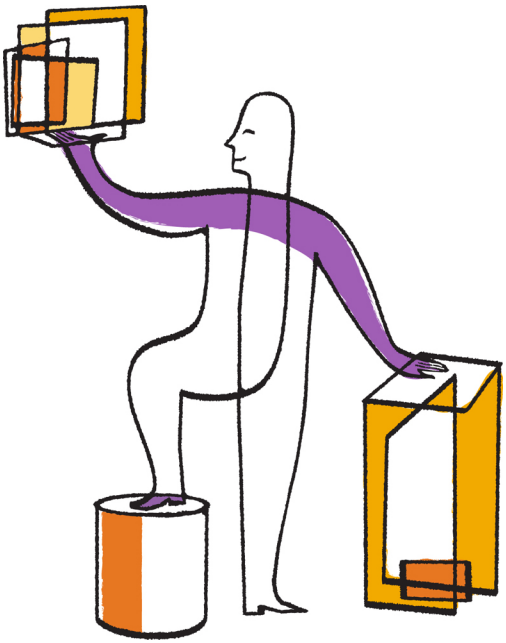
# Data ONTAP®

## Cisco® Switch Configuration Guide

## For Fabric-attached MetroCluster™ 7-Mode Systems



NetApp, Inc.
495 East Java Drive
Sunnyvale, CA 94089
U.S.

Telephone: +1 (408) 822-6000
Fax: +1 (408) 822-4501
Support telephone: +1 (888) 463-8277
Web: www.netapp.com
Feedback: doccomments@netapp.com

Part number: 215-08571_A0
February 2014

# Contents

**Supported Cisco switches ..... 4**
What port-chunks in Cisco 9710 switches are ..... 4
**Guidelines for configuring Cisco switches ..... 5**
**Guidelines for cabling Cisco 9710 switches ..... 6**
**Examples of preferred cabling requirements in Cisco 9148 and 9222i switches ..... 7**
**Examples of preferred cabling for Cisco 9710 switches ..... 11**
**Configuring Cisco switches for a fabric-attached MetroCluster configuration ..... 13**
Configuring a switch initially ..... 13
Setting the switch parameters ..... 13
Reviewing Cisco license requirements ..... 15
Enabling ports in a Cisco MDS switch ..... 16
Configuring non-E ports in a port group containing E ports ..... 17
Configuring an E port ..... 19
Configuring an F port ..... 21
**Creating VSANs ..... 23**
Creating FC-VI VSANs ..... 23
Creating storage VSANs ..... 24
Enabling the in-order-guarantee of exchanges ..... 25
Enabling the QoS settings ..... 26
**Creating zones and zone sets ..... 28**
Clearing existing zones ..... 28
Obtaining the switch WWN ..... 29
Setting the system default values ..... 29
Creating FC-VI zones and zone set ..... 31
Creating storage zones and zone set ..... 33
**Copyright information ..... 35**
**Trademark information ..... 36**
**How to send your comments ..... 37**
**Index ..... 38**

# Supported Cisco switches

You must use one of the supported Cisco switches to configure your fabric-attached MetroCluster configuration.

The following Cisco switches are supported with fabric-attached MetroCluster configurations:

- Cisco MDS 9148
  The Cisco MDS 9148 contains 48 ports that are grouped into 12 port groups with each port group containing four ports.
- Cisco MDS 9222i
  The Cisco MDS 9222i contains 18 ports that are grouped into three port groups, with each port group containing six ports. However, if you need more ports, you can install a 48-port, 8-Gb blade (X-DS-X9248-48K9-R5-C) in the available slots of the Cisco MDS 9222i. This gives you an additional four port groups, with each port group containing 12 ports.
- Cisco MDS 9710 Fibre Channel Switching Module
  The Cisco MDS 9710 contains 48 ports that are grouped into eight port chunks.

To learn about the NX-OS and Data ONTAP version supported for MetroCluster configuration, see the Interoperability Matrix available on the NetApp Support Site.

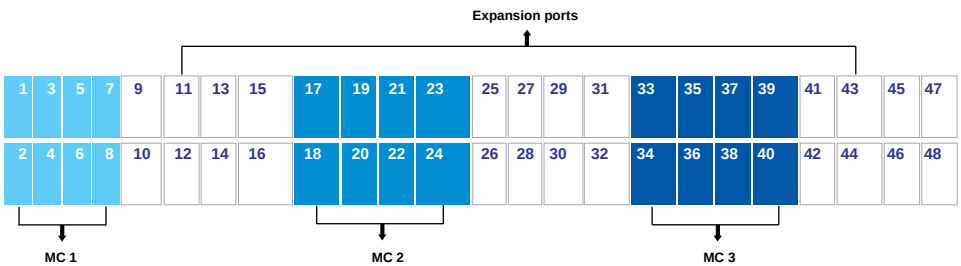
**Related information**

*Interoperability Matrix: support.netapp.com/NOW/products/interoperability*

## What port-chunks in Cisco 9710 switches are

In Cisco 9710 switches, a single 48 port-module or blade can connect to a maximum of six fabric-attached MetroCluster configurations. Each fabric-attached MetroCluster configuration must use eight consecutive ports on the module. This group of eight ports is called a *port-chunk*.

The following is an illustration of the 48 port-module of a Cisco 9710 switch. In the illustration, the ports 1 through 8 form one port-chunk.



# Guidelines for configuring Cisco switches

There are some guidelines that you must know when using the Cisco switches in a fabric-attached MetroCluster configuration.

The following are the general guidelines that apply to all the Cisco switches:

- All four switches connected to the same MetroCluster configuration must be running the same NX-OS version.
- FCIP is not supported for ISL connection in a fabric-attached MetroCluster configuration.
- Encryption and compression in the storage fabric are not supported for fabric-attached MetroCluster configuration.
- When cabling a stack of disks, ensure that the two FibreBridge 6500N connected to that stack are connected to the same port on the two switches (Cisco 9222i and 9148) or blades (Cisco 9710) at the site.

The following are the guidelines that apply to Cisco 9148 and 9222i switches:

- You should use two switches of the same model and switch slot configuration at each site.
- With the four switches, you should create two fabrics of two switches each.
- MetroCluster configuration supports only one or two ISLs between the switches.
- Both the ISLs in the same fabric should be configured for the same speed and distance.

  The ISLs in one fabric can be of different speed and distance compared to the ISLs of the second fabric. However, it is best that all ISLs in the same MetroCluster system be of the same speed and length to reduce complexity.
- Two initiator ports must be connected from each controller to each fabric.

  This requires each controller to have four initiator ports to connect to the back-end fabrics for a MetroCluster configuration.

