Broadcom-supported BES-53248 switches

Cluster and storage switches

NetApp
September 12, 2022

Table of Contents

Broadcom-supported BES-53248 switches

Overview of Broadcom-supported BES-53248 cluster switches

Broadcom-supported BES-53248 cluster switches are designed to work in clusters ranging in size from two to 24 nodes in ONTAP 9.5P8 and later. Support for 40/100 GbE cluster ports starts with EFOS firmware version 3.4.4.6 and later.

BES-53248 is a switch running on a Broadcom-embedded OS known as Ethernet Fabric OS (EFOS).

The following table lists the part number and description for the BES-53248 cluster switch, rack mount rail kit, fans, and power supplies:

Part number	Description
X190005	BES-53248, CLSW, 16Pt10/25GB, PTSX, BRDCM SUPP (PTSX = Port Side Exhaust)
X190005R	BES-53248, CLSW, 16Pt10/25GB, PSIN, BRDCM SUPP (PSIN = Port Side Intake)
X-RAIL-4POST-190005	Rack mount rail kit Ozeki 4 post 19"
X-FAN-190005-R	Fan, port side intake X190005
X-FAN-190005-F	Fan, port side exhaust X190005
X-PSU-190005-R	Power supply, port side intake X190005
X-PSU-190005-F	Power supply, port side exhaust X190005

Overview of airflow based on the two models offered:

- Port-side exhaust airflow (standard air): Cool air enters the chassis through the fan and power supply modules in the cold aisle and exhausts through the port end of the chassis in the hot aisle. Blue coloring indicates port-side exhaust airflow. This is the most common option.
- Port-side intake airflow (reverse air): Cool air enters the chassis through the port end in the cold aisle and exhausts through the fan and power supply modules in the hot aisle.

See the NetApp KB article: How to add additional port licensing for the Broadcom-supported BES-53248 switch for details on adding additional port licenses.

For information on the relevant connectors and cable options to use along with their part numbers, see the NetApp Hardware Universe.

For more information, see the *Cluster Network and Management Network Compatibility Matrix* available from the BES-53248 switch download site Broadcom cluster switches.

Set up the switch

BES-53248 cluster switch configuration requirements

To configure your cluster, you need the appropriate number and type of cables and cable connectors for your 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 and you need specific network information.

BES-53248 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	100GbE cluster port nodes, with licenses, added right to left
55-56	100GbE cluster Inter-Switch Link (ISL) ports, base configuration

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.

BES-53248 cluster switch required documentation

You need specific switch and controller documentation to set up your Cluster-Mode configuration.

Required documentation for BES-53248 cluster switches

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.

Document title	Description
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.
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.

Required documentation for supported ONTAP systems

To set up an ONTAP system, you need the following documents from the NetApp Support Site at mysupport.netapp.com

Name	Description
NetApp Hardware Universe	Describes the power and site requirements for all NetApp hardware, including system cabinets.
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.

Configure your BES-53248 cluster switches

Configure a new BES-53248 cluster switch

You can configure a new BES-53248 cluster switch by completing the steps detailed in this chapter.

About this task

Installing the BES-53248 cluster switch on systems running ONTAP starts with setting up an IP address and configuration to allow the switch to communicate through the management interface. Then you can install the Ethernet Fabric OS (EFOS) software, reference configuration file (RCF), and other licenses as needed. This procedure is intended for preparing the BES-53248 switch before controllers are added. In addition, you might need to install the required configuration file to support the Cluster Switch Health Monitor (CSHM) for the BES-53248 cluster switches. See Installing the Cluster Switch Health Monitor (CSHM) configuration file for more details.

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

- The NetApp switch names are `cs1` and `cs2`.

- The example used in this procedure starts the upgrade 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 in this procedure use two nodes, but you can have up to 24 nodes in a cluster.

Initial installation of the BES-53248 cluster switch

You can use this procedure to perform the initial installation of the BES-53248 cluster switch.

You can download the applicable Broadcom EFOS software for your cluster switches from the Broadcom Ethernet Switch Support site.

EFOS is a wide-ranging software set of advanced networking features and protocols necessary to develop a variety of Ethernet and IP infrastructure systems for data center applications. EFOS software is an architecture suitable for any network organizational device using leading-edge applications that require thorough packet inspection or separation.

This procedure provides a summary of the process to install your switches and get them running:

Steps

1. Connect the serial port to the host or serial port of your choice.
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, `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:

```
(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.

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

7. Verify the results using the command:

   `show serviceport`

   The following example shows IP information provided by DHCP server.

```
(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`

```
(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)#
      ```

   b. Configure the time manually:

      `clock`

```
(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!
```

Install the EFOS software

You can use this procedure to install the EFOS software on the BES-53248 cluster switch. You can download the applicable Broadcom EFOS software for your cluster switches from the Broadcom Ethernet Switch Support site.

About this task

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 to 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.

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) 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. 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. 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. 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. 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. The switch configuration and license information will be lost.
	FIPS compliant	Non-FIPS compliant	

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 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.

   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
   ```

```
(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
   ```

```
(cs2)# show version

Switch: 1

System Description..............................  Quanta IX8-B 48x25GB SFP
8x100GB QSFP, 3.4.3.3, Linux 4.4.117-ceeeb99d, 2016.05.00.04
Machine Type....................................  Quanta IX8-B 48x25GB SFP
8x100GB QSFP
Machine Model...................................  IX8-B
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.

```
(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`

```
(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`

```
(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`

```
(cs2)# show version

Switch: 1

System Description.............................. x86_64-
quanta_common_rglbmc-r0, 3.4.4.6, Linux 4.4.211-28a6fe76, 2016.05.00.04
Machine Type.................................... x86_64-
quanta_common_rglbmc-r0
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
```

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.

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 the following screen appears:

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

   After selecting **ONIE"**, the switch will then load and present you with the following choices:

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

   The switch now will boot into ONIE installation mode.

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

   Once the following message appears press <Enter> to invoke the ONIE console:

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

The ONIE discovery will continue and messages will be 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:

```
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
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 will install and then reboot the switch. Let the switch reboot normally into the new EFOS version.

6. Verify that the new switch software is installed: `show bootvar`

```
(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.

Related information

Broadcom Ethernet Switch Support

Install licenses

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. New ports can be added by purchasing more licenses.

The following licenses are 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	SW-BES53248-24P-1025G-LIC
Broadcom 24Port 10G25G License Key, X190005/R	EFOS 3.4.4.6 and later

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.

   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
   ```

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

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

```
(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`

```
(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.

```
(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`

```
(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`

```
(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`

```
(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. Re-applying an RCF to an existing working production switch is not advisable.

Restrictions and limitations

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

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

```
(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 following log output is returned:

```
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 backup port licenses to the server:

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

See Installing licenses for BES-53248 cluster switches for details of the firmware versions supported for available licenses.

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.

Edit the Reference Configuration File (RCF)

In order 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 details of the available license types for use on the BES-53248 cluster switch, see Installing licenses for BES-53248 cluster switches.

For example to activate the SW-BES54248-40-100G-LIC license, you must uncomment the following section in the RCF:

```
.
.
!
! 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
- 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.

Install the Reference Configuration File (RCF)

You can install the RCF after setting up the BES-53248 cluster switch for the first time and after the new license or licenses have been applied. 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 following KB article for details.

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 connectivity 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.

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. Install the RCF on the BES-53248 cluster switch using the `copy` command.

```
(cs2)# copy sftp://172.19.2.1/tmp/BES-53248_RCF_v1.6-Cluster-HA.txt
nvram:script BES-53248_RCF_v1.6-Cluster-HA.scr

Remote Password:**

Mode..................................... SFTP
Set Server IP.............................. 172.19.2.1
Path....................................... //tmp/
Filename................................... BES-53248_RCF_v1.6-
Cluster-HA.txt
Data Type.................................. Config Script
Destination Filename....................... BES-53248_RCF_v1.6-
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.
```

Depending on your environment, you might need to use a double slash in the `copy` command, for example: `copy sftp://172.19.2.1//tmp/BES-53248_RCF_v1.6-Cluster-HA.txt nvram:script BES-53248_RCF_v1.6-Cluster-HA.scr`.

The `.scr` extension must be set as part of the file name before invoking the script. This extension is the extension for the EFOS operating system. The switch validates the script automatically when it is downloaded to the switch, and the output goes to the console. Also, you can change the name of the `.scr` to fit your console screen for easier readability, for example: `copy sftp://172.19.2.1/tmp/BES-53248_RCF_v1.6-Cluster-HA.txt nvram:script RCF_v1.6-Cluster-HA.scr`.

The file name must not include the symbols `\/:*?"<>|` and the maximum length allowed is 32 chars.

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

   `script list`

```
(cs2)# script list

Configuration Script Name                  Size(Bytes)  Date of
Modification
-----------------------------------------  -----------
--------------------
BES-53248_RCF_v1.6-Cluster-HA.scr        2241         2020 09 30
05:41:00

1 configuration script(s) found.
```

5. Apply the script to the switch.

   `script apply`

```
(cs2)# script apply BES-53248_RCF_v1.6-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_v1.6-Cluster-HA.scr' applied.
```

6. Verify the ports for an additional license after the RCF is applied:

   `show port all | exclude Detach`

```
(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
```

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

   `show running-config`

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

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

   `write memory`

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

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

   Config file 'startup-config' created successfully.

   Configuration Saved!
   ```

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

   `reload`

   ```
   (cs2)# reload

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

   System will now restart!
   ```

Install the Cluster Switch Health Monitor (CSHM) configuration file

You can use this procedure to install the applicable configuration file for cluster switch health monitoring of BES-53248 cluster switches. In ONTAP releases 9.5P7 and earlier and 9.6P2 and earlier, you must download the cluster switch health monitor configuration file separately. In ONTAP releases 9.5P8 and later, 9.6P3 and later, and 9.7 and later, the cluster switch health monitor configuration file is bundled with ONTAP.

Before you begin

Before you setup the switch health monitor for BES-53248 cluster switches, you must ensure that the ONTAP cluster is up and running.

It is advisable to enable SSH in order to use all features available in CSHM.

Steps

1. Download the cluster switch health monitor configuration zip file based on the corresponding ONTAP release version. This file is available from the page: NetApp Software download
   a. On the Software download page, select **Switch Health Monitor Configuration Files**
   b. Select Platform = **ONTAP** and click **Go!**
   c. On the Switch Health Monitor Configuration Files for ONTAP page, click **View & Download**
   d. On the Switch Health Monitor Configuration Files for ONTAP - Description page, click **Download** for the applicable cluster switch model, for example: **Broadcom-supported BES-53248**
   e. On the End User License Agreement page, click **Accept**
   f. On the Switch Health Monitor Configuration Files for ONTAP - Download page, select the applicable configuration file, for example, **Broadcom_BES-53248.zip**
2. Upload the applicable zip file to your internal web server where the IP address is X.X.X.X.

   For an internal web server IP address of 192.168.2.20 and assuming a /usr/download directory exists, you can upload your zip file to your web server using scp:

   ```
   % scp Broadcom_BES-53248.zip
   admin@192.168.2.20:/usr/download/Broadcom_BES-53248.zip
   ```

3. Access the advanced mode setting from one of the ONTAP systems in the cluster, using the command `set -privilege advanced`:

   ```
   cluster1::> set -privilege advanced
   ```

4. Run the switch health monitor configure command `system cluster-switch configure-health-monitor -node * -package-url http://server/file-location`:

   ```
   cluster1::> system cluster-switch configure-health-monitor -node *
   -package-url
   http://192.168.2.20/usr/download/Broadcom_BES-53248.zip
   ```

5. Verify that the command output contains the text string "downloaded package processed successfully". If an error occurs, contact NetApp support.
6. Run the command `system cluster-switch show` on the ONTAP system and ensure that the cluster switches are discovered with the monitored field set to "True".

   ```
   cluster1::> system cluster-switch show
   ```

   If at any time you revert to an earlier version of ONTAP, you will need to install the CSHM configuration file again to enable switch health monitoring of BES-53248 cluster switches.

Enable SSH on BES-53248 cluster switches

SSH is a requirement when using the Cluster Switch Health Monitor (CSHM) and log collection features. To enable SSH on BES-53248 cluster switches, you generate the SSH keys first and then enable SSH.

Steps

1. Generate the SSH keys:

```
crypto key generate
```

```
(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
SCP server Administrative Mode: ..... Disabled

(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 ssh pubkey-auth
(switch)# ip scp server enable
(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!
```

2. 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
SCP server Administrative Mode: ..... Disabled
```

Configure the cluster switch log collection feature

The cluster switch health monitor log collection feature is used to collect switch-related log files in ONTAP. You must make sure that you have set up your environment using the BES-53248 cluster switch CLI as detailed here.

Steps

1. For ONTAP 9.8 and later, enable the cluster switch health monitor log collection feature for collecting switch-related log files, using the commands:

   `system switch ethernet log setup-password` and `system switch ethernet log enable-collection`

   Enter: `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
RSA key fingerprint is e5:8b:c6:dc:e2:18:18:09:36:63:d9:63:dd:03:d9:cc
Do you want to continue? {y|n}::[n] y

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
RSA key fingerprint is 57:49:86:a1:b9:80:6a:61:9a:86:8e:3c:e3:b7:1f:b1
Do you want to continue? {y|n}:: [n] y

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

Followed by: `system switch ethernet log enable-collection`

```
cluster1::*> system switch ethernet log enable-collection

Do you want to enable cluster log collection for all nodes in the
cluster?
{y|n}: [n] y

Enabling cluster switch log collection.

cluster1::*>
```

2. For ONTAP 9.5P15, 9.6P11, 9.7P8 and later patch releases, enable the cluster switch health monitor log collection feature for collecting switch-related log files, using the commands:

   `system cluster-switch log setup-password` and `system cluster-switch log enable-collection`

   Enter: `system cluster-switch log setup-password`

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

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

Enter the switch name: cs1
RSA key fingerprint is e5:8b:c6:dc:e2:18:18:09:36:63:d9:63:dd:03:d9:cc
Do you want to continue? {y|n}::[n] y

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

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

Enter the switch name: cs2
RSA key fingerprint is 57:49:86:a1:b9:80:6a:61:9a:86:8e:3c:e3:b7:1f:b1
Do you want to continue? {y|n}:: [n] y

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

Followed by: `system cluster-switch log enable-collection`

```
cluster1::*> system cluster-switch log enable-collection

Do you want to enable cluster log collection for all nodes in the
cluster?
{y|n}: [n] y

Enabling cluster switch log collection.
```

The log collect command is not available at this time. See Bug 1225042 for further details.

If any of these commands return an error, contact NetApp support.

Migrate from CN1610 switches to BES-53248 switches

Migrate CN1610 cluster switches to Broadcom-supported BES-53248 cluster switches

You must be aware of certain configuration information, port connections, and cabling requirements when you migrate CN1610 cluster switches to Broadcom-supported BES-53248 cluster switches.

- The following cluster switches are supported:
  - CN1610
  - BES-53248
- The cluster switches support the following node connections:
  - NetApp CN1610: ports 0/1 through 0/12 (10 GbE)
  - BES-53248: ports 0/1-0/16 (10/25 GbE)

    Additional ports can be activated by purchasing port licenses.
- The cluster switches use the following inter-switch link (ISL) ports:
  - NetApp CN1610: ports 0/13 through 0/16 (10 GbE)
  - BES-53248: ports 0/55-0/56 (100 GbE)
- The *NetApp Hardware Universe* contains information about ONTAP compatibility, supported EFOS firmware, and cabling to BES-53248 cluster switches.
- The appropriate ISL cabling is as follows:
  - **Beginning:** For CN1610 to CN1610 (SFP+ to SFP+), four SFP+ optical fiber or copper direct-attach cables.
  - **Interim:** For CN1610 to BES-53248 (SFP+ to SFP28), four 10G SFP+ optical transceiver/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.

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

See Install the Cluster Switch Health Monitor (CSHM) configuration file and Configure the cluster switch log collection feature for the steps required to enable cluster health switch log collection used for collecting switch-related log files.

How to migrate CN1610 cluster switches to BES-53248 cluster switches

To replace the existing CN1610 cluster switches in a cluster with Broadcom-supported BES-53248 cluster switches, you must perform a specific sequence of tasks.

What you'll need

The examples in this procedure use two nodes, each deploying two 10 GbE cluster interconnect ports: `e0a` and `e0b`.

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

- 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:
  - 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.
  - Disconnect the cables between ISL ports CL1 and CL2, and then use supported cables to reconnect the ports from CL1 to cs2.
- CN1610 switch CL1 is replaced by BES-53248 switch cs1:
  - 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.
  - Disconnect the cables between ISL ports CL1 and cs2, and then use supported cables to reconnect the ports from cs1 to cs2.

Steps

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. Verify that auto-revert is enabled on all cluster LIFs:

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

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

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

4. Display information about the devices in your configuration:

   `network device-discovery show -protocol cdp`

   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    CL2                       0/2               CN1610
            e0b    CL1                       0/2               CN1610
node1      /cdp
            e0a    CL2                       0/1               CN1610
            e0b    CL1                       0/1               CN1610
```

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

   a. Display the cluster network port attributes:

      `network port show -ipspace Cluster`

```
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. Display information about the logical interfaces:

```
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     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. Verify that the appropriate port licenses, RCF, and EFOS image are installed on the new BES-53248 switches as necessary for your requirements, and make any essential site customizations, such as users and passwords, network addresses, and so on.
7. Ping the remote cluster interfaces:

   `cluster ping-cluster -node node-name`

   The following example shows how to ping the remote cluster interfaces:

```
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)
```

8. Shut down the ISL ports 13 through 16 on the active CN1610 switch CL1:

   `shutdown`

   The following example shows how to shut down ISL ports 13 through 16 on the CN1610 switch CL1:

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

9. Build a temporary ISL between CN1610 CL1 and new BES-53248 cs2. The ISL will only be defined on cs2 as the existing ISL on CL1 can be reused.

   The following example builds a temporary ISL on cs2 (ports 13-16) to be connected to the existing ISL on CL1 (ports 13-16):

```
(cs2)# configure
(cs2) (Config)# port-channel name 1/2 temp-isl-cn1610
(cs2) (Config)# interface 0/13-0/16
(cs2) (Interface 0/13-0/16)# no spanning-tree edgeport
(cs2) (Interface 0/13-0/16)# addport 1/2
(cs2) (Interface 0/13-0/16)# exit
(cs2) (Config)# interface lag 2
(cs2) (Interface lag 2)# mtu 9216
(cs2) (Interface lag 2)# port-channel load-balance 7
(cs2) (Config)# exit

(cs2)# show port-channel 1/2
Local Interface................................ 1/2
Channel Name................................... temp-isl-cn1610
Link State..................................... Down
Admin Mode..................................... Enabled
Type........................................... Static
Port-channel Min-links......................... 1
Load Balance Option............................ 7
(Enhanced hashing mode)

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

10. On all nodes, remove the cables that are attached to the CN1610 switch CL2.

    You must then reconnect the disconnected ports on all nodes to the new BES-53248 switch cs2. Refer to the *NetApp Hardware Universe* for approved cabling options.

11. Remove four ISL cables from ports 13 to 16 on the CN1610 switch CL2.

    You must attach appropriate approved cabling connecting port 0/13 to 0/16 on the new BES-53248 switch cs2, to ports 13 to 16 on the existing CN1610 switch CL1.

12. Bring up ISLs 13 through 16 on the active CN1610 switch CL1.

    The following example illustrates the process of bringing up ISL ports 13 through 16 on CL1:

```
(CL1)# configure
(CL1)(Config)# interface 0/13-0/16
(CL1)(Interface 0/13-0/16,3/1)# no shutdown
(CL1)(Interface 0/13-0/16,3/1)# exit
(CL1)(Config)# exit
(CL1)#
```

13. Verify that the ISLs are **up** on the CN1610 switch CL1:

    `show port-channel`

    The `Link State` should be `Up`, `Type` should be `Static`, and `Port Active` should be `True` for ports 0/13 to 0/16:

```
(CL2)# show port-channel 3/1
Local Interface................................ 3/1
Channel Name................................... ISL-LAG
Link State..................................... Up
Admin Mode..................................... Enabled
Type........................................... Static
Load Balance Option............................ 7


(Enhanced hashing mode)
Mbr      Device/         Port         Port
Ports    Timeout         Speed        Active
-------- --------------  -----------  --------
0/13     actor/long      10 Gb Full   True
         partner/long
0/14     actor/long      10 Gb Full   True
         partner/long
0/15     actor/long      10 Gb Full   True
         partner/long
0/16     actor/long      10 Gb Full   True
         partner/long
```

14. Verify that the ISL ports are up on the BES-53248 switch:

    `show port-channel`

```
(cs2)# show port-channel 1/2

Local Interface................................ 1/2
Channel Name................................... temp-isl-cn1610
Link State..................................... Up
Admin Mode..................................... Enabled
Type........................................... Static
Port-channel Min-links......................... 1
Load Balance Option............................ 7

(Src/Dest MAC, VLAN, EType, incoming port)

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

15. Verify that all of the cluster interconnect ports are reverted to their home ports:

    `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
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
```

16. Verify that all of the cluster ports are connected:

    `network port show -ipspace Cluster`

    The following example shows the result of the previous command, verifying that all of the cluster interconnects are up:

```
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
```

17. Ping the remote cluster interfaces:

    `cluster ping-cluster -node node-name`

    The following example shows how to ping the remote cluster interfaces:

```
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     eob
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)
```

18. On all nodes, remove the cables that are attached to the CN1610 switch CL1.

    You must then reconnect the disconnected ports on all nodes to the new BES-53248 switch cs1. Refer to the *NetApp Hardware Universe* for approved cabling options.

19. Remove four ISL cables from ports 13 to 16 on BES-53248 switch cs2.
20. Remove the temporary port-channel 2 on cs2.

    The following example removes port-channel 2 and copies the running-configuration file to the startup-configuration file:

```
(cs2)# configure
(cs2) (Config)# deleteport 1/2 all
(cs2) (Config)# interface 0/13-0/16
(cs2) (Interface 0/13-0/16)# spanning-tree edgeport
(cs2) (Interface 0/13-0/16)# exit
(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 .
```

21. Verify the status of the cluster node port:

    `network port show -ipspace Cluster`

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

```
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
```

22. Verify that the interface is now home:

    `network interface show -vserver Cluster`

    The following example shows the status of cluster interconnect interfaces are `up` and `Is home` for node1 and node2:

```
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
```

23. Ping the remote cluster interfaces and then perform a remote procedure call server check:

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

    The following example shows how to ping the remote cluster interfaces:

```
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)
```

24. Display the information about the devices in your configuration:

    `network device-discovery show -protocol cdp`

    The following examples show node1 and node2 have been migrated from CN1610 CL2 and CL1 to BES-53248 cs2 and cs1:

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

25. Remove the replaced CN1610 switches if they are not automatically removed:

```
system cluster-switch delete -device device-name
```

The following example shows how to remove the CN1610 switches:

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

26. 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*
```

After you finish

See Install the Cluster Switch Health Monitor (CSHM) configuration file and Configure the cluster switch log collection feature for the steps required to enable cluster health switch log collection used for collecting switch-related log files.

Related information

Hardware Universe

Broadcom-supported BES-53248 switches setup and configuration

Migrate to a two-node switched cluster

Migrate to a two-node switched cluster with Broadcom-supported BES-53248 cluster switches

If you have a two-node switchless cluster, you can migrate, non-disruptively, to a two-node switched cluster that includes Broadcom-supported BES-53248 cluster switches. The documented process works for all cluster node ports using optical or Twinax ports but is not supported on this switch if nodes are using onboard 10GBASE-T RJ45 ports for the cluster network ports.

About this task

Most systems require two dedicated cluster-network ports on each controller.

Ensure that the BES-53248 cluster switch is set up as described in Broadcom-supported BES-53248 switches setup and configuration before starting this migration process.

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

See Installing the Cluster Switch Health Monitor (CSHM) configuration file in the *Switch Setup and Configuration Guide for Broadcom-supported BES-53248 switches* guide.

Also, see See Install the Cluster Switch Health Monitor (CSHM) configuration file and Configure the cluster switch log collection feature for the steps required to enable cluster health switch log collection used for collecting switch-related log files.

Migrate to a switched NetApp cluster environment using Broadcom-supported BES-53248 cluster switches

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 to enable you to scale beyond two nodes in the cluster.

What you'll need

Two-node switchless configuration:

- The two-node switchless configuration must be properly set up and functioning.
- The nodