Configuring the Cisco or Brocade FC switches manually

ONTAP MetroCluster

NetApp
April 28, 2021

Table of Contents

Configuring the Cisco or Brocade FC switches manually

Switch configuration procedures and commands are different, depending on the switch vendor.

Configuring the Brocade FC switches

You must configure each of the Brocade switch fabrics in the MetroCluster configuration.

- You must have a PC or UNIX workstation with Telnet or Secure Shell (SSH) access to the FC switches.
- You must be using four supported Brocade switches of the same model with the same Brocade Fabric Operating System (FOS) version and licensing.

  NetApp Interoperability Matrix Tool

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

- The four supported Brocade switches must be connected to two fabrics of two switches each, with each fabric spanning both sites.
- Each storage controller must have four initiator ports available to connect to the switch fabrics. Two initiator ports must be connected from each storage controller to each fabric.

  You can configure FAS8020, AFF8020, FAS8200, and AFF A300 systems with two initiators ports per controller (a single initiator port to each fabric) if all the following criteria are met:

  - There are fewer than four FC initiator ports available to connect the disk storage and no additional ports can be configured as FC initiators.
  - All slots are in use and no FC initiator card can be added.

- You should enable Inter-Switch Link (ISL) trunking when it is supported by the links.

  Considerations for using TDM/WDM equipment with fabric-attached MetroCluster configurations

- All ISLs must have the same length and same speed in one fabric.

  Different lengths can be used in the different fabrics. The same speed must be used in all fabrics.

- Metro-E and TDM (SONET/SDH) are not supported, and any non-FC native framing or signaling is not supported.

  Metro-E means Ethernet framing or signaling occurs either natively over a Metro distance or through some time-division multiplexing (TDM), multiprotocol label switching (MPLS), or wavelength-division multiplexing (WDM).

- TDMs, FCR (native FC Routing), or FCIP extensions are not supported for the MetroCluster FC switch fabric.

- Certain switches in the MetroCluster FC switch fabric support encryption or compression, and sometimes support both.

  NetApp Interoperability Matrix Tool

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

- The Brocade Virtual Fabric (VF) feature is not supported.
- FC zoning based on domain port is supported, but zoning based on worldwide name (WWN) is not supported.

Reviewing Brocade license requirements

You need certain licenses for the switches in a MetroCluster configuration. You must install these licenses on all four switches.

The MetroCluster configuration has the following Brocade license requirements:

- Trunking license for systems using more than one ISL, as recommended.
- Extended Fabric license (for ISL distances over 6 km)
- Enterprise license for sites with more than one ISL and an ISL distance greater than 6 km

  The Enterprise license includes Brocade Network Advisor and all licenses except for additional port licenses.

You can verify that the licenses are installed by using the licenseshow command. If you do not have these licenses, you should contact your sales representative before proceeding.

Setting the Brocade FC switch values to factory defaults

You must set the switch to its factory defaults to ensure a successful configuration. You must also assign each switch a unique name.

In the examples in this procedure, the fabric consists of BrocadeSwitchA and BrocadeSwitchB.

1. Make a console connection and log in to both switches in one fabric.
2. Disable the switch persistently: `switchcfgpersistentdisable`

   This ensures the switch will remain disabled after a reboot or fastboot. If this command is not available, use the switchdisable command.

   The following example shows the command on BrocadeSwitchA:

   ```
   BrocadeSwitchA:admin> switchcfgpersistentdisable
   ```

   The following example shows the command on BrocadeSwitchB:

```
BrocadeSwitchA:admin> switchcfgpersistentdisable
```

3. Enter `switchname switch_name` to set the switch name.

   The switches should each have a unique name. After setting the name, the prompt changes accordingly.

   The following example shows the command on BrocadeSwitchA:

```
BrocadeSwitchA:admin> switchname "FC_switch_A_1"
FC_switch_A_1:admin>
```

   The following example shows the command on BrocadeSwitchB:

```
BrocadeSwitchB:admin> switchname "FC_Switch_B_1"
FC_switch_B_1:admin>
```

4. Set all ports to their default values by issuing the following command for each port: `portcfgdefault`

   This must be done for all ports on the switch.

   The following example shows the commands on FC_switch_A_1:

```
FC_switch_A_1:admin> portcfgdefault 0
FC_switch_A_1:admin> portcfgdefault 1
...
FC_switch_A_1:admin> portcfgdefault 39
```

   The following example shows the commands on FC_switch_B_1:

```
FC_switch_B_1:admin> portcfgdefault 0
FC_switch_B_1:admin> portcfgdefault 1
...
FC_switch_B_1:admin> portcfgdefault 39
```

5. Clear the zoning information by issuing the following commands: `cfgdisablecfgclearcfgsave`

   The following example shows the commands on FC_switch_A_1:

```
FC_switch_A_1:admin> cfgdisable
FC_switch_A_1:admin> cfgclear
FC_switch_A_1:admin> cfgsave
```

The following example shows the commands on FC_switch_B_1:

```
FC_switch_B_1:admin> cfgdisable
FC_switch_B_1:admin> cfgclear
FC_switch_B_1:admin> cfgsave
```

6. Set the general switch settings to default: `configdefault`

   The following example shows the command on FC_switch_A_1:

   ```
   FC_switch_A_1:admin> configdefault
   ```

   The following example shows the command on FC_switch_B_1:

   ```
   FC_switch_B_1:admin> configdefault
   ```

7. Set all ports to non-trunking mode: `switchcfgtrunk 0`

   The following example shows the command on FC_switch_A_1:

   ```
   FC_switch_A_1:admin> switchcfgtrunk 0
   ```

   The following example shows the command on FC_switch_B_1:

   ```
   FC_switch_B_1:admin> switchcfgtrunk 0
   ```

8. On Brocade 6510 switches, disable the Brocade Virtual Fabrics (VF) feature: `fosconfig options`

   The following example shows the command on FC_switch_A_1:

   ```
   FC_switch_A_1:admin> fosconfig --disable vf
   ```

   The following example shows the command on FC_switch_B_1:

   ```
   FC_switch_B_1:admin> fosconfig --disable vf
   ```

9. Clear the Administrative Domain (AD) configuration: `ad options`

   The following example shows the commands on FC_switch_A_1:

```
FC_switch_A_1:admin> switch:admin> ad --select AD0
FC_switch_A_1:> defzone --noaccess
FC_switch_A_1:> cfgsave
FC_switch_A_1:> exit
FC_switch_A_1:admin> ad --clear -f
FC_switch_A_1:admin> ad --apply
FC_switch_A_1:admin> ad --save
FC_switch_A_1:admin> exit
```

The following example shows the commands on FC_switch_B_1:

```
FC_switch_B_1:admin> switch:admin> ad --select AD0
FC_switch_A_1:> defzone --noaccess
FC_switch_A_1:> cfgsave
FC_switch_A_1:> exit
FC_switch_B_1:admin> ad --clear -f
FC_switch_B_1:admin> ad --apply
FC_switch_B_1:admin> ad --save
FC_switch_B_1:admin> exit
```

10. Reboot the switch by issuing the following command: `reboot`

The following example shows the command on FC_switch_A_1:

```
FC_switch_A_1:admin> reboot
```

The following example shows the command on FC_switch_B_1:

```
FC_switch_B_1:admin> reboot
```

Configuring basic switch settings

You must configure basic global settings, including the domain ID, for Brocade switches.

This task contains steps that must be performed on each switch at both of the MetroCluster sites.

In this procedure, you set the unique domain ID for each switch as shown in the following example. In the example, domain IDs 5 and 7 form fabric_1, and domain IDs 6 and 8 form fabric_2.

- FC_switch_A_1 is assigned to domain ID 5
- FC_switch_A_2 is assigned to domain ID 6
- FC_switch_B_1 is assigned to domain ID 7

- FC_switch_B_2 is assigned to domain ID 8

1. Enter configuration mode: `configure`
2. Proceed through the prompts:
   a. Set the domain ID for the switch.
   b. Press Enter in response to the prompts until you get to RDP Polling Cycle, and then set that value to 0 to disable the polling.
   c. Press Enter until you return to the switch prompt.

```
FC_switch_A_1:admin> configure
Fabric parameters = y
Domain_id = 5
.
.

RSCN Transmission Mode [yes, y, no, no: [no] y

End-device RSCN Transmission Mode
 (0 = RSCN with single PID, 1 = RSCN with multiple PIDs, 2 =
Fabric RSCN): (0..2) [1]
Domain RSCN To End-device for switch IP address or name change
 (0 = disabled, 1 = enabled): (0..1) [0] 1

.
.
RDP Polling Cycle(hours)[0 = Disable Polling]: (0..24) [1] 0
```

3. If you are using two or more ISLs per fabric, then you can configure either in-order delivery (IOD) of frames or out-of-order (OOD) delivery of frames.

The standard IOD settings are recommended. You should configure OOD only if necessary.

Considerations for using TDM/WDM equipment with fabric-attached MetroCluster configurations

- The following steps must be performed on each switch fabric to configure IOD of frames:
  i. Enable IOD: `iodset`
  ii. Set the Advanced Performance Tuning (APT) policy to 1: `aptpolicy 1`
  iii. Disable Dynamic Load Sharing (DLS): `dlsreset`
  iv. Verify the IOD settings by using the iodshow, aptpolicy, and dlsshow commands.

  For example, issue the following commands on FC_switch_A_1:

```
FC_switch_A_1:admin> iodshow
    IOD is set

    FC_switch_A_1:admin> aptpolicy
    Current Policy: 1 0(ap)

    3 0(ap) : Default Policy
    1: Port Based Routing Policy
    3: Exchange Based Routing Policy
         0: AP Shared Link Policy
         1: AP Dedicated Link Policy
    command aptpolicy completed

    FC_switch_A_1:admin> dlsshow
    DLS is not set
```

v. Repeat these steps on the second switch fabric.

- The following steps must be performed on each switch fabric to configure OOD of frames:
  i. Enable OOD: `iodreset`
  ii. Set the Advanced Performance Tuning (APT) policy to 3: `aptpolicy 3`
  iii. Disable Dynamic Load Sharing (DLS): `dlsreset`
  iv. Verify the OOD settings by using the iodshow, aptpolicy and dlsshow commands.

  For example, issue the following commands on FC_switch_A_1:

```
FC_switch_A_1:admin> iodshow
    IOD is not set

    FC_switch_A_1:admin> aptpolicy
    Current Policy: 3 0(ap)
    3 0(ap) : Default Policy
    1: Port Based Routing Policy
    3: Exchange Based Routing Policy
    0: AP Shared Link Policy
    1: AP Dedicated Link Policy
    command aptpolicy completed


    FC_switch_A_1:admin> dlsshow
    DLS is set by default with current routing policy
```

  v. Repeat these steps on the second switch fabric. **Note:** When configuring ONTAP on the controller modules, OOD must be explicitly configured on each controller module in the

MetroCluster configuration.

Configuring in-order delivery or out-of-order delivery of frames on ONTAP software

4. Verify that the switch is using the dynamic port licensing method.
   a. Run the `licensePort --show` command.

```
FC_switch_A_1:admin> licenseport -show
24 ports are available in this switch
Full POD license is installed
Dynamic POD method is in use
```

Brocade FabricOS versions before 8.0 run the following commands as admin and versions 8.0 and later run them as root.

   b. Enable the root user.

      If the root user is already disabled by Brocade, enable the root user as shown in the following example:

```
FC_switch_A_1:admin> userconfig --change root -e yes
FC_switch_A_1:admin> rootaccess --set consoleonly
```

   c. Run the license command: `licensePort --show`

```
FC_switch_A_1:root> licenseport -show
24 ports are available in this switch
Full POD license is installed
Dynamic POD method is in use
```

   d. Change the license method to dynamic: `licenseport --method dynamic`

If the dynamic license method is not in use (if the method is static), you must change the license method to dynamic. Skip this step if the dynamic license method is in use.

```
FC_switch_A_1:admin> licenseport --method dynamic
The POD method has been changed to dynamic.
Please reboot the switch now for this change to take effect
```

5. Enable the trap for T11-FC-ZONE-SERVER-MIB to provide successful health monitoring of the switches in ONTAP:
   a. Enable the T11-FC-ZONE-SERVER-MIB: `snmpconfig --set mibCapability -mib_name T11-FC-ZONE-SERVER-MIB -bitmask 0x3f`

b. Enable the T11-FC-ZONE-SERVER-MIB trap: `snmpconfig --enable mibcapability -mib_name SW-MIB -trap_name swZoneConfigChangeTrap`

c. Repeat the previous steps on the second switch fabric.

6. Optional: If you set the community string to a value other than “public”, you must configure the ONTAP Health Monitors using the community string you specify:

a. Change the existing community string: `snmpconfig --set snmpv1`

b. Press Enter until you see the Community (ro): [public] text.

c. Enter the desired community string.

On FC_switch_A_1:

+

```
FC_switch_A_1:admin> snmpconfig --set snmpv1
SNMP community and trap recipient configuration:
Community (rw): [Secret C0de]
Trap Recipient's IP address : [0.0.0.0]
Community (rw): [OrigEquipMfr]
Trap Recipient's IP address : [0.0.0.0]
Community (rw): [private]
Trap Recipient's IP address : [0.0.0.0]
Community (ro): [public] mcchm                          <<<<<<<<<<<<<
change the community string to the
desired value, in this example it is set to 'mcchm'
Trap Recipient's IP address : [0.0.0.0]
Community (ro): [common]
Trap Recipient's IP address : [0.0.0.0]
Community (ro): [FibreChannel]
Trap Recipient's IP address : [0.0.0.0]
Committing configuration.....done.
FC_switch_A_1:admin>
```

+ On FC_switch_B_1:

+

```
FC_switch_B_1:admin> snmpconfig --set snmpv1
SNMP community and trap recipient configuration:
Community (rw): [Secret C0de]
Trap Recipient's IP address : [0.0.0.0]
Community (rw): [OrigEquipMfr]
Trap Recipient's IP address : [0.0.0.0]
Community (rw): [private]
Trap Recipient's IP address : [0.0.0.0]
Community (ro): [public] mcchm                          <<<<<<<<<<<<<
change the community string to the
desired value, in this example it is set to 'mcchm'
Trap Recipient's IP address : [0.0.0.0]
Community (ro): [common]
Trap Recipient's IP address : [0.0.0.0]
Community (ro): [FibreChannel]
Trap Recipient's IP address : [0.0.0.0]
Committing configuration.....done.
FC_switch_B_1:admin>
```

1. Reboot the switch: `reboot`

   On FC_switch_A_1:

   ```
   FC_switch_A_1:admin> reboot
   ```

   On FC_switch_B_1:

   ```
   FC_switch_B_1:admin> reboot
   ```

2. Persistently enable the switch: `switchcfgpersistentenable`

   On FC_switch_A_1:

   ```
   FC_switch_A_1:admin> switchcfgpersistentenable
   ```

   On FC_switch_B_1:

   ```
   FC_switch_B_1:admin> switchcfgpersistentenable
   ```

Configuring basic switch settings on a Brocade DCX 8510-8 switch

You must configure basic global settings, including the domain ID, for Brocade switches.

You must perform the steps on each switch at both MetroCluster sites. In this procedure, you set the domain ID for each switch as shown in the following examples:

- FC_switch_A_1 is assigned to domain ID 5
- FC_switch_A_2 is assigned to domain ID 6
- FC_switch_B_1 is assigned to domain ID 7
- FC_switch_B_2 is assigned to domain ID 8

In the previous example, domain IDs 5 and 7 form fabric_1, and domain IDs 6 and 8 form fabric_2.

You can also use this procedure to configure the switches when you are only using one DCX 8510-8 switch per site.

Using this procedure, you should create two logical switches on each Brocade DCX 8510-8 switch. The two logical switches created on both Brocade DCX8510-8 switches will form two logical fabrics as shown in the following examples:

- LOGICAL FABRIC 1: Switch1/Blade1 and Switch 2 Blade 1
- LOGICAL FABRIC 2: Switch1/Blade2 and Switch 2 Blade 2

1. Enter the command mode: `configure`
2. Proceed through the prompts:
   a. Set the domain ID for the switch.
   b. Keep selecting **Enter** until you get to RDP Polling Cycle, and then set the value to `0` to disable the polling.
   c. Select **Enter** until you return to the switch prompt.

```
FC_switch_A_1:admin> configure
Fabric parameters = y
Domain_id = `5


RDP Polling Cycle(hours)[0 = Disable Polling]: (0..24) [1] 0
`
```

3. Repeat these steps on all switches in fabric_1 and fabric_2.
4. Configure the virtual fabrics.
   a. Enable virtual fabrics on the switch: `fosconfig --enablevf`
   b. Configure the system to use the same base configuration on all logical switches: `configurechassis`

   The following example shows the output for the configurechassis command:

```
System (yes, y, no, n): [no] n
cfgload attributes (yes, y, no, n): [no] n
Custom attributes (yes, y, no, n): [no] y
Config Index (0 to ignore): (0..1000) [3]:
```

5. Create and configure the logical switch: `scfg --create fabricID`
6. Add all ports from a blade to the virtual fabric: `lscfg --config fabricID -slot slot -port lowest-port - highest-port`

> The blades forming a logical fabric (e.g. Switch 1 Blade 1 and Switch 3 Blade 1) need to have the same fabric ID.

```
setcontext fabricid
switchdisable
configure
<configure the switch per the above settings>
switchname unique switch name
switchenable
```

Related information

Requirements for using a Brocade DCX 8510-8 switch

Configuring E-ports on Brocade FC switches using FC ports

For Brocade switches on which the Inter-Switch Links (ISL) are configured using FC ports, you must configure the switch ports on each switch fabric that connect the ISL. These ISL ports are also known as E-ports.

- All of the ISLs in an FC switch fabric must be configured with the same speed and distance.
- The combination of the switch port and small form-factor pluggable (SFP) must support the speed.
- The supported ISL distance depends on the FC switch model.

  NetApp Interoperability Matrix Tool

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

- The ISL link must have a dedicated lambda, and the link must be supported by Brocade for the distance, switch type, and Fabric Operating System (FOS).

You must not use the L0 setting when issuing the portCfgLongDistance command. Instead, you should use the LE or LS setting to configure the distance on the Brocade switches with a minimum of LE distance level.

You must not use the LD setting when issuing the portCfgLongDistance command when working with

xWDM/TDM equipment. Instead, you should use the LE or LS setting to configure the distance on the Brocade switches.

You must perform this task for each FC switch fabric.

The following tables show the ISL ports for different switches and different number of ISLs in a configuration running ONTAP 9.1 or 9.2. The examples shown in this section are for a Brocade 6505 switch. You should modify the examples to use ports that apply to your switch type.

If your configuration is running ONTAP 9.0 or earlier, see the “Port assignments for FC switches when using ONTAP 9.0” section in the *Fabric-attached MetroCluster Installation and Configuration Guide*.

