



# **Recover from a multi-controller or storage failure**

## **ONTAP MetroCluster**

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# Recover from a multi-controller or storage failure

## Recovering from a multi-controller or storage failure

If the controller failure extends to all controller modules on one side of a DR group in a MetroCluster configuration (including a single controller in a two-node MetroCluster configuration), or storage has been replaced, you must replace the equipment and reassign ownership of drives to recover from the disaster.

- You should review the available recovery procedures before deciding to use this procedure.

### [Choosing the correct recovery procedure](#)

- The disaster site must be fenced off.

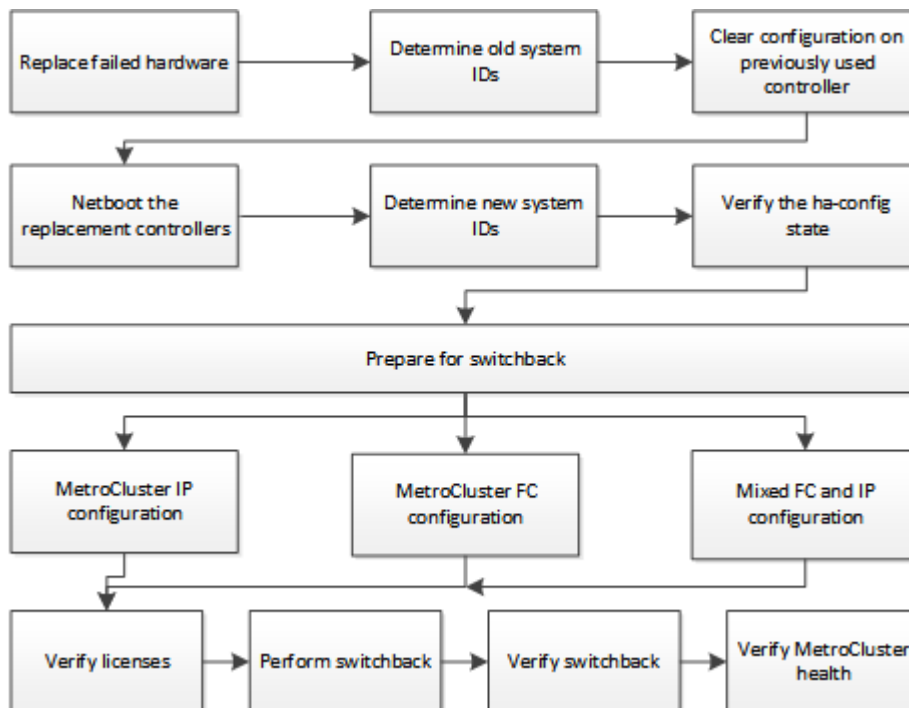
### [Fencing off the disaster site.](#)

- Switchover must have been performed.

### [Performing a forced switchover.](#)

- Replacement drives and the controller modules must be new and must not have been assigned ownership previously.
- The examples in this procedure show two or four-node configurations. If you have an eight-node configuration (two DR groups), you must take into account any failures and perform the required recovery task on the additional controller modules.

This procedure uses the following workflow:



This procedure can be used when performing recovery on a system that was in mid-transition when the failure occurred. In that case, you must perform the appropriate steps when preparing for switchback, as indicated in

the procedure.

# Replacing hardware and booting new controllers

## Replacing hardware at the disaster site

If hardware components have to be replaced, you must replace them using their individual hardware replacement and installation guides.

### Before you begin

The storage controllers must be powered off or remain halted (showing the LOADER prompt).

### Steps

1. Replace the components as necessary.



In this step, you replace and cable the components exactly as they were cabled prior to the disaster. You must not power up the components.

If you are replacing...	Perform these steps...	Using these guides...
FC switches in a MetroCluster FC configuration	<ol style="list-style-type: none"><li>a. Install the new switches.</li><li>b. Cable the ISL links. Do not power on the FC switches at this time.</li></ol>	<a href="#">Maintain MetroCluster Components</a>
IP switches in a MetroCluster IP configuration	<ol style="list-style-type: none"><li>a. Install the new switches.</li><li>b. Cable the ISL links. Do not power on the IP switches at this time.</li></ol>	<a href="#">MetroCluster IP installation and configuration: Differences among the ONTAP MetroCluster configurations</a>
Disk shelves	<ol style="list-style-type: none"><li>a. Install the disk shelves and disks.<ul style="list-style-type: none"><li>◦ Disk shelf stacks should be the same configuration as at the surviving site.</li><li>◦ Disks can be the same size or larger, but must be of the same type (SAS or SATA).</li></ul></li><li>b. Cable the disk shelves to adjacent shelves within the stack and to the FC-to-SAS bridge. Do not power on the disk shelves at this time.</li></ol>	<a href="#">ONTAP Hardware Systems Documentation</a>
SAS cables	<ol style="list-style-type: none"><li>a. Install the new cables. Do not power on the disk shelves at this time.</li></ol>	<a href="#">ONTAP Hardware Systems Documentation</a>

<p>FC-to-SAS bridges in a MetroCluster FC configuration</p>	<p>a. Install the FC-to-SAS bridges.</p> <p>b. Cable the FC-to-SAS bridges.</p> <p>Cable them to the FC switches or to the controller modules, depending on your MetroCluster configuration type.</p> <p>Do not power on the FC-to-SAS bridges at this time.</p>	<p><a href="#">Fabric-attached MetroCluster installation and configuration</a></p> <p><a href="#">Stretch MetroCluster installation and configuration</a></p>
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Controller modules	<p>a. Install the new controller modules:</p> <ul style="list-style-type: none"> <li>◦ The controller modules must be the same model as those being replaced.</li> </ul> <p>For example, 8080 controller modules must be replaced with 8080 controller modules.</p> <ul style="list-style-type: none"> <li>◦ The controller modules must not have previously been part of either cluster within the MetroCluster configuration or any previously existing cluster configuration.</li> </ul> <p>If they were, you must set defaults and perform a “wipeconfig” process.</p> <ul style="list-style-type: none"> <li>◦ Ensure that all network interface cards (such as Ethernet or FC) are in the same slots used on the old controller modules.</li> </ul> <p>b. Cable the new controller modules exactly the same as the old ones.</p> <p>The ports connecting the controller module to the storage (either by connections to the IP or FC switches, FC-to-SAS bridges, or directly) should be the same as those used prior to the disaster.</p> <p>Do not power on the controller modules at this time.</p>	<a href="#">ONTAP Hardware Systems Documentation</a>
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2. Verify that all components are cabled correctly for your configuration.

- [MetroCluster IP configuration](#)
- [MetroCluster fabric-attached configuration](#)

## Determining the system IDs and VLAN IDs of the old controller modules

After you have replaced all hardware at the disaster site, you must determine the system IDs of the replaced controller modules. You need the old system IDs when you reassign disks to the new controller modules. If the

systems are AFF A220, AFF A250, AFF A400, AFF A800, FAS2750, FAS500f, FAS8300, or FAS8700 models, you must also determine the VLAN IDs used by the MetroCluster IP interfaces.

**Before you begin**

All equipment at the disaster site must be powered off.

**About this task**

This discussion provides examples for two and four-node configurations. For eight-node configurations, you must account for any failures in the additional nodes on the second DR group.

For a two-node MetroCluster configuration, you can ignore references to the second controller module at each site.

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

- Site A is the disaster site.
- node\_A\_1 has failed and is being completely replaced.
- node\_A\_2 has failed and is being completely replaced.

node\_A\_2 is present in a four-node MetroCluster configuration only.

- Site B is the surviving site.
- node\_B\_1 is healthy.
- node\_B\_2 is healthy.

node\_B\_2 is present in a four-node MetroCluster configuration only.

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
	node_B_1	4068741254

**Steps**

1. From the surviving site, display the system IDs of the nodes in the MetroCluster configuration.

Number of nodes in MetroCluster configuration	Use this command
---	------------------

Four or eight	<code>metrocluster node show -fields node-systemid,ha-partner-systemid,dr-partner-systemid,dr-auxiliary-systemid</code>
Two	<code>metrocluster node show -fields node-systemid,dr-partner-systemid</code>

In this example for a four-node MetroCluster configuration, the following old system IDs are retrieved:

- Node\_A\_1: 4068741258
- Node\_A\_2: 4068741260

Disks owned by the old controller modules are still owned these system IDs.

```
metrocluster node show -fields node-systemid,ha-partner-systemid,dr-
partner-systemid,dr-auxiliary-systemid

dr-group-id cluster      node      node-systemid ha-partner-systemid
dr-partner-systemid dr-auxiliary-systemid
-----
1          Cluster_A    Node_A_1    4068741258      4068741260
4068741254          4068741256
1          Cluster_A    Node_A_2    4068741260      4068741258
4068741256          4068741254
1          Cluster_B    Node_B_1    -                -
-
1          Cluster_B    Node_B_2    -                -
-
4 entries were displayed.
```

In this example for a two-node MetroCluster configuration, the following old system ID is retrieved:

- Node\_A\_1: 4068741258

Disks owned by the old controller module are still owned this system ID.

```
metrocluster node show -fields node-systemid,dr-partner-systemid

dr-group-id cluster      node      node-systemid dr-partner-systemid
-----
1          Cluster_A    Node_A_1    4068741258      4068741254
1          Cluster_B    Node_B_1    -                -
2 entries were displayed.
```



2. For MetroCluster IP configurations using the ONTAP Mediator service, get the IP address of the ONTAP Mediator service:

```
storage iscsi-initiator show -node * -label mediator
```

3. If the systems are AFF A220, AFF A400, FAS2750, FAS8300, or FAS8700 models, determine the VLAN IDs:

```
metrocluster interconnect show
```

The VLAN IDs are included in the adapter name shown in the Adapter column of the output.

In this example, the VLAN IDs are 120 and 130:

```
metrocluster interconnect show
```

Node	Partner	Name	Type	Mirror Admin Status	Mirror Oper Status	Adapter	Type	Status
Node_A_1	Node_A_2	HA		enabled	online			
						e0a-120	iWARP	Up
						e0b-130	iWARP	Up
	Node_B_1	DR		enabled	online			
						e0a-120	iWARP	Up
						e0b-130	iWARP	Up
	Node_B_2	AUX		enabled	offline			
						e0a-120	iWARP	Up
						e0b-130	iWARP	Up
Node_A_2	Node_A_1	HA		enabled	online			
						e0a-120	iWARP	Up
						e0b-130	iWARP	Up
	Node_B_2	DR		enabled	online			
						e0a-120	iWARP	Up
						e0b-130	iWARP	Up
	Node_B_1	AUX		enabled	offline			
						e0a-120	iWARP	Up
						e0b-130	iWARP	Up

12 entries were displayed.

## Isolating replacement drives from the surviving site (MetroCluster IP configurations)

You must isolate any replacement drives by taking down the MetroCluster iSCSI initiator connections from the surviving nodes.

### About this task

This procedure is only required on MetroCluster IP configurations.

## Steps

1. From either surviving node's prompt, change to the advanced privilege level:

```
set -privilege advanced
```

You need to respond with `y` when prompted to continue into advanced mode and see the advanced mode prompt (`*>`).

2. Disconnect the iSCSI initiators on both surviving nodes in the DR group:

```
storage iscsi-initiator disconnect -node surviving-node -label *
```

This command must be issued twice, once for each of the surviving nodes.

The following example shows the commands for disconnecting the initiators on site B:

```
site_B::*> storage iscsi-initiator disconnect -node node_B_1 -label *
site_B::*> storage iscsi-initiator disconnect -node node_B_2 -label *
```

3. Return to the admin privilege level:

```
set -privilege admin
```

## Clearing the configuration on a controller module

Before using a new controller module in the MetroCluster configuration, you must clear the existing configuration.

### Steps

1. If necessary, halt the node to display the LOADER prompt:

```
halt
```

2. At the LOADER prompt, set the environmental variables to default values:

```
set-defaults
```

3. Save the environment:

```
saveenv
```

4. At the LOADER prompt, launch the boot menu:

```
boot_ontap menu
```

5. At the boot menu prompt, clear the configuration:

```
wipeconfig
```

Respond `yes` to the confirmation prompt.

The node reboots and the boot menu is displayed again.

- At the boot menu, select option **5** to boot the system into Maintenance mode.

Respond `yes` to the confirmation prompt.

## Netbooting the new controller modules

If the new controller modules have a different version of ONTAP from the version on the surviving controller modules, you must netboot the new controller modules.

### Before you begin

- You must have access to an HTTP server.
- You must have access to the NetApp Support Site to download the necessary system files for your platform and version of ONTAP software that is running on it.

[NetApp Support](#)

### Steps

- Access the [NetApp Support Site](#) to download the files used for performing the netboot of the system.
- Download the appropriate ONTAP software from the software download section of the NetApp Support Site and store the `ontap-version_image.tgz` file on a web-accessible directory.
- Go to the web-accessible directory and verify that the files you need are available.