# Guidelines for cabling Cisco 9710 switches

There are certain guidelines that you must consider before cabling the Cisco 9710 switches to a MetroCluster configuration.

The following are the general guidelines for using Cisco 9710 switches:

- When cabling a stack of disks, ensure that the two FibreBridge 6500N connected to that stack are connected to the same port on the two switches (Cisco 9222i and 9148) or blades (Cisco 9710) at the site.
- You can have more than one MetroCluster configuration on each 48-port blade but you can have a maximum of six MetroCluster configurations on each line cards.
- The ISLs cannot be shared but must be dedicated to each MetroCluster configuration.
- You must use one port-chunk even if your MetroCluster configuration requires fewer than eight ports.
- You must use the next consecutive port-chunk if your MetroCluster configuration requires more than eight ports.
- For scalability, it is best to leave one port-chunk between MetroCluster configurations if you are cabling three MetroCluster configurations in a single 48-port module.

  This enables MetroCluster configurations to expand port usage without recabling.

The following are the guidelines for using two Cisco 9710 switches:

- You must have one Cisco 9710 switch at each site in a MetroCluster configuration.
- You must use a minimum of two 48-port blades that contain 16 G modules in each Cisco 9710 switch.
- The FC-VI and the initiator ports of the controller must be connected to both the blades to ensure redundancy.

The following are the guidelines for using four switches at each site in a MetroCluster configuration

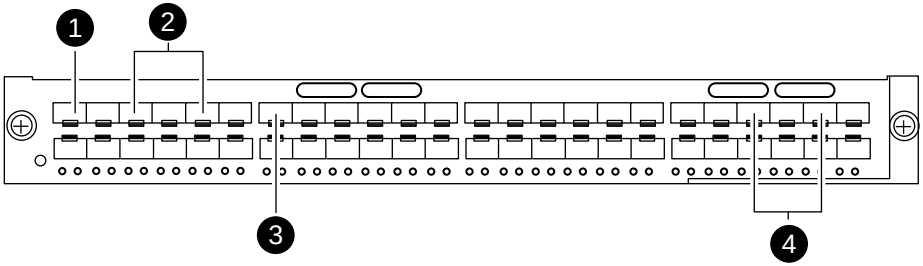
- You must have two Cisco 9710 switches at each site in a MetroCluster configuration.
- You must use a minimum of one 48-port blade per Cisco 9710 switch.

# Examples of preferred cabling requirements in Cisco 9148 and 9222i switches

You must follow some of the best practices for cabling in Cisco 9148 and Cisco 9222i switches in a MetroCluster configuration, such as dedicating ports for FC-VI and initiator ports, and dedicating the port group containing the E ports only to ISL traffic in each switch.

### Cisco 9148 switches

The following is an example of preferred cabling in Cisco 9148 switches:




| | |
|---|---|
| 1 | FC-VI ports |
| 2 | Initiator port |
| 3 | FibreBridge 6500N |
| 4 | ISL ports |

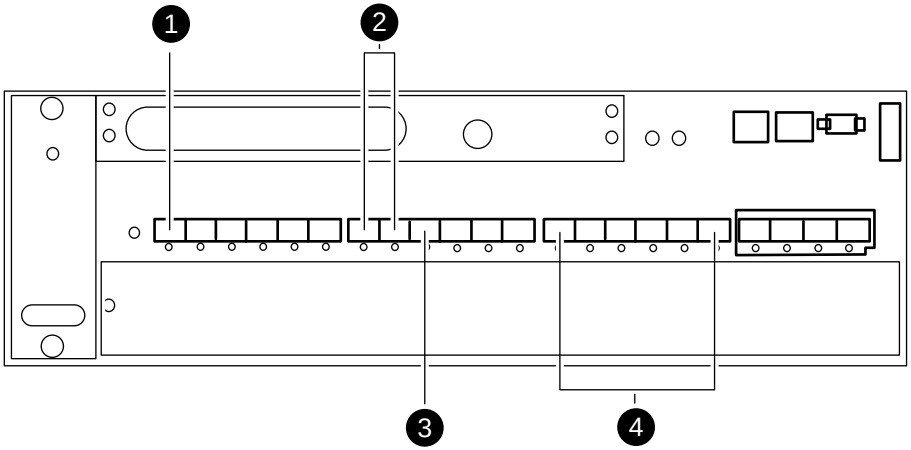
The following table shows the preferred cabling for Cisco 9148 switches:

| Port number | Device |
|---|---|
| fc 1/1 | FC-VI |
| fc 1/5 | Initiator 1 |
| fc 1/9 | Initiator 2 |

| Port number | Device |
|---|---|
| fc 1/13, fc 1/17, fc 1/ 21, fc 1/25, fc1/29, fc 1/33, fc1/37 | FibreBridge 6500N |
| fc 1/45 | ISL 1 |
| fc 1/41 | ISL 2 |

### Cisco 9222i switches

The following is an example of preferred cabling in Cisco 9222i switches:




| | |
|---|---|
| 1 | FC-VI ports |
| 2 | Initiator port |
| 3 | FibreBridge 6500N |
| 4 | ISL ports |

The following table shows the preferred cabling for Cisco 9222i switch used in a MetroCluster configuration:

| **Port number** | **Device** |
|---|---|
| fc 1/1 | FC-VI |
| fc 1/7 | Initiator 1 |
| fc 1/8 | Initiator 2 |
| fc 1/9, fc 1/10, fc 1/11, fc 1/12, fc 1/2, fc1/3 | FibreBridge 6500N |
| fc 1/13 | ISL 1 |
| fc 1/18 | ISL 2 |

### Cisco 9222i (8-Gb card) switches with one ISL

The following is an example of preferred cabling in Cisco 9222i (8-Gb card) switches with one ISL:

| **Port number** | **Device** |
|---|---|
| fc 2/1 | FC-VI |
| fc 2/13 | Initiator 1 |
| fc 2/25 | Initiator 2 |
| fc 1/1, fc1/7, fc1/13, fc1/6, fc1/12, fc 1/18 | FibreBridge 6500N |
| fc 2/37 | ISL 1 |

### Cisco 9222i (8-Gb card) switches with two 4-G ISLs

The following is an example of preferred cabling in Cisco 9222i (8-Gb card) switches with two 4-G ISLs:

| **Port number** | **Device** |
|---|---|
| fc 2/14 | FC-VI |
| fc 2/13 | Initiator 1 |
| fc 2/25 | Initiator 2 |
| fc 2/37, fc1/1, fc1/2, fc1/3, fc1/4, fc1/5, fc1/6 | FibreBridge 6500N |
| fc 1/12 | ISL 1 |
| fc 1/18 | ISL 2 |

