



# **NetApp CN1610**

## **Cluster and storage switches**

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# NetApp CN1610

## Overview of installation and configuration for NetApp CN1610 switches

The CN1610 is a high bandwidth, managed Layer 2 switch that provides 16 10-Gigabit Small Form-Factor Pluggable Plus (SFP+) ports.

The switch includes redundant power supplies and fan trays that support hot swapping for high availability. This 1U switch can be installed in a standard 19-inch NetApp 42U system cabinet or third-party cabinet.

The switch supports local management through the console port or remote management by using Telnet or SSH through a network connection. The CN1610 includes a dedicated 1-Gigabit Ethernet RJ45 management port for out-of-band switch management. You can manage the switch by entering commands into the command-line interface (CLI) or by using an SNMP-based network management system (NMS).

## Install and configure workflow for NetApp CN1610 switches

To install and configure a NetApp CN1610 switch on systems running ONTAP, follow these steps:

1. [Install hardware](#)
2. [Install FASTPATH software](#)
3. [Install Reference Configuration file](#)

If the switches are running ONTAP 8.3.1 or later, follow the instructions in [Install FASTPATH and RCFs on switches running ONTAP 8.3.1 and later](#).

4. [Configure switch](#)

## Documentation requirements for NetApp CN1610 switches

For NetApp CN1610 switch installation and maintenance, be sure to review all the recommended documentation.

Document title	Description
<a href="#">1G Installation Guide</a>	An overview of the CN1601 switch hardware and software features and installation process.
<a href="#">10G Installation Guide</a>	An overview of the CN1610 switch hardware and software features and describes the features to install the switch and access the CLI.
<a href="#">CN1601 and CN1610 Switch Setup and Configuration Guide</a>	Details how to configure the switch hardware and software for your cluster environment.

Document title	Description
CN1601 Switch Administrator's Guide	<p>Provides examples of how to use the CN1601 switch in a typical network.</p> <ul style="list-style-type: none"> <li>• <a href="#">Administrator's Guide</a></li> <li>• <a href="#">Administrator's Guide, Version 1.1.x.x</a></li> <li>• <a href="#">Administrator's Guide, Version 1.2.x.x</a></li> </ul>
CN1610 Network Switch CLI Command Reference	<p>Provides detailed information about the command-line interface (CLI) commands you use to configure the CN1601 software.</p> <ul style="list-style-type: none"> <li>• <a href="#">Command Reference</a></li> <li>• <a href="#">Command Reference, Version 1.1.x.x</a></li> <li>• <a href="#">Command Reference, Version 1.2.x.x</a></li> </ul>

## Install and configure

### Install the hardware for the NetApp CN1610 switch

To install the NetApp CN1610 switch hardware, use the instructions in one of the following guides.

- [1G Installation Guide](#).

An overview of the CN1601 switch hardware and software features and installation process.

- [10G Installation Guide](#)

An overview of the CN1610 switch hardware and software features and describes the features to install the switch and access the CLI.

### Install FASTPATH software

When you install the FASTPATH software on your NetApp switches, you must begin the upgrade with the second switch, cs2.

#### Review requirements

##### What you'll need

- A current backup of the switch configuration.
- A fully functioning cluster (no errors in the logs and no defective cluster network interface cards (NICs) or similar issues).
- Fully functional port connections on the cluster switch.
- All cluster ports set up.
- All cluster logical interfaces (LIFs) set up (must not have been migrated).

- A successful communication path: The ONTAP (privilege: advanced) `cluster ping-cluster -node node1` command must indicate that larger than PMTU communication is successful on all paths.
- A supported version of FASTPATH and ONTAP.

Make sure you consult the switch compatibility table on the [NetApp CN1601 and CN1610 Switches](#) page for the supported FASTPATH and ONTAP versions.

## Install FASTPATH

The following procedure uses the clustered Data ONTAP 8.2 syntax. As a result, the cluster Vserver, LIF names, and CLI output are different than those in Data ONTAP 8.3.

There can be command dependencies between command syntax in the RCF and FASTPATH versions.

### About the examples

The examples in this procedure use the following switch and node nomenclature:

- The two NetApp switches are cs1 and cs2.
- The two cluster LIFs are clus1 and clus2.
- The Vservers are vs1 and vs2.
- The `cluster::*>` prompt indicates the name of the cluster.
- The cluster ports on each node are named e1a and e2a.

[Hardware Universe](#) has more information about the actual cluster ports that are supported on your platform.

- The supported Inter-Switch Links (ISLs) are ports 0/13 through 0/16.
- The supported node connections are ports 0/1 through 0/12.

### Step 1: Migrate cluster

1. If AutoSupport is enabled on this cluster, suppress automatic case creation by invoking an AutoSupport message:

```
system node autosupport invoke -node * -type all - message MAINT=xh
```

x is the duration of the maintenance window in hours.



The AutoSupport message notifies technical support of this maintenance task so that automatic case creation is suppressed during the maintenance window.

2. Log into the switch as admin. There is no password by default. At the (cs2) # prompt, enter the `enable` command. Again, there is no password by default. This gives you access to Privileged EXEC mode, which allows you to configure the network interface.

### Show example

```
(cs2) # enable
Password (Enter)
(cs2) #
```

3. On the console of each node, migrate clus2 to port e1a:

```
network interface migrate
```

### Show example

```
cluster::*> network interface migrate -vserver vs1 -lif clus2
-destnode node1 -dest-port e1a
cluster::*> network interface migrate -vserver vs2 -lif clus2
-destnode node2 -dest-port e1a
```

4. On the console of each node, verify that the migration took place:

```
network interface show
```

The following example shows that clus2 has migrated to port e1a on both nodes:

### Show example

```
cluster::*> network interface show -role cluster
```

Vserver	Logical Interface	Status Admin/Open	Network Address/Mask	Current Node	Current Port	Is Home
vs1	clus1	up/up	10.10.10.1/16	node1	e1a	true
	clus2	up/up	10.10.10.2/16	node1	e1a	
false						
vs2	clus1	up/up	10.10.10.1/16	node2	e1a	true
	clus2	up/up	10.10.10.2/16	node2	e1a	
false						

## Step 2: Install FASTPATH software

1. Shut down cluster port e2a on both nodes:

```
network port modify
```

### Show example

The following example shows port e2a being shut down on both nodes:

```
cluster::*> network port modify -node node1 -port e2a -up-admin
false
cluster::*> network port modify -node node2 -port e2a -up-admin
false
```

2. Verify that port e2a is shut down on both nodes:

```
network port show
```

### Show example

```
cluster::*> network port show -role cluster
```

					Auto-Negot	Duplex	Speed
(Mbps)							
Node	Port	Role	Link	MTU	Admin/Oper	Admin/Oper	Admin/Oper
-----	----	-----	----	-----	-----	-----	-----
node1							
	e1a	cluster	up	9000	true/true	full/full	auto/10000
	e2a	cluster	down	9000	true/true	full/full	auto/10000
node2							
	e1a	cluster	up	9000	true/true	full/full	auto/10000
	e2a	cluster	down	9000	true/true	full/full	auto/10000

3. Shut down the Inter-Switch Link (ISL) ports on cs1, the active NetApp switch:

### Show example

```
(cs1) # configure
(cs1)(config) # interface 0/13-0/16
(cs1)(Interface 0/13-0/16) # shutdown
(cs1)(Interface 0/13-0/16) # exit
(cs1)(config) # exit
```

4. Back up the current active image on cs2.

## Show example

```
(cs2) # show bootvar

Image Descriptions .

active:
backup:

Images currently available on Flash

-----
--
unit          active      backup      current-active      next-
active
-----
--

      1          1.1.0.3      1.1.0.1          1.1.0.3          1.1.0.3

(cs2) # copy active backup
Copying active to backup
Copy operation successful

(cs2) #
```

5. Download the image file to the switch.

Copying the image file to the active image means that when you reboot, that image establishes the running FASTPATH version. The previous image remains available as a backup.



## Show example

```
(cs2) # copy tftp://10.0.0.1/NetApp_CN1610_1.1.0.5.stk active

Mode..... TFTP
Set Server IP..... 10.0.0.1
Path..... ./
Filename..... NetApp_CN1610_1.1.0.5.stk
Data Type..... Code
Destination Filename..... active

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

File transfer operation completed successfully.
```

## 6. Verify the running version of the FASTPATH software.

```
show version
```

## Show example

```
(cs2) # show version

Switch: 1

System Description..... Broadcom Scorpion 56820
                        Development System - 16 TENGIG,
                        1.1.0.3, Linux 2.6.21.7
Machine Type.....      Broadcom Scorpion 56820
                        Development System - 16TENGIG
Machine Model.....     BCM-56820
Serial Number.....     10611100004
FRU Number.....
Part Number.....       BCM56820
Maintenance Level..... A
Manufacturer.....      0xbc00
Burned In MAC Address..... 00:A0:98:4B:A9:AA
Software Version.....  1.1.0.3
Operating System.....  Linux 2.6.21.7
Network Processing Device..... BCM56820_B0
Additional Packages..... FASTPATH QOS
                        FASTPATH IPv6 Management
```

## 7. View the boot images for the active and backup configuration.

```
show bootvar
```

### Show example

```
(cs2) # show bootvar
```

```
Image Descriptions
```

```
active :
```

```
backup :
```

```
Images currently available on Flash
```

```
-----  
--  
unit          active      backup      current-active      next-  
active  
-----  
--  
1             1.1.0.3      1.1.0.3      1.1.0.3              1.1.0.5
```

### 8. Reboot the switch.

```
reload
```

### Show example

```
(cs2) # reload
```

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

```
System will now restart!
```

### Step 3: Validate installation

#### 1. Log in again, and verify the new version of the FASTPATH software.

```
show version
```

### Show example

```
(cs2) # show version

Switch: 1

System Description..... Broadcom Scorpion 56820
                        Development System - 16
TENGIG,
                        1.1.0.5, Linux 2.6.21.7
Machine Type.....      Broadcom Scorpion 56820
                        Development System - 16TENGIG
Machine Model.....     BCM-56820
Serial Number.....     10611100004
FRU Number.....
Part Number.....       BCM56820
Maintenance Level..... A
Manufacturer.....      0xbc00
Burned In MAC Address..... 00:A0:98:4B:A9:AA
Software Version.....  1.1.0.5
Operating System.....  Linux 2.6.21.7
Network Processing Device..... BCM56820_B0
Additional Packages..... FASTPATH QOS
                        FASTPATH IPv6 Management
```

2. Bring up the ISL ports on cs1, the active switch.

```
configure
```

### Show example

```
(cs1) # configure
(cs1) (config) # interface 0/13-0/16
(cs1) (Interface 0/13-0/16) # no shutdown
(cs1) (Interface 0/13-0/16) # exit
(cs1) (config) # exit
```

3. Verify that the ISLs are operational:

```
show port-channel 3/1
```

The Link State field should indicate Up.

### Show example

```
(cs2) # show port-channel 3/1

Local Interface..... 3/1
Channel Name..... ISL-LAG
Link State..... Up
Admin Mode..... Enabled
Type..... Static
Load Balance Option..... 7
(Enhanced hashing mode)

Mbr      Device/      Port      Port
Ports   Timeout      Speed     Active
-----
0/13    actor/long    10G Full  True
        partner/long
0/14    actor/long    10G Full  True
        partner/long
0/15    actor/long    10G Full  True
        partner/long
0/16    actor/long    10G Full  True
        partner/long
```

4. Copy the running-config file to the startup-config file when you are satisfied with the software versions and switch settings.

### Show example

```
(cs2) # write memory

This operation may take a few minutes.
Management interfaces will not be available during this time.

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

Config file 'startup-config' created successfully .

Configuration Saved!
```

5. Enable the second cluster port, e2a, on each node:

```
network port modify
```

### Show example

```
cluster::*> network port modify -node node1 -port e2a -up-admin true
cluster::*> **network port modify -node node2 -port e2a -up-admin
true**
```

### 6. Revert clus2 that is associated with port e2a:

```
network interface revert
```

The LIF might revert automatically, depending on your version of ONTAP software.

### Show example

```
cluster::*> network interface revert -vserver Cluster -lif n1_clus2
cluster::*> network interface revert -vserver Cluster -lif n2_clus2
```

### 7. Verify that the LIF is now home (true) on both nodes:

```
network interface show -role cluster
```

### Show example

```
cluster::*> network interface show -role cluster
```

Vserver	Logical Interface	Status Admin/Oper	Network Address/Mask	Current Node	Current Port	Is Home
vs1	clus1	up/up	10.10.10.1/24	node1	e1a	true
	clus2	up/up	10.10.10.2/24	node1	e2a	true
vs2	clus1	up/up	10.10.10.1/24	node2	e1a	true
	clus2	up/up	10.10.10.2/24	node2	e2a	true

### 8. View the status of the nodes:

```
cluster show
```

## Show example

```
cluster::> cluster show
```

Node	Health	Eligibility
node1	true	true
node2	true	true

9. Repeat the previous steps to install the FASTPATH software on the other switch, cs1.
10. If you suppressed automatic case creation, re-enable it by invoking an AutoSupport message:

```
system node autosupport invoke -node * -type all -message MAINT=END
```

## Install a Reference Configuration File on a CN1610 switch

Follow this procedure to install a Reference Configuration File (RCF).

Before installing an RCF, you must first migrate the cluster LIFs away from switch cs2. After the RCF is installed and validated, the LIFs can be migrated back.

### Review requirements

#### What you'll need

- A current backup of the switch configuration.
- A fully functioning cluster (no errors in the logs and no defective cluster network interface cards (NICs) or similar issues).
- Fully functional port connections on the cluster switch.
- All cluster ports set up.
- All cluster logical interfaces (LIFs) set up.
- A successful communication path: The ONTAP (privilege: advanced) `cluster ping-cluster -node node1` command must indicate that larger than PMTU communication is successful on all paths.
- A supported version of RCF and ONTAP.

Make sure you consult the switch compatibility table on the [NetApp CN1601 and CN1610 Switches](#) page for the supported RCF and ONTAP versions.

### Install the RCF

The following procedure uses the clustered Data ONTAP 8.2 syntax. As a result, the cluster Vserver, LIF names, and CLI output are different than those in Data ONTAP 8.3.

There can be command dependencies between command syntax in the RCF and FASTPATH versions.



In RCF version 1.2, support for Telnet has been explicitly disabled because of security concerns. To avoid connectivity issues while installing RCF 1.2, verify that Secure Shell (SSH) is enabled. The [NetApp CN1610 Switch Administrator's Guide](#) has more information about SSH.

### About the examples

The examples in this procedure use the following switch and node nomenclature:

- The two NetApp switches are cs1 and cs2.
- The two cluster LIFs are clus1 and clus2.
- The Vservers are vs1 and vs2.
- The `cluster: :*>` prompt indicates the name of the cluster.
- The cluster ports on each node are named e1a and e2a.

[Hardware Universe](#) has more information about the actual cluster ports that are supported on your platform.

- The supported Inter-Switch Links (ISLs) are ports 0/13 through 0/16.
- The supported node connections are ports 0/1 through 0/12.
- A supported version of FASTPATH, RCF, and ONTAP.

Make sure you consult the switch compatibility table on the [NetApp CN1601 and CN1610 Switches](#) page for the supported FASTPATH, RCF, and ONTAP versions.

### Step 1: Migrate cluster

1. Save your current switch configuration information:

```
write memory
```

#### Show example

The following example shows the current switch configuration being saved to the startup configuration (`startup-config`) file on switch cs2:

```
(cs2) # write memory
This operation may take a few minutes.
Management interfaces will not be available during this time.

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

Config file 'startup-config' created successfully.

Configuration Saved!
```

2. On the console of each node, migrate clus2 to port e1a:



```
network interface migrate
```

### Show example

```
cluster::*> network interface migrate -vserver vs1 -lif clus2
-source-node node1 -destnode node1 -dest-port e1a

cluster::*> network interface migrate -vserver vs2 -lif clus2
-source-node node2 -destnode node2 -dest-port e1a
```

3. On the console of each node, verify that the migration occurred:

```
network interface show -role cluster
```

### Show example

The following example shows that clus2 has migrated to port e1a on both nodes:

```
cluster::*> network port show -role cluster
      clus1      up/up      10.10.10.1/16  node2  e1a      true
      clus2      up/up      10.10.10.2/16  node2  e1a
false
```

4. Shut down port e2a on both nodes:

```
network port modify
```

### Show example

The following example shows port e2a being shut down on both nodes:

```
cluster::*> network port modify -node node1 -port e2a -up-admin
false
cluster::*> network port modify -node node2 -port e2a -up-admin
false
```

5. Verify that port e2a is shut down on both nodes:

```
network port show
```

### Show example

```
cluster::*> network port show -role cluster
```

(Mbps)					Auto-Negot	Duplex	Speed
Node	Port	Role	Link	MTU	Admin/Oper	Admin/Oper	Admin/Oper
-----	-----	-----	----	-----	-----	-----	-----
node1							
	e1a	cluster	up	9000	true/true	full/full	auto/10000
	e2a	cluster	down	9000	true/true	full/full	auto/10000
node2							
	e1a	cluster	up	9000	true/true	full/full	auto/10000
	e2a	cluster	down	9000	true/true	full/full	auto/10000

6. Shut down the ISL ports on cs1, the active NetApp switch.

### Show example

```
(cs1) # configure
(cs1) (config) # interface 0/13-0/16
(cs1) (interface 0/13-0/16) # shutdown
(cs1) (interface 0/13-0/16) # exit
(cs1) (config) # exit
```

## Step 2: Install RCF

1. Copy the RCF to the switch.



You must set the `.scr` extension as part of the file name before invoking the script. This extension is the extension for the FASTPATH operating system.

The switch will validate the script automatically as it is downloaded to the switch, and the output will go to the console.

### Show example

```
(cs2) # copy tftp://10.10.0.1/CN1610_CS_RCF_v1.1.txt nvram:script
CN1610_CS_RCF_v1.1.scr

[the script is now displayed line by line]
Configuration script validated.
File transfer operation completed successfully.
```

2. Verify that the script was downloaded and saved with the file name that you gave it.

### Show example

```
(cs2) # script list
Configuration Script Name          Size(Bytes)
-----
running-config.scr                6960
CN1610_CS_RCF_v1.1.scr            2199

2 configuration script(s) found.
6038 Kbytes free.
```

3. Validate the script.



The script is validated during the download to verify that each line is a valid switch command line.

### Show example

```
(cs2) # script validate CN1610_CS_RCF_v1.1.scr
[the script is now displayed line by line]
Configuration script 'CN1610_CS_RCF_v1.1.scr' validated.
```

4. Apply the script to the switch.

### Show example

```
(cs2) #script apply CN1610_CS_RCF_v1.1.scr  
  
Are you sure you want to apply the configuration script? (y/n) y  
[the script is now displayed line by line]...  
  
Configuration script 'CN1610_CS_RCF_v1.1.scr' applied.
```

5. Verify that your changes have been implemented on the switch.

```
(cs2) # show running-config
```

The example displays the `running-config` file on the switch. You must compare the file to the RCF to verify that the parameters that you set are as you expect.

6. Save the changes.
7. Set the `running-config` file to be the standard one.

### Show example

```
(cs2) # write memory  
This operation may take a few minutes.  
Management interfaces will not be available during this time.  
  
Are you sure you want to save? (y/n) y  
  
Config file 'startup-config' created successfully.
```

8. Reboot the switch and verify that the `running-config` file is correct.

After the reboot completes, you must log in, view the `running-config` file, and then look for the description on interface 3/64, which is the version label for the RCF.

**Show example**

```
(cs2) # reload

The system has unsaved changes.
Would you like to save them now? (y/n) y

Config file 'startup-config' created successfully.
Configuration Saved!
System will now restart!
```

9. Bring up the ISL ports on cs1, the active switch.

**Show example**

```
(cs1) # configure
(cs1) (config)# interface 0/13-0/16
(cs1) (Interface 0/13-0/16)# no shutdown
(cs1) (Interface 0/13-0/16)# exit
(cs1) (config)# exit
```

10. Verify that the ISLs are operational:

```
show port-channel 3/1
```

The Link State field should indicate Up.

### Show example

```
(cs2) # show port-channel 3/1

Local Interface..... 3/1
Channel Name..... ISL-LAG
Link State..... Up
Admin Mode..... Enabled
Type..... Static
Load Balance Option..... 7
(Enhanced hashing mode)

Mbr      Device/      Port      Port
Ports   Timeout     Speed     Active
-----
0/13    actor/long   10G Full   True
        partner/long
0/14    actor/long   10G Full   True
        partner/long
0/15    actor/long   10G Full   True
        partner/long
0/16    actor/long   10G Full   True
        partner/long
```

11. Bring up cluster port e2a on both nodes:

```
network port modify
```

### Show example

The following example shows port e2a being brought up on node1 and node2:

```
cluster::*> network port modify -node node1 -port e2a -up-admin true
cluster::*> network port modify -node node2 -port e2a -up-admin true
```

### Step 3: Validate installation

1. Verify that port e2a is up on both nodes:

```
network port show -role cluster
```

### Show example

```
cluster::*> network port show -role cluster
```

Node	Port	Role	Link	MTU	Auto-Negot Admin/Oper	Duplex Admin/Oper	Speed (Mbps) Admin/Oper
node1							
	e1a	cluster	up	9000	true/true	full/full	auto/10000
	e2a	cluster	up	9000	true/true	full/full	auto/10000
node2							
	e1a	cluster	up	9000	true/true	full/full	auto/10000
	e2a	cluster	up	9000	true/true	full/full	auto/10000

2. On both nodes, revert clus2 that is associated with port e2a:

```
network interface revert
```

The LIF might revert automatically, depending on your version of ONTAP.

### Show example

```
cluster::*> network interface revert -vserver node1 -lif clus2  
cluster::*> network interface revert -vserver node2 -lif clus2
```

3. Verify that the LIF is now home (true) on both nodes:

```
network interface show -role cluster
```

### Show example

```
cluster::*> network interface show -role cluster
```

Vserver	Logical Interface	Status Admin/Oper	Network Address/Mask	Current Node	Current Port	Is Home
vs1						
	clus1	up/up	10.10.10.1/24	node1	e1a	true
	clus2	up/up	10.10.10.2/24	node1	e2a	true
vs2						
	clus1	up/up	10.10.10.1/24	node2	e1a	true
	clus2	up/up	10.10.10.2/24	node2	e2a	true

4. View the status of the node members:

```
cluster show
```

**Show example**

```
cluster::> cluster show

Node           Health  Eligibility
-----
node1
node2

           true   true
           true   true
```

5. Copy the `running-config` file to the `startup-config` file when you are satisfied with the software versions and switch settings.

**Show example**

```
(cs2) # write memory
This operation may take a few minutes.
Management interfaces will not be available during this time.

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

Config file 'startup-config' created successfully.

Configuration Saved!
```

6. Repeat the previous steps to install the RCF on the other switch, cs1.

**What's next?**

[Configure switch health monitoring](#)

## Install FASTPATH software and RCFs for ONTAP 8.3.1 and later

Follow this procedure to install FASTPATH software and RCFs for ONTAP 8.3.1 and later.

The installation steps are the same for both NetApp CN1601 management switches and CN1610 cluster switches running ONTAP 8.3.1 or later. However, the two models require different software and RCFs.

### Review requirements

#### What you'll need



- A current backup of the switch configuration.
- A fully functioning cluster (no errors in the logs and no defective cluster network interface cards (NICs) or similar issues).
- Fully functional port connections on the cluster switch.
- All cluster ports set up.
- All cluster logical interfaces (LIFs) set up (must not have been migrated).
- A successful communication path: The ONTAP (privilege: advanced) `cluster ping-cluster -node node1` command must indicate that larger than PMTU communication is successful on all paths.
- A supported version of FASTPATH, RCF, and ONTAP.

Make sure you consult the switch compatibility table on the [NetApp CN1601 and CN1610 Switches](#) page for the supported FASTPATH, RCF, and ONTAP versions.

## Install the FASTPATH software

The following procedure uses the clustered Data ONTAP 8.2 syntax. As a result, the cluster Vserver, LIF names, and CLI output are different than those in Data ONTAP 8.3.

There can be command dependencies between command syntax in the RCF and FASTPATH versions.



In RCF version 1.2, support for Telnet has been explicitly disabled because of security concerns. To avoid connectivity issues while installing RCF 1.2, verify that Secure Shell (SSH) is enabled. The [NetApp CN1610 Switch Administrator's Guide](#) has more information about SSH.

## About the examples

The examples in this procedure use the following switch and node nomenclature:

- The two NetApp switch names are cs1 and cs2.
- The cluster logical interface (LIF) names are node1\_clus1 and node1\_clus2 for node1, and node2\_clus1 and node2\_clus2 for node2. (You can have up to 24 nodes in a cluster.)
- The storage virtual machine (SVM) name is Cluster.
- The `cluster1:.*>` prompt indicates the name of the cluster.
- The cluster ports on each node are named e0a and e0b.

[Hardware Universe](#) has more information about the actual cluster ports that are supported on your platform.

- The supported Inter-Switch Links (ISLs) are ports 0/13 through 0/16.
- The supported node connections are ports 0/1 through 0/12.

## Step 1: Migrate cluster

1. Display information about the network ports on the cluster:

```
network port show -ipspace cluster
```

## Show example

The following example shows the type of output from the command:

```
cluster1::> network port show -ipspace cluster
```

						Speed
(Mbps)						
Node	Port	IPspace	Broadcast Domain	Link	MTU	
Admin/Oper						
-----	-----	-----	-----	-----	-----	-----
node1						
	e0a	Cluster	Cluster	up	9000	
auto/10000						
	e0b	Cluster	Cluster	up	9000	
auto/10000						
node2						
	e0a	Cluster	Cluster	up	9000	
auto/10000						
	e0b	Cluster	Cluster	up	9000	
auto/10000						

4 entries were displayed.

## 2. Display information about the LIFs on the cluster:

```
network interface show -role cluster
```

### Show example

The following example shows the logical interfaces on the cluster. In this example the `-role` parameter displays information about the LIFs that are associated with cluster ports:

```
cluster1::> network interface show -role cluster
(network interface show)

      Logical      Status      Network      Current
Current Is
Vserver      Interface  Admin/Oper  Address/Mask  Node
Port      Home
-----
Cluster
e0a      node1_clus1  up/up      10.254.66.82/16  node1
true
e0b      node1_clus2  up/up      10.254.206.128/16  node1
true
e0a      node2_clus1  up/up      10.254.48.152/16  node2
true
e0b      node2_clus2  up/up      10.254.42.74/16  node2
true
4 entries were displayed.
```

3. On each respective node, using a node management LIF, migrate `node1_clus2` to `e0a` on `node1` and `node2_clus2` to `e0a` on `node2`:

```
network interface migrate
```

You must enter the commands on the controller consoles that own the respective cluster LIFs.

### Show example

```
cluster1::> network interface migrate -vserver Cluster -lif
node1_clus2 -destination-node node1 -destination-port e0a
cluster1::> network interface migrate -vserver Cluster -lif
node2_clus2 -destination-node node2 -destination-port e0a
```



For this command, the name of the cluster is case-sensitive and the command should be run on each node. It is not possible to run this command in the general cluster LIF.

4. Verify that the migration took place by using the `network interface show` command on a node.

### Show example

The following example shows that clus2 has migrated to port e0a on nodes node1 and node2:

```
cluster1::> **network interface show -role cluster**
          Logical      Status      Network      Current
Current Is
Vserver   Interface  Admin/Oper  Address/Mask  Node
Port      Home
-----
Cluster
          node1_clus1  up/up      10.254.66.82/16  node1
e0a       true
          node1_clus2  up/up      10.254.206.128/16 node1
e0a       false
          node2_clus1  up/up      10.254.48.152/16  node2
e0a       true
          node2_clus2  up/up      10.254.42.74/16  node2
e0a       false
4 entries were displayed.
```

5. Change the privilege level to advanced, entering y when prompted to continue:

```
set -privilege advanced
```

The advanced prompt (\*>) appears.

6. Shut down cluster port e0b on both nodes:

```
network port modify -node node_name -port port_name -up-admin false
```

You must enter the commands on the controller consoles that own the respective cluster LIFs.

### Show example

The following example shows the commands to shut down port e0b on all nodes:

```
cluster1::*> network port modify -node node1 -port e0b -up-admin
false
cluster1::*> network port modify -node node2 -port e0b -up-admin
false
```

7. Verify that port e0b is shut down on both nodes:

network port show

**Show example**

```
cluster1::*> network port show -role cluster
```

(Mbps)					Speed
Node	Port	IPspace	Broadcast Domain	Link	MTU
Admin/Oper					
-----					
-----					
node1					
	e0a	Cluster	Cluster	up	9000
auto/10000					
	e0b	Cluster	Cluster	down	9000
auto/10000					
node2					
	e0a	Cluster	Cluster	up	9000
auto/10000					
	e0b	Cluster	Cluster	down	9000
auto/10000					

4 entries were displayed.

8. Shut down the Inter-Switch Link (ISL) ports on cs1.

**Show example**

```
(cs1) #configure
(cs1) (Config)#interface 0/13-0/16
(cs1) (Interface 0/13-0/16)#shutdown
(cs1) (Interface 0/13-0/16)#exit
(cs1) (Config)#exit
```

9. Back up the current active image on cs2.

## Show example

```
(cs2) # show bootvar
```

```
Image Descriptions
```

```
active :
```

```
backup :
```

```
Images currently available on Flash
```

```
-----  
unit      active      backup      current-active      next-active  
-----  
1         1.1.0.5      1.1.0.3      1.1.0.5              1.1.0.5
```

```
(cs2) # copy active backup
```

```
Copying active to backup
```

```
Copy operation successful
```

## Step 2: Install the FASTPATH software and RCF

1. Verify the running version of the FASTPATH software.

## Show example

```
(cs2) # show version

Switch: 1

System Description..... NetApp CN1610,
1.1.0.5, Linux
                               2.6.21.7
Machine Type..... NetApp CN1610
Machine Model..... CN1610
Serial Number..... 20211200106
Burned In MAC Address..... 00:A0:98:21:83:69
Software Version..... 1.1.0.5
Operating System..... Linux 2.6.21.7
Network Processing Device..... BCM56820_B0
Part Number..... 111-00893

--More-- or (q)uit

Additional Packages..... FASTPATH QOS
                               FASTPATH IPv6

Management
```

## 2. Download the image file to the switch.

Copying the image file to the active image means that when you reboot, that image establishes the running FASTPATH version. The previous image remains available as a backup.

### Show example

```
(cs2) #copy
sftp://root@10.22.201.50//tftpboot/NetApp_CN1610_1.2.0.7.stk active
Remote Password:*****

Mode..... SFTP
Set Server IP..... 10.22.201.50
Path..... /tftpboot/
Filename.....
NetApp_CN1610_1.2.0.7.stk
Data Type..... Code
Destination Filename..... active

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

File transfer operation completed successfully.
```

### 3. Confirm the current and next-active boot image versions:

```
show bootvar
```

### Show example

```
(cs2) #show bootvar

Image Descriptions

active :
backup :

Images currently available on Flash

-----
unit      active      backup      current-active      next-active
-----
1         1.1.0.8     1.1.0.8     1.1.0.8             1.2.0.7
```



4. Install the compatible RCF for the new image version to the switch.

If the RCF version is already correct, bring up the ISL ports.

**Show example**

```
(cs2) #copy tftp://10.22.201.50//CN1610_CS_RCF_v1.2.txt nvram:script
CN1610_CS_RCF_v1.2.scr

Mode..... TFTP
Set Server IP..... 10.22.201.50
Path..... /
Filename.....
CN1610_CS_RCF_v1.2.txt
Data Type..... Config Script
Destination Filename.....
CN1610_CS_RCF_v1.2.scr

File with same name already exists.
WARNING:Continuing with this command will overwrite the existing
file.

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

Validating configuration script...
[the script is now displayed line by line]

Configuration script validated.
File transfer operation completed successfully.
```



The `.scr` extension must be set as part of the file name before invoking the script. This extension is for the FASTPATH operating system.

The switch validates the script automatically as it is downloaded to the switch. The output goes to the console.

5. Verify that the script was downloaded and saved to the file name you gave it.

**Show example**

```
(cs2) #script list

Configuration Script Name          Size(Bytes)
-----
CN1610_CS_RCF_v1.2.scr            2191

1 configuration script(s) found.
2541 Kbytes free.
```

6. Apply the script to the switch.

**Show example**

```
(cs2) #script apply CN1610_CS_RCF_v1.2.scr

Are you sure you want to apply the configuration script? (y/n) y
[the script is now displayed line by line]...

Configuration script 'CN1610_CS_RCF_v1.2.scr' applied.
```

7. Verify that the changes have been applied to the switch, and then save them:

```
show running-config
```

**Show example**

```
(cs2) #show running-config
```

8. Save the running configuration so it becomes the startup configuration when you reboot the switch.

### Show example

```
(cs2) #write memory
This operation may take a few minutes.
Management interfaces will not be available during this time.

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

Config file 'startup-config' created successfully.

Configuration Saved!
```

### 9. Reboot the switch.

### Show example

```
(cs2) #reload

The system has unsaved changes.
Would you like to save them now? (y/n) y

Config file 'startup-config' created successfully.
Configuration Saved!
System will now restart!
```

### Step 3: Validate installation

1. Log in again, and then verify that the switch is running the new version of the FASTPATH software.

### Show example

```
(cs2) #show version

Switch: 1

System Description..... NetApp CN1610,
1.2.0.7,Linux
                                     3.8.13-4ce360e8
Machine Type..... NetApp CN1610
Machine Model..... CN1610
Serial Number..... 20211200106
Burned In MAC Address..... 00:A0:98:21:83:69
Software Version..... 1.2.0.7
Operating System..... Linux 3.8.13-
4ce360e8
Network Processing Device..... BCM56820_B0
Part Number..... 111-00893
CPLD version..... 0x5

Additional Packages..... FASTPATH QOS
                                     FASTPATH IPv6

Management
```

After the reboot completes, you must log in to verify the image version, view the running configuration, and look for the description on interface 3/64, which is the version label for the RCF.

2. Bring up the ISL ports on cs1, the active switch.

### Show example

```
(cs1) #configure
(cs1) (Config) #interface 0/13-0/16
(cs1) (Interface 0/13-0/16) #no shutdown
(cs1) (Interface 0/13-0/16) #exit
(cs1) (Config) #exit
```

3. Verify that the ISLs are operational:

```
show port-channel 3/1
```

The Link State field should indicate Up.

### Show example

```
(cs1) #show port-channel 3/1

Local Interface..... 3/1
Channel Name..... ISL-LAG
Link State..... Up
Admin Mode..... Enabled
Type..... Static
Load Balance Option..... 7
(Enhanced hashing mode)

Mbr      Device/      Port      Port
Ports   Timeout    Speed    Active
-----
0/13    actor/long   10G Full  True
        partner/long
0/14    actor/long   10G Full  True
        partner/long
0/15    actor/long   10G Full  False
        partner/long
0/16    actor/long   10G Full  True
        partner/long
```

#### 4. Bring up cluster port e0b on all nodes:

```
network port modify
```

You must enter the commands on the controller consoles that own the respective cluster LIFs.

### Show example

The following example shows port e0b being brought up on node1 and node2:

```
cluster1::*> network port modify -node node1 -port e0b -up-admin
true
cluster1::*> network port modify -node node2 -port e0b -up-admin
true
```

#### 5. Verify that the port e0b is up on all nodes:

```
network port show -ipSpace cluster
```

## Show example

```
cluster1::*> network port show -ipspace cluster
```

(Mbps)					Speed
Node	Port	IPspace	Broadcast Domain	Link	MTU
Admin/Oper					
-----					
node1					
	e0a	Cluster	Cluster	up	9000
auto/10000					
	e0b	Cluster	Cluster	up	9000
auto/10000					
node2					
	e0a	Cluster	Cluster	up	9000
auto/10000					
	e0b	Cluster	Cluster	up	9000
auto/10000					

4 entries were displayed.

6. Verify that the LIF is now home (`true`) on both nodes:

```
network interface show -role cluster
```

### Show example

```
cluster1::*> network interface show -role cluster
```

Current Is	Logical	Status	Network	Current
Vserver	Interface	Admin/Oper	Address/Mask	Node
Port	Home			
-----				
-----				
Cluster				
e0a	node1_clus1	up/up	169.254.66.82/16	node1
e0b	true			
e0a	node1_clus2	up/up	169.254.206.128/16	node1
e0b	true			
e0a	node2_clus1	up/up	169.254.48.152/16	node2
e0b	true			
e0a	node2_clus2	up/up	169.254.42.74/16	node2
e0b	true			

4 entries were displayed.

### 7. Show the status of the node members:

```
cluster show
```

### Show example

```
cluster1::*> cluster show
```

Node	Health	Eligibility	Epsilon
-----			
node1	true	true	false
node2	true	true	false

2 entries were displayed.

### 8. Return to the admin privilege level:

```
set -privilege admin
```

### 9. Repeat the previous steps to install the FASTPATH software and RCF on the other switch, cs1.

## Configure the hardware for the NetApp CN1610 switch

To configure the switch hardware and software for your cluster environment, refer to the

## Migrate switches

### Migrate from a switchless cluster environment to a switched NetApp CN1610 cluster environment

If you have an existing two-node switchless cluster environment, you can migrate to a two-node switched cluster environment using CN1610 cluster network switches that enables you to scale beyond two nodes.

#### Review requirements

##### What you'll need

For a two-node switchless configuration, ensure that:

- The two-node switchless configuration is properly set up and functioning.
- The nodes are running ONTAP 8.2 or later.
- All cluster ports are in the `up` state.
- All cluster logical interfaces (LIFs) are in the `up` state and on their home ports.

For the CN1610 cluster switch configuration:

- The CN1610 cluster switch infrastructure are fully functional on both switches.
- Both switches have management network connectivity.
- There is console access to the cluster switches.
- CN1610 node-to-node switch and switch-to-switch connections use twinax or fiber cables.

The [Hardware Universe](#) contains more information about cabling.

- Inter-Switch Link (ISL) cables are connected to ports 13 through 16 on both CN1610 switches.
- Initial customization of both the CN1610 switches are completed.

Any previous site customization, such as SMTP, SNMP, and SSH should be copied to the new switches.

#### Related information

- [Hardware Universe](#)
- [NetApp CN1601 and CN1610 description page](#)
- [CN1601 and CN1610 Switch Setup and Configuration Guide](#)
- [NetApp KB Article 1010449: How to suppress automatic case creation during scheduled maintenance windows](#)

#### Migrate the switches

##### About the examples

The examples in this procedure use the following cluster switch and node nomenclature:



- The names of the CN1610 switches are cs1 and cs2.
- The names of the LIFs are clus1 and clus2.
- The names of the nodes are node1 and node2.
- The `cluster::*>` prompt indicates the name of the cluster.
- The cluster ports used in this procedure are e1a and e2a.

The [Hardware Universe](#) contains the latest information about the actual cluster ports for your platforms.

### Step 1: Prepare for migration

1. Change the privilege level to advanced, entering `y` when prompted to continue:

```
set -privilege advanced
```

The advanced prompt (`*>`) appears.

2. If AutoSupport is enabled on this cluster, suppress automatic case creation by invoking an AutoSupport message:

```
system node autosupport invoke -node * -type all -message MAINT=xh
```

`x` is the duration of the maintenance window in hours.



The AutoSupport message notifies technical support of this maintenance task so that automatic case creation is suppressed during the maintenance window.

### Show example

The following command suppresses automatic case creation for two hours:

```
cluster::*> system node autosupport invoke -node * -type all
-message MAINT=2h
```

### Step 2: Configure ports

1. Disable all of the node-facing ports (not ISL ports) on both the new cluster switches cs1 and cs2.

You must not disable the ISL ports.

## Show example

The following example shows that node-facing ports 1 through 12 are disabled on switch cs1:

```
(cs1)> enable
(cs1)# configure
(cs1) (Config)# interface 0/1-0/12
(cs1) (Interface 0/1-0/12)# shutdown
(cs1) (Interface 0/1-0/12)# exit
(cs1) (Config)# exit
```

The following example shows that node-facing ports 1 through 12 are disabled on switch cs2:

```
(c2)> enable
(cs2)# configure
(cs2) (Config)# interface 0/1-0/12
(cs2) (Interface 0/1-0/12)# shutdown
(cs2) (Interface 0/1-0/12)# exit
(cs2) (Config)# exit
```

2. Verify that the ISL and the physical ports on the ISL between the two CN1610 cluster switches cs1 and cs2 are up:

```
show port-channel
```

## Show example

The following example shows that the ISL ports are up on switch cs1:

```
(cs1)# show port-channel 3/1
Local Interface..... 3/1
Channel Name..... ISL-LAG
Link State..... Up
Admin Mode..... Enabled
Type..... Static
Load Balance Option..... 7
(Enhanced hashing mode)

Mbr      Device/      Port      Port
Ports   Timeout     Speed     Active
-----
0/13    actor/long   10G Full  True
        partner/long
0/14    actor/long   10G Full  True
        partner/long
0/15    actor/long   10G Full  True
        partner/long
0/16    actor/long   10G Full  True
        partner/long
```

The following example shows that the ISL ports are up on switch cs2:

```
(cs2)# show port-channel 3/1
Local Interface..... 3/1
Channel Name..... ISL-LAG
Link State..... Up
Admin Mode..... Enabled
Type..... Static
Load Balance Option..... 7
(Enhanced hashing mode)
```

Mbr	Device/ Ports	Port Timeout	Port Speed	Port Active
0/13	actor/long partner/long		10G Full	True
0/14	actor/long partner/long		10G Full	True
0/15	actor/long partner/long		10G Full	True
0/16	actor/long partner/long		10G Full	True

### 3. Display the list of neighboring devices:

```
show isdp neighbors
```

This command provides information about the devices that are connected to the system.

## Show example

The following example lists the neighboring devices on switch cs1:

```
(cs1)# show isdp neighbors
Capability Codes: R - Router, T - Trans Bridge, B - Source Route
Bridge,
                S - Switch, H - Host, I - IGMP, r - Repeater
Device ID          Intf          Holdtime  Capability  Platform
Port ID
-----
-----
cs2                0/13          11        S           CN1610
0/13
cs2                0/14          11        S           CN1610
0/14
cs2                0/15          11        S           CN1610
0/15
cs2                0/16          11        S           CN1610
0/16
```

The following example lists the neighboring devices on switch cs2:

```
(cs2)# show isdp neighbors
Capability Codes: R - Router, T - Trans Bridge, B - Source Route
Bridge,
                S - Switch, H - Host, I - IGMP, r - Repeater
Device ID          Intf          Holdtime  Capability  Platform
Port ID
-----
-----
cs1                0/13          11        S           CN1610
0/13
cs1                0/14          11        S           CN1610
0/14
cs1                0/15          11        S           CN1610
0/15
cs1                0/16          11        S           CN1610
0/16
```

#### 4. Display the list of cluster ports:

```
network port show
```

**Show example**

The following example shows the available cluster ports:



```
cluster::*> network port show -ipspace Cluster
```

```
Node: node1
```

```
Ignore
```

Health					Speed(Mbps)	Health	
Port	IPspace	Broadcast	Domain	Link	MTU	Admin/Oper	Status
Status							
-----	-----	-----	-----	-----	-----	-----	-----
e0a	Cluster	Cluster		up	9000	auto/10000	
healthy	false						
e0b	Cluster	Cluster		up	9000	auto/10000	
healthy	false						
e0c	Cluster	Cluster		up	9000	auto/10000	
healthy	false						
e0d	Cluster	Cluster		up	9000	auto/10000	
healthy	false						
e4a	Cluster	Cluster		up	9000	auto/10000	
healthy	false						
e4b	Cluster	Cluster		up	9000	auto/10000	
healthy	false						

```
Node: node2
```

```
Ignore
```

Health					Speed(Mbps)	Health	
Port	IPspace	Broadcast	Domain	Link	MTU	Admin/Oper	Status
Status							
-----	-----	-----	-----	-----	-----	-----	-----
-----	-----	-----	-----	-----	-----	-----	-----
e0a	Cluster	Cluster		up	9000	auto/10000	
healthy	false						
e0b	Cluster	Cluster		up	9000	auto/10000	
healthy	false						
e0c	Cluster	Cluster		up	9000	auto/10000	
healthy	false						
e0d	Cluster	Cluster		up	9000	auto/10000	
healthy	false						
e4a	Cluster	Cluster		up	9000	auto/10000	
healthy	false						
e4b	Cluster	Cluster		up	9000	auto/10000	
healthy	false						

```
12 entries were displayed.
```

5. Verify that each cluster port is connected to the corresponding port on its partner cluster node:

```
run * cdpd show-neighbors
```

**Show example**

The following example shows that cluster ports e1a and e2a are connected to the same port on their cluster partner node:

```
cluster::*> run * cdpd show-neighbors
2 entries were acted on.

Node: node1
Local Remote Remote Remote Remote Hold
Remote
Port Device Interface Platform Time
Capability
-----
-----
e1a node2 e1a FAS3270 137
H
e2a node2 e2a FAS3270 137
H

Node: node2
Local Remote Remote Remote Remote Hold
Remote
Port Device Interface Platform Time
Capability
-----
-----
e1a node1 e1a FAS3270 161
H
e2a node1 e2a FAS3270 161
H
```

6. Verify that all of the cluster LIFs are up and operational:

```
network interface show -vserver Cluster
```

Each cluster LIF should display `true` in the “Is Home” column.



## Show example

```
cluster::*> network interface show -vserver Cluster
          Logical   Status   Network   Current
Current Is
Vserver   Interface  Admin/Oper Address/Mask  Node   Port
Home
-----
node1
true      clus1      up/up     10.10.10.1/16 node1   e1a
true      clus2      up/up     10.10.10.2/16 node1   e2a
node2
true      clus1      up/up     10.10.11.1/16 node2   e1a
true      clus2      up/up     10.10.11.2/16 node2   e2a

4 entries were displayed.
```



The following modification and migration commands in steps 10 through 13 must be done from the local node.

7. Verify that all cluster ports are up:

```
network port show -ipSPACE Cluster
```

### Show example

```
cluster::*> network port show -ipSpace Cluster

(Mbps)
Node  Port  Role      Link  MTU  Auto-Negot  Duplex  Speed
Admin/Oper
-----
node1
   e1a  clus1    up     9000  true/true  full/full
auto/10000
   e2a  clus2    up     9000  true/true  full/full
auto/10000
node2
   e1a  clus1    up     9000  true/true  full/full
auto/10000
   e2a  clus2    up     9000  true/true  full/full
auto/10000

4 entries were displayed.
```

8. Set the `-auto-revert` parameter to `false` on cluster LIFs `clus1` and `clus2` on both nodes:

```
network interface modify
```

### Show example

```
cluster::*> network interface modify -vserver node1 -lif clus1 -auto
-revert false
cluster::*> network interface modify -vserver node1 -lif clus2 -auto
-revert false
cluster::*> network interface modify -vserver node2 -lif clus1 -auto
-revert false
cluster::*> network interface modify -vserver node2 -lif clus2 -auto
-revert false
```



For release 8.3 and later, use the following command: `network interface modify -vserver Cluster -lif * -auto-revert false`

9. Verify the connectivity of the remote cluster interfaces:

## ONTAP 9.9.1 and later

You can use the `network interface check cluster-connectivity` command to start an accessibility check for cluster connectivity and then display the details:

```
network interface check cluster-connectivity start and network interface check cluster-connectivity show
```

```
cluster1::*> network interface check cluster-connectivity start
```

**NOTE:** Wait for a number of seconds before running the `show` command to display the details.

```
cluster1::*> network interface check cluster-connectivity show
```

Packet	Source	Destination
Node	LIF	LIF
Date		
Loss		
node1		
3/5/2022 19:21:18 -06:00	node1_clus2	node2-clus1
node		
3/5/2022 19:21:20 -06:00	node1_clus2	node2_clus2
node2		
3/5/2022 19:21:18 -06:00	node2_clus2	node1_clus1
node		
3/5/2022 19:21:20 -06:00	node2_clus2	node1_clus2
node		

## All ONTAP releases

For all ONTAP releases, you can also use the `cluster ping-cluster -node <name>` command to check the connectivity:

```
cluster ping-cluster -node <name>
```

```

cluster1::*> cluster ping-cluster -node local
Host is node2
Getting addresses from network interface table...
Cluster node1_clus1 169.254.209.69 node1 e0a
Cluster node1_clus2 169.254.49.125 node1 e0b
Cluster node2_clus1 169.254.47.194 node2 e0a
Cluster node2_clus2 169.254.19.183 node2 e0b
Local = 169.254.47.194 169.254.19.183
Remote = 169.254.209.69 169.254.49.125
Cluster Vserver Id = 4294967293
Ping status:
....
Basic connectivity succeeds on 4 path(s)
Basic connectivity fails on 0 path(s)
.....
Detected 9000 byte MTU on 4 path(s):
Local 169.254.47.194 to Remote 169.254.209.69
Local 169.254.47.194 to Remote 169.254.49.125
Local 169.254.19.183 to Remote 169.254.209.69
Local 169.254.19.183 to Remote 169.254.49.125
Larger than PMTU communication succeeds on 4 path(s)
RPC status:
2 paths up, 0 paths down (tcp check)
2 paths up, 0 paths down (udp check)

```

10. Migrate clus1 to port e2a on the console of each node:

```
network interface migrate
```

**Show example**

The following example shows the process for migrating clus1 to port e2a on node1 and node2:

```

cluster::*> network interface migrate -vserver node1 -lif clus1
-source-node node1 -dest-node node1 -dest-port e2a
cluster::*> network interface migrate -vserver node2 -lif clus1
-source-node node2 -dest-node node2 -dest-port e2a

```



For release 8.3 and later, use the following command: `network interface migrate -vserver Cluster -lif clus1 -destination-node node1 -destination-port e2a`

11. Verify that the migration took place:

```
network interface show -vserver Cluster
```

### Show example

The following example verifies that clus1 is migrated to port e2a on node1 and node2:

```
cluster::*> network interface show -vserver Cluster
      Logical   Status   Network   Current
Current Is
Vserver   Interface  Admin/Oper Address/Mask  Node        Port
Home
-----
-----
node1
false     clus1      up/up     10.10.10.1/16  node1       e2a
true      clus2      up/up     10.10.10.2/16  node1       e2a
node2
false     clus1      up/up     10.10.11.1/16  node2       e2a
true      clus2      up/up     10.10.11.2/16  node2       e2a

4 entries were displayed.
```

### 12. Shut down cluster port e1a on both nodes:

```
network port modify
```

### Show example

The following example shows how to shut down the port e1a on node1 and node2:

```
cluster::*> network port modify -node node1 -port e1a -up-admin
false
cluster::*> network port modify -node node2 -port e1a -up-admin
false
```

### 13. Verify the port status:

```
network port show
```

### Show example

The following example shows that port e1a is down on node1 and node2:

```
cluster::*> network port show -role cluster
                                     Auto-Negot Duplex      Speed
(Mbps)
Node  Port  Role      Link  MTU Admin/Oper Admin/Oper
Admin/Oper
-----
node1
      e1a  clus1    down  9000 true/true  full/full
auto/10000
      e2a  clus2    up    9000 true/true  full/full
auto/10000
node2
      e1a  clus1    down  9000 true/true  full/full
auto/10000
      e2a  clus2    up    9000 true/true  full/full
auto/10000

4 entries were displayed.
```

14. Disconnect the cable from cluster port e1a on node1, and then connect e1a to port 1 on cluster switch cs1, using the appropriate cabling supported by the CN1610 switches.

The [Hardware Universe](#) contains more information about cabling.

15. Disconnect the cable from cluster port e1a on node2, and then connect e1a to port 2 on cluster switch cs1, using the appropriate cabling supported by the CN1610 switches.
16. Enable all of the node-facing ports on cluster switch cs1.

### Show example

The following example shows that ports 1 through 12 are enabled on switch cs1:

```
(cs1)# configure
(cs1)(Config)# interface 0/1-0/12
(cs1)(Interface 0/1-0/12)# no shutdown
(cs1)(Interface 0/1-0/12)# exit
(cs1)(Config)# exit
```

17. Enable the first cluster port e1a on each node:

```
network port modify
```

### Show example

The following example shows how to enable the port e1a on node1 and node2:

```
cluster::*> network port modify -node node1 -port e1a -up-admin true
cluster::*> network port modify -node node2 -port e1a -up-admin true
```

18. Verify that all of the cluster ports are up:

```
network port show -ipSpace Cluster
```

### Show example

The following example shows that all of the cluster ports are up on node1 and node2:

```
cluster::*> network port show -ipSpace Cluster
                                     Auto-Negot  Duplex      Speed
(Mbps)
Node  Port  Role      Link  MTU Admin/Oper Admin/Oper
Admin/Oper
-----
-----
node1
      e1a  clus1    up    9000 true/true  full/full
auto/10000
      e2a  clus2    up    9000 true/true  full/full
auto/10000
node2
      e1a  clus1    up    9000 true/true  full/full
auto/10000
      e2a  clus2    up    9000 true/true  full/full
auto/10000

4 entries were displayed.
```

19. Revert clus1 (which was previously migrated) to e1a on both nodes:

```
network interface revert
```

### Show example

The following example shows how to revert clus1 to the port e1a on node1 and node2:

```
cluster::*> network interface revert -vserver node1 -lif clus1
cluster::*> network interface revert -vserver node2 -lif clus1
```



For release 8.3 and later, use the following command: `network interface revert -vserver Cluster -lif <nodename_clus<N>>`

20. Verify that all of the cluster LIFs are up, operational, and display as true in the "Is Home" column:

```
network interface show -vserver Cluster
```

### Show example

The following example shows that all of the LIFs are up on node1 and node2 and that the "Is Home" column results are true:

```
cluster::*> network interface show -vserver Cluster
      Logical      Status      Network      Current
Current Is
Vserver  Interface  Admin/Oper  Address/Mask  Node      Port
Home
-----
node1
      clus1      up/up      10.10.10.1/16  node1      e1a
true
      clus2      up/up      10.10.10.2/16  node1      e2a
true
node2
      clus1      up/up      10.10.11.1/16  node2      e1a
true
      clus2      up/up      10.10.11.2/16  node2      e2a
true

4 entries were displayed.
```

21. Display information about the status of the nodes in the cluster:

```
cluster show
```



### Show example

The following example displays information about the health and eligibility of the nodes in the cluster:

```
cluster::*> cluster show
Node           Health Eligibility  Epsilon
-----
node1          true   true        false
node2          true   true        false
```

22. Migrate clus2 to port e1a on the console of each node:

```
network interface migrate
```

### Show example

The following example shows the process for migrating clus2 to port e1a on node1 and node2:

```
cluster::*> network interface migrate -vserver node1 -lif clus2
-source-node node1 -dest-node node1 -dest-port e1a
cluster::*> network interface migrate -vserver node2 -lif clus2
-source-node node2 -dest-node node2 -dest-port e1a
```



For release 8.3 and later, use the following command: `network interface migrate -vserver Cluster -lif node1_clus2 -dest-node node1 -dest-port e1a`

23. Verify that the migration took place:

```
network interface show -vserver Cluster
```

### Show example

The following example verifies that clus2 is migrated to port e1a on node1 and node2:

```
cluster::*> network interface show -vserver Cluster
          Logical   Status   Network   Current
Current Is
Vserver   Interface  Admin/Oper  Address/Mask  Node      Port
Home
-----
node1
true      clus1      up/up      10.10.10.1/16  node1     e1a
false     clus2      up/up      10.10.10.2/16  node1     e1a
node2
true      clus1      up/up      10.10.11.1/16  node2     e1a
false     clus2      up/up      10.10.11.2/16  node2     e1a

4 entries were displayed.
```

24. Shut down cluster port e2a on both nodes:

```
network port modify
```

### Show example

The following example shows how to shut down the port e2a on node1 and node2:

```
cluster::*> network port modify -node node1 -port e2a -up-admin
false
cluster::*> network port modify -node node2 -port e2a -up-admin
false
```

25. Verify the port status:

```
network port show
```

### Show example

The following example shows that port e2a is down on node1 and node2:

```
cluster::*> network port show -role cluster
                                     Auto-Negot Duplex      Speed
(Mbps)
Node  Port  Role      Link  MTU Admin/Oper Admin/Oper
Admin/Oper
-----
node1
      e1a  clus1    up    9000 true/true  full/full
      auto/10000
      e2a  clus2    down  9000 true/true  full/full
      auto/10000
node2
      e1a  clus1    up    9000 true/true  full/full
      auto/10000
      e2a  clus2    down  9000 true/true  full/full
      auto/10000

4 entries were displayed.
```

26. Disconnect the cable from cluster port e2a on node1, and then connect e2a to port 1 on cluster switch cs2, using the appropriate cabling supported by the CN1610 switches.
27. Disconnect the cable from cluster port e2a on node2, and then connect e2a to port 2 on cluster switch cs2, using the appropriate cabling supported by the CN1610 switches.
28. Enable all of the node-facing ports on cluster switch cs2.

### Show example

The following example shows that ports 1 through 12 are enabled on switch cs2:

```
(cs2)# configure
(cs2)(Config)# interface 0/1-0/12
(cs2)(Interface 0/1-0/12)# no shutdown
(cs2)(Interface 0/1-0/12)# exit
(cs2)(Config)# exit
```

29. Enable the second cluster port e2a on each node.

### Show example

The following example shows how to enable the port e2a on node1 and node2:

```
cluster::*> network port modify -node node1 -port e2a -up-admin true
cluster::*> network port modify -node node2 -port e2a -up-admin true
```

30. Verify that all of the cluster ports are up:

```
network port show -ipSPACE Cluster
```

### Show example

The following example shows that all of the cluster ports are up on node1 and node2:

```
cluster::*> network port show -ipSPACE Cluster
                                     Auto-Negot Duplex      Speed
(Mbps)
Node  Port  Role      Link  MTU Admin/Oper Admin/Oper
Admin/Oper
-----
node1
      e1a  clus1    up    9000 true/true  full/full
auto/10000
      e2a  clus2    up    9000 true/true  full/full
auto/10000
node2
      e1a  clus1    up    9000 true/true  full/full
auto/10000
      e2a  clus2    up    9000 true/true  full/full
auto/10000

4 entries were displayed.
```

31. Revert clus2 (which was previously migrated) to e2a on both nodes:

```
network interface revert
```

### Show example

The following example shows how to revert clus2 to the port e2a on node1 and node2:

```
cluster::*> network interface revert -vserver node1 -lif clus2
cluster::*> network interface revert -vserver node2 -lif clus2
```



For release 8.3 and later, the commands are: `cluster::*> network interface revert -vserver Cluster -lif node1_clus2` and `cluster::*> network interface revert -vserver Cluster -lif node2_clus2`

### Step 3: Complete the configuration

1. Verify that all of the interfaces display `true` in the "Is Home" column:

```
network interface show -vserver Cluster
```

### Show example

The following example shows that all of the LIFs are up on node1 and node2 and that the "Is Home" column results are true:

```
cluster::*> network interface show -vserver Cluster
```

Current Is	Logical	Status	Network	Current
Vserver	Interface	Admin/Oper	Address/Mask	Node
Port	Home			
-----				
node1				
e1a	clus1	up/up	10.10.10.1/16	node1
e2a	clus2	up/up	10.10.10.2/16	node1
node2				
e1a	clus1	up/up	10.10.11.1/16	node2
e2a	clus2	up/up	10.10.11.2/16	node2

2. Verify the connectivity of the remote cluster interfaces:

### ONTAP 9.9.1 and later

You can use the `network interface check cluster-connectivity` command to start an accessibility check for cluster connectivity and then display the details:

```
network interface check cluster-connectivity start and network interface check cluster-connectivity show
```

```
cluster1::*> network interface check cluster-connectivity start
```

**NOTE:** Wait for a number of seconds before running the `show` command to display the details.

```
cluster1::*> network interface check cluster-connectivity show
```

Packet	Source	Destination
Node	LIF	LIF
Date		
Loss		
node1		
3/5/2022 19:21:18 -06:00	node1_clus2	node2-clus1
node		
3/5/2022 19:21:20 -06:00	node1_clus2	node2_clus2
node2		
3/5/2022 19:21:18 -06:00	node2_clus2	node1_clus1
node		
3/5/2022 19:21:20 -06:00	node2_clus2	node1_clus2
node		

### All ONTAP releases

For all ONTAP releases, you can also use the `cluster ping-cluster -node <name>` command to check the connectivity:

```
cluster ping-cluster -node <name>
```

```
cluster1::*> cluster ping-cluster -node local
Host is node2
Getting addresses from network interface table...
Cluster node1_clus1 169.254.209.69 node1 e0a
Cluster node1_clus2 169.254.49.125 node1 e0b
Cluster node2_clus1 169.254.47.194 node2 e0a
Cluster node2_clus2 169.254.19.183 node2 e0b
Local = 169.254.47.194 169.254.19.183
Remote = 169.254.209.69 169.254.49.125
Cluster Vserver Id = 4294967293
Ping status:
....
Basic connectivity succeeds on 4 path(s)
Basic connectivity fails on 0 path(s)
.....
Detected 9000 byte MTU on 4 path(s):
Local 169.254.47.194 to Remote 169.254.209.69
Local 169.254.47.194 to Remote 169.254.49.125
Local 169.254.19.183 to Remote 169.254.209.69
Local 169.254.19.183 to Remote 169.254.49.125
Larger than PMTU communication succeeds on 4 path(s)
RPC status:
2 paths up, 0 paths down (tcp check)
2 paths up, 0 paths down (udp check)
```

3. Verify that both nodes have two connections to each switch:

```
show isdp neighbors
```

## Show example

The following example shows the appropriate results for both switches:

```
(cs1)# show isdp neighbors
Capability Codes: R - Router, T - Trans Bridge, B - Source Route
Bridge,
                S - Switch, H - Host, I - IGMP, r - Repeater
Device ID      Intf      Holdtime  Capability  Platform
Port ID
-----
-----
node1          0/1       132       H           FAS3270
e1a
node2          0/2       163       H           FAS3270
e1a
cs2            0/13      11        S           CN1610
0/13
cs2            0/14      11        S           CN1610
0/14
cs2            0/15      11        S           CN1610
0/15
cs2            0/16      11        S           CN1610
0/16

(cs2)# show isdp neighbors
Capability Codes: R - Router, T - Trans Bridge, B - Source Route
Bridge,
                S - Switch, H - Host, I - IGMP, r - Repeater
Device ID      Intf      Holdtime  Capability  Platform
Port ID
-----
-----
node1          0/1       132       H           FAS3270
e2a
node2          0/2       163       H           FAS3270
e2a
cs1            0/13      11        S           CN1610
0/13
cs1            0/14      11        S           CN1610
0/14
cs1            0/15      11        S           CN1610
0/15
cs1            0/16      11        S           CN1610
0/16
```



4. Display information about the devices in your configuration:

```
network device discovery show
```

5. Disable the two-node switchless configuration settings on both nodes using the advanced privilege command:

```
network options detect-switchless modify
```

#### Show example

The following example shows how to disable the switchless configuration settings:

```
cluster::*> network options detect-switchless modify -enabled false
```



For release 9.2 and later, skip this step since the configuration is automatically converted.

6. Verify that the settings are disabled:

```
network options detect-switchless-cluster show
```

#### Show example

The false output in the following example shows that the configuration settings are disabled:

```
cluster::*> network options detect-switchless-cluster show
Enable Switchless Cluster Detection: false
```



For release 9.2 and later, wait until `Enable Switchless Cluster` is set to false. This can take up to three minutes.

7. Configure clusters `clus1` and `clus2` to auto revert on each node and confirm.

#### Show example

```
cluster::*> network interface modify -vserver node1 -lif clus1 -auto
-revert true
cluster::*> network interface modify -vserver node1 -lif clus2 -auto
-revert true
cluster::*> network interface modify -vserver node2 -lif clus1 -auto
-revert true
cluster::*> network interface modify -vserver node2 -lif clus2 -auto
-revert true
```



For release 8.3 and later, use the following command: `network interface modify -vserver Cluster -lif * -auto-revert true` to enable auto-revert on all nodes in the cluster.

8. Verify the status of the node members in the cluster:

```
cluster show
```

#### Show example

The following example shows information about the health and eligibility of the nodes in the cluster:

```
cluster::*> cluster show
Node                Health  Eligibility  Epsilon
-----
node1                true    true         false
node2                true    true         false
```

9. If you suppressed automatic case creation, reenable it by invoking an AutoSupport message:

```
system node autosupport invoke -node * -type all -message MAINT=END
```

#### Show example

```
cluster::*> system node autosupport invoke -node * -type all
-message MAINT=END
```

10. Change the privilege level back to admin:

```
set -privilege admin
```

## Replace switches

### Replace a NetApp CN1610 cluster switch

Follow these steps to replace a defective NetApp CN1610 switch in a cluster network. This is a non-disruptive procedure (NDU).