If the platform model is...	Then...
FAS/AFF8000 series systems	<p>Extract the contents of the <code>ontap-version_image.tgz</code> file to the target directory: <code>tar -zxvf ontap-version_image.tgz</code></p> <p>NOTE: If you are extracting the contents on Windows, use 7-Zip or WinRAR to extract the netboot image.</p> <p>Your directory listing should contain a netboot folder with a kernel file: <code>netboot/kernel</code></p>
All other systems	<p>Your directory listing should contain a netboot folder with a kernel file: <code>ontap-version_image.tgz</code></p> <p>You do not need to extract the <code>ontap-version_image.tgz</code> file.</p>

- At the LOADER prompt, configure the netboot connection for a management LIF:
  - If IP addressing is DHCP, configure the automatic connection:

```
ifconfig e0M -auto
```

- If IP addressing is static, configure the manual connection:

```
ifconfig e0M -addr=ip_addr -mask=netmask -gw=gateway
```

5. Perform the netboot.

- If the platform is an 80xx series system, use this command:

```
netboot http://web_server_ip/path_to_web-accessible_directory/netboot/kernel
```

- If the platform is any other system, use the following command:

```
netboot http://web_server_ip/path_to_web-accessible_directory/ontap-  
version_image.tgz
```

6. From the boot menu, select option **(7) Install new software first** to download and install the new software image to the boot device.

Disregard the following message: "This procedure is not supported for Non-Disruptive Upgrade on an HA pair". It applies to nondisruptive upgrades of software, not to upgrades of controllers.

7. If you are prompted to continue the procedure, enter `y`, and when prompted for the package, enter the URL of the image file: `http://web_server_ip/path_to_web-accessible_directory/ontap-version_image.tgz`

Enter username/password if applicable, or press Enter to continue.

8. Be sure to enter `n` to skip the backup recovery when you see a prompt similar to the following:

Do you want to restore the backup configuration now? {y|n}

9. Reboot by entering `y` when you see a prompt similar to the following:

The node must be rebooted to start using the newly installed software.  
Do you want to reboot now? {y|n}

10. From the Boot menu, select **option 5** to enter Maintenance mode.

11. If you have a four-node MetroCluster configuration, repeat this procedure on the other new controller module.

## Determining the system IDs of the replacement controller modules

After you have replaced all hardware at the disaster site, you must determine the system ID of the newly installed storage controller module or modules.

### About this task

You must perform this procedure with the replacement controller modules in Maintenance mode.

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

Number of nodes in MetroCluster configuration	Node	Original system ID	New system ID	Will pair with this node as DR partner
Four	node_A_1	4068741258	1574774970	node_B_1
	node_A_2	4068741260	1574774991	node_B_2
	node_B_1	4068741254	unchanged	node_A_1
	node_B_2	4068741256	unchanged	node_A_2
Two	node_A_1	4068741258	1574774970	node_B_1
	node_B_1	4068741254	unchanged	node_A_1



In a four-node MetroCluster configuration, the system determines DR partnerships by pairing the node with the lowest system ID at site\_A and the node with the lowest system ID at site\_B. Because the system IDs change, the DR pairs might be different after the controller replacements are completed than they were prior to the disaster.

In the preceding example:

- node\_A\_1 (1574774970) will be paired with node\_B\_1 (4068741254)
- node\_A\_2 (1574774991) will be paired with node\_B\_2 (4068741256)

## Steps

1. With the node in Maintenance mode, display the local system ID of the node from each node: `disk show`

In the following example, the new local system ID is 1574774970:

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

2. On the second node, repeat the previous step.



This step is not required in a two-node MetroCluster configuration.

In the following example, the new local system ID is 1574774991:

```
*> disk show
Local System ID: 1574774991
...
```

## Verifying the ha-config state of components

In a MetroCluster configuration, the ha-config state of the controller module and chassis components must be set to "mcc" or "mcc-2n" so they boot up properly.

### Before you begin

The system must be in Maintenance mode.

### About this task

This task must be performed on each new controller module.

### Steps

1. In Maintenance mode, display the HA state of the controller module and chassis:

```
ha-config show
```

The correct HA state depends on your MetroCluster configuration.

Number of controllers in the MetroCluster configuration	HA state for all components should be...
Eight- or four-node MetroCluster FC configuration	mcc
Two-node MetroCluster FC configuration	mcc-2n
MetroCluster IP configuration	mccip

2. If the displayed system state of the controller is not correct, set the HA state for the controller module:

Number of controllers in the MetroCluster configuration	Command
---	---------

Eight- or four-node MetroCluster FC configuration	<code>ha-config modify controller mcc</code>
Two-node MetroCluster FC configuration	<code>ha-config modify controller mcc-2n</code>
MetroCluster IP configuration	<code>ha-config modify controller mccip</code>

3. If the displayed system state of the chassis is not correct, set the HA state for the chassis:

Number of controllers in the MetroCluster configuration	Command
Eight- or four-node MetroCluster FC configuration	<code>ha-config modify chassis mcc</code>
Two-node MetroCluster FC configuration	<code>ha-config modify chassis mcc-2n</code>
MetroCluster IP configuration	<code>ha-config modify chassis mccip</code>

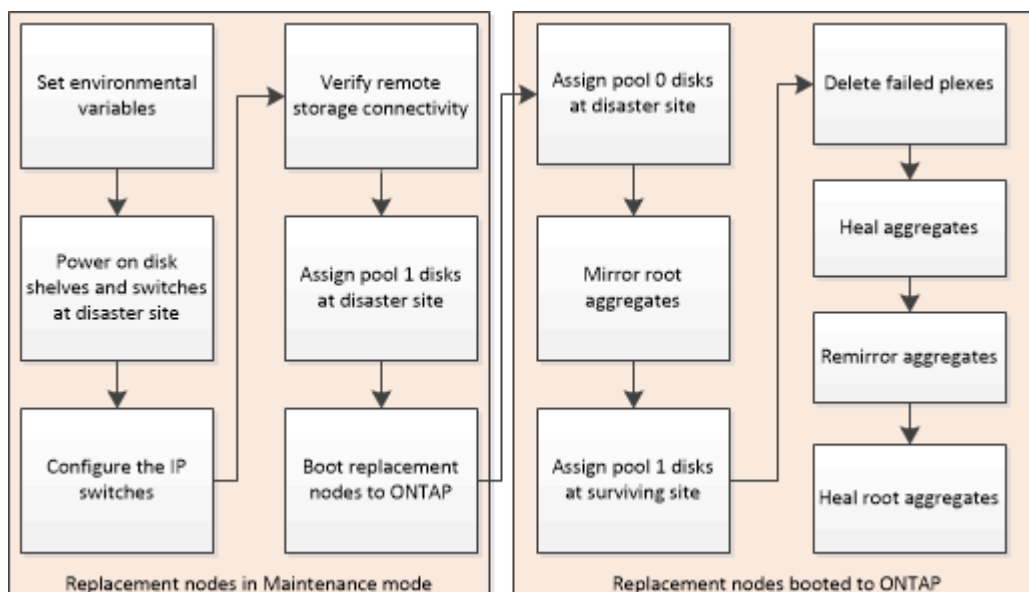
4. Repeat these steps on the other replacement node.

## Prepare for switchback in a MetroCluster IP configuration

### Prepare for switchback in a MetroCluster IP configuration

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

#### About this task



## Setting required environmental variables in MetroCluster IP configurations

In MetroCluster IP configurations, you must retrieve the IP address of the MetroCluster interfaces on the Ethernet ports, and then use them to configure the interfaces on the replacement controller modules.

### About this task

This task is required only in MetroCluster IP configurations.

Commands in this task are performed from the cluster prompt of the surviving site and from the LOADER prompt of the nodes at the disaster site.

The nodes in these examples have the following IP addresses for their MetroCluster IP connections:



These examples are for an AFF A700 or FAS9000 system. The interfaces vary by platform model.

Node	Port	IP address
node_A_1	e5a	172.17.26.10
	e5b	172.17.27.10
node_A_2	e5a	172.17.26.11
	e5b	172.17.27.11
node_B_1	e5a	172.17.26.13
	e5b	172.17.27.13
node_B_2	e5a	172.17.26.12
	e5b	172.17.27.12

The following table summarizes the relationships between the nodes and each node's MetroCluster IP addresses.

Node	HA partner	DR partner	DR auxiliary partner
node_A_1 <ul style="list-style-type: none"><li>• e5a: 172.17.26.10</li><li>• e5b: 172.17.27.10</li></ul>	node_A_2 <ul style="list-style-type: none"><li>• e5a: 172.17.26.11</li><li>• e5b: 172.17.27.11</li></ul>	node_B_1 <ul style="list-style-type: none"><li>• e5a: 172.17.26.13</li><li>• e5b: 172.17.27.13</li></ul>	node_B_2 <ul style="list-style-type: none"><li>• e5a: 172.17.26.12</li><li>• e5b: 172.17.27.12</li></ul>



node_A_2	node_A_1	node_B_2	node_B_1
<ul style="list-style-type: none"> <li>• e5a: 172.17.26.11</li> <li>• e5b: 172.17.27.11</li> </ul>	<ul style="list-style-type: none"> <li>• e5a: 172.17.26.10</li> <li>• e5b: 172.17.27.10</li> </ul>	<ul style="list-style-type: none"> <li>• e5a: 172.17.26.12</li> <li>• e5b: 172.17.27.12</li> </ul>	<ul style="list-style-type: none"> <li>• e5a: 172.17.26.13</li> <li>• e5b: 172.17.27.13</li> </ul>
node_B_1	node_B_2	node_A_1	node_A_2
<ul style="list-style-type: none"> <li>• e5a: 172.17.26.13</li> <li>• e5b: 172.17.27.13</li> </ul>	<ul style="list-style-type: none"> <li>• e5a: 172.17.26.12</li> <li>• e5b: 172.17.27.12</li> </ul>	<ul style="list-style-type: none"> <li>• e5a: 172.17.26.10</li> <li>• e5b: 172.17.27.10</li> </ul>	<ul style="list-style-type: none"> <li>• e5a: 172.17.26.11</li> <li>• e5b: 172.17.27.11</li> </ul>
node_B_2	node_B_1	node_A_2	node_A_1
<ul style="list-style-type: none"> <li>• e5a: 172.17.26.12</li> <li>• e5b: 172.17.27.12</li> </ul>	<ul style="list-style-type: none"> <li>• e5a: 172.17.26.13</li> <li>• e5b: 172.17.27.13</li> </ul>	<ul style="list-style-type: none"> <li>• e5a: 172.17.26.11</li> <li>• e5b: 172.17.27.11</li> </ul>	<ul style="list-style-type: none"> <li>• e5a: 172.17.26.10</li> <li>• e5b: 172.17.27.10</li> </ul>

The following table lists the platform models that use VLAN IDs on the MetroCluster IP interfaces. These models might require additional steps if you are not using the default VLAN IDs.

Platform models that use VLAN IDs with the MetroCluster IP interfaces	
<ul style="list-style-type: none"> <li>• AFF A220</li> <li>• AFF A250</li> <li>• AFF A400</li> </ul>	<ul style="list-style-type: none"> <li>• FAS500f</li> <li>• FAS2750</li> <li>• FAS8300</li> <li>• FAS8700</li> </ul>

## Steps

1. From the surviving site, gather the IP addresses of the MetroCluster interfaces on the disaster site:

```
metrocluster configuration-settings connection show
```

The required addresses are the DR Partner addresses shown in the **Destination Network Address** column.

The following output shows the IP addresses for a configuration with AFF A700 and FAS9000 systems with the MetroCluster IP interfaces on ports e5a and e5b. The interfaces vary depending on platform type.

```
cluster_B::*> metrocluster configuration-settings connection show
DR                               Source           Destination
DR                               Source           Destination
Group Cluster Node   Network Address Network Address Partner Type
Config State
-----
1      cluster_B
      node_B_1
      Home Port: e5a
```

```

completed          172.17.26.13      172.17.26.12      HA Partner
                    Home Port: e5a
                    172.17.26.13      172.17.26.10      DR Partner
completed
                    Home Port: e5a
                    172.17.26.13      172.17.26.11      DR Auxiliary
completed
                    Home Port: e5b
                    172.17.27.13      172.17.27.12      HA Partner
completed
                    Home Port: e5b
                    172.17.27.13      172.17.27.10      DR Partner
completed
                    Home Port: e5b
                    172.17.27.13      172.17.27.11      DR Auxiliary
completed
node_B_2
                    Home Port: e5a
                    172.17.26.12      172.17.26.13      HA Partner
completed
                    Home Port: e5a
                    172.17.26.12      172.17.26.11      DR Partner
completed
                    Home Port: e5a
                    172.17.26.12      172.17.26.10      DR Auxiliary
completed
                    Home Port: e5b
                    172.17.27.12      172.17.27.13      HA Partner
completed
                    Home Port: e5b
                    172.17.27.12      172.17.27.11      DR Partner
completed
                    Home Port: e5b
                    172.17.27.12      172.17.27.10      DR Auxiliary
completed
12 entries were displayed.

