



Preparing for switchback in a MetroCluster FC configuration

ONTAP MetroCluster

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Preparing for switchback in a MetroCluster FC configuration

You must perform certain tasks in order to prepare the MetroCluster FC configuration for the switchback operation.

Verifying port configuration (MetroCluster FC configurations only)

You must set the environmental variables on the node and then power it off to prepare it for MetroCluster configuration.

This procedure is performed with the replacement controller modules in Maintenance mode.

The steps to check configuration of ports is needed only on systems in which FC or CNA ports are used in initiator mode.

1. In Maintenance mode, enter the following command to restore the FC port configuration: `ucadmin modify -m fc -t initiatoradapter_name`

If you only want to use one of a port pair in the initiator configuration, enter a precise adapter_name.

2. Take one of the following actions, depending on your configuration:

| If the FC port configuration is... | Then... |
|------------------------------------|--|
| The same for both ports | Answer <code>y</code> when prompted by the system since modifying one port in a port pair modifies the other port as well. |
| Different | <ol style="list-style-type: none">a. Answer <code>n</code> when prompted by the system.b. Enter the following command to restore the FC port configuration: <code>ucadmin modify -m fc -t initiator targetadapter_name</code> |

3. Exit Maintenance mode by entering the following command: `halt`

After you issue the command, wait until the system stops at the LOADER prompt.

4. Boot the node back into Maintenance mode for the configuration changes to take effect: `boot_ontap maint`
5. Verify the values of the variables by entering the following command: `ucadmin show`
6. Exit Maintenance mode and display the LOADER prompt:`halt`

Configuring the FC-to-SAS bridges (MetroCluster FC configurations only)

If you replaced the FC-to-SAS bridges, you must configure them when restoring the MetroCluster configuration. The procedure is identical to the initial configuration of an FC-to-SAS bridge.

1. Power on the FC-to-SAS bridges.
2. Set the IP address on the Ethernet ports by using the `set IPAddressportipaddress` command.

port can be either MP1 or MP2.

ipaddress can be an IP address in the format xxx.xxx.xxx.xxx.

In the following example, the IP address is 10.10.10.55 on Ethernet port 1:

```
Ready.  
set IPAddress MP1 10.10.10.55  
  
Ready. *
```

3. Set the IP subnet mask on the Ethernet ports by using the `set IPSubnetMaskportmask` command.

port can be MP1 or MP2.

mask can be a subnet mask in the format xxx.xxx.xxx.xxx.

In the following example, the IP subnet mask is 255.255.255.0 on Ethernet port 1:

```
Ready.  
set IPSubnetMask MP1 255.255.255.0  
  
Ready. *
```

4. Set the speed on the Ethernet ports by using the `set EthernetSpeedportspeed` command.

port can be MP1 or MP2.

speed can be 100, 1000, or auto.

In the following example, the Ethernet speed is set to 1000 on Ethernet port 1.

```
Ready.  
set EthernetSpeed MP1 1000  
  
Ready. *
```

5. Save the configuration by using the saveConfiguration command, and restart the bridge when prompted to do so.

Saving the configuration after configuring the Ethernet ports enables you to proceed with the bridge configuration using Telnet and enables you to access the bridge using FTP to perform firmware updates.

The following example shows the saveConfiguration command and the prompt to restart the bridge.

```
Ready.  
SaveConfiguration  
  Restart is necessary....  
  Do you wish to restart (y/n) ?  
Confirm with 'y'. The bridge will save and restart with the new  
settings.
```

6. After the FC-to-SAS bridge reboots, log in again.
7. Set the speed on the FC ports by using the set fcdatarateportspeed command.

port can be 1 or 2.

speed can be 2 Gb, 4 Gb, 8 Gb, or 16 Gb, depending on your model bridge.

In the following example, the port FC1 speed is set to 8 Gb.

```
Ready.  
set fcdatarate 1 8Gb  
  
Ready. *
```

8. Set the topology on the FC ports by using the set FCConnModeportmode command.

port can be 1 or 2.

mode can be ptp, loop, ptp-loop, or auto.

In the following example, the port FC1 topology is set to ptp.

```
Ready.  
set FCConnMode 1 ptp  
  
Ready. *
```

9. Save the configuration by using the saveConfiguration command, and restart the bridge when prompted to do so.

The following example shows the saveConfiguration command and the prompt to restart the bridge.

```
Ready.  
SaveConfiguration  
Restart is necessary....  
Do you wish to restart (y/n) ?  
Confirm with 'y'. The bridge will save and restart with the new  
settings.
```

10. After the FC-to-SAS bridge reboots, log in again.

11. If the FC-to-SAS bridge is running firmware 1.60 or later, enable SNMP.

```
Ready.  
set snmp enabled  
  
Ready. *  
saveconfiguration  
  
Restart is necessary....  
Do you wish to restart (y/n) ?  
  
Verify with 'y' to restart the FibreBridge.
```

12. Power off the FC-to-SAS bridges.

Configuring the FC switches (MetroCluster FC configurations only)

If you have replaced the FC switches in the disaster site, you must configure them using the vendor-specific procedures. You must configure one switch, verify that storage access on the surviving site is not impacted, and then configure the second switch.

