in the four quadrants of the shelf.

## Drive location considerations for AFF A800 internal drives

For correct implementation of the ADP feature, the AFF A800 system disk slots must be divided into quarters and the disks must be located symmetrically in the quarters.

An AFF A800 system has 48 drive bays. The bays can be divided into quarters:

- Quarter one:
  - Bays 0 - 5
  - Bays 24 - 29
- Quarter two:
  - Bays 6 - 11
  - Bays 30 - 35

- Quarter three:
  - Bays 12 - 17
  - Bays 36 - 41
- Quarter four:
  - Bays 18 - 23
  - Bays 42 - 47

If this system is populated with 16 drives, they must be symmetrically distributed among the four quarters:

- Four drives in the first quarter: 0, 1, 2, 3
- Four drives in the second quarter: 12, 13, 14, 15
- Four drives in the third quarter: 24, 25, 26, 27
- Four drives in the fourth quarter: 36, 37, 38, 39

## Mixing IOM12 and IOM 6 modules in a stack

Your version of ONTAP must support shelf mixing. Refer to the Interoperability Matrix Tool (IMT) to see if your version of ONTAP supports shelf mixing. [NetApp Interoperability](#)

For further details on shelf mixing, see: [Hot-adding shelves with IOM12 modules to a stack of shelves with IOM6 modules](#)

## Racking the hardware components

If you have not received the equipment already installed in cabinets, you must rack the components.

This task must be performed on both MetroCluster sites.

1. Plan out the positioning of the MetroCluster components.

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

2. Properly ground yourself.

1. Install the controller modules in the rack or cabinet.

[AFF A220/FAS2700 Systems Installation and Setup Instructions](#)

[AFF A250 Systems Installation and Setup Instructions](#)

[AFF A300 Systems Installation and Setup Instructions](#)

[AFF A320 systems: Installation and setup](#)

[AFF A400 Systems Installation and Setup Instructions](#)

[AFF A700 Systems Installation and Setup Instructions](#)

[AFF A800 Systems Installation and Setup Instructions](#)

[FAS500f Systems Installation and Setup Instructions](#)

[FAS8200 Systems Installation and Setup Instructions](#)

[FAS8300 and FAS8700 Systems Installation and Setup Instructions](#)

[FAS9000 Systems Installation and Setup Instructions](#)

2. Install the IP switches in the rack or cabinet.
3. Install the disk shelves, power them on, and then set the shelf IDs.
  - You must power-cycle each disk shelf.
  - Shelf IDs must be unique for each SAS disk shelf within each MetroCluster DR group (including both sites). **Note:** Do not cable disk shelves intended to contain unmirrored aggregates at this time. You must wait to deploy shelves intended for unmirrored aggregates until after the MetroCluster configuration is complete and only deploy them after using the `metrocluster modify -enable -unmirrored-aggr-deployment true` command.

## Cabling the IP switches

You must cable each IP switch to the local controller modules and to the ISLs.

- This task must be repeated for each switch in the MetroCluster configuration.
- The controller module Ethernet port usage depends on the model of the controller module.

## Using the port tables with the RcfFileGenerator tool or multiple MetroCluster configurations

You must understand how to use the information in the port tables to correctly generate your RCF files.

Review these considerations before using the tables:

- The following tables show the port usage for site A. The same cabling is used for site B.
- The switches cannot be configured with ports of different speeds (for example, a mix of 100 Gbps ports and 40 Gbps ports).
- Keep track of the MetroCluster port group (MetroCluster 1, MetroCluster 2, etc.). You will need it when using the RcfFileGenerator tool as described later in this configuration procedure.
- The RcfFileGenerator for MetroCluster IP also provides a per-port cabling overview for each switch.

Use this cabling overview to verify your cabling.

## Cabling eight-node MetroCluster configurations

For MetroCluster configuration running ONTAP 9.8 and earlier, some procedures that are performed to transition an upgrade require the addition of a second four-node DR group to the configuration to create a temporary eight-node configuration. Starting with ONTAP 9.9.1, permanent 8-node MetroCluster configurations are supported.

For such configurations, you use the same method as described above. Instead of a second MetroCluster, you are cabling an additional four-node DR group.

For example, your configuration includes the following:

- Cisco 3132Q-V switches
- MetroCluster 1: FAS2750 platforms
- MetroCluster 2: AFF A700 platforms (these platforms are being added as a second four-node DR group)

For MetroCluster 1, cable the Cisco 3132Q-V switches using the table for the FAS2750 platform and the rows for MetroCluster 1 interfaces.

For MetroCluster 2 (the second DR group), cable the Cisco 3132Q-V switches using the table for the AFF A700 platform and the rows for MetroCluster 2 interfaces.