You must use the required number of ISLs for your configuration.

Switch model	ISL port	Switch port
Brocade 6520	ISL port 1	23
ISL port 2	47	ISL port 3
71	ISL port 4	95
Brocade 6505	ISL port 1	20
ISL port 2	21	ISL port 3
22	ISL port 4	23
Brocade 6510 and Brocade DCX 8510-8	ISL port 1	40
ISL port 2	41	ISL port 3
42	ISL port 4	43
ISL port 5	44	ISL port 6
45	ISL port 7	46
ISL port 8	47	Brocade 7810
ISL port 1	ge2 (10-Gbps)	ISL port 2
ge3(10-Gbps)	ISL port 3	ge4 (10-Gbps)
ISL port 4	ge5 (10-Gbps)	ISL port 5
ge6 (10-Gbps)	ISL port 6	ge7 (10-Gbps)

Brocade 7840**Note:** The Brocade 7840 switch supports either two 40 Gbps VE-ports or up to four 10 Gbps VE-ports per switch for the creation of FCIP ISLs.	ISL port 1	ge0 (40-Gbps) or ge2 (10-Gbps)
ISL port 2	ge1 (40-Gbps) or ge3 (10-Gbps)	ISL port 3
ge10 (10-Gbps)	ISL port 4	ge11 (10-Gbps)
Brocade G610	ISL port 1	20
ISL port 2	21	ISL port 3
22	ISL port 4	23
Brocade G620, G620-1, G630, G630-1, G720	ISL port 1	40
ISL port 2	41	ISL port 3
42	ISL port 4	43
ISL port 5	44	ISL port 6
45	ISL port 7	46

1. Configure the port speed: `portcfgspeed port-numberspeed`

   You must use the highest common speed that is supported by the components in the path.

   In the following example, there are two ISLs for each fabric:

   ```
   FC_switch_A_1:admin> portcfgspeed 20 16
   FC_switch_A_1:admin> portcfgspeed 21 16

   FC_switch_B_1:admin> portcfgspeed 20 16
   FC_switch_B_1:admin> portcfgspeed 21 16
   ```

2. Configure the trunking mode for each ISL: `portcfgtrunkport port-number`
   - If you are configuring the ISLs for trunking (IOD), set the portcfgtrunk port-numberport-number to 1 as shown in the following example:

```
FC_switch_A_1:admin> portcfgtrunkport 20 1
FC_switch_A_1:admin> portcfgtrunkport 21 1
FC_switch_B_1:admin> portcfgtrunkport 20 1
FC_switch_B_1:admin> portcfgtrunkport 21 1
```

- If you do not want to configure the ISL for trunking (OOD), set portcfgtrunkport-number to 0 as shown in the following example:

```
FC_switch_A_1:admin> portcfgtrunkport 20 0
FC_switch_A_1:admin> portcfgtrunkport 21 0
FC_switch_B_1:admin> portcfgtrunkport 20 0
FC_switch_B_1:admin> portcfgtrunkport 21 0
```

3. Enable QoS traffic for each of the ISL ports: `portcfgqos --enable port-number`

   In the following example, there are two ISLs per switch fabric:

```
FC_switch_A_1:admin> portcfgqos --enable 20
FC_switch_A_1:admin> portcfgqos --enable 21

FC_switch_B_1:admin> portcfgqos --enable 20
FC_switch_B_1:admin> portcfgqos --enable 21
```

4. Verify the settings: `portCfgShow command`

   The following example shows the output for a configuration that uses two ISLs cabled to port 20 and port 21. The Trunk Port setting should be ON for IOD and OFF for OOD:

```
Ports of Slot 0   12  13   14 15    16  17  18  19   20  21 22  23    24
25  26  27
----------------+---+---+---+-----+---+---+---+----+---+---+---+
-----+---+---+---
Speed             AN  AN  AN  AN    AN  AN  8G  AN   AN  AN  16G  16G
AN  AN  AN  AN
Fill Word         0   0   0   0     0   0   3   0    0   0   3   3     3
0   0   0
AL_PA Offset 13   ..  ..  ..  ..    ..  ..  ..  ..   ..  ..  ..  ..
..  ..  ..  ..
Trunk Port        ..  ..  ..  ..    ..  ..  ..  ..   ON  ON  ..  ..
..  ..  ..  ..
Long Distance     ..  ..  ..  ..    ..  ..  ..  ..   ..  ..  ..  ..
..  ..  ..  ..
VC Link Init      ..  ..  ..  ..    ..  ..  ..  ..   ..  ..  ..  ..
..  ..  ..  ..
```

```
Locked L_Port     ..  ..  ..  ..    ..  ..  ..  ..   ..  ..  ..  ..
..  ..  ..  ..
Locked G_Port     ..  ..  ..  ..    ..  ..  ..  ..   ..  ..  ..  ..
..  ..  ..  ..
Disabled E_Port   ..  ..  ..  ..    ..  ..  ..  ..   ..  ..  ..  ..
..  ..  ..  ..
Locked E_Port     ..  ..  ..  ..    ..  ..  ..  ..   ..  ..  ..  ..
..  ..  ..  ..
ISL R_RDY Mode    ..  ..  ..  ..    ..  ..  ..  ..   ..  ..  ..  ..
..  ..  ..  ..
RSCN Suppressed   ..  ..  ..  ..    ..  ..  ..  ..   ..  ..  ..  ..
..  ..  ..  ..
Persistent Disable..  ..  ..  ..    ..  ..  ..  ..   ..  ..  ..  ..
..  ..  ..  ..
LOS TOV enable    ..  ..  ..  ..    ..  ..  ..  ..   ..  ..  ..  ..
..  ..  ..  ..
NPIV capability   ON  ON  ON  ON    ON  ON  ON  ON   ON  ON  ON  ON
ON  ON  ON  ON
NPIV PP Limit    126 126 126 126   126 126 126 126  126 126 126 126
126 126 126 126
QOS E_Port        AE  AE  AE  AE    AE  AE  AE  AE   AE  AE  AE  AE
AE  AE  AE  AE
Mirror Port       ..  ..  ..  ..    ..  ..  ..  ..   ..  ..  ..  ..
..  ..  ..  ..
Rate Limit        ..  ..  ..  ..    ..  ..  ..  ..   ..  ..  ..  ..
..  ..  ..  ..
Credit Recovery   ON  ON  ON  ON    ON  ON  ON  ON   ON  ON  ON  ON
ON  ON  ON  ON
Fport Buffers     ..  ..  ..  ..    ..  ..  ..  ..   ..  ..  ..  ..
..  ..  ..  ..
Port Auto Disable ..  ..  ..  ..    ..  ..  ..  ..   ..  ..  ..  ..
..  ..  ..  ..
CSCTL mode        ..  ..  ..  ..    ..  ..  ..  ..   ..  ..  ..  ..
..  ..  ..  ..

Fault Delay       0  0  0  0    0  0  0  0   0  0  0  0    0  0  0  0
```

5. Calculate the ISL distance.

   Because of the behavior of FC-VI, the distance must be set to 1.5 times the real distance with a minimum distance of 10 km (using the LE distance level).

   The distance for the ISL is calculated as follows, rounded up to the next full kilometer:

   1.5 × real_distance = distance

   If the distance is 3 km, then 1.5 × 3 km = 4.5 km. This is lower than 10 km, so the ISL must be set to the LE distance level.

If the distance is 20 km, then 1.5 × 20 km = 30 km. The ISL must be set to 30 km and must use the LS distance level.

6. Set the distance on each ISL port: `portcfglongdistance`portdistance-levelvc_link_initdistance

   A vc_link_init value of `1` uses the ARB fill word (default). A value of `0` uses IDLE. The required value might depend on the link being used. The commands must be repeated for each ISL port.

   For an ISL distance of 3 km, as given in the example in the previous step, the setting is 4.5 km with the default vc_link_init value of `1`. Because a setting of 4.5 km is lower than 10 km, the port needs to be set to the LE distance level:

   ```
   FC_switch_A_1:admin> portcfglongdistance 20 LE 1

   FC_switch_B_1:admin> portcfglongdistance 20 LE 1
   ```

   For an ISL distance of 20 km, as given in the example in the previous step, the setting is 30 km with the default vc_link_init value of `1`:

   ```
   FC_switch_A_1:admin> portcfglongdistance 20 LS 1 -distance 30

   FC_switch_B_1:admin> portcfglongdistance 20 LS 1 -distance 30
   ```

7. Verify the distance setting: `portbuffershow`

   A distance level of LE appears as 10 km.

   The following example shows the output for a configuration that uses ISLs on port 20 and port 21:

   ```
   FC_switch_A_1:admin> portbuffershow

   User  Port     Lx      Max/Resv    Buffer Needed    Link      Remaining
   Port  Type    Mode     Buffers     Usage  Buffers   Distance  Buffers
   ----  ----    ----     -------     ------ -------   --------- ---------
   ...
    20     E      -          8          67      67       30km
    21     E      -          8          67      67       30km
   ...
    23            -          8           0      -        -        466
   ```

8. Verify that both switches form one fabric: `switchshow`

   The following example shows the output for a configuration that uses ISLs on port 20 and port 21:

```
FC_switch_A_1:admin> switchshow
switchName: FC_switch_A_1
switchType: 109.1
switchState:Online
switchMode: Native
switchRole: Subordinate
switchDomain:       5
switchId:   fffc01
switchWwn:  10:00:00:05:33:86:89:cb
zoning:             OFF
switchBeacon:       OFF

Index Port Address Media Speed State  Proto
==========================================
...
20   20  010C00   id    16G  Online FC  LE E-Port
10:00:00:05:33:8c:2e:9a "FC_switch_B_1" (downstream)(trunk master)
21   21  010D00   id    16G  Online FC  LE E-Port  (Trunk port, master
is Port 20)
...

FC_switch_B_1:admin> switchshow
switchName: FC_switch_B_1
switchType: 109.1
switchState:Online
switchMode: Native
switchRole: Principal
switchDomain:       7
switchId:   fffc03
switchWwn:  10:00:00:05:33:8c:2e:9a
zoning:             OFF
switchBeacon:       OFF

Index Port Address Media Speed State Proto
==========================================
...
20   20  030C00   id    16G  Online  FC  LE E-Port
10:00:00:05:33:86:89:cb "FC_switch_A_1" (downstream)(Trunk master)
21   21  030D00   id    16G  Online  FC  LE E-Port  (Trunk port, master
is Port 20)
...
```

9. Confirm the configuration of the fabrics: `fabricshow`

```
FC_switch_A_1:admin> fabricshow
   Switch ID   Worldwide Name      Enet IP Addr FC IP Addr Name
-----------------------------------------------------------------
1: fffc01 10:00:00:05:33:86:89:cb 10.10.10.55  0.0.0.0
"FC_switch_A_1"
3: fffc03 10:00:00:05:33:8c:2e:9a 10.10.10.65  0.0.0.0
>"FC_switch_B_1"
```

```
FC_switch_B_1:admin> fabricshow
   Switch ID   Worldwide Name     Enet IP Addr FC IP Addr   Name
-----------------------------------------------------------------
1: fffc01 10:00:00:05:33:86:89:cb 10.10.10.55  0.0.0.0
"FC_switch_A_1"

3: fffc03 10:00:00:05:33:8c:2e:9a 10.10.10.65  0.0.0.0
>"FC_switch_B_1
```

10. Confirm the trunking of the ISLs: `trunkshow`
    - If you are configuring the ISLs for trunking (IOD), you should see output similar to the following:

```
FC_switch_A_1:admin> trunkshow
 1: 20-> 20 10:00:00:05:33:ac:2b:13 3 deskew 15 MASTER
    21-> 21 10:00:00:05:33:8c:2e:9a 3 deskew 16
 FC_switch_B_1:admin> trunkshow
 1: 20-> 20 10:00:00:05:33:86:89:cb 3 deskew 15 MASTER
    21-> 21 10:00:00:05:33:86:89:cb 3 deskew 16
```

    - If you are not configuring the ISLs for trunking (OOD), you should see output similar to the following:

```
FC_switch_A_1:admin> trunkshow
 1: 20-> 20 10:00:00:05:33:ac:2b:13 3 deskew 15 MASTER
 2: 21-> 21 10:00:00:05:33:8c:2e:9a 3 deskew 16 MASTER
FC_switch_B_1:admin> trunkshow
 1: 20-> 20 10:00:00:05:33:86:89:cb 3 deskew 15 MASTER
 2: 21-> 21 10:00:00:05:33:86:89:cb 3 deskew 16 MASTER
```

11. Repeat Step 1 through Step 10 for the second FC switch fabric.

Related information

Port assignments for FC switches when using ONTAP 9.1 and later

Configuring 10 Gbps VE ports on Brocade FC 7840 switches

When using the 10 Gbps VE ports (which use FCIP) for ISLs, you must create IP interfaces on each port, and configure FCIP tunnels and circuits in each tunnel.

This procedure must be performed on each switch fabric in the MetroCluster configuration.

The examples in this procedure assume that the two Brocade 7840 switches have the following IP addresses:

- FC_switch_A_1 is local.
- FC_switch_B_1 is remote.

1. Create IP interface (ipif) addresses for the 10 Gbps ports on both switches in the fabric: `portcfg ipif FC_switch1_namefirst_port_name create FC_switch1_IP_address netmask netmask_number vlan 2 mtu auto`

   The following command creates ipif addresses on ports ge2.dp0 and ge3.dp0 of FC_switch_A_1:

   ```
   portcfg ipif  ge2.dp0 create  10.10.20.71 netmask 255.255.0.0 vlan 2
   mtu auto
   portcfg ipif  ge3.dp0 create  10.10.21.71 netmask 255.255.0.0 vlan 2
   mtu auto
   ```

   The following command creates ipif addresses on ports ge2.dp0 and ge3.dp0 of FC_switch_B_1:

   ```
   portcfg ipif  ge2.dp0 create  10.10.20.72 netmask 255.255.0.0 vlan 2
   mtu auto
   portcfg ipif  ge3.dp0 create  10.10.21.72 netmask 255.255.0.0 vlan 2
   mtu auto
   ```

2. Verify that the ipif addresses were created successfully on both switches: `portshow ipif all`

   The following command shows the ipif addresses on switch FC_switch_A_1:

```
FC_switch_A_1:root> portshow ipif all

 Port         IP Address                    / Pfx  MTU   VLAN  Flags
-------------------------------------------------------------------
-----------
 ge2.dp0      10.10.20.71                   / 24   AUTO  2     U R M
I
 ge3.dp0      10.10.21.71                   / 20   AUTO  2     U R M
I
-------------------------------------------------------------------
-----------
Flags: U=Up B=Broadcast D=Debug L=Loopback P=Point2Point R=Running
I=InUse
       N=NoArp PR=Promisc M=Multicast S=StaticArp LU=LinkUp
X=Crossport
```

The following command shows the ipif addresses on switch FC_switch_B_1:

```
FC_switch_B_1:root> portshow ipif all

 Port         IP Address                    / Pfx  MTU   VLAN  Flags
-------------------------------------------------------------------
-----------
 ge2.dp0      10.10.20.72                   / 24   AUTO  2     U R M
I
 ge3.dp0      10.10.21.72                   / 20   AUTO  2     U R M
I
-------------------------------------------------------------------
-----------
Flags: U=Up B=Broadcast D=Debug L=Loopback P=Point2Point R=Running
I=InUse
       N=NoArp PR=Promisc M=Multicast S=StaticArp LU=LinkUp
X=Crossport
```

3. Create the first of the two FCIP tunnels using the ports on dp0: `portcfg fciptunnel`

   This command creates a tunnel with a single circuit.

   The following command creates the tunnel on switch FC_switch_A_1:

```
portcfg fciptunnel 24 create -S 10.10.20.71  -D 10.10.20.72 -b
10000000 -B 10000000
```

   The following command creates the tunnel on switch FC_switch_B_1:

```
portcfg fciptunnel 24 create -S 10.10.20.72  -D 10.10.20.71 -b
10000000 -B 10000000
```

4. Verify that the FCIP tunnels were successfully created: `portshow fciptunnel all`

   The following example shows that the tunnels were created and the circuits are up:

```
FC_switch_B_1:root>

 Tunnel Circuit  OpStatus  Flags    Uptime  TxMBps  RxMBps ConnCnt
CommRt Met/G
-------------------------------------------------------------------
-----------
 24    -         Up      ---------     2d8m    0.05    0.41   3
-       -
-------------------------------------------------------------------
-----------
 Flags (tunnel): i=IPSec f=Fastwrite T=TapePipelining F=FICON
r=ReservedBW
                 a=FastDeflate d=Deflate D=AggrDeflate P=Protocol
                 I=IP-Ext
```

5. Create an additional circuit for dp0.

   The following command creates a circuit on switch FC_switch_A_1 for dp0:

```
portcfg fcipcircuit 24 create 1 -S 10.10.21.71 -D 10.10.21.72  --min
-comm-rate 5000000 --max-comm-rate 5000000
```

   The following command creates a circuit on switch FC_switch_B_1 for dp0:

```
portcfg fcipcircuit 24 create 1 -S 10.10.21.72 -D 10.10.21.71  --min
-comm-rate 5000000 --max-comm-rate 5000000
```

6. Verify that all circuits were successfully created: `portshow fcipcircuit all`

   The following command shows the circuits and their status:

```
FC_switch_A_1:root> portshow fcipcircuit all

 Tunnel Circuit  OpStatus  Flags    Uptime  TxMBps  RxMBps ConnCnt
CommRt Met/G
-------------------------------------------------------------------
-----------
 24    0 ge2     Up      ---va---4    2d12m    0.02    0.03   3
10000/10000 0/-
 24    1 ge3     Up      ---va---4    2d12m    0.02    0.04   3
10000/10000 0/-
-------------------------------------------------------------------
-----------
 Flags (circuit): h=HA-Configured v=VLAN-Tagged p=PMTU i=IPSec 4=IPv4
6=IPv6
                 ARL a=Auto r=Reset s=StepDown t=TimedStepDown  S=SLA
```

Configuring 40 Gbps VE-ports on Brocade 7810 and 7840 FC switches

When using the two 40 GbE VE-ports (which use FCIP) for ISLs, you must create IP interfaces on each port, and configure FCIP tunnels and circuits in each tunnel.

This procedure must be performed on each switch fabric in the MetroCluster configuration.

The examples in this procedure use two switches:

- FC_switch_A_1 is local.
- FC_switch_B_1 is remote.