Related information

[Configuring a Brocade FC switch after site disaster](#)

[Configuring a Cisco FC switch after site disaster](#)

[Port assignments for FC switches when using ONTAP 9.0](#)

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

Configuring a Brocade FC switch after site disaster

You must use this Brocade-specific procedure to configure the replacement switch and enable the ISL ports.

The examples in this procedure are based on the following assumptions:

- Site A is the disaster site.
- FC_switch_A_1 has been replaced.
- FC_switch_A_2 has been replaced.
- Site B is the surviving site.
- FC_switch_B_1 is healthy.
- FC_switch_B_2 is healthy.

You must verify that you are using the specified port assignments when you cable the FC switches:

- [Port assignments for FC switches when using ONTAP 9.0](#)
- [Port assignments for FC switches when using ONTAP 9.1 and later](#)

The examples show two FC-to-SAS bridges. If you have more bridges, you must disable and subsequently enable the additional ports.

1. Boot and pre-configure the new switch:

- Power up the new switch and let it boot up.
- Check the firmware version on the switch to confirm it matches the version of the other FC switches:
`firmwareShow`
- Configure the new switch as described in the *MetroCluster Installation and Configuration Guide*, skipping the steps for configuring zoning on the switch.

[Fabric-attached MetroCluster installation and configuration](#)

[Stretch MetroCluster installation and configuration](#)

- Disable the switch persistently: `switchcfgpersistentdisable`

The switch will remain disabled after a reboot or fastboot. If this command is not available, you should 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
```

2. Complete configuration of the new switch:

- Enable the ISLs on the surviving site: `portcfgpersistentenable port-number`

```
FC_switch_B_1:admin> portcfgpersistentenable 10
FC_switch_B_1:admin> portcfgpersistentenable 11
```

- b. Enable the ISLs on the replacement switches: `portcfgpersistentenable port-number`

```
FC_switch_A_1:admin> portcfgpersistentenable 10
FC_switch_A_1:admin> portcfgpersistentenable 11
```

- c. On the replacement switch (FC_switch_A_1 in our example) verify that the ISL's are online: `switchshow`

```
FC_switch_A_1:admin> switchshow
switchName: FC_switch_A_1
switchType: 71.2
switchState: Online
switchMode: Native
switchRole: Principal
switchDomain: 4
switchId: fffc03
switchWwn: 10:00:00:05:33:8c:2e:9a
zoning: OFF
switchBeacon: OFF

Index Port Address Media Speed State Proto
=====
...
10 10 030A00 id 16G Online FC E-Port
10:00:00:05:33:86:89:cb "FC_switch_A_1"
11 11 030B00 id 16G Online FC E-Port
10:00:00:05:33:86:89:cb "FC_switch_A_1" (downstream)
...
```

3. Persistently enable the switch: `switchcfgpersistentenable`
4. Verify that the ports are online: `switchshow`

Configuring a Cisco FC switch after site disaster

You must use the Cisco-specific procedure to configure the replacement switch and enable the ISL ports.

The examples in this procedure are based on the following assumptions:

- Site A is the disaster site.
- FC_switch_A_1 has been replaced.
- FC_switch_A_2 has been replaced.
- Site B is the surviving site.
- FC_switch_B_1 is healthy.

- FC_switch_B_2 is healthy.

1. Configure the switch:

- a. Refer to the *Fabric-attached MetroCluster Installation and Configuration Guide*.

[Fabric-attached MetroCluster installation and configuration](#)

- b. Follow the steps for configuring the switch in the [Configuring the Cisco FC switches](#) section, *except* for the “Configuring zoning on a Cisco FC switch” section:

Zoning is configured later in this procedure.

2. On the healthy switch (in this example, FC_switch_B_1), enable the ISL ports.

The following example shows the commands to enable the ports:

```
FC_switch_B_1# conf t
FC_switch_B_1(config)# int fc1/14-15
FC_switch_B_1(config)# no shut
FC_switch_B_1(config)# end
FC_switch_B_1# copy running-config startup-config
FC_switch_B_1#
```

3. Verify that the ISL ports are up by using the show interface brief command.

4. Retrieve the zoning information from the fabric.

The following example shows the commands to distribute the zoning configuration:

```
FC_switch_B_1(config-zone)# zoneset distribute full vsan 10
FC_switch_B_1(config-zone)# zoneset distribute full vsan 20
FC_switch_B_1(config-zone)# end
```

FC_switch_B_1 is distributed to all other switches in the fabric for vsan 10 and vsan 20, and the zoning information is retrieved from FC_switch_A_1.

5. On the healthy switch, verify that the zoning information is properly retrieved from the partner switch:

`show zone`