## **Platform port assignments for Cisco 3132Q-V switches**

The port usage in a MetroCluster IP configuration depends on the switch model and platform type.

### **Port usage for FAS2750 or AFF A220 systems and a Cisco 3132Q-V switch**

Cabling an AFF A220 or FAS2750 to a Cisco 3132Q-V switch			
Port use	FAS2750, AFF A220		Switch Port
	IP_switch_x_1	IP_switch_x_2	
Unused	-		1
			2
			3
			4
			5
			6
ISL, Local Cluster native speed / 40G / 100G	ISL, Local Cluster		7
			8
MetroCluster 1, Shared Cluster and MetroCluster interface	e0a	e0b	9/1
	disabled		9/2-4
	e0a	e0b	10/1
	disabled		10/2-4
MetroCluster 2, Shared Cluster and MetroCluster interface	e0a	e0b	11/1
	disabled		11/2-4
	e0a	e0b	12/1
	disabled		12/2-4
MetroCluster 3, Shared Cluster and MetroCluster interface	e0a	e0b	13/1
	disabled		13/2-4
	e0a	e0b	14/1
	disabled		14/2-4
ISL, MetroCluster native speed 40G	ISL, MetroCluster		15 - 20
ISL, MetroCluster breakout mode 10G	ISL, MetroCluster		21/1-4
			22/1-4
			23/1-4
			24/1-4
Unused	-		25 - 32

Port usage for FAS9000, AFF A700 and a Cisco 3132Q-V switch

Cabling an AFF A700 or FAS9000 to a Cisco 3132Q-V switch			
Port use	FAS9000, AFF A700		Switch port Port
	IP_switch_x_1	IP_switch_x_2	
MetroCluster 1 Local Cluster interface	See Hardware Universe for available ports		1
			2
MetroCluster 2 Local Cluster interface			3
			4
MetroCluster 3 Local Cluster interface			5
			6
ISL, Local Cluster native speed / 40G / 100G	ISL, Local Cluster		7
			8
MetroCluster 1 MetroCluster interface	e5a	e5b	9
	e5a	e5b	10
MetroCluster 2 MetroCluster interface	e5a	e5b	11
	e5a	e5b	12
MetroCluster 3 MetroCluster interface	e5a	e5b	13
	e5a	e5b	14
ISL, MetroCluster native speed 40G	ISL, MetroCluster		15
			16
			17
			18
			19
			20
ISL, MetroCluster breakout mode 10G	ISL, MetroCluster		21/1-4
			22/1-4
			23/1-4
			24/1-4
Unused	-		25 - 32

Port usage for AFF A800 and a Cisco 3132Q-V switch

Cabling an AFF A800 to a Cisco 3132Q-V switch			
Port use	AFF A800		Switch Port
	IP_switch_x_1	IP_switch_x_2	
MetroCluster 1 Local Cluster interface	See Hardware Universe for available ports		1
			2
MetroCluster 2 Local Cluster interface			3
			4
MetroCluster 3 Local Cluster interface			5
			6
ISL, Local Cluster native speed / 40G / 100G	ISL, Local Cluster		7
			8
MetroCluster 1 MetroCluster interface	e0b	e1b	9
	e0b	e1b	10
MetroCluster 2 MetroCluster interface	e0b	e1b	11
	e0b	e1b	12
MetroCluster 3 MetroCluster interface	e0b	e1b	13
	e0b	e1b	14
ISL, MetroCluster native speed 40G	ISL, MetroCluster		15
			16
			17
			18
			19
			20
ISL, MetroCluster breakout mode 10G	ISL, MetroCluster		21/1-4
			22/1-4
			23/1-4
			24/1-4
Unused	-		25 - 32

## Platform port assignments for Cisco 3232C or Cisco 9336C switches

The port usage in a MetroCluster IP configuration depends on the switch model and platform type.

Review these considerations before using the tables:

- The following tables show the port usage for site A. The same cabling is used for site B.
- The switches cannot be configured with ports of different speeds (for example, a mix of 100 Gbps ports and 40 Gbps ports).
- If you are configuring a single MetroCluster with the switches, use the **MetroCluster 1** port group.

Keep track of the MetroCluster port group (MetroCluster 1, MetroCluster 2, or MetroCluster 3). You will



need it when using the RcfFileGenerator tool as described later in this configuration procedure.

- The RcfFileGenerator for MetroCluster IP also provides a per-port cabling overview for each switch.

Use this cabling overview to verify your cabling.

### Cabling two MetroCluster configurations to the switches

When cabling more than one MetroCluster configuration to a Cisco 3132Q-V switch, then cable each MetroCluster according to the appropriate table. For example, if cabling a FAS2750 and an A700 to the same Cisco 3132Q-V switch. Then you cable the FAS2750 as per 'MetroCluster 1' in Table 1, and the A700 as per 'MetroCluster 2' or 'MetroCluster 3' in Table 2. You cannot physically cable both the FAS2750 and A700 as 'MetroCluster 1'.

