# NetApp

# Broadcom-supported BES-53248

Cluster and storage switches

NetApp
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# Broadcom-supported BES-53248

## Overview

### Overview of installation and configuration for BES-53248 switches

The BES-53248 is a bare metal switch designed to work in ONTAP clusters ranging from two to 24 nodes.

**Initial configuration overview**

To initially configure a BES-53248 cluster switch on systems running ONTAP, follow these steps:

1. Install the hardware for the BES-53248 cluster switch.

   Instructions are available in the *Broadcom-supported BES-53248 Cluster Switch Installation Guide*.

2. Configure the BES-53248 cluster switch.

   Perform an initial setup of the BES-53248 cluster switch.

3. Install the EFOS software.

   Download and install the Ethernet Fabric OS (EFOS) software on the BES-53248 cluster switch.

4. Install licenses for BES-53248 cluster switches.

   Optionally, add new ports by purchasing and installing more licenses. The switch base model is licensed for 16 10GbE or 25GbE ports and two 100GbE ports.

5. Install the Reference Configuration File (RCF).

   Install or upgrade the RCF on the BES-53248 cluster switch, and then verify the ports for an additional license after the RCF is applied.

6. Install the Cluster Switch Health Monitor (CSHM) configuration file.

   Install the applicable configuration file for cluster switch health monitoring.

7. Enable SSH on BES-53248 cluster switches.

   If you use the Cluster Switch Health Monitor (CSHM) and log collection features, enable SSH on the switches.

8. Enable the log collection feature.

   Use log collection features to collect switch-related log files in ONTAP.

**Additional information**

Before you begin installation or maintenance, be sure to review the following:

- Configuration requirements

- Components and part numbers
- Required documentation

## Configuration requirements for BES-53248 cluster switches

For BES-53248 switch installation and maintenance, be sure to review EFOS and ONTAP support and configuration requirements.

### EFOS and ONTAP support

See the NetApp Hardware Universe and Broadcom switches compatibility matrix for EFOS and ONTAP compatibility information with BES-53248 switches. EFOS and ONTAP support can vary by the specific machine type of the BES-53248 switch. For details of all BES-52348 switch machine types, see Components and part numbers for BES-53248 cluster switches.

### Configuration requirements

To configure a cluster, you need the appropriate number and type of cables and cable connectors for the cluster switches. Depending on the type of cluster switch you are initially configuring, you need to connect to the switch console port with the included console cable.

#### Cluster switch port assignments

You can use the Broadcom-supported BES-53248 cluster switch port assignments table as a guide to configuring your cluster.

| Switch ports | Ports usage |
| --- | --- |
| 01-16 | 10/25GbE cluster port nodes, base configuration |
| 17-48 | 10/25GbE cluster port nodes, with licenses |
| 49-54 | 40/100GbE cluster port nodes, with licenses, added right to left |
| 55-56 | 100GbE cluster Inter-Switch Link (ISL) ports, base configuration |

See the Hardware Universe for more information on switch ports.

#### Port group speed constraint

- On BES-53248 cluster switches, the 48 10/25GbE (SFP28/SFP+) ports are combined into 12 x 4-port groups as follows: Ports 1-4, 5-8, 9-12, 13-16, 17-20, 21-24, 25-28, 29-32, 33-36, 37-40, 41-44, and 45-48.
- The SFP28/SFP+ port speed must be the same (10GbE or 25GbE) across all ports in the 4-port group.

#### Additional requirements

- If you purchase additional licenses, see Activate newly licenses ports for details on how to activate them.
- If SSH is active, you must re-enable it manually after running the command `erase startup-config` and rebooting the switch.

## Components and part numbers for BES-53248 cluster switches

For BES-53248 switch installation and maintenance, be sure to review the list of components and part numbers.

The following table lists the part number, description, and minimum EFOS and ONTAP versions for the BES-53248 cluster switch components, including rack-mount rail kit details.

ⓘ    A minimum EFOS version of **3.10.0.3** is required for part numbers **X190005-B** and **X190005R-B**.

| Part number | Description | Minimum EFOS version | Minimum ONTAP version |
|---|---|---|---|
| X190005-B | BES-53248-B/IX8, CLSW, 16PT10/25GB, PTSX (PTSX = Port Side Exhaust) | 3.10.0.3 | 9.8 |
| X190005R-B | BES-53248-B/IX8, CLSW, 16PT10/25GB, PSIN (PSIN = Port Side Intake) | 3.10.0.3 | 9.8 |
| X190005 | BES-53248, CLSW, 16Pt10/25GB, PTSX, BRDCM SUPP | 3.4.4.6 | 9.5P8 |
| X190005R | BES-53248, CLSW, 16Pt10/25GB, PSIN, BRDCM SUPP | 3.4.4.6 | 9.5P8 |
| X-RAIL-4POST-190005 | Rack mount rail kit Ozeki 4 post 19" | N/A | N/A |

ⓘ    Note the following information with regards to machine types:

| Machine type | EFOS version |
|---|---|
| BES-53248A1 | 3.4.4.6 |
| BES-53248A2 | 3.10.0.3 |
| BES-53248A3 | 3.10.0.3 |

You can determine your specific machine type by using the command: `show version`

**Show example**

```
(cs1)# show version

Switch: cs1

System Description............................ EFOS, 3.10.0.3, Linux
5.4.2-b4581018, 2016.05.00.07
Machine Type.................................. BES-53248A3
Machine Model................................. BES-53248
Serial Number................................. QTWCU225xxxxx
Part Number................................... 1IX8BZxxxxx
Maintenance Level............................. a3a
Manufacturer.................................. QTMC
Burned In MAC Address......................... C0:18:50:F4:3x:xx
Software Version.............................. 3.10.0.3
Operating System.............................. Linux 5.4.2-b4581018
Network Processing Device..................... BCM56873_A0
.
.
.
```

## Documentation requirements for BES-53248 cluster switches

For BES-53248 switch installation and maintenance, be sure to review the specific switch and controller documentation.

**Broadcom documentation**

To set up the BES-53248 cluster switch, you need the following documents available from the Broadcom Support Site: Broadcom Ethernet Switch Product Line

| Document title | Description |
|---|---|
| *EFOS Administrator's Guide v3.4.3* | Provides examples of how to use the BES-53248 switch in a typical network. |
| *EFOS CLI Command Reference v3.4.3* | Describes the command-line interface (CLI) commands you use to view and configure the BES-53248 software. |
| *EFOS Getting Started Guide v3.4.3* | Provides detailed information about for the BES-53248 switch. |
| *EFOS SNMP Reference Guide v3.4.3* | Provides examples of how to use the BES-53248 switch in a typical network. |

| Document title | Description |
|---|---|
| *EFOS Scaling Parameters and Values v3.4.3* | Describes the default scaling parameters with which EFOS software is delivered and validated on the supported platforms. |
| *EFOS Functional Specifications v3.4.3* | Describes the specifications for the EFOS software on the supported platforms. |
| *EFOS Release Notes v3.4.3* | Provides release-specific information about BES-53248 software. |
| *Cluster Network and Management Network Compatibility Matrix* | Provides information on network compatibility. The matrix is available from the BES-53248 switch download site at Broadcom cluster switches. |

**ONTAP systems documentation and KB articles**

To set up an ONTAP system, you need the following documents from the NetApp Support Site at mysupport.netapp.com or the Knowledgebase (KB) site at kb.netapp.com.

| Name | Description |
|---|---|
| NetApp Hardware Universe | Describes the power and site requirements for all NetApp hardware, including system cabinets, and provides information on the relevant connectors and cable options to use along with their part numbers. |
| Controller-specific *Installation and Setup Instructions* | Describes how to install NetApp hardware. |
| ONTAP 9 | Provides detailed information about all aspects of the ONTAP 9 release. |
| *How to add additional port licensing for the Broadcom-supported BES-53248 switch* | Provides detailed information on adding port licenses. Go to the KB article. |

# Install hardware

## Install the hardware for the BES-53248 cluster switch

To install the BES-53248 hardware, refer to Broadcom's documentation.

**Steps**

1. Review the configuration requirements.

2. Follow the instructions in the Broadcom-supported BES-53248 Cluster Switch Installation Guide.

**What's next?**

Configure the switch.

## Configure the BES-53248 cluster switch

Follow these steps to perform an initial setup of the BES-53248 cluster switch.

**Before you begin**

- Hardware is installed, as described in Install the hardware.
- You have reviewed the following:
    - Configuration requirements
    - Components and part numbers
    - Documentation requirements

**About the examples**

The examples in the configuration procedures use the following switch and node nomenclature:

- The NetApp switch names are `cs1` and `cs2`. The upgrade starts on the second switch, *cs2.*
- The cluster LIF names are `node1_clus1` and `node1_clus2` for node1, and `node2_clus1` and `node2_clus2` for node2.
- The IPspace name is Cluster.
- The `cluster1::>` prompt indicates the name of the cluster.
- The cluster ports on each node are named `e0a` and `e0b`. See the NetApp Hardware Universe for the actual cluster ports supported on your platform.
- The Inter-Switch Links (ISLs) supported for the NetApp switches are ports 0/55 and 0/56.
- The node connections supported for the NetApp switches are ports 0/1 through 0/16 with default licensing.
- The examples use two nodes, but you can have up to 24 nodes in a cluster.

**Steps**

1. Connect the serial port to a host or serial port.
2. 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.
3. At the console, set the host-side serial settings:
    - 115200 baud
    - 8 data bits
    - 1 stop bit
    - parity: none
    - flow control: none
4. Log in to the switch as `admin` and press **Enter** when prompted for a password. The default switch name is **routing**. At the prompt, enter `enable`. This gives you access to Privileged EXEC mode for switch configuration.

```
User: admin
Password:
(Routing)> enable
Password:
(Routing)#
```

5. Change the switch name to **cs2**.

**Show example**

```
(Routing)# hostname cs2
(cs2)#
```

6. To set a static IP address, use the `serviceport protocol`, `network protocol`, and `serviceport ip` commands as shown in the example.

   The serviceport is set to use DHCP by default. The IP address, subnet mask, and default gateway address are assigned automatically.

   **Show example**

```
(cs2)# serviceport protocol none
(cs2)# network protocol none
(cs2)# serviceport ip ipaddr netmask gateway
```

7. Verify the results using the command:

   `show serviceport`

```
(cs2)# show serviceport
Interface Status............................... Up
IP Address.................................... 172.19.2.2
Subnet Mask................................... 255.255.255.0
Default Gateway............................... 172.19.2.254
IPv6 Administrative Mode...................... Enabled
IPv6 Prefix is ...............................
fe80::dac4:97ff:fe71:123c/64
IPv6 Default Router...........................
fe80::20b:45ff:fea9:5dc0
Configured IPv4 Protocol...................... DHCP
Configured IPv6 Protocol...................... None
IPv6 AutoConfig Mode.......................... Disabled
Burned In MAC Address......................... D8:C4:97:71:12:3C
```

8. Configure the domain and name server:

```
configure
```

**Show example**

```
(cs2)# configure
(cs2) (Config)# ip domain name company.com
(cs2) (Config)# ip name server 10.10.99.1 10.10.99.2
(cs2) (Config)# exit
(cs2) (Config)#
```

9. Configure the NTP server.
   a. Configure the time zone and time synchronization (SNTP):

```
sntp
```

```
(cs2)#
(cs2) (Config)# sntp client mode unicast
(cs2) (Config)# sntp server 10.99.99.5
(cs2) (Config)# clock timezone -7
(cs2) (Config)# exit
(cs2) (Config)#
```

For EFOS version 3.10.0.3 and later, use the command `ntp`.

```
ntp
```

**Show example**

```
(cs2)configure
(cs2)(Config)# ntp ?

authenticate              Enables NTP authentication.
authentication-key        Configure NTP authentication key.
broadcast                 Enables NTP broadcast mode.
broadcastdelay            Configure NTP broadcast delay in
microseconds.
server                    Configure NTP server.
source-interface          Configure the NTP source-interface.
trusted-key               Configure NTP authentication key number
for trusted time source.
vrf                       Configure the NTP VRF.

(cs2)(Config)# ntp server ?

ip-address|ipv6-address|hostname  Enter a valid IPv4/IPv6 address
or hostname.

(cs2)(Config)# ntp server 10.99.99.5
```

b. Configure the time manually:

```
clock
```

**Show example**

```
(cs2)# config
(cs2) (Config)# no sntp client mode
(cs2) (Config)# clock summer-time recurring 1 sun mar 02:00 1 sun
nov 02:00 offset 60 zone EST
(cs2) (Config)# clock timezone -5 zone EST
(cs2) (Config)# clock set 07:00:00
(cs2) (Config)# *clock set 10/20/2020

(cs2) (Config)# show clock

07:00:11 EST(UTC-5:00) Oct 20 2020
No time source

(cs2) (Config)# exit

(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!
```

**What's next?**

Install the EFOS software.

# Configure software

## Software install workflow for BES-53248 switches

To initially install and configure the software for a BES-53248 cluster switch, follow these steps:

1. Install the EFOS software.

   Download and install the Ethernet Fabric OS (EFOS) software on the BES-53248 cluster switch.

2. Install licenses for BES-53248 cluster switches.

   Optionally, add new ports by purchasing and installing more licenses. The switch base model is licensed for 16 10GbE or 25GbE ports and two 100GbE ports.

3. Install the Reference Configuration File (RCF).

   Install or upgrade the RCF on the BES-53248 cluster switch, and then verify the ports for an additional license after the RCF is applied.

4. Install the Cluster Switch Health Monitor (CSHM) configuration file.

   Install the applicable configuration file for cluster switch health monitoring.

5. Enable SSH on BES-53248 cluster switches.

   If you use the Cluster Switch Health Monitor (CSHM) and log collection features, enable SSH on the switches.

6. Enable the log collection feature.

   Use this feature to collect switch-related log files in ONTAP.

## Install the EFOS software

Follow these steps to install the Ethernet Fabric OS (EFOS) software on the BES-53248 cluster switch.

EFOS software includes a set of advanced networking features and protocols for developing Ethernet and IP infrastructure systems. This software architecture is suitable for any network organizational device using applications that require thorough packet inspection or separation.

**Prepare for installation**

**Before you begin**

- Download the applicable Broadcom EFOS software for your cluster switches from the Broadcom Ethernet Switch Support site.
- Review the following notes regarding EFOS versions.

---

**Note the following:**

- When upgrading from EFOS 3.4.x.x to EFOS 3.7.x.x or later, the switch must be running EFOS 3.4.4.6 (or later 3.4.x.x release). If you are running a release prior to that, then upgrade the switch to EFOS 3.4.4.6 (or later 3.4.x.x release) first, then upgrade the switch to EFOS 3.7.x.x or later.

- The configuration for EFOS 3.4.x.x and 3.7.x.x or later are different. Changing the EFOS version from 3.4.x.x to 3.7.x.x or later, or vice versa, requires the switch to be reset to factory defaults and the RCF files for the corresponding EFOS version to be (re)applied. This procedure requires access through the serial console port.

- Beginning with EFOS version 3.7.x.x or later, a non-FIPS compliant and a FIPS compliant version is available. Different steps apply when moving from a non-FIPS compliant to a FIPS compliant version or vice versa. Changing EFOS from a non-FIPS compliant to a FIPS compliant version or vice versa will reset the switch to factory defaults. This procedure requires access through the serial console port.

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| Procedure | Current EFOS version | New EFOS version | High level steps |
|-----------|---------------------|------------------|------------------|

| | | | |
|---|---|---|---|
| Steps to upgrade EFOS between two (non) FIPS compliant versions | 3.4.x.x | 3.4.x.x | Install the new EFOS image using Method 1: Install EFOS. The configuration and license information is retained. |
| | 3.4.4.6 (or later 3.4.x.x) | 3.7.x.x or later non-FIPS compliant | Upgrade EFOS using Method 1: Install EFOS. Reset the switch to factory defaults and apply the RCF file for EFOS 3.7.x.x or later. |
| | 3.7.x.x or later non-FIPS compliant | 3.4.4.6 (or later 3.4.x.x) | Downgrade EFOS using Method 1: Install EFOS. Reset the switch to factory defaults and apply the RCF file for EFOS 3.4.x.x |
| | | 3.7.x.x or later non-FIPS compliant | Install the new EFOS image using Method 1: Install EFOS. The configuration and license information is retained. |
| | 3.7.x.x or later FIPS compliant | 3.7.x.x or later FIPS compliant | Install the new EFOS image using Method 1: Install EFOS. The configuration and license information is retained. |
| Steps to upgrade to/from a FIPS compliant EFOS version | Non-FIPS compliant | FIPS compliant | Installation of the EFOS image using Method 2: Upgrade EFOS using the ONIE OS installation. The switch configuration and license information will be lost. |
| | FIPS compliant | Non-FIPS compliant | |

To check if your version of EFOS is FIPS compliant or non-FIPS compliant, use the `show fips status` command. In the following examples, **IP_switch_a1** is using FIPS compliant EFOS and **IP_switch_a2** is using non-FIPS compliant EFOS.