```

FC_switch_B_1# show zone
zone name FC-VI_Zone_1_10 vsan 10
  interface fc1/1 swwn 20:00:54:7f:ee:e3:86:50
  interface fc1/2 swwn 20:00:54:7f:ee:e3:86:50
  interface fc1/1 swwn 20:00:54:7f:ee:b8:24:c0
  interface fc1/2 swwn 20:00:54:7f:ee:b8:24:c0

zone name STOR_Zone_1_20_25A vsan 20
  interface fc1/5 swwn 20:00:54:7f:ee:e3:86:50
  interface fc1/8 swwn 20:00:54:7f:ee:e3:86:50
  interface fc1/9 swwn 20:00:54:7f:ee:e3:86:50
  interface fc1/10 swwn 20:00:54:7f:ee:e3:86:50
  interface fc1/11 swwn 20:00:54:7f:ee:e3:86:50
  interface fc1/8 swwn 20:00:54:7f:ee:b8:24:c0
  interface fc1/9 swwn 20:00:54:7f:ee:b8:24:c0
  interface fc1/10 swwn 20:00:54:7f:ee:b8:24:c0
  interface fc1/11 swwn 20:00:54:7f:ee:b8:24:c0

zone name STOR_Zone_1_20_25B vsan 20
  interface fc1/8 swwn 20:00:54:7f:ee:e3:86:50
  interface fc1/9 swwn 20:00:54:7f:ee:e3:86:50
  interface fc1/10 swwn 20:00:54:7f:ee:e3:86:50
  interface fc1/11 swwn 20:00:54:7f:ee:e3:86:50
  interface fc1/5 swwn 20:00:54:7f:ee:b8:24:c0
  interface fc1/8 swwn 20:00:54:7f:ee:b8:24:c0
  interface fc1/9 swwn 20:00:54:7f:ee:b8:24:c0
  interface fc1/10 swwn 20:00:54:7f:ee:b8:24:c0
  interface fc1/11 swwn 20:00:54:7f:ee:b8:24:c0
FC_switch_B_1#

```

6. Determine the worldwide names (WWNs) of the switches in the switch fabric.

In this example, the two switch WWNs are as follows:

- FC_switch_A_1: 20:00:54:7f:ee:b8:24:c0
- FC_switch_B_1: 20:00:54:7f:ee:c6:80:78

```

FC_switch_B_1# show wwn switch
Switch WWN is 20:00:54:7f:ee:c6:80:78
FC_switch_B_1#

FC_switch_A_1# show wwn switch
Switch WWN is 20:00:54:7f:ee:b8:24:c0
FC_switch_A_1#

```

7. Enter configuration mode for the zone and remove zone members that do not belong to the switch WWNs of the two switches: `no member interface interface-ide swwn wwn`

In this example, the following members are not associated with the WWN of either of the switches in the fabric and must be removed:

- Zone name FC-VI_Zone_1_10 vsan 10
 - Interface fc1/1 swwn 20:00:54:7f:ee:e3:86:50
 - Interface fc1/2 swwn 20:00:54:7f:ee:e3:86:50 **Note:** AFF A700 and FAS9000 systems support four FC-VI ports. You must remove all four ports from the FC-VI zone.
- Zone name STOR_Zone_1_20_25A vsan 20
 - Interface fc1/5 swwn 20:00:54:7f:ee:e3:86:50
 - Interface fc1/8 swwn 20:00:54:7f:ee:e3:86:50
 - Interface fc1/9 swwn 20:00:54:7f:ee:e3:86:50
 - Interface fc1/10 swwn 20:00:54:7f:ee:e3:86:50
 - Interface fc1/11 swwn 20:00:54:7f:ee:e3:86:50
- Zone name STOR_Zone_1_20_25B vsan 20
 - Interface fc1/8 swwn 20:00:54:7f:ee:e3:86:50
 - Interface fc1/9 swwn 20:00:54:7f:ee:e3:86:50
 - Interface fc1/10 swwn 20:00:54:7f:ee:e3:86:50
 - Interface fc1/11 swwn 20:00:54:7f:ee:e3:86:50 The following example shows the removal of these interfaces:

```

FC_switch_B_1# conf t
FC_switch_B_1(config)# zone name FC-VI_Zone_1_10 vsan 10
FC_switch_B_1(config-zone)# no member interface fc1/1 swwn
20:00:54:7f:ee:e3:86:50
FC_switch_B_1(config-zone)# no member interface fc1/2 swwn
20:00:54:7f:ee:e3:86:50
FC_switch_B_1(config-zone)# zone name STOR_Zone_1_20_25A vsan 20
FC_switch_B_1(config-zone)# no member interface fc1/5 swwn
20:00:54:7f:ee:e3:86:50
FC_switch_B_1(config-zone)# no member interface fc1/8 swwn
20:00:54:7f:ee:e3:86:50
FC_switch_B_1(config-zone)# no member interface fc1/9 swwn
20:00:54:7f:ee:e3:86:50
FC_switch_B_1(config-zone)# no member interface fc1/10 swwn
20:00:54:7f:ee:e3:86:50
FC_switch_B_1(config-zone)# no member interface fc1/11 swwn
20:00:54:7f:ee:e3:86:50
FC_switch_B_1(config-zone)# zone name STOR_Zone_1_20_25B vsan 20
FC_switch_B_1(config-zone)# no member interface fc1/8 swwn
20:00:54:7f:ee:e3:86:50
FC_switch_B_1(config-zone)# no member interface fc1/9 swwn
20:00:54:7f:ee:e3:86:50
FC_switch_B_1(config-zone)# no member interface fc1/10 swwn
20:00:54:7f:ee:e3:86:50
FC_switch_B_1(config-zone)# no member interface fc1/11 swwn
20:00:54:7f:ee:e3:86:50
FC_switch_B_1(config-zone)# save running-config startup-config
FC_switch_B_1(config-zone)# zoneset distribute full 10
FC_switch_B_1(config-zone)# zoneset distribute full 20
FC_switch_B_1(config-zone)# end
FC_switch_B_1# copy running-config startup-config

```

1. Add the ports of the new switch to the zones.

The following example assumes that the cabling on the replacement switch is the same as on the old switch:

```

FC_switch_B_1# conf t
FC_switch_B_1(config)# zone name FC-VI_Zone_1_10 vsan 10
FC_switch_B_1(config-zone)# member interface fc1/1 swwn
20:00:54:7f:ee:c6:80:78
FC_switch_B_1(config-zone)# member interface fc1/2 swwn
20:00:54:7f:ee:c6:80:78
FC_switch_B_1(config-zone)# zone name STOR_Zone_1_20_25A vsan 20
FC_switch_B_1(config-zone)# member interface fc1/5 swwn
20:00:54:7f:ee:c6:80:78
FC_switch_B_1(config-zone)# member interface fc1/8 swwn
20:00:54:7f:ee:c6:80:78
FC_switch_B_1(config-zone)# member interface fc1/9 swwn
20:00:54:7f:ee:c6:80:78
FC_switch_B_1(config-zone)# member interface fc1/10 swwn
20:00:54:7f:ee:c6:80:78
FC_switch_B_1(config-zone)# member interface fc1/11 swwn
20:00:54:7f:ee:c6:80:78
FC_switch_B_1(config-zone)# zone name STOR_Zone_1_20_25B vsan 20
FC_switch_B_1(config-zone)# member interface fc1/8 swwn
20:00:54:7f:ee:c6:80:78
FC_switch_B_1(config-zone)# member interface fc1/9 swwn
20:00:54:7f:ee:c6:80:78
FC_switch_B_1(config-zone)# member interface fc1/10 swwn
20:00:54:7f:ee:c6:80:78
FC_switch_B_1(config-zone)# member interface fc1/11 swwn
20:00:54:7f:ee:c6:80:78
FC_switch_B_1(config-zone)# save running-config startup-config
FC_switch_B_1(config-zone)# zoneset distribute full 10
FC_switch_B_1(config-zone)# zoneset distribute full 20
FC_switch_B_1(config-zone)# end
FC_switch_B_1# copy running-config startup-config

```

2. Verify that the zoning is properly configured: `show zone`

The following example output shows the three zones:

```

FC_switch_B_1# show zone
zone name FC-VI_Zone_1_10 vsan 10
  interface fc1/1 swwn 20:00:54:7f:ee:c6:80:78
  interface fc1/2 swwn 20:00:54:7f:ee:c6:80:78
  interface fc1/1 swwn 20:00:54:7f:ee:b8:24:c0
  interface fc1/2 swwn 20:00:54:7f:ee:b8:24:c0

zone name STOR_Zone_1_20_25A vsan 20
  interface fc1/5 swwn 20:00:54:7f:ee:c6:80:78
  interface fc1/8 swwn 20:00:54:7f:ee:c6:80:78
  interface fc1/9 swwn 20:00:54:7f:ee:c6:80:78
  interface fc1/10 swwn 20:00:54:7f:ee:c6:80:78
  interface fc1/11 swwn 20:00:54:7f:ee:c6:80:78
  interface fc1/8 swwn 20:00:54:7f:ee:b8:24:c0
  interface fc1/9 swwn 20:00:54:7f:ee:b8:24:c0
  interface fc1/10 swwn 20:00:54:7f:ee:b8:24:c0
  interface fc1/11 swwn 20:00:54:7f:ee:b8:24:c0

zone name STOR_Zone_1_20_25B vsan 20
  interface fc1/8 swwn 20:00:54:7f:ee:c6:80:78
  interface fc1/9 swwn 20:00:54:7f:ee:c6:80:78
  interface fc1/10 swwn 20:00:54:7f:ee:c6:80:78
  interface fc1/11 swwn 20:00:54:7f:ee:c6:80:78
  interface fc1/5 swwn 20:00:54:7f:ee:b8:24:c0
  interface fc1/8 swwn 20:00:54:7f:ee:b8:24:c0
  interface fc1/9 swwn 20:00:54:7f:ee:b8:24:c0
  interface fc1/10 swwn 20:00:54:7f:ee:b8:24:c0
  interface fc1/11 swwn 20:00:54:7f:ee:b8:24:c0
FC_switch_B_1#

```

Verifying the storage configuration

You must confirm that all storage is visible from the surviving nodes.

1. Confirm that all storage components at the disaster site are the same in quantity and type at the surviving site.

The surviving site and disaster site should have the same number of disk shelf stacks, disk shelves, and disks. In a bridge-attached or fabric-attached MetroCluster configuration, the sites should have the same number of FC-to-SAS bridges.

2. Confirm that all disks that have been replaced at the disaster site are unowned: run local disk show-n

Disks should appear as being unowned.

3. If no disks were replaced, confirm that all disks are present: disk show

Powering on the equipment at the disaster site

You must power on the MetroCluster components at the disaster site when you are ready to prepare for switchback. In addition, you must also recable the SAS storage connections in direct-attached MetroCluster configurations and enable non-Inter-Switch Link ports in fabric-attached MetroCluster configurations.

You must have already replaced and cabled the MetroCluster components exactly as the old ones.

Fabric-attached MetroCluster installation and configuration

Stretch MetroCluster installation and configuration

The examples in this procedure assume the following:

- Site A is the disaster site.
- FC_switch_A_1 has been replaced.
- FC_switch_A_2 has been replaced.
- Site B is the surviving site.
- FC_switch_B_1 is healthy.
- FC_switch_B_2 is healthy.

The FC switches are present only in fabric-attached MetroCluster configurations.

1. In a stretch MetroCluster configuration using SAS cabling (and no FC switch fabric or FC-to-SAS bridges), connect all the storage including the remote storage across both sites.

The controller at the disaster site must remain powered off or at the LOADER prompt.

2. On the surviving site, disable disk autoassignment: `storage disk option modify -autoassign off *`

```
cluster_B::> storage disk option modify -autoassign off *
2 entries were modified.
```

3. On the surviving site, confirm that disk autoassignment is off: `storage disk option show`

```
cluster_B::> storage disk option show
Node      BKg. FW. Upd.  Auto Copy  Auto Assign  Auto Assign Policy
-----
node_B_1      on           on         off          default
node_B_2      on           on         off          default
2 entries were displayed.

cluster_B::>
```

4. Turn on the disk shelves at the disaster site and make sure that all disks are running.
5. In a bridge-attached or fabric-attached MetroCluster configuration, turn on all FC-to-SAS bridges at the disaster site.
6. If any disks were replaced, leave the controllers powered off or at the LOADER prompt.
7. In a fabric-attached MetroCluster configuration, enable the non-ISL ports on the FC switches.

| | |
|----------------------------|---|
| If the switch vendor is... | Then use these steps to enable the ports... |
|----------------------------|---|

Brocade

- a. Persistently enable the ports connected to the FC-to-SAS bridges: `portpersistentenable port-number`

In the following example, ports 6 and 7 are enabled:

```
FC_switch_A_1:admin>
portpersistentenable 6
FC_switch_A_1:admin>
portpersistentenable 7

FC_switch_A_1:admin>
```

- b. Persistently enable the ports connected to the HBAs and FC-VI adapters: `portpersistentenable port-number`

In the following example, ports 6 and 7 are enabled:

```
FC_switch_A_1:admin>
portpersistentenable 1
FC_switch_A_1:admin>
portpersistentenable 2
FC_switch_A_1:admin>
portpersistentenable 4
FC_switch_A_1:admin>
portpersistentenable 5
FC_switch_A_1:admin>
```



For AFF A700 and FAS9000 systems, you must persistently enable all four FC-VI ports by using the `switchcfgpersistentenable` command.

- c. Repeat substeps a and b for the second FC switch at the surviving site.

Cisco

- a. Enter configuration mode for the interface, and then enable the ports with the no shut command.

In the following example, port fc1/36 is disabled:

```
FC_switch_A_1# conf t
FC_switch_A_1(config)#
interface fc1/36
FC_switch_A_1(config)# no shut
FC_switch_A_1(config-if)# end
FC_switch_A_1# copy running-
config startup-config
```

- b. Verify that the switch port is enabled: `show interface brief`
- c. Repeat substeps a and b on the other ports connected to the FC-to-SAS bridges, HBAs, and FC-VI adapters.
- d. Repeat substeps a, b, and c for the second FC switch at the surviving site.

Assigning ownership for replaced drives

If you replaced drives when restoring hardware at the disaster site or you had to zero drives or remove ownership, you must assign ownership to the affected drives.

The disaster site must have at least as many available drives as it did prior to the disaster.

The drives shelves and drives arrangement must meet the requirements in the “Required MetroCluster IP components and naming conventions” section of the *MetroCluster IP Installation and Configuration Guide*.

[MetroCluster IP installation and configuration](#)

These steps are performed on the cluster at the disaster site.

This procedure shows the reassignment of all drives and the creation of new plexes at the disaster site. The new plexes are remote plexes of surviving site and local plexes of disaster site.

This section provides examples for two and four-node configurations. For two-node configurations, you can ignore references to the second node at each site. For eight-node configurations, you must account for the additional nodes on the second DR group. The examples make the following assumptions:

- Site A is the disaster site.
- node_A_1 has been replaced.
- node_A_2 has been replaced.

Present only in four-node MetroCluster configurations.

- Site B is the surviving site.
- node_B_1 is healthy.
- node_B_2 is healthy.

Present only in four-node MetroCluster configurations.

The controller modules have the following original system IDs:

| Number of nodes in MetroCluster configuration | Node | Original system ID |
|---|------------|--------------------|
| Four | node_A_1 | 4068741258 |
| node_A_2 | 4068741260 | node_B_1 |
| 4068741254 | node_B_2 | 4068741256 |
| Two | node_A_1 | 4068741258 |

You should keep in mind the following points when assigning the drives:

- The old-count-of-disks must be at least the same number of disks for each node that were present before the disaster.

If a lower number of disks is specified or present, the healing operations might not be completed due to insufficient space.

- The new plexes to be created are remote plexes belonging to the surviving site (node_B_x pool1) and local plexes belonging to the disaster site (node_B_x pool0).
- The total number of required drives should not include the root aggr disks.

If n disks are assigned to pool1 of the surviving site, then (n-3) disks should be assigned to the disaster site with the assumption that the root aggregate uses three disks.

- None of the disks can be assigned to a pool that is different from the one to which all other disks on the same stack are assigned.
- Disks belonging to the surviving site are assigned to pool 1 and disks belonging to the disaster site are assigned to pool 0.

1. Assign the new, unowned drives based on whether you have a four-node or two-node MetroCluster configuration:

- For four-node MetroCluster configurations, assign the new, unowned disks to the appropriate disk pools by using the following series of commands on the replacement nodes:
 - i. Systematically assign the replaced disks for each node to their respective disk pools: `disk assign -s sysid -n old-count-of-disks -p pool`

From the surviving site, you issue a disk assign command for each node:

```
cluster_B::> disk assign -s node_B_1-sysid -n old-count-of-
disks -p 1 **\ (remote pool of surviving site\)**
cluster_B::> disk assign -s node_B_2-sysid -n old-count-of-
disks -p 1 **\ (remote pool of surviving site\)**
cluster_B::> disk assign -s node_A_1-old-sysid -n old-count-of-
disks -p 0 **\ (local pool of disaster site\)**
cluster_B::> disk assign -s node_A_2-old-sysid -n old-count-of-
disks -p 0 **\ (local pool of disaster site\)**
```

The following example shows the commands with the system IDs:

```
cluster_B::> disk assign -s 4068741254 -n 21 -p 1
cluster_B::> disk assign -s 4068741256 -n 21 -p 1
cluster_B::> disk assign -s 4068741258 -n 21 -p 0
cluster_B::> disk assign -s 4068741260 -n 21 -p 0
```

ii. Confirm the ownership of the disks: `storage disk show -fields owner, pool`

```
storage disk show -fields owner, pool
cluster_A::> storage disk show -fields owner, pool
disk      owner          pool
-----
0c.00.1   node_A_1             Pool0
0c.00.2   node_A_1             Pool0
.
.
.
0c.00.8   node_A_1             Pool1
0c.00.9   node_A_1             Pool1
.
.
.
0c.00.15  node_A_2             Pool0
0c.00.16  node_A_2             Pool0
.
.
.
0c.00.22  node_A_2             Pool1
0c.00.23  node_A_2             Pool1
.
.
.
```

- For two-node MetroCluster configurations, assign the new, unowned disks to the appropriate disk pools by using the following series of commands on the replacement node:
 - i. Display the local shelf IDs: `run local storage show shelf`
 - ii. Assign the replaced disks for the healthy node to pool 1: `run local disk assign -shelf shelf-id -n old-count-of-disks -p 1 -s node_B_1-sysid -f`
 - iii. Assign the replaced disks for the replacement node to pool 0: `run local disk assign -shelf shelf-id -n old-count-of-disks -p 0 -s node_A_1-sysid -f`
- 2. On the surviving site, turn on automatic disk assignment again: `storage disk option modify -autoassign on *`

```
cluster_B::> storage disk option modify -autoassign on *
2 entries were modified.
```

3. On the surviving site, confirm that automatic disk assignment is on: `storage disk option show`

```
cluster_B::> storage disk option show
Node      BKg. FW. Upd.  Auto Copy  Auto Assign  Auto Assign Policy
-----
node_B_1      on           on         on           default
node_B_2      on           on         on           default
2 entries were displayed.

cluster_B::>
```

Related information

[Disk and aggregate management](#)

[How MetroCluster configurations use SyncMirror to provide data redundancy](#)

Performing aggregate healing and restoring mirrors (MetroCluster FC configurations)

After replacing hardware and assigning disks, you can perform the MetroCluster healing operations. You must then confirm that aggregates are mirrored and, if necessary, restart mirroring.

1. Perform the two phases of healing (aggregate healing and root healing) on the disaster site:

```
cluster_B::> metrocluster heal -phase aggregates

cluster_B::> metrocluster heal -phase root aggregates
```

- Monitor the healing and verify that the aggregates are in either the resyncing or mirrored state: `storage aggregate show -node local`

| If the aggregate shows this state... | Then... |
|--------------------------------------|---|
| resyncing | No action is required. Let the aggregate complete resyncing. |
| mirror degraded | Proceed to step 3. |
| mirrored, normal | No action is required. |
| unknown, offline | The root aggregate shows this state if all the disks on the disaster sites were replaced. |

```
cluster_B::> storage aggregate show -node local
```

```

Aggregate      Size Available Used% State  #Vols  Nodes      RAID
Status
-----
node_B_1_aggr1
      227.1GB    11.00GB   95% online      1 node_B_1  raid_dp,
resyncing
NodeA_1_aggr2
      430.3GB    28.02GB   93% online      2 node_B_1  raid_dp,
mirror
degraded
node_B_1_aggr3
      812.8GB    85.37GB   89% online      5 node_B_1  raid_dp,
mirrored,
normal

```

```
3 entries were displayed.
```

```
cluster_B::>
```

In the following examples, the three aggregates are each in a different state:

| Node | State |
|----------------|------------------|
| node_B_1_aggr1 | resyncing |
| node_B_1_aggr2 | mirror degraded |
| node_B_1_aggr3 | mirrored, normal |

3. If one or more plexes remain offline, additional steps are required to rebuild the mirror.

In the preceding table, the mirror for node_B_1_aggr2 must be rebuilt.

- a. View details of the aggregate to identify any failed plexes: `storage aggregate show -r -aggregate node_B_1_aggr2`

In the following example, plex /node_B_1_aggr2/plex0 is in a failed state:

```
cluster_B::> storage aggregate show -r -aggregate node_B_1_aggr2

Owner Node: node_B_1
Aggregate: node_B_1_aggr2 (online, raid_dp, mirror degraded) (block
checksums)
Plex: /node_B_1_aggr2/plex0 (offline, failed, inactive, pool0)
RAID Group /node_B_1_aggr2/plex0/rg0 (partial)
Usable
Physical
Position Disk          Pool Type    RPM      Size
Size Status
-----
-----

Plex: /node_B_1_aggr2/plex1 (online, normal, active, pool1)
RAID Group /node_B_1_aggr2/plex1/rg0 (normal, block checksums)
Usable
Physical
Position Disk          Pool Type    RPM      Size
Size Status
-----
-----

dparity  1.44.8          1    SAS      15000    265.6GB
273.5GB (normal)
parity   1.41.11         1    SAS      15000    265.6GB
273.5GB (normal)
data     1.42.8          1    SAS      15000    265.6GB
273.5GB (normal)
data     1.43.11         1    SAS      15000    265.6GB
273.5GB (normal)
data     1.44.9          1    SAS      15000    265.6GB
273.5GB (normal)
data     1.43.18         1    SAS      15000    265.6GB
273.5GB (normal)
6 entries were displayed.

cluster_B::>
```

- b. Delete the failed plex: `storage aggregate plex delete -aggregate aggregate-name -plex plex`
- c. Reestablish the mirror: `storage aggregate mirror -aggregate aggregate-name`
- d. Monitor the resynchronization and mirroring status of the plex until all mirrors are reestablished and all aggregates show mirrored, normal status: `storage aggregate show`

Reassigning disk ownership for root aggregates to replacement controller modules (MetroCluster FC configurations)

If one or both of the controller modules or NVRAM cards were replaced at the disaster site, the system ID has changed and you must reassign disks belonging to the root aggregates to the replacement controller modules.

Because the nodes are in switchover mode and healing has been done, only the disks containing the root aggregates of pool1 of the disaster site will be reassigned in this section. They are the only disks still owned by the old system ID at this point.

This section provides examples for two and four-node configurations. For two-node configurations, you can ignore references to the second node at each site. For eight-node configurations, you must account for the additional nodes on the second DR group. The examples make the following assumptions:

- Site A is the disaster site.
- node_A_1 has been replaced.
- node_A_2 has been replaced.

Present only in four-node MetroCluster configurations.

- Site B is the surviving site.
- node_B_1 is healthy.
- node_B_2 is healthy.

Present only in four-node MetroCluster configurations.

The old and new system IDs were identified in [Acquiring the new System ID](#).

The examples in this procedure use controllers with the following system IDs:

| Number of nodes | Node | Original system ID | New system ID |
|-----------------|------------|--------------------|---------------|
| Four | node_A_1 | 4068741258 | 1574774970 |
| node_A_2 | 4068741260 | 1574774991 | node_B_1 |
| 4068741254 | unchanged | node_B_2 | 4068741256 |
| unchanged | Two | node_A_1 | 4068741258 |

| | | | |
|------------|----------|------------|-----------|
| 1574774970 | node_B_1 | 4068741254 | unchanged |
|------------|----------|------------|-----------|

1. With the replacement node in Maintenance mode, reassign the root aggregate disks: `disk reassign -s old-system-ID -d new-system-ID`

```
*> disk reassign -s 4068741258 -d 1574774970
```

2. View the disks to confirm the ownership change of the pool1 root aggr disks of the disaster site to the replacement node: `disk show`

The output might show more or fewer disks, depending on how many disks are in the root aggregate and whether any of these disks failed and were replaced. If the disks were replaced, then Pool0 disks will not appear in the output.

The pool1 root aggregate disks of the disaster site should now be assigned to the replacement node.

```
*> disk show
Local System ID: 1574774970

  DISK              OWNER              POOL  SERIAL NUMBER      HOME
DR HOME
-----
sw_A_1:6.126L19 node_A_1(1574774970) Pool0  serial-number
node_A_1(1574774970)
sw_A_1:6.126L3  node_A_1(1574774970) Pool0  serial-number
node_A_1(1574774970)
sw_A_1:6.126L7  node_A_1(1574774970) Pool0  serial-number
node_A_1(1574774970)
sw_B_1:6.126L8  node_A_1(1574774970) Pool1  serial-number
node_A_1(1574774970)
sw_B_1:6.126L24 node_A_1(1574774970) Pool1  serial-number
node_A_1(1574774970)
sw_B_1:6.126L2  node_A_1(1574774970) Pool1  serial-number
node_A_1(1574774970)

*> aggr status
      Aggr State      Status
node_A_1_root online  raid_dp, aggr
                      mirror degraded
                      64-bit

*>
```

3. View the aggregate status: `aggr status`

The output might show more or fewer disks, depending on how many disks are in the root aggregate and whether any of these disks failed and were replaced. If disks were replaced, then Pool0 disks will not appear in output.

```
*> aggr status
      Aggr State      Status
node_A_1_root online  raid_dp, aggr
                      mirror degraded
                      64-bit
*>
```

4. Delete the contents of the mailbox disks: `mailbox destroy local`
5. If the aggregate is not online, bring it online: `aggr online aggr_name`
6. Halt the node to display the LOADER prompt: `halt`

Booting the new controller modules (MetroCluster FC configurations)

After aggregate healing has been completed for both the data and root aggregates, you must boot the node or nodes at the disaster site.

This task begins with the nodes showing the LOADER prompt.

1. Display the boot menu: `boot_ontap menu`
2. From the boot menu, select option 6, **Update flash from backup config**.
3. Respond y to the following prompt: This will replace all flash-based configuration with the last backup to disks. Are you sure you want to continue?: y

The system will boot twice, the second time to load the new configuration.



If you did not clear the NVRAM contents of a used replacement controller, then you might see a panic with the following message: PANIC: NVRAM contents are invalid...

If this occurs, repeat step 2 to boot the system to the ONTAP prompt. You will then need to perform a root recovery. Contact technical support for assistance.

4. Mirror the root aggregate on plex 0:
 - a. Assign three pool0 disks to the new controller module.
 - b. Mirror the root aggregate pool1 plex: `aggr mirror root-aggr-name`
 - c. Assign unowned disks to pool0 on the local node
5. Refresh the MetroCluster configuration:
 - a. Enter advanced privilege mode: `set -privilege advanced`
 - b. Refresh the configuration: `metrocluster configure -refresh true`
 - c. Return to admin privilege mode: `set -privilege admin`

6. If you have a four-node configuration, repeat the previous steps on the other node at the disaster site.

Proceed to verify the licenses on the replaced nodes.

[Verifying licenses on the replaced nodes](#)

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