### Cabling a FAS2750 or AFF A220 system to a Cisco 3232C or Cisco 9336C switch

Cabling an AFF A220 or FAS2750 to a Cisco 3232C or Cisco 9336C switch			
Port use	FAS2750, AFF A220		Switch port
	IP_switch_x_1	IP_switch_x_2	
Unused	-		1 - 6
ISL, Local Cluster native speed / 100G	ISL, Local Cluster		7
			8
MetroCluster 1, Shared Cluster and MetroCluster interface	e0a	e0b	9/1
	disabled		9/2-4
	e0a	e0b	10/1
	disabled		10/2-4
MetroCluster 2, Shared Cluster and MetroCluster interface	e0a	e0b	11/1
	disabled		11/2-4
	e0a	e0b	12/1
	disabled		12/2-4
MetroCluster 3, Shared Cluster and MetroCluster interface	e0a	e0b	13/1
	disabled		13/2-4
	e0a	e0b	14/1
	disabled		14/2-4
ISL, MetroCluster native speed 40G / 100G	ISL, MetroCluster		15
			16
			17
			18
			19
			20
ISL, MetroCluster breakout mode 10G	ISL, MetroCluster		21/1-4
			22/1-4
			23/1-4
			24/1-4
Unused	-		25 - 32

## Cabling a AFF A300 or FAS8200 to a Cisco 3232C or Cisco 9336C switch

Cabling a AFF A300 or FAS8200 to a Cisco 3232C or Cisco 9336C switch			
Port use	FAS8200, AFF A300		Switch port
	IP_switch_x_1	IP_switch_x_2	
MetroCluster 1 Local Cluster interface	See Hardware Universe for available ports		1/1
			1/2 - 4
			2/1
			2/2 - 4
MetroCluster 2 Local Cluster interface			3/1
			3/2 - 4
			4/1
			4/2 - 4
MetroCluster 3 Local Cluster interface			5/1
			5/2 - 4
			6/1
			6/2 - 4
ISL, Local Cluster native speed / 100G	ISL, Local Cluster		7
			8
MetroCluster 1 MetroCluster interface	e1a	e1b	9/1
	disabled		9/2-4
	e1a	e1b	10/1
	disabled		10/2-4
MetroCluster 2 MetroCluster interface	e1a	e1b	11/1
	disabled		11/2-4
	e1a	e1b	12/1
	disabled		12/2-4
MetroCluster 3 MetroCluster interface	e1a	e1b	13/1
	disabled		13/2-4
	e1a	e1b	14/1
	disabled		14/2-4
ISL, MetroCluster	ISL, MetroCluster		15 - 20
ISL, MetroCluster breakout mode 10G	ISL, MetroCluster		21/1-4
			22/1-4
			23/1-4
			24/1-4
MetroCluster 4 MetroCluster interface	e1a	e1b	25/1
	disabled		25/2-4
	e1a	e1b	26/1
	disabled		26/2-4
Unused	-		27 - 28
MetroCluster 4 Local Cluster interface	See Hardware Universe		29/1
	disabled		29/2-4
	See Hardware Universe		30/1
	disabled		30/2-4
Unused	-		31 - 32

## Cabling a AFF A250 or FAS500f to a Cisco 3232C or Cisco 9336C switch

Cabling an AFF A250 or FAS500f to a Cisco 3232C or Cisco 9336C switch			
Port use	FAS500f, AFF A250		Switch port
	IP_switch_x_1	IP_switch_x_2	
Unused	-		1 - 6
ISL, Local Cluster native speed / 100G	ISL, Local Cluster		7
			8
MetroCluster 1, Shared Cluster and MetroCluster interface	e0c	e0d	9/1
	disabled		9/2-4
	e0c	e0d	10/1
	disabled		10/2-4
MetroCluster 2, Shared Cluster and MetroCluster interface	e0c	e0d	11/1
	disabled		11/2-4
	e0c	e0d	12/1
	disabled		12/2-4
MetroCluster 3, Shared Cluster and MetroCluster interface	e0c	e0d	13/1
	disabled		13/2-4
	e0c	e0d	14/1
	disabled		14/2-4
ISL, MetroCluster native speed 40G / 100G	ISL, MetroCluster		15
			16
			17
			18
			19
			20
ISL, MetroCluster breakout mode 10G	ISL, MetroCluster		21/1-4
			22/1-4
			23/1-4
			24/1-4
Unused	-		25 - 32