#### Review requirements

##### What you'll need

Before you perform the switch replacement, the following conditions must exist before you perform the switch replacement in the current environment and on the replacement switch for existing cluster and network infrastructure:

- The existing cluster must be verified as completely functional, with at least one fully connected cluster switch.
- All of the cluster ports must be **up**.
- All of the cluster logical interfaces (LIFs) must be up and must not have been migrated.
- The ONTAP cluster `ping-cluster -node node1` command must indicate that basic connectivity and larger than PMTU communication are successful on all of the paths.

## Enable console logging

NetApp strongly recommends that you enable console logging on the devices that you are using and take the following actions when replacing your switch:

- Leave AutoSupport enabled during maintenance.
- Trigger a maintenance AutoSupport before and after maintenance to disable case creation for the duration of the maintenance. See this Knowledge Base article [SU92: How to suppress automatic case creation during scheduled maintenance windows](#) for further details.
- Enable session logging for any CLI sessions. For instructions on how to enable session logging, review the "Logging Session Output" section in this Knowledge Base article [How to configure PuTTY for optimal connectivity to ONTAP systems](#).

## Replace the switch

### About this task

You must execute the command for migrating a cluster LIF from the node where the cluster LIF is hosted.

The examples in this procedure use the following cluster switch and node nomenclature:

- The names of the two CN1610 cluster switches are `cs1` and `cs2`.
- The name of the CN1610 switch that is to be replaced (the defective switch) is `old_cs1`.
- The name of the new CN1610 switch (the replacement switch) is `new_cs1`.
- The name of the partner switch that is not being replaced is `cs2`.

### Steps

1. Confirm that the startup configuration file matches the running configuration file. You must save these files locally for use during the replacement.

The configuration commands in the following example are for FASTPATH 1.2.0.7:

#### Show example

```
(old_cs1)> enable
(old_cs1)# show running-config
(old_cs1)# show startup-config
```

2. Create a copy of the running configuration file.

The command in the following example is for FASTPATH 1.2.0.7:

### Show example

```
(old_cs1)# show running-config filename.scr  
Config script created successfully.
```



You can use any file name except `CN1610_CS_RCF_v1.2.scr`. The file name must have the `.scr` extension.

3. Save the running configuration file of the switch to an external host in preparation for the replacement.

### Show example

```
(old_cs1)# copy nvram:script filename.scr  
scp://<Username>@<remote_IP_address>/path_to_file/filename.scr
```

4. Verify that the switch and ONTAP versions match in the compatibility matrix. See the [NetApp CN1601 and CN1610 Switches](#) page for details.
5. From the [Software Downloads page](#) on the NetApp Support Site, select NetApp Cluster Switches to download the appropriate RCF and FASTPATH versions.
6. Set up a Trivial File Transfer Protocol (TFTP) server with the FASTPATH, RCF, and saved configuration `.scr` file for use with the new switch.
7. Connect the serial port (the RJ-45 connector labeled “IOIOI” on the right side of the switch) to an available host with terminal emulation.
8. On the host, set the serial terminal connection settings:
  - a. 9600 baud
  - b. 8 data bits
  - c. 1 stop bit
  - d. parity: none
  - e. flow control: none
9. Connect the management port (the RJ-45 wrench port on the left side of the switch) to the same network where your TFTP server is located.
10. Prepare to connect to the network with the TFTP server.

If you are using Dynamic Host Configuration Protocol (DHCP), you do not have to configure an IP address for the switch at this time. The service port is set to use DHCP by default. The network management port is set to none for the IPv4 and IPv6 protocol settings. If your wrench port is connected to a network that has a DHCP server, then the server settings are configured automatically.

To set a static IP address, you should use the `serviceport protocol`, `network protocol`, and `serviceport ip` commands.

### Show example

```
(new_cs1) # serviceport ip <ipaddr> <netmask> <gateway>
```

11. Optionally, if the TFTP server is on a laptop, then connect the CN1610 switch to the laptop by using a standard Ethernet cable, and then configure its network port in the same network with an alternate IP address.

You can use the `ping` command to verify the address. If you are unable to establish the connectivity, you should use a nonrouted network, and configure the service port using IP 192.168.x or 172.16.x. You can reconfigure the service port to the production management IP address at a later date.

12. Optionally, verify and install the appropriate versions of the RCF and FASTPATH software for the new switch. If you have verified that the new switch is correctly set up and does not require updates to the RCF and FASTPATH software, you should go to step 13.
  - a. Verify the new switch settings.

### Show example

```
(new_cs1) > enable  
(new_cs1) # show version
```

- b. Download the RCF to the new switch.

### Show example

```
(new_cs1)# copy tftp://<server_ip_address>/CN1610_CS_RCF_v1.2.txt
nvram:script CN1610_CS_RCF_v1.2.scr
Mode.      TFTP
Set Server IP.  172.22.201.50
Path.      /
Filename.....
CN1610_CS_RCF_v1.2.txt
Data Type..... Config Script
Destination Filename.....
CN1610_CS_RCF_v1.2.scr
File with same name already exists.
WARNING:Continuing with this command will overwrite the existing
file.

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

File transfer in progress. Management access will be blocked for
the duration of the transfer. please wait...
Validating configuration script...
(the entire script is displayed line by line)
...
description "NetApp CN1610 Cluster Switch RCF v1.2 - 2015-01-13"
...
Configuration script validated.
File transfer operation completed successfully.
```

- c. Verify that the RCF is downloaded to the switch.

### Show example

```
(new_cs1)# script list
Configuration Script Nam   Size(Bytes)
-----
CN1610_CS_RCF_v1.1.scr     2191
CN1610_CS_RCF_v1.2.scr     2240
latest_config.scr          2356

4 configuration script(s) found.
2039 Kbytes free.
```

13. Apply the RCF to the CN1610 switch.

**Show example**

```
(new_cs1)# script apply CN1610_CS_RCF_v1.2.scr
Are you sure you want to apply the configuration script? (y/n) y
...
(the entire script is displayed line by line)
...
description "NetApp CN1610 Cluster Switch RCF v1.2 - 2015-01-13"
...
Configuration script 'CN1610_CS_RCF_v1.2.scr' applied. Note that the
script output will go to the console.
After the script is applied, those settings will be active in the
running-config file. To save them to the startup-config file, you
must use the write memory command, or if you used the reload answer
yes when asked if you want to save the changes.
```

a. Save the running configuration file so that it becomes the startup configuration file when you reboot the switch.

**Show example**

```
(new_cs1)# write memory
This operation may take a few minutes.
Management interfaces will not be available during this time.

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

Config file 'startup-config' created successfully.

Configuration Saved!
```

b. Download the image to the CN1610 switch.

### Show example

```
(new_cs1)# copy
tftp://<server_ip_address>/NetApp_CN1610_1.2.0.7.stk active
Mode.      TFTP
Set Server IP.  tftp_server_ip_address
Path.      /
Filename.....
NetApp_CN1610_1.2.0.7.stk
Data Type.  Code
Destination Filename.  active

Management access will be blocked for the duration of the
transfer

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

TFTP Code transfer starting...

File transfer operation completed successfully.
```

- c. Run the new active boot image by rebooting the switch.

The switch must be rebooted for the command in step 6 to reflect the new image. There are two possible views for a response that you might see after you enter the reload command.

### Show example

```
(new_cs1)# reload
The system has unsaved changes.
Would you like to save them now? (y/n) y

Config file 'startup-config' created successfully.

Configuration Saved! System will now restart!
.
.
.
Cluster Interconnect Infrastructure

User:admin Password: (new_cs1) >*enable*
```

- d. Copy the saved configuration file from the old switch to the new switch.



### Show example

```
(new_cs1)# copy tftp://<server_ip_address>/<filename>.scr  
nvram:script <filename>.scr
```

- e. Apply the previously saved configuration to the new switch.

### Show example

```
(new_cs1)# script apply <filename>.scr  
Are you sure you want to apply the configuration script? (y/n) y  
  
The system has unsaved changes.  
Would you like to save them now? (y/n) y  
  
Config file 'startup-config' created successfully.  
  
Configuration Saved!
```

- f. Save the running configuration file to the startup configuration file.

### Show example

```
(new_cs1)# write memory
```

14. If AutoSupport is enabled on this cluster, suppress automatic case creation by invoking an AutoSupport message: `system node autosupport invoke -node * -type all - message MAINT=xh`

x is the duration of the maintenance window in hours.



The AutoSupport message notifies technical support of this maintenance task so that automatic case creation is suppressed during the maintenance window.

15. On the new switch new\_cs1, log in as the admin user, and shut down all of the ports that are connected to the node cluster interfaces (ports 1 through 12).

### Show example

```
User:*admin*
Password:
(new_cs1)> enable
(new_cs1)#
(new_cs1)# config
(new_cs1)(config)# interface 0/1-0/12
(new_cs1)(interface 0/1-0/12)# shutdown
(new_cs1)(interface 0/1-0/12)# exit
(new_cs1)# write memory
```

16. Migrate the cluster LIFs from the ports that are connected to the old\_cs1 switch.

You must migrate each cluster LIF from its current node's management interface.

### Show example

```
cluster::> set -privilege advanced
cluster::> network interface migrate -vserver <vserver_name> -lif
<Cluster_LIF_to_be_moved> - sourcenode <current_node> -dest-node
<current_node> -dest-port <cluster_port_that_is_UP>
```

17. Verify that all of the cluster LIFs have been moved to the appropriate cluster port on each node.

### Show example

```
cluster::> network interface show -role cluster
```

18. Shut down the cluster ports that are attached to the switch that you replaced.

### Show example

```
cluster::*> network port modify -node <node_name> -port
<port_to_admin_down> -up-admin false
```

19. Verify the health of the cluster.

### Show example

```
cluster::*> cluster show
```

20. Verify that the ports are down.

### Show example

```
cluster::*> cluster ping-cluster -node <node_name>
```

21. On the switch cs2, shut down the ISL ports 13 through 16.

### Show example

```
(cs2)# config  
(cs2)(config)# interface 0/13-0/16  
(cs2)(interface 0/13-0/16)# shutdown  
(cs2)# show port-channel 3/1
```

22. Verify whether the storage administrator is ready for the replacement of the switch.
23. Remove all of the cables from the old\_cs1 switch, and then connect the cables to the same ports on the new\_cs1 switch.
24. On the cs2 switch, bring up the ISL ports 13 through 16.

### Show example

```
(cs2)# config  
(cs2)(config)# interface 0/13-0/16  
(cs2)(interface 0/13-0/16)# no shutdown
```

25. Bring up the ports on the new switch that are associated with the cluster nodes.

### Show example

```
(new_cs1)# config  
(new_cs1)(config)# interface 0/1-0/12  
(new_cs1)(interface 0/13-0/16)# no shutdown
```

26. On a single node, bring up the cluster node port that is connected to the replaced switch, and then confirm that the link is up.

**Show example**

```
cluster::*> network port modify -node node1 -port
<port_to_be_onlined> -up-admin true
cluster::*> network port show -role cluster
```

27. Revert the cluster LIFs that are associated with the port in step 25 on the same node.

In this example, the LIFs on node1 are successfully reverted if the “Is Home” column is true.

**Show example**

```
cluster::*> network interface revert -vserver node1 -lif
<cluster_lif_to_be_reverted>
cluster::*> network interface show -role cluster
```

28. If the first node’s cluster LIF is up and is reverted to its home port, repeat steps 25 and 26 to bring up the cluster ports and to revert the cluster LIFs on the other nodes in the cluster.
29. Display information about the nodes in the cluster.

**Show example**

```
cluster::*> cluster show
```

30. Confirm that the startup configuration file and running configuration file are correct on the replaced switch. This configuration file should match the output in step 1.

**Show example**

```
(new_cs1)> enable
(new_cs1)# show running-config
(new_cs1)# show startup-config
```

31. If you suppressed automatic case creation, re-enable it by invoking an AutoSupport message:

```
system node autosupport invoke -node * -type all -message MAINT=END
```

## Replace NetApp CN1610 cluster switches with switchless connections

You can migrate from a cluster with a switched cluster network to one where two nodes are directly connected for ONTAP 9.3 and later.

### Review requirements

#### Guidelines

Review the following guidelines:

- Migrating to a two-node switchless cluster configuration is a nondisruptive operation. Most systems have two dedicated cluster interconnect ports on each node, but you can also use this procedure for systems with a larger number of dedicated cluster interconnect ports on each node, such as four, six or eight.
- You cannot use the switchless cluster interconnect feature with more than two nodes.
- If you have an existing two-node cluster that uses cluster interconnect switches and is running ONTAP 9.3 or later, you can replace the switches with direct, back-to-back connections between the nodes.

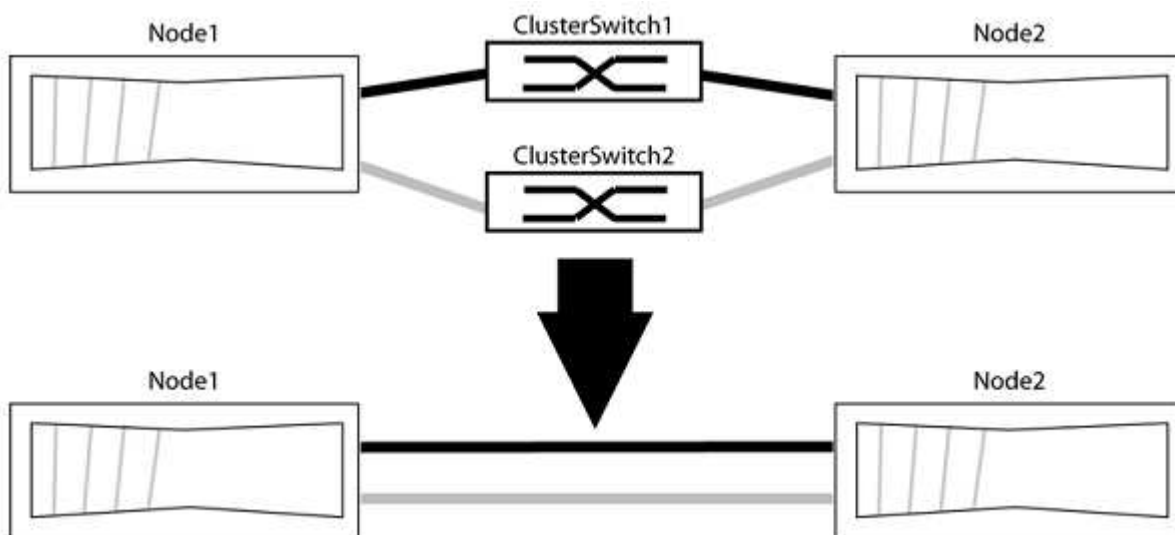
#### What you'll need

- A healthy cluster that consists of two nodes connected by cluster switches. The nodes must be running the same ONTAP release.
- Each node with the required number of dedicated cluster ports, which provide redundant cluster interconnect connections to support your system configuration. For example, there are two redundant ports for a system with two dedicated cluster interconnect ports on each node.

### Migrate the switches

#### About this task

The following procedure removes the cluster switches in a two-node cluster and replaces each connection to the switch with a direct connection to the partner node.



#### About the examples

The examples in the following procedure show nodes that are using "e0a" and "e0b" as cluster ports. Your nodes might be using different cluster ports as they vary by system.

## Step 1: Prepare for migration

1. Change the privilege level to advanced, entering `y` when prompted to continue:

```
set -privilege advanced
```

The advanced prompt `*>` appears.

2. ONTAP 9.3 and later supports automatic detection of switchless clusters, which is enabled by default.

You can verify that detection of switchless clusters is enabled by running the advanced privilege command:

```
network options detect-switchless-cluster show
```

### Show example

The following example output shows if the option is enabled.

```
cluster::*> network options detect-switchless-cluster show
(network options detect-switchless-cluster show)
Enable Switchless Cluster Detection: true
```

If "Enable Switchless Cluster Detection" is `false`, contact NetApp support.

3. If AutoSupport is enabled on this cluster, suppress automatic case creation by invoking an AutoSupport message:

```
system node autosupport invoke -node * -type all -message
MAINT=<number_of_hours>h
```

where `h` is the duration of the maintenance window in hours. The message notifies technical support of this maintenance task so that they can suppress automatic case creation during the maintenance window.

In the following example, the command suppresses automatic case creation for two hours:

### Show example

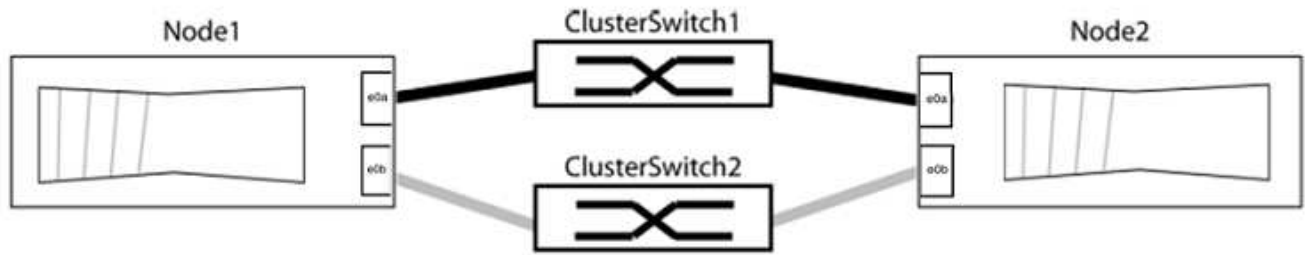
```
cluster::*> system node autosupport invoke -node * -type all
-message MAINT=2h
```

## Step 2: Configure ports and cabling

1. Organize the cluster ports on each switch into groups so that the cluster ports in `group1` go to cluster switch1 and the cluster ports in `group2` go to cluster switch2. These groups are required later in the procedure.
2. Identify the cluster ports and verify link status and health:

```
network port show -ipSpace Cluster
```

In the following example for nodes with cluster ports "e0a" and "e0b", one group is identified as "node1:e0a" and "node2:e0a" and the other group as "node1:e0b" and "node2:e0b". Your nodes might be using different cluster ports because they vary by system.



Verify that the ports have a value of `up` for the "Link" column and a value of `healthy` for the "Health Status" column.

### Show example

```
cluster::> network port show -ipspace Cluster
Node: node1

Ignore
Health
Port IPspace Broadcast Domain Link MTU Admin/Oper Status
Speed (Mbps) Health
Status
-----
-----
e0a Cluster Cluster up 9000 auto/10000 healthy
false
e0b Cluster Cluster up 9000 auto/10000 healthy
false

Node: node2

Ignore
Health
Port IPspace Broadcast Domain Link MTU Admin/Oper Status
Speed (Mbps) Health
Status
-----
-----
e0a Cluster Cluster up 9000 auto/10000 healthy
false
e0b Cluster Cluster up 9000 auto/10000 healthy
false
4 entries were displayed.
```

3. Confirm that all the cluster LIFs are on their home ports.

Verify that the “is-home” column is `true` for each of the cluster LIFs:

```
network interface show -vserver Cluster -fields is-home
```



### Show example

```
cluster::*> net int show -vserver Cluster -fields is-home
(network interface show)
vserver  lif           is-home
-----  -
Cluster  node1_clus1  true
Cluster  node1_clus2  true
Cluster  node2_clus1  true
Cluster  node2_clus2  true
4 entries were displayed.
```

If there are cluster LIFs that are not on their home ports, revert those LIFs to their home ports:

```
network interface revert -vserver Cluster -lif *
```

#### 4. Disable auto-revert for the cluster LIFs:

```
network interface modify -vserver Cluster -lif * -auto-revert false
```

#### 5. Verify that all ports listed in the previous step are connected to a network switch:

```
network device-discovery show -port cluster_port
```

The “Discovered Device” column should be the name of the cluster switch that the port is connected to.

### Show example

The following example shows that cluster ports "e0a" and "e0b" are correctly connected to cluster switches "cs1" and "cs2".

```
cluster:::> network device-discovery show -port e0a|e0b
(network device-discovery show)
Node/      Local  Discovered
Protocol  Port   Device (LLDP: ChassisID)  Interface  Platform
-----  -
node1/cdp
          e0a    cs1                       0/11       BES-53248
          e0b    cs2                       0/12       BES-53248
node2/cdp
          e0a    cs1                       0/9        BES-53248
          e0b    cs2                       0/9        BES-53248
4 entries were displayed.
```

#### 6. Verify the connectivity of the remote cluster interfaces:

### ONTAP 9.9.1 and later

You can use the `network interface check cluster-connectivity` command to start an accessibility check for cluster connectivity and then display the details:

```
network interface check cluster-connectivity start and network interface check cluster-connectivity show
```

```
cluster1::*> network interface check cluster-connectivity start
```

**NOTE:** Wait for a number of seconds before running the `show` command to display the details.

```
cluster1::*> network interface check cluster-connectivity show
```

Packet	Source	Destination
Node	LIF	LIF
Date		
Loss		
node1		
3/5/2022 19:21:18 -06:00	node1_clus2	node2-clus1
node		
3/5/2022 19:21:20 -06:00	node1_clus2	node2_clus2
node2		
3/5/2022 19:21:18 -06:00	node2_clus2	node1_clus1
node		
3/5/2022 19:21:20 -06:00	node2_clus2	node1_clus2
node		

### All ONTAP releases

For all ONTAP releases, you can also use the `cluster ping-cluster -node <name>` command to check the connectivity:

```
cluster ping-cluster -node <name>
```

```

cluster1::*> cluster ping-cluster -node local
Host is node2
Getting addresses from network interface table...
Cluster node1_clus1 169.254.209.69 node1 e0a
Cluster node1_clus2 169.254.49.125 node1 e0b
Cluster node2_clus1 169.254.47.194 node2 e0a
Cluster node2_clus2 169.254.19.183 node2 e0b
Local = 169.254.47.194 169.254.19.183
Remote = 169.254.209.69 169.254.49.125
Cluster Vserver Id = 4294967293
Ping status:

Basic connectivity succeeds on 4 path(s)
Basic connectivity fails on 0 path(s)

Detected 9000 byte MTU on 4 path(s):
Local 169.254.47.194 to Remote 169.254.209.69
Local 169.254.47.194 to Remote 169.254.49.125
Local 169.254.19.183 to Remote 169.254.209.69
Local 169.254.19.183 to Remote 169.254.49.125
Larger than PMTU communication succeeds on 4 path(s)
RPC status:
2 paths up, 0 paths down (tcp check)
2 paths up, 0 paths down (udp check)

```

7. Verify that the cluster is healthy:

```
cluster ring show
```

All units must be either master or secondary.

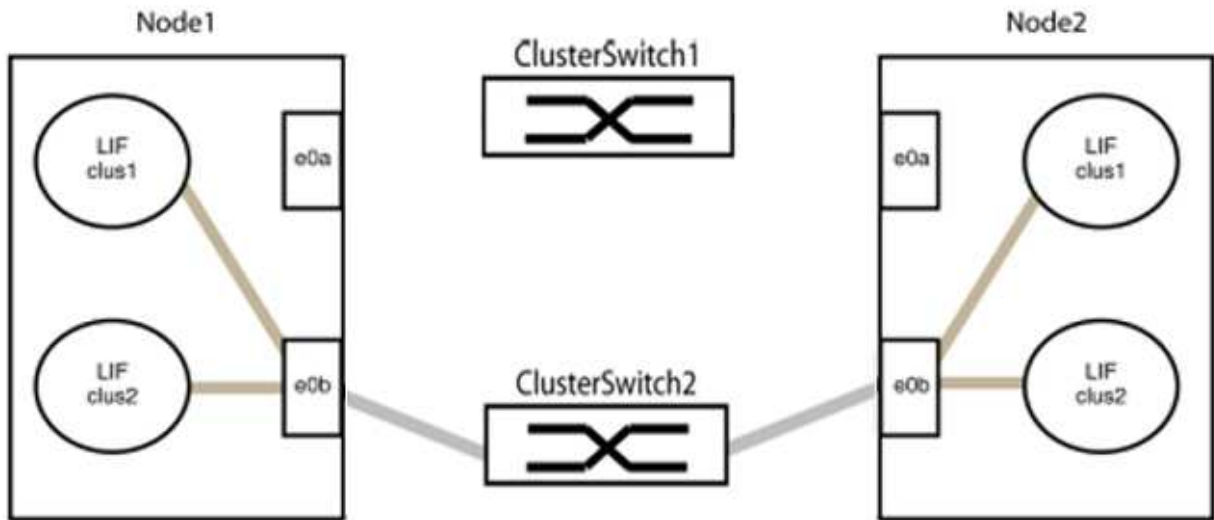
8. Set up the switchless configuration for the ports in group 1.



To avoid potential networking issues, you must disconnect the ports from group1 and reconnect them back-to-back as quickly as possible, for example, **in less than 20 seconds**.

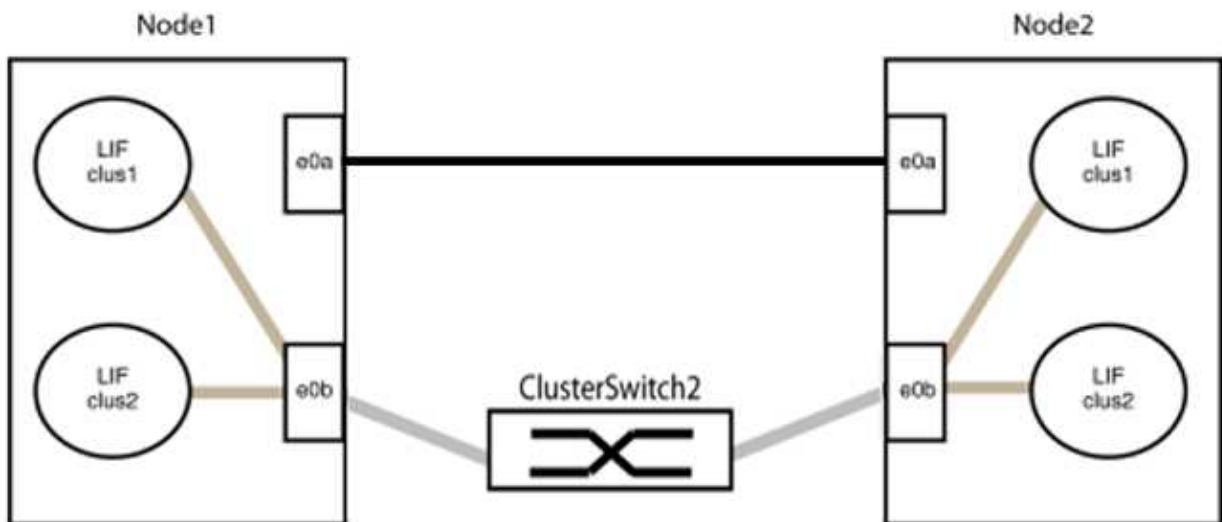
a. Disconnect all the cables from the ports in group1 at the same time.