```

2. If you need to determine the VLAN ID or gateway address for the interface, determine the VLAN IDs from the surviving site:

```
metrocluster configuration-settings interface show
```

- You need the VLAN ID if the platform models use VLAN IDs (see the list above), and if you are not using the default VLAN IDs.
- You need the gateway address if you are using [Layer 3 wide-area networks](#).

The VLAN IDs are included in the **Network Address** column of the output. The **Gateway** column shows the gateway IP address.

In this example the interfaces are e0a with the VLAN ID 120 and e0b with the VLAN ID 130:

```
Cluster-A::*> metrocluster configuration-settings interface show
DR
Config
Group Cluster Node      Network Address Netmask      Gateway
State
-----
1
      cluster_A
      node_A_1
      Home Port: e0a-120
      172.17.26.10  255.255.255.0  -
completed
      Home Port: e0b-130
      172.17.27.10  255.255.255.0  -
completed
```

3. If the disaster site nodes use VLAN IDs (see the list above), at the LOADER prompt for each of the disaster site nodes, set the following bootargs:

```
setenv bootarg.mcc.port_a_ip_config local-IP-address/local-IP-
mask,gateway-IP-address,HA-partner-IP-address,DR-partner-IP-address,DR-
aux-partnerIP-address,vlan-id

setenv bootarg.mcc.port_b_ip_config local-IP-address/local-IP-
mask,gateway-IP-address,HA-partner-IP-address,DR-partner-IP-address,DR-
aux-partnerIP-address,vlan-id
```



- If the interfaces are using the default VLANs, or the platform model does not require a VLAN (see the list above), the *vlan-id* is not necessary.
- If the configuration is not using [Layer3 wide-area networks](#), the value for *gateway-IP-address* is **0** (zero).
- If the interfaces are using the default VLANs, or the platform model does not require a VLAN (see the list above), the *vlan-id* is not necessary.
- If the configuration is not using [layer 3 backend connections](#), the value for *gateway-IP-address* is **0** (zero).

The following commands set the values for node\_A\_1 using VLAN 120 for the first network and VLAN 130 for the second network:

```
setenv bootarg.mcc.port_a_ip_config
172.17.26.10/23,0,172.17.26.11,172.17.26.13,172.17.26.12,120

setenv bootarg.mcc.port_b_ip_config
172.17.27.10/23,0,172.17.27.11,172.17.27.13,172.17.27.12,130
```

The following example shows the commands for node\_A\_1 without a VLAN ID:

```
setenv bootarg.mcc.port_a_ip_config
172.17.26.10/23,0,172.17.26.11,172.17.26.13,172.17.26.12

setenv bootarg.mcc.port_b_ip_config
172.17.27.10/23,0,172.17.27.11,172.17.27.13,172.17.27.12
```

4. If the disaster site nodes are not systems that use VLAN IDs, at the LOADER prompt for each of the disaster nodes, set the following bootargs with local\_IP/mask,gateway:

```
setenv bootarg.mcc.port_a_ip_config local-IP-address/local-IP-mask,0,HA-
partner-IP-address,DR-partner-IP-address,DR-aux-partnerIP-address

setenv bootarg.mcc.port_b_ip_config local-IP-address/local-IP-mask,0,HA-
partner-IP-address,DR-partner-IP-address,DR-aux-partnerIP-address
```



- If the interfaces are using the default VLANs, or the platform model does not require a VLAN (see the list above), the *vlan-id* is not necessary.
- If the configuration is not using [Layer 3 wide-area networks](#), the value for *gateway-IP-address* is **0** (zero).

The following commands set the values for node\_A\_1. In this example, the *gateway-IP-address* and *vlan-id* values are not used.

```
setenv bootarg.mcc.port_a_ip_config
172.17.26.10/23,0,172.17.26.11,172.17.26.13,172.17.26.12

setenv bootarg.mcc.port_b_ip_config
172.17.27.10/23,0,172.17.27.11,172.17.27.13,172.17.27.12
```

5. From the surviving site, gather the UUIDs for the disaster site:

```
metrocluster node show -fields node-cluster-uuid, node-uuid
```

```

cluster_B::> metrocluster node show -fields node-cluster-uuid, node-uuid

(metrocluster node show)
dr-group-id cluster      node      node-uuid
node-cluster-uuid
-----
1          cluster_A    node_A_1 f03cb63c-9a7e-11e7-b68b-00a098908039
ee7db9d5-9a82-11e7-b68b-00a098

908039
1          cluster_A    node_A_2 aa9a7a7a-9a81-11e7-a4e9-00a098908c35
ee7db9d5-9a82-11e7-b68b-00a098

908039
1          cluster_B    node_B_1 f37b240b-9ac1-11e7-9b42-00a098c9e55d
07958819-9ac6-11e7-9b42-00a098

c9e55d
1          cluster_B    node_B_2 bf8e3f8f-9ac4-11e7-bd4e-00a098ca379f
07958819-9ac6-11e7-9b42-00a098

c9e55d
4 entries were displayed.
cluster_A::~*>

```

Node	UUID
cluster_B	07958819-9ac6-11e7-9b42-00a098c9e55d
node_B_1	f37b240b-9ac1-11e7-9b42-00a098c9e55d
node_B_2	bf8e3f8f-9ac4-11e7-bd4e-00a098ca379f
cluster_A	ee7db9d5-9a82-11e7-b68b-00a098908039
node_A_1	f03cb63c-9a7e-11e7-b68b-00a098908039
node_A_2	aa9a7a7a-9a81-11e7-a4e9-00a098908c35

6. At the replacement nodes' LOADER prompt, set the UUIDs:

```
setenv bootarg.mgwd.partner_cluster_uuid partner-cluster-UUID

setenv bootarg.mgwd.cluster_uuid local-cluster-UUID

setenv bootarg.mcc.pri_partner_uuid DR-partner-node-UUID

setenv bootarg.mcc.aux_partner_uuid DR-aux-partner-node-UUID

setenv bootarg.mcc_iscsi.node_uuid local-node-UUID`
```

a. Set the UUIDs on node\_A\_1.

The following example shows the commands for setting the UUIDs on node\_A\_1:

```
setenv bootarg.mgwd.cluster_uuid ee7db9d5-9a82-11e7-b68b-00a098908039

setenv bootarg.mgwd.partner_cluster_uuid 07958819-9ac6-11e7-9b42-
00a098c9e55d

setenv bootarg.mcc.pri_partner_uuid f37b240b-9ac1-11e7-9b42-
00a098c9e55d

setenv bootarg.mcc.aux_partner_uuid bf8e3f8f-9ac4-11e7-bd4e-
00a098ca379f

setenv bootarg.mcc_iscsi.node_uuid f03cb63c-9a7e-11e7-b68b-
00a098908039
```

b. Set the UUIDs on node\_A\_2:

The following example shows the commands for setting the UUIDs on node\_A\_2:

```
setenv bootarg.mgwd.cluster_uuid ee7db9d5-9a82-11e7-b68b-00a098908039

setenv bootarg.mgwd.partner_cluster_uuid 07958819-9ac6-11e7-9b42-
00a098c9e55d

setenv bootarg.mcc.pri_partner_uuid bf8e3f8f-9ac4-11e7-bd4e-
00a098ca379f

setenv bootarg.mcc.aux_partner_uuid f37b240b-9ac1-11e7-9b42-
00a098c9e55d

setenv bootarg.mcc.iscsi.node_uuid aa9a7a7a-9a81-11e7-a4e9-
00a098908c35
```

7. If the original systems were configured for ADP, at each of the replacement nodes' LOADER prompt, enable ADP:

```
setenv bootarg.mcc.adp_enabled true
```

8. If running ONTAP 9.5, 9.6 or 9.7, at each of the replacement nodes' LOADER prompt, enable the following variable:

```
setenv bootarg.mcc.lun_part true
```

- a. Set the variables on node\_A\_1.

The following example shows the commands for setting the values on node\_A\_1 when running ONTAP 9.6:

```
setenv bootarg.mcc.lun_part true
```

- b. Set the variables on node\_A\_2.

The following example shows the commands for setting the values on node\_A\_2 when running ONTAP 9.6:

```
setenv bootarg.mcc.lun_part true
```

9. If the original systems were configured for ADP, at each of the replacement nodes' LOADER prompt, set the original system ID (**not** the system ID of the replacement controller module) and the system ID of the DR partner of the node:

```
setenv bootarg.mcc.local_config_id original-sysID
```

```
setenv bootarg.mcc.dr_partner dr_partner-sysID
```

[Determining the system IDs and VLAN IDs of the old controller modules](#)

- a. Set the variables on node\_A\_1.

The following example shows the commands for setting the system IDs on node\_A\_1:

- The old system ID of node\_A\_1 is 4068741258.
- The system ID of node\_B\_1 is 4068741254.

```
setenv bootarg.mcc.local_config_id 4068741258  
setenv bootarg.mcc.dr_partner 4068741254
```

- b. Set the variables on node\_A\_2.

The following example shows the commands for setting the system IDs on node\_A\_2:

- The old system ID of node\_A\_1 is 4068741260.
- The system ID of node\_B\_1 is 4068741256.

```
setenv bootarg.mcc.local_config_id 4068741260  
setenv bootarg.mcc.dr_partner 4068741256
```

## Powering on the equipment at the disaster site (MetroCluster IP configurations)

You must power on the disk shelves and MetroCluster IP switches components at the disaster site. The controller modules at the disaster site remain at the LOADER prompt.

### About this task

The examples in this procedure assume the following:

- Site A is the disaster site.
- Site B is the surviving site.

### Steps

1. Turn on the disk shelves at the disaster site and make sure that all disks are running.
2. Turn on the MetroCluster IP switches if they are not already on.

## Configuring the IP switches (MetroCluster IP configurations)

You must configure any IP switches that were replaced.

### About this task

This task applies to MetroCluster IP configurations only.

This must be done on both switches. Verify after configuring the first switch that storage access on the surviving site is not impacted.



You must not proceed with the second switch if storage access on the surviving site is impacted.



Steps

- 1. Refer to [MetroCluster IP installation and configuration: : Differences among the ONTAP MetroCluster configurations](#) for procedures for cabling and configuring a replacement switch.

You can use the procedures in the following sections:

- Cabling the IP switches
  - Configuring the IP switches
2. If the ISLs were disabled at the surviving site, enable the ISLs and verify that the ISLs are online.
- a. Enable the ISL interfaces on the first switch:

```
no shutdown
```

The following examples show the commands for a Broadcom IP switch or a Cisco IP switch.

Switch vendor	Commands
Broadcom	<pre>(IP_Switch_A_1)&gt; enable (IP_switch_A_1)# configure (IP_switch_A_1)(Config)# interface 0/13-0/16 (IP_switch_A_1)(Interface 0/13-0/16 )# no shutdown (IP_switch_A_1)(Interface 0/13-0/16 )# exit (IP_switch_A_1)(Config)# exit</pre>
Cisco	<pre>IP_switch_A_1# conf t IP_switch_A_1(config)# int eth1/15-eth1/20 IP_switch_A_1(config)# no shutdown IP_switch_A_1(config)# copy running startup IP_switch_A_1(config)# show interface brief</pre>

- b. Enable the ISL interfaces on the partner switch:

```
no shutdown
```

The following examples show the commands for a Broadcom IP switch or a Cisco IP switch.

Switch vendor	Commands
---------------	----------

Broadcom	<pre>(IP_Switch_A_2)&gt; enable (IP_switch_A_2)# configure (IP_switch_A_2)(Config)# interface 0/13-0/16 (IP_switch_A_2)(Interface 0/13-0/16 )# no shutdown (IP_switch_A_2)(Interface 0/13-0/16 )# exit (IP_switch_A_2)(Config)# exit</pre>
Cisco	<pre>IP_switch_A_2# conf t IP_switch_A_2(config)# int eth1/15-eth1/20 IP_switch_A_2(config)# no shutdown IP_switch_A_2(config)# copy running startup IP_switch_A_2(config)# show interface brief</pre>

c. Verify that the interfaces are enabled:

```
show interface brief
```

The following example shows the output for a Cisco switch.

```

IP_switch_A_2(config)# show interface brief

-----
Port VRF Status IP Address Speed MTU
-----
mt0 -- up 10.10.99.10 100 1500
-----

Ethernet      VLAN Type Mode      Status Reason Speed   Port
Interface                                           Ch
#
-----
.
.
.
Eth1/15      10  eth  access  up      none   40G(D)  --
Eth1/16      10  eth  access  up      none   40G(D)  --
Eth1/17      10  eth  access  down    none   auto(D)  --
Eth1/18      10  eth  access  down    none   auto(D)  --
Eth1/19      10  eth  access  down    none   auto(D)  --
Eth1/20      10  eth  access  down    none   auto(D)  --
.
.
.
IP_switch_A_2#

```

## Verify storage connectivity to the remote site (MetroCluster IP configurations)

You must confirm that the replaced nodes have connectivity to the disk shelves at the surviving site.

### About this task

This task is performed on the replacement nodes at the disaster site.

This task is performed in Maintenance mode.