1. Create IP interface (ipif) addresses for the 40 Gbps ports on both switches in the fabric: `portcfg ipif FC_switch_namefirst_port_name create FC_switch_IP_address netmask netmask_number vlan 2 mtu auto`

   The following command creates ipif addresses on ports ge0.dp0 and ge1.dp0 of FC_switch_A_1:

   ```
   portcfg ipif  ge0.dp0 create  10.10.82.10 netmask 255.255.0.0 vlan 2
   mtu auto
   portcfg ipif  ge1.dp0 create  10.10.82.11 netmask 255.255.0.0 vlan 2
   mtu auto
   ```

   The following command creates ipif addresses on ports ge0.dp0 and ge1.dp0 of FC_switch_B_1:

```
portcfg ipif  ge0.dp0 create  10.10.83.10 netmask 255.255.0.0 vlan 2
mtu auto
portcfg ipif  ge1.dp0 create  10.10.83.11 netmask 255.255.0.0 vlan 2
mtu auto
```

2. Verify that the ipif addresses were successfully created on both switches: `portshow ipif all`

   The following example shows the IP interfaces on FC_switch_A_1:

```
Port         IP Address                      / Pfx  MTU   VLAN  Flags
-------------------------------------------------------------------------
------
-----
 ge0.dp0      10.10.82.10                      / 16   AUTO  2     U R M
 ge1.dp0      10.10.82.11                      / 16   AUTO  2     U R M
-------------------------------------------------------------------------
-----------
Flags: U=Up B=Broadcast D=Debug L=Loopback P=Point2Point R=Running
I=InUse
       N=NoArp PR=Promisc M=Multicast S=StaticArp LU=LinkUp
X=Crossport
```

   The following example shows the IP interfaces on FC_switch_B_1:

```
Port         IP Address                      / Pfx  MTU   VLAN  Flags
-------------------------------------------------------------------------
-----------
 ge0.dp0      10.10.83.10                      / 16   AUTO  2     U R M
 ge1.dp0      10.10.83.11                      / 16   AUTO  2     U R M
-------------------------------------------------------------------------
-----------
Flags: U=Up B=Broadcast D=Debug L=Loopback P=Point2Point R=Running
I=InUse
       N=NoArp PR=Promisc M=Multicast S=StaticArp LU=LinkUp
X=Crossport
```

3. Create the FCIP tunnel on both switches: `portcfig fciptunnel`

   The following command creates the tunnel on FC_switch_A_1:

```
portcfg fciptunnel 24 create -S 10.10.82.10  -D 10.10.83.10 -b
10000000 -B 10000000
```

The following command creates the tunnel on FC_switch_B_1:

```
portcfg fciptunnel 24 create -S 10.10.83.10  -D 10.10.82.10 -b
10000000 -B 10000000
```

4. Verify that the FCIP tunnel has been successfully created: `portshow fciptunnel all`

   The following example shows that the tunnel was created and the circuits are up:

```
FC_switch_A_1:root>

 Tunnel Circuit  OpStatus  Flags    Uptime  TxMBps  RxMBps ConnCnt
CommRt Met/G
-------------------------------------------------------------------
-----------
 24    -         Up      ---------     2d8m    0.05    0.41   3
-       -
 -------------------------------------------------------------------
------------
 Flags (tunnel): i=IPSec f=Fastwrite T=TapePipelining F=FICON
r=ReservedBW
                 a=FastDeflate d=Deflate D=AggrDeflate P=Protocol
                 I=IP-Ext
```

5. Create an additional circuit on each switch: `portcfg fcipcircuit 24 create 1 -S source-IP-address -D destination-IP-address --min-comm-rate 10000000 --max-comm-rate 10000000`

   The following command creates a circuit on switch FC_switch_A_1 for dp0:

```
portcfg fcipcircuit 24  create 1 -S 10.10.82.11 -D 10.10.83.11  --min
-comm-rate 10000000 --max-comm-rate 10000000
```

   The following command creates a circuit on switch FC_switch_B_1 for dp1:

```
portcfg fcipcircuit 24 create 1  -S 10.10.83.11 -D 10.10.82.11  --min
-comm-rate 10000000 --max-comm-rate 10000000
```

6. Verify that all circuits were successfully created: `portshow fcipcircuit all`

   The following example lists the circuits and shows that their OpStatus is up:

```
FC_switch_A_1:root> portshow fcipcircuit all

 Tunnel Circuit  OpStatus  Flags    Uptime  TxMBps  RxMBps ConnCnt
CommRt Met/G
-------------------------------------------------------------------
-----------
 24    0 ge0     Up      ---va---4    2d12m    0.02    0.03   3
10000/10000 0/-
 24    1 ge1     Up      ---va---4    2d12m    0.02    0.04   3
10000/10000 0/-
 -------------------------------------------------------------------
------------
 Flags (circuit): h=HA-Configured v=VLAN-Tagged p=PMTU i=IPSec 4=IPv4
6=IPv6
                  ARL a=Auto r=Reset s=StepDown t=TimedStepDown  S=SLA
```

Configuring the non-E-ports on the Brocade switch

You must configure the non-E-ports on the FC switch. In a MetroCluster configuration, these are the ports that connect the switch to the HBA initiators, FC-VI interconnects, and FC-to-SAS bridges. These steps must be done for each port.

In the following example, the ports connect an FC-to-SAS bridge:

- Port 6 on FC_FC_switch_A_1 at Site_A
- Port 6 on FC_FC_switch_B_1 at Site_B

1. Configure the port speed for each non-E-port: `portcfgspeed portspeed`

   You should use the highest common speed, which is the highest speed supported by all components in the data path: the SFP, the switch port that the SFP is installed on, and the connected device (HBA, bridge, and so on).

   For example, the components might have the following supported speeds:

   - The SFP is capable of 4, 8, or 16 GB.
   - The switch port is capable of 4, 8, or 16 GB.
   - The connected HBA maximum speed is 16 GB. The highest common speed in this case is 16 GB, so the port should be configured for a speed of 16 GB.

```
FC_switch_A_1:admin> portcfgspeed 6 16

FC_switch_B_1:admin> portcfgspeed 6 16
```

1. Verify the settings: `portcfgshow`

```
FC_switch_A_1:admin> portcfgshow

FC_switch_B_1:admin> portcfgshow
```

In the example output, port 6 has the following settings; speed is set to 16G:

```
Ports of Slot 0                   0   1   2   3   4   5   6   7   8
----------------------------------+---+---+---+---+---+---+---+---+
--
Speed                             16G 16G 16G 16G 16G 16G 16G 16G
16G
AL_PA Offset 13                   ..  ..  ..  ..  ..  ..  ..  ..
..
Trunk Port                        ..  ..  ..  ..  ..  ..  ..  ..
..
Long Distance                     ..  ..  ..  ..  ..  ..  ..  ..
..
VC Link Init                      ..  ..  ..  ..  ..  ..  ..  ..
..
Locked L_Port                     -   -   -   -   -  -   -   -   -
Locked G_Port                     ..  ..  ..  ..  ..  ..  ..  ..
..
Disabled E_Port                   ..  ..  ..  ..  ..  ..  ..  ..
..
Locked E_Port                     ..  ..  ..  ..  ..  ..  ..  ..
..
ISL R_RDY Mode                    ..  ..  ..  ..  ..  ..  ..  .. ..
RSCN Suppressed                   ..  ..  ..  ..  ..  ..  ..  .. ..
Persistent Disable                ..  ..  ..  ..  ..  ..  ..  .. ..
LOS TOV enable                    ..  ..  ..  ..  ..  ..  ..  .. ..
NPIV capability                   ON  ON  ON  ON  ON  ON  ON  ON
ON
NPIV PP Limit                     126 126 126 126 126 126 126 126
126
QOS Port                          AE  AE  AE  AE  AE  AE  AE  AE
ON
EX Port                           ..  ..  ..  ..  ..  ..  ..  ..
..
Mirror Port                       ..  ..  ..  ..  ..  ..  ..  ..
..
Rate Limit                        ..  ..  ..  ..  ..  ..  ..  ..
..
Credit Recovery                   ON  ON  ON  ON  ON  ON  ON  ON
ON
Fport Buffers                     ..  ..  ..  ..  ..  ..  ..  ..
```

```
..
Eport Credits                          ..  ..  ..  ..  ..  ..  ..  ..
..
Port Auto Disable                      ..  ..  ..  ..  ..  ..  ..  ..
..
CSCTL mode                             ..  ..  ..  ..  ..  ..  ..  ..
..
D-Port mode                            ..  ..  ..  ..  ..  ..  ..  ..
..
D-Port over DWDM                       ..  ..  ..  ..  ..  ..  ..  ..
..
FEC                                    ON  ON  ON  ON  ON  ON  ON  ON
ON
Fault Delay                            0   0   0   0   0   0   0   0   0
Non-DFE                                ..  ..  ..  ..  ..  ..  ..  ..
..
```

Configuring compression on ISL ports on a Brocade G620 switch

If you are using Brocade G620 switches and enabling compression on the ISLs, you must configure it on each E-port on the switches.

This tasks must be performed on the ISL ports on both switches using the ISL.

1. Disable the port on which you want to configure compression: `portdisable port-id`
2. Enable compression on the port: `portCfgCompress --enable port-id`
3. Enable the port to activate the configuration with compression: `portenable port-id`
4. Confirm that the setting has been changed: `portcfgshow port-id`

The following example enables compression on port 0.

```
FC_switch_A_1:admin> portdisable 0
FC_switch_A_1:admin> portcfgcompress --enable 0
FC_switch_A_1:admin> portenable 0
FC_switch_A_1:admin> portcfgshow 0
Area Number: 0
Octet Speed Combo: 3(16G,10G)
(output truncated)
D-Port mode: OFF
D-Port over DWDM ..
Compression: ON
Encryption: ON
```

You can use the islShow command to check that the E_port has come online with encryption or compression

configured and active.

```
FC_switch_A_1:admin> islshow
  1: 0-> 0 10:00:c4:f5:7c:8b:29:86   5 FC_switch_B_1
sp: 16.000G bw: 16.000G TRUNK QOS CR_RECOV ENCRYPTION COMPRESSION
```

You can use the portEncCompShow command to see which ports are active. In this example you can see that encryption and compression are configured and active on port 0.

```
FC_switch_A_1:admin> portenccompshow
User      Encryption                    Compression           Config
Port   Configured    Active   Configured   Active  Speed
----   ----------    -------  ----------   ------  -----
  0    Yes            Yes        Yes             Yes        16G
```

Configuring zoning on Brocade FC switches

You must assign the switch ports to separate zones to separate controller and storage traffic. The procedure differs depending on whether you are using a FibreBridge 7500N or FibreBridge 6500N bridge.

Zoning for FC-VI ports

For each DR group in the MetroCluster, you must configure two zones for the FC-VI connections that allow controller-to-controller traffic. These zones contain the FC switch ports connecting to the controller module FC-VI ports. These zones are Quality of Service (QoS) zones.

A QoS zone name starts with the prefix QOSHid_, followed by a user-defined string to differentiate it from a regular zone. These QoS zones are the same regardless of the model of FibreBridge bridge that is being used.

Each zone contains all the FC-VI ports, one for each FC-VI cable from each controller. These zones are configured for high priority.

The following tables show the FC-VI zones for two DR groups.

DR group 1 : QOSH1 FC-VI zone for FC-VI port a / c

FC switch	Site	Switch domain	6505 / 6510 port	6520 port	G620 port	Connects to…
FC_switch_A_1	A	5	0	0	0	controller_A_1 port FC-VI a
FC_switch_A_1	A	5	1	1	1	controller_A_1 port FC-VI c
FC_switch_A_1	A	5	4	4	4	controller_A_2 port FC-VI a

FC switch	Site	Switch domain	6505 / 6510 port	6520 port	G620 port	Connects to…
FC_switch_A_1	A	5	5	5	5	controller_A_2 port FC-VI c
FC_switch_B_1	B	7	0	0	0	controller_B_1 port FC-VI a
FC_switch_B_1	B	7	1	1	1	controller_B_1 port FC-VI c
FC_switch_B_1	B	7	4	4	4	controller_B_2 port FC-VI a
FC_switch_B_1	B	7	5	5	5	controller_B_2 port FC-VI c

Zone in Fabric_1	Member ports
QOSH1_MC1_FAB_1_FCVI	5,0;5,1;5,4;5,5;7,0;7,1;7,4;7,5

DR group 1 : QOSH1 FC-VI zone for FC-VI port b / d

FC switch	Site	Switch domain	6505 / 6510 port	6520 port	G620 port	Connects to…
FC_switch_A_2	A	6	0	0	0	controller_A_1 port FC-VI b
			1	1	1	controller_A_1 port FC-VI d
			4	4	4	controller_A_2 port FC-VI b
			5	5	5	controller_A_2 port FC-VI d
FC_switch_B_2	B	8	0	0	0	controller_B_1 port FC-VI b
			1	1	1	controller_B_1 port FC-VI d
			4	4	4	controller_B_2 port FC-VI b
			5	5	5	controller_B_2 port FC-VI d

Zone in Fabric_1	Member ports
QOSH1_MC1_FAB_2_FCVI	6,0;6,1;6,4;6,5;8,0;8,1;8,4;8,5

DR group 2 : QOSH2 FC-VI zone for FC-VI port a / c

FC switch	Site	Switch domain	Switch port			Connects to…
			6510	6520	G620	
FC_switch_A_1	A	5	24	48	18	controller_A_3 port FC-VI a
			25	49	19	controller_A_3 port FC-VI c
			28	52	22	controller_A_4 port FC-VI a
			29	53	23	controller_A_4 port FC-VI c
FC_switch_B_1	B	7	24	48	18	controller_B_3 port FC-VI a
			25	49	19	controller_B_3 port FC-VI c
			28	52	22	controller_B_4 port FC-VI a
			29	53	23	controller_B_4 port FC-VI c

Zone in Fabric_1	Member ports
QOSH2_MC2_FAB_1_FCVI (6510)	5,24;5,25;5,28;5,29;7,24;7,25;7,28;7,29
QOSH2_MC2_FAB_1_FCVI (6520)	5,48;5,49;5,52;5,53;7,48;7,49;7,52;7,53

DR group 2 : QOSH2 FC-VI zone for FC-VI port b / d

FC switch	Site	Switch domain	6510 port	6520 port	G620 port	Connects to…
FC_switch_A_2	A	6	24	48	18	controller_A_3 port FC-VI b
FC_switch_A_2	A	6	25	49	19	controller_A_3 port FC-VI d
FC_switch_A_2	A	6	28	52	22	controller_A_4 port FC-VI b
FC_switch_A_2	A	6	29	53	23	controller_A_4 port FC-VI d
FC_switch_B_2	B	8	24	48	18	controller_B_3 port FC-VI b
FC_switch_B_2	B	8	25	49	19	controller_B_3 port FC-VI d
FC_switch_B_2	B	8	28	52	22	controller_B_4 port FC-VI b

FC switch	Site	Switch domain	6510 port	6520 port	G620 port	Connects to…
FC_switch_B_2	B	8	29	53	23	controller_B_4 port FC-VI d

Zone in Fabric_2	Member ports
QOSH2_MC2_FAB_2_FCVI (6510)	6,24;6,25;6,28;6,29;8,24;8,25;8,28;8,29
QOSH2_MC2_FAB_2_FCVI (6520)	6,48;6,49;6,52;6,53;8,48;8,49;8,52;8,53

The following table provides a summary of the FC-VI zones:

Fabric	Zone name	Member ports
FC_switch_A_1 and FC_switch_B_1	QOSH1_MC1_FAB_1_FCVI	5,0;5,1;5,4;5,5;7,0;7,1;7,4;7,5
	QOSH2_MC1_FAB_1_FCVI (6510)	5,24;5,25;5,28;5,29;7,24;7,25;7,28; 7,29
	QOSH2_MC1_FAB_1_FCVI (6520)	5,48;5,49;5,52;5,53;7,48;7,49;7,52; 7,53
FC_switch_A_2 and FC_switch_B_2	QOSH1_MC1_FAB_2_FCVI	6,0;6,1;6,4;6,5;8,0;8,1;8,4;8,5
	QOSH2_MC1_FAB_2_FCVI (6510)	6,24;6,25;6,28;6,29;8,24;8,25;8,28; 8,29
	QOSH2_MC1_FAB_2_FCVI (6520)	6,48;6,49;6,52;6,53;8,48;8,49;8,52; 8,53

Zoning for FibreBridge 6500N bridges, or FibreBridge 7500N or 7600N bridges using one FC port

If you are using FibreBridge 6500N bridges, or FibreBridge 7500N or 7600N bridges using only one of the two FC ports, you need to create storage zones for the bridge ports. You should understand the zones and associated ports before you configure the zones.

The examples show zoning for DR group 1 only. If your configuration includes a second DR group, configure the zoning for the second DR group in the same manner, using the corresponding ports of the controllers and bridges.

Required zones

You must configure one zone for each of the FC-to-SAS bridge FC ports that allows traffic between initiators on each controller module and that FC-to-SAS bridge.

Each storage zone contains nine ports:

- Eight HBA initiator ports (two connections for each controller)
- One port connecting to an FC-to-SAS bridge FC port

The storage zones use standard zoning.

The examples show two pairs of bridges connecting two stack groups at each site. Because each bridge uses one FC port, there are a total of four storage zones per fabric (eight in total).

Bridge naming

The bridges use the following example naming: bridge_site_stack grouplocation in pair

This portion of the name…	Identifies the…	Possible values…
site	Site on which the bridge pair physically resides.	A or B
stack group	Number of the stack group to which the bridge pair connects. • FibreBridge 7600N or 7500N bridges support up to four stacks in the stack group. The stack group can contain no more than 10 storage shelves. • FibreBridge 6500N bridges support only a single stack in the stack group.	1, 2, etc.
location in pair	Bridge within the bridge pair.A pair of bridges connect to a specific stack group.	a or b

Example bridge names for one stack group on each site:

- bridge_A_1a
- bridge_A_1b
- bridge_B_1a
- bridge_B_1b

DR Group 1 - Stack 1 at Site_A

Table for DrGroup 1 : MC1_INIT_GRP_1_SITE_A_STK_GRP_1_TOP_FC1:

FC switch	Site	Switch domain	Brocade 6505, 6510, 6520, G620, or G610 switch port	Connects to…
FC_switch_A_1	A	5	2	controller_A_1 port 0a
FC_switch_A_1	A	5	3	controller_A_1 port 0c
FC_switch_A_1	A	5	6	controller_A_2 port 0a
FC_switch_A_1	A	5	7	controller_A_2 port 0c
FC_switch_A_1	A	5	8	bridge_A_1a FC1
FC_switch_B_1	B	7	2	controller_B_1 port 0a
FC_switch_B_1	B	7	3	controller_B_1 port 0c
FC_switch_B_1	B	7	6	controller_B_2 port 0a
FC_switch_B_1	B	7	7	controller_B_2 port 0c

Zone in Fabric_1
Member ports
MC1_INIT_GRP_1_SITE_A_STK_GRP_1_TOP_FC1
5,2;5,3;5,6;5,7;7,2;7,3;7,6;7,7;5,8

Table for DrGroup 1 : MC1_INIT_GRP_1_SITE_A_STK_GRP_1_BOT_FC1:

FC switch	Site	Switch domain	Brocade 6505, 6510, 6520, G620, or G610 switch port	Connects to…
FC_switch_A_1	A	6	2	controller_A_1 port 0b
FC_switch_A_1	A	6	3	controller_A_1 port 0d
FC_switch_A_1	A	6	6	controller_A_2 port 0b
FC_switch_A_1	A	6	7	controller_A_2 port 0d
FC_switch_A_1	A	6	8	bridge_A_1b FC1
FC_switch_B_1	B	8	2	controller_B_1 port 0b

FC switch	Site	Switch domain	Brocade 6505, 6510, 6520, G620, or G610 switch port	Connects to…
FC_switch_B_1	B	8	3	controller_B_1 port 0d
FC_switch_B_1	B	8	6	controller_B_2 port 0b
FC_switch_B_1	B	8	7	controller_B_2 port 0d

Zone in Fabric_2	Member ports
MC1_INIT_GRP_1_SITE_A_STK_GRP_1_BOT_FC1	6,2;6,3;6,6;6,7;8,2;8,3;8,6;8,7;6,8

DR Group 1 - Stack 2 at Site_A

Table for DrGroup 1 : MC1_INIT_GRP_1_SITE_A_STK_GRP_2_TOP_FC1:

FC switch	Site	Switch domain	Brocade 6505, 6510, 6520, G620, or G610 switch port	Connects to…
FC_switch_A_1	A	5	2	controller_A_1 port 0a
FC_switch_A_1	A	5	3	controller_A_1 port 0c
FC_switch_A_1	A	5	6	controller_A_2 port 0a
FC_switch_A_1	A	5	7	controller_A_2 port 0c
FC_switch_A_1	A	5	9	bridge_A_2a FC1
FC_switch_B_1	B	7	2	controller_B_1 port 0a
FC_switch_B_1	B	7	3	controller_B_1 port 0c
FC_switch_B_1	B	7	6	controller_B_2 port 0a
FC_switch_B_1	B	7	7	controller_B_2 port 0c

Zone in Fabric_1	Member ports
MC1_INIT_GRP_1_SITE_A_STK_GRP_2_TOP_FC1	5,2;5,3;5,6;5,7;7,2;7,3;7,6;7,7;5,9

Table for DrGroup 1 : MC1_INIT_GRP_1_SITE_A_STK_GRP_2_BOT_FC1:

FC switch	Site	Switch domain	Brocade 6505, 6510, 6520, G620, or G610 switch port	Connects to…
FC_switch_A_1	A	6	2	controller_A_1 port 0b
FC_switch_A_1	A	6	3	controller_A_1 port 0d
FC_switch_A_1	A	6	6	controller_A_2 port 0b
FC_switch_A_1	A	6	7	controller_A_2 port 0d
FC_switch_A_1	A	6	9	bridge_A_2b FC1
FC_switch_B_1	B	8	2	controller_B_1 port 0b
FC_switch_B_1	B	8	3	controller_B_1 port 0d
FC_switch_B_1	B	8	6	controller_B_2 port 0b
FC_switch_B_1	B	8	7	controller_B_2 port 0d

Zone in Fabric_2	Member ports
MC1_INIT_GRP_1_SITE_A_STK_GRP_2_BOT_FC1	6,2;6,3;6,6;6,7;8,2;8,3;8,6;8,7;6,9

DR Group 1 - Stack 1 at Site_B

MC1_INIT_GRP_1_SITE_B_STK_GRP_1_TOP_FC1:*

FC switch	Site	Switch domain	Brocade 6505, 6510, 6520, G620, or G610 switch	Connects to…
FC_switch_A_1	A	5	2	controller_A_1 port 0a
FC_switch_A_1	A	5	3	controller_A_1 port 0c
FC_switch_A_1	A	5	6	controller_A_2 port 0a
FC_switch_A_1	A	5	7	controller_A_2 port 0c
FC_switch_B_1	B	7	2	controller_B_1 port 0a
FC_switch_B_1	B	7	3	controller_B_1 port 0c

FC switch	Site	Switch domain	Brocade 6505, 6510, 6520, G620, or G610 switch	Connects to…
FC_switch_B_1	B	7	6	controller_B_2 port 0a
FC_switch_B_1	B	7	7	controller_B_2 port 0c
FC_switch_B_1	B	7	8	bridge_B_1a FC1

Zone in Fabric_1	Member ports
MC1_INIT_GRP_1_SITE_B_STK_GRP_1_TOP_FC1	5,2;5,3;5,6;5,7;7,2;7,3;7,6;7,7;7,8

Table for DrGroup 1 : MC1_INIT_GRP_1_SITE_B_STK_GRP_1_BOT_FC1:

FC switch	Site	Switch domain	Brocade 6505, 6510, 6520, G620, or G610 switch	Connects to…
FC_switch_A_1	A	6	2	controller_A_1 port 0b
FC_switch_A_1	A	6	3	controller_A_1 port 0d
FC_switch_A_1	A	6	6	controller_A_2 port 0b
FC_switch_A_1	A	6	7	controller_A_2 port 0d
FC_switch_B_1	B	8	2	controller_B_1 port 0b
FC_switch_B_1	B	8	3	controller_B_1 port 0d
FC_switch_B_1	B	8	6	controller_B_2 port 0b
FC_switch_B_1	B	8	7	controller_B_2 port 0d
FC_switch_B_1	B	8	8	bridge_B_1b FC1

Zone in Fabric_2	Member ports
MC1_INIT_GRP_1_SITE_B_STK_GRP_1_BOT_FC1	5,2;5,3;5,6;5,7;7,2;7,3;7,6;7,7;8,8

DR Group 1 - Stack 2 at Site_B

Table for DrGroup 1 : MC1_INIT_GRP_1_SITE_B_STK_GRP_2_TOP_FC1:

FC switch	Site	Switch domain	Brocade 6505, 6510, 6520, G620, or G610 switch port	Connects to…
FC_switch_A_1	A	5	2	controller_A_1 port 0a
FC_switch_A_1	A	5	3	controller_A_1 port 0c
FC_switch_A_1	A	5	6	controller_A_2 port 0a
FC_switch_A_1	A	5	7	controller_A_2 port 0c
FC_switch_B_1	B	7	2	controller_B_1 port 0a
FC_switch_B_1	B	7	3	controller_B_1 port 0c
FC_switch_B_1	B	7	6	controller_B_2 port 0a
FC_switch_B_1	B	7	7	controller_B_2 port 0c
FC_switch_B_1	B	7	9	bridge_b_2a FC1

Zone in Fabric_1	Member ports
MC1_INIT_GRP_1_SITE_b_STK_GRP_2_TOP_FC1	5,2;5,3;5,6;5,7;7,2;7,3;7,6;7,7;7,9

Table for DrGroup 1 : MC1_INIT_GRP_1_SITE_B_STK_GRP_2_BOT_FC1:

FC switch	Site	Switch domain	Brocade 6505, 6510, 6520, G620, or G610 switch port	Connects to…
FC_switch_A_1	A	6	2	controller_A_1 port 0b
FC_switch_A_1	A	6	3	controller_A_1 port 0d
FC_switch_A_1	A	6	6	controller_A_2 port 0b
FC_switch_A_1	A	6	7	controller_A_2 port 0d
FC_switch_B_1	B	8	2	controller_B_1 port 0b
FC_switch_B_1	B	8	3	controller_B_1 port 0d
FC_switch_B_1	B	8	6	controller_B_2 port 0b

FC switch	Site	Switch domain	Brocade 6505, 6510, 6520, G620, or G610 switch port	Connects to…
FC_switch_B_1	B	8	7	controller_B_2 port 0d
FC_switch_B_1	B	8	9	bridge_B_1b FC1

Zone in Fabric_2	Member ports
MC1_INIT_GRP_1_SITE_B_STK_GRP_2_BOT_FC1	6,2;6,3;6,6;6,7;8,2;8,3;8,6;8,7;8,9

Summary of storage zones

Fabric	Zone name	Member ports
FC_switch_A_1 and FC_switch_B_1	MC1_INIT_GRP_1_SITE_A_STK_GRP_1_TOP_FC1	5,2;5,3;5,6;5,7;7,2;7,3;7,6;7,7;5,8
	MC1_INIT_GRP_1_SITE_A_STK_GRP_2_TOP_FC1	5,2;5,3;5,6;5,7;7,2;7,3;7,6;7,7;5,9
	MC1_INIT_GRP_1_SITE_B_STK_GRP_1_TOP_FC1	5,2;5,3;5,6;5,7;7,2;7,3;7,6;7,7;7,8
	MC1_INIT_GRP_1_SITE_B_STK_GRP_2_TOP_FC1	5,2;5,3;5,6;5,7;7,2;7,3;7,6;7,7;7,9
FC_switch_A_2 and FC_switch_B_2	MC1_INIT_GRP_1_SITE_A_STK_GRP_1_BOT_FC1	6,2;6,3;6,6;6,7;8,2;8,3;8,6;8,7;6,8
	vMC1_INIT_GRP_1_SITE_A_STK_GRP_2_BOT_FC1	6,2;6,3;6,6;6,7;8,2;8,3;8,6;8,7;6,9
	MC1_INIT_GRP_1_SITE_B_STK_GRP_1_BOT_FC1	6,2;6,3;6,6;6,7;8,2;8,3;8,6;8,7;8,8
	MC1_INIT_GRP_1_SITE_B_STK_GRP_2_BOT_FC1	6,2;6,3;6,6;6,7;8,2;8,3;8,6;8,7;8,9

Zoning for FibreBridge 7500N bridges using both FC ports

If you are using FibreBridge 7500N bridges with both FC ports, you need to create storage zones for the bridge ports. You should understand the zones and associated ports before you configure the zones.

Required zones

You must configure one zone for each of the FC-to-SAS bridge FC ports that allows traffic between initiators on each controller module and that FC-to-SAS bridge.

Each storage zone contains five ports:

- Four HBA initiator ports (one connection for each controller)
- One port connecting to an FC-to-SAS bridge FC port

The storage zones use standard zoning.

The examples show two pairs of bridges connecting two stack groups at each site. Because each bridge uses one FC port, there are a total of eight storage zones per fabric (sixteen in total).

Bridge naming

The bridges use the following example naming: bridge_site_stack grouplocation in pair

This portion of the name…	Identifies the…	Possible values…
site	Site on which the bridge pair physically resides.	A or B
stack group	Number of the stack group to which the bridge pair connects. • FibreBridge 7600N or 7500N bridges support up to four stacks in the stack group. The stack group can contain no more than 10 storage shelves. • FibreBridge 6500N bridges support only a single stack in the stack group.	1, 2, etc.
location in pair	Bridge within the bridge pair. A pair of bridges connect to a specific stack group.	a or b

Example bridge names for one stack group on each site:

- bridge_A_1a
- bridge_A_1b
- bridge_B_1a
- bridge_B_1b

DR Group 1 - Stack 1 at Site_A

Table for DrGroup 1 : MC1_INIT_GRP_1_SITE_A_STK_GRP_1_TOP_FC1:

FC switch	Site	Switch domain	6505 / 6510 / G610/ G620 port	6520 port	Connects to…
FC_switch_A_1	A	5	2	2	controller_A_1 port 0a
FC_switch_A_1	A	5	6	6	controller_A_2 port 0a

FC switch	Site	Switch domain	6505 / 6510 / G610/ G620 port	6520 port	Connects to…
FC_switch_A_1	A	5	8	8	bridge_A_1a FC1
FC_switch_B_1	B	7	2	2	controller_B_1 port 0a
FC_switch_B_1	B	7	6	6	controller_B_2 port 0a

Zone in Fabric_1	Member ports
MC1_INIT_GRP_1_SITE_A_STK_GRP_1_TOP_FC1	5,2;5,6;7,2;7,6;5,8

Table for DrGroup 1 : MC1_INIT_GRP_2_SITE_A_STK_GRP_1_TOP_FC1:

FC switch	Site	Switch domain	6505 / 6510 / G610 port	6520 port	G620 port	Connects to…
FC_switch_A_1	A	5	3	3	3	controller_A_1 port 0c
FC_switch_A_1	A	5	7	7	7	controller_A_2 port 0c
FC_switch_A_1	A	5	9	9	9	bridge_A_1b FC1
FC_switch_B_1	B	7	3	3	3	controller_B_1 port 0c
FC_switch_B_1	B	7	7	7	7	controller_B_2 port 0c

Zone in Fabric_2	Member ports
MC1_INIT_GRP_2_SITE_A_STK_GRP_1_BOT_FC1	5,3;5,7;7,3;7,7;5,9

Table for DrGroup 1 : MC1_INIT_GRP_1_SITE_A_STK_GRP_1_BOT_FC1:

FC switch	Site	Switch domain	6505 / 6510 / G610	6520	G620	Connects to…
FC_switch_A_2	A	6	2	2	2	controller_A_1 port 0b

FC switch	Site	Switch domain	6505 / 6510 / G610	6520	G620	Connects to…
FC_switch_A_2	A	6	6	6	6	controller_A_2 port 0b
FC_switch_A_2	A	6	8	8	8	bridge_A_1a FC2
FC_switch_B_2	B	8	2	2	2	controller_B_1 port 0b
FC_switch_B_2	B	8	6	6	6	controller_B_2 port 0b

Zone in Fabric_1	Member ports
MC1_INIT_GRP_1_SITE_A_STK_GRP_1_TOP_FC2	6,2;6,6;8,2;8,6;6,8

Table for DrGroup 1 : MC1_INIT_GRP_2_SITE_A_STK_GRP_1_BOT_FC2:

FC switch	Site	Switch domain	6505 / 6510 / G610	6520	G620	Connects to…
FC_switch_A_2	A	6	3	3	3	controller_A_1 port 0b
FC_switch_A_2	A	6	7	7	7	controller_A_2 port 0b
FC_switch_A_2	A	6	9	9	9	bridge_A_1b FC2
FC_switch_B_2	B	8	3	3	3	controller_B_1 port 0b
FC_switch_B_2	B	8	7	7	7	controller_B_2 port 0b

Zone in Fabric_2	Member ports
MC1_INIT_GRP_2_SITE_A_STK_GRP_1_BOT_FC2	6,3;6,7;8,3;8,7;6,9

DR Group 1 - Stack 2 at Site_A

Table for DrGroup 1 : MC1_INIT_GRP_1_SITE_A_STK_GRP_2_TOP_FC1:

FC switch	Site	Switch domain	6505 / 6510 / G610 port	6520 port	G620 port	Connects to…
FC_switch_A_1	A	5	2	2	2	controller_A_1 port 0a
FC_switch_A_1	A	5	6	6	6	controller_A_2 port 0a
FC_switch_A_1	A	5	10	10	10	bridge_A_2a FC1
FC_switch_B_1	B	7	2	2	2	controller_B_1 port 0a
FC_switch_B_1	B	7	6	6	6	controller_B_2 port 0a

Zone in Fabric_1	Member ports
MC1_INIT_GRP_1_SITE_A_STK_GRP_2_TOP_FC1	5,2;5,6;7,2;7,6;5,10

Table for DrGroup 1 : MC1_INIT_GRP_2_SITE_A_STK_GRP_2_TOP_FC1:

FC switch	Site	Switch domain	6505 / 6510 / G610 port	6520 port	G620 port	Connects to…
FC_switch_A_1	A	5	3	3	3	controller_A_1 port 0c
FC_switch_A_1	A	5	7	7	7	controller_A_2 port 0c
FC_switch_A_1	A	5	11	11	11	bridge_A_2b FC1
FC_switch_B_1	B	7	3	3	3	controller_B_1 port 0c
FC_switch_B_1	B	7	7	7	7	controller_B_2 port 0c

Zone in Fabric_2	Member ports
MC1_INIT_GRP_2_SITE_A_STK_GRP_2_BOT_FC1	5,3;5,7;7,3;7,7;5,11

Table for DrGroup 1 : MC1_INIT_GRP_1_SITE_A_STK_GRP_2_BOT_FC2:

FC switch	Site	Switch domain	6505 / 6510 / G610 port	6520 port	G620 port	Connects to…
FC_switch_A_2	A	6	2	0	0	controller_A_1 port 0b
FC_switch_A_2	A	6	6	4	4	controller_A_2 port 0b
FC_switch_A_2	A	6	10	10	10	bridge_A_2a FC2
FC_switch_B_2	B	8	2	2	2	controller_B_1 port 0b
FC_switch_B_2	B	8	6	6	6	controller_B_2 port 0b

Zone in Fabric_1	Member ports
MC1_INIT_GRP_1_SITE_A_STK_GRP_2_TOP_FC2	6,2;6,6;8,2;8,6;6,10

Table for DrGroup 1 : MC1_INIT_GRP_2_SITE_A_STK_GRP_2_BOT_FC2:

FC switch	Site	Switch domain	6505 / 6510 / G610 port	6520 port	G620 port	Connects to…
FC_switch_A_2	A	6	3	3	3	controller_A_1 port 0b
FC_switch_A_2	A	6	7	7	7	controller_A_2 port 0b
FC_switch_A_2	A	6	11	11	11	bridge_A_2b FC2
FC_switch_B_2	B	8	3	3	3	controller_B_1 port 0b\
FC_switch_B_2	B	8	7	7	7	controller_B_2 port 0b

Zone in Fabric_2	Member ports
MC1_INIT_GRP_2_SITE_A_STK_GRP_2_BOT_FC2	6,3;6,7;8,3;8,7;6,11

DR Group 1 - Stack 1 at Site_B

Table for DrGroup 1 : MC1_INIT_GRP_1_SITE_B_STK_GRP_1_TOP_FC1:

FC switch	Site	Switch domain	6505 / 6510 / G610 port	6520 port	G620 port	Connects to…
FC_switch_A_1	A	5	2	2	2	controller_A_1 port 0a
FC_switch_A_1	A	5	6	6	6	controller_A_2 port 0a
FC_switch_B_1	B	7	2	2	8	controller_B_1 port 0a
FC_switch_B_1	B	7	6	6	2	controller_B_2 port 0a
FC_switch_B_1	B	7	8	8	6	bridge_B_1a FC1

Zone in Fabric_1	Member ports
MC1_INIT_GRP_1_SITE_B_STK_GRP_1_TOP_FC1	5,2;5,6;7,2;7,6;7,8

Table for DrGroup 1 : MC1_INIT_GRP_2_SITE_B_STK_GRP_1_TOP_FC1:

FC switch	Site	Switch domain	6505 / 6510 / G610 port	6520 port	G620 port	Connects to…
FC_switch_A_1	A	5	3	3	3	controller_A_1 port 0c
FC_switch_A_1	A	5	7	7	7	controller_A_2 port 0c
FC_switch_B_1	B	7	3	3	9	controller_B_1 port 0c
FC_switch_B_1	B	7	7	7	3	controller_B_2 port 0c
FC_switch_B_1	B	7	9	9	7	bridge_B_1b FC1

Zone in Fabric_2	Member ports
MC1_INIT_GRP_2_SITE_B_STK_GRP_1_BOT_FC1	5,3;5,7;7,3;7,7;7,9

Table for DrGroup 1 : MC1_INIT_GRP_1_SITE_B_STK_GRP_1_BOT_FC2:

FC switch	Site	Switch domain	6505 / 6510 / G610 port	6520 port	G620 port	Connects to…
FC_switch_A_2	A	6	2	2	2	controller_A_1 port 0b
FC_switch_A_2	A	6	6	6	6	controller_A_2 port 0b
FC_switch_B_2	B	8	2	2	2	controller_B_1 port 0b
FC_switch_B_2	B	8	6	6	6	controller_B_2 port 0b
FC_switch_B_2	B	8	8	8	8	bridge_B_1a FC2

Zone in Fabric_1	Member ports
MC1_INIT_GRP_1_SITE_B_STK_GRP_1_TOP_FC2	6,2;6,6;8,2;8,6;8,8

Table for DrGroup 1 : MC1_INIT_GRP_2_SITE_B_STK_GRP_1_BOT_FC2:

FC switch	Site	Switch domain	6505 / 6510 / G610 port	6520 port	G620 port	Connects to…
FC_switch_A_2	A	6	3	3	3	controller_A_1 port 0b
FC_switch_A_2	A	6	7	7	7	controller_A_2 port 0b
FC_switch_B_2	B	8	3	3	3	controller_B_1 port 0b
FC_switch_B_2	B	8	7	7	7	controller_B_2 port 0b
FC_switch_B_2	B	8	9	9	9	bridge_A_1b FC2

Zone in Fabric_2	Member ports
MC1_INIT_GRP_2_SITE_B_STK_GRP_1_BOT_FC2	6,3;6,7;8,3;8,7;8,9

DR Group 1 - Stack 2 at Site_B

Table for DrGroup 1 : MC1_INIT_GRP_1_SITE_B_STK_GRP_2_TOP_FC1:

FC switch	Site	Switch domain	6505 / 6510 / G610 port	6520 port	G620 port	Connects to…
FC_switch_A_1	A	5	2	2	2	controller_A_1 port 0a
FC_switch_A_1	A	5	6	6	6	controller_A_2 port 0a
FC_switch_B_1	B	7	2	2	2	controller_B_1 port 0a
FC_switch_B_1	B	7	6	6	6	controller_B_2 port 0a
FC_switch_B_1	B	7	10	10	10	bridge_B_2a FC1

Zone in Fabric_1	Member ports
MC1_INIT_GRP_1_SITE_B_STK_GRP_2_TOP_FC1	5,2;5,6;7,2;7,6;7,10

Table for DrGroup 1 : MC1_INIT_GRP_2_SITE_B_STK_GRP_2_TOP_FC1:

FC switch	Site	Switch domain	6505 / 6510 / G610 port	6520 port	G620 port	Connects to…
FC_switch_A_1	A	5	3	3	3	controller_A_1 port 0c
FC_switch_A_1	A	5	7	7	7	controller_A_2 port 0c
FC_switch_B_1	B	7	3	3	3	controller_B_1 port 0c
FC_switch_B_1	B	7	7	7	7	controller_B_2 port 0c

FC switch	Site	Switch domain	6505 / 6510 / G610 port	6520 port	G620 port	Connects to…
FC_switch_B_1	B	7	11	11	11	bridge_B_2b FC1

Zone in Fabric_2	Member ports
MC1_INIT_GRP_2_SITE_B_STK_GRP_2_BOT_FC1	5,3;5,7;7,3;7,7;7,11

Table for DrGroup 1 : MC1_INIT_GRP_1_SITE_B_STK_GRP_2_BOT_FC2:

FC switch	Site	Switch domain	6505 / 6510 / G610 port	6520 port	G620 port	Connects to…
FC_switch_A_2	A	6	2	2	2	controller_A_1 port 0b
FC_switch_A_2	A	6	6	6	6	controller_A_2 port 0b
FC_switch_B_2	B	8	2	2	2	controller_B_1 port 0b
FC_switch_B_2	B	8	6	6	6	controller_B_2 port 0b
FC_switch_B_2	B	8	10	10	10	bridge_B_2a FC2

Zone in Fabric_1	Member ports
MC1_INIT_GRP_1_SITE_B_STK_GRP_2_TOP_FC2	6,2;6,6;8,2;8,6;8,10

Table for DrGroup 1 : MC1_INIT_GRP_2_SITE_B_STK_GRP_2_BOT_FC2:

FC switch	Site	Switch domain	6505 / 6510 / G610 port	6520 port	G620 port	Connects to…
FC_switch_A_2	A	6	3	3	3	controller_A_1 port 0b
FC_switch_A_2	A	6	7	7	7	controller_A_2 port 0b
FC_switch_B_2	B	8	3	3	3	controller_B_1 port 0b

FC switch	Site	Switch domain	6505 / 6510 / G610 port	6520 port	G620 port	Connects to…
FC_switch_B_2	B	8	7	7	7	controller_B_2 port 0b
FC_switch_B_2	B	8	11	11	11	bridge_B_2b FC2

Zone in Fabric_2	Member ports
MC1_INIT_GRP_2_SITE_B_STK_GRP_2_BOT_FC2	6,3;6,7;8,3;8,7;8,11

Summary of storage zones

Fabric		Zone name	Member ports
FC_switch_A_1 FC_switch_B_1	and	MC1_INIT_GRP_1_SITE_A_STK_GRP_1_TOP_FC1	5,2;5,6;7,2;7,6;5,8
FC_switch_A_1 FC_switch_B_1	and	MC1_INIT_GRP_2_SITE_A_STK_GRP_1_BOT_FC1	5,3;5,7;7,3;7,7;5,9
FC_switch_A_1 FC_switch_B_1	and	MC1_INIT_GRP_1_SITE_A_STK_GRP_2_TOP_FC1	5,2;5,6;7,2;7,6;5,10
FC_switch_A_1 FC_switch_B_1	and	MC1_INIT_GRP_2_SITE_A_STK_GRP_2_BOT_FC1	5,3;5,7;7,3;7,7;5,11
FC_switch_A_1 FC_switch_B_1	and	MC1_INIT_GRP_1_SITE_B_STK_GRP_1_TOP_FC1	5,2;5,6;7,2;7,6;7,8
FC_switch_A_1 FC_switch_B_1	and	MC1_INIT_GRP_2_SITE_B_STK_GRP_1_BOT_FC1	5,3;5,7;7,3;7,7;7,9
FC_switch_A_1 FC_switch_B_1	and	MC1_INIT_GRP_1_SITE_B_STK_GRP_2_TOP_FC1	5,2;5,6;7,2;7,6;7,10
FC_switch_A_1 FC_switch_B_1	and	MC1_INIT_GRP_2_SITE_B_STK_GRP_2_BOT_FC1	5,3;5,7;7,3;7,7;7,11
FC_switch_A_2 FC_switch_B_2	and	MC1_INIT_GRP_1_SITE_A_STK_GRP_1_TOP_FC2	6,2;6,6;8,2;8,6;6,8
FC_switch_A_2 FC_switch_B_2	and	MC1_INIT_GRP_2_SITE_A_STK_GRP_1_BOT_FC2	6,3;6,7;8,3;8,7;6,9

Fabric	Zone name	Member ports
FC_switch_A_2 and FC_switch_B_2	MC1_INIT_GRP_1_SITE_A_STK_GRP_2_TOP_FC2	6,2;6,6;8,2;8,6;6,10
FC_switch_A_2 and FC_switch_B_2	MC1_INIT_GRP_2_SITE_A_STK_GRP_2_BOT_FC2	6,3;6,7;8,3;8,7;6,11
FC_switch_A_2 and FC_switch_B_2	MC1_INIT_GRP_1_SITE_B_STK_GRP_1_TOP_FC2	6,2;6,6;8,2;8,6;8,8
FC_switch_A_2 and FC_switch_B_2	MC1_INIT_GRP_2_SITE_B_STK_GRP_1_BOT_FC2	6,3;6,7;8,3;8,7;8,9
FC_switch_A_2 and FC_switch_B_2	MC1_INIT_GRP_1_SITE_B_STK_GRP_2_TOP_FC2	6,2;6,6;8,2;8,6;8,10
FC_switch_A_2 and FC_switch_B_2	MC1_INIT_GRP_2_SITE_B_STK_GRP_2_BOT_FC2	6,3;6,7;8,3;8,7;8,11

Configuring zoning on Brocade FC switches

You must assign the switch ports to separate zones to separate controller and storage traffic, with zones for the FC-VI ports and zones for the storage ports.

The following steps use the standard zoning for the MetroCluster configuration.

Zoning for FC-VI ports

Zoning for FibreBridge 6500N bridges, or FibreBridge 7500N or 7600N bridges using one FC port

Zoning for FibreBridge 7500N bridges using both FC ports

1. Create the FC-VI zones on each switch: `zonecreate "QOSH1_FCVI_1", member;member ...`

   In this example a QOS FCVI zone is created containing ports 5,0;5,1;5,4;5,5;7,0;7,1;7,4;7,5:

   ```
   Switch_A_1:admin> zonecreate "QOSH1_FCVI_1",
   "5,0;5,1;5,4;5,5;7,0;7,1;7,4;7,5"
   ```

2. Configure the storage zone s on each switch.

   You can configure zoning for the fabric from one switch in the fabric. In the example that follows, zoning is configured on Switch_A_1.

   a. Create the storage zone for each switch domain in the switch fabric: `zonecreate name, member;member ...`

      In this example a storage zone for a FibreBridge 7500N using both FC ports is being created. The

zones contains ports 5,2;5,6;7,2;7,6;5,16:

```
Switch_A_1:admin> zonecreate
"MC1_INIT_GRP_1_SITE_A_STK_GRP_1_TOP_FC1", "5,2;5,6;7,2;7,6;5,16"
```

b. Create the configuration in the first switch fabric: `cfgcreate config_name, zone;zone...`

   In this example a configuration with the name CFG_1 and the two zones QOSH1_MC1_FAB_1_FCVI and MC1_INIT_GRP_1_SITE_A_STK_GRP_1_TOP_FC1 is created

```
Switch_A_1:admin> cfgcreate "CFG_1", "QOSH1_MC1_FAB_1_FCVI;
MC1_INIT_GRP_1_SITE_A_STK_GRP_1_TOP_FC1"
```

c. Add zones to the configuration, if desired: `cfgadd config_namezone;zone...`

d. Enable the configuration: `cfgenable config_name`

```
Switch_A_1:admin> cfgenable "CFG_1"
```

e. Save the configuration: `cfgsave`

```
Switch_A_1:admin> cfgsave
```

f. Validate the zoning configuration: `zone --validate`

```
Switch_A_1:admin> zone --validate
Defined configuration:
cfg: CFG_1 QOSH1_MC1_FAB_1_FCVI ;
MC1_INIT_GRP_1_SITE_A_STK_GRP_1_TOP_FC1
zone: QOSH1_MC1_FAB_1_FCVI
5,0;5,1;5,4;5,5;7,0;7,1;7,4;7,5
zone: MC1_INIT_GRP_1_SITE_A_STK_GRP_1_TOP_FC1
5,2;5,6;7,2;7,6;5,16
Effective configuration:
cfg: CFG_1
zone: QOSH1_MC1_FAB_1_FCVI
5,0
5,1
5,4
5,5
7,0
7,1
7,4
7,5
zone: MC1_INIT_GRP_1_SITE_A_STK_GRP_1_TOP_FC1
5,2
5,6
7,2
7,6
5,16
----------------------------------
~ - Invalid configuration
* - Member does not exist
# - Invalid usage of broadcast zone
```

Setting ISL encryption on Brocade 6510 or G620 switches

On Brocade 6510 or G620 switches, you can optionally use the Brocade encryption feature on the ISL connections. If you want to use the encryption feature, you must perform additional configuration steps on each switch in the MetroCluster configuration.

- You must have Brocade 6510 or G620 switches.

> Support for ISL encryption on Brocade G620 switches is only supported on ONTAP 9.4 and later.

- You must have selected two switches from the same fabric.
- You must have reviewed the Brocade documentation for your switch and Fabric Operating System version to confirm the bandwidth and port limits.

The steps must be performed on both the switches in the same fabric.

Disabling virtual fabric

In order to set the ISL encryption, you must disable the virtual fabric on all the four switches being used in a MetroCluster configuration.

1. Disable the virtual fabric by entering the following command at the switch console:`fosconfig --disable vf`

Reboot the switch.

Setting the payload

After disabling the virtual fabric, you must set the payload or the data field size on both switches in the fabric.

The data field size must not exceed 2048.

1. Disable the switch: `switchdisable`
2. Configure and set the payload: `configure`
3. Set the following switch parameters:
   a. Set the Fabric parameter as follows: `y`
   b. Set the other parameters, such as Domain, WWN Based persistent PID, and so on.
   c. Set the data field size: `2048`

Setting the authentication policy

You must set the authentication policy and associated parameters.

The commands must be executed at the switch console.

1. Set the authentication secret:

   a. Begin the setup process: `secAuthSecret --set`

      This command initiates a series of prompts that you respond to in the following steps.

   b. Provide the worldwide name (WWN) of the other switch in the fabric for the Enter peer WWN, Domain, or switch name parameter.
   c. Provide the peer secret for the Enter peer secret parameter.
   d. Provide the local secret for the Enter local secret parameter.
   e. Enter `Y` for the Are you done parameter.

   The following is an example of setting the authentication secret:

   +

```
brcd> secAuthSecret --set

This command is used to set up secret keys for the DH-CHAP
authentication.
The minimum length of a secret key is 8 characters and maximum 40
characters. Setting up secret keys does not initiate DH-CHAP
authentication. If switch is configured to do DH-CHAP, it is performed
whenever a port or a switch is enabled.

Warning: Please use a secure channel for setting secrets. Using
an insecure channel is not safe and may compromise secrets.

Following inputs should be specified for each entry.

1. WWN for which secret is being set up.
2. Peer secret: The secret of the peer that authenticates to peer.
3. Local secret: The local secret that authenticates peer.

Press enter to start setting up secrets > <cr>

Enter peer WWN, Domain, or switch name (Leave blank when done):
10:00:00:05:33:76:2e:99
Enter peer secret: <hidden>
Re-enter peer secret: <hidden>
Enter local secret: <hidden>
Re-enter local secret: <hidden>

Enter peer WWN, Domain, or switch name (Leave blank when done):
Are you done? (yes, y, no, n): [no] yes
Saving data to key store... Done.
```

2. Set the authentication group to 4: `authUtil --set -g 4`
3. Set the authentication type to dhchap: `authUtil --set -a dhchap`

   The system displays the following output:

```
Authentication is set to dhchap.
```

4. Set the authentication policy on the switch to on: `authUtil --policy -sw on`

   The system displays the following output:

```
Warning: Activating the authentication policy requires either DH-CHAP
secrets or PKI certificates depending on the protocol selected.
Otherwise, ISLs will be segmented during next E-port bring-up.
ARE YOU SURE  (yes, y, no, n): [no] yes
Auth Policy is set to ON
```

Enabling ISL encryption on Brocade switches

After setting the authentication policy and the authentication secret, you must enable ISL encryption on the ports for it to take effect.

- These steps should be performed on one switch fabric at a time.
- The commands must be run at the switch console.

1. Enable encryption on all of the ISL ports: `portCfgEncrypt --enable port_number`

   In the following example, the encryption is enabled on ports 8 and 12: `portCfgEncrypt --enable 8``portCfgEncrypt --enable 12`

2. Enable the switch: `switchenable`
3. Verify that the ISL is up and working: `islshow`
4. Verify that encryption is enabled: `portenccompshow`

   The following example shows that encryption is enabled on ports 8 and 12:

```
User Encryption
Port  configured     Active
----   ----------    ------
 8      yes          yes
 9      No           No
 10     No           No
 11     No           No
 12     yes          yes
```

Perform all of the steps on the switches in the other fabric in a MetroCluster configuration.

Configuring the Cisco FC switches

Each Cisco switch in the MetroCluster configuration must be configured appropriately for the ISL and storage connections.

The following requirements apply to the Cisco FC switches:

- You must be using four supported Cisco switches of the same model with the same NX-OS version and licensing.

- The MetroCluster configuration requires four switches.

  The four switches must be connected into two fabrics of two switches each, with each fabric spanning both sites.

- The switch must support connectivity to the ATTO FibreBridge model.
- You cannot be using encryption or compression in the Cisco FC storage fabric.

  It is not supported in the MetroCluster configuration.

NetApp Interoperability Matrix Tool

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

The following requirement applies to the Inter-Switch Link (ISL) connections:

- All ISLs must have the same length and same speed in one fabric.

  Different lengths of ISLs can be used in the different fabrics. The same speed must be used in all fabrics.

The following requirement applies to the storage connections:

- Each storage controller must have four initiator ports available to connect to the switch fabrics.

  Two initiator ports must be connected from each storage controller to each fabric.

  You can configure FAS8020, AFF8020, FAS8200, and AFF A300 systems with two initiators ports per controller (a single initiator port to each fabric) if all of the following criteria are met:

  - There are fewer than four FC initiator ports available to connect the disk storage and no additional ports can be configured as FC initiators.
  - All slots are in use and no FC initiator card can be added.

Related information

NetApp Interoperability Matrix Tool

Cisco switch license requirements

Certain feature-based licenses might be required for the Cisco 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 the required feature-based licenses on all four switches in a MetroCluster configuration.

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

- ENTERPRISE_PKG

  This license enables you to use the QoS feature on 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

  This license 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 and threshold monitoring. For more information about this license, see the Cisco Fabric Manager Server Package.

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

The Cisco MDS 9250i switches have two fixed 1/10 GbE IP storage services ports. No additional licenses are required for these ports. The Cisco SAN Extension over IP application package is a standard license on these switches that enables features such as FCIP and compression.

Setting the Cisco FC switch to factory defaults

To ensure a successful configuration, you must set the switch to its factory defaults. This ensures that the switch is starting from a clean configuration.

This task must be performed on all switches in the MetroCluster configuration.

1. Make a console connection and log in to both switches in the same fabric.
2. Issue the following command to set the switch back to its default settings: `write erase`

   You can respond `y` when prompted to confirm the command. This erases all licenses and configuration information on the switch.

3. Issue the following command to reboot the switch: `reload`

   You can respond `y` when prompted to confirm the command.

4. Repeat the write erase and reload commands on the other switch.

   After issuing the reload command, the switch reboots and then prompts with setup questions. At that point, proceed to the next section.

The following example shows the process on a fabric consisting of FC_switch_A_1 and FC_switch_B_1.

```
FC_Switch_A_1# write erase
    Warning: This command will erase the startup-configuration.
    Do you wish to proceed anyway? (y/n)  [n] y
    FC_Switch_A_1# reload
    This command will reboot the system. (y/n)?  [n] y

FC_Switch_B_1# write erase
    Warning: This command will erase the startup-configuration.
    Do you wish to proceed anyway? (y/n)  [n] y
    FC_Switch_B_1# reload
    This command will reboot the system. (y/n)?  [n] y
```

Configure the Cisco FC switch basic settings and community string

You must specify the basic settings with the setup command or after issuing the reload command.

1. If the switch does not display the setup questions, configure the basic switch settings: `setup`
2. Accept the default responses to the setup questions until you are prompted for the SNMP community string.
3. Set the community string to public (all lowercase) to allow access from the ONTAP Health Monitors.

   You can set the community string to a value other than public, but you must configure the ONTAP Health Monitors using the community string you specify.

   The following example shows the commands on FC_switch_A_1:

   ```
   FC_switch_A_1# setup
       Configure read-only SNMP community string (yes/no) [n]: y
       SNMP community string : public
       Note:  Please set the SNMP community string to "Public" or another
   value of your choosing.
       Configure default switchport interface state (shut/noshut) [shut]:
   noshut
       Configure default switchport port mode F (yes/no) [n]: n
       Configure default zone policy (permit/deny) [deny]: deny
       Enable full zoneset distribution? (yes/no) [n]: yes
   ```

   The following example shows the commands on FC_switch_B_1:

```
FC_switch_B_1# setup
    Configure read-only SNMP community string (yes/no) [n]: y
    SNMP community string : public
    Note:  Please set the SNMP community string to "Public" or another
value of your choosing.
    Configure default switchport interface state (shut/noshut) [shut]:
noshut
    Configure default switchport port mode F (yes/no) [n]: n
    Configure default zone policy (permit/deny) [deny]: deny
    Enable full zoneset distribution? (yes/no) [n]: yes
```

Acquiring licenses for ports

You do not have to use Cisco switch licenses on a continuous range of ports; instead, you can acquire licenses for specific ports that are used and remove licenses from unused ports. You should verify the number of licensed ports in the switch configuration and, if necessary, move licenses from one port to another as needed.

1. Issue the following command to show license usage for a switch fabric: `show port-resources module 1`

   Determine which ports require licenses. If some of those ports are unlicensed, determine if you have extra licensed ports and consider removing the licenses from them.

2. Issue the following command to enter configuration mode: `config t`
3. Remove the license from the selected port:
   a. Issue the following command to select the port to be unlicensed: `interface interface-name`
   b. Remove the license from the port using the following command: `no port-license acquire`
   c. Exit the port configuration interface: `exit`
4. Acquire the license for the selected port:
   a. Issue the following command to select the port to be unlicensed: `interface interface-name`
   b. Make the port eligible to acquire a license using the "port license" command: `port-license`
   c. Acquire the license on the port using the following command: `port-license acquire`
   d. Exit the port configuration interface: `exit`
5. Repeat for any additional ports.
6. Issue the following command to exit configuration mode: `exit`

Removing and acquiring a license on a port

This example shows a license being removed from port fc1/2, port fc1/1 being made eligible to acquire a license, and the license being acquired on port fc1/1:

```
Switch_A_1# conf t
    Switch_A_1(config)# interface fc1/2
    Switch_A_1(config)# shut
    Switch_A_1(config-if)# no port-license acquire
    Switch_A_1(config-if)# exit
    Switch_A_1(config)# interface fc1/1
    Switch_A_1(config-if)# port-license
    Switch_A_1(config-if)# port-license acquire
    Switch_A_1(config-if)# no shut
    Switch_A_1(config-if)# end
    Switch_A_1# copy running-config startup-config

    Switch_B_1# conf t
    Switch_B_1(config)# interface fc1/2
    Switch_B_1(config)# shut
    Switch_B_1(config-if)# no port-license acquire
    Switch_B_1(config-if)# exit
    Switch_B_1(config)# interface fc1/1
    Switch_B_1(config-if)# port-license
    Switch_B_1(config-if)# port-license acquire
    Switch_B_1(config-if)# no shut
    Switch_B_1(config-if)# end
    Switch_B_1# copy running-config startup-config
```

The following example shows port license usage being verified:

```
Switch_A_1# show port-resources module 1
    Switch_B_1# show port-resources module 1
```

Enabling ports in a Cisco MDS 9148 or 9148S switch

In Cisco MDS 9148 or 9148S switches, you must manually enable the ports required in a MetroCluster configuration.

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

1. View the port groups available in a Cisco switch: `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 tinterface port_numbershutport-license acquireno shut`

   For example, the following command licenses and acquires Port fc 1/45:

```
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: `copy running-config startup-config`

Configuring the F-ports on a Cisco FC switch

You must configure the F-ports on the FC switch. In a MetroCluster configuration, the F-ports are the ports that connect the switch to the HBA initiators, FC-VI interconnects and FC-to-SAS bridges. Each port must be configured individually.

Refer to the following sections to identify the F-ports (switch-to-node) for your configuration:

- Port assignments for FC switches when using ONTAP 9.1 and later
- Port assignments for FC switches when using ONTAP 9.0

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

1. Issue the following command to enter configuration mode: `config t`
2. Enter interface configuration mode for the port: `interface port-ID`
3. Shut down the port: `shutdown`
4. Set the ports to F mode by issuing the following command: `switchport mode F`
5. Set the ports to fixed speed by issuing the following command: `switchport speed speed`

   speed is either `8000` or `16000`
6. Set the rate mode of the switch port to dedicated by issuing the following command: `switchport rate-mode dedicated`
7. Restart the port: `no shutdown`
8. Issue the following command to exit configuration mode: `end`

The following example shows the commands on the two switches:

```
Switch_A_1# config  t
FC_switch_A_1(config)# interface fc 1/1
FC_switch_A_1(config-if)# shutdown
FC_switch_A_1(config-if)# switchport mode F
FC_switch_A_1(config-if)# switchport speed 8000
FC_switch_A_1(config-if)# switchport rate-mode dedicated
FC_switch_A_1(config-if)# no shutdown
FC_switch_A_1(config-if)# end
FC_switch_A_1# copy running-config startup-config

FC_switch_B_1# config  t
FC_switch_B_1(config)# interface fc 1/1
FC_switch_B_1(config-if)# switchport mode F
FC_switch_B_1(config-if)# switchport speed 8000
FC_switch_B_1(config-if)# switchport rate-mode dedicated
FC_switch_B_1(config-if)# no shutdown
FC_switch_B_1(config-if)# end
FC_switch_B_1# copy running-config startup-config
```

Assigning buffer-to-buffer credits to F-Ports in the same port group as the ISL

You must assign the buffer-to-buffer credits to the F-ports if they are in the same port group as the ISL. If the ports do not have the required buffer-to-buffer credits, the ISL could be inoperative. This task is not required if the F-ports are not in the same port group as the ISL port.

If the F-Ports are in a port group that contains the ISL, this task must be performed on each FC switch in the MetroCluster configuration.

1. Issue the following command to enter configuration mode: `config t`
2. Enter the following command to set the interface configuration mode for the port: `interface port-ID`
3. Disable the port:`shut`
4. If the port is not already in F mode, set the port to F mode by entering the following command: `switchport mode F`
5. Set the buffer-to-buffer credit of the non-E ports to 1 by using the following command: `switchport fcrxbbcredit 1`
6. Re-enable the port:`no shut`
7. Exit configuration mode:`exit`
8. Copy the updated configuration to the startup configuration:`copy running-config startup-config`
9. Verify the buffer-to-buffer credit assigned to a port by entering the following commands: `show port-resources module 1`
10. Issue the following command to exit configuration mode: `exit`

11. Repeat these steps on the other switch in the fabric.
12. Verify the settings:`show port-resource module 1`

In this example, port fc1/40 is the ISL. Ports fc1/37, fc1/38 and fc1/39 are in the same port group and must be configured.

The following commands show the port range being configured for fc1/37 through fc1/39:

```
FC_switch_A_1# conf t
FC_switch_A_1(config)# interface fc1/37-39
FC_switch_A_1(config-if)# shut
FC_switch_A_1(config-if)# switchport mode F
FC_switch_A_1(config-if)# switchport fcrxbbcredit 1
FC_switch_A_1(config-if)# no shut
FC_switch_A_1(config-if)# exit
FC_switch_A_1# copy running-config startup-config

FC_switch_B_1# conf t
FC_switch_B_1(config)# interface fc1/37-39
FC_switch_B_1(config-if)# shut
FC_switch_B_1(config-if)# switchport mode F
FC_switch_B_1(config-if)# switchport fcrxbbcredit 1
FC_switch_A_1(config-if)# no shut
FC_switch_A_1(config-if)# exit
FC_switch_B_1# copy running-config startup-config
```

The following commands and system output show that the settings are properly applied:

```
FC_switch_A_1# show port-resource module 1
...
Port-Group 11
 Available dedicated buffers are 93

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

--------------------------------------------------------------------------
fc1/37                                    32        8.0  dedicated
fc1/38                                     1        8.0  dedicated
fc1/39                                     1        8.0  dedicated
...

FC_switch_B_1# port-resource module
...
Port-Group 11
 Available dedicated buffers are 93

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

--------------------------------------------------------------------------
fc1/37                                    32        8.0  dedicated
fc1/38                                     1        8.0  dedicated
fc1/39                                     1        8.0 dedicated
...
```

Creating and configuring VSANs on Cisco FC switches

You must create a VSAN for the FC-VI ports and a VSAN for the storage ports on each FC switch in the MetroCluster configuration. The VSANs should have a unique number and name. You must do additional configuration if you are using two ISLs with in-order delivery of frames.

The examples here use the following naming conventions:

Switch fabric	VSAN name	ID number
1	FCVI_1_10	10
STOR_1_20	20	2

FCVI_2_30	30	STOR_2_20

This task must be performed on each FC switch fabric.

1. Configure the FC-VI VSAN:
   a. Enter configuration mode if you have not done so already: `config t`
   b. Edit the VSAN database: `vsan database`
   c. Set the VSAN ID: `vsan vsan-ID`
   d. Set the VSAN name: `vsan vsan-ID name vsan_name`
2. Add ports to the FC-VI VSAN:
   a. Add the interfaces for each port in the VSAN: `vsan vsan-ID interface interface_name`

      For the FC-VI VSAN, the ports connecting the local FC-VI ports will be added.

   b. Exit configuration mode: `end`
   c. Copy the running-config to the startup-config: `copy running-config startup-config`

   In the following example, the ports are fc1/1 and fc1/13:

   +

```
FC_switch_A_1# conf t
FC_switch_A_1(config)# vsan database
FC_switch_A_1(config)# vsan 10 interface fc1/1
FC_switch_A_1(config)# vsan 10 interface fc1/13
FC_switch_A_1(config)# end
FC_switch_A_1# copy running-config startup-config
FC_switch_B_1# conf t
FC_switch_B_1(config)# vsan database
FC_switch_B_1(config)# vsan 10 interface fc1/1
FC_switch_B_1(config)# vsan 10 interface fc1/13
FC_switch_B_1(config)# end
FC_switch_B_1# copy running-config startup-config
```

3. Verify port membership of the VSAN: `show vsan member`

```
FC_switch_A_1# show vsan member
FC_switch_B_1# show vsan member
```

4. Configure the VSAN to guarantee in-order delivery of frames or out-of-order delivery of frames:

   The standard IOD settings are recommended. You should configure OOD only if necessary.

- The following steps must be performed to configure in-order delivery of frames:
  i. Enter configuration mode: `conf t`
  ii. Enable the in-order guarantee of exchanges for the VSAN: `in-order-guarantee vsan vsan-ID`

  > **!** For FC-VI VSANs (FCVI_1_10 and FCVI_2_30), you must enable in-order guarantee of frames and exchanges only on VSAN 10.

  iii. Enable load balancing for the VSAN: `vsan vsan-ID loadbalancing src-dst-id`
  iv. Exit configuration mode: `end`
  v. Copy the running-config to the startup-config: `copy running-config startup-config`

  The commands to configure in-order delivery of frames on FC_switch_A_1:

```
FC_switch_A_1# config t
FC_switch_A_1(config)# in-order-guarantee vsan 10
FC_switch_A_1(config)# vsan database
FC_switch_A_1(config-vsan-db)# vsan 10 loadbalancing src-dst-id
FC_switch_A_1(config-vsan-db)# end
FC_switch_A_1# copy running-config startup-config
```

  The commands to configure in-order delivery of frames on FC_switch_B_1:

```
FC_switch_B_1# config t
FC_switch_B_1(config)# in-order-guarantee vsan 10
FC_switch_B_1(config)# vsan database
FC_switch_B_1(config-vsan-db)# vsan 10 loadbalancing src-dst-id
FC_switch_B_1(config-vsan-db)# end
FC_switch_B_1# copy running-config startup-config
```

- The following steps must be performed to configure out-of-order delivery of frames:
  i. Enter configuration mode: `conf t`
  ii. Disable the in-order guarantee of exchanges for the VSAN: `no in-order-guarantee vsan vsan-ID`
  iii. Enable load balancing for the VSAN: `vsan vsan-ID loadbalancing src-dst-id`
  iv. Exit configuration mode: `end`
  v. Copy the running-config to the startup-config: `copy running-config startup-config`

  The commands to configure out-of-order delivery of frames on FC_switch_A_1:

```
FC_switch_A_1# config t
FC_switch_A_1(config)# no in-order-guarantee vsan 10
FC_switch_A_1(config)# vsan database
FC_switch_A_1(config-vsan-db)# vsan 10 loadbalancing src-dst-id
FC_switch_A_1(config-vsan-db)# end
FC_switch_A_1# copy running-config startup-config
```

The commands to configure out-of-order delivery of frames on FC_switch_B_1:

```
FC_switch_B_1# config t
FC_switch_B_1(config)# no in-order-guarantee vsan 10
FC_switch_B_1(config)# vsan database
FC_switch_B_1(config-vsan-db)# vsan 10 loadbalancing src-dst-id
FC_switch_B_1(config-vsan-db)# end
FC_switch_B_1# copy running-config startup-config
```

When configuring ONTAP on the controller modules, OOD must be explicitly configured on each controller module in the MetroCluster configuration.

+ Configuring in-order delivery or out-of-order delivery of frames on ONTAP software

5. Set QoS policies for the FC-VI VSAN:

   a. Enter configuration mode: `conf t`

   b. Enable the QoS and create a class map by entering the following commands in sequence: `qos enable``qos class-map class_name match-any`

   c. Add the class map created in a previous step to the policy map: `class class_name`

   d. Set the priority: `priority high`

   e. Add the VSAN to the policy map created previously in this procedure: `qos service policy policy_name vsan vsanid`

   f. Copy the updated configuration to the startup configuration: `copy running-config startup-config`

   The commands to set the QoS policies on FC_switch_A_1:

   +

```
FC_switch_A_1# conf t
FC_switch_A_1(config)# qos enable
FC_switch_A_1(config)# qos class-map FCVI_1_10_Class match-any
FC_switch_A_1(config)# qos policy-map FCVI_1_10_Policy
FC_switch_A_1(config-pmap)# class FCVI_1_10_Class
FC_switch_A_1(config-pmap-c)# priority high
FC_switch_A_1(config-pmap-c)# exit
FC_switch_A_1(config)# exit
FC_switch_A_1(config)# qos service policy FCVI_1_10_Policy vsan 10
FC_switch_A_1(config)# end
FC_switch_A_1# copy running-config startup-config
```

+ The commands to set the QoS policies on FC_switch_B_1:

+

```
FC_switch_B_1# conf t
FC_switch_B_1(config)# qos enable
FC_switch_B_1(config)# qos class-map FCVI_1_10_Class match-any
FC_switch_B_1(config)# qos policy-map FCVI_1_10_Policy
FC_switch_B_1(config-pmap)# class FCVI_1_10_Class
FC_switch_B_1(config-pmap-c)# priority high
FC_switch_B_1(config-pmap-c)# exit
FC_switch_B_1(config)# exit
FC_switch_B_1(config)# qos service policy FCVI_1_10_Policy vsan 10
FC_switch_B_1(config)# end
FC_switch_B_1# copy running-config startup-config
```

6. Configure the storage VSAN:

   a. Set the VSAN ID: `vsan vsan-ID`

   b. Set the VSAN name: `vsan vsan-ID name vsan_name`

The commands to configure the storage VSAN on FC_switch_A_1:

+

```
FC_switch_A_1# conf t
FC_switch_A_1(config)# vsan database
FC_switch_A_1(config-vsan-db)# vsan 20
FC_switch_A_1(config-vsan-db)# vsan 20 name STOR_1_20
FC_switch_A_1(config-vsan-db)# end
FC_switch_A_1# copy running-config startup-config
```

+ The commands to configure the storage VSAN on FC_switch_B_1:

+

```
FC_switch_B_1# conf t
FC_switch_B_1(config)# vsan database
FC_switch_B_1(config-vsan-db)# vsan 20
FC_switch_B_1(config-vsan-db)# vsan 20 name STOR_1_20
FC_switch_B_1(config-vsan-db)# end
FC_switch_B_1# copy running-config startup-config
```

7. Add ports to the storage VSAN.

   For the storage VSAN, all ports connecting HBA or FC-to-SAS bridges must be added. In this example fc1/5, fc1/9, fc1/17, fc1/21. fc1/25, fc1/29, fc1/33, and fc1/37 are being added.

   The commands to add ports to the storage VSAN on FC_switch_A_1:

```
FC_switch_A_1# conf t
FC_switch_A_1(config)# vsan database
FC_switch_A_1(config)# vsan 20 interface fc1/5
FC_switch_A_1(config)# vsan 20 interface fc1/9
FC_switch_A_1(config)# vsan 20 interface fc1/17
FC_switch_A_1(config)# vsan 20 interface fc1/21
FC_switch_A_1(config)# vsan 20 interface fc1/25
FC_switch_A_1(config)# vsan 20 interface fc1/29
FC_switch_A_1(config)# vsan 20 interface fc1/33
FC_switch_A_1(config)# vsan 20 interface fc1/37
FC_switch_A_1(config)# end
FC_switch_A_1# copy running-config startup-config
```

   The commands to add ports to the storage VSAN on FC_switch_B_1:

```
FC_switch_B_1# conf t
FC_switch_B_1(config)# vsan database
FC_switch_B_1(config)# vsan 20 interface fc1/5
FC_switch_B_1(config)# vsan 20 interface fc1/9
FC_switch_B_1(config)# vsan 20 interface fc1/17
FC_switch_B_1(config)# vsan 20 interface fc1/21
FC_switch_B_1(config)# vsan 20 interface fc1/25
FC_switch_B_1(config)# vsan 20 interface fc1/29
FC_switch_B_1(config)# vsan 20 interface fc1/33
FC_switch_B_1(config)# vsan 20 interface fc1/37
FC_switch_B_1(config)# end
FC_switch_B_1# copy running-config startup-config
```

Configuring E-ports

You must configure the switch ports that connect the ISL (these are the E-Ports). The procedure you use depends on which switch you are using.

Configuring the E-ports on the Cisco FC switch

You must configure the FC switch ports that connect the inter-switch link (ISL). These are the E-ports, and configuration must be done for each port. To do so, you must calculate the correct number of buffer-to-buffer credits (BBCs).

All ISLs in the fabric must be configured with the same speed and distance settings.

This task must be performed on each ISL port.

1. Use the following table to determine the adjusted required BBCs per kilometer for possible port speeds.

   To determine the correct number of BBCs, you multiply the Adjusted BBCs required (determined from the following table) by the distance in kilometers between the switches. An adjustment factor of 1.5 is required to account for FC-VI framing behavior.

Speed in Gbps	BBCs required per kilometer	Adjusted BBCs required (BBCs per km x 1.5)
1	0.5	0.75
2	1	1.5
4	2	3
8	4	6
16	8	12

   For example, to compute the required number of credits for a distance of 30 km on a 4-Gbps link, make the following calculation:

   - Speed in Gbps is 4
   - Adjusted BBCs required is 3
   - Distance in kilometers between switches is 30 km
   - 3 x 30 = 90

2. Issue the following command to enter configuration mode: `config t`
3. Specify the port you are configuring: `interface port-name`
4. Shut down the port: `shutdown`
5. Set the rate mode of the port to `dedicated`:`switchport rate-mode dedicated`
6. Set the speed for the port: `switchport speed speed`

7. Set the buffer-to-buffer credits for the port: `switchport fcrxbbcredit number of buffers`
8. Set the port to E mode: `switchport mode E`
9. Enable the trunk mode for the port: `switchport trunk mode on`
10. Add the ISL virtual storage area networks (VSANs) to the trunk:`switchport trunk allowed vsan 10switchport trunk allowed vsan add 20`
11. Add the port to port channel 1:`channel-group 1`
12. Repeat the previous steps for the matching ISL port on the partner switch in the fabric.

    The following example shows port fc1/41 configured for a distance of 30 km and 8 Gbps:

```
FC_switch_A_1# conf t
FC_switch_A_1# shutdown
FC_switch_A_1# switchport rate-mode dedicated
FC_switch_A_1# switchport speed 8000
FC_switch_A_1# switchport fcrxbbcredit 60
FC_switch_A_1# switchport mode E
FC_switch_A_1# switchport trunk mode on
FC_switch_A_1# switchport trunk allowed vsan 10
FC_switch_A_1# switchport trunk allowed vsan add 20
FC_switch_A_1# channel-group 1
fc1/36 added to port-channel 1 and disabled

FC_switch_B_1# conf t
FC_switch_B_1# shutdown
FC_switch_B_1# switchport rate-mode dedicated
FC_switch_B_1# switchport speed 8000
FC_switch_B_1# switchport fcrxbbcredit 60
FC_switch_B_1# switchport mode E
FC_switch_B_1# switchport trunk mode on
FC_switch_B_1# switchport trunk allowed vsan 10
FC_switch_B_1# switchport trunk allowed vsan add 20
FC_switch_B_1# channel-group 1
fc1/36 added to port-channel 1 and disabled
```

13. Issue the following command on both switches to restart the ports: `no shutdown`
14. Repeat the previous steps for the other ISL ports in the fabric.
15. Add the native VSAN to the port-channel interface on both switches in the same fabric: `interface port-channel number``switchport trunk allowed vsan add native_san_id`
16. Verify configuration of the port-channel:`show interface port-channel number`

    The port channel should have the following attributes:

    - The port-channel is trunking.

- Admin port mode is E, trunk mode is on.
- Speed shows the cumulative value of all the ISL link speeds.

  For example, two ISL ports operating at 4 Gbps should show a speed of 8 Gbps.

- Trunk vsans (admin allowed and active) shows all the allowed VSANs.
- Trunk vsans (up) shows all the allowed VSANs.
- The member list shows all the ISL ports that were added to the port-channel.
- The port VSAN number should be the same as the VSAN that contains the ISLs (usually native vsan 1).

```
FC_switch_A_1(config-if)# show int port-channel 1
port-channel 1 is trunking
    Hardware is Fibre Channel
    Port WWN is 24:01:54:7f:ee:e2:8d:a0
    Admin port mode is E, trunk mode is on
    snmp link state traps are enabled
    Port mode is TE
    Port vsan is 1
    Speed is 8 Gbps
    Trunk vsans (admin allowed and active) (1,10,20)
    Trunk vsans (up)                       (1,10,20)
    Trunk vsans (isolated)                 ()
    Trunk vsans (initializing)             ()
    5 minutes input rate 1154832 bits/sec,144354 bytes/sec, 170
frames/sec
    5 minutes output rate 1299152 bits/sec,162394 bytes/sec, 183
frames/sec
      535724861 frames input,1069616011292 bytes
        0 discards,0 errors
        0 invalid CRC/FCS,0 unknown class
        0 too long,0 too short
      572290295 frames output,1144869385204 bytes
        0 discards,0 errors
      5 input OLS,11  LRR,2 NOS,0 loop inits
      14 output OLS,5 LRR, 0 NOS, 0 loop inits
    Member[1] : fc1/36
    Member[2] : fc1/40
    Interface last changed at Thu Oct 16 11:48:00 2014
```

17. Exit interface configuration on both switches: `end`
18. Copy the updated configuration to the startup configuration on both fabrics: `copy running-config startup-config`

```
FC_switch_A_1(config-if)# end
FC_switch_A_1# copy running-config startup-config

FC_switch_B_1(config-if)# end
FC_switch_B_1# copy running-config startup-config
```

19. Repeat the previous steps on the second switch fabric.

Related information

Port assignments for FC switches when using ONTAP 9.1 and later

Configuring FCIP ports for a single ISL on Cisco 9250i FC switches

You must configure the FCIP switch ports that connect the ISL (E-ports) by creating FCIP profiles and interfaces, and then assigning them to the IPStorage1/1 GbE interface.

This task is only for configurations using a single ISL per switch fabric, using the IPStorage1/1 interface on each switch.

This task must be performed on each FC switch.

Two FCIP profiles are created on each switch:

- Fabric 1
  - FC_switch_A_1 is configured with FCIP profiles 11 and 111.
  - FC_switch_B_1 is configured with FCIP profiles 12 and 121.
- Fabric 2
  - FC_switch_A_2 is configured with FCIP profiles 13 and 131.
  - FC_switch_B_2 is configured with FCIP profiles 14 and 141.

1. Enter configuration mode: `config t`
2. Enable FCIP: `feature fcip`
3. Configure the IPStorage1/1 GbE interface:
   a. Enter configuration mode: `conf t`
   b. Specify the IPStorage1/1 interface: `interface IPStorage1/1`
   c. Specify the IP address and subnet mask: `interface ip-addresssubnet-mask`
   d. Specify the MTU size of 2500: `switchport mtu 2500`
   e. Enable the port: `no shutdown`
   f. Exit configuration mode: `exit`

   The following example shows the configuration of an IPStorage1/1 port:

   +

```
conf t
interface IPStorage1/1
  ip address 192.168.1.201 255.255.255.0
  switchport mtu 2500
  no shutdown
exit
```

4. Configure the FCIP profile for FC-VI traffic:

   a. Configure an FCIP profile and enter FCIP profile configuration mode: `fcip profile FCIP-profile-name`

      The profile name depends on which switch is being configured.

   b. Assign the IP address of the IPStorage1/1 interface to the FCIP profile: `ip address ip-address`

   c. Assign the FCIP profile to TCP port 3227: `port 3227`

   d. Set the TCP settings: `tcp keepalive-timeout 1tcp max-retransmissions 3max-bandwidth-mbps 5000 min-available-bandwidth-mbps 4500 round-trip-time-ms 3tcp min-retransmit-time 200tcp keepalive-timeout 1tcp pmtu-enable reset-timeout 3600tcp sack-enable``no tcp cwm`

   The following example shows the configuration of the FCIP profile:

   +

```
conf t
fcip profile 11
  ip address 192.168.1.333
  port 3227
  tcp keepalive-timeout 1
tcp max-retransmissions 3
max-bandwidth-mbps 5000 min-available-bandwidth-mbps 4500 round-
trip-time-ms 3
  tcp min-retransmit-time 200
  tcp keepalive-timeout 1
  tcp pmtu-enable reset-timeout 3600
  tcp sack-enable
  no tcp cwm
```

5. Configure the FCIP profile for storage traffic:

   a. Configure an FCIP profile with the name 111 and enter FCIP profile configuration mode: `fcip profile 111`

   b. Assign the IP address of the IPStorage1/1 interface to the FCIP profile: `ip address ip-address`

c. Assign the FCIP profile to TCP port 3229: `port 3229`

d. Set the TCP settings: `tcp keepalive-timeout 1tcp max-retransmissions 3max-bandwidth-mbps 5000 min-available-bandwidth-mbps 4500 round-trip-time-ms 3tcp min-retransmit-time 200tcp keepalive-timeout 1tcp pmtu-enable reset-timeout 3600tcp sack-enable``no tcp cwm`

The following example shows the configuration of the FCIP profile:

+

```
conf t
fcip profile 111
  ip address 192.168.1.334
  port 3229
  tcp keepalive-timeout 1
tcp max-retransmissions 3
max-bandwidth-mbps 5000 min-available-bandwidth-mbps 4500 round-
trip-time-ms 3
  tcp min-retransmit-time 200
  tcp keepalive-timeout 1
  tcp pmtu-enable reset-timeout 3600
  tcp sack-enable
  no tcp cwm
```

6. Create the first of two FCIP interfaces: `interface fcip 1`

   This interface is used for FC-IV traffic.

   a. Select the profile 11 created previously: `use-profile 11`

   b. Set the IP address and port of the IPStorage1/1 port on the partner switch: `peer-info ipaddr partner-switch-port-ip port 3227`

   c. Select TCP connection 2: `tcp-connection 2`

   d. Disable compression: `no ip-compression`

   e. Enable the interface: `no shutdown`

   f. Configure the control TCP connection to 48 and the data connection to 26to mark all packets on that differentiated services code point (DSCP) value: `qos control 48 data 26`

   g. Exit the interface configuration mode: `exit`

The following example shows the configuration of the FCIP interface:

+

```
interface fcip  1
  use-profile 11
# the port # listed in this command is the port that the remote
switch is listening on
 peer-info ipaddr 192.168.32.334   port 3227
  tcp-connection 2
  no ip-compression
  no shutdown
  qos control 48 data 26
exit
```

1. Create the second of two FCIP interfaces: `interface fcip 2`

   This interface is used for storage traffic.

   a. Select the profile 111 created previously: `use-profile 111`

   b. Set the IP address and port of the IPStorage1/1 port on the partner switch: `peer-info ipaddr partner-switch-port-ip port 3229`

   c. Select TCP connection 2: `tcp-connection 5`

   d. Disable compression: `no ip-compression`

   e. Enable the interface: `no shutdown`

   f. Configure the control TCP connection to 48 and data connection to 26to mark all packets on that differentiated services code point (DSCP) value: `qos control 48 data 26`

   g. Exit the interface configuration mode: `exit`

The following example shows the configuration of the FCIP interface:

+

```
interface fcip  2
  use-profile 11
# the port # listed in this command is the port that the remote switch
is listening on
 peer-info ipaddr 192.168.32.33e  port 3229
  tcp-connection 5
  no ip-compression
  no shutdown
  qos control 48 data 26
exit
```

1. Configure the switchport settings on the fcip 1 interface:

   a. Enter configuration mode: `config t`

   b. Specify the port you are configuring: `interface fcip 1`

c. Shut down the port: `shutdown`

d. Set the port to E mode: `switchport mode E`

e. Enable the trunk mode for the port: `switchport trunk mode on`

f. Set the trunk allowed vsan to 10: `switchport trunk allowed vsan 10`

g. Set the speed for the port: `switchport speed speed`

2. Configure the switchport settings on the fcip 2 interface:

a. Enter configuration mode: `config t`

b. Specify the port you are configuring: `interface fcip 2`

c. Shut down the port: `shutdown`

d. Set the port to E mode: `switchport mode E`

e. Enable the trunk mode for the port: `switchport trunk mode on`

f. Set the trunk allowed vsan to 20: `switchport trunk allowed vsan 20`

g. Set the speed for the port: `switchport speed speed`

3. Repeat the previous steps on the second switch.

   The only differences are the appropriate IP addresses and unique FCIP profile names.

   - When configuring the first switch fabric, FC_switch_B_1 is configured with FCIP profiles 12 and 121.
   - When configuring the first switch fabric, FC_switch_A_2 is configured with FCIP profiles 13 and 131 and FC_switch_B_2 is configured with FCIP profiles 14 and 141.

4. Restart the ports on both switches: `no shutdown`

5. Exit the interface configuration on both switches: `end`

6. Copy the updated configuration to the startup configuration on both switches: `copy running-config startup-config`

```
FC_switch_A_1(config-if)# end
FC_switch_A_1# copy running-config startup-config

FC_switch_B_1(config-if)# end
FC_switch_B_1# copy running-config startup-config
```

7. Repeat the previous steps on the second switch fabric.

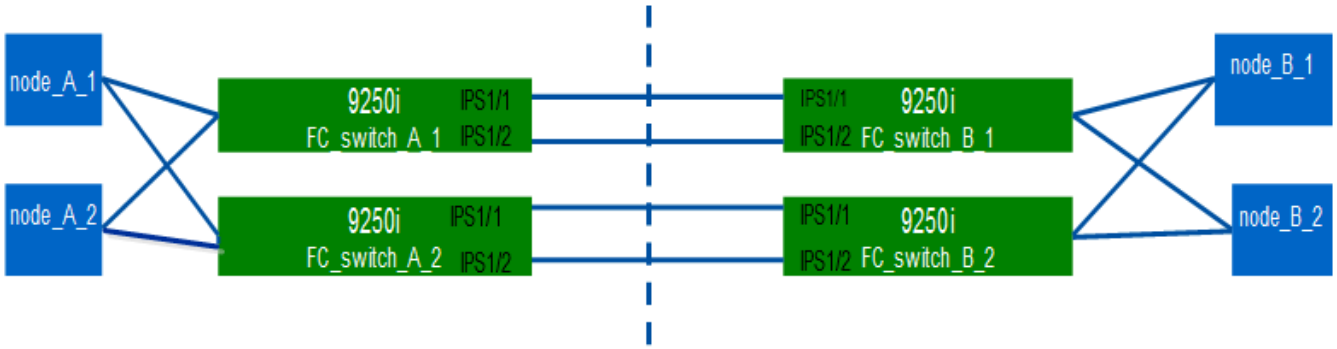
Configuring FCIP ports for a dual ISL on Cisco 9250i FC switches

You must configure the FCIP switch ports that connect the ISL (E-ports) by creating FCIP profiles and interfaces, and then assigning them to the IPStorage1/1 and IPStorage1/2 GbE interfaces.

This task is only for configurations that use a dual ISL per switch fabric, using the IPStorage1/1 and

IPStorage1/2 GbE interfaces on each switch.

This task must be performed on each FC switch.



The task and examples use the following profile configuration table:

Switch fabric	IPStorage interface	IP Address	Port type	FCIP interface	FCIP profile	Port	Peer IP/port	VSAN ID
Fabric 1	FC_switch _A_1	IPStorage 1/1	a.a.a.a	FC-VI	fcip 1	15	3220	c.c.c.c/323 0
10	Fabric 1	FC_switch _A_1	IPStorage 1/1	a.a.a.a	Storage	fcip 2	20	3221
	20	Fabric 1	FC_switch _A_1	IPStorage 1/2	b.b.b.b	FC-VI	fcip 3	25
3222	d.d.d.d/32 32	10	Fabric 1	FC_switch _A_1	IPStorage 1/2	b.b.b.b	Storage	fcip 4
30	3223	d.d.d.d/32 33	20	FC_switch _B_1	IPStorage 1/1	c.c.c.c	FC-VI	fcip 1
15	3230	a.a.a.a/32 20	10	FC_switch _B_1	IPStorage 1/1	c.c.c.c	Storage	fcip 2
20	3231	a.a.a.a/32 21	20	FC_switch _B_1	IPStorage 1/2	d.d.d.d	FC-VI	fcip 3
25	3232	b.b.b.b/32 22	10	FC_switch _B_1	IPStorage 1/2	d.d.d.d	Storage	fcip 4
30	3233	b.b.b.b/32 23	20	Fabric 2	FC_switch _A_2	IPStorage 1/1	e.e.e.e	FC-VI
fcip 1	15	3220	g.g.g.g/32 30	10	Fabric 2	FC_switch _A_2	IPStorage 1/1	e.e.e.e

Switch fabric	IPStorage interface	IP Address	Port type	FCIP interface	FCIP profile	Port	Peer IP/port	VSAN ID
Storage	fcip 2	20	3221	g.g.g.g/32 31	20	Fabric 2	FC_switch _A_2	IPStorage 1/2
f.f.f.f	FC-VI	fcip 3	25	3222	h.h.h.h/32 32	10	Fabric 2	FC_switch _A_2
IPStorage 1/2	f.f.f.f	Storage	fcip 4	30	3223	h.h.h.h/32 33	20	FC_switch _B_2
IPStorage 1/1	g.g.g.g	FC-VI	fcip 1	15	3230	e.e.e.e/32 20	10	FC_switch _B_2
IPStorage 1/1	g.g.g.g	Storage	fcip 2	20	3231	e.e.e.e/32 21	20	FC_switch _B_2
IPStorage 1/2	h.h.h.h	FC-VI	fcip 3	25	3232	f.f.f.f/3222	10	FC_switch _B_2

1. Enter configuration mode: `config t`
2. Enable FCIP: `feature fcip`
3. On each switch, configure the two IPStorage interfaces (IPStorage1/1 and IPStorage1/2):
   a. Enter configuration mode: `conf t`
   b. Specify the IPStorage interface to create: `interface ipstorage`

      The ipstorage parameter value is IPStorage1/1 or IPStorage1/2.

   c. Specify the IP address and subnet mask of the IPStorage interface previously specified: `interface ip-addresssubnet-mask`

      On each switch, the IPStorage interfaces IPStorage1/1 and IPStorage1/2 must have different IP addresses.

   d. Specify the MTU size as 2500: `switchport mtu 2500`
   e. Enable the port: `no shutdown`
   f. Exit configuration mode: `exit`
   g. Repeat steps a through f to configure the IPStorage1/2 GbE interface with a different IP address.
4. Configure the FCIP profiles for FC-VI and storage traffic with the profile names given in the profile configuration table:
   a. Enter configuration mode: `conf t`
   b. Configure the FCIP profiles with the following profile names: `fcip profile FCIP-profile-name`

      The following list provides the values for the FCIP-profile-name parameter:

- 15 for FC-VI on IPStorage1/1
- 20 for storage on IPStorage1/1
- 25 for FC-VI on IPStorage1/2
- 30 for storage on IPStorage1/2

c. Assign the FCIP profile ports according to the profile configuration table: `port port number`

d. Set the TCP settings: `tcp keepalive-timeout 1tcp max-retransmissions 3max-bandwidth-mbps 5000 min-available-bandwidth-mbps 4500 round-trip-time-ms 3tcp min-retransmit-time 200tcp keepalive-timeout 1tcp pmtu-enable reset-timeout 3600tcp sack-enable``no tcp cwm`

5. Create FCIP interfaces: `interface fcip FCIP interface`

   The FCIP interface parameter value is 1, 2, 3, or 4 as given in the profile configuration table.

   a. Map interfaces to the previously created profiles: `use-profile profile`

   b. Set the peer IP address and peer profile port number: `peer-info peer IPstorage ipaddrpeer profile port number`

   c. Select the TCP connections: `tcp-connection connection \#`

      The connection # parameter value is 2 for FC-VI profiles and 5 for storage profiles.

   d. Disable compression: `no ip-compression`

   e. Enable the interface: `no shutdown`

   f. Configure the control TCP connection to 48 and the data connection to 26to mark all packets that have differentiated services code point (DSCP) value: `qos control 48 data 26`

   g. Exit configuration mode: `exit`

6. Configure the switchport settings on each FCIP interface:

   a. Enter configuration mode: `config t`

   b. Specify the port that you are configuring: `interface fcip 1`

   c. Shut down the port: `shutdown`

   d. Set the port to E mode: `switchport mode E`

   e. Enable the trunk mode for the port: `switchport trunk mode on`

   f. Specify the trunk that is allowed on a specific VSAN: `switchport trunk allowed vsan vsan`

      The vsan parameter value is VSAN 10 for FC-VI profiles and VSAN 20 for storage profiles.

   g. Set the speed for the port: `switchport speed speed`

   h. Exit configuration mode: `exit`

7. Copy the updated configuration to the startup configuration on both switches: `copy running-config startup-config`

The following examples show the configuration of FCIP ports for a dual ISL in fabric 1 switches FC_switch_A_1 and FC_switch_B_1.

For FC_switch_A_1:

```
FC_switch_A_1# config t
FC_switch_A_1(config)# no in-order-guarantee vsan 10
FC_switch_A_1(config-vsan-db)# end
FC_switch_A_1# copy running-config startup-config

# fcip settings

feature  fcip

conf t
interface IPStorage1/1
#  IP address:  a.a.a.a
#  Mask:  y.y.y.y
  ip address <a.a.a.a   y.y.y.y>
  switchport mtu 2500
  no shutdown
exit
conf t
fcip profile 15
  ip address <a.a.a.a>
  port 3220
  tcp keepalive-timeout 1
tcp max-retransmissions 3
max-bandwidth-mbps 5000 min-available-bandwidth-mbps 4500 round-trip-time-
ms 3
  tcp min-retransmit-time 200
  tcp keepalive-timeout 1
  tcp pmtu-enable reset-timeout 3600
  tcp sack-enable
  no tcp cwm

conf t
fcip profile 20
  ip address <a.a.a.a>
  port 3221
  tcp keepalive-timeout 1
tcp max-retransmissions 3
max-bandwidth-mbps 5000 min-available-bandwidth-mbps 4500 round-trip-time-
ms 3
  tcp min-retransmit-time 200
  tcp keepalive-timeout 1
  tcp pmtu-enable reset-timeout 3600
  tcp sack-enable
  no tcp cwm
```

```
conf t
interface IPStorage1/2
#  IP address:  b.b.b.b
#  Mask:  y.y.y.y
  ip address <b.b.b.b   y.y.y.y>
  switchport mtu 2500
  no shutdown
exit

conf t
fcip profile 25
  ip address <b.b.b.b>
  port 3222
tcp keepalive-timeout 1
tcp max-retransmissions 3
max-bandwidth-mbps 5000 min-available-bandwidth-mbps 4500 round-trip-time-
ms 3
  tcp min-retransmit-time 200
  tcp keepalive-timeout 1
  tcp pmtu-enable reset-timeout 3600
  tcp sack-enable
  no tcp cwm

conf t
fcip profile 30
  ip address <b.b.b.b>
  port 3223
tcp keepalive-timeout 1
tcp max-retransmissions 3
max-bandwidth-mbps 5000 min-available-bandwidth-mbps 4500 round-trip-time-
ms 3
  tcp min-retransmit-time 200
  tcp keepalive-timeout 1
  tcp pmtu-enable reset-timeout 3600
  tcp sack-enable
  no tcp cwm
interface fcip  1
  use-profile 15
# the port # listed in this command is the port that the remote switch is
listening on
 peer-info ipaddr <c.c.c.c>  port 3230
  tcp-connection 2
  no ip-compression
  no shutdown
  qos control 48 data 26
```

```
exit

interface fcip  2
  use-profile 20
# the port # listed in this command is the port that the remote switch is
listening on
 peer-info ipaddr <c.c.c.c>  port 3231
  tcp-connection 5
  no ip-compression
  no shutdown
  qos control 48 data 26
exit

interface fcip  3
  use-profile 25
# the port # listed in this command is the port that the remote switch is
listening on
 peer-info ipaddr < d.d.d.d >  port 3232
  tcp-connection 2
  no ip-compression
  no shutdown
  qos control 48 data 26
exit

interface fcip  4
  use-profile 30
# the port # listed in this command is the port that the remote switch is
listening on
 peer-info ipaddr < d.d.d.d >  port 3233
  tcp-connection 5
  no ip-compression
  no shutdown
  qos control 48 data 26
exit

conf t
interface fcip  1
shutdown
switchport mode E
switchport trunk mode on
switchport trunk allowed vsan 10
no shutdown
exit

conf t
interface fcip  2
```

```
shutdown
switchport mode E
switchport trunk mode on
switchport trunk allowed vsan 20
no shutdown
exit

conf t
interface fcip  3
shutdown
switchport mode E
switchport trunk mode on
switchport trunk allowed vsan 10
no shutdown
exit

conf t
interface fcip  4
shutdown
switchport mode E
switchport trunk mode on
switchport trunk allowed vsan 20
no shutdown
exit
```

For FC_switch_B_1:

```
FC_switch_A_1# config t
FC_switch_A_1(config)# in-order-guarantee vsan 10
FC_switch_A_1(config-vsan-db)# end
FC_switch_A_1# copy running-config startup-config

# fcip settings

feature  fcip

conf t
interface IPStorage1/1
#  IP address:  c.c.c.c
#  Mask:  y.y.y.y
  ip address <c.c.c.c   y.y.y.y>
  switchport mtu 2500
  no shutdown
exit

conf t
```

```
fcip profile 15
  ip address <c.c.c.c>
  port 3230
  tcp keepalive-timeout 1
tcp max-retransmissions 3
max-bandwidth-mbps 5000 min-available-bandwidth-mbps 4500 round-trip-time-
ms 3
  tcp min-retransmit-time 200
  tcp keepalive-timeout 1
  tcp pmtu-enable reset-timeout 3600
  tcp sack-enable
  no tcp cwm

conf t
fcip profile 20
  ip address <c.c.c.c>
  port 3231
  tcp keepalive-timeout 1
tcp max-retransmissions 3
max-bandwidth-mbps 5000 min-available-bandwidth-mbps 4500 round-trip-time-
ms 3
  tcp min-retransmit-time 200
  tcp keepalive-timeout 1
  tcp pmtu-enable reset-timeout 3600
  tcp sack-enable
  no tcp cwm

conf t
interface IPStorage1/2
#  IP address:  d.d.d.d
#  Mask:  y.y.y.y
  ip address <b.b.b.b   y.y.y.y>
  switchport mtu 2500
  no shutdown
exit

conf t
fcip profile 25
  ip address <d.d.d.d>
  port 3232
tcp keepalive-timeout 1
tcp max-retransmissions 3
max-bandwidth-mbps 5000 min-available-bandwidth-mbps 4500 round-trip-time-
ms 3
  tcp min-retransmit-time 200
  tcp keepalive-timeout 1
```

```
  tcp pmtu-enable reset-timeout 3600
  tcp sack-enable
  no tcp cwm

conf t
fcip profile 30
  ip address <d.d.d.d>
  port 3233
tcp keepalive-timeout 1
tcp max-retransmissions 3
max-bandwidth-mbps 5000 min-available-bandwidth-mbps 4500 round-trip-time-
ms 3
  tcp min-retransmit-time 200
  tcp keepalive-timeout 1
  tcp pmtu-enable reset-timeout 3600
  tcp sack-enable
  no tcp cwm

interface fcip  1
  use-profile 15
# the port # listed in this command is the port that the remote switch is
listening on
 peer-info ipaddr <a.a.a.a>  port 3220
  tcp-connection 2
  no ip-compression
  no shutdown
  qos control 48 data 26
exit

interface fcip  2
  use-profile 20
# the port # listed in this command is the port that the remote switch is
listening on
 peer-info ipaddr <a.a.a.a>  port 3221
  tcp-connection 5
  no ip-compression
  no shutdown
  qos control 48 data 26
exit

interface fcip  3
  use-profile 25
# the port # listed in this command is the port that the remote switch is
listening on
 peer-info ipaddr < b.b.b.b >  port 3222
  tcp-connection 2
```

```
  no ip-compression
  no shutdown
  qos control 48 data 26
exit

interface fcip  4
  use-profile 30
# the port # listed in this command is the port that the remote switch is
listening on
 peer-info ipaddr < b.b.b.b >  port 3223
  tcp-connection 5
  no ip-compression
  no shutdown
  qos control 48 data 26
exit

conf t
interface fcip  1
shutdown
switchport mode E
switchport trunk mode on
switchport trunk allowed vsan 10
no shutdown
exit

conf t
interface fcip  2
shutdown
switchport mode E
switchport trunk mode on
switchport trunk allowed vsan 20
no shutdown
exit

conf t
interface fcip  3
shutdown
switchport mode E
switchport trunk mode on
switchport trunk allowed vsan 10
no shutdown
exit

conf t
interface fcip  4
shutdown
```

```
switchport mode E
switchport trunk mode on
switchport trunk allowed vsan 20
no shutdown
exit
```

Configuring zoning on a Cisco FC switch

You must assign the switch ports to separate zones to isolate storage (HBA) and controller (FC-VI) traffic.

These steps must be performed on both FC switch fabrics.

The following steps use the zoning described in the section Zoning for a FibreBridge 7500N in a four-node MetroCluster configuration.

Zoning for FC-VI ports

1. Clear the existing zones and zone set, if present.

   a. Determine which zones and zone sets are active: `show zoneset active`

   ```
   FC_switch_A_1# show zoneset active

   FC_switch_B_1# show zoneset active
   ```

   b. Disable the active zone sets identified in the previous step: `no zoneset activate name zoneset_name vsan vsan_id`

   The following example shows two zone sets being disabled:

   - ZoneSet_A on FC_switch_A_1 in VSAN 10
   - ZoneSet_B on FC_switch_B_1 in VSAN 20

   ```
   FC_switch_A_1# no zoneset activate name ZoneSet_A vsan 10

   FC_switch_B_1# no zoneset activate name ZoneSet_B vsan 20
   ```

   a. After all zone sets are deactivated, clear the zone database: `clear zone database zone-name`

   ```
   FC_switch_A_1# clear zone database 10
   FC_switch_A_1# copy running-config startup-config

   FC_switch_B_1# clear zone database 20
   FC_switch_B_1# copy running-config startup-config
   ```

2. Obtain the switch worldwide name (WWN): `show wwn switch`
3. Configure the basic zone settings:
   a. Set the default zoning policy to permit: `no system default zone default-zone permit`
   b. Enable the full zone distribution: `system default zone distribute full`
   c. Set the default zoning policy for each VSAN: `no zone default-zone permit vsanid`
   d. Set the default full zone distribution for each VSAN: `zoneset distribute full vsanid`

```
FC_switch_A_1# conf t
FC_switch_A_1(config)# no system default zone default-zone permit
FC_switch_A_1(config)# system default zone distribute full
FC_switch_A_1(config)# no zone default-zone permit 10
FC_switch_A_1(config)# no zone default-zone permit 20
FC_switch_A_1(config)# zoneset distribute full vsan 10
FC_switch_A_1(config)# zoneset distribute full vsan 20
FC_switch_A_1(config)# end
FC_switch_A_1# copy running-config startup-config

FC_switch_B_1# conf t
FC_switch_B_1(config)# no system default zone default-zone permit
FC_switch_B_1(config)# system default zone distribute full
FC_switch_B_1(config)# no zone default-zone permit 10
FC_switch_B_1(config)# no zone default-zone permit 20
FC_switch_B_1(config)# zoneset distribute full vsan 10
FC_switch_B_1(config)# zoneset distribute full vsan 20
FC_switch_B_1(config)# end
FC_switch_B_1# copy running-config startup-config
```

4. Create storage zones and add the storage ports to them.

   These steps only need to be performed on one switch in each fabric.

   The zoning depends on the model FC-to-SAS bridge you are using. For details, see the section for your model bridge. The examples show Brocade switch ports, so adjust your ports accordingly.

   - Zoning for FibreBridge 6500N bridges, or FibreBridge 7500N or 7600N bridges using one FC port
   - Zoning for FibreBridge 7500N bridges using both FC ports Each storage zone contains the HBA initiator ports from all controllers and one single port connecting an FC-to-SAS bridge.
     a. Create the storage zones: `zone name STOR_zone-name vsan vsanid`
     b. Add storage ports to the zone: `member portswitch WWN`
     c. Activate the zone set: `zoneset activate name STOR_zonenameesetname vsan vsanid`

```
FC_switch_A_1# conf t
FC_switch_A_1(config)# zone name STOR_Zone_1_20_25 vsan 20
FC_switch_A_1(config-zone)# member interface fc1/5 swwn
20:00:00:05:9b:24:cb:78
FC_switch_A_1(config-zone)# member interface fc1/9 swwn
20:00:00:05:9b:24:cb:78
FC_switch_A_1(config-zone)# member interface fc1/17 swwn
20:00:00:05:9b:24:cb:78
FC_switch_A_1(config-zone)# member interface fc1/21 swwn
20:00:00:05:9b:24:cb:78
FC_switch_A_1(config-zone)# member interface fc1/5 swwn
20:00:00:05:9b:24:12:99
FC_switch_A_1(config-zone)# member interface fc1/9 swwn
20:00:00:05:9b:24:12:99
FC_switch_A_1(config-zone)# member interface fc1/17 swwn
20:00:00:05:9b:24:12:99
FC_switch_A_1(config-zone)# member interface fc1/21 swwn
20:00:00:05:9b:24:12:99
FC_switch_A_1(config-zone)# member interface fc1/25 swwn
20:00:00:05:9b:24:cb:78
FC_switch_A_1(config-zone)# end
FC_switch_A_1# copy running-config startup-config
```

5. Create a storage zone set and add the storage zones to the new set.

   You only need to perform these steps on one switch in the fabric.

   a. Create the storage zone set: `zoneset name STOR_zonesetname vsan vsanid`

   b. Add storage zones to the zone set: `member STOR_zonename`

   c. Activate the zone set: `zoneset activate name STOR_zonesetname vsan vsanid`

```
FC_switch_A_1# conf t
FC_switch_A_1(config)# zoneset name STORI_Zoneset_1_20 vsan 20
FC_switch_A_1(config-zoneset)# member STOR_Zone_1_20_25
...
FC_switch_A_1(config-zoneset)# exit
FC_switch_A_1(config)# zoneset activate name STOR_ZoneSet_1_20 vsan
20
FC_switch_A_1(config)# exit
FC_switch_A_1# copy running-config startup-config
```

6. Create FCVI zones and add the FCVI ports to them.

   Each FCVI zone contains the FCVI ports from all the controllers of one DR Group.

These steps only need to be performed on one switch in each fabric.

The zoning depends on the model FC-to-SAS bridge you are using. For details, see the section for your model bridge. The examples show Brocade switch ports, so adjust your ports accordingly.

- Zoning for FibreBridge 6500N bridges, or FibreBridge 7500N or 7600N bridges using one FC port
- Zoning for FibreBridge 7500N bridges using both FC ports Each storage zone contains the HBA initiator ports from all controllers and one single port connecting an FC-to-SAS bridge.
  a. Create the FCVI zones: `zone name FCVI_zone-name vsan vsanid`
  b. Add FCVI ports to the zone: `member FCVI zone-name`
  c. Activate the zone set: `zoneset activate name FCVI_zonenameesetname vsan vsanid`

```
FC_switch_A_1# conf t
FC_switch_A_1(config)# zone name FCVI_Zone_1_10_25 vsan 10
FC_switch_A_1(config-zone)# member interface fc1/1
swwn20:00:00:05:9b:24:cb:78
FC_switch_A_1(config-zone)# member interface fc1/2
swwn20:00:00:05:9b:24:cb:78
FC_switch_A_1(config-zone)# member interface fc1/1
swwn20:00:00:05:9b:24:12:99
FC_switch_A_1(config-zone)# member interface fc1/2
swwn20:00:00:05:9b:24:12:99
FC_switch_A_1(config-zone)# end
FC_switch_A_1# copy running-config startup-config
```

7. Create an FCVI zone set and add the FCVI zones to it:

   These steps only need to be performed on one switch in the fabric.

   a. Create the FCVI zone set: `zoneset name FCVI_zonesetname vsan vsanid`
   b. Add FCVI zones to the zone set: `member FCVI_zonename`
   c. Activate the zone set: `zoneset activate name FCVI_zonesetname vsan vsanid`

```
FC_switch_A_1# conf t
FC_switch_A_1(config)# zoneset name FCVI_Zoneset_1_10 vsan 10
FC_switch_A_1(config-zoneset)# member FCVI_Zone_1_10_25
FC_switch_A_1(config-zoneset)# member FCVI_Zone_1_10_29
    ...
FC_switch_A_1(config-zoneset)# exit
FC_switch_A_1(config)# zoneset activate name FCVI_ZoneSet_1_10 vsan 10
FC_switch_A_1(config)# exit
FC_switch_A_1# copy running-config startup-config
```

8. Verify the zoning: `show zone`

9. Repeat the previous steps on the second FC switch fabric.

Ensuring the FC switch configuration is saved

You must make sure the FC switch configuration is saved to the startup config on all switches.

1. Issue the following command on both FC switch fabrics:`copy running-config startup-config`

```
FC_switch_A_1# copy running-config startup-config

FC_switch_B_1# copy running-config startup-config
```