In the following example, the cables are disconnected from port "e0a" on each node, and cluster traffic continues through the switch and port "e0b" on each node:



b. Cable the ports in group1 back-to-back.

In the following example, "e0a" on node1 is connected to "e0a" on node2:



9. The switchless cluster network option transitions from *false* to *true*. This might take up to 45 seconds. Confirm that the switchless option is set to *true*:

```
network options switchless-cluster show
```

The following example shows that the switchless cluster is enabled:

```
cluster::*> network options switchless-cluster show
Enable Switchless Cluster: true
```

10. Verify the connectivity of the remote cluster interfaces:

### ONTAP 9.9.1 and later

You can use the `network interface check cluster-connectivity` command to start an accessibility check for cluster connectivity and then display the details:

```
network interface check cluster-connectivity start and network interface check cluster-connectivity show
```

```
cluster1::*> network interface check cluster-connectivity start
```

**NOTE:** Wait for a number of seconds before running the `show` command to display the details.

```
cluster1::*> network interface check cluster-connectivity show
```

Packet	Source	Destination
Node	LIF	LIF
Date		
Loss		
node1		
3/5/2022 19:21:18 -06:00	node1_clus2	node2-clus1
node		
3/5/2022 19:21:20 -06:00	node1_clus2	node2_clus2
node2		
3/5/2022 19:21:18 -06:00	node2_clus2	node1_clus1
node		
3/5/2022 19:21:20 -06:00	node2_clus2	node1_clus2
node		

### All ONTAP releases

For all ONTAP releases, you can also use the `cluster ping-cluster -node <name>` command to check the connectivity:

```
cluster ping-cluster -node <name>
```

```

cluster1::*> cluster ping-cluster -node local
Host is node2
Getting addresses from network interface table...
Cluster node1_clus1 169.254.209.69 node1 e0a
Cluster node1_clus2 169.254.49.125 node1 e0b
Cluster node2_clus1 169.254.47.194 node2 e0a
Cluster node2_clus2 169.254.19.183 node2 e0b
Local = 169.254.47.194 169.254.19.183
Remote = 169.254.209.69 169.254.49.125
Cluster Vserver Id = 4294967293
Ping status:

Basic connectivity succeeds on 4 path(s)
Basic connectivity fails on 0 path(s)

Detected 9000 byte MTU on 4 path(s):
Local 169.254.47.194 to Remote 169.254.209.69
Local 169.254.47.194 to Remote 169.254.49.125
Local 169.254.19.183 to Remote 169.254.209.69
Local 169.254.19.183 to Remote 169.254.49.125
Larger than PMTU communication succeeds on 4 path(s)
RPC status:
2 paths up, 0 paths down (tcp check)
2 paths up, 0 paths down (udp check)

```



Before proceeding to the next step, you must wait at least two minutes to confirm a working back-to-back connection on group 1.

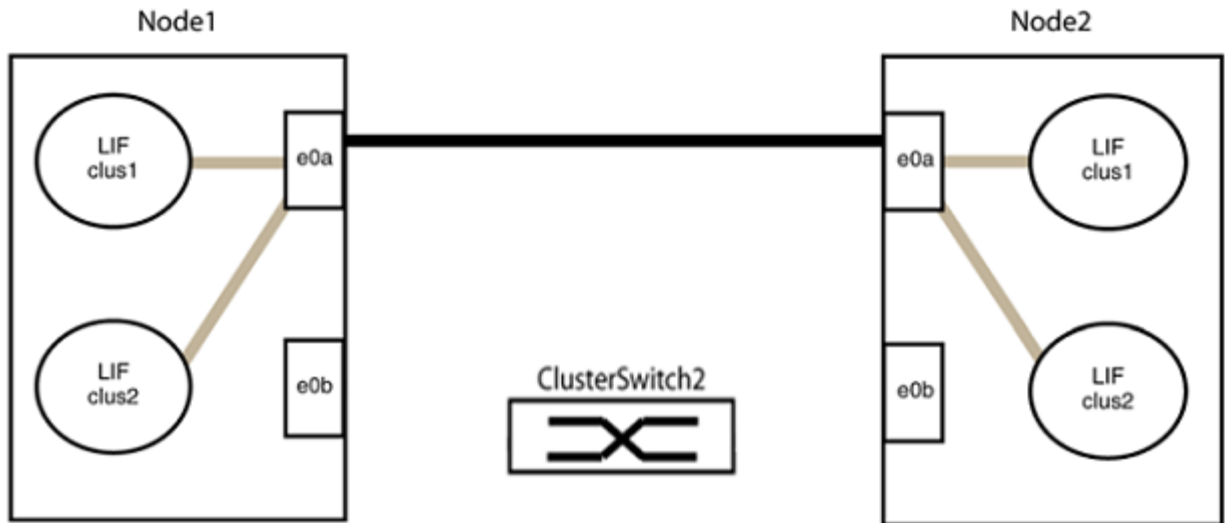
11. Set up the switchless configuration for the ports in group 2.



To avoid potential networking issues, you must disconnect the ports from group2 and reconnect them back-to-back as quickly as possible, for example, **in less than 20 seconds**.

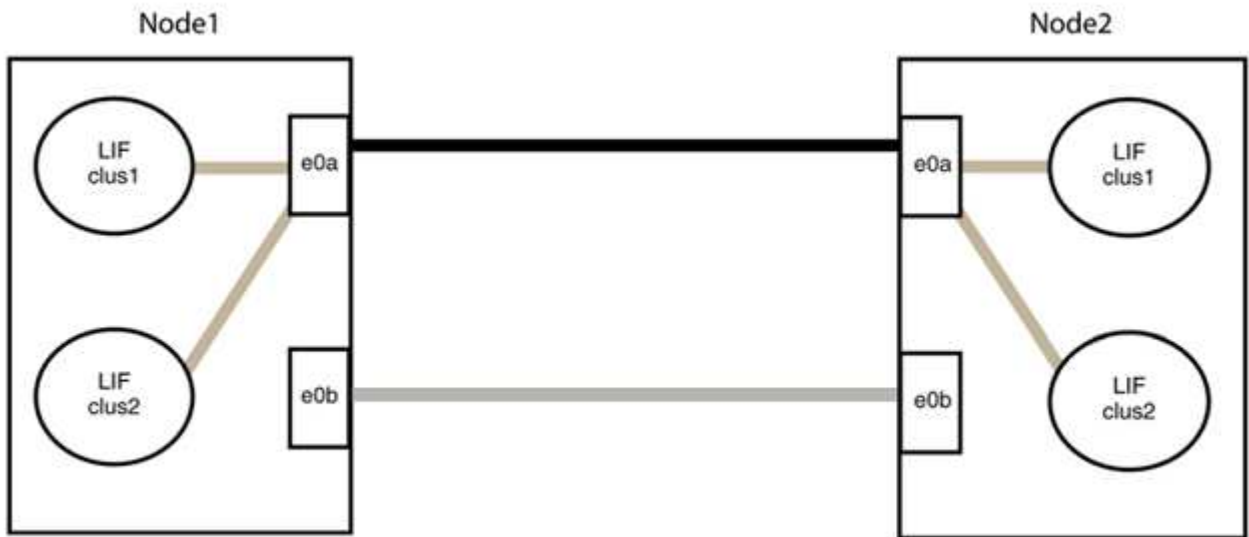
- a. Disconnect all the cables from the ports in group2 at the same time.

In the following example, the cables are disconnected from port "e0b" on each node, and cluster traffic continues through the direct connection between the "e0a" ports:



b. Cable the ports in group2 back-to-back.

In the following example, "e0a" on node1 is connected to "e0a" on node2 and "e0b" on node1 is connected to "e0b" on node2:



### Step 3: Verify the configuration

1. Verify that the ports on both nodes are correctly connected:

```
network device-discovery show -port cluster_port
```

## Show example

The following example shows that cluster ports "e0a" and "e0b" are correctly connected to the corresponding port on the cluster partner:

```
cluster::> net device-discovery show -port e0a|e0b
(network device-discovery show)
Node/      Local  Discovered
Protocol   Port   Device (LLDP: ChassisID)  Interface  Platform
-----
node1/cdp
          e0a    node2                      e0a        AFF-A300
          e0b    node2                      e0b        AFF-A300
node1/lldp
          e0a    node2 (00:a0:98:da:16:44) e0a        -
          e0b    node2 (00:a0:98:da:16:44) e0b        -
node2/cdp
          e0a    node1                      e0a        AFF-A300
          e0b    node1                      e0b        AFF-A300
node2/lldp
          e0a    node1 (00:a0:98:da:87:49) e0a        -
          e0b    node1 (00:a0:98:da:87:49) e0b        -
8 entries were displayed.
```

### 2. Re-enable auto-revert for the cluster LIFs:

```
network interface modify -vserver Cluster -lif * -auto-revert true
```

### 3. Verify that all LIFs are home. This might take a few seconds.

```
network interface show -vserver Cluster -lif lif_name
```



### Show example

The LIFs have been reverted if the “Is Home” column is `true`, as shown for `node1_clus2` and `node2_clus2` in the following example:

```
cluster::> network interface show -vserver Cluster -fields curr-  
port,is-home  
vserver  lif                curr-port  is-home  
-----  -  
Cluster  node1_clus1             e0a        true  
Cluster  node1_clus2             e0b        true  
Cluster  node2_clus1             e0a        true  
Cluster  node2_clus2             e0b        true  
4 entries were displayed.
```

If any cluster LIFS have not returned to their home ports, revert them manually from the local node:

```
network interface revert -vserver Cluster -lif lif_name
```

4. Check the cluster status of the nodes from the system console of either node:

```
cluster show
```

### Show example

The following example shows `epsilon` on both nodes to be `false`:

```
Node  Health  Eligibility  Epsilon  
-----  
node1 true     true        false  
node2 true     true        false  
2 entries were displayed.
```

5. Verify the connectivity of the remote cluster interfaces:

### ONTAP 9.9.1 and later

You can use the `network interface check cluster-connectivity` command to start an accessibility check for cluster connectivity and then display the details:

```
network interface check cluster-connectivity start and network interface check cluster-connectivity show
```

```
cluster1::*> network interface check cluster-connectivity start
```

**NOTE:** Wait for a number of seconds before running the `show` command to display the details.

```
cluster1::*> network interface check cluster-connectivity show
```

Packet	Source	Destination
Node	LIF	LIF
Date		
Loss		
node1		
3/5/2022 19:21:18 -06:00	node1_clus2	node2-clus1
node		
3/5/2022 19:21:20 -06:00	node1_clus2	node2_clus2
node2		
3/5/2022 19:21:18 -06:00	node2_clus2	node1_clus1
node		
3/5/2022 19:21:20 -06:00	node2_clus2	node1_clus2
node		

### All ONTAP releases

For all ONTAP releases, you can also use the `cluster ping-cluster -node <name>` command to check the connectivity:

```
cluster ping-cluster -node <name>
```

```

cluster1::*> cluster ping-cluster -node local
Host is node2
Getting addresses from network interface table...
Cluster node1_clus1 169.254.209.69 node1 e0a
Cluster node1_clus2 169.254.49.125 node1 e0b
Cluster node2_clus1 169.254.47.194 node2 e0a
Cluster node2_clus2 169.254.19.183 node2 e0b
Local = 169.254.47.194 169.254.19.183
Remote = 169.254.209.69 169.254.49.125
Cluster Vserver Id = 4294967293
Ping status:

Basic connectivity succeeds on 4 path(s)
Basic connectivity fails on 0 path(s)

Detected 9000 byte MTU on 4 path(s):
Local 169.254.47.194 to Remote 169.254.209.69
Local 169.254.47.194 to Remote 169.254.49.125
Local 169.254.19.183 to Remote 169.254.209.69
Local 169.254.19.183 to Remote 169.254.49.125
Larger than PMTU communication succeeds on 4 path(s)
RPC status:
2 paths up, 0 paths down (tcp check)
2 paths up, 0 paths down (udp check)

```

6. If you suppressed automatic case creation, reenable it by invoking an AutoSupport message:

```
system node autosupport invoke -node * -type all -message MAINT=END
```

For more information, see [NetApp KB Article 1010449: How to suppress automatic case creation during scheduled maintenance windows](#).

7. Change the privilege level back to admin:

```
set -privilege admin
```

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