### Steps

1. Display the disks that are owned by the original system ID.

```
disk show -s old-system-ID
```

The remote disks can be recognized by the 0m device. 0m indicates that the disk is connected via the MetroCluster iSCSI connection. These disks must be reassigned later in the recovery procedure.

```

*> disk show -s 4068741256
Local System ID: 1574774970

    DISK      OWNER                POOL  SERIAL NUMBER    HOME
DR HOME
-----
-----
0m.i0.0L11 node_A_2 (4068741256) Pool1 S396NA0HA02128 node_A_2
(4068741256) node_A_2 (4068741256)
0m.i0.1L38 node_A_2 (4068741256) Pool1 S396NA0J148778 node_A_2
(4068741256) node_A_2 (4068741256)
0m.i0.0L52 node_A_2 (4068741256) Pool1 S396NA0J148777 node_A_2
(4068741256) node_A_2 (4068741256)
...
...
NOTE: Currently 49 disks are unowned. Use 'disk show -n' for additional
information.
*>

```

2. Repeat this step on the other replacement nodes

## Reassigning disk ownership for pool 1 disks on the disaster site (MetroCluster IP 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.

### About this task

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

This task is performed on the replacement nodes at the disaster site.

This task is performed in Maintenance mode.

The examples make the following assumptions:

- Site A is the disaster site.
- node\_A\_1 has been replaced.
- node\_A\_2 has been replaced.
- Site B is the surviving site.
- node\_B\_1 is healthy.
- node\_B\_2 is healthy.

The old and new system IDs were identified in [Determining the new System IDs of the replacement controller modules](#).

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

Node	Original system ID	New system ID
node_A_1	4068741258	1574774970
node_A_2	4068741260	1574774991
node_B_1	4068741254	unchanged
node_B_2	4068741256	unchanged

### Steps

1. With the replacement node in Maintenance mode, reassign the root aggregate disks, using the correct command, depending on whether your system is configured with ADP and your ONTAP version.

You can proceed with the reassignment when prompted.

If the system is using ADP...	Use this command for disk reassignment...
Yes (ONTAP 9.8)	<code>disk reassign -s old-system-ID -d new-system-ID -r dr-partner-system-ID</code>
Yes (ONTAP 9.7.x and earlier)	<code>disk reassign -s old-system-ID -d new-system-ID -p old-partner-system-ID</code>
No	<code>disk reassign -s old-system-ID -d new-system-ID</code>

The following example shows reassignment of drives on a non-ADP system:

```
*> disk reassign -s 4068741256 -d 1574774970
Partner node must not be in Takeover mode during disk reassignment from
maintenance mode.
Serious problems could result!!
Do not proceed with reassignment if the partner is in takeover mode.
Abort reassignment (y/n)? n

After the node becomes operational, you must perform a takeover and
giveback of the HA partner node to ensure disk reassignment is
successful.
Do you want to continue (y/n)? y
Disk ownership will be updated on all disks previously belonging to
Filer with sysid 537037643.
Do you want to continue (y/n)? y
disk reassign parameters: new_home_owner_id 537070473 ,
new_home_owner_name
Disk 0m.i0.3L14 will be reassigned.
Disk 0m.i0.1L6 will be reassigned.
Disk 0m.i0.1L8 will be reassigned.
Number of disks to be reassigned: 3
```

## 2. Destroy the contents of the mailbox disks:

```
mailbox destroy local
```

You can proceed with the destroy operation when prompted.

The following example shows the output for the mailbox destroy local command:

```
*> mailbox destroy local
Destroying mailboxes forces a node to create new empty mailboxes,
which clears any takeover state, removes all knowledge
of out-of-date plexes of mirrored volumes, and will prevent
management services from going online in 2-node cluster
HA configurations.
Are you sure you want to destroy the local mailboxes? y
.....Mailboxes destroyed.
*>
```

## 3. If disks have been replaced, there will be failed local plexes that must be deleted.

### a. Display the aggregate status:

```
aggr status
```

In the following example, plex node\_A\_1\_aggr0/plex0 has failed.

```

*> aggr status
Aug 18 15:00:07 [node_B_1:raid.vol.mirror.degraded:ALERT]: Aggregate
node_A_1_aggr0 is
    mirrored and one plex has failed. It is no longer protected by
    mirroring.
Aug 18 15:00:07 [node_B_1:raid.debug:info]: Mirrored aggregate
node_A_1_aggr0 has plex0
    clean(-1), online(0)
Aug 18 15:00:07 [node_B_1:raid.debug:info]: Mirrored aggregate
node_A_1_aggr0 has plex2
    clean(0), online(1)
Aug 18 15:00:07 [node_B_1:raid.mirror.vote.noRecord1Plex:error]:
WARNING: Only one plex
    in aggregate node_A_1_aggr0 is available. Aggregate might contain
    stale data.
Aug 18 15:00:07 [node_B_1:raid.debug:info]:
volobj_mark_sb_recovery_aggrs: tree:
    node_A_1_aggr0 vol_state:1 mcc_dr_opstate: unknown
Aug 18 15:00:07 [node_B_1:raid.fsm.commitStateTransit:debug]:
/node_A_1_aggr0 (VOL):
    raid state change UNINITD -> NORMAL
Aug 18 15:00:07 [node_B_1:raid.fsm.commitStateTransit:debug]:
/node_A_1_aggr0 (MIRROR):
    raid state change UNINITD -> DEGRADED
Aug 18 15:00:07 [node_B_1:raid.fsm.commitStateTransit:debug]:
/node_A_1_aggr0/plex0
    (PLEX): raid state change UNINITD -> FAILED
Aug 18 15:00:07 [node_B_1:raid.fsm.commitStateTransit:debug]:
/node_A_1_aggr0/plex2
    (PLEX): raid state change UNINITD -> NORMAL
Aug 18 15:00:07 [node_B_1:raid.fsm.commitStateTransit:debug]:
/node_A_1_aggr0/plex2/rg0
    (GROUP): raid state change UNINITD -> NORMAL
Aug 18 15:00:07 [node_B_1:raid.debug:info]: Topology updated for
aggregate node_A_1_aggr0
    to plex plex2
*>

```

**b. Delete the failed plex:**

```
aggr destroy plex-id
```

```
*> aggr destroy node_A_1_aggr0/plex0
```

4. Halt the node to display the LOADER prompt:

```
halt
```

5. Repeat these steps on the other node at the disaster site.

## Booting to ONTAP on replacement controller modules in MetroCluster IP configurations

You must boot the replacement nodes at the disaster site to the ONTAP operating system.

### About this task

This task begins with the nodes at the disaster site in Maintenance mode.

### Steps

1. On one of the replacement nodes, exit to the LOADER prompt: `halt`
2. Display the boot menu: `boot_ontap menu`
3. From the boot menu, select option 6, **Update flash from backup config**.

The system boots twice. You should respond `yes` when prompted to continue. After the second boot, you should respond `y` when prompted about the system ID mismatch.



If you did not clear the NVRAM contents of a used replacement controller module, then you might see the following panic message: `PANIC: NVRAM contents are invalid...`. If this occurs, boot the system to the ONTAP prompt again (`boot_ontap menu`). You then need to [Reset the boot\\_recovery and rdb\\_corrupt bootargs](#)

- Confirmation to continue prompt:

```
Selection (1-9)? 6
```

```
This will replace all flash-based configuration with the last backup  
to  
disks. Are you sure you want to continue?: yes
```

- System ID mismatch prompt:

```
WARNING: System ID mismatch. This usually occurs when replacing a  
boot device or NVRAM cards!  
Override system ID? {y|n} y
```

4. From the surviving site, verify that the correct partner system IDs have been applied to the nodes:

```
metrocluster node show -fields node-systemid,ha-partner-systemid,dr-partner-  
systemid,dr-auxiliary-systemid
```



In this example, the following new system IDs should appear in the output:

- Node\_A\_1: 1574774970
- Node\_A\_2: 1574774991

The "ha-partner-systemid" column should show the new system IDs.

```
metrocluster node show -fields node-systemid,ha-partner-systemid,dr-
partner-systemid,dr-auxiliary-systemid

dr-group-id cluster      node      node-systemid ha-partner-systemid dr-
partner-systemid dr-auxiliary-systemid
-----
-----
1             Cluster_A  Node_A_1  1574774970    1574774991
4068741254    4068741256
1             Cluster_A  Node_A_2  1574774991    1574774970
4068741256    4068741254
1             Cluster_B  Node_B_1  -              -              -
-
1             Cluster_B  Node_B_2  -              -              -
-
4 entries were displayed.
```

5. If the partner system IDs were not correctly set, you must manually set the correct value:

- Halt and display the LOADER prompt on the node.
- Verify the partner-sysID bootarg's current value:

```
printenv
```

- Set the value to the correct partner system ID:

```
setenv partner-sysid partner-sysID
```

- Boot the node:

```
boot_ontap
```

- Repeat these substeps on the other node, if necessary.

6. Confirm that the replacement nodes at the disaster site are ready for switchback:

```
metrocluster node show
```

The replacement nodes should be in waiting for switchback recovery mode. If they are in normal mode instead, you can reboot the replacement nodes. After that boot, the nodes should be in waiting for switchback recovery mode.

The following example shows that the replacement nodes are ready for switchback:

```

cluster_B::> metrocluster node show
DR
Group Cluster Node          Configuration  DR
State                      Mirroring Mode
-----
1      cluster_B
      node_B_1      configured      enabled      switchover
completed
      node_B_2      configured      enabled      switchover
completed
      cluster_A
      node_A_1      configured      enabled      waiting for
switchback recovery
      node_A_2      configured      enabled      waiting for
switchback recovery
4 entries were displayed.

cluster_B::>

```

## 7. Verify the MetroCluster connection configuration settings:

```
metrocluster configuration-settings connection show
```

The configuration state should indicate completed.

```

cluster_B::*> metrocluster configuration-settings connection show
DR
Group Cluster Node          Source          Destination
Config State      Network Address Network Address Partner Type
-----
1      cluster_B
      node_B_2
      Home Port: e5a
      172.17.26.13      172.17.26.12      HA Partner
completed
      Home Port: e5a
      172.17.26.13      172.17.26.10      DR Partner
completed
      Home Port: e5a
      172.17.26.13      172.17.26.11      DR Auxiliary
completed
      Home Port: e5b
      172.17.27.13      172.17.27.12      HA Partner
completed

```

	Home Port: e5b		
completed	172.17.27.13	172.17.27.10	DR Partner
	Home Port: e5b		
completed	172.17.27.13	172.17.27.11	DR Auxiliary
	node_B_1		
	Home Port: e5a		
completed	172.17.26.12	172.17.26.13	HA Partner
	Home Port: e5a		
completed	172.17.26.12	172.17.26.11	DR Partner
	Home Port: e5a		
completed	172.17.26.12	172.17.26.10	DR Auxiliary
	Home Port: e5b		
completed	172.17.27.12	172.17.27.13	HA Partner
	Home Port: e5b		
completed	172.17.27.12	172.17.27.11	DR Partner
	Home Port: e5b		
completed	172.17.27.12	172.17.27.10	DR Auxiliary
	cluster_A		
	node_A_2		
	Home Port: e5a		
completed	172.17.26.11	172.17.26.10	HA Partner
	Home Port: e5a		
completed	172.17.26.11	172.17.26.12	DR Partner
	Home Port: e5a		
completed	172.17.26.11	172.17.26.13	DR Auxiliary
	Home Port: e5b		
completed	172.17.27.11	172.17.27.10	HA Partner
	Home Port: e5b		
completed	172.17.27.11	172.17.27.12	DR Partner
	Home Port: e5b		
completed	172.17.27.11	172.17.27.13	DR Auxiliary
	node_A_1		

```

                                Home Port: e5a
                                172.17.26.10    172.17.26.11    HA Partner
completed
                                Home Port: e5a
                                172.17.26.10    172.17.26.13    DR Partner
completed
                                Home Port: e5a
                                172.17.26.10    172.17.26.12    DR Auxiliary
completed
                                Home Port: e5b
                                172.17.27.10    172.17.27.11    HA Partner
completed
                                Home Port: e5b
                                172.17.27.10    172.17.27.13    DR Partner
completed
                                Home Port: e5b
                                172.17.27.10    172.17.27.12    DR Auxiliary
completed
24 entries were displayed.

cluster_B::*>

```

8. Repeat the previous steps on the other node at the disaster site.

#### Reset the boot\_recovery and rdb\_corrupt bootargs

If required, you can reset the boot\_recovery and rdb\_corrupt\_bootargs

#### Steps

1. Halt the node back to the LOADER prompt:

```
node_A_1::*> halt -node _node-name_
```

2. Check if the following bootargs have been set:

```

LOADER> printenv bootarg.init.boot_recovery
LOADER> printenv bootarg.rdb_corrupt

```

3. If either bootarg has been set to a value, unset it and boot ONTAP:

```

LOADER> unsetenv bootarg.init.boot_recovery
LOADER> unsetenv bootarg.rdb_corrupt
LOADER> saveenv
LOADER> bye

```

## Restoring connectivity from the surviving nodes to the disaster site (MetroCluster IP configurations)

You must restore the MetroCluster iSCSI initiator connections from the surviving nodes.

### About this task

This procedure is only required on MetroCluster IP configurations.

### Steps

1. From either surviving node's prompt, change to the advanced privilege level:

```
set -privilege advanced
```

You need to respond with `y` when prompted to continue into advanced mode and see the advanced mode prompt (`*>`).

2. Connect the iSCSI initiators on both surviving nodes in the DR group:

```
storage iscsi-initiator connect -node surviving-node -label *
```

The following example shows the commands for connecting the initiators on site B:

```
site_B::*> storage iscsi-initiator connect -node node_B_1 -label *
site_B::*> storage iscsi-initiator connect -node node_B_2 -label *
```

3. Return to the admin privilege level:

```
set -privilege admin
```

## Verifying automatic assignment or manually assigning pool 0 drives

On systems configured for ADP, you must verify that pool 0 drives have been automatically assigned. On systems that are not configured for ADP, you must manually assign the pool 0 drives.

### Verifying drive assignment of pool 0 drives on ADP systems at the disaster site (MetroCluster IP systems)

If drives have been replaced at the disaster site and the system is configured for ADP, you must verify that the remote drives are visible to the nodes and have been assigned correctly.

### Step

1. Verify that pool 0 drives are assigned automatically:

```
disk show
```

In the following example for an AFF A800 system with no external shelves, one quarter (8 drives) were automatically assigned to node\_A\_1 and one quarter were automatically assigned to node\_A\_2. The remaining drives will be remote (pool1) drives for node\_B\_1 and node\_B\_2.

```
cluster_A::*> disk show
```

Disk Owner	Usable Size	Disk Shelf	Bay	Container Type	Type	Container Name
node_A_1:0n.12	1.75TB	0	12	SSD-NVM	shared	aggr0
node_A_1						
node_A_1:0n.13	1.75TB	0	13	SSD-NVM	shared	aggr0
node_A_1						
node_A_1:0n.14	1.75TB	0	14	SSD-NVM	shared	aggr0
node_A_1						
node_A_1:0n.15	1.75TB	0	15	SSD-NVM	shared	aggr0
node_A_1						
node_A_1:0n.16	1.75TB	0	16	SSD-NVM	shared	aggr0
node_A_1						
node_A_1:0n.17	1.75TB	0	17	SSD-NVM	shared	aggr0
node_A_1						
node_A_1:0n.18	1.75TB	0	18	SSD-NVM	shared	aggr0
node_A_1						
node_A_1:0n.19	1.75TB	0	19	SSD-NVM	shared	-
node_A_1						
node_A_2:0n.0	1.75TB	0	0	SSD-NVM	shared	
aggr0_node_A_2_0	node_A_2					
node_A_2:0n.1	1.75TB	0	1	SSD-NVM	shared	
aggr0_node_A_2_0	node_A_2					
node_A_2:0n.2	1.75TB	0	2	SSD-NVM	shared	
aggr0_node_A_2_0	node_A_2					
node_A_2:0n.3	1.75TB	0	3	SSD-NVM	shared	
aggr0_node_A_2_0	node_A_2					
node_A_2:0n.4	1.75TB	0	4	SSD-NVM	shared	
aggr0_node_A_2_0	node_A_2					
node_A_2:0n.5	1.75TB	0	5	SSD-NVM	shared	
aggr0_node_A_2_0	node_A_2					
node_A_2:0n.6	1.75TB	0	6	SSD-NVM	shared	
aggr0_node_A_2_0	node_A_2					
node_A_2:0n.7	1.75TB	0	7	SSD-NVM	shared	-
node_A_2						
node_A_2:0n.24	-	0	24	SSD-NVM	unassigned	-
node_A_2:0n.25	-	0	25	SSD-NVM	unassigned	-
node_A_2:0n.26	-	0	26	SSD-NVM	unassigned	-
node_A_2:0n.27	-	0	27	SSD-NVM	unassigned	-
node_A_2:0n.28	-	0	28	SSD-NVM	unassigned	-
node_A_2:0n.29	-	0	29	SSD-NVM	unassigned	-
node_A_2:0n.30	-	0	30	SSD-NVM	unassigned	-
node_A_2:0n.31	-	0	31	SSD-NVM	unassigned	-

```
node_A_2:0n.36 - 0 36 SSD-NVM unassigned - -
node_A_2:0n.37 - 0 37 SSD-NVM unassigned - -
node_A_2:0n.38 - 0 38 SSD-NVM unassigned - -
node_A_2:0n.39 - 0 39 SSD-NVM unassigned - -
node_A_2:0n.40 - 0 40 SSD-NVM unassigned - -
node_A_2:0n.41 - 0 41 SSD-NVM unassigned - -
node_A_2:0n.42 - 0 42 SSD-NVM unassigned - -
node_A_2:0n.43 - 0 43 SSD-NVM unassigned - -
32 entries were displayed.
```

## Assigning pool 0 drives on non-ADP systems at the disaster site (MetroCluster IP configurations)

If drives have been replaced at the disaster site and the system is not configured for ADP, you need to manually assign new drives to pool 0.

### About this task

For ADP systems, the drives are assigned automatically.

### Steps

1. On one of the replacement nodes at the disaster site, reassign the node's pool 0 drives:

```
storage disk assign -n number-of-replacement disks -p 0
```

This command assigns the newly added (and unowned) drives on the disaster site. You should assign the same number and size (or larger) of drives that the node had prior to the disaster. The `storage disk assign` man page contains more information about performing more granular drive assignment.

2. Repeat the step on the other replacement node at the disaster site.

## Assigning pool 1 drives on the surviving site (MetroCluster IP configurations)

If drives have been replaced at the disaster site and the system is not configured for ADP, at the surviving site you need to manually assign remote drives located at the disaster site to the surviving nodes' pool 1. You must identify the number of drives to assign.

### About this task

For ADP systems, the drives are assigned automatically.

### Step

1. On the surviving site, assign the first node's pool 1 (remote) drives: `storage disk assign -n number-of-replacement disks -p 1 0m*`

This command assigns the newly added and unowned drives on the disaster site.

The following command assigns 22 drives:

```
cluster_B::> storage disk assign -n 22 -p 1 0m*
```

## Deleting failed plexes owned by the surviving site (MetroCluster IP configurations)

After replacing hardware and assigning disks, you must delete failed remote plexes that are owned by the surviving site nodes but located at the disaster site.

### About this task

These steps are performed on the surviving cluster.

### Steps

1. Identify the local aggregates: `storage aggregate show -is-home true`

```
cluster_B::> storage aggregate show -is-home true
```

```
cluster_B Aggregates:
```

Aggregate	Size	Available	Used%	State	#Vols	Nodes	RAID
-----------	------	-----------	-------	-------	-------	-------	------

Status							
--------	--	--	--	--	--	--	--

node_B_1_aggr0	1.49TB	74.12GB	95%	online	1	node_B_1	
----------------	--------	---------	-----	--------	---	----------	--

raid4,

mirror

degraded

node_B_2_aggr0	1.49TB	74.12GB	95%	online	1	node_B_2	
----------------	--------	---------	-----	--------	---	----------	--

raid4,

mirror

degraded

node_B_1_aggr1	2.99TB	2.88TB	3%	online	15	node_B_1	
----------------	--------	--------	----	--------	----	----------	--

raid\_dp,

mirror

degraded

node_B_1_aggr2	2.99TB	2.91TB	3%	online	14	node_B_1	
----------------	--------	--------	----	--------	----	----------	--

raid\_tec,

mirror

degraded

node_B_2_aggr1	2.95TB	2.80TB	5%	online	37	node_B_2	
----------------	--------	--------	----	--------	----	----------	--

raid\_dp,

mirror



```

degraded
node_B_2_aggr2 2.99TB 2.87TB 4% online 35 node_B_2
raid_tec,

mirror

degraded
6 entries were displayed.

cluster_B::>

```

## 2. Identify the failed remote plexes:

```
storage aggregate plex show
```

The following example calls out the plexes that are remote (not plex0) and have a status of "failed":

```

cluster_B::> storage aggregate plex show -fields aggregate,status,is-
online,Plex,pool
aggregate      plex  status          is-online pool
-----
node_B_1_aggr0 plex0 normal,active true    0
node_B_1_aggr0 plex4 failed,inactive false - <<<<---Plex at remote site
node_B_2_aggr0 plex0 normal,active true    0
node_B_2_aggr0 plex4 failed,inactive false - <<<<---Plex at remote site
node_B_1_aggr1 plex0 normal,active true    0
node_B_1_aggr1 plex4 failed,inactive false - <<<<---Plex at remote site
node_B_1_aggr2 plex0 normal,active true    0
node_B_1_aggr2 plex1 failed,inactive false - <<<<---Plex at remote site
node_B_2_aggr1 plex0 normal,active true    0
node_B_2_aggr1 plex4 failed,inactive false - <<<<---Plex at remote site
node_B_2_aggr2 plex0 normal,active true    0
node_B_2_aggr2 plex1 failed,inactive false - <<<<---Plex at remote site
node_A_1_aggr1 plex0 failed,inactive false -
node_A_1_aggr1 plex4 normal,active true    1
node_A_1_aggr2 plex0 failed,inactive false -
node_A_1_aggr2 plex1 normal,active true    1
node_A_2_aggr1 plex0 failed,inactive false -
node_A_2_aggr1 plex4 normal,active true    1
node_A_2_aggr2 plex0 failed,inactive false -
node_A_2_aggr2 plex1 normal,active true    1
20 entries were displayed.

cluster_B::>

```

3. Take offline each of the failed plexes, and then delete them:

a. Take offline the failed plexes:

```
storage aggregate plex offline -aggregate aggregate-name -plex plex-id
```

The following example shows the aggregate "node\_B\_2\_aggr1/plex1" being taken offline:

```
cluster_B::> storage aggregate plex offline -aggregate node_B_1_aggr0  
-plex plex4
```

```
Plex offline successful on plex: node_B_1_aggr0/plex4
```

b. Delete the failed plex:

```
storage aggregate plex delete -aggregate aggregate-name -plex plex-id
```

You can destroy the plex when prompted.

The following example shows the plex node\_B\_2\_aggr1/plex1 being deleted.

```

cluster_B::> storage aggregate plex delete -aggregate node_B_1_aggr0
-plex plex4

Warning: Aggregate "node_B_1_aggr0" is being used for the local
management root
        volume or HA partner management root volume, or has been
marked as
        the aggregate to be used for the management root volume
after a
        reboot operation. Deleting plex "plex4" for this aggregate
could lead
        to unavailability of the root volume after a disaster
recovery
        procedure. Use the "storage aggregate show -fields
        has-mroot,has-partner-mroot,root" command to view such
aggregates.

Warning: Deleting plex "plex4" of mirrored aggregate "node_B_1_aggr0"
on node
        "node_B_1" in a MetroCluster configuration will disable its
synchronous disaster recovery protection. Are you sure you
want to
        destroy this plex? {y|n}: y
[Job 633] Job succeeded: DONE

cluster_B::>

```

You must repeat these steps for each of the failed plexes.

#### 4. Confirm that the plexes have been removed:

```
storage aggregate plex show -fields aggregate,status,is-online,plex,pool
```

```
cluster_B::> storage aggregate plex show -fields aggregate,status,is-
online,Plex,pool
aggregate      plex  status          is-online pool
-----
node_B_1_aggr0 plex0 normal,active true      0
node_B_2_aggr0 plex0 normal,active true      0
node_B_1_aggr1 plex0 normal,active true      0
node_B_1_aggr2 plex0 normal,active true      0
node_B_2_aggr1 plex0 normal,active true      0
node_B_2_aggr2 plex0 normal,active true      0
node_A_1_aggr1 plex0 failed,inactive false    -
node_A_1_aggr1 plex4 normal,active true      1
node_A_1_aggr2 plex0 failed,inactive false    -
node_A_1_aggr2 plex1 normal,active true      1
node_A_2_aggr1 plex0 failed,inactive false    -
node_A_2_aggr1 plex4 normal,active true      1
node_A_2_aggr2 plex0 failed,inactive false    -
node_A_2_aggr2 plex1 normal,active true      1
14 entries were displayed.

cluster_B::>
```

##### 5. Identify the switched-over aggregates:

```
storage aggregate show -is-home false
```

You can also use the `storage aggregate plex show -fields aggregate,status,is-online,plex,pool` command to identify plex 0 switched-over aggregates. They will have a status of "failed, inactive".

The following commands show four switched-over aggregates:

- `node_A_1_aggr1`
- `node_A_1_aggr2`
- `node_A_2_aggr1`
- `node_A_2_aggr2`

```

cluster_B::> storage aggregate show -is-home false

cluster_A Switched Over Aggregates:
Aggregate      Size Available Used% State   #Vols  Nodes      RAID
Status
-----
node_A_1_aggr1 2.12TB  1.88TB   11% online    91 node_B_1
raid_dp,

mirror

degraded
node_A_1_aggr2 2.89TB  2.64TB    9% online    90 node_B_1
raid_tec,

mirror

degraded
node_A_2_aggr1 2.12TB  1.86TB   12% online    91 node_B_2
raid_dp,

mirror

degraded
node_A_2_aggr2 2.89TB  2.64TB    9% online    90 node_B_2
raid_tec,

mirror

degraded
4 entries were displayed.

cluster_B::>

```

#### 6. Identify switched-over plexes:

```
storage aggregate plex show -fields aggregate,status,is-online,Plex,pool
```

You want to identify the plexes with a status of "failed, inactive".

The following commands show four switched-over aggregates:

```
cluster_B::> storage aggregate plex show -fields aggregate,status,is-
online,Plex,pool
aggregate      plex  status          is-online pool
-----
node_B_1_aggr0 plex0 normal,active true      0
node_B_2_aggr0 plex0 normal,active true      0
node_B_1_aggr1 plex0 normal,active true      0
node_B_1_aggr2 plex0 normal,active true      0
node_B_2_aggr1 plex0 normal,active true      0
node_B_2_aggr2 plex0 normal,active true      0
node_A_1_aggr1 plex0 failed,inactive false - <<<<-- Switched over
aggr/Plex0
node_A_1_aggr1 plex4 normal,active true      1
node_A_1_aggr2 plex0 failed,inactive false - <<<<-- Switched over
aggr/Plex0
node_A_1_aggr2 plex1 normal,active true      1
node_A_2_aggr1 plex0 failed,inactive false - <<<<-- Switched over
aggr/Plex0
node_A_2_aggr1 plex4 normal,active true      1
node_A_2_aggr2 plex0 failed,inactive false - <<<<-- Switched over
aggr/Plex0
node_A_2_aggr2 plex1 normal,active true      1
14 entries were displayed.

cluster_B::>
```

## 7. Delete the failed plex:

```
storage aggregate plex delete -aggregate node_A_1_aggr1 -plex plex0
```

You can destroy the plex when prompted.

The following example shows the plex node\_A\_1\_aggr1/plex0 being deleted:

```

cluster_B::> storage aggregate plex delete -aggregate node_A_1_aggr1
-plex plex0

Warning: Aggregate "node_A_1_aggr1" hosts MetroCluster metadata volume
"MDV_CRS_e8457659b8a711e78b3b00a0988fe74b_A". Deleting plex
"plex0"
      for this aggregate can lead to the failure of configuration
      replication across the two DR sites. Use the "volume show
-vserver
      <admin-vserver> -volume MDV_CRS*" command to verify the
location of
      such volumes.

Warning: Deleting plex "plex0" of mirrored aggregate "node_A_1_aggr1" on
node
      "node_A_1" in a MetroCluster configuration will disable its
      synchronous disaster recovery protection. Are you sure you want
to
      destroy this plex? {y|n}: y
[Job 639] Job succeeded: DONE

cluster_B::>

```

You must repeat these steps for each of the failed aggregates.

#### 8. Verify that there are no failed plexes remaining on the surviving site.

The following output shows that all plexes are normal, active, and online.

```
cluster_B::> storage aggregate plex show -fields aggregate,status,is-
online,Plex,pool
aggregate      plex  status          is-online pool
-----
node_B_1_aggr0 plex0 normal,active true      0
node_B_2_aggr0 plex0 normal,active true      0
node_B_1_aggr1 plex0 normal,active true      0
node_B_2_aggr2 plex0 normal,active true      0
node_B_1_aggr1 plex0 normal,active true      0
node_B_2_aggr2 plex0 normal,active true      0
node_A_1_aggr1 plex4 normal,active true      1
node_A_1_aggr2 plex1 normal,active true      1
node_A_2_aggr1 plex4 normal,active true      1
node_A_2_aggr2 plex1 normal,active true      1
10 entries were displayed.

cluster_B::>
```

## Performing aggregate healing and restoring mirrors (MetroCluster IP configurations)

After replacing hardware and assigning disks, in systems running ONTAP 9.5 or earlier you can perform the MetroCluster healing operations. In all versions of ONTAP, you must then confirm that aggregates are mirrored and, if necessary, restart mirroring.

### About this task

Beginning with ONTAP 9.6, the healing operations are performed automatically when the disaster site nodes boot up. The healing commands are not required.

These steps are performed on the surviving cluster.

### Steps

1. If you are using ONTAP 9.6 or later, you must verify that automatic healing completed successfully:
  - a. Confirm that the heal-aggr-auto and heal-root-aggr-auto operations completed:

```
metrocluster operation history show
```

The following output shows that the operations have completed successfully on cluster\_A.



```
cluster_B::*> metrocluster operation history show
```

Operation Time	State	Start Time	End
-----	-----	-----	
heal-root-aggr-auto	successful	2/25/2019 06:45:58	
2/25/2019 06:46:02			
heal-aggr-auto	successful	2/25/2019 06:45:48	
2/25/2019 06:45:52			
.			
.			
.			

b. Confirm that the disaster site is ready for switchback:

```
metrocluster node show
```

The following output shows that the operations have completed successfully on cluster\_A.

```
cluster_B::*> metrocluster node show
```

DR Group	Cluster	Node	Configuration State	DR Mirroring Mode
-----	-----	-----	-----	-----
1	cluster_A			
		node_A_1	configured	enabled heal roots
completed				
		node_A_2	configured	enabled heal roots
completed				
	cluster_B			
		node_B_1	configured	enabled waiting for
switchback recovery				
		node_B_2	configured	enabled waiting for
switchback recovery				

4 entries were displayed.

2. If you are using ONTAP 9.5 or earlier, you must perform aggregate healing:

a. Verify the state of the nodes:

```
metrocluster node show
```

The following output shows that switchover has completed, so healing can be performed.

```
cluster_B::> metrocluster node show
```

DR Group	Cluster	Node	Configuration State	DR Mirroring Mode
1	cluster_B	node_B_1	configured	enabled switchover
		node_B_2	configured	enabled switchover
	cluster_A	node_A_1	configured	enabled waiting for switchback recovery
		node_A_2	configured	enabled waiting for switchback recovery

4 entries were displayed.

```
cluster_B::>
```

b. Perform the aggregates healing phase:

```
metrocluster heal -phase aggregates
```

The following output shows a typical aggregates healing operation.

```
cluster_B::*> metrocluster heal -phase aggregates
[Job 647] Job succeeded: Heal Aggregates is successful.

cluster_B::*> metrocluster operation show
  Operation: heal-aggregates
    State: successful
  Start Time: 10/26/2017 12:01:15
  End Time: 10/26/2017 12:01:17
  Errors: -

cluster_B::*>
```

c. Verify that aggregate healing has completed and the disaster site is ready for switchback:

```
metrocluster node show
```

The following output shows that the "heal aggregates" phase has completed on cluster\_A.

```

cluster_B::> metrocluster node show
DR                               Configuration  DR
Group Cluster Node              State          Mirroring Mode
-----
1      cluster_A
      node_A_1                  configured    enabled    heal
aggregates completed
      node_A_2                  configured    enabled    heal
aggregates completed
      cluster_B
      node_B_1                  configured    enabled    waiting for
switchback recovery
      node_B_2                  configured    enabled    waiting for
switchback recovery
4 entries were displayed.

cluster_B::>

```

3. If disks have been replaced, you must mirror the local and switched-over aggregates:

a. Display the aggregates:

```
storage aggregate show
```

```

cluster_B::> storage aggregate show
cluster_B Aggregates:
Aggregate      Size Available Used% State  #Vols  Nodes
RAID Status
-----
node_B_1_aggr0 1.49TB  74.12GB  95% online    1 node_B_1
raid4,

normal
node_B_2_aggr0 1.49TB  74.12GB  95% online    1 node_B_2
raid4,

normal
node_B_1_aggr1 3.14TB  3.04TB   3% online   15 node_B_1
raid_dp,

normal
node_B_1_aggr2 3.14TB  3.06TB   3% online   14 node_B_1
raid_tec,

```

```

normal
node_B_1_aggr1 3.14TB  2.99TB    5% online    37 node_B_2
raid_dp,

normal
node_B_1_aggr2 3.14TB  3.02TB    4% online    35 node_B_2
raid_tec,

normal

cluster_A Switched Over Aggregates:
Aggregate      Size Available Used% State  #Vols  Nodes
RAID Status
-----
node_A_1_aggr1 2.36TB  2.12TB   10% online    91 node_B_1
raid_dp,

normal
node_A_1_aggr2 3.14TB  2.90TB    8% online    90 node_B_1
raid_tec,

normal
node_A_2_aggr1 2.36TB  2.10TB   11% online    91 node_B_2
raid_dp,

normal
node_A_2_aggr2 3.14TB  2.89TB    8% online    90 node_B_2
raid_tec,

normal
12 entries were displayed.

cluster_B::>

```

b. Mirror the aggregate:

```
storage aggregate mirror -aggregate aggregate-name
```

The following output shows a typical mirroring operation.

```
cluster_B::> storage aggregate mirror -aggregate node_B_1_aggr1
```

Info: Disks would be added to aggregate "node\_B\_1\_aggr1" on node "node\_B\_1" in the following manner:

Second Plex

	RAID Group rg0, 6 disks (block checksum, raid_dp)		
Size	Position	Disk	Type
	-----	-----	-----
	dparity	5.20.6	SSD
-	parity	5.20.14	SSD
-	data	5.21.1	SSD
894.0GB	data	5.21.3	SSD
894.0GB	data	5.22.3	SSD
894.0GB	data	5.21.13	SSD
894.0GB			

Aggregate capacity available for volume use would be 2.99TB.

Do you want to continue? {y|n}: y

- c. Repeat the previous step for each of the aggregates from the surviving site.
- d. Wait for the aggregates to resynchronize; you can check the status with the `storage aggregate show` command.

The following output shows that a number of aggregates are resynchronizing.

```
cluster_B::> storage aggregate show
```

cluster\_B Aggregates:

Aggregate	Size	Available	Used%	State	#Vols	Nodes
RAID Status						
-----	-----	-----	-----	-----	-----	-----
node_B_1_aggr0	1.49TB	74.12GB	95%	online	1	node_B_1
raid4,						

```

mirrored,

normal
node_B_2_aggr0 1.49TB  74.12GB  95% online  1 node_B_2
raid4,

mirrored,

normal
node_B_1_aggr1 2.86TB  2.76TB   4% online  15 node_B_1
raid_dp,

resyncing
node_B_1_aggr2 2.89TB  2.81TB   3% online  14 node_B_1
raid_tec,

resyncing
node_B_2_aggr1 2.73TB  2.58TB   6% online  37 node_B_2
raid_dp,

resyncing
node_B-2_aggr2 2.83TB  2.71TB   4% online  35 node_B_2
raid_tec,

resyncing

cluster_A Switched Over Aggregates:
Aggregate      Size Available Used% State  #Vols  Nodes
RAID Status
-----
node_A_1_aggr1 1.86TB  1.62TB  13% online  91 node_B_1
raid_dp,

resyncing
node_A_1_aggr2 2.58TB  2.33TB  10% online  90 node_B_1
raid_tec,

resyncing
node_A_2_aggr1 1.79TB  1.53TB  14% online  91 node_B_2
raid_dp,

resyncing
node_A_2_aggr2 2.64TB  2.39TB   9% online  90 node_B_2
raid_tec,

```

```
resyncing
12 entries were displayed.
```

- e. Confirm that all aggregates are online and have resynchronized:

```
storage aggregate plex show
```

The following output shows that all aggregates have resynchronized.

```
cluster_A::> storage aggregate plex show
()
```

Aggregate Plex	Is Online	Is Resyncing	Resyncing Percent	Status
node_B_1_aggr0 plex0	true	false		- normal,active
node_B_1_aggr0 plex8	true	false		- normal,active
node_B_2_aggr0 plex0	true	false		- normal,active
node_B_2_aggr0 plex8	true	false		- normal,active
node_B_1_aggr1 plex0	true	false		- normal,active
node_B_1_aggr1 plex9	true	false		- normal,active
node_B_1_aggr2 plex0	true	false		- normal,active
node_B_1_aggr2 plex5	true	false		- normal,active
node_B_2_aggr1 plex0	true	false		- normal,active
node_B_2_aggr1 plex9	true	false		- normal,active
node_B_2_aggr2 plex0	true	false		- normal,active
node_B_2_aggr2 plex5	true	false		- normal,active
node_A_1_aggr1 plex4	true	false		- normal,active
node_A_1_aggr1 plex8	true	false		- normal,active
node_A_1_aggr2 plex1	true	false		- normal,active
node_A_1_aggr2 plex5	true	false		- normal,active
node_A_2_aggr1 plex4	true	false		- normal,active
node_A_2_aggr1 plex8	true	false		- normal,active
node_A_2_aggr2 plex1	true	false		- normal,active
node_A_2_aggr2 plex5	true	false		- normal,active

```
20 entries were displayed.
```

4. On systems running ONTAP 9.5 and earlier, perform the root-aggregates healing phase:

```
metrocluster heal -phase root-aggregates
```

```
cluster_B::> metrocluster heal -phase root-aggregates
[Job 651] Job is queued: MetroCluster Heal Root Aggregates Job.Oct 26
13:05:00
[Job 651] Job succeeded: Heal Root Aggregates is successful.
```

5. Verify that the "heal roots" phase has completed and the disaster site is ready for switchback:

The following output shows that the "heal roots" phase has completed on cluster\_A.

```
cluster_B::> metrocluster node show
DR
Group Cluster Node          Configuration  DR
State          Mirroring Mode
-----
1      cluster_A
      node_A_1      configured    enabled    heal roots
completed
      node_A_2      configured    enabled    heal roots
completed
      cluster_B
      node_B_1      configured    enabled    waiting for
switchback recovery
      node_B_2      configured    enabled    waiting for
switchback recovery
4 entries were displayed.

cluster_B::>
```

Proceed to verify the licenses on the replaced nodes.