## Cabling a AFF A320 to a Cisco 3232C or Cisco 9336C switch

Cabling a AFF A320 to a Cisco 3232C or Cisco 9336C switch			
Port use	AFF A320		Switch port
	IP_switch_x_1	IP_switch_x_2	
MetroCluster 1, Local Cluster interface	See Hardware Universe for available ports		1
			2
MetroCluster 2, Local Cluster interface			3
			4
MetroCluster 3, Local Cluster interface			5
			6
ISL, Local Cluster native speed / 100G	ISL, Local Cluster		7
			8
MetroCluster 1, MetroCluster interface	e0g	e0h	9
	e0g	e0h	10
MetroCluster 2, MetroCluster interface	e0g	e0h	11
	e0g	e0h	12
MetroCluster 3, MetroCluster interface	e0g	e0h	13
	e0g	e0h	14
ISL, MetroCluster native speed 40G / 100G	ISL, MetroCluster		15
			16
			17
			18
			19
			20
ISL, MetroCluster breakout mode 10G	ISL, MetroCluster		21/1-4
			22/1-4
			23/1-4
			24/1-4
Unused	-		25
			26
			27
			28
			29
			30
			31
			32

Cabling an AFF A400, FAS8300 or FAS8700 to a Cisco 3232C or Cisco 9336C switch

Cabling a AFF A400, FAS8300 or FAS8700 to a Cisco 3232C or Cisco 9336C switch			
Port use	FAS8300, FAS8700, AFF A400		Switch port
	IP_switch_x_1	IP_switch_x_2	
MetroCluster 1, Local Cluster interface	See Hardware Universe for available ports		1
			2
MetroCluster 2, Local Cluster interface			3
			4
MetroCluster 3, Local Cluster interface			5
			6
ISL, Local Cluster native speed / 100G	ISL, Local Cluster		7
			8
MetroCluster 1, MetroCluster interface	e1a	e1b	9
	e1a	e1b	10
MetroCluster 2, MetroCluster interface	e1a	e1b	11
	e1a	e1b	12
MetroCluster 3, MetroCluster interface	e1a	e1b	13
	e1a	e1b	14
ISL, MetroCluster native speed 40G / 100G	ISL, MetroCluster		15
			16
			17
			18
			19
			20
ISL, MetroCluster breakout mode 10G	ISL, MetroCluster		21/1-4
			22/1-4
			23/1-4
			24/1-4
Unused	-		25
			26
			27
			28
			29
			30
			31
			32

Cabling a AFF A700 or FAS9000 to a Cisco 3232C or Cisco 9336C switch

Cabling a AFF A700 or FAS9000 to a Cisco 3232C or Cisco 9336C switch			
Port use	FAS9000, AFF A700		Switch port
	IP_switch_x_1	IP_switch_x_2	
MetroCluster 1, Local Cluster interface	See Hardware Universe for available ports		1
			2
MetroCluster 2, Local Cluster interface			3
			4
MetroCluster 3, Local Cluster interface			5
			6
ISL, Local Cluster native speed / 100G	ISL, Local Cluster		7
			8
MetroCluster 1, MetroCluster interface	e5a	e5b	9
	e5a	e5b	10
MetroCluster 2, MetroCluster interface	e5a	e5b	11
	e5a	e5b	12
MetroCluster 3, MetroCluster interface	e5a	e5b	13
	e5a	e5b	14
ISL, MetroCluster native speed 40G / 100G	ISL, MetroCluster		15
			16
			17
			18
			19
			20
ISL, MetroCluster breakout mode 10G	ISL, MetroCluster		21/1-4
			22/1-4
			23/1-4
			24/1-4
Unused	-		25
			26
			27
			28
			29
			30
			31
			32

#### Cabling a AFF A800 to a Cisco 3232C or Cisco 9336C switch

Cabling an AFF A800 to a Cisco 3232C or Cisco 9336C switch			
Port use	AFF A800		Switch port
	IP_switch_x_1	IP_switch_x_2	
MetroCluster 1, Local Cluster interface	See Hardware Universe for available ports		1
			2
MetroCluster 2, Local Cluster interface			3
			4
MetroCluster 3, Local Cluster interface			5
			6
ISL, Local Cluster native speed / 100G	ISL, Local Cluster		7
			8
MetroCluster 1, MetroCluster interface	e0b	e1b	9
	e0b	e1b	10
MetroCluster 2, MetroCluster interface	e0b	e1b	11
	e0b	e1b	12
MetroCluster 3, MetroCluster interface	e0b	e1b	13
	e0b	e1b	14
ISL, MetroCluster native speed 40G / 100G	ISL, MetroCluster		15
			16
			17
			18
			19
			20
ISL, MetroCluster breakout mode 10G	ISL, MetroCluster		21/1-4
			22/1-4
			23/1-4
			24/1-4
Unused	-		25
			26
			27
			28
			29
			30
			31
			32

Cabling an AFF A320, AFF A400, AFF A700 or AFF A800 to a Cisco 9336C-FX2 shared switch



Cabling an AFF A320, A400, A700, and A800 to a Cisco 9336C-FX2 shared switch			
MetroCluster 1, Local Cluster Interface	See Hardware Universe for available ports		1
			2
MetroCluster 2, Local Cluster Interface			3
			4
Storage shelf 1 (9)	NSM-A, e0a	NSM-A, e0b	5
	NSM-B, e0a	NSM-B, e0b	6
ISL, Local Cluster native speed / 100G	ISL, Local Cluster		7
			8
MetroCluster 1, MetroCluster interface	Port 'A'	Port 'B'	9
	Port 'A'	Port 'B'	10
MetroCluster 2, MetroCluster interface	Port 'A'	Port 'B'	11
	Port 'A'	Port 'B'	12
ISL, MetroCluster, native speed 40G / 100G breakout mode 10G	ISL, MetroCluster	ISL, MetroCluster	13
			14
			15
			16
MetroCluster 1, Storage Interface	See Hardware Universe for available ports		17
			18
MetroCluster 2, Storage Interface			19
			20
Storage shelf 2 (8)	NSM-A, e0a	NSM-A, e0b	21
	NSM-B, e0a	NSM-B, e0b	22
Storage shelf 3 (7)	NSM-A, e0a	NSM-A, e0b	23
	NSM-B, e0a	NSM-B, e0b	24
Storage shelf 4 (6)	NSM-A, e0a	NSM-A, e0b	25
	NSM-B, e0a	NSM-B, e0b	26
Storage shelf 5 (5)	NSM-A, e0a	NSM-A, e0b	27
	NSM-B, e0a	NSM-B, e0b	28
Storage shelf 6 (4)	NSM-A, e0a	NSM-A, e0b	29
	NSM-B, e0a	NSM-B, e0b	30
Storage shelf 7 (3)	NSM-A, e0a	NSM-A, e0b	31
	NSM-B, e0a	NSM-B, e0b	32
Storage shelf 8 (2)	NSM-A, e0a	NSM-A, e0b	33
	NSM-B, e0a	NSM-B, e0b	34
Storage shelf 9 (1)	NSM-A, e0a	NSM-A, e0b	35
	NSM-B, e0a	NSM-B, e0b	36

MetroCluster interfaces per platform		
Platform	Port 'A'	Port 'B'
AFF A320	e0g	e0h
AFF A400	e1a	e1b
AFF A700	e5a	e5b
AFF A800	e0b	e1b

## Platform port assignments for Broadcom supported BES-53248 IP switches

The port usage in a MetroCluster IP configuration depends on the switch model and platform type.

The switches cannot be configured with ports of different speeds (for example, a mix of 25 Gbps ports and 10 Gbps ports).

Notes for the tables below:

1. For some platforms, you can use ports 49 - 54 for MetroCluster ISLs or MetroCluster interface connections.

These ports requires an additional license.

2. Only a single AFF A320 system can be connected to the switch and no other platform can be connected at the same time.

Features that require a switched cluster are not supported in this configuration, including MetroCluster FC to IP transition and tech refresh procedures.

3. AFF A320 systems configured with Broadcom BES-53248 switches might not support all features.

Any configuration or feature that requires that the local cluster connections are connected to a switch is not supported. For example, the following configurations and procedures are not supported:

- Eight-node MetroCluster configurations
- Transitioning from MetroCluster FC to MetroCluster IP configurations
- Refreshing a four-node MetroCluster IP configuration (ONTAP 9.8 and later)

## Switch port usage for AFF A220 or FAS2750 systems

Cabling a AFF A220 or FAS2750 to a Broadcom BES-53248 switch			
Port use	FAS2750, A220		Switch port
	IP_switch_x_1	IP_switch_x_2	
Unused	-		1-6
MetroCluster 3, Shared Cluster and MetroCluster interface	e0a	e0b	9
	e0a	e0b	10
MetroCluster 4, Shared Cluster and MetroCluster interface	e0a	e0b	11
	e0a	e0b	12
ISL, MetroCluster native speed 10G / 25G	ISL, MetroCluster		13
			14
			15
			16
Unused	-		17 - 52
ISL, MetroCluster, native speed 40G / 100G (see note 1)	ISL, MetroCluster		53
			54
ISL, Local Cluster native speed / 100G	ISL, Local Cluster		55
			56