### Cisco 9222i (8-Gb card) switches with two 8-G ISLs

The following is an example of preferred cabling in Cisco 9222i (8-Gb card) switches with two 8-G ISLs:

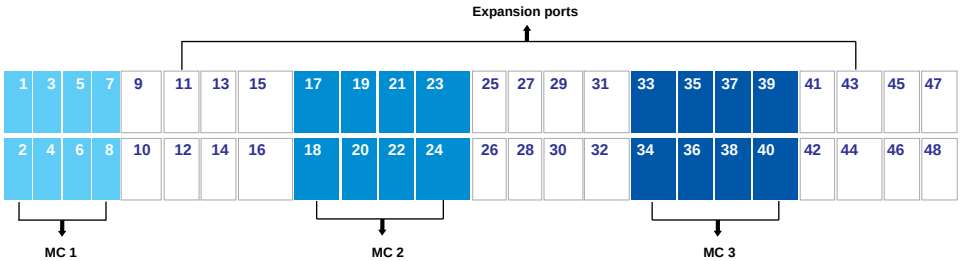
| **Port number** | **Device** |
|---|---|
| fc 2/1 | FC-VI |
| fc 1/12 | Initiator 1 |
| fc 1/18 | Initiator 2 |
| fc 2/37, fc1/1, fc1/2, fc1/3, fc1/4, fc1/5, fc1/6 | FibreBridge 6500N |
| fc 2/13 | ISL 1 |
| fc 2/25 | ISL 2 |

# Examples of preferred cabling for Cisco 9710 switches

The best practice for cabling using Cisco 9710 switches is to leave eight consecutive port-chunks between the MetroCluster configurations. This enables the MetroCluster configurations to expand port usage without recabling.

It is best to use the same port number to configure the ports in all the switches in a MetroCluster configuration. For example, if you are using Port 1 for FC-VI, then it is best to use Port 1 for FC-VI in all the other switches.

The following illustration shows a single module of Cisco 9710 switches:




Note that this illustration shows that the single module is connected to three MetroCluster configurations: MC1, MC2, and MC3. The following table shows the recommended cabling for MC1, using Ports 1 through 8:

| Port number | Type of port |
|---|---|
| 1 | FC-VI ports |
| 2 and 3 | Initiator ports |
| 4 and 5 | ISL ports |
| 6, 7, and 8 | FibreBridge 6500N |

Ports 9 through 16 can be used by MC1 for further expansion.

The following table shows the recommended cabling example of MC2 using Ports17 through 24:

| Port number | Type of port |
|---|---|
| 17 | FC-VI ports |
| 18 and 19 | Initiator ports |
| 20 and 21 | ISL ports |

| Port number | Type of port |
|---|---|
| 22, 23, and 24 | FibreBridge 6500N |

Ports 25 through 32 can be used by MC2 for further expansion.

The following table shows the recommended cabling example for MC3 using Ports 33 through 40.

| Port number | Type of port |
|---|---|
| 33 | FC-VI ports |
| 34 and 35 | Initiator ports |
| 36 and 37 | ISL ports |
| 38, 39, and 40 | FibreBridge 6500N |

Ports 41 through 48 can be used by MC3 for further expansion.

### Related references

*Guidelines for cabling Cisco 9710 switches* on page 6

# Configuring Cisco switches for a fabric-attached MetroCluster configuration

You must configure your Cisco switches to prepare them for fabric-attached MetroCluster configuration. This set of procedures must be performed on each switch in the MetroCluster configuration.

Configuring Cisco switches involves the following tasks:

- Clearing the preexisting configuration and restoring the switches to default setting
- Setting the switch parameters
- Enabling the ports in a switch
- Setting the port-speed and buffer credits for both E and non-E ports

## Configuring a switch initially

When you log in to the switch for the first time and the setup script is not running, you must restore the switch to factory default values. These procedures must be performed on each switch in the MetroCluster configuration.

### Steps

1. Clear any preexisting configuration and restore the switches to their default setting by entering the following command:

   **`write erase`**

   Additional parameters appear. You must define the following parameters:
   `This command will erase the startup-configuration. Do you wish to proceed anyway? (y/n): y`

2. Reboot the system by entering the following command:

   **`Reload`**

## Setting the switch parameters

When configuring the system for the first time, you must complete the switch configuration through the Setup wizard. This is because the setup parameter always takes the system default values. You can provide the switch IP address, date and time, zone policy, and so on in the Setup wizard.

### About this task

These steps must be performed on each switch in a fabric-attached MetroCluster configuration.

### Steps

1. To start the Setup wizard, enter the following command:

   **`setup`**

2. Enter the following switch parameters in the Setup wizard:

   - Set `Configure read-only SNMP community string` as follows:

     **`Y`**

   - Set `SNMP community string` as follows:

     **`Public`**

     **Note:** You can change the SNMP community string according to your requirement.

   - Set `Configure default switch port interface state` as follows:

     **`noshut`**

   - Set `Configure default switchport port mode F` as follows:

     **`N`**

   - Set `Configure default zone policy (permit/deny)` as follows:

     **`Deny`**

   - Set `Enable full zoneset distribution?` as follows:

     **`Yes`**

### Example

```
Press Enter at anytime to skip a dialog. Use ctrl-c at anytime
to skip the remaining dialogs.

Would you like to enter the basic configuration dialog (yes/no): yes
Do you want to enforce secure password standard (yes/no) [y]:
Create another login account (yes/no) [n]:
Configure read-only SNMP community string (yes/no) [n]:
Configure read-write SNMP community string (yes/no) [n]:
Enter the switch name :
Continue with Out-of-band (mgmt0) management configuration? (yes/no)
[y]:
Mgmt0 IPv4 address :
Configure the default gateway? (yes/no) [y]:
IPv4 address of the default gateway :
Configure advanced IP options? (yes/no) [n]:
Enable the ssh service? (yes/no) [y]:
Type of ssh key you would like to generate (dsa/rsa) [rsa]:
Number of rsa key bits <1024-2048> [1024]:
Enable the telnet service? (yes/no) [n]:
Enable the http-server? (yes/no) [y]:
Configure clock? (yes/no) [n]:
Configure timezone? (yes/no) [n]:
Configure summertime? (yes/no) [n]:
Configure the ntp server? (yes/no) [n]:
Configure default switchport interface state (shut/noshut) [shut]:
```

```
noshut
Configure default switchport trunk mode (on/off/auto) [on]:
Configure default switchport port mode F (yes/no) [n]:
Configure default zone policy (permit/deny) [deny]:
Enable full zoneset distribution? (yes/no) [n]:
Configure default zone mode (basic/enhanced) [basic]:

The following configuration will be applied:

  password strength-check
  ssh key rsa 1024 force
  feature ssh
  no feature telnet
  feature http-server
  no system default switchport shutdown
  system default switchport trunk mode on
  no system default zone default-zone permit
  no system default zone distribute full
  no system default zone mode enhanced

csco2# like to edit the configuration? (yes/no) [n]:

Exiting the basic config setup.
```

# Reviewing Cisco license requirements

Certain feature-based licenses might be required for the switches in a fabric-attached MetroCluster configuration. These licenses enable you to use features such as QoS or long-distance mode credits on the switches. You must install these licenses on all four switches in a MetroCluster configuration.

The following are the feature-based licenses that might be required in a MetroCluster configuration:

- ENTERPRISE_PKG
  Enables you to use the QoS feature in Cisco switches.
- PORT_ACTIVATION_PKG
  You can use this license for Cisco 9148 switches. This license enables you to activate or deactivate ports on the switches as long as only 16 ports are active at any given time. By default, 16 ports are enabled in Cisco MDS 9148 switches.
- FM_SERVER_PKG
  Enables you to manage fabrics simultaneously and to manage switches through a web browser. The FM_SERVER_PKG license also enables performance management features such as performance thresholds, threshold monitoring, and so on. For more information about this license, see the Cisco Fabric Manager Server Package.

You can verify the licenses installed by using the `show license usage` command. If you do not have these licenses, contact your sales representative before proceeding.

# Enabling ports in a Cisco MDS switch

In Cisco MDS 9222i and Cisco MDS 9710 switches, all the ports are enabled by default. However, in Cisco MDS 9148 switches, you must manually enable the ports required in a fabric-attached MetroCluster configuration.

### About this task

- By default, you can manually enable 16 ports in a Cisco MDS 9148 switch.
- The Cisco switches enable you to apply the POD license on random ports, as opposed to applying them in sequence.
- Cisco switches in a fabric-attached MetroCluster configuration require that you use one port from each port group, unless you need more than 12 ports.

### Steps

1. View the port groups available in a Cisco switch by entering the following command:

   **show port-resources module *blade_number***

2. License and acquire the required port in a port group by entering the following commands in sequence:

   **config t**

   **interface *port_number***

   **shut**

   **port-license acquire**

   **no shut**

   #### Example

   For example, to license and acquire Port fc 1/45, enter the following command:

   ```
   switch# config t
   switch(config)#
   switch(config)# interface fc 1/45
   switch(config-if)#
   switch(config-if)# shut
   switch(config-if)# port-license acquire
   switch(config-if)# no shut
   switch(config-if)# end
   ```

3. Save the configuration by entering the following command:

   **copy running-config startup-config**

### Related concepts

*Reviewing Cisco license requirements* on page 15

# Configuring non-E ports in a port group containing E ports

In a port group containing the E port, you should set the port type and the buffer-to-buffer credits of all the non-E ports to F mode and 1, respectively. This enables the E port to use the buffer-to-buffer credits that were freed up by the non-E ports.

### About this task

You should perform this set of procedures on each switch in the MetroCluster configuration.

### Steps

1. Set the ports to `F` mode by entering the following command:

   **`switchport mode F`**

2. Set the buffer-to-buffer credit of the non-E ports to `1` by entering the following commands in sequence:

   **`switchport fcrxbbcredit 1`**

   **`shut`**

   **`end`**

3. Save the settings by entering the following command:

   **`copy running-config startup-config`**

4. Verify that the buffer-to-buffer credit is assigned to a port by entering the following commands:

   **`show port-resources module 1`**

   **`show interface *portnumber* bbcredit`**

**Example of setting the buffer-to-buffer credit of non-E ports in a Cisco 9148 switch**

Consider a port group 11 that contains the ports 41 through 44, where 41 is an E port and 42 through 44 are non-E ports. Verify the buffer-to-buffer credit of the port group by entering the `show port-resources module *blade_number*` command. The command displays the following information for port group 11:

```
Available dedicated buffers are 128

------------------------------------------------------------------------
  Interfaces in the Port-Group       B2B Credit  Bandwidth  Rate
Mode
                                        Buffers     (Gbps)
```

```
--------------------------------------------------------------------------
  fc1/41                                    32        8.0
dedicated
  fc1/42                                    32        8.0
dedicated
  fc1/43                                    32        8.0
dedicated
  fc1/44                                    32        8.0
dedicated
```

To set the mode and buffer-to-buffer credit of the non-E ports (ports 42 to 44) in port group 11 to F and 1 respectively, enter the following commands in sequence:

```
switch# config t
switch(config)# interface fc 1/42-44
switch(config-if)# switchport mode F
switch(config-if)# switchport fcrxbbcredit 1
switch(config-if)# shut
switch(config-if)# end
switch# copy running-config startup-config
```

Verify that the buffer-to-buffer credit is assigned to each port by using the `show interface portnumber bbcredit` command. The command displays the following information:

```
Port-Group 11
  Available dedicated buffers are 93

--------------------------------------------------------------------------
  Interfaces in the Port-Group       B2B Credit  Bandwidth  Rate
Mode
                                        Buffers     (Gbps)

--------------------------------------------------------------------------
  fc1/41                                    32        8.0
dedicated
  fc1/42                                     1        8.0
dedicated
  fc1/43                                     1        8.0
dedicated
  fc1/44                                     1        8.0
dedicated
```

The available buffer-to-buffer credits (93) can now be used by the E port (port 41) in port group 11.

# Configuring an E port

For the port connected to an ISL, the port type must be set to E mode and the buffer-to-buffer credits must be set to a value required for that distance.

### About this task

This set of procedures must be performed on each switch in a fabric-attached MetroCluster configuration.

### Steps

1. Set the rate mode of the switch port to `dedicated` by entering the following command:

   **`switchport rate-mode dedicated`**

2. Set the ports to a fixed speed by entering the following command:

   **`switchport speed`** ***`speed`***

   *`speed`* is the speed of the ISL.