- On switch IP_switch_a1:

```
IP_switch_a1 # *show fips status*

System running in FIPS mode
```

- On switch IP_switch_a2:

```
IP_switch_a2 # *show fips status*
                           ^
% Invalid input detected at `^` marker.
```

**Install the software**

Use one of the following methods:

- Method 1: Install EFOS. Use for most cases (see the table above).
- Method 2: Upgrade EFOS using the ONIE OS installation. Use if one EFOS version is FIPS compliant and the other EFOS version is non-FIPS compliant.

**Method 1: Install EFOS**

Perform the following steps to install or upgrade the EFOS software.

Note that after upgrading BES-53248 cluster switches from EFOS 3.3.x.x or 3.4.x.x to EFOS 3.7.0.4 or 3.8.0.2, Inter-Switch Links (ISLs) and port channel are marked in the **Down** state. See this KB article: BES-53248 Cluster Switch NDU failed upgrade to EFOS 3.7.0.4 and later for further details.

**Steps**

1. Connect the BES-53248 cluster switch to the management network.

2. Use the `ping` command to verify connectivity to the server hosting EFOS, licenses, and the RCF file.

**Show example**

This example verifies that the switch is connected to the server at IP address 172.19.2.1:

```
(cs2)# ping 172.19.2.1
Pinging 172.19.2.1 with 0 bytes of data:

Reply From 172.19.2.1: icmp_seq = 0. time= 5910 usec.
```

3. Back up the current active image on cs2:

```
show bootvar
```

**Show example**

```
(cs2)# show bootvar

 Image Descriptions

 active :
 backup :

 Images currently available on Flash
 ---------------------------------------------------------------------
  unit       active       backup       current-active     next-active
 ---------------------------------------------------------------------
    1       3.4.3.3      Q.10.22.1     3.4.3.3            3.4.3.3

(cs2)# copy active backup
Copying active to backup
Management access will be blocked for the duration of the operation
Copy operation successful

(cs2)# show bootvar

Image Descriptions

 active :
 backup :
 Images currently available on Flash
 ---------------------------------------------------------------------
  unit       active       backup       current-active     next-active
 ---------------------------------------------------------------------
    1       3.4.3.3      3.4.3.3       3.4.3.3            3.4.3.3
(cs2)#
```

4. Verify the running version of the EFOS software:

```
show version
```

**Show example**

```
(cs2)# show version

Switch: 1

System Description.............................. BES-53248A1,
3.4.3.3, Linux 4.4.117-ceeeb99d, 2016.05.00.05
Machine Type.................................... BES-53248A1
Machine Model................................... BES-53248
Serial Number................................... QTFCU38260014
Maintenance Level............................... A
Manufacturer.................................... 0xbc00
Burned In MAC Address........................... D8:C4:97:71:12:3D
Software Version................................ 3.4.3.3
Operating System................................ Linux 4.4.117-
ceeeb99d
Network Processing Device....................... BCM56873_A0
CPLD Version.................................... 0xff040c03

Additional Packages............................. BGP-4
................................................ QOS
................................................ Multicast
................................................ IPv6
................................................ Routing
................................................ Data Center
................................................ OpEN API
................................................ Prototype Open API
```

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 EFOS version. The previous image remains available as a backup.

**Show example**

```
(cs2)# copy sftp://root@172.19.2.1//tmp/EFOS-3.4.4.6.stk active
Remote Password:**

Mode......................................... SFTP
Set Server IP................................ 172.19.2.1
Path......................................... //tmp/
Filename..................................... EFOS-3.4.4.6.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.
```

6. Display 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      3.4.3.3     3.4.3.3       3.4.3.3             3.4.4.6
```

7. Reboot the switch:

```
reload
```

**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!
```

8. Log in again and verify the new version of the EFOS software:

```
show version
```

**Show example**

```
(cs2)# show version

Switch: 1

System Description............................. BES-53248A1,
3.4.4.6, Linux 4.4.211-28a6fe76, 2016.05.00.04
Machine Type................................... BES-53248A1,
Machine Model.................................. BES-53248
Serial Number.................................. QTFCU38260023
Maintenance Level.............................. A
Manufacturer................................... 0xbc00
Burned In MAC Address.......................... D8:C4:97:71:0F:40
Software Version............................... 3.4.4.6
Operating System............................... Linux 4.4.211-
28a6fe76
Network Processing Device...................... BCM56873_A0
CPLD Version................................... 0xff040c03

Additional Packages............................ BGP-4
............................................... QOS
............................................... Multicast
............................................... IPv6
............................................... Routing
............................................... Data Center
............................................... OpEN API
............................................... Prototype Open API
```

**What's next?**

Install licenses for BES-53248 cluster switches.

**Method 2: Upgrade EFOS using the ONIE OS installation**

You can perform the following steps if one EFOS version is FIPS compliant and the other EFOS version is non-FIPS compliant. These steps can be used to install the non-FIPS or FIPS compliant EFOS 3.7.x.x image from ONIE if the switch fails to boot.

> (i) This functionality is only available for EFOS 3.7.x.x or later non-FIPS compliant.

**Steps**

1. Boot the switch into ONIE installation mode.

   During boot, select ONIE when you see the prompt.

   **Show example**

   ```
   +----------------------------------------------------------------
   -+
   |EFOS
   |
   |*ONIE
   |
   |
   |
   |
   |
   |
   |
   |
   |
   |
   |
   |
   |
   |
   |
   |
   |
   |
   |
   |
   +----------------------------------------------------------------
   -+
   ```

After you select **ONIE**, the switch loads and presents you with several choices. Select **Install OS**.

**Show example**

```
+---------------------------------------------------------------------
-+
|*ONIE: Install OS
|
| ONIE: Rescue
|
| ONIE: Uninstall OS
|
| ONIE: Update ONIE
|
| ONIE: Embed ONIE
|
| DIAG: Diagnostic Mode
|
| DIAG: Burn-In Mode
|
|
|
|
|
|
|
|
|
|
|
+---------------------------------------------------------------------
-+
```

The switch boots into ONIE installation mode.

2. Stop the ONIE discovery and configure the Ethernet interface.

When the following message appears, press **Enter** to invoke the ONIE console:

```
Please press Enter to activate this console. Info: eth0:  Checking
link... up.
 ONIE:/ #
```

> (i) The ONIE discovery continues and messages are printed to the console.

```
Stop the ONIE discovery
ONIE:/ # onie-discovery-stop
discover: installer mode detected.
Stopping: discover... done.
ONIE:/ #
```

3. Configure the Ethernet interface and add the route using `ifconfig eth0 <ipAddress> netmask <netmask> up` and `route add default gw <gatewayAddress>`

```
ONIE:/ # ifconfig eth0 10.10.10.10 netmask 255.255.255.0 up
ONIE:/ # route add default gw 10.10.10.1
```

4. Verify that the server hosting the ONIE installation file is reachable:

`ping`

**Show example**

```
ONIE:/ # ping 50.50.50.50
PING 50.50.50.50 (50.50.50.50): 56 data bytes
64 bytes from 50.50.50.50: seq=0 ttl=255 time=0.429 ms
64 bytes from 50.50.50.50: seq=1 ttl=255 time=0.595 ms
64 bytes from 50.50.50.50: seq=2 ttl=255 time=0.369 ms
^C
--- 50.50.50.50 ping statistics ---
3 packets transmitted, 3 packets received, 0% packet loss
round-trip min/avg/max = 0.369/0.464/0.595 ms
ONIE:/ #
```

5. Install the new switch software:

```
ONIE:/ # onie-nos-install http://50.50.50.50/Software/onie-installer-x86_64
```

**Show example**

```
ONIE:/ # onie-nos-install http://50.50.50.50/Software/onie-
installer-x86_64
discover: installer mode detected.
Stopping: discover... done.
Info: Fetching http://50.50.50.50/Software/onie-installer-3.7.0.4
...
Connecting to 50.50.50.50 (50.50.50.50:80)
installer              100% |******************************| 48841k
0:00:00 ETA
ONIE: Executing installer: http://50.50.50.50/Software/onie-
installer-3.7.0.4
Verifying image checksum ... OK.
Preparing image archive ... OK.
```

The software installs and then reboots the switch. Let the switch reboot normally into the new EFOS version.

6. Verify that the new switch software is installed:

   show bootvar

   **Show example**

```
(cs2)# show bootvar
Image Descriptions
active :
backup :
Images currently available on Flash
----    ----------- -------- -------------- ------------
unit    active       backup   current-active next-active
----    ----------- -------- -------------- ------------
1       3.7.0.4      3.7.0.4  3.7.0.4        3.7.0.4
(cs2) #
```

7. Complete the installation.

   The switch will reboot with no configuration applied and reset to factory defaults.

**What's next?**

Install licenses for BES-53248 cluster switches.

# Install licenses for BES-53248 cluster switches

The BES-53248 cluster switch base model is licensed for 16 10GbE or 25GbE ports and two 100GbE ports. You can add new ports by purchasing more licenses.

**Review available licenses**

The following licenses are available for use on the BES-53248 cluster switch:

| License type | License details | Supported firmware version |
|---|---|---|
| SW-BES-53248A2-8P-2P | Broadcom 8PT-10G25G + 2PT-40G100G License Key, X190005/R | EFOS 3.4.4.6 and later |
| SW-BES-53248A2-8P-1025G | Broadcom 8 Port 10G25G License Key, X190005/R | EFOS 3.4.4.6 and later |
| SW-BES53248A2-6P-40-100G | Broadcom 6 Port 40G100G License Key, X190005/R | EFOS 3.4.4.6 and later |

**Legacy licenses**

The following table lists the legacy licenses that were available for use on the BES-53248 cluster switch:

| License type | License details | Supported firmware version |
|---|---|---|
| SW-BES-53248A1-G1-8P-LIC | Broadcom 8P 10-25,2P40-100 License Key, X190005/R | EFOS 3.4.3.3 and later |
| SW-BES-53248A1-G1-16P-LIC | Broadcom 16P 10-25,4P40-100 License Key, X190005/R | EFOS 3.4.3.3 and later |
| SW-BES-53248A1-G1-24P-LIC | Broadcom 24P 10-25,6P40-100 License Key, X190005/R | EFOS 3.4.3.3 and later |
| SW-BES54248-40-100G-LIC | Broadcom 6Port 40G100G License Key, X190005/R | EFOS 3.4.4.6 and later |
| SW-BES53248-8P-10G25G-LIC | Broadcom 8Port 10G25G License Key, X190005/R | EFOS 3.4.4.6 and later |
| SW-BES53248-16P-1025G-LIC | Broadcom 16Port 10G25G License Key, X190005/R | EFOS 3.4.4.6 and later |

| License type | License details | Supported firmware version |
|---|---|---|
| SW-BES53248-24P-1025G-LIC | Broadcom 24Port 10G25G License Key, X190005/R | EFOS 3.4.4.6 and later |

ⓘ     A license is not required for the base configuration.

**Install license files**

Follow these steps to install licenses for BES-53248 cluster switches.

**Steps**

1. Connect the cluster switch to the management network.

2. Use the `ping` command to verify connectivity to the server hosting EFOS, licenses, and the RCF file.

   **Show example**

   This example verifies that the switch is connected to the server at IP address 172.19.2.1:

   ```
   (cs2)# ping 172.19.2.1
   Pinging 172.19.2.1 with 0 bytes of data:

   Reply From 172.19.2.1: icmp_seq = 0. time= 5910 usec.
   ```

3. Check the current license usage on switch cs2:

   ```
   show license
   ```

   **Show example**

   ```
   (cs2)# show license
   Reboot needed.................................. No
   Number of active licenses...................... 0

   License Index   License Type       Status
   --------------  ----------------   -----------

   No license file found.
   ```

4. Install the license file.

   Repeat this step to load more licenses and to use different key index numbers.

**Show example**

The following example uses SFTP to copy a license file to a key index 1.

```
(cs2)# copy sftp://root@172.19.2.1/var/lib/tftpboot/license.dat
nvram:license-key 1
Remote Password:**

Mode........................................... SFTP
Set Server IP.................................. 172.19.2.1
Path........................................... /var/lib/tftpboot/
Filename....................................... license.dat
Data Type...................................... license

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...


License Key transfer operation completed successfully. System reboot
is required.
```

5. Display all current license information and note the license status before switch cs2 is rebooted:

```
show license
```

**Show example**

```
(cs2)# show license

Reboot needed.................................. Yes
Number of active licenses..................... 0


License Index  License Type      Status
--------------  ----------------  ------------------------------
1               Port              License valid but not applied
```

6. Display all licensed ports:

```
show port all | exclude Detach
```

The ports from the additional license files are not displayed until after the switch is rebooted.

**Show example**

```
(cs2)# show port all | exclude Detach

                Admin    Physical   Physical   Link   Link    LACP    Actor
Intf      Type  Mode     Mode       Status     Status Trap    Mode    Timeout
--------- ----- -------- ---------- ---------- ------ ------- ------ --------
0/1             Disable  Auto                  Down   Enable  Enable long
0/2             Disable  Auto                  Down   Enable  Enable long
0/3             Disable  Auto                  Down   Enable  Enable long
0/4             Disable  Auto                  Down   Enable  Enable long
0/5             Disable  Auto                  Down   Enable  Enable long
0/6             Disable  Auto                  Down   Enable  Enable long
0/7             Disable  Auto                  Down   Enable  Enable long
0/8             Disable  Auto                  Down   Enable  Enable long
0/9             Disable  Auto                  Down   Enable  Enable long
0/10            Disable  Auto                  Down   Enable  Enable long
0/11            Disable  Auto                  Down   Enable  Enable long
0/12            Disable  Auto                  Down   Enable  Enable long
0/13            Disable  Auto                  Down   Enable  Enable long
0/14            Disable  Auto                  Down   Enable  Enable long
0/15            Disable  Auto                  Down   Enable  Enable long
0/16            Disable  Auto                  Down   Enable  Enable long
0/55            Disable  Auto                  Down   Enable  Enable long
0/56            Disable  Auto                  Down   Enable  Enable long
```

7. Reboot the switch:

```
reload
```

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

8. Check that the new license is active and note that the license has been applied:

```
show license
```

**Show example**

```
(cs2)# show license

Reboot needed.................................. No
Number of installed licenses.................. 1
Total Downlink Ports enabled.................. 16
Total Uplink Ports enabled.................... 8

License Index   License Type                Status
--------------  -------------------------
------------------------------------
1               Port                        License applied
```

9. Check that all new ports are available:

```
show port all | exclude Detach
```

**Show example**

```
(cs2)# show port all | exclude Detach

                Admin      Physical   Physical    Link    Link    LACP
Actor
Intf      Type  Mode       Mode       Status      Status  Trap    Mode
Timeout
--------- ------ --------- ---------- ---------- ------ -------
------ --------
0/1             Disable    Auto                   Down    Enable
Enable long
0/2             Disable    Auto                   Down    Enable
Enable long
0/3             Disable    Auto                   Down    Enable
Enable long
0/4             Disable    Auto                   Down    Enable
Enable long
0/5             Disable    Auto                   Down    Enable
Enable long
0/6             Disable    Auto                   Down    Enable
Enable long
0/7             Disable    Auto                   Down    Enable
Enable long
0/8             Disable    Auto                   Down    Enable
Enable long
0/9             Disable    Auto                   Down    Enable
Enable long
0/10            Disable    Auto                   Down    Enable
Enable long
0/11            Disable    Auto                   Down    Enable
Enable long
0/12            Disable    Auto                   Down    Enable
Enable long
0/13            Disable    Auto                   Down    Enable
Enable long
0/14            Disable    Auto                   Down    Enable
Enable long
0/15            Disable    Auto                   Down    Enable
Enable long
0/16            Disable    Auto                   Down    Enable
Enable long
0/49            Disable    100G Full              Down    Enable
Enable long
0/50            Disable    100G Full              Down    Enable
Enable long
```

```
 0/51              Disable   100G Full            Down   Enable
 Enable long
 0/52              Disable   100G Full            Down   Enable
 Enable long
 0/53              Disable   100G Full            Down   Enable
 Enable long
 0/54              Disable   100G Full            Down   Enable
 Enable long
 0/55              Disable   100G Full            Down   Enable
 Enable long
 0/56              Disable   100G Full            Down   Enable
 Enable long
```

> ⚠ When installing additional licenses, you must configure the new interfaces manually. Do not re-apply an RCF to an existing working production switch.

**Troubleshoot install issues**

Where problems arise when installing a license, run the following debug commands before running the `copy` command again.

Debug commands to use: `debug transfer` and `debug license`

**Show example**

```
(cs2)# debug transfer
Debug transfer output is enabled.
(cs2)# debug license
Enabled capability licensing debugging.
```

When you run the `copy` command with the `debug transfer` and `debug license` options enabled, the log output is returned.