#### Switch port usage for AFF A250 or FAS500f systems

Cabling a AFF A250 or FAS500f to a Broadcom BES-53248 switch			
Port use	FAS500f, A250		Switch port
	IP_switch_x_1	IP_switch_x_2	
Unused	-		1-6
MetroCluster 3, Shared Cluster and MetroCluster interface	e0c	e0d	9
	e0c	e0d	10
MetroCluster 4, Shared Cluster and MetroCluster interface	e0c	e0d	11
	e0c	e0d	12
ISL, MetroCluster native speed 10G / 25G	ISL, MetroCluster		13
			14
			15
			16
Unused	-		17 - 52
ISL, MetroCluster, native speed 40G / 100G (see note 1)	ISL, MetroCluster		53
			54
ISL, Local Cluster native speed / 100G	ISL, Local Cluster		55
			56

#### Switch port usage for AFF A300 or FAS8200 systems

Cabling a AFF A300 or FAS8200 to a Broadcom BES-53248 switch			
Port use	FAS8200, AFF A300		Switch port
	IP_switch_x_1	IP_switch_x_2	
MetroCluster 1, Local Cluster interface	See Hardware Universe for available ports		1
			2
MetroCluster 2, Local Cluster interface			3
			4
MetroCluster 1, MetroCluster interface	e1a	e1b	5
	e1a	e1b	6
MetroCluster 2, MetroCluster interface	e1a	e1b	7
	e1a	e1b	8
Unused	-		9
			10
			11
			12
ISL, MetroCluster native speed 10G / 25G	ISL, MetroCluster		13
			14
			15
			16
Unused	-		17 - 52
ISL, MetroCluster, native speed 40G / 100G (see note 1)	ISL, MetroCluster		53
			54
ISL, Local Cluster native speed / 100G	ISL, Local Cluster		55
			56

Cabling a AFF A320 to a Broadcom BES-53248 switch			
Port use	AFF A320		Switch port
	IP_switch_x_1	IP_switch_x_2	
Ports not used	Ports not used		1 - 12
ISL, MetroCluster native speed 10G / 25G	ISL, MetroCluster		13
			14
			15
			16
Ports not licensed (17 - 52)			..
ISL, MetroCluster, native speed 40G / 100G (see note 1)	ISL, MetroCluster		53
			54
MetroCluster 1, MetroCluster interface (see note 2)	e0g	e0h	55
	e0g	e0h	56

Switch port usage for AFF A400, FAS8300 or FAS8700 systems

Cabling a FAS8300, A400 or FAS8700 to a Broadcom BES-53248 switch			
Port use	FAS8300,FAS8700, A400		Switch port
	IP_switch_x_1	IP_switch_x_2	
Unused	-		1 - 12
ISL, MetroCluster native speed 10G / 25G	ISL, MetroCluster		13
			14
			15
			16
Unused	-		17 - 48
MetroCluster 5, Local Cluster interface (see note 1)	See Hardware Universe for available ports		49
			50
MetroCluster 5, MetroCluster interface (see note 1)	e1a	e1b	51
	e1a	e1b	52
ISL, MetroCluster, native speed 40G / 100G (see note 1)	ISL, MetroCluster		53
			54
ISL, Local Cluster native speed / 100G	ISL, Local Cluster		55
			56

## Cabling the controller peering, data, and management ports

You must cable the controller module ports used for cluster peering, management and data connectivity.

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.

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.

[Cluster and SVM peering express configuration](#)

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

[AFF A320 systems: Installation and setup](#)

[AFF A220/FAS2700 Systems Installation and Setup Instructions](#)

[AFF A800 Systems Installation and Setup Instructions](#)

[AFF A300 Systems Installation and Setup Instructions](#)

[FAS8200 Systems Installation and Setup Instructions](#)

# Configuring the IP switches

You must configure the switches for use as the cluster interconnect and for backend MetroCluster IP connectivity.

## Configuring Broadcom IP switches

You must configure the Broadcom IP switches for use as the cluster interconnect and for backend MetroCluster IP connectivity.

## Resetting the Broadcom IP switch to factory defaults

Before installing a new switch software version and RCFs, you must erase the Broadcom switch settings and perform basic configuration.

- You must repeat these steps on each of the IP switches in the MetroCluster IP configuration.
- You must be connected to the switch using the serial console.
- This task resets the configuration of the management network.

1. Change to the elevated command prompt (#): `enable`

```
(Routing)> enable
(Routing) #
```

2. Erase the startup configuration: `erase startup-config`

```
(Routing) #erase startup-config
Are you sure you want to clear the configuration? (y/n) y

(Routing) #
```

This command does not erase the banner.

3. Reboot the switch: `reload`

```
(IP_switch_A_1) #reload

Are you sure you would like to reset the system? (y/n) y
```



If the system asks whether to save the unsaved or changed configuration before reloading the switch, select **No**.