3. Set the port to `E` mode by entering the following command:

   **`switchport mode E`**

4. Enable the trunk mode for the switch port by entering the following command:

   **`switchport trunk mode on`**

5. Calculate the required buffer-to-buffer credit by using the following formula:

   **`number of buffers = buffers per km × distance in km × 1.5`**

   The buffer-to-buffer credits can be calculated by using the values in the following table:

| ISL Speed | Buffer-to-buffer credits required per km |
|---|---|
| 1G | 0.5 |
| 2G | 1 |
| 4G | 2 |
| 8G | 4 |

### Example

An E port using 4G speed and ISL distance is 25 km will require the following number of buffers:

**`number of buffers = 2 × 25 × 1.5 = 75`**

6. Set the buffer-to-buffer credit for the E port by entering the following command:

**switchport fcrxbbcredit *number of buffers***

7. Save the settings by entering the following command:

   **copy running-config startup-config**

8. Verify the buffer-to-buffer credit assigned to the port by entering the following commands:

   **show port-resources module 1**

   **show interface portnumber_bbcredit**

### Example of setting the buffer credit of E ports in a Cisco 9148 switch

Consider a port group 11 that contains the ports 41 through 44, where 41 is an E port and the buffer-to-buffer credit of the non-E ports is set to 1. Verify the buffer-to-buffer credit of the port group by using the `show interface portnumber bbcredit` command. The command displays the following information:

```
Port-Group 11
  Available dedicated buffers are 93

--------------------------------------------------------------------------
  Interfaces in the Port-Group       B2B Credit  Bandwidth  Rate
Mode
                                        Buffers     (Gbps)

--------------------------------------------------------------------------
  fc1/41                                    32        8.0
dedicated
  fc1/42                                     1        8.0
dedicated
  fc1/43                                     1        8.0
dedicated
  fc1/44                                     1        8.0
dedicated
```

Assuming that the ISL is operating at 8 G and the ISL distance is 20 km, the E port will need a buffer-to-buffer credit of 120 (4 × 20 × 1.5).To set the mode and buffer-to-buffer credit of the E port, 41, enter the following commands in sequence:

```
switch# config t
switch(config)# interface fc1/41
switch(config-if)# switchport rate-mode dedicated
switch(config-if)# switchport speed 4000
switch(config-if)# switchport mode E
switch(config-if)# switchport trunk mode on
switch(config-if)# switchport fcrxbbcredit 120
switch(config-if)# shut
switch(config-if)# no shut
switch(config-if)# end
switch# copy running-config startup-config
```

When you verify the buffer-to-buffer credit assigned to each port by using the `show interface portnumber bbcredit` command, it displays the following information:

```
Port-Group 11
  Available dedicated buffers are 5

--------------------------------------------------------------------------
  Interfaces in the Port-Group       B2B Credit  Bandwidth  Rate
Mode
                                        Buffers     (Gbps)

--------------------------------------------------------------------------
  fc1/41                                   120        8.0
dedicated
  fc1/42                                     1        8.0
dedicated
  fc1/43                                     1        8.0
dedicated
  fc1/44                                     1        8.0
dedicated
```

# Configuring an F port

The F ports are the ports connecting the storage initiator HBA, FC-VI or FibreBridge 6500N. These ports are located in a port group that does not contain an E port.

### About this task

This set of procedures must be performed on each switch in the MetroCluster configuration.

### Steps

1. Set the ports to `F` mode by entering the following command:

   **`switchport mode F`**

2. Set the ports to fixed speed by entering the following command:

   **`switchport speed`** ***`speed`***

   *speed* is either 4000 or 8000.

3. Set the rate mode of the switch port to `dedicated` by entering the following command:

   **`switchport rate-mode dedicated`**

4. Set the port to no shutdown mode by entering the following command:

   **`no shutdown`**

**Example of setting the F ports in a Cisco 9148 switch**

In the following example, the port “fc1/1” is set as an F port with a speed of 8000:

```
switch# config  t
switch(config)# interface fc 1/1
switch(config-if)# switchport mode F
switch(config-if)# switchport speed 8000
switch(config-if)# switchport rate-mode dedicated
switch(config-if)# no shutdown
switch(config-if)# end
switch# copy running-config startup-config
```

# Creating VSANs

You must create two VSANs: FC-VI VSANs for FC-VI traffic and storage VSANs for storage traffic. You must create these two VSANs as the in-order-guarantee of exchanges and QoS settings are applied to the FC-VI VSANs to ensure that FC-VI guarantees ordered delivery and have higher priority than storage traffic.

The steps involved in creating the FC-VI and storage VSANs must be performed on both the switches in a fabric.

## Creating FC-VI VSANs

You can create FC-VI VSANs by providing an identification number and name, and adding FC ports.

### Steps

1. Create an FC-VI VSAN by entering the following command in sequence:

   **vsan database**

   **vsan *identification_number***

   **vsan *identification_number* name *vsan_name***

   #### Example

   To create FC-VI VSAN, fab1_vsan_fcvi with identification number as 10, enter the following commands in a sequence:

   ```
   switch# config t
   switch(config)# vsan database
   switch(config-vsan-db)#
   switch(config-vsan-db)# vsan 10
   switch(config-vsan-db)# vsan 10 name fab1_vsan_fcvi
   switch(config-vsan-db_# end
   switch#
   ```

2. Add FC ports to the FC-VI VSAN by entering the following commands in sequence:

   **vsan database**

   **vsan *identification_number* interface *switch_portnumber***

   #### Example

   To add FC-VI port fc1/1 to VSAN 10, enter the following commands in sequence:

   ```
   switch# config t
   switch(config)# vsan database
   ```

```
switch(config-vsan-db)#
switch(config-vsan-db)# vsan 10 interface fc1/1
switch(config-vsan-db)# end
switch#
```

3. Verify the members in the FC-VI VSAN by entering the following command:

   **show vsan member**

4. Save the configuration by entering the following command:

   **copy running-config startup-config**

# Creating storage VSANs

You can create storage VSANs by providing identification number and name, and adding storage ports.

### Steps

1. Create a storage VSAN by entering the following commands in sequence:

   **vsan database**

   **vsan *identification_number***

   **vsan *identification_number* name *vsan_name***

   #### Example

   To create a storage VSAN, such as "fab1_vsan_storage" with identification number as "20", enter the following commands in sequence:

   ```
   switch# config t
   switch(config)# vsan database
   switch(config-vsan-db)#
   switch(config-vsan-db)# vsan 20
   switch(config-vsan-db)# vsan 20 name fab1_vsan_storage
   switch(config-vsan-db)# end
   switch#
   ```

2. Add ports to storage VSAN by entering the following commands in sequence:

   **vsan database**

   **vsan *identification_number interface switch_portnumber***

   #### Example

   To add storage ports to storage "VSAN 20", enter the following commands in a sequence:

   ```
   switch# config t
   switch(config)# vsan database
   ```

```
switch(config-vsan-db)#
switch(config-vsan-db)# vsan 20 interface fc1/5
switch(config-vsan-db)# end
switch#
```

3. Verify the members in the VSAN by entering the following command:

   **show vsan member**

4. Save the configuration by entering the following command:

   **copy running-config startup-config**

# Enabling the in-order-guarantee of exchanges

You must enable the in-order-guarantee of exchanges on the FC-VI VSAN to ensure that the data frames are delivered to the destination switch in the same order as they were sent by the source switch. This set of tasks must be performed on both the switches in each fabric.

### Before you begin

You must have created the FC-VI VSAN for which you want to enable the in-order-guarantee.

### Steps

1. Enable the in-order-guarantee of exchanges for the VSAN by entering the following command:

   **in-order-guarantee vsan *identification_number***

2. Enable the load balancing for the VSAN by entering the following command:

   **vsan *identification_number* loadbalancing src-dst-id**

3. Save the configuration and verify the status of the in-order-guarantee by entering the following commands in sequence:

   **show in-order-guarantee**

   **copy running-config startup-config**

### Enabling the in-order-guarantee of exchanges for VSAN 10

The following example shows how to enable the in-order-guarantee of exchanges for VSAN 10 of a fabric:

```
switch# config t
switch(config)# in-order-guarantee vsan 10
switch(config)# vsan database
switch(config-vsan-db)# vsan 10 loadbalancing src-dst-id
switch(config-vsan-db)# end
switch# show in-order-guarantee
switch# copy running-config startup-config
```

Similarly, enable the in-order-guarantee of exchanges in the second fabric also.

# Enabling the QoS settings

You must enable the quality of service (QoS) parameter to ensure that the FC-VI traffic gets priority over storage traffic in an ISL. Enabling QoS involves creating a class map, policy map and adding VSAN identification number to the policy map.

### About this task

The steps involved in enabling the QoS must be performed on all the switches in a fabric.

### Steps

1. Enable the QoS and create a class map by entering the following commands in sequence:

   **qos enable**

   **qos class-map *class_name* match-any**

   **end**

   #### Example

   In the example, the QoS is enabled for the class called fab1_FCVI_Class.

   ```
   switch# config t
   switch(config)# qos enable
   switch(config)# qos class-map fab1_FCVI_Class match-any
   switch(config-cmap)# end
   ```

2. Create the policy map and add the class map, and set the priority to high by entering the following command:

   **qos *policy_name***

   #### Example

   ```
   switch# config t
   switch(config)# qos policy-map fab1_FCVI_Policy
   switch(config-pmap)#
   ```

3. Add the class map created in step 1 to the policy map by entering the following command:

   **class *class_name***

**Example**

```
switch(config-pmap)# class fab1_FCVI_Class
switch(config-pmap-c)#
```

4. Set the priority by entering the following command:

   **priority high**

   **Example**

   ```
   switch(config-pmap-c)# priority high
   ```

5. Add the VSAN to the policy map created in step 2 by entering the following command:

   **qos service policy *policy_name* vsan *vsanid***

   **Example**

   ```
   switch(config)# qos service policy fab1_FCVI_Policy vsan 10
   ```

6. Exit the configuration by entering the following command:

   **end**

# Creating zones and zone sets

You can create zones and zone sets to arrange fabric-connected storage devices into two or more logical zones on the same switch. The zone members can access only the members of the same zone.

The zoning configuration only needs to be performed on one of the switches in the fabric. The zone configuration created at one switch automatically synchronizes with the partner switch of the same fabric.

Creating zones in Cisco switches involves the following steps:

1. Clearing the existing zones.
2. Obtaining the switch wwn.
3. Configuring the zone settings.
4. Creating FC-VI zones and adding ports to it.
5. Creating an FC-VI zone set and adding FC-VI zones to it.
6. Creating storage zones and adding the storage ports to it.
7. Creating storage zone set and adding storage zones to it.
8. Activating the zone set.

## Clearing existing zones

You should clear the existing zoning information from the database before creating a new zone. You must perform this activity on one switch in each fabric.

#### Steps

1. Clear the existing zoning information by entering the following commands in a sequence:

   **no zoneset activate name *zoneset_name* vsan *vsan_id***

   **no zoneset distribute full vsan *vsan_id***

   **clear zone database vsan *vsan_id***

   #### Example

   The following example illustrates how to clear existing zoning information from VSAN10:

   ```
   switch# config t
   switch(config)# no zoneset activate name fabric1_zoneset vsan 10
   ....
   ```

2. Clear the zone database by entering the following command:
   **clear zone database vsan *vsanid***

   **Example**

   ```
   switch# clear zone database vsan 10
   ```

3. Verify and confirm that no active zones are present by entering the following commands in sequence:
   **show zoneset active**
   **show zone active**

   **Example**

   ```
   switch# show zoneset active
   switch# show zone active
   ```

# Obtaining the switch WWN

You must obtain the switch WWN to create VSANs and zones.

**Step**

1. Obtain the switch WWN by entering the following command:
   **show wwn switch**

   **Example**

   ```
   switch# show wwn switch
   ```

   You should get an output in the following format:
   `Switch WWN is 20:00:00:05:9b:24:cb:78`

# Setting the system default values

You must set the default values for certain system settings such as full zone distribution and zone policies.

**About this task**

These system settings are required if you have used the `write erase` command to clear the preexisting configuration. You must run these commands on each switch in a fabric.

### Steps

1. Set the default zoning policy to deny access by entering the following command:

   **no system default zone default-zone permit**

   #### Example

   ```
   switch# config t
   switch(config)# no system default zone default-zone permit
   ```

2. Enable the full zone distribution by entering the following command:

   **system default zone distribute full**

   #### Example

   ```
   switch# config t
   switch(config)# system default zone distribute full
   ```

3. Set the default zoning policy for a VSAN by entering the following command:

   **zone default-zone permit *vsanid***

   #### Example

   The following example shows how to apply the default zoning policy for VSAN 10:

   **zone default-zone permit vsan 10**

   The following example shows how to apply the default zoning policy for VSAN 20:

   **zone default-zone permit vsan 20**

4. Set the default full zone distribution for a VSAN by entering the following command:

   **zoneset distribute full vsan *vsanid***

   #### Example

   The following example shows how to apply the default full zone distribution for VSAN 10:

   **zoneset distribute full vsan 10**

   The following example shows how to apply the default full zone distribution for VSAN 20:

   **zoneset distribute full vsan 20**

### Related tasks

*Configuring a switch initially* on page 13

# Creating FC-VI zones and zone set

You can create an FC-VI zone and zone set by grouping together the FC ports of the switches in a fabric. This helps in avoiding interruption or congestion caused by the storage traffic. You must perform zoning configuration on only one of the switches in a fabric.

### Before you begin

- You must have created an FC-VI VSAN.
- You must have acquired the switch WWN.
- The FC-VI zone must contain the FC-VI port from each storage controller.

### Steps

1. Create an FC-VI zone by entering the following command:

   **zone name *FCVI_zonename* vsan *vsanid***

   #### Example

   The following example shows how to create an FC-VI zone called fcvi_zone_40_42_10 with VSAN identification number as 10. The example includes the switches that form a fabric with FC-VI port as 1.

   ```
   switch# config t
   switch(config)# zone name fcvi_zone_40_42_10 vsan 10
   switch(config-zone)#
   ```

2. Add FC-VI ports to the zone by entering the following command:

   **member interface *FCVI_portnumber* swwn *switch wwn***

   #### Example

   The following example shows how to add the FC-VI port fc1/1 to the FC-VI zone created in the first step. This also includes the switch wwn. The following example shows how to add the FC-VI port details for two switches in a same fabric.

   ```
   switch(config-zone)# member interface fc1/1 swwn 20:00:00:05:9b:24:cb:
   78
   switch(config-zone)# member interface fc1/1 swwn 20:00:00:05:9b:24:3c:
   10
   ```

3. Create the FC-VI zone set by entering the following command:

   **zoneset name *FCVI_zonesetname* vsan *vsanid***

**Example**

The following example shows how to create FC-VI zone set called fabric1_zoneset10 with VSAN identification number as 10.

```
switch# config t
switch(config)# zoneset name fabric1_zoneset10 vsan 10
switch(config-zoneset)#
```

4. Add FC-VI zones to the zone set by entering the following command:

   **member *FCVI_zonename***

   **Example**

   The following example shows how to add the FC-VI zone created in step 1 to the FC-VI zone set fabric1_zoneset10:

   ```
   switch(config-zoneset)# member fcvi_zone_40_42_10
   ```

5. Activate the zone set by entering the following command:

   **zoneset activate name *FCVI_zonesetname* vsan *vsanid***

   **Example**

   The following example shows how to activate the zone set fabric1_zoneset10 with VSAN identification number as 10:

   ```
   switch(config)# zoneset activate name fabric1_zoneset10 vsan 10
   ```

6. Share the switch settings with the partner switch in the fabric by entering the following command:

   **zoneset distribute vsan *vsanid***

   **Example**

   The following example shows how to share the switch settings with the partner switch in the fabric with VSAN identification number as 10:

   ```
   switch# (config) t
   switch(config)# zoneset distribute full vsan 10
   ```

**Related tasks**

*Obtaining the switch WWN* on page 29

# Creating storage zones and zone set

You can create the storage zones and zone set by grouping together the storage ports to segregate them from FC port. The zoning configuration must be done on only one of the switches in a fabric.

### Before you begin

- You must have created the storage VSANs.
- You must have acquired the switch WWN.
- Each storage zone must contain the two HBA ports from both controllers (4 ports in total) and one FibreBridge 6500N port.

### Steps

1. Create a storage zone by entering the following command:

   **zone name *storage_zonename* vsan *vsanid***

   #### Example

   The following example shows how to create a storage zone called storage_zone_40_2 with VSAN identification number as 20:

   ```
   switch# config t
   switch(config)# zone name storage_zone_40_2 vsan 20
   switch(config-zone)#
   ```

2. Add storage zones by entering the following command:

   **member interface *storage_portnumber switch_wwn***

   In this step, you must also add the FibreBridge 6500N port number and storage port number of the other switch in the same fabric. For more information about FibreBridge 6500N, see *Configuring a MetroCluster system with SAS disk shelves and FibreBridge 6500N bridges*.

   #### Example

   The following example shows how to add the storage ports fc1/13, fc1/2, and fc1/14 of switch 1 and the storage ports fc1/13 and fc1/14 of switch 3. In this example, the storage controllers are connected to fc1/13 and fc1/14 of switch 1 and fc1/13 and fc1/14 of switch 3, the FibreBridge 6500N is connected to the storage port fc1/2 of switch 1.

   ```
   member interface fc1/13 swwn 20:00:00:05:9b:24:cb:78
   member interface fc1/14 swwn 20:00:00:05:9b:24:cb:78
   member interface fc1/2 swwn 20:00:00:05:9b:24:cb:78
   member interface fc1/13 swwn 20:00:00:05:9b:24:3c:10
   member interface fc1/14 swwn 20:00:00:05:9b:24:3c:10
   ```

3. Create the storage zone set by entering the following command:

   **zoneset name *storage_zonesetname* vsan *vsanid***

   **Example**

   The following example shows how to create storage zone set called fabric1_zoneset20, with VSAN identification number as 20:

   ```
   switch# config t
   switch(config)# zoneset name fabric1_zoneset20 vsan 20
   switch(config-zoneset)#
   ```

4. Add the storage zones created in step 1 to the zone set by entering the following command:

   **member *storage_zonename***

   **Example**

   The following example shows how to add the storage zones created in step 1 to the zone set:

   ```
   switch(config-zoneset)# member storage_zone_40_2
   ```

5. Activate the zone set by entering the following command:

   **zoneset activate name *zoneset_name* vsan *vsanid***

   **Example**

   The following example shows how to activate the zone set fabric1_zoneset20:

   ```
   switch(config)# zoneset activate name fabric1_zoneset20 vsan 20
   ```

6. Share the switch settings with the partner switch in the fabric by entering the following command:

   **zoneset distribute vsan *vsanid***

   **Example**

   ```
   switch# config t
   switch(config)# zoneset distribute full vsan 20
   ```

**Related tasks**

*Obtaining the switch WWN* on page 29

# Copyright information

Copyright © 1994–2014 NetApp, Inc. All rights reserved. Printed in the U.S.

No part of this document covered by copyright may be reproduced in any form or by any means—graphic, electronic, or mechanical, including photocopying, recording, taping, or storage in an electronic retrieval system—without prior written permission of the copyright owner.

Software derived from copyrighted NetApp material is subject to the following license and disclaimer:

THIS SOFTWARE IS PROVIDED BY NETAPP "AS IS" AND WITHOUT ANY EXPRESS OR IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, WHICH ARE HEREBY DISCLAIMED. IN NO EVENT SHALL NETAPP BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO, PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.

NetApp reserves the right to change any products described herein at any time, and without notice. NetApp assumes no responsibility or liability arising from the use of products described herein, except as expressly agreed to in writing by NetApp. The use or purchase of this product does not convey a license under any patent rights, trademark rights, or any other intellectual property rights of NetApp.

The product described in this manual may be protected by one or more U.S. patents, foreign patents, or pending applications.

RESTRICTED RIGHTS LEGEND: Use, duplication, or disclosure by the government is subject to restrictions as set forth in subparagraph (c)(1)(ii) of the Rights in Technical Data and Computer Software clause at DFARS 252.277-7103 (October 1988) and FAR 52-227-19 (June 1987).

# Trademark information

NetApp, the NetApp logo, Network Appliance, the Network Appliance logo, Akorri, ApplianceWatch, ASUP, AutoSupport, BalancePoint, BalancePoint Predictor, Bycast, Campaign Express, ComplianceClock, Customer Fitness, Cryptainer, CryptoShred, CyberSnap, Data Center Fitness, Data ONTAP, DataFabric, DataFort, Decru, Decru DataFort, DenseStak, Engenio, Engenio logo, E-Stack, ExpressPod, FAServer, FastStak, FilerView, Fitness, Flash Accel, Flash Cache, Flash Pool, FlashRay, FlexCache, FlexClone, FlexPod, FlexScale, FlexShare, FlexSuite, FlexVol, FPolicy, GetSuccessful, gFiler, Go further, faster, Imagine Virtually Anything, Lifetime Key Management, LockVault, Manage ONTAP, Mars, MetroCluster, MultiStore, NearStore, NetCache, NOW (NetApp on the Web), Onaro, OnCommand, ONTAPI, OpenKey, PerformanceStak, RAID-DP, ReplicatorX, SANscreen, SANshare, SANtricity, SecureAdmin, SecureShare, Select, Service Builder, Shadow Tape, Simplicity, Simulate ONTAP, SnapCopy, Snap Creator, SnapDirector, SnapDrive, SnapFilter, SnapIntegrator, SnapLock, SnapManager, SnapMigrator, SnapMirror, SnapMover, SnapProtect, SnapRestore, Snapshot, SnapSuite, SnapValidator, SnapVault, StorageGRID, StoreVault, the StoreVault logo, SyncMirror, Tech OnTap, The evolution of storage, Topio, VelocityStak, vFiler, VFM, Virtual File Manager, VPolicy, WAFL, Web Filer, and XBB are trademarks or registered trademarks of NetApp, Inc. in the United States, other countries, or both.

IBM, the IBM logo, and ibm.com are trademarks or registered trademarks of International Business Machines Corporation in the United States, other countries, or both. A complete and current list of other IBM trademarks is available on the web at *www.ibm.com/legal/copytrade.shtml*.

Apple is a registered trademark and QuickTime is a trademark of Apple, Inc. in the United States and/or other countries. Microsoft is a registered trademark and Windows Media is a trademark of Microsoft Corporation in the United States and/or other countries. RealAudio, RealNetworks, RealPlayer, RealSystem, RealText, and RealVideo are registered trademarks and RealMedia, RealProxy, and SureStream are trademarks of RealNetworks, Inc. in the United States and/or other countries.

All other brands or products are trademarks or registered trademarks of their respective holders and should be treated as such.

NetApp, Inc. is a licensee of the CompactFlash and CF Logo trademarks.

NetApp, Inc. NetCache is certified RealSystem compatible.

# How to send your comments

You can help us to improve the quality of our documentation by sending us your feedback.

Your feedback is important in helping us to provide the most accurate and high-quality information. If you have suggestions for improving this document, send us your comments by email to *doccomments@netapp.com*. To help us direct your comments to the correct division, include in the subject line the product name, version, and operating system.

You can also contact us in the following ways:

- NetApp, Inc., 495 East Java Drive, Sunnyvale, CA 94089 U.S.
- Telephone: +1 (408) 822-6000
- Fax: +1 (408) 822-4501
- Support telephone: +1 (888) 463-8277

# Index

9148 Cisco switch
    support in fabric-attached MetroCluster configurations *4*
9222i Cisco switch
    support in fabric-attached MetroCluster configurations *4*
9710 Cisco switch
    support in fabric-attached MetroCluster configurations *4*

## B

buffer-to-buffer credit
    setting *17*

## C

Cisco 9148
    examples of preferred cabling *7*
    guidelines *5*
    manually enabling ports in *16*
Cisco 9222i
    examples of preferred cabling *7*
    guidelines *5*
Cisco 9710 switches
    cabling guidelines *6*
    examples of preferred cabling *11*
    port-chunks, defined and illustrated *4*
Cisco switches
    enabling ports in *16*
    guidelines *5*
    list of supported with fabric-attached MetroCluster configurations *4*
    setting system default values *29*
configurations
    list of Cisco switches supported in fabric-attached MetroCluster *4*
configuring
    an F port *21*
creating
    FC-VI zones and zone set *31*
    storage zones and zone sets *33*
    zones and zone sets *28*

## E

E ports
    setting the speed and buffer-to-buffer credit of non-E ports *17*
enabling
    QoS setting *26*
enabling ports
    in Cisco MDS 9148 *16*
    not required in Cisco MDS 9222i *16*
    not required in Cisco MDS 9710 *16*
enabling ports in Cisco MDS switches
    required for 9148 model *16*

## F

F ports
    configuring *21*
fabric-attached MetroCluster configurations
    list of Cisco switches supported in *4*
FC-VI VSANs
    creating *23*
FC-VI zone sets
    creating *31*
FC-VI zones
    creating *31*

## G

guidelines
    for configuring Cisco 9710 switches *6*
    for configuring Cisco switches *5*

## I

ISL ports
    setting port speed and buffer credit *19*

## M

MetroCluster configurations
    Cisco 9710 switch *11*
    list of Cisco switches supported in *4*

## N

non-E ports
    setting port speed and buffer-to-buffer credit *17*

## P

port speed
    setting *17*
port-chunks
    defined and illustrated *4*
ports
    configuring an F port *21*
    setting the speed and buffer-to-buffer credit *17*
preferred cabling examples
    Cisco 9148 *7*
    Cisco 9222i *7*
    Cisco 9710 *11*

## Q

QoS
    enabling *26*

## S

setting
    port speed and buffer credit for ISL ports *19*
    switch parameters *13*
    system default values *29*
setting port speed and buffer-to-buffer credit
    non-E ports *17*
storage VSANs
    creating *24*
storage zone sets
    creating *33*
storage zones
    creating *33*
switches
    configuring initially *13*
    configuring switches for fabric-attached MetroCluster configuration *13*
    examples of preferred cabling for Cisco 9148 and Cisco 9222i *7*
    guidelines for configuring Cisco 9148 and 9222i *5*
    licensing requirements *15*
    obtaining switch WWN *29*
    setting parameters *13*
    supported, Cisco *4*
switches supported for MetroCluster configuration
    Cisco MDS 9148 *4*
    Cisco MDS 9222i *4*
    Cisco MDS 9710 *4*
system defaults
    setting values *29*

## U

understanding
    port-chunks in Cisco 9710 switches *4*

## V

VSANs
    creating *23*
    enabling in-order-guarantee *25*

## Z

zone sets
    creating *28*
zones
    clearing the existing information *28*
    clearing the existing zones *28*
    creating *28*