**Show example**

```
transfer.c(3083):Transfer process  key or certificate file type = 43
transfer.c(3229):Transfer process  key/certificate cmd = cp
/mnt/download//license.dat.1 /mnt/fastpath/ >/dev/null 2>&1CAPABILITY
LICENSING :
Fri Sep 11 13:41:32 2020: License file with index 1 added.
CAPABILITY LICENSING : Fri Sep 11 13:41:32 2020: Validating hash value
29de5e9a8af3e510f1f16764a13e8273922d3537d3f13c9c3d445c72a180a2e6.
CAPABILITY LICENSING : Fri Sep 11 13:41:32 2020: Parsing JSON buffer {
   "license": {
     "header": {
       "version": "1.0",
       "license-key": "964B-2D37-4E52-BA14",
       "serial-number": "QTFCU38290012",
       "model": "BES-53248"
   },
   "description": "",
   "ports": "0+6"
   }
}.
CAPABILITY LICENSING : Fri Sep 11 13:41:32 2020: License data does not
contain 'features' field.
CAPABILITY LICENSING : Fri Sep 11 13:41:32 2020: Serial number
QTFCU38290012 matched.
CAPABILITY LICENSING : Fri Sep 11 13:41:32 2020: Model BES-53248
matched.
CAPABILITY LICENSING : Fri Sep 11 13:41:32 2020: Feature not found in
license file with index = 1.
CAPABILITY LICENSING : Fri Sep 11 13:41:32 2020: Applying license file
1.
```

Check for the following in the debug output:

* Check that the Serial number matches: `Serial number QTFCU38290012 matched.`

* Check that the switch Model matches: `Model BES-53248 matched.`

* Check that the specified license index was not used previously. Where a license index is already used, the following error is returned: `License file /mnt/download//license.dat.1 already exists.`

* A port license is not a feature license. Therefore, the following statement is expected: `Feature not found in license file with index = 1.`

Use the `copy` command to back up port licenses to the server:

```
(cs2)# copy nvram:license-key 1
scp://<UserName>@<IP_address>/saved_license_1.dat
```

> ⚠️ If you need to downgrade the switch software from version 3.4.4.6, the licenses are removed. This is expected behavior.

You must install an appropriate older license before reverting to an older version of the software.

**Activate newly licensed ports**

To activate newly licensed ports, you need to edit the latest version of the RCF and uncomment the applicable port details.

The default license activates ports 0/1 to 0/16 and 0/55 to 0/56 while the newly licensed ports will be between ports 0/17 to 0/54 depending on the type and number of licenses available. For example, to activate the SW-BES54248-40-100G-LIC license, you must uncomment the following section in the RCF:

**Show example**

```
.
.
!
! 2-port or 6-port 40/100GbE node port license block
!
interface 0/49
no shutdown
description "40/100GbE Node Port"
!speed 100G full-duplex
speed 40G full-duplex
service-policy in WRED_100G
spanning-tree edgeport
mtu 9216
switchport mode trunk
datacenter-bridging
priority-flow-control mode on
priority-flow-control priority 5 no-drop
exit
exit
!
interface 0/50
no shutdown
description "40/100GbE Node Port"
!speed 100G full-duplex
speed 40G full-duplex
service-policy in WRED_100G
spanning-tree edgeport
mtu 9216
switchport mode trunk
datacenter-bridging
priority-flow-control mode on
priority-flow-control priority 5 no-drop
exit
exit
!
interface 0/51
no shutdown
description "40/100GbE Node Port"
speed 100G full-duplex
!speed 40G full-duplex
service-policy in WRED_100G
spanning-tree edgeport
mtu 9216
switchport mode trunk
```

```
datacenter-bridging
priority-flow-control mode on
priority-flow-control priority 5 no-drop
exit
exit
!
interface 0/52
no shutdown
description "40/100GbE Node Port"
speed 100G full-duplex
!speed 40G full-duplex
service-policy in WRED_100G
spanning-tree edgeport
mtu 9216
switchport mode trunk
datacenter-bridging
priority-flow-control mode on
priority-flow-control priority 5 no-drop
exit
exit
!
interface 0/53
no shutdown
description "40/100GbE Node Port"
speed 100G full-duplex
!speed 40G full-duplex
service-policy in WRED_100G
spanning-tree edgeport
mtu 9216
switchport mode trunk
datacenter-bridging
priority-flow-control mode on
priority-flow-control priority 5 no-drop
exit
exit
!
interface 0/54
no shutdown
description "40/100GbE Node Port"
speed 100G full-duplex
!speed 40G full-duplex
service-policy in WRED_100G
spanning-tree edgeport
mtu 9216
switchport mode trunk
datacenter-bridging
```

```
priority-flow-control mode on
priority-flow-control priority 5 no-drop
exit
exit
!
.
.
```

For high-speed ports between 0/49 to 0/54 inclusive, uncomment each port but only uncomment one **speed** line in the RCF for each of these ports, either: **speed 100G full-duplex** or **speed 40G full-duplex** as shown in the example. For low-speed ports between 0/17 to 0/48 inclusive, uncomment the entire 8-port section when an appropriate license has been activated.

**What's next?**

Install the Reference Configuration File (RCF).

## Install the Reference Configuration File (RCF)

You can install the Reference Configuration File (RCF) after configuring the BES-53248 cluster switch and after applying the new licenses.

If you are upgrading an RCF from an older version, you must reset the Broadcom switch settings and perform basic configuration to re-apply the RCF. You must perform this operation every time you want to upgrade or change an RCF. See the KB article for details.

**Review requirements**

**Before you begin**

- A current backup of the switch configuration.

- A fully functioning cluster (no errors in the logs or similar issues).

- The current RCF file, available from the Broadcom Cluster Switches page.

- A boot configuration in the RCF that reflects the desired boot images, required if you are installing only EFOS and keeping your current RCF version. If you need to change the boot configuration to reflect the current boot images, you must do so before reapplying the RCF so that the correct version is instantiated on future reboots.

- A console connection to the switch, required when installing the RCF from a factory-default state. This requirement is optional if you have used the Knowledge Base article How to clear configuration on a Broadcom interconnect switch while retaining remote connectivity to clear the configuration, beforehand.

**Suggested documentation**

- Consult the switch compatibility table for the supported ONTAP and RCF versions. See the EFOS Software download page. Note that there can be command dependencies between the command syntax in the RCF and that found in versions of EFOS.

- Refer to the appropriate software and upgrade guides available on the Broadcom site for complete documentation on the BES-53248 switch upgrade and downgrade procedures.

**Install the configuration file**

**About the examples**

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

- The names of the two BES-53248 switches are cs1 and cs2.
- The node names are cluster1-01, cluster1-02, cluster1-03, and cluster1-04.
- The cluster LIF names are cluster1-01_clus1, cluster1-01_clus2, cluster1-02_clus1, cluster1-02_clus2, cluster1-03_clus1, cluster1-03_clus2, cluster1-04_clus1, and cluster1-04_clus2.
- The `cluster1::*>` prompt indicates the name of the cluster.
- The examples in this procedure use four nodes. These nodes use two 10GbE cluster interconnect ports `e0a` and `e0b`. See the Hardware Universe to verify the correct cluster ports on your platforms.

> ⓘ The command outputs might vary depending on different releases of ONTAP.

**About this task**

The procedure requires the use of both ONTAP commands and Broadcom switch commands; ONTAP commands are used unless otherwise indicated.

No operational inter-switch link (ISL) is needed during this procedure. This is by design because RCF version changes can affect ISL connectivity temporarily. To ensure non-disruptive cluster operations, the following procedure migrates all the cluster LIFs to the operational partner switch while performing the steps on the target switch.

> ⚠ Before installing a new switch software version and RCFs, use the KB: How to clear configuration on a Broadcom interconnect switch while retaining remote connectivity. If you must erase the switch settings completely, then you will need to perform the basic configuration again. You must be connected to the switch using the serial console, since a complete configuration erasure resets the configuration of the management network.

**Step 1: Prepare for the installation**

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`

   where *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.

   The following command suppresses automatic case creation for two hours:

   ```
   cluster1::*> system node autosupport invoke -node \* -type all -message
   MAINT=2h
   ```

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

```
set -privilege advanced
```

The advanced prompt (*>) appears.

3. Display the cluster ports on each node that are connected to the cluster switches: `network device-discovery show`

**Show example**

```
cluster1::*> network device-discovery show
Node/       Local  Discovered
Protocol    Port   Device (LLDP: ChassisID)  Interface
Platform
----------- ------ ------------------------- ----------------
--------
cluster1-01/cdp
            e0a    cs1                         0/2            BES-
53248
            e0b    cs2                         0/2            BES-
53248
cluster1-02/cdp
            e0a    cs1                         0/1            BES-
53248
            e0b    cs2                         0/1            BES-
53248
cluster1-03/cdp
            e0a    cs1                         0/4            BES-
53248
            e0b    cs2                         0/4            BES-
53248
cluster1-04/cdp
            e0a    cs1                         0/3            BES-
53248
            e0b    cs2                         0/3            BES-
53248
cluster1::*>
```

4. Check the administrative and operational status of each cluster port.

   a. Verify that all the cluster ports are up with a healthy status: `network port show -role cluster`

**Show example**

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

Node: cluster1-01

Ignore
                                                  Speed(Mbps)
Health   Health
Port      IPspace      Broadcast Domain Link MTU  Admin/Oper
Status   Status
--------- ------------ --------------- ---- ---- -----------
-------- ------
e0a       Cluster      Cluster          up   9000  auto/100000
healthy false
e0b       Cluster      Cluster          up   9000  auto/100000
healthy false

Node: cluster1-02

Ignore
                                                  Speed(Mbps)
Health   Health
Port      IPspace      Broadcast Domain Link MTU  Admin/Oper
Status   Status
--------- ------------ --------------- ---- ---- -----------
-------- ------
e0a       Cluster      Cluster          up   9000  auto/100000
healthy false
e0b       Cluster      Cluster          up   9000  auto/100000
healthy false
8 entries were displayed.

Node: cluster1-03

   Ignore
                                                  Speed(Mbps)
Health   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
```

```
Node: cluster1-04

 Ignore

                                           Speed(Mbps)
 Health    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
 cluster1::*>
```

b. Verify that all the cluster interfaces (LIFs) are on the home port: `network interface show -role cluster`

**Show example**

```
cluster1::*> network interface show -role cluster
           Logical              Status     Network
Current       Current Is
Vserver     Interface           Admin/Oper Address/Mask       Node
Port    Home
----------- ------------------ ---------- -----------------
------------ ------- ----
Cluster
           cluster1-01_clus1  up/up      169.254.3.4/23
cluster1-01  e0a      true
           cluster1-01_clus2  up/up      169.254.3.5/23
cluster1-01  e0b      true
           cluster1-02_clus1  up/up      169.254.3.8/23
cluster1-02  e0a      true
           cluster1-02_clus2  up/up      169.254.3.9/23
cluster1-02  e0b      true
           cluster1-03_clus1  up/up      169.254.1.3/23
cluster1-03  e0a      true
           cluster1-03_clus2  up/up      169.254.1.1/23
cluster1-03  e0b      true
           cluster1-04_clus1  up/up      169.254.1.6/23
cluster1-04  e0a      true
           cluster1-04_clus2  up/up      169.254.1.7/23
cluster1-04  e0b      true
```

5. Verify that the cluster displays information for both cluster switches.

**ONTAP 9.8 and later**

Beginning with ONTAP 9.8, use the command: `system switch ethernet show -is-monitoring -enabled-operational true`

```
cluster1::*> system switch ethernet show -is-monitoring-enabled
-operational true
Switch                        Type               Address          Model
---------------------------   ----------------   ----------------
---------------
cs1                           cluster-network    10.228.143.200   BES-
53248
           Serial Number: QTWCU22510008
             Is Monitored: true
                   Reason: None
         Software Version: 3.10.0.3
           Version Source: CDP/ISDP

cs2                           cluster-network    10.228.143.202   BES-
53248
           Serial Number: QTWCU22510009
             Is Monitored: true
                   Reason: None
         Software Version: 3.10.0.3
           Version Source: CDP/ISDP
cluster1::*>
```

**ONTAP 9.7 and earlier**

For ONTAP 9.7 and earlier, use the command: `system cluster-switch show -is-monitoring -enabled-operational true`

```
cluster1::*> system cluster-switch show -is-monitoring-enabled
-operational true
Switch                         Type                Address           Model
--------------------------- ------------------ -----------------
---------------
cs1                            cluster-network    10.228.143.200   BES-
53248
            Serial Number: QTWCU22510008
             Is Monitored: true
                   Reason: None
         Software Version: 3.10.0.3
           Version Source: CDP/ISDP

cs2                            cluster-network    10.228.143.202   BES-
53248
            Serial Number: QTWCU22510009
             Is Monitored: true
                   Reason: None
         Software Version: 3.10.0.3
           Version Source: CDP/ISDP
cluster1::*>
```

6. Disable auto-revert on the cluster LIFs.

```
cluster1::*> network interface modify -vserver Cluster -lif * -auto
-revert false
```

**Step 2: Configure ports**

1. On cluster switch cs2, shut down the ports connected to the cluster ports of the nodes.

```
(cs2)(Config)# interface 0/1-0/16
(cs2)(Interface 0/1-0/16)# shutdown
```

2. Verify that the cluster LIFs have migrated to the ports hosted on cluster switch cs1. This might take a few seconds.

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

```
cluster1::*> network interface show -role cluster
          Logical              Status     Network                Current
Current Is
Vserver    Interface          Admin/Oper Address/Mask         Node
Port    Home
----------- ----------------- ---------- ------------------
------------- ------- ----
Cluster
          cluster1-01_clus1 up/up       169.254.3.4/23
cluster1-01   e0a      true
          cluster1-01_clus2 up/up       169.254.3.5/23
cluster1-01   e0a      false
          cluster1-02_clus1 up/up       169.254.3.8/23
cluster1-02   e0a      true
          cluster1-02_clus2 up/up       169.254.3.9/23
cluster1-02   e0a      false
          cluster1-03_clus1 up/up       169.254.1.3/23
cluster1-03   e0a      true
          cluster1-03_clus2 up/up       169.254.1.1/23
cluster1-03   e0a      false
          cluster1-04_clus1 up/up       169.254.1.6/23
cluster1-04   e0a      true
          cluster1-04_clus2 up/up       169.254.1.7/23
cluster1-04   e0a      false
cluster1::*>
```

3. Verify that the cluster is healthy: `cluster show`

**Show example**

```
cluster1::*> cluster show
Node                Health  Eligibility   Epsilon
-------------------- ------- ------------  -------
cluster1-01          true    true          false
cluster1-02          true    true          false
cluster1-03          true    true          true
cluster1-04          true    true          false
```

4. If you have not already done so, save the current switch configuration by copying the output of the following command to a log file: `show running-config`

5. Clean the configuration on switch cs2 and perform a basic setup.

> ⚠️ When updating or applying a new RCF, you must erase the switch settings and perform basic configuration. You must be connected to the switch using the serial console to erase switch settings.

a. SSH into the switch.

Only proceed when all the cluster LIFs have been removed from the ports on the switch and the switch is prepared to have the configuration cleared.

b. Enter privilege mode:

```
(cs2)> enable

(cs2)#
```

c. Copy and paste the following commands to remove the previous RCF configuration (depending on the previous RCF version used, some commands might generate an error if a particular setting is not present):

**Show example**

```
clear config interface 0/1-0/56
y
clear config interface lag 1
y
configure
deleteport 1/1 all
no policy-map CLUSTER
no policy-map WRED_25G
no policy-map WRED_100G
no class-map CLUSTER
no class-map HA
no class-map RDMA
no classofservice dot1p-mapping
no random-detect queue-parms 0
no random-detect queue-parms 1
no random-detect queue-parms 2
no random-detect queue-parms 3
no random-detect queue-parms 4
no random-detect queue-parms 5
no random-detect queue-parms 6
no random-detect queue-parms 7
no cos-queue min-bandwidth
no cos-queue random-detect 0
no cos-queue random-detect 1
no cos-queue random-detect 2
no cos-queue random-detect 3
no cos-queue random-detect 4
no cos-queue random-detect 5
no cos-queue random-detect 6
no cos-queue random-detect 7
exit
vlan database
no vlan 17
no vlan 18
exit
```

d. Save the running configuration to the startup configuration:

**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!
```

e. Perform a reboot of the switch:

**Show example**

```
(cs2)# reload

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

f. Log in to the switch again using SSH to complete the RCF installation.

6. If additional port licenses have been installed on the switch, you must modify the RCF to configure the additional licensed ports. See Activate newly licensed ports for details.

7. Copy the RCF to the bootflash of switch cs2 using one of the following transfer protocols: FTP, TFTP, SFTP, or SCP.

This example shows SFTP being used to copy an RCF to the bootflash on switch cs2:

**Show example**

```
(cs2)# copy sftp://172.19.2.1/tmp/BES-53248_RCF_v1.9-Cluster-HA.txt
nvram:script BES-53248_RCF_v1.9-Cluster-HA.scr
Remote Password:**
Mode........................................... SFTP
Set Server IP.................................. 172.19.2.1
Path........................................... //tmp/
Filename....................................... BES-53248_RCF_v1.9-
Cluster-HA.txt
Data Type...................................... Config Script
Destination Filename........................... BES-53248_RCF_v1.9-
Cluster-HA.scr
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.
```

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

```
script list
```

**Show example**

```
(cs2)# script list

Configuration Script Name                  Size(Bytes)   Date of
Modification
---------------------------------------    -----------
-------------------
BES-53248_RCF_v1.9-Cluster-HA.scr          2241          2020 09 30
05:41:00

1 configuration script(s) found.
```

9. Apply the script to the switch:

```
script apply
```

**Show example**

```
(cs2)# script apply BES-53248_RCF_v1.9-Cluster-HA.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!