4. Wait for the switch to reload, and then log in to the switch.

The default user is “admin”, and no password is set. A prompt similar to the following is displayed:

```
(Routing)>
```

5. Change to the elevated command prompt: `enable`

```
Routing)> enable  
(Routing) #
```

6. Set the serviceport protocol to `none`: `serviceport protocol none`

```
(Routing) #serviceport protocol none  
Changing protocol mode will reset ip configuration.  
Are you sure you want to continue? (y/n) y  
  
(Routing) #
```

7. Assign the IP address to the service port: `serviceport ip ip-addressnetmaskgateway`

The following example shows a service port assigned IP address 10.10.10.10 with subnet 255.255.255.0 and gateway 10.10.10.1:

```
(Routing) #serviceport ip 10.10.10.10 255.255.255.0 10.10.10.1
```

8. Verify that the service port is correctly configured: `show serviceport`

The following example shows that the port is up and the correct addresses have been assigned:

```
(Routing) #show serviceport

Interface Status..... Up
IP Address..... 10.10.10.10
Subnet Mask..... 255.255.255.0
Default Gateway..... 10.10.10.1
IPv6 Administrative Mode..... Enabled
IPv6 Prefix is .....
fe80::dac4:97ff:fe56:87d7/64
IPv6 Default Router.....
fe80::222:bdff:fef8:19ff
Configured IPv4 Protocol..... None
Configured IPv6 Protocol..... None
IPv6 AutoConfig Mode..... Disabled
Burned In MAC Address..... D8:C4:97:56:87:D7

(Routing) #
```

9. If desired, configure the SSH server.



The RCF file disables the Telnet protocol. If you do not configure the SSH server, you can only access the bridge using the serial port connection.

a. Generate RSA keys.

```
(Routing) #configure
(Routing) (Config)#crypto key generate rsa
```

b. Generate DSA keys.

```
(Routing) #configure
(Routing) (Config)#crypto key generate dsa
```

c. Enable the SSH server.

If necessary, exit the configuration context.

```
(Routing) (Config)#end
(Routing) #ip ssh server enable
```



If keys already exist, then you might be asked to overwrite them.

10. If desired, configure the domain and name server: `configure`



The following example shows the ip domain and ip name server commands:

```
(Routing) # configure
(Routing) (Config)#ip domain name lab.netapp.com
(Routing) (Config)#ip name server 10.99.99.1 10.99.99.2
(Routing) (Config)#exit
(Routing) (Config)#
```

11. If desired, configure the time zone and time synchronization (SNTP).

The following example shows the sntp commands, specifying the IP address of the SNTP server and the relative timezone.

```
(Routing) #
(Routing) (Config)#sntp client mode unicast
(Routing) (Config)#sntp server 10.99.99.5
(Routing) (Config)#clock timezone -7
(Routing) (Config)#exit
(Routing) (Config)#
```

12. Configure the switch name: `hostname IP_switch_A_1`

The switch prompt will display the new name:

```
(Routing) # hostname IP_switch_A_1

(IP_switch_A_1) #
```

13. Save the configuration: `write memory`

You receive prompts and output similar to the following example:

```
(IP_switch_A_1) #write memory
```

This operation may take a few minutes.

Management interfaces will not be available during this time.

Are you sure you want to save? (y/n) y

Config file 'startup-config' created successfully .

Configuration Saved!

```
(IP_switch_A_1) #
```

14. Repeat the previous steps on the other three switches in the MetroCluster IP configuration.

### Downloading and installing the Broadcom switch EFOS software

You must download the switch operating system file and RCF file to each switch in the MetroCluster IP configuration.

This task must be repeated on each switch in the MetroCluster IP configuration.

1. Copy the switch software to the switch: `copy sftp://user@50.50.50.50/switchsoftware/efos-3.4.3.1.stk backup`

In this example, the efos-3.4.3.1.stk operating system file is copied from the SFTP server at 50.50.50.50 to the backup partition. You need to use the IP address of your TFTP/SFTP server and the file name of the RCF file that you need to install.

```
(IP_switch_A_1) #copy sftp://user@50.50.50.50/switchsoftware/efos-3.4.3.1.stk backup
Remote Password:*****

Mode..... SFTP
Set Server IP..... 50.50.50.50
Path..... /switchsoftware/
Filename..... efos-3.4.3.1.stk
Data Type..... Code
Destination Filename..... backup

Management access will be blocked for the duration of the transfer
Are you sure you want to start? (y/n) y

File transfer in progress. Management access will be blocked for the
duration of the transfer. Please wait...
SFTP Code transfer starting...

File transfer operation completed successfully.

(IP_switch_A_1) #
```

2. Set the switch to boot from the backup partition on the next switch reboot: `boot system backup`

```
(IP_switch_A_1) #boot system backup
Activating image backup ..

(IP_switch_A_1) #
```

3. Verify that the new boot image will be active on the next boot: `show bootvar`

```
(IP_switch_A_1) #show bootvar
```

Image Descriptions

active :

backup :

Images currently available on Flash

unit	active	backup	current-active	next-active
1	3.4.3.0	3.4.3.1	3.4.3.0	3.4.3.1

```
(IP_switch_A_1) #
```

4. Save the configuration: **write memory**

```
(IP_switch_A_1) #write memory
```

This operation may take a few minutes.

Management interfaces will not be available during this time.

Are you sure you want to save? (y/n) y

Configuration Saved!

```
(IP_switch_A_1) #
```

5. Reboot the switch: **reload**

```
(IP_switch_A_1) #reload
```

Are you sure you would like to reset the system? (y/n) y

6. Wait for the switch to reboot.

7. Repeat these steps on the remaining three IP switches in the MetroCluster IP configuration.

## Downloading and installing the Broadcom RCF files

You must download and install the switch RCF file to each switch in the MetroCluster IP configuration.

This task requires file transfer software, such as FTP, TFTP, SFTP, or SCP, to copy the files to the switches.

These steps must be repeated on each of the IP switches in the MetroCluster IP configuration.

There are four RCF files, one for each of the four switches in the MetroCluster IP configuration. You must use the correct RCF files for the switch model you are using.

Switch	RCF file
IP_switch_A_1	BES-53248_v1.32_Switch-A1.txt
IP_switch_A_2	BES-53248_v1.32_Switch-A2.txt
IP_switch_B_1	BES-53248_v1.32_Switch-B1.txt
IP_switch_B_2	BES-53248_v1.32_Switch-B2.txt

1. Download the MetroCluster IP RCF files for the Broadcom switch.

[Broadcom Cluster and Management Network Switch Reference Configuration File Download for MetroCluster IP](#)

2. Copy the RCF files to the switches:

- a. Copy the RCF files to the first switch: 

```
copy sftp://user@FTP-server-IP-address/RcfFiles/switch-specific-RCF nvram:script BES-53248_v1.32_Switch-A1.txt nvram:script BES-53248_v1.32_Switch-A1.scr
```

In this example, the BES-53248\_v1.32\_Switch-A1.txt RCF file is copied from the SFTP server at 50.50.50.50 to the local bootflash. You need to use the IP address of your TFTP/SFTP server and the file name of the RCF file that you need to install.

```

(IP_switch_A_1) #copy sftp://user@50.50.50.50/RcfFiles/BES-
53248_v1.32_Switch-A1.txt nvram:script BES-53248_v1.32_Switch-A1.scr

Remote Password:*****

Mode..... SFTP
Set Server IP..... 50.50.50.50
Path..... /RcfFiles/
Filename..... BES-
53248_v1.32_Switch-A1.txt
Data Type..... Config Script
Destination Filename..... BES-
53248_v1.32_Switch-A1.scr

Management access will be blocked for the duration of the transfer
Are you sure you want to start? (y/n) y

File transfer in progress. Management access will be blocked for the
duration of the transfer. Please wait...
File transfer operation completed successfully.

Validating configuration script...

config

set clibanner
"*****
*****

* NetApp Reference Configuration File (RCF)

*

* Switch      : BES-53248

...
The downloaded RCF is validated. Some output is being logged here.
...

Configuration script validated.
File transfer operation completed successfully.

(IP_switch_A_1) #

```

- b. Verify that the RCF file is saved as a script: `script list`

```
(IP_switch_A_1) #script list

Configuration Script Name          Size(Bytes)   Date of Modification
-----
BES-53248_v1.32_Switch-A1.scr      852          2019 01 29 18:41:25

1 configuration script(s) found.
2046 Kbytes free.
(IP_switch_A_1) #
```

- c. Apply the RCF script: `script apply BES-53248_v1.32_Switch-A1.scr`

```
(IP_switch_A_1) #script apply BES-53248_v1.32_Switch-A1.scr

Are you sure you want to apply the configuration script? (y/n) y

config

set clibanner
*****
*****

* NetApp Reference Configuration File (RCF)

*

* Switch      : BES-53248

...
The downloaded RCF is validated. Some output is being logged here.
...

Configuration script 'BES-53248_v1.32_Switch-A1.scr' applied.

(IP_switch_A_1) #
```

- d. Save the configuration: `write memory`

```
(IP_switch_A_1) #write memory
```

This operation may take a few minutes.

Management interfaces will not be available during this time.

Are you sure you want to save? (y/n) y

Configuration Saved!

```
(IP_switch_A_1) #
```

- e. Reboot the switch: **reload**

```
(IP_switch_A_1) #reload
```

Are you sure you would like to reset the system? (y/n) y

- f. Repeat the previous steps for each of the other three switches, being sure to copy the matching RCF file to the corresponding switch.

3. Reload the switch: **reload**

```
IP_switch_A_1# reload
```

4. Repeat the previous steps on the other three switches in the MetroCluster IP configuration.



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