[Verifying licenses on the replaced nodes](#)

## Prepare for switchback in a MetroCluster FC configuration

### 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.

#### About this task

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.

#### Steps



1. In Maintenance mode, 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 “y” when prompted by the system, because modifying one port in a port pair also modifies the other port.
Different	<ol style="list-style-type: none"><li>a. Answer “n” when prompted by the system.</li><li>b. Restore the FC port configuration: <pre>ucadmin modify -m fc -t initiator targetadapter_name</pre></li></ol>

3. Exit Maintenance mode:

```
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:

```
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.

### Steps

1. Power on the FC-to-SAS bridges.
2. Set the IP address on the Ethernet ports by using the `set IPAddress port ipaddress` 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 IPSubnetMask port mask` 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 EthernetSpeed port speed` command.

- `port` can be "MP1" or "MP2".
- `speed` can be "100" or "1000".

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 fcdatarate port speed` 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 FCConnMode port mode` 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 tasks

[Port assignments for FC switches when using 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.

### About this task

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.

## Steps

### 1. Boot and pre-configure the new switch:

- a. Power up the new switch and let it boot up.
- b. Check the firmware version on the switch to confirm it matches the version of the other FC switches:

```
firmwareShow
```

- c. Configure the new switch as described in the following topics, skipping the steps for configuring zoning on the switch.

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

[Stretch MetroCluster installation and configuration](#)

- d. 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:

- a. 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 this 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.

### About this task

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.

## Steps

1. Configure the switch:
  - a. Refer to [Fabric-attached MetroCluster installation and configuration](#)
  - b. Follow the steps for configuring the switch in [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



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

```

## 8. 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

```

9. 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.

### Steps

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.

### Before you begin

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](#)

### About this task

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.

### Steps

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.

<b>If the switch vendor is...</b>	<b>Then use these steps to enable the ports...</b>
-----------------------------------	--

- 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	<p>a. Enter configuration mode for the interface, and then enable the ports with the no shut command.</p> <p>In the following example, port fc1/36 is disabled:</p> <pre>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</pre> <p>b. Verify that the switch port is enabled: show interface brief</p> <p>c. Repeat Substeps a and b on the other ports connected to the FC-to-SAS bridges, HBAs, and FC-VI adapters.</p> <p>d. Repeat Substeps a, b, and c for the second FC switch at the surviving site.</p>
-------	--

## 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.

### Before you begin

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 [Required MetroCluster IP component and naming conventions](#) section of the [MetroCluster IP installation and configuration](#).

### About this task

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.

## Steps

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.

### Steps

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
```

2. 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 <a href="#">If one or more plexes remain offline, additional steps are required to rebuild the mirror.</a>
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.

### About this task

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 [Determining the system IDs of the replacement controller modules](#).

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
-----	----------	------------	------------

## Steps

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.

### About this task

This task begins with the nodes showing the LOADER prompt.

### Steps

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 [From the boot menu, select option 6, Update flash from backup config](#). to boot the system to the ONTAP prompt. You then need to [Reset the boot recovery and rdb\\_corrupt bootargs](#)

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

7. Confirm that the replacement nodes at the disaster site are ready for switchback:

```
metrocluster node show
```

The replacement nodes should be in “waiting for switchback recovery” mode. If they are in “normal” mode instead, you can reboot the replacement nodes. After that boot, the nodes should be in “waiting for switchback recovery” mode.

The following example shows that the replacement nodes are ready for switchback:

```
cluster_B::> metrocluster node show
DR
Grp Cluster Node      Configuration  DR
---  -
1    cluster_B
      node_B_1  configured   enabled    switchover completed
      node_B_2  configured   enabled    switchover completed
      cluster_A
      node_A_1  configured   enabled    waiting for switchback
recovery
      node_A_2  configured   enabled    waiting for switchback
recovery
4 entries were displayed.

cluster_B::>
```

### What to do next

Proceed to [Complete the disaster recovery process](#).

**Reset the boot\_recovery and rdb\_corrupt bootargs**

If required, you can reset the boot\_recovery and rdb\_corrupt\_bootargs

### Steps

1. Halt the node back to the LOADER prompt:

```
node_A_1::*> halt -node _node-name_
```

2. Check if the following bootargs have been set:

```
LOADER> printenv bootarg.init.boot_recovery
LOADER> printenv bootarg.rdb_corrupt
```

3. If either bootarg has been set to a value, unset it and boot ONTAP:

```
LOADER> unsetenv bootarg.init.boot_recovery
LOADER> unsetenv bootarg.rdb_corrupt
LOADER> saveenv
LOADER> bye
```

## Preparing for switchback in a mixed configuration (recovery during transition)

You must perform certain tasks in order to prepare the mixed MetroCluster IP and FC configuration for the switchback operation. This procedure only applies to configurations that encountered a failure during the MetroCluster FC to IP transition process.

### About this task

This procedure should only be used when performing recovery on a system that was in mid-transition when the failure occurred.

In this scenario, the MetroCluster is a mixed configuration:

- One DR group consists of fabric-attached MetroCluster FC nodes.

You must perform the MetroCluster FC recovery steps on these nodes.

- One DR group consists of MetroCluster IP nodes.

You must perform the MetroCluster IP recovery steps on these nodes.

### Steps

Perform the steps in the following order.

1. Prepare the FC nodes for switchback by performing the following tasks in order:
  - a. [Verifying port configuration \(MetroCluster FC configurations only\)](#)
  - b. [Configuring the FC-to-SAS bridges \(MetroCluster FC configurations only\)](#)
  - c. [Configuring the FC switches \(MetroCluster FC configurations only\)](#)
  - d. [Verifying the storage configuration](#) (only perform these steps on replaced drives on the MetroCluster FC nodes)
  - e. [Powering on the equipment at the disaster site](#) (only perform these steps on replaced drives on the MetroCluster FC nodes)
  - f. [Assigning ownership for replaced drives](#) (only perform these steps on replaced drives on the MetroCluster FC nodes)

- g. Perform the steps in [Reassigning disk ownership for root aggregates to replacement controller modules \(MetroCluster FC configurations\)](#), up to and including the step to issue the mailbox destroy command.
- h. Destroy the local plex (plex 0) of the root aggregate:

```
aggr destroy plex-id
```

- i. If the root aggr is not online, bring it online.

## 2. Boot the MetroCluster FC nodes.

You must perform these steps on both of the MetroCluster FC nodes.

- a. Display the boot menu:

```
boot_ontap menu
```

- b. From the boot menu, select option 6, **Update flash from backup config**.
- c. 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 these substeps to boot the system to the ONTAP prompt. You then need to [Reset the boot recovery and rdb\\_corrupt bootargs](#)

## 3. Mirror the root aggregate on plex 0:

You must perform these steps on both of the MetroCluster FC nodes.

- 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

## 4. Return to Maintenance mode.

You must perform these steps on both of the MetroCluster FC nodes.

- a. Halt the node:

```
halt
```

- b. Boot the node to Maintenance:

```
mode:boot_ontap maint
```

## 5. Delete the contents of the mailbox disks:

```
mailbox destroy local
```

You must perform these steps on both of the MetroCluster FC nodes.

6. Halt the nodes:

```
halt
```

7. After the nodes boot up, verify the status of the node:

```
metrocluster node show
```

```
siteA::*> metrocluster node show
```

DR	Configuration	DR
Group Cluster Node	State	Mirroring Mode
-----	-----	-----
1	siteA	
	wmc66-a1	configured
switchback recovery		enabled
	wmc66-a2	configured
switchback recovery		enabled
	siteB	
	wmc66-b1	configured
completed		enabled
	wmc66-b2	configured
completed		enabled
2	siteA	
	wmc55-a1	-
	wmc55-a2	unreachable
	siteB	
	wmc55-b1	configured
completed		enabled
	wmc55-b2	configured

8. Prepare the MetroCluster IP nodes for switchback by performing the tasks in [Preparing for switchback in a MetroCluster IP configuration](#) up to and including [Deleting failed plexes owned by the surviving site \(MetroCluster IP configurations\)](#).
9. On the MetroCluster FC nodes, perform the steps in [Performing aggregate healing and restoring mirrors \(MetroCluster FC configurations\)](#).
10. On the MetroCluster IP nodes, perform the steps in [Performing aggregate healing and restoring mirrors \(MetroCluster IP configurations\)](#).
11. Proceed through the remaining tasks of the recovery process beginning with [Reestablishing object stores for FabricPool configurations](#).

### Reset the boot\_recovery and rdb\_corrupt bootargs

If required, you can reset the boot\_recovery and rdb\_corrupt\_bootargs

## Steps

1. Halt the node back to the LOADER prompt:

```
node_A_1::*> halt -node _node-name_
```

2. Check if the following bootargs have been set:

```
LOADER> printenv bootarg.init.boot_recovery  
LOADER> printenv bootarg.rdb_corrupt
```

3. If either bootarg has been set to a value, unset it and boot ONTAP:

```
LOADER> unsetenv bootarg.init.boot_recovery  
LOADER> unsetenv bootarg.rdb_corrupt  
LOADER> saveenv  
LOADER> bye
```

## Completing recovery

### Reestablishing object stores for FabricPool configurations

If one of the object stores in a FabricPool mirror was co-located with the MetroCluster disaster site and was destroyed, you must reestablish the object store and the FabricPool mirror.

#### About this task

- If the object-stores are remote and a MetroCluster site is destroyed, you do not need to rebuild the object store, and the original object store configurations as well as cold data contents are retained.
- For more information about FabricPool configurations, see the [Disk and aggregates management](#).

#### Step

1. Follow the procedure "Replacing a FabricPool mirror on a MetroCluster configuration" in the [Disk and aggregates management](#).

### Verifying licenses on the replaced nodes

You must install new licenses for the replacement nodes if the impaired nodes were using ONTAP features that require a standard (node-locked) license. For features with standard licenses, each node in the cluster should have its own key for the feature.

#### About this task

Until you install license keys, features requiring standard licenses continue to be available to the replacement node. However, if the impaired node was the only node in the cluster with a license for the feature, no configuration changes to the feature are allowed. Also, using unlicensed features on the node might put you out of compliance with your license agreement, so you should install the replacement license key or keys on the replacement node as soon as possible.

The licenses keys must be in the 28-character format.

You have a 90-day grace period in which to install the license keys. After the grace period, all old licenses are invalidated. After a valid license key is installed, you have 24 hours to install all of the keys before the grace period ends.



If all nodes at a site have been replaced (a single node in the case of a two-node MetroCluster configuration), license keys must be installed on the replacement node or nodes prior to switchback.

## Steps

1. Identify the licenses on the node:

```
license show
```

The following example displays the information about licenses in the system:

```
cluster_B::> license show
               (system license show)

Serial Number: 1-80-00050
Owner: site1-01
Package      Type      Description      Expiration
-----
Base         license  Cluster Base License  -
NFS          site     NFS License        -
CIFS         site     CIFS License        -
iSCSI        site     iSCSI License        -
FCP          site     FCP License         -
FlexClone    site     FlexClone License    -

6 entries were displayed.
```

2. Verify that the licenses are good for the node after switchback:

```
metrocluster check license show
```

The following example displays the licenses that are good for the node:



```
cluster_B::> metrocluster check license show
```

Cluster	Check	Result
-----	-----	-----
Cluster_B	negotiated-switchover-ready	not-applicable
NFS	switchback-ready	not-applicable
CIFS	job-schedules	ok
iSCSI	licenses	ok
FCP	periodic-check-enabled	ok

3. If you need new license keys, obtain replacement license keys on the NetApp Support Site in the My Support section under Software licenses.



The new license keys that you require are automatically generated and sent to the email address on file. If you fail to receive the email with the license keys within 30 days, refer to the *"Who to contact if I have issues with my Licenses?"* section in the Knowledge Base article [Post Motherboard Replacement Process to update Licensing on a AFF/FAS system](#).

4. Install each license key:

```
system license add -license-code license-key, license-key...+
```

5. Remove the old licenses, if desired:

- a. Check for unused licenses:

```
license clean-up -unused -simulate
```

- b. If the list looks correct, remove the unused licenses:

```
license clean-up -unused
```

## Restoring key management

If data volumes are encrypted, you must restore key management. If the root volume is encrypted, you must recover key management.

### Steps

1. If data volumes are encrypted, restore the keys using the correct command for your key management configuration.

If you are using...	Use this command...
<b>Onboard key management</b>	<pre>security key-manager onboard sync</pre> <p>For more information, see <a href="#">Restoring onboard key management encryption keys</a>.</p>

<b>External key management</b>	<pre>security key-manager key query -node node-name</pre> <p>For more information, see <a href="#">Restoring external key management encryption keys</a>.</p>
--------------------------------	---

2. If the root volume is encrypted, use the procedure in [Recovering key management if the root volume is encrypted](#).

## Performing a switchback

After you heal the MetroCluster configuration, you can perform the MetroCluster switchback operation. The MetroCluster switchback operation returns the configuration to its normal operating state, with the sync-source storage virtual machines (SVMs) on the disaster site active and serving data from the local disk pools.

### Before you begin

- The disaster cluster must have successfully switched over to the surviving cluster.
- Healing must have been performed on the data and root aggregates.
- The surviving cluster nodes must not be in the HA failover state (all nodes must be up and running for each HA pair).
- The disaster site controller modules must be completely booted and not in the HA takeover mode.
- The root aggregate must be mirrored.
- The Inter-Switch Links (ISLs) must be online.
- Any required licenses must be installed on the system.

### Steps

1. Confirm that all nodes are in the enabled state:

```
metrocluster node show
```

The following example displays the nodes that are in the enabled state:

```
cluster_B::> metrocluster node show
```

DR	Configuration	DR
Group Cluster Node	State	Mirroring Mode
-----	-----	-----
1 cluster_A		
node_A_1	configured	enabled heal roots completed
node_A_2	configured	enabled heal roots completed
cluster_B		
node_B_1	configured	enabled waiting for
switchback recovery		
node_B_2	configured	enabled waiting for
switchback recovery		

4 entries were displayed.

2. Confirm that resynchronization is complete on all SVMs:

```
metrocluster vserver show
```

3. Verify that any automatic LIF migrations being performed by the healing operations have been successfully completed:

```
metrocluster check lif show
```

4. Perform the switchback by running the `metrocluster switchback` command from any node in the surviving cluster.
5. Check the progress of the switchback operation:

```
metrocluster show
```

The switchback operation is still in progress when the output displays "waiting-for-switchback":

```
cluster_B::> metrocluster show
Cluster                               Entry Name                               State
-----
Local: cluster_B                      Configuration state configured
                                      Mode                                     switchover
                                      AUSO Failure Domain -
Remote: cluster_A                     Configuration state configured
                                      Mode                                     waiting-for-switchback
                                      AUSO Failure Domain -
```

The switchback operation is complete when the output displays "normal":

```
cluster_B::> metrocluster show
Cluster                               Entry Name                               State
-----
Local: cluster_B                      Configuration state configured
                                      Mode                                     normal
                                      AUSO Failure Domain -
Remote: cluster_A                     Configuration state configured
                                      Mode                                     normal
                                      AUSO Failure Domain -
```

If a switchback takes a long time to finish, you can check on the status of in-progress baselines by using the the following command at the advanced privilege level:

```
metrocluster config-replication resync-status show
```

6. Reestablish any SnapMirror or SnapVault configurations.

In ONTAP 8.3, you need to manually reestablish a lost SnapMirror configuration after a MetroCluster

switchback operation. In ONTAP 9.0 and later, the relationship is reestablished automatically.

## Verifying a successful switchback

After performing the switchback, you want to confirm that all aggregates and storage virtual machines (SVMs) are switched back and online.

### Steps

1. Verify that the switched-over data aggregates are switched back:

```
storage aggregate show
```

In the following example, `aggr_b2` on node B2 has switched back:

```
node_B_1::> storage aggregate show
Aggregate      Size Available Used% State   #Vols  Nodes           RAID
Status
-----
...
aggr_b2        227.1GB   227.1GB    0% online      0 node_B_2   raid_dp,
mirrored,
normal

node_A_1::> aggr show
Aggregate      Size Available Used% State   #Vols  Nodes           RAID
Status
-----
...
aggr_b2        -         -         - unknown      - node_A_1
```

If the disaster site included unmirrored aggregates and the unmirrored aggregates are no longer present, the aggregate might show up with a state of “unknown” in the output of the `storage aggregate show` command. Contact technical support to remove the out-of-date entries for the unmirrored aggregates, reference the Knowledge Base article [How to remove stale unmirrored aggregate entries in a MetroCluster following disaster where storage was lost](#).

2. Verify that all sync-destination SVMs on the surviving cluster are dormant (showing an Admin State of “stopped”) and the sync-source SVMs on the disaster cluster are up and running:

```
vserver show -subtype sync-source
```

```

node_B_1::> vserver show -subtype sync-source
                                Admin      Root
Name      Name
Vserver    Type      Subtype      State      Volume      Aggregate
Service Mapping
-----
...
vs1a      data      sync-source
                                running    vs1a_vol    node_B_2
file      file

aggr_b2

node_A_1::> vserver show -subtype sync-destination
                                Admin      Root
Name      Name
Vserver    Type      Subtype      State      Volume      Aggregate
Service Mapping
-----
...
cluster_A-vs1a-mc  data      sync-destination
                                stopped    vs1a_vol    sosb_
file      file

aggr_b2

```

Sync-destination aggregates in the MetroCluster configuration have the suffix "-mc" automatically appended to their name to help identify them.

3. Confirm that the switchback operations succeeded by using the `metrocluster operation show` command.

If the command output shows...	Then...
That the switchback operation state is successful.	The switchback process is complete and you can proceed with operation of the system.
That the switchback operation or switchback-continuation-agent operation is partially successful.	Perform the suggested fix provided in the output of the <code>metrocluster operation show</code> command.

### After you finish

You must repeat the previous sections to perform the switchback in the opposite direction. If site\_A did a switchover of site\_B, have site\_B do a switchover of site\_A.

## Mirroring the root aggregates of the replacement nodes

If disks were replaced, you must mirror the root aggregates of the new nodes on the disaster site.

### Steps

1. On the disaster site, identify the aggregates which are not mirrored:

```
storage aggregate show
```

```
cluster_A::> storage aggregate show
```

Aggregate Status	Size	Available	Used%	State	#Vols	Nodes	RAID
node_A_1_aggr0	1.49TB	74.12GB	95%	online	1	node_A_1	
raid4,							
normal							
node_A_2_aggr0	1.49TB	74.12GB	95%	online	1	node_A_2	
raid4,							
normal							
node_A_1_aggr1	1.49TB	74.12GB	95%	online	1	node_A_1	raid
4, normal							
mirrored							
node_A_2_aggr1	1.49TB	74.12GB	95%	online	1	node_A_2	raid
4, normal							
mirrored							

4 entries were displayed.

```
cluster_A::>
```

2. Mirror one of the root aggregates:

```
storage aggregate mirror -aggregate root-aggregate
```

The following example shows how the command selects disks and prompts for confirmation when mirroring the aggregate.

```
cluster_A::> storage aggregate mirror -aggregate node_A_2_aggr0

Info: Disks would be added to aggregate "node_A_2_aggr0" on node
"node_A_2" in
    the following manner:

    Second Plex

        RAID Group rg0, 3 disks (block checksum, raid4)
        Position    Disk                                Type
Size
-----
-----
-      parity      2.10.0                                SSD
      data         1.11.19                                SSD
894.0GB
      data         2.10.2                                SSD
894.0GB

    Aggregate capacity available for volume use would be 1.49TB.

Do you want to continue? {y|n}: y

cluster_A::>
```

### 3. Verify that mirroring of the root aggregate is complete:

```
storage aggregate show
```

The following example shows that the root aggregates are mirrored.

```
cluster_A::> storage aggregate show
```

Aggregate Status	Size	Available	Used%	State	#Vols	Nodes	RAID
node_A_1_aggr0	1.49TB	74.12GB	95%	online	1	node_A_1	raid4, mirrored, normal
node_A_2_aggr0	2.24TB	838.5GB	63%	online	1	node_A_2	raid4, mirrored, normal
node_A_1_aggr1	1.49TB	74.12GB	95%	online	1	node_A_1	raid4, mirrored, normal
node_A_2_aggr1	1.49TB	74.12GB	95%	online	1	node_A_2	raid4 mirrored, normal

```
4 entries were displayed.
```

```
cluster_A::>
```

4. Repeat these steps for the other root aggregates.

Any root aggregate that does not have a status of mirrored must be mirrored.

## Reconfiguring the ONTAP Mediator service (MetroCluster IP configurations)

If you have a MetroCluster IP configuration that was configured with the ONTAP Mediator service, you must remove and reconfigure the association with the mediator.

### Before you begin

- You must have the IP address and username and password for the ONTAP Mediator service.
- The ONTAP Mediator service must be configured and operating on the Linux host.

### Steps

1. Remove the existing ONTAP Mediator configuration:

```
metrocluster configuration-settings mediator remove
```

2. Reconfigure the ONTAP Mediator configuration:

```
metrocluster configuration-settings mediator add -mediator-address mediator-
```



## Verifying the health of the MetroCluster configuration

You should check the health of the MetroCluster configuration to verify proper operation.

### Steps

1. Check that the MetroCluster is configured and in normal mode on each cluster:

```
metrocluster show
```

```
cluster_A::> metrocluster show
Cluster                               Entry Name                               State
-----
Local: cluster_A                      Configuration state configured
                                      Mode normal
                                      AUSO Failure Domain auso-on-cluster-disaster
Remote: cluster_B                     Configuration state configured
                                      Mode normal
                                      AUSO Failure Domain auso-on-cluster-disaster
```

2. Check that mirroring is enabled on each node:

```
metrocluster node show
```

```
cluster_A::> metrocluster node show
DR                               Configuration  DR
Group Cluster Node              State          Mirroring Mode
-----
1      cluster_A
          node_A_1      configured    enabled    normal
          cluster_B
          node_B_1      configured    enabled    normal
2 entries were displayed.
```

3. Check that the MetroCluster components are healthy:

```
metrocluster check run
```

```
cluster_A::> metrocluster check run
```

```
Last Checked On: 10/1/2014 16:03:37
```

Component	Result
nodes	ok
lifs	ok
config-replication	ok
aggregates	ok

4 entries were displayed.

Command completed. Use the `metrocluster check show -instance` command or sub-commands in `metrocluster check` directory for detailed results. To check if the nodes are ready to do a switchover or switchback operation, run `metrocluster switchover -simulate` or `metrocluster switchback -simulate`, respectively.

4. Check that there are no health alerts:

```
system health alert show
```

5. Simulate a switchover operation:

- a. From any node's prompt, change to the advanced privilege level:

```
set -privilege advanced
```

You need to respond with `y` when prompted to continue into advanced mode and see the advanced mode prompt (`*>`).

- b. Perform the switchover operation with the `-simulate` parameter:

```
metrocluster switchover -simulate
```

- c. Return to the admin privilege level:

```
set -privilege admin
```

6. For MetroCluster IP configurations using the ONTAP Mediator service, confirm that the Mediator service is up and operating.

- a. Check that the Mediator disks are visible to the system:

```
storage failover mailbox-disk show
```

The following example shows that the mailbox disks have been recognized.

```

node_A_1::*> storage failover mailbox-disk show
Mailbox
Node          Owner      Disk      Name      Disk UUID
-----
still13-vsim-ucs626g
.
.
    local      0m.i2.3L26
7BBA77C9:AD702D14:831B3E7E:0B0730EE:00000000:00000000:00000000:000000
00:00000000:00000000
    local      0m.i2.3L27
928F79AE:631EA9F9:4DCB5DE6:3402AC48:00000000:00000000:00000000:000000
00:00000000:00000000
    local      0m.i1.0L60
B7BCDB3C:297A4459:318C2748:181565A3:00000000:00000000:00000000:000000
00:00000000:00000000
.
.
.
    partner    0m.i1.0L14
EA71F260:D4DD5F22:E3422387:61D475B2:00000000:00000000:00000000:000000
00:00000000:00000000
    partner    0m.i2.3L64
4460F436:AAE5AB9E:D1ED414E:ABF811F7:00000000:00000000:00000000:000000
00:00000000:00000000
28 entries were displayed.

```

b. Change to the advanced privilege level:

```
set -privilege advanced
```

c. Check that the mailbox LUNs are visible to the system:

```
storage iscsi-initiator show
```

The output will show the presence of the mailbox LUNs:

Node	Type	Label	Target	Portal	Target Name
Admin/Op					
-----	-----	-----	-----	-----	-----
-----					
.					
.					
.					
.node_A_1					
		mailbox			
		mediator	172.16.254.1		iqn.2012-
		05.local:mailbox.target.db5f02d6-e3d3		up/up	
.					
.					
.					
17 entries were displayed.					

d. Return to the administrative privilege level:

```
set -privilege admin
```

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