Configuration script 'BES-53248_RCF_v1.9-Cluster-HA.scr' applied.
```

10. Examine the banner output from the `show clibanner` command. You must read and follow these instructions to ensure the proper configuration and operation of the switch.

**Show example**

```
(cs2)# show clibanner

Banner Message configured :
=========================
BES-53248 Reference Configuration File v1.9 for Cluster/HA/RDMA

Switch   : BES-53248
Filename : BES-53248-RCF-v1.9-Cluster.txt
Date     : 10-26-2022
Version  : v1.9
Port Usage:
Ports 01 - 16: 10/25GbE Cluster Node Ports, base config
Ports 17 - 48: 10/25GbE Cluster Node Ports, with licenses
Ports 49 - 54: 40/100GbE Cluster Node Ports, with licenses, added
right to left
Ports 55 - 56: 100GbE Cluster ISL Ports, base config
NOTE:
- The 48 SFP28/SFP+ ports are organized into 4-port groups in terms
of port
speed:
Ports 1-4, 5-8, 9-12, 13-16, 17-20, 21-24, 25-28, 29-32, 33-36, 37-
40, 41-44,
45-48
The port speed should be the same (10GbE or 25GbE) across all ports
in a 4-port
group
- If additional licenses are purchased, follow the 'Additional Node
Ports
activated with Licenses' section for instructions
- If SSH is active, it will have to be re-enabled manually after
'erase
startup-config'
command has been executed and the switch rebooted
```

11. On the switch, verify that the additional licensed ports appear after the RCF is applied:

```
show port all | exclude Detach
```

**Show example**

```
(cs2)# show port all | exclude Detach

                    Admin      Physical      Physical    Link   Link
LACP     Actor
Intf        Type   Mode       Mode          Status      Status Trap
Mode     Timeout
--------- ------ --------- ------------ ---------- ------ -------
------ --------
0/1                Enable     Auto                      Down   Enable
Enable long
0/2                Enable     Auto                      Down   Enable
Enable long
0/3                Enable     Auto                      Down   Enable
Enable long
0/4                Enable     Auto                      Down   Enable
Enable long
0/5                Enable     Auto                      Down   Enable
Enable long
0/6                Enable     Auto                      Down   Enable
Enable long
0/7                Enable     Auto                      Down   Enable
Enable long
0/8                Enable     Auto                      Down   Enable
Enable long
0/9                Enable     Auto                      Down   Enable
Enable long
0/10               Enable     Auto                      Down   Enable
Enable long
0/11               Enable     Auto                      Down   Enable
Enable long
0/12               Enable     Auto                      Down   Enable
Enable long
0/13               Enable     Auto                      Down   Enable
Enable long
0/14               Enable     Auto                      Down   Enable
Enable long
0/15               Enable     Auto                      Down   Enable
Enable long
0/16               Enable     Auto                      Down   Enable
Enable long
0/49               Enable     40G Full                  Down   Enable
Enable long
0/50               Enable     40G Full                  Down   Enable
Enable long
```

```
0/51                Enable    100G Full               Down    Enable
Enable long
0/52                Enable    100G Full               Down    Enable
Enable long
0/53                Enable    100G Full               Down    Enable
Enable long
0/54                Enable    100G Full               Down    Enable
Enable long
0/55                Enable    100G Full               Down    Enable
Enable long
0/56                Enable    100G Full               Down    Enable
Enable long
```

12. Verify on the switch that your changes have been made:

    show running-config

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

13. Save the running configuration so that it becomes the startup configuration when you reboot the switch:

    write memory

    **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!
    ```

14. Reboot the switch and verify that the running configuration is correct:

    reload

**Show example**

```
(cs2)# reload

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

System will now restart!
```

15. On cluster switch cs2, bring up the ports connected to the cluster ports of the nodes.

```
(cs2)(Config)# interface 0/1-0/16
(cs2)(Interface 0/1-0/16)# no shutdown
```

16. Verify the ports on switch cs2: `show interfaces status all | exclude Detach`

**Show example**

```
(cs1)# show interfaces status all | exclude Detach

                                 Link    Physical    Physical
Media       Flow
Port        Name                 State   Mode        Status      Type
Control     VLAN
---------   ------------------   ------  ----------  ----------
----------  ----------  ------
.
.
.
0/16        10/25GbE Node Port   Down    Auto
Inactive    Trunk
0/17        10/25GbE Node Port   Down    Auto
Inactive    Trunk
0/18        10/25GbE Node Port   Up      25G Full    25G Full
25GBase-SR  Inactive    Trunk
0/19        10/25GbE Node Port   Up      25G Full    25G Full
25GBase-SR  Inactive    Trunk
.
.
.
0/50        40/100GbE Node Port  Down    Auto
Inactive    Trunk
0/51        40/100GbE Node Port  Down    Auto
Inactive    Trunk
0/52        40/100GbE Node Port  Down    Auto
Inactive    Trunk
0/53        40/100GbE Node Port  Down    Auto
Inactive    Trunk
0/54        40/100GbE Node Port  Down    Auto
Inactive    Trunk
0/55        Cluster   ISL Port   Up      Auto        100G Full
Copper      Inactive    Trunk
0/56        Cluster   ISL Port   Up      Auto        100G Full
Copper      Inactive    Trunk
```

17. Verify the health of cluster ports on the cluster.

   a. Verify that e0b ports are up and healthy across all nodes in the cluster: `network port show -role cluster`

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


Node: cluster1-01

 Ignore
                                                  Speed(Mbps)
Health  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


Node: cluster1-02


 Ignore
                                                  Speed(Mbps)
Health  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


Node: cluster1-03

 Ignore
                                                  Speed(Mbps)
Health  Health
Port      IPspace      Broadcast Domain Link MTU  Admin/Oper
Status  Status
--------- ------------ --------------- ---- ---- -----------
-------- -----
e0a       Cluster      Cluster          up   9000  auto/100000
healthy false
e0b       Cluster      Cluster          up   9000  auto/100000
healthy false
```

```
Node: cluster1-04

Ignore
                                            Speed(Mbps)
Health  Health
Port      IPspace       Broadcast Domain Link MTU  Admin/Oper
Status  Status
--------- ------------ ---------------- ---- ---- -----------
-------- -----
e0a       Cluster       Cluster          up   9000  auto/100000
healthy false
e0b       Cluster       Cluster          up   9000  auto/100000
healthy false
```

b. Verify the switch health from the cluster.

**Show example**

```
cluster1::*> network device-discovery show -protocol cdp
Node/       Local  Discovered
Protocol    Port   Device (LLDP: ChassisID)  Interface
Platform
----------- ------ ------------------------ -----------------
--------
cluster1-01/cdp
            e0a    cs1                       0/2
BES-53248
            e0b    cs2                       0/2
BES-53248
cluster01-2/cdp
            e0a    cs1                       0/1
BES-53248
            e0b    cs2                       0/1
BES-53248
cluster01-3/cdp
            e0a    cs1                       0/4
BES-53248
            e0b    cs2                       0/4
BES-53248
cluster1-04/cdp
            e0a    cs1                       0/3
BES-53248
            e0b    cs2                       0/2
BES-53248
```

**ONTAP 9.8 and later**

Beginning with ONTAP 9.8, use the command: `system switch ethernet show -is-monitoring -enabled-operational true`

```
cluster1::*> system switch ethernet show -is-monitoring-enabled
-operational true
Switch                       Type              Address           Model
---------------------------- ----------------- -----------------
---------------
cs1                                cluster-network   10.228.143.200   BES-
53248
          Serial Number: QTWCU22510008
            Is Monitored: true
                  Reason: None
        Software Version: 3.10.0.3
          Version Source: CDP/ISDP

cs2                                cluster-network   10.228.143.202   BES-
53248
          Serial Number: QTWCU22510009
            Is Monitored: true
                  Reason: None
        Software Version: 3.10.0.3
          Version Source: CDP/ISDP
cluster1::*>
```

**ONTAP 9.7 and earlier**

For ONTAP 9.7 and earlier, use the command: `system cluster-switch show -is-monitoring -enabled-operational true`

```
cluster1::*> system cluster-switch show -is-monitoring-enabled
-operational true
Switch                          Type              Address          Model
--------------------------- ------------------ -----------------
---------------
cs1                             cluster-network   10.228.143.200   BES-
53248
            Serial Number: QTWCU22510008
              Is Monitored: true
                    Reason: None
          Software Version: 3.10.0.3
            Version Source: CDP/ISDP

cs2                             cluster-network   10.228.143.202   BES-
53248
            Serial Number: QTWCU22510009
              Is Monitored: true
                    Reason: None
          Software Version: 3.10.0.3
            Version Source: CDP/ISDP
cluster1::*>
```

18. On cluster switch cs1, shut down the ports connected to the cluster ports of the nodes.

    The following example uses the interface example output:

```
(cs1)# configure
(cs1)(Config)# interface 0/1-0/16
(cs1)(Interface 0/1-0/16)# shutdown
```

19. Verify that the cluster LIFs have migrated to the ports hosted on switch cs2. This might take a few seconds.
    `network interface show -role cluster`

**Show example**

```
cluster1::*> network interface show -role cluster
           Logical                Status      Network                   Current
Current  Is
Vserver    Interface            Admin/Oper Address/Mask          Node
Port     Home
---------- ------------------ ---------- ------------------
------------------ -------- ----
Cluster
           cluster1-01_clus1  up/up        169.254.3.4/23
cluster1-01        e0a       false
           cluster1-01_clus2  up/up        169.254.3.5/23
cluster1-01        e0b       true
           cluster1-02_clus1  up/up        169.254.3.8/23
cluster1-02        e0a       false
           cluster1-02_clus2  up/up        169.254.3.9/23
cluster1-02        e0b       true
           cluster1-03_clus1  up/up        169.254.1.3/23
cluster1-03        e0a       false
           cluster1-03_clus2  up/up        169.254.1.1/23
cluster1-03        e0b       true
           cluster1-04_clus1  up/up        169.254.1.6/23
cluster1-04        e0a       false
           cluster1-04_clus2  up/up        169.254.1.7/23
cluster1-04        e0b       true
cluster1::*>
```

20. Verify that the cluster is healthy: `cluster show`

**Show example**

```
cluster1::*> cluster show
Node                  Health   Eligibility   Epsilon
-------------------- -------- ------------- -------
cluster1-01           true     true          false
cluster1-02           true     true          false
cluster1-03           true     true          true
cluster1-04           true     true          false
```

21. Repeat steps 4 to 14 on switch cs1.

22. Enable auto-revert on the cluster LIFs: `cluster1::*> network interface modify -vserver`

```
Cluster -lif * -auto-revert true
```

23. Reboot switch cs1. You do this to trigger the cluster LIFs to revert to their home ports. You can ignore the "cluster ports down" events reported on the nodes while the switch reboots.

**Show example**

```
(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!
```

**Step 3: Verify the configuration**

1. On switch cs1, verify that the switch ports connected to the cluster ports are **up**.

**Show example**

```
(cs1)# show interfaces status all | exclude Detach

                                   Link     Physical    Physical
Media        Flow
Port         Name                  State    Mode        Status        Type
Control      VLAN
---------    ------------------    ------   ----------  ----------
----------   ----------  ------
.
.
.
0/16         10/25GbE Node Port    Down     Auto
Inactive     Trunk
0/17         10/25GbE Node Port    Down     Auto
Inactive     Trunk
0/18         10/25GbE Node Port    Up       25G Full    25G Full
25GBase-SR   Inactive     Trunk
0/19         10/25GbE Node Port    Up       25G Full    25G Full
25GBase-SR   Inactive     Trunk
.
.
.
0/50         40/100GbE Node Port   Down     Auto
Inactive     Trunk
0/51         40/100GbE Node Port   Down     Auto
Inactive     Trunk
0/52         40/100GbE Node Port   Down     Auto
Inactive     Trunk
0/53         40/100GbE Node Port   Down     Auto
Inactive     Trunk
0/54         40/100GbE Node Port   Down     Auto
Inactive     Trunk
0/55         Cluster   ISL Port    Up       Auto        100G Full
Copper       Inactive     Trunk
0/56         Cluster   ISL Port    Up       Auto        100G Full
Copper       Inactive     Trunk
```

2. Verify that the ISL between switches cs1 and cs2 is functional: `show port-channel 1/1`

**Show example**

```
(cs1)# show port-channel 1/1
Local Interface................................ 1/1
Channel Name................................... Cluster-ISL
Link State..................................... Up
Admin Mode..................................... Enabled
Type........................................... Dynamic
Port-channel Min-links......................... 1
Load Balance Option............................ 7
(Enhanced hashing mode)
Mbr     Device/         Port      Port
Ports   Timeout         Speed     Active
-------  -------------   ---------  -------
0/55     actor/long      Auto      True
         partner/long
0/56     actor/long      Auto      True
         partner/long
```

3. Verify that the cluster LIFs have reverted to their home port: `network interface show -role cluster`

**Show example**

```
cluster1::*> network interface show -role cluster
           Logical              Status     Network                Current
Current Is
Vserver    Interface            Admin/Oper Address/Mask           Node
Port    Home
---------- ------------------ ---------- ------------------
------------------ ------- ----
Cluster
           cluster1-01_clus1  up/up      169.254.3.4/23
cluster1-01         e0a      true
           cluster1-01_clus2  up/up      169.254.3.5/23
cluster1-01         e0b      true
           cluster1-02_clus1  up/up      169.254.3.8/23
cluster1-02         e0a      true
           cluster1-02_clus2  up/up      169.254.3.9/23
cluster1-02         e0b      true
           cluster1-03_clus1  up/up      169.254.1.3/23
cluster1-03         e0a      true
           cluster1-03_clus2  up/up      169.254.1.1/23
cluster1-03         e0b      true
           cluster1-04_clus1  up/up      169.254.1.6/23
cluster1-04         e0a      true
           cluster1-04_clus2  up/up      169.254.1.7/23
cluster1-04         e0b      true
```

4. Verify that the cluster is healthy: `cluster show`

**Show example**

```
cluster1::*> cluster show
Node                    Health  Eligibility   Epsilon
-------------------- ------- ------------- -------
cluster1-01             true    true          false
cluster1-02             true    true          false
cluster1-03             true    true          true
cluster1-04             true    true          false
```

5. Ping the remote cluster interfaces to verify connectivity: `cluster ping-cluster -node local`

**Show example**

```
cluster1::*> cluster ping-cluster -node local
Host is cluster1-03
Getting addresses from network interface table...
Cluster cluster1-03_clus1 169.254.1.3 cluster1-03 e0a
Cluster cluster1-03_clus2 169.254.1.1 cluster1-03 e0b
Cluster cluster1-04_clus1 169.254.1.6 cluster1-04 e0a
Cluster cluster1-04_clus2 169.254.1.7 cluster1-04 e0b
Cluster cluster1-01_clus1 169.254.3.4 cluster1-01 e0a
Cluster cluster1-01_clus2 169.254.3.5 cluster1-01 e0b
Cluster cluster1-02_clus1 169.254.3.8 cluster1-02 e0a
Cluster cluster1-02_clus2 169.254.3.9 cluster1-02 e0b
Local = 169.254.1.3 169.254.1.1
Remote = 169.254.1.6 169.254.1.7 169.254.3.4 169.254.3.5 169.254.3.8
169.254.3.9
Cluster Vserver Id = 4294967293
Ping status:
............
Basic connectivity succeeds on 12 path(s)
Basic connectivity fails on 0 path(s)
................................................
Detected 9000 byte MTU on 12 path(s):
    Local 169.254.1.3 to Remote 169.254.1.6
    Local 169.254.1.3 to Remote 169.254.1.7
    Local 169.254.1.3 to Remote 169.254.3.4
    Local 169.254.1.3 to Remote 169.254.3.5
    Local 169.254.1.3 to Remote 169.254.3.8
    Local 169.254.1.3 to Remote 169.254.3.9
    Local 169.254.1.1 to Remote 169.254.1.6
    Local 169.254.1.1 to Remote 169.254.1.7
    Local 169.254.1.1 to Remote 169.254.3.4
    Local 169.254.1.1 to Remote 169.254.3.5
    Local 169.254.1.1 to Remote 169.254.3.8
    Local 169.254.1.1 to Remote 169.254.3.9
Larger than PMTU communication succeeds on 12 path(s)
RPC status:
6 paths up, 0 paths down (tcp check)
6 paths up, 0 paths down (udp check)
```

6. Change the privilege level back to admin:

```
set -privilege admin
```

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

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

**What's next?**

Install the CSHM configuration file.

## Enable SSH on BES-53248 cluster switches

If you are using the Cluster Switch Health Monitor (CSHM) and log collection features, you must generate the SSH keys and then enable SSH on the cluster switches.

**Steps**

1. Verify that SSH is disabled:

   ```
   show ip ssh
   ```

   **Show example**

   ```
   (switch)# show ip ssh

   SSH Configuration

   Administrative Mode: ......................... Disabled
   SSH Port: .................................... 22
   Protocol Level: .............................. Version 2
   SSH Sessions Currently Active: ............... 0
   Max SSH Sessions Allowed: .................... 5
   SSH Timeout (mins): .......................... 5
   Keys Present: ................................ DSA(1024) RSA(1024)
   ECDSA(521)
   Key Generation In Progress: .................. None
   SSH Public Key Authentication Mode: .......... Disabled
   SCP server Administrative Mode: .............. Disabled
   ```

2. Generate the SSH keys:

   ```
   crypto key generate
   ```

**Show example**

```
(switch)# config

(switch) (Config)# crypto key generate rsa

Do you want to overwrite the existing RSA keys? (y/n): y


(switch) (Config)# crypto key generate dsa

Do you want to overwrite the existing DSA keys? (y/n): y


(switch) (Config)# crypto key generate ecdsa 521

Do you want to overwrite the existing ECDSA keys? (y/n): y

(switch) (Config)# aaa authorization commands "noCmdAuthList" none
(switch) (Config)# exit
(switch)# ip ssh server enable
(switch)# ip scp server enable
(switch)# ip ssh pubkey-auth
(switch)# write mem

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!
```

> ⚠ Make sure that SSH is disabled before modifying the keys otherwise a warning is reported on the switch.

3. Reboot the switch:

```
reload
```

4. Verify that SSH is enabled:

```
show ip ssh
```

```
(switch)# show ip ssh

SSH Configuration

Administrative Mode: ........................... Enabled
SSH Port: ..................................... 22
Protocol Level: ............................... Version 2
SSH Sessions Currently Active: ................ 0
Max SSH Sessions Allowed: ..................... 5
SSH Timeout (mins): ........................... 5
Keys Present: ................................. DSA(1024) RSA(1024)
ECDSA(521)
Key Generation In Progress: ................... None
SSH Public Key Authentication Mode: ........... Enabled
SCP server Administrative Mode: ............... Enabled
```

**What's next?**

Enable log collection.

## Ethernet Switch Health Monitoring log collection

The Ethernet switch health monitor (CSHM) is responsible for ensuring the operational health of Cluster and Storage network switches and collecting switch logs for debugging purposes. This procedure guides you through the process of setting up and starting the collection of detailed **Support** logs from the switch and starts an hourly collection of **Periodic** data that is collected by AutoSupport.

**Before you begin**

- To enable the log collection feature, you must be running ONTAP version 9.12.1 or later and EFOS 3.8.0.2 or later.

- Switch health monitoring must be enabled for the switch. Verify this by ensuring the `Is Monitored:` field is set to **true** in the output of the `system switch ethernet show` command.

**Steps**

1. To set up log collection, run the following command for each switch. You are prompted to enter the switch name, username, and password for log collection.

```
system switch ethernet log setup-password
```

```
cluster1::*> system switch ethernet log setup-password
Enter the switch name: <return>
The switch name entered is not recognized.
Choose from the following list:
cs1
cs2

cluster1::*> system switch ethernet log setup-password

Enter the switch name: cs1
Would you like to specify a user other than admin for log
collection? {y|n}: n

Enter the password: <enter switch password>
Enter the password again: <enter switch password>

cluster1::*> system switch ethernet log setup-password

Enter the switch name: cs2
Would you like to specify a user other than admin for log
collection? {y|n}: n

Enter the password: <enter switch password>
Enter the password again: <enter switch password>
```

2. To start log collection, run the following command, replacing DEVICE with the switch used in the previous command. This starts both types of log collection: the detailed **Support** logs and an hourly collection of **Periodic** data.

```
system switch ethernet log modify -device <switch-name> -log-request true
```

**Show example**

```
cluster1::*> system switch ethernet log modify -device cs1 -log
-request true

Do you want to modify the cluster switch log collection
configuration? {y|n}: [n] y

Enabling cluster switch log collection.

cluster1::*> system switch ethernet log modify -device cs2 -log
-request true

Do you want to modify the cluster switch log collection
configuration? {y|n}: [n] y

Enabling cluster switch log collection.
```

Wait for 10 minutes and then check that the log collection completes:

```
system switch ethernet log show
```

> ⚠️ If any of these commands return an error or if the log collection does not complete, contact NetApp support.

**Troubleshooting**

If you encounter any of the following error statuses reported by the log collection feature (visible in the output of `system switch ethernet log show`), try the corresponding debug steps:

| Log collection error status | Resolution |
|---|---|
| **RSA keys not present** | Regenerate ONTAP SSH keys. Contact NetApp support. |
| **switch password error** | Verify credentials, test SSH connectivity, and regenerate ONTAP SSH keys. Review switch documentation or contact NetApp support for instructions. |
| **ECDSA keys not present for FIPS** | If FIPS mode is enabled, ECDSA keys need to be generated on the switch before retrying. |
| **pre-existing log found** | Remove the previous log collection file on the switch. |

| switch dump log error | Ensure the switch user has log collection permissions. Refer to the prerequisites above. |
| --- | --- |
| | |

## Configure SNMPv3

Follow this procedure to configure SNMPv3, which supports Ethernet switch health monitoring (CSHM).

**About this task**

The following commands configure an SNMPv3 username on Broadcom BES-53248 switches:

* For **no authentication**: `snmp-server user SNMPv3UserNoAuth NETWORK-OPERATOR noauth`

* For **MD5/SHA authentication**: `snmp-server user SNMPv3UserAuth NETWORK-OPERATOR [auth-md5|auth-sha]`

* For **MD5/SHA authentication with AES/DES encryption**: `snmp-server user SNMPv3UserAuthEncrypt NETWORK-OPERATOR [auth-md5|auth-sha] [priv-aes128|priv-des]`

The following command configures an SNMPv3 username on the ONTAP side: `cluster1::*> security login create -user-or-group-name SNMPv3_USER -application snmp -authentication -method usm -remote-switch-ipaddress ADDRESS`

The following command establishes the SNMPv3 username with CSHM: `cluster1::*> system switch ethernet modify -device DEVICE -snmp-version SNMPv3 -community-or-username SNMPv3_USER`

**Steps**

1. Set up the SNMPv3 user on the switch to use authentication and encryption:

   ```
   show snmp status
   ```

   **Show example**

   ```
   (sw1)(Config)# snmp-server user <username> network-admin auth-md5
   <password> priv-aes128 <password>

   (cs1)(Config)# show snmp user snmp

       Name                Group Name       Auth Priv
                                            Meth Meth     Remote Engine ID
   ---------------- ------------------ ---- ------
   -------------------------
   <username>           network-admin      MD5  AES128
   8000113d03d8c497710bee
   ```

2. Set up the SNMPv3 user on the ONTAP side:

```
security login create -user-or-group-name <username> -application snmp
-authentication-method usm -remote-switch-ipaddress 10.231.80.212
```

**Show example**

```
cluster1::*> security login create -user-or-group-name <username>
-application snmp -authentication-method usm -remote-switch
-ipaddress 10.231.80.212

Enter the authoritative entity's EngineID [remote EngineID]:

Which authentication protocol do you want to choose (none, md5, sha,
sha2-256)
[none]: md5

Enter the authentication protocol password (minimum 8 characters
long):

Enter the authentication protocol password again:

Which privacy protocol do you want to choose (none, des, aes128)
[none]: aes128

Enter privacy protocol password (minimum 8 characters long):
Enter privacy protocol password again:
```

3. Configure CSHM to monitor with the new SNMPv3 user:

```
system switch ethernet show-all -device "sw1" -instance
```

**Show example**

```
cluster1::*> system switch ethernet show-all -device "sw1
(b8:59:9f:09:7c:22)" -instance

                                   Device Name: sw1
                                    IP Address: 10.228.136.24
                                  SNMP Version: SNMPv2c
                                 Is Discovered: true
DEPRECATED-Community String or SNMPv3 Username: -
           Community String or SNMPv3 Username: cshm1!
                                  Model Number: BES-53248
                                Switch Network: cluster-network
                              Software Version: 3.9.0.2
                     Reason For Not Monitoring: None  <---- should
display this if SNMP settings are valid
                        Source Of Switch Version: CDP/ISDP
                                 Is Monitored ?: true
                  Serial Number of the Device: QTFCU3826001C
                                   RCF Version: v1.8X2 for
Cluster/HA/RDMA

cluster1::*>
cluster1::*> system switch ethernet modify -device "sw1" -snmp
-version SNMPv3 -community-or-username <username>
```

4. Verify that the serial number to be queried with the newly created SNMPv3 user is the same as detailed in the previous step after the CSHM polling period has completed.

```
system switch ethernet polling-interval show
```

**Show example**

```
cluster1::*> system switch ethernet polling-interval show
          Polling Interval (in minutes): 5

cluster1::*> system switch ethernet show-all -device "sw1" -instance
                                      Device Name: sw1
                                        IP Address: 10.228.136.24
                                      SNMP Version: SNMPv3
                                     Is Discovered: true
DEPRECATED-Community String or SNMPv3 Username: -
          Community String or SNMPv3 Username: <username>
                                      Model Number: BES-53248
                                    Switch Network: cluster-network
                                  Software Version: 3.9.0.2
                          Reason For Not Monitoring: None  <---- should
display this if SNMP settings are valid
                          Source Of Switch Version: CDP/ISDP
                                    Is Monitored ?: true
                      Serial Number of the Device: QTFCU3826001C
                                        RCF Version: v1.8X2 for
Cluster/HA/RDMA
```

# Upgrade switches

## Overview of upgrade process for BES-53248 switches

Before configuring BES-53248 cluster switches for an upgrade, review the configuration overview.

To upgrade a BES-53248 cluster switch, follow these steps:

1. Prepare the BES-53248 cluster switch for upgrade. Prepare the controller, and then install the EFOS software, licenses, and reference configuration file (RCF). Last, verify the configuration.

2. Install the EFOS software. Download and install the Ethernet Fabric OS (EFOS) software on the BES-53248 cluster switch.

3. Install licenses for BES-53248 cluster switches. Optionally, add new ports by purchasing and installing more licenses. The switch base model is licensed for 16 10GbE or 25GbE ports and two 100GbE ports.

4. Install the Reference Configuration File (RCF). Install or upgrade the RCF on the BES-53248 cluster switch, and then verify the ports for an additional license after the RCF is applied.

5. Install the Cluster Switch Health Monitor (CSHM) configuration file. Install the applicable configuration file for cluster switch health monitoring.

6. Enable SSH on BES-53248 cluster switches. If you use the Cluster Switch Health Monitor (CSHM) and log collection features, enable SSH on the switches.

7. Enable the log collection feature. Use this feature to collect switch-related log files in ONTAP.

8. Verify the configuration. Use the recommended commands to verify operations after a BES-53248 cluster switch upgrade.

## Upgrade the BES-53248 cluster switch

Follow these steps to upgrade the BES-53248 cluster switch.

This procedure applies to a functioning cluster and allows for a nondisruptive upgrade (NDU) and nondisruptive operation (NDO) environment. See the Knowledge Base article How to prepare ONTAP for a cluster switch upgrade.

### Review requirements

Before you install the EFOS software, licenses, and the RCF file on an existing NetApp BES-53248 cluster switch, make sure that:

- The cluster is a fully functioning cluster (no error log messages or other issues).
- The cluster does not contain any defective cluster network interface cards (NICs).
- All connected ports on both cluster switches are functional.
- All cluster ports are up.
- All cluster LIFs are administratively and operationally up and on their home ports.
- The first two cluster LIFs on each node are configured on separate NICs and connected to separate cluster switch ports.
- The ONTAP `cluster ping-cluster -node node1` advanced privilege command indicates that `larger than PMTU communication` is successful on all paths.

> ⓘ There might be command dependencies between command syntax in the RCF and EFOS versions.

> ⓘ For switch compatibility, consult the compatibility table on the Broadcom cluster switches page for the supported EFOS, RCF, and ONTAP versions.

### Prepare the controller

Follow this procedure to prepare the controller for a BES-53248 cluster switch upgrade.

**Steps**

1. Connect the cluster switch to the management network.

2. Use the ping command to verify connectivity to the server hosting EFOS, licenses, and the RCF.

   If this is an issue, use a nonrouted network and configure the service port using IP address 192.168.x or 172.19.x. You can reconfigure the service port to the production management IP address later.

**Show example**

This example verifies that the switch is connected to the server at IP address 172.19.2.1:

```
(cs2)# ping 172.19.2.1
Pinging 172.19.2.1 with 0 bytes of data:

Reply From 172.19.2.1: icmp_seq = 0. time= 5910 usec.
```

3. Verify that the cluster ports are healthy and have a link using the command:

```
network port show -ipspace Cluster
```

**Show example**

The following example shows the type of output with all ports having a `Link` value of up and a `Health Status` of healthy:

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

Node: node1

Ignore
                                            Speed(Mbps) Health
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

Node: node2

Ignore
                                            Speed(Mbps) Health
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
```

4. Verify that the cluster LIFs are administratively and operationally up and reside on their home ports, using the command:

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

**Show example**

In this example, the `-vserver` parameter displays information about the LIFs that are associated with cluster ports. `Status Admin/Oper` must be up and `Is Home` must be true:

```
cluster1::> network interface show -vserver Cluster

          Logical      Status      Network                 Current
Current Is
Vserver    Interface    Admin/Oper Address/Mask            Node
Port    Home
--------- ----------    ---------- -----------------   ------------
------- ----
Cluster
          node1_clus1
                        up/up       169.254.217.125/16  node1
e0a      true
          node1_clus2
                        up/up       169.254.205.88/16   node1
e0b      true
          node2_clus1
                        up/up       169.254.252.125/16  node2
e0a      true
          node2_clus2
                        up/up       169.254.110.131/16  node2
e0b      true
```

**Install software**

Follow these instructions to install the software.

1. Install the EFOS software. Download and install the Ethernet Fabric OS (EFOS) software on the BES-53248 cluster switch.
2. Install licenses for BES-53248 cluster switches. Optionally, add new ports by purchasing and installing more licenses. The switch base model is licensed for 16 10GbE or 25GbE ports and two 100GbE ports.
3. Install the Reference Configuration File (RCF). Install or upgrade the RCF on the BES-53248 cluster switch, and then verify the ports for an additional license after the RCF is applied.
4. Install the Cluster Switch Health Monitor (CSHM) configuration file. Install the applicable configuration file for cluster switch health monitoring.
5. Enable SSH on BES-53248 cluster switches. If you use the Cluster Switch Health Monitor (CSHM) and log collection features, enable SSH on the switches.
6. Enable the log collection feature. Use this feature to collect switch-related log files in ONTAP.

## Verify the configuration after a BES-53248 cluster switch upgrade

You can use recommended commands to verify operations after a BES-53248 cluster switch upgrade.

**Steps**

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

   `network port show -ipspace Cluster`

   Link must have the value `up` and `Health Status` must be `healthy`.

   **Show example**

   The following example shows the output from the command:

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

   Node: node1

   Ignore
                                                     Speed(Mbps) Health
   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

   Node: node2

   Ignore
                                                     Speed(Mbps) Health
   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
   ```

2. For each LIF, verify that `Is Home` is `true` and `Status Admin/Oper` is `up` on both nodes, using the command:

`network interface show -vserver Cluster`

**Show example**

```
cluster1::> network interface show -vserver Cluster

           Logical    Status     Network               Current
Current Is
Vserver    Interface  Admin/Oper Address/Mask          Node
Port    Home
---------- ---------- ---------- ----------------- -------------
------- ----
Cluster
           node1_clus1  up/up     169.254.217.125/16 node1
e0a     true
           node1_clus2  up/up     169.254.205.88/16  node1
e0b     true
           node2_clus1  up/up     169.254.252.125/16 node2
e0a     true
           node2_clus2  up/up     169.254.110.131/16 node2
e0b     true
```

3. Verify that the `Health Status` of each node is `true` using the command:

`cluster show`

**Show example**

```
cluster1::> cluster show

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

# Migrate switches

**Migrate CN1610 cluster switches to BES-53248 cluster switches**

To migrate the CN1610 cluster switches in a cluster to Broadcom-supported BES-53248

cluster switches, review the migration requirements and then follow the migration procedure.

The following cluster switches are supported:

- CN1610
- BES-53248

## Review requirements

Verify that your configuration meets the following requirements:

- Some of the ports on BES-53248 switches are configured to run at 10GbE.
- The 10GbE connectivity from nodes to BES-53248 cluster switches have been planned, migrated, and documented.
- The cluster is fully functioning (there should be no errors in the logs or similar issues).
- Initial customization of the BES-53248 switches is complete, so that:
    - BES-53248 switches are running the latest recommended version of EFOS software.
    - Reference Configuration Files (RCFs) have been applied to the switches.
    - Any site customization, such as DNS, NTP, SMTP, SNMP, and SSH, are configured on the new switches.

## Node connections

The cluster switches support the following node connections:

- NetApp CN1610: ports 0/1 through 0/12 (10GbE)
- BES-53248: ports 0/1-0/16 (10GbE/25GbE)

> (i) Additional ports can be activated by purchasing port licenses.

## ISL ports

The cluster switches use the following inter-switch link (ISL) ports:

- NetApp CN1610: ports 0/13 through 0/16 (10GbE)
- BES-53248: ports 0/55-0/56 (100GbE)

The *NetApp Hardware Universe* contains information about ONTAP compatibility, supported EFOS firmware, and cabling to BES-53248 cluster switches.

## ISL cabling

The appropriate ISL cabling is as follows:

- **Beginning:** For CN1610 to CN1610 (SFP+ to SFP+), four SFP+ optical fiber or copper direct-attach cables.
- **Final:** For BES-53248 to BES-53248 (QSFP28 to QSFP28), two QSFP28 optical transceivers/fiber or copper direct-attach cables.

## Migrate the switches

Follow this procedure to migrate CN1610 cluster switches to BES-53248 cluster switches.

### About the examples

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

- The examples use two nodes, each deploying two 10 GbE cluster interconnect ports: `e0a` and `e0b`.
- The command outputs might vary depending on different releases of ONTAP software.
- The CN1610 switches to be replaced are `CL1` and `CL2`.
- The BES-53248 switches to replace the CN1610 switches are `cs1` and `cs2`.
- The nodes are `node1` and `node2`.
- The switch CL2 is replaced by cs2 first, followed with CL1 by cs1.
- The BES-53248 switches are pre-loaded with the supported versions of Reference Configuration File (RCF) and Ethernet Fabric OS (EFOS) with ISL cables connected on ports 55 and 56.
- The cluster LIF names are `node1_clus1` and `node1_clus2` for node1, and `node2_clus1` and `node2_clus2` for node2.

### About this task

This procedure covers the following scenario:

- The cluster starts with two nodes connected to two CN1610 cluster switches.
- CN1610 switch CL2 is replaced by BES-53248 switch cs2:
  - Shut down the ports to the cluster nodes. All ports must be shut down simultaneously to avoid cluster instability.
  - Disconnect the cables from all cluster ports on all nodes connected to CL2, and then use supported cables to reconnect the ports to the new cluster switch cs2.
- CN1610 switch CL1 is replaced by BES-53248 switch cs1:
  - Shut down the ports to the cluster nodes. All ports must be shut down simultaneously to avoid cluster instability.
  - Disconnect the cables from all cluster ports on all nodes connected to CL1, and then use supported cables to reconnect the ports to the new cluster switch cs1.

> (i) No operational inter-switch link (ISL) is needed during this procedure. This is by design because RCF version changes can affect ISL connectivity temporarily. To ensure non-disruptive cluster operations, the following procedure migrates all of the cluster LIFs to the operational partner switch while performing the steps on the target switch.

### Step 1: Prepare for migration

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
   ```

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

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

The following command suppresses automatic case creation for two hours:

```
cluster1::*> system node autosupport invoke -node * -type all -message
MAINT=2h
```

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

```
set -privilege advanced
```

The advanced prompt (*>) appears.

**Step 2: Configure ports and cabling**

1. On the new switches, confirm that the ISL is cabled and healthy between switches cs1 and cs2:

```
show port-channel
```

**Show example**

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

```
(cs1)# show port-channel 1/1
Local Interface................................. 1/1
Channel Name.................................... Cluster-ISL
Link State...................................... Up
Admin Mode...................................... Enabled
Type............................................ Dynamic
Port channel Min-links.......................... 1
Load Balance Option............................. 7
(Enhanced hashing mode)

Mbr     Device/         Port        Port
Ports   Timeout         Speed       Active
------  -------------   ---------   -------
0/55    actor/long      100G Full   True
        partner/long
0/56    actor/long      100G Full   True
        partner/long
(cs1) #
```

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

```
(cs2)# show port-channel 1/1
Local Interface................................. 1/1
Channel Name.................................... Cluster-ISL
Link State...................................... Up
Admin Mode...................................... Enabled
Type............................................ Dynamic
Port channel Min-links.......................... 1
Load Balance Option............................. 7
(Enhanced hashing mode)

Mbr     Device/         Port        Port
Ports   Timeout         Speed       Active
------  -------------   ---------   -------
0/55    actor/long      100G Full   True
        partner/long
0/56    actor/long      100G Full   True
        partner/long
```

2. Display the cluster ports on each node that is connected to the existing cluster switches:

```
network device-discovery show -protocol cdp
```

**Show example**

The following example displays how many cluster interconnect interfaces have been configured in each node for each cluster interconnect switch:

```
cluster1::*> network device-discovery show -protocol cdp
Node/          Local   Discovered
Protocol       Port    Device (LLDP: ChassisID)   Interface
Platform
-----------    ------  ------------------------   ----------------
----------------
node2          /cdp
               e0a     CL1                             0/2
CN1610
               e0b     CL2                             0/2
CN1610
node1          /cdp
               e0a     CL1                             0/1
CN1610
               e0b     CL2                             0/1
CN1610
```

3. Determine the administrative or operational status for each cluster interface.

   a. Verify that all the cluster ports are `up` with a `healthy` status:

      ```
      network port show -ipspace Cluster
      ```

**Show example**

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

Node: node1

Ignore
                                                          Speed(Mbps)
Health      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

Node: node2

Ignore
                                                          Speed(Mbps)
Health      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
```

b.  Verify that all the cluster interfaces (LIFs) are on their home ports:

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

**Show example**

```
cluster1::*> network interface show -vserver Cluster

          Logical    Status     Network                 Current
Current Is
Vserver      Interface  Admin/Oper Address/Mask          Node
Port    Home
----------- ---------- ---------- ------------------
------------- ------- ----
Cluster
          node1_clus1  up/up    169.254.209.69/16  node1
e0a      true
          node1_clus2  up/up    169.254.49.125/16  node1
e0b      true
          node2_clus1  up/up    169.254.47.194/16  node2
e0a      true
          node2_clus2  up/up    169.254.19.183/16  node2
e0b      true
```

4. Verify that the cluster displays information for both cluster switches:

**ONTAP 9.8 and later**

Beginning with ONTAP 9.8, use the command: `system switch ethernet show -is-monitoring -enabled-operational true`

```
cluster1::*> system switch ethernet show -is-monitoring-enabled
-operational true
Switch                          Type             Address        Model
------------------------------  ---------------- -------------- --------
CL1                             cluster-network  10.10.1.101    CN1610
     Serial Number: 01234567
       Is Monitored: true
             Reason:
   Software Version: 1.3.0.3
     Version Source: ISDP

CL2                             cluster-network  10.10.1.102    CN1610
     Serial Number: 01234568
       Is Monitored: true
             Reason:
   Software Version: 1.3.0.3
     Version Source: ISDP
cluster1::*>
```

**ONTAP 9.7 and earlier**

For ONTAP 9.7 and earlier, use the command: `system cluster-switch show -is-monitoring -enabled-operational true`

```
cluster1::*> system cluster-switch show -is-monitoring-enabled
-operational true
Switch                             Type             Address         Model
---------------------------        ---------------  -------------   --------
CL1                                cluster-network  10.10.1.101     CN1610
        Serial Number: 01234567
          Is Monitored: true
                Reason:
     Software Version: 1.3.0.3
       Version Source: ISDP

CL2                                cluster-network  10.10.1.102     CN1610
        Serial Number: 01234568
          Is Monitored: true
                Reason:
     Software Version: 1.3.0.3
       Version Source: ISDP
cluster1::*>
```

5. Disable auto-revert on the cluster LIFs.

```
cluster1::*> network interface modify -vserver Cluster -lif * -auto
-revert false
```

6. On cluster switch CL2, shut down the ports connected to the cluster ports of the nodes in order to fail over the cluster LIFs:

```
(CL2)# configure
(CL2)(Config)# interface 0/1-0/16
(CL2)(Interface 0/1-0/16)# shutdown
(CL2)(Interface 0/1-0/16)# exit
(CL2)(Config)# exit
(CL2)#
```

7. Verify that the cluster LIFs have failed over to the ports hosted on cluster switch CL1. This might take a few seconds.

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

**Show example**

```
cluster1::*> network interface show -vserver Cluster
            Logical      Status     Network              Current
Current Is
Vserver     Interface    Admin/Oper Address/Mask         Node
Port    Home
----------- ------------ ---------- ------------------ -------------
------- ----
Cluster
            node1_clus1  up/up      169.254.209.69/16  node1
e0a     true
            node1_clus2  up/up      169.254.49.125/16  node1
e0a     false
            node2_clus1  up/up      169.254.47.194/16  node2
e0a     true
            node2_clus2  up/up      169.254.19.183/16  node2
e0a     false
```

8. Verify that the cluster is healthy:

```
cluster show
```

**Show example**

```
cluster1::*> cluster show
Node         Health  Eligibility   Epsilon
----------   ------- ------------- -------
node1        true    true          false
node2        true    true          false
```

9. Move all cluster node connection cables from the old CL2 switch to the new cs2 switch.

10. Confirm the health of the network connections moved to cs2:

```
network port show -ipspace Cluster
```

**Show example**

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

Node: node1

Ignore
                                                  Speed(Mbps) Health
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

Node: node2

Ignore
                                                  Speed(Mbps) Health
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
```

All cluster ports that were moved should be `up`.

11. Check neighbor information on the cluster ports:

```
network device-discovery show -protocol cdp
```

**Show example**

```
cluster1::*> network device-discovery show -protocol cdp
Node/         Local  Discovered
Protocol      Port   Device (LLDP: ChassisID)  Interface
Platform
-----------  ------  ------------------------  ----------------
----------------
node2        /cdp
             e0a    CL1                        0/2
CN1610
             e0b    cs2                        0/2              BES-
53248
node1        /cdp
             e0a    CL1                        0/1
CN1610
             e0b    cs2                        0/1              BES-
53248
```

12. Confirm the switch port connections are healthy from switch cs2's perspective:

```
cs2# show port all
cs2# show isdp neighbors
```

13. On cluster switch CL1, shut down the ports connected to the cluster ports of the nodes in order to fail over the cluster LIFs:

```
(CL1)# configure
(CL1)(Config)# interface 0/1-0/16
(CL1)(Interface 0/1-0/16)# shutdown
(CL1)(Interface 0/13-0/16)# exit
(CL1)(Config)# exit
(CL1)#
```

All cluster LIFs failover to the cs2 switch.

14. Verify that the cluster LIFs have failed over to the ports hosted on switch cs2. This might take a few seconds:

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

**Show example**

```
cluster1::*> network interface show -vserver Cluster
            Logical      Status     Network            Current
Current Is
Vserver     Interface    Admin/Oper Address/Mask       Node
Port    Home
----------- ------------ ---------- ------------------ -------------
------- ----
Cluster
            node1_clus1  up/up      169.254.209.69/16  node1
e0b     false
            node1_clus2  up/up      169.254.49.125/16  node1
e0b     true
            node2_clus1  up/up      169.254.47.194/16  node2
e0b     false
            node2_clus2  up/up      169.254.19.183/16  node2
e0b     true
```

15. Verify that the cluster is healthy:

```
cluster show
```

**Show example**

```
cluster1::*> cluster show
Node        Health  Eligibility   Epsilon
---------- ------- ------------- -------
node1       true    true          false
node2       true    true          false
```

16. Move the cluster node connection cables from CL1 to the new cs1 switch.

17. Confirm the health of the network connections moved to cs1:

```
network port show -ipspace Cluster
```

**Show example**

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

Node: node1

Ignore
                                                          Speed(Mbps) Health
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

Node: node2

Ignore
                                                          Speed(Mbps) Health
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
```

All cluster ports that were moved should be `up`.

18. Check neighbor information on the cluster ports:

```
network device-discovery show
```

**Show example**

```
cluster1::*> network device-discovery show -protocol cdp
Node/        Local  Discovered
Protocol     Port   Device (LLDP: ChassisID)  Interface
Platform
-----------  ------ ------------------------  ----------------
----------------
node1        /cdp
             e0a    cs1                                0/1             BES-
53248
             e0b    cs2                                0/1             BES-
53248
node2        /cdp
             e0a    cs1                                0/2             BES-
53248
             e0b    cs2                                0/2             BES-
53248
```

19. Confirm the switch port connections are healthy from switch cs1's perspective:

```
cs1# show port all
cs1# show isdp neighbors
```

20. Verify that the ISL between cs1 and cs2 is still operational:

```
show port-channel
```

**Show example**

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

```
(cs1)# show port-channel 1/1
Local Interface................................ 1/1
Channel Name................................... Cluster-ISL
Link State..................................... Up
Admin Mode..................................... Enabled
Type........................................... Dynamic
Port channel Min-links......................... 1
Load Balance Option............................ 7
(Enhanced hashing mode)

Mbr     Device/         Port        Port
Ports   Timeout         Speed       Active
------  -------------   ---------   -------
0/55    actor/long      100G Full   True
        partner/long
0/56    actor/long      100G Full   True
        partner/long
(cs1) #
```

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

```
(cs2)# show port-channel 1/1
Local Interface................................ 1/1
Channel Name................................... Cluster-ISL
Link State..................................... Up
Admin Mode..................................... Enabled
Type........................................... Dynamic
Port channel Min-links......................... 1
Load Balance Option............................ 7
(Enhanced hashing mode)

Mbr     Device/         Port        Port
Ports   Timeout         Speed       Active
------  -------------   ---------   -------
0/55    actor/long      100G Full   True
        partner/long
0/56    actor/long      100G Full   True
        partner/long
```

21. Delete the replaced CN1610 switches from the cluster's switch table, if they are not automatically removed:

**ONTAP 9.8 and later**

Beginning with ONTAP 9.8, use the command: `system switch ethernet delete -device`
*device-name*

```
cluster::*> system switch ethernet delete -device CL1
cluster::*> system switch ethernet delete -device CL2
```

**ONTAP 9.7 and earlier**

For ONTAP 9.7 and earlier, use the command: `system cluster-switch delete -device`
*device-name*

```
cluster::*> system cluster-switch delete -device CL1
cluster::*> system cluster-switch delete -device CL2
```

**Step 3: Verify the configuration**

1. Enable auto-revert on the cluster LIFs.

```
cluster1::*> network interface modify -vserver Cluster -lif * -auto
-revert true
```

2. Verify that the cluster LIFs have reverted to their home ports (this might take a minute):

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

If the cluster LIFs have not reverted to their home port, manually revert them:

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

3. Verify that the cluster is healthy:

```
cluster show
```

4. Ping the remote cluster interfaces to verify connectivity:

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

**Show example**

```
cluster1::*> cluster ping-cluster -node node2
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)
```

5. To set up log collection, run the following command for each switch. You are prompted to enter the switch name, username, and password for log collection.

```
system switch ethernet log setup-password
```

```
cluster1::*> system switch ethernet log setup-password
Enter the switch name: <return>
The switch name entered is not recognized.
Choose from the following list:
cs1
cs2

cluster1::*> system switch ethernet log setup-password

Enter the switch name: cs1
Would you like to specify a user other than admin for log
collection? {y|n}: n

Enter the password: <enter switch password>
Enter the password again: <enter switch password>

cluster1::*> system switch ethernet log setup-password

Enter the switch name: cs2
Would you like to specify a user other than admin for log
collection? {y|n}: n

Enter the password: <enter switch password>
Enter the password again: <enter switch password>
```

6. To start log collection, run the following command, replacing DEVICE with the switch used in the previous command. This starts both types of log collection: the detailed **Support** logs and an hourly collection of **Periodic** data.

```
system switch ethernet log modify -device <switch-name> -log-request true
```

**Show example**

```
cluster1::*> system switch ethernet log modify -device cs1 -log
-request true

Do you want to modify the cluster switch log collection
configuration?
{y|n}: [n] y

Enabling cluster switch log collection.

cluster1::*> system switch ethernet log modify -device cs2 -log
-request true

Do you want to modify the cluster switch log collection
configuration?
{y|n}: [n] y

Enabling cluster switch log collection.
```

Wait for 10 minutes and then check that the log collection completes:

```
system switch ethernet log show
```

> ⚠️ If any of these commands return an error or if the log collection does not complete, contact
> NetApp support.

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

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

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

## Migrate to a switched NetApp cluster environment

If you have an existing two-node *switchless* cluster environment, you can migrate to a
two-node *switched* cluster environment using Broadcom-supported BES-53248 cluster
switches, which enables you to scale beyond two nodes in the cluster.

The migration process works for all cluster node ports using optical or Twinax ports, but it is not supported on
this switch if nodes are using onboard 10GBASE-T RJ45 ports for the cluster network ports.

## Review requirements

Review the following requirements for the cluster environment.

- Be aware that most systems require two dedicated cluster-network ports on each controller.

- Make sure that the BES-53248 cluster switch is set up as described in Replace requirements before starting this migration process.

- For the two-node switchless configuration, ensure that:

  - The two-node switchless configuration is properly set up and functioning.

  - The nodes are running ONTAP 9.5P8 and later. Support for 40/100 GbE cluster ports starts with EFOS firmware version 3.4.4.6 and 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 Broadcom-supported BES-53248 cluster switch configuration, ensure that:

  - The BES-53248 cluster switch is fully functional on both switches.

  - Both switches have management network connectivity.

  - There is console access to the cluster switches.

  - BES-53248 node-to-node switch and switch-to-switch connections are using Twinax or fiber cables.

    The *NetApp Hardware Universe* contains information about ONTAP compatibility, supported EFOS firmware, and cabling to BES-53248 switches.

- Inter-Switch Link (ISL) cables are connected to ports 0/55 and 0/56 on both BES-53248 switches.

- Initial customization of both the BES-53248 switches is complete, so that:

  - BES-53248 switches are running the latest version of software.

  - BES-53248 switches have optional port licenses installed, if purchased.

  - Reference Configuration Files (RCFs) are applied to the switches.

- Any site customization (SMTP, SNMP, and SSH) are configured on the new switches.

## Port group speed constraints

- The 48 10/25GbE (SFP28/SFP+) ports are combined into 12 x 4-port groups as follows: Ports 1-4, 5-8, 9-12, 13-16, 17-20, 21-24, 25-28, 29-32, 33-36, 37-40, 41-44, and 45-48.

- The SFP28/SFP+ port speed must be the same (10GbE or 25GbE) across all ports in the 4-port group.

- If speeds in a 4-port group are different, the switch ports will not operate correctly.

## Migrate to the cluster environment

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

- The names of the BES-53248 switches are `cs1` and `cs2`.

- The names of the cluster SVMs are `node1` and `node2`.

- The names of the LIFs are `node1_clus1` and `node1_clus2` on node 1, and `node2_clus1` and `node2_clus2` on node 2 respectively.

- The `cluster1::*>` prompt indicates the name of the cluster.
- The cluster ports used in this procedure are `e0a` and `e0b`.

  The *NetApp Hardware Universe* contains the latest information about the actual cluster ports for your platforms.

**Step 1: Prepare for migration**

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`

   where 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.

   The following command suppresses automatic case creation for two hours:

   ```
   cluster1::*> system node autosupport invoke -node \* -type all -message
   MAINT=2h
   ```

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

   `set -privilege advanced`

   The advanced prompt (`*>`) appears.

**Step 2: Configure ports and cabling**

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

   > ⓘ  You must not disable the ISL ports.

   The following example shows that node-facing ports 1 through 16 are disabled on switch cs1:

   ```
   (cs1)# configure
   (cs1)(Config)# interface 0/1-0/16
   (cs1)(Interface 0/1-0/16)# shutdown
   (cs1)(Interface 0/1-0/16)# exit
   (cs1)(Config)# exit
   ```

2. Verify that the ISL and the physical ports on the ISL between the two BES-53248 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 1/1
Local Interface................................ 1/1
Channel Name................................... Cluster-ISL
Link State..................................... Up
Admin Mode..................................... Enabled
Type........................................... Dynamic
Port channel Min-links......................... 1
Load Balance Option............................ 7
(Enhanced hashing mode)

Mbr     Device/         Port        Port
Ports   Timeout         Speed       Active
------  -------------   ---------   -------
0/55    actor/long      100G Full   True
        partner/long
0/56    actor/long      100G Full   True
        partner/long
(cs1) #
```

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

```
(cs2)# show port-channel 1/1
Local Interface................................ 1/1
Channel Name................................... Cluster-ISL
Link State..................................... Up
Admin Mode..................................... Enabled
Type........................................... Dynamic
Port channel Min-links......................... 1
Load Balance Option............................ 7
(Enhanced hashing mode)

Mbr     Device/         Port        Port
Ports   Timeout         Speed       Active
------  -------------   ---------   -------
0/55    actor/long      100G Full   True
        partner/long
0/56    actor/long      100G Full   True
        partner/long
```

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            0/55      176        R            BES-53248   0/55
cs2            0/56      176        R            BES-53248   0/56
```

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
-------------- -------- --------- ------------ ----------- ---------
cs2            0/55      176        R            BES-53248   0/55
cs2            0/56      176        R            BES-53248   0/56
```

4. Verify that all cluster ports are up:

```
network port show -ipspace Cluster
```

**Show example**

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

Node: node1

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

Node: node2

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

5. Verify that all cluster LIFs are up and operational:

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

**Show example**

```
cluster1::*> network interface show -vserver Cluster

            Logical      Status     Network                Current
Current Is
Vserver     Interface    Admin/Oper Address/Mask           Node
Port    Home
----------- ------------ ---------- ------------------ -------------
------- -----
Cluster
            node1_clus1  up/up      169.254.209.69/16  node1
e0a     true
            node1_clus2  up/up      169.254.49.125/16  node1
e0b     true
            node2_clus1  up/up      169.254.47.194/16  node2
e0a     true
            node2_clus2  up/up      169.254.19.183/16  node2
e0b     true
```

6. Disable auto-revert on the cluster LIFs.

```
cluster1::*> network interface modify -vserver Cluster -lif * -auto
-revert false
```

7. Disconnect the cable from cluster port e0a on node1, and then connect e0a to port 1 on cluster switch cs1, using the appropriate cabling supported by the BES-53248 switches.

   The *NetApp Hardware Universe* contains more information about cabling.

8. Disconnect the cable from cluster port e0a on node2, and then connect e0a to port 2 on cluster switch cs1, using the appropriate cabling supported by the BES-53248 switches.

9. Enable all node-facing ports on cluster switch cs1.

   The following example shows that ports 1 through 16 are enabled on switch cs1:

```
(cs1)# configure
(cs1)(Config)# interface 0/1-0/16
(cs1)(Interface 0/1-0/16)# no shutdown
(cs1)(Interface 0/1-0/16)# exit
(cs1)(Config)# exit
```

10. Verify that all cluster ports are up:

```
network port show -ipspace Cluster
```

**Show example**

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

Node: node1

Ignore
                                                  Speed(Mbps) Health
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

Node: node2

Ignore
                                                  Speed(Mbps) Health
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
```

11. Verify that all cluster LIFs are up and operational:

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

```
cluster1::*> network interface show -vserver Cluster

          Logical       Status      Network                    Current
Current Is
Vserver   Interface     Admin/Oper Address/Mask                Node         Port
Home
--------  ------------  ---------- ------------------  -----------
-------  ----
Cluster
          node1_clus1  up/up        169.254.209.69/16   node1        e0a
false
          node1_clus2  up/up        169.254.49.125/16   node1        e0b
true
          node2_clus1  up/up        169.254.47.194/16   node2        e0a
false
          node2_clus2  up/up        169.254.19.183/16   node2        e0b
true
```

12. 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:

```
cluster1::*> cluster show

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

13. Disconnect the cable from cluster port e0b on node1, and then connect e0b to port 1 on cluster switch cs2, using the appropriate cabling supported by the BES-53248 switches.

14. Disconnect the cable from cluster port e0b on node2, and then connect e0b to port 2 on cluster switch cs2, using the appropriate cabling supported by the BES-53248 switches.

15. Enable all node-facing ports on cluster switch cs2.

The following example shows that ports 1 through 16 are enabled on switch cs2:

```
(cs2)# configure
(cs2)(Config)# interface 0/1-0/16
(cs2)(Interface 0/1-0/16)# no shutdown
(cs2)(Interface 0/1-0/16)# exit
(cs2)(Config)# exit
```

16. Verify that all cluster ports are up:

`network port show -ipspace Cluster`

**Show example**

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

Node: node1

Ignore
                                                  Speed(Mbps) Health
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

Node: node2

Ignore
                                                  Speed(Mbps) Health
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
```

**Step 3: Verify the configuration**

1. Enable auto-revert on the cluster LIFs.

   ```
   cluster1::*> network interface modify -vserver Cluster -lif * -auto
   -revert true
   ```

2. Verify that the cluster LIFs have reverted to their home ports (this might take a minute):

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

   If the cluster LIFs have not reverted to their home port, manually revert them:

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

3. Verify that all interfaces display `true` for `Is Home`:

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

   > **i**   This might take several minutes to complete.

   **Show example**

   ```
   cluster1::*> network interface show -vserver Cluster

             Logical      Status      Network              Current
   Current Is
   Vserver   Interface    Admin/Oper Address/Mask          Node        Port
   Home
   --------- ------------ ---------- -------------------- ----------
   ------- ----
   Cluster
             node1_clus1  up/up       169.254.209.69/16   node1        e0a
   true
             node1_clus2  up/up       169.254.49.125/16   node1        e0b
   true
             node2_clus1  up/up       169.254.47.194/16   node2        e0a
   true
             node2_clus2  up/up       169.254.19.183/16   node2        e0b
   true
   ```

4. Verify that both nodes each have one connection 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           175       H            FAS2750     e0a
node2          0/2           157       H            FAS2750     e0a
cs2            0/55          178       R            BES-53248   0/55
cs2            0/56          178       R            BES-53248   0/56


(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           137       H            FAS2750     e0b
node2          0/2           179       H            FAS2750     e0b
cs1            0/55          175       R            BES-53248   0/55
cs1            0/56          175       R            BES-53248   0/56
```

5. Display information about the discovered network devices in your cluster:

```
network device-discovery show -protocol cdp
```

**Show example**

```
cluster1::*> network device-discovery show -protocol cdp
Node/         Local   Discovered
Protocol      Port    Device (LLDP: ChassisID)   Interface
Platform
-----------   ------  -------------------------  ----------------
----------------
node2         /cdp
              e0a     cs1                        0/2             BES-
53248
              e0b     cs2                        0/2             BES-
53248
node1         /cdp
              e0a     cs1                        0/1             BES-
53248
              e0b     cs2                        0/1             BES-
53248
```

6. Verify that the settings are disabled:

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

(i) It might take several minutes for the command to complete. Wait for the '3 minute lifetime to expire' announcement.

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

```
cluster1::*> network options switchless-cluster show
Enable Switchless Cluster: false
```

7. 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:

```
cluster1::*> cluster show

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

8. Verify that the cluster network has full connectivity using the command:

```
cluster ping-cluster -node node-name
```

**Show example**

```
cluster1::*> cluster ping-cluster -node local

Host is node2
Getting addresses from network interface table...
Cluster node1_clus1 192.168.168.26 node1 e0a
Cluster node1_clus2 192.168.168.27 node1 e0b
Cluster node2_clus1 192.168.168.28 node2 e0a
Cluster node2_clus2 192.168.168.29 node2 e0b
Local = 192.168.168.28 192.168.168.29
Remote = 192.168.168.26 192.168.168.27
Cluster Vserver Id = 4294967293
Ping status:
....
Basic connectivity succeeds on 4 path(s)
Basic connectivity fails on 0 path(s)
...............
Detected 1500 byte MTU on 4 path(s):
    Local 192.168.168.28 to Remote 192.168.168.26
    Local 192.168.168.28 to Remote 192.168.168.27
    Local 192.168.168.29 to Remote 192.168.168.26
    Local 192.168.168.29 to Remote 192.168.168.27
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)
```

9. Change the privilege level back to admin:

```
set -privilege admin
```

10. 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**

```
cluster1::*> system node autosupport invoke -node \* -type all
-message MAINT=END
```

For more information, see: NetApp KB Article: How to suppress automatic case creation during scheduled maintenance windows

**What's next?**

After your migration completes, you might need to install the required configuration file to support the Ethernet Switch Health Monitor (CSHM) for BES-53248 cluster switches. See Enable log collection.

# Replace switches

## Replacement requirements

Before replacing the switch, make sure the following conditions are met in the current environment and on the replacement switch.

### Existing cluster and network infrastructure

Make sure that:

- The existing cluster is verified as completely functional, with at least one fully connected cluster switch.
- All cluster ports are **up**.
- All cluster logical interfaces (LIFs) are administratively and operationally **up** and on their home ports.
- The ONTAP `cluster ping-cluster -node node1` command must indicate that the settings, `basic connectivity` and `larger than PMTU communication`, are successful on all paths.

### BES-53248 replacement cluster switch

Make sure that:

- Management network connectivity on the replacement switch is functional.
- Console access to the replacement switch is in place.
- The node connections are ports 0/1 through 0/16 with default licensing.
- All Inter-Switch Link (ISL) ports are disabled on ports 0/55 and 0/56.
- The desired reference configuration file (RCF) and EFOS operating system switch image are loaded onto

the switch.

- Initial customization of the switch is complete, as detailed in Configure the BES-53248 cluster switch.

Any previous site customizations, such as STP, SNMP, and SSH, are copied to the new switch.

**For more information**

- NetApp Support Site
- NetApp Hardware Universe

## Replace a Broadcom-supported BES-53248 cluster switch

Follow these steps to replace a defective Broadcom-supported BES-53248 cluster switch in a cluster network. This is a nondisruptive procedure (NDU).

**About the examples**

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

- The names of the existing BES-53248 switches are `cs1` and `cs2`.
- The name of the new BES-53248 switch is `newcs2`.
- The node names are `node1` and `node2`.
- The cluster ports on each node are named `e0a` and `e0b`.
- The cluster LIF names are `node1_clus1` and `node1_clus2` for node1, and `node2_clus1` and `node2_clus2` for node2.
- The prompt for changes to all cluster nodes is `cluster1::>`.

**About the topology**

This procedure is based on the following cluster network topology:

**Show example topology**

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

Node: node1

Ignore
                                            Speed(Mbps) Health
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


Node: node2

Ignore
                                            Speed(Mbps) Health
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


cluster1::> network interface show -vserver Cluster
          Logical    Status     Network          Current
Current Is
Vserver   Interface  Admin/Oper Address/Mask      Node          Port
Home
--------- ---------- ---------- ----------------- -------------
------- ----
Cluster
          node1_clus1 up/up     169.254.209.69/16 node1         e0a
true
          node1_clus2 up/up     169.254.49.125/16 node1         e0b
true
```

```
          node2_clus1  up/up    169.254.47.194/16  node2        e0a
true
          node2_clus2  up/up    169.254.19.183/16  node2        e0b
true


cluster1::> network device-discovery show -protocol cdp
Node/      Local  Discovered
Protocol   Port   Device (LLDP: ChassisID)  Interface        Platform
---------- ------ ------------------------- ---------------- ----------------
node2      /cdp
           e0a    cs1                       0/2              BES-
53248
           e0b    cs2                       0/2              BES-
53248
node1      /cdp
           e0a    cs1                       0/1              BES-
53248
           e0b    cs2                       0/1              BES-
53248
```

```
(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       175       H          FAS2750
e0a
node2                    0/2       152       H          FAS2750
e0a
cs2                      0/55      179       R          BES-53248
0/55
cs2                      0/56      179       R          BES-53248
0/56


(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       129       H          FAS2750
e0b
node2                    0/2       165       H          FAS2750
e0b
cs1                      0/55      179       R          BES-53248
0/55
cs1                      0/56      179       R          BES-53248
0/56
```

**Steps**

1. Review the Replacement requirements.

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
```

where *x* is the duration of the maintenance window in hours.

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

3. Install the appropriate Reference Configuration File (RCF) and image on the switch, newcs2, and make any necessary site preparations.

   If necessary, verify, download, and install the appropriate versions of the RCF and EFOS software for the new switch. If you have verified that the new switch is correctly set up and does not need updates to the RCF and EFOS software, continue to step 2.

   a. You can download the applicable Broadcom EFOS software for your cluster switches from the Broadcom Ethernet Switch Support site. Follow the steps on the Download page to download the EFOS file for the version of ONTAP software you are installing.

   b. The appropriate RCF is available from the Broadcom Cluster Switches page. Follow the steps on the Download page to download the correct RCF for the version of ONTAP software you are installing.

4. On the new switch, log in as `admin` and shut down all of the ports that will be connected to the node cluster interfaces (ports 1 to 16).

> (i) If you purchased additional licenses for additional ports, shut down these ports too.

   If the switch that you are replacing is not functional and is powered down, the LIFs on the cluster nodes should have already failed over to the other cluster port for each node.

> (i) No password is required to enter `enable` mode.

**Show example**

```
User: admin
Password:
(newcs2)> enable
(newcs2)# config
(newcs2)(config)# interface 0/1-0/16
(newcs2)(interface 0/1-0/16)# shutdown
(newcs2)(interface 0/1-0/16)# exit
(newcs2)(config)# exit
(newcs2)#
```

5. Verify that all cluster LIFs have `auto-revert` enabled:

```
network interface show -vserver Cluster -fields auto-revert
```

**Show example topology**

```
cluster1::> network interface show -vserver Cluster -fields auto-
revert

Logical
Vserver    Interface    Auto-revert
---------  ------------  ------------
Cluster    node1_clus1   true
Cluster    node1_clus2   true
Cluster    node2_clus1   true
Cluster    node2_clus2   true
```

6. Shut down the ISL ports 0/55 and 0/56 on the BES-53248 switch cs1:

**Show example topology**

```
(cs1)# config
(cs1)(config)# interface 0/55-0/56
(cs1)(interface 0/55-0/56)# shutdown
```

7. Remove all cables from the BES-53248 cs2 switch, and then connect them to the same ports on the BES-53248 newcs2 switch.

8. Bring up the ISLs ports 0/55 and 0/56 between the cs1 and newcs2 switches, and then verify the port channel operation status.

   The Link State for port-channel 1/1 should be **up** and all member ports should be True under the Port Active heading.

**Show example**

This example enables ISL ports 0/55 and 0/56 and displays the Link State for port-channel 1/1 on switch cs1:

```
(cs1)# config
(cs1)(config)# interface 0/55-0/56
(cs1)(interface 0/55-0/56)# no shutdown
(cs1)(interface 0/55-0/56)# exit
(cs1)# show port-channel 1/1

Local Interface................................ 1/1
Channel Name................................... Cluster-ISL
Link State..................................... Up
Admin Mode..................................... Enabled
Type........................................... Dynamic
Port-channel Min-links......................... 1
Load Balance Option............................ 7
(Enhanced hashing mode)

Mbr     Device/         Port        Port
Ports   Timeout         Speed       Active
------  -------------   ----------  -------
0/55    actor/long      100G Full   True
        partner/long
0/56    actor/long      100G Full   True
        partner/long
```

9. On the new switch newcs2, re-enable all of the ports that are connected to the node cluster interfaces (ports 1 to 16).

> (i)  If you purchased additional licenses for additional ports, shut down these ports too.

**Show example**

```
User:admin
Password:
(newcs2)> enable
(newcs2)# config
(newcs2)(config)# interface 0/1-0/16
(newcs2)(interface 0/1-0/16)# no shutdown
(newcs2)(interface 0/1-0/16)# exit
(newcs2)(config)# exit
```

10. Verify that port e0b is **up**:

```
network port show -ipspace Cluster
```

**Show example**

The output should be similar to the following:

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

Node: node1

Ignore
                                              Speed(Mbps)
Health    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

Node: node2

Ignore
                                              Speed(Mbps)
Health    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/auto   -
false
```

11. On the same node as you used in the previous step, wait for the cluster LIF node1_clus2 on node1 to auto-revert.

**Show example**

In this example, LIF node1_clus2 on node1 is successfully reverted if `Is Home` is `true` and the port is e0b.

The following command displays information about the LIFs on both nodes. Bringing up the first node is successful if `Is Home` is `true` for both cluster interfaces and they show the correct port assignments, in this example `e0a` and `e0b` on node1.

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

            Logical      Status     Network                 Current
Current Is
Vserver     Interface    Admin/Oper Address/Mask            Node
Port     Home
----------- ------------ ---------- ------------------ ----------
------- -----
Cluster
            node1_clus1  up/up      169.254.209.69/16  node1
e0a      true
            node1_clus2  up/up      169.254.49.125/16  node1
e0b      true
            node2_clus1  up/up      169.254.47.194/16  node2
e0a      true
            node2_clus2  up/up      169.254.19.183/16  node2
e0a      false
```

12. Display information about the nodes in a cluster:

```
cluster show
```

**Show example**

This example shows that the node health for `node1` and `node2` in this cluster is `true`:

```
cluster1::> cluster show
Node    Health   Eligibility   Epsilon
------  -------- ------------  --------
node1   true     true          true
node2   true     true          true
```

13. Confirm the following cluster network configuration:

```
network port show
```

```
cluster1::> network port show -ipspace Cluster
Node: node1

Ignore
                                      Speed(Mbps)         Health
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


Node: node2

Ignore
                                      Speed(Mbps)         Health
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



cluster1::> network interface show -vserver Cluster

          Logical     Status      Network              Current
Current Is
Vserver     Interface Admin/Oper Address/Mask        Node
Port    Home
----------- ---------- ---------- ----------------- -------------
------- ----
Cluster
          node1_clus1  up/up     169.254.209.69/16  node1
e0a       true
          node1_clus2  up/up     169.254.49.125/16  node1
e0b       true
          node2_clus1  up/up     169.254.47.194/16  node2
```

```
e0a       true
            node2_clus2  up/up     169.254.19.183/16  node2
e0b       true
4 entries were displayed.
```

+

```
cs1# show cdp neighbors

Capability Codes: R - Router, T - Trans-Bridge, B - Source-Route-
Bridge
                  S - Switch, H - Host, I - IGMP, r - Repeater,
                  V - VoIP-Phone, D - Remotely-Managed-Device,
                  s - Supports-STP-Dispute

Device-ID           Local Intrfce  Hldtme Capability  Platform
Port ID
node1               Eth1/1          144    H           FAS2980
e0a
node2               Eth1/2          145    H           FAS2980
e0a
newcs2(FDO296348FU) Eth1/65         176    R S I s     N9K-C92300YC
Eth1/65
newcs2(FDO296348FU) Eth1/66         176    R S I s     N9K-C92300YC
Eth1/66


cs2# show cdp neighbors

Capability Codes: R - Router, T - Trans-Bridge, B - Source-Route-
Bridge
                  S - Switch, H - Host, I - IGMP, r - Repeater,
                  V - VoIP-Phone, D - Remotely-Managed-Device,
                  s - Supports-STP-Dispute

Device-ID           Local Intrfce  Hldtme Capability  Platform
Port ID
node1               Eth1/1          139    H           FAS2980
e0b
node2               Eth1/2          124    H           FAS2980
e0b
cs1(FDO220329KU)    Eth1/65         178    R S I s     N9K-C92300YC
Eth1/65
cs1(FDO220329KU)    Eth1/66         178    R S I s     N9K-C92300YC
Eth1/66
```

14. Verify that the cluster network is healthy:

    `show isdp neighbors`

    **Show example**

    ```
    (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       175         H             FAS2750     e0a
    node2         0/2       152         H             FAS2750     e0a
    newcs2        0/55      179         R             BES-53248   0/55
    newcs2        0/56      179         R             BES-53248   0/56

    (newcs2)# 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       129         H             FAS2750     e0b
    node2         0/2       165         H             FAS2750     e0b
    cs1           0/55      179         R             BES-53248   0/55
    cs1           0/56      179         R             BES-53248   0/56
    ```

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

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

**What's next?**

See for the steps required to enable cluster health switch log collection used for collecting switch-related log files.

## Replace Broadcom BES-53248 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.
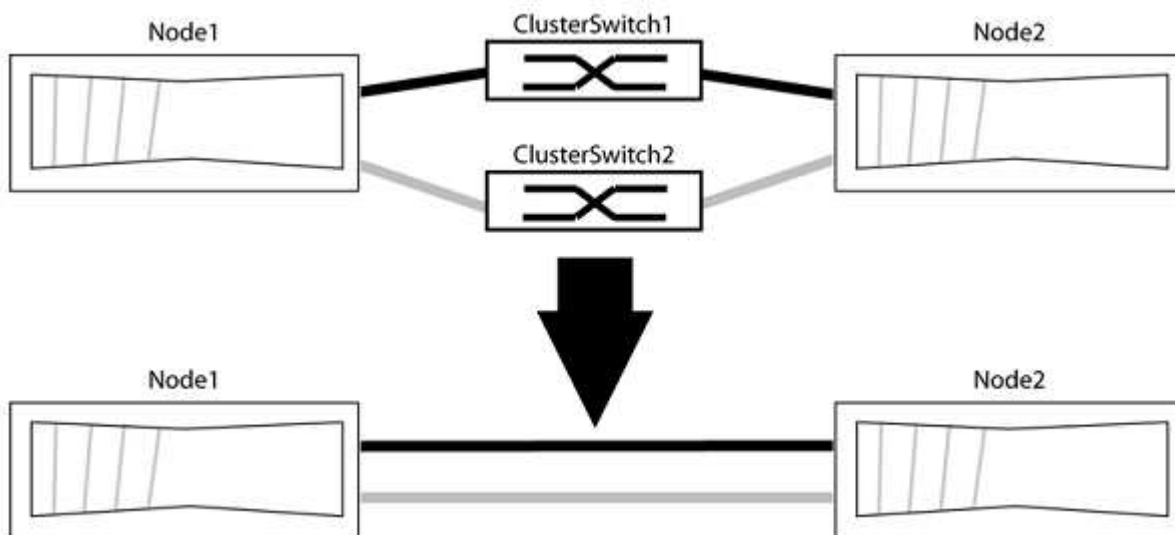


**About the examples**

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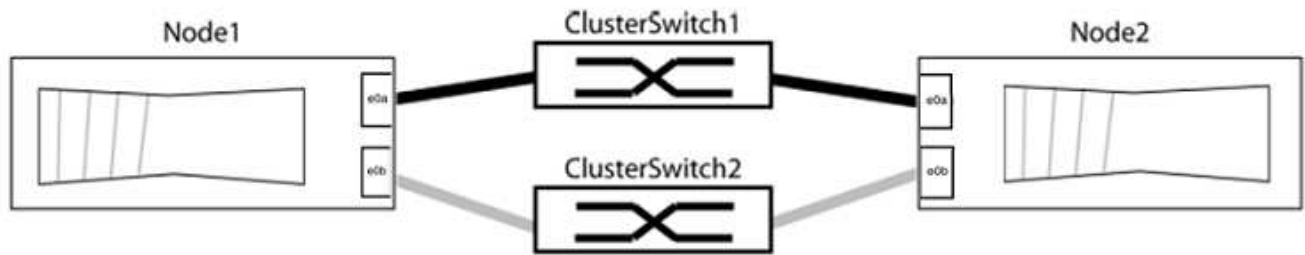
Verify that the ports have a value of `up` for the "Link" column and a value of `healthy` for the "Health Status" column.

**Show example**

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

Ignore
                                                  Speed(Mbps) Health
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

Node: node2

Ignore
                                                  Speed(Mbps) Health
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
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 cluster connectivity:

   `cluster ping-cluster -node local`

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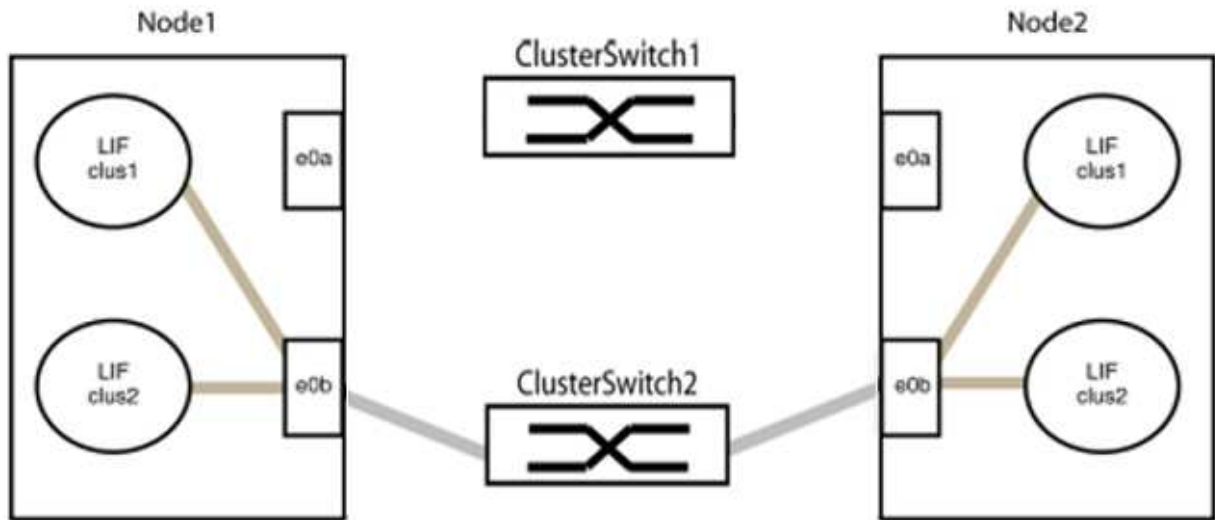
b. Cable the ports in group1 back-to-back.

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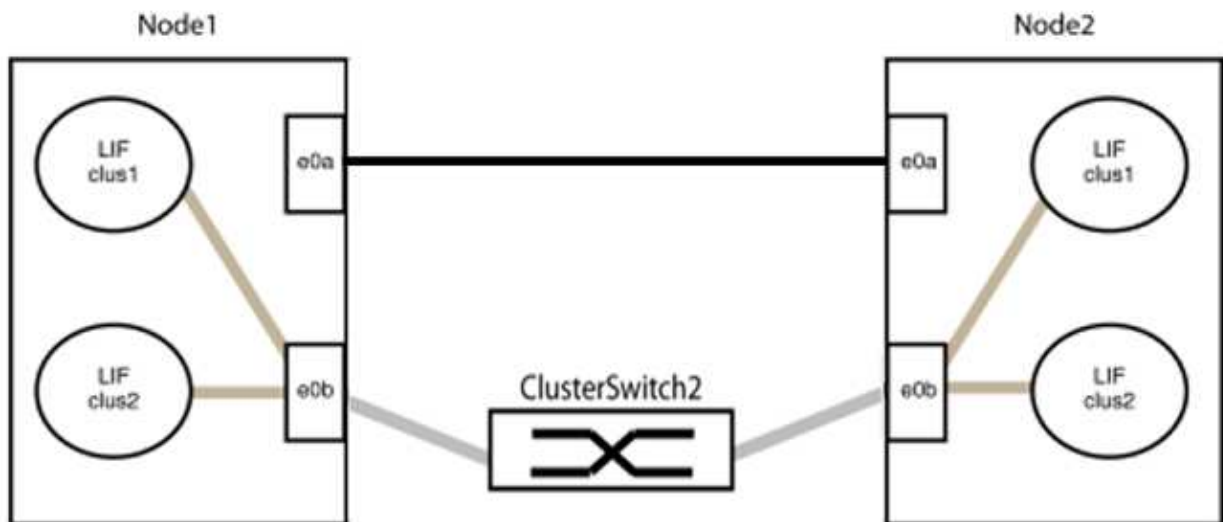


9. The switchless cluster network option transitions from `false` to `true`. This might take up to 45 seconds. Confirm that the switchless option is set to `true`:

`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 that the cluster network is not disrupted:

`cluster ping-cluster -node local`

> **ⓘ** 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:
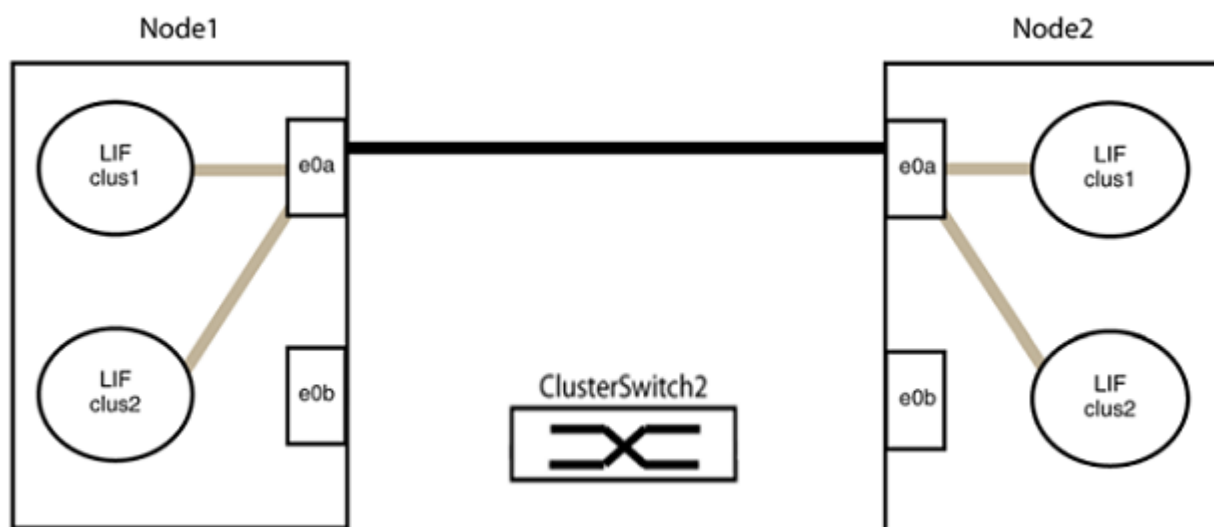


   b. Cable the ports in group2 back-to-back.

   In the following example, "e0a" on node1 is connected to "e0a" on node2 and "e0b" on node1 is connected to "e0b" on node2:
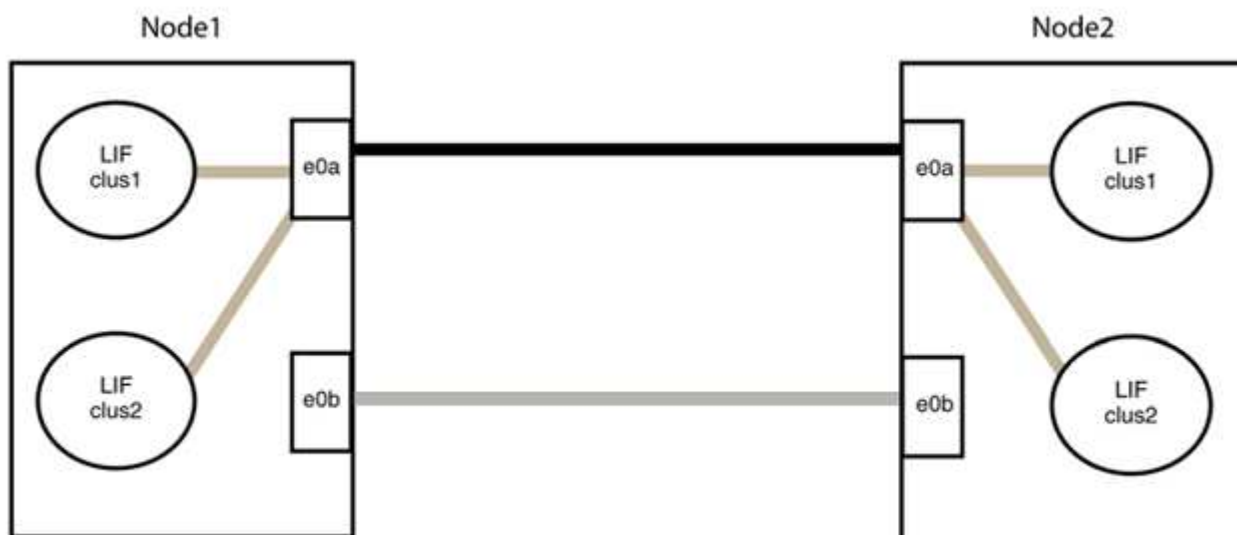
**Step 3: Verify the configuration**

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. Confirm connectivity between the cluster ports:

```
cluster ping-cluster local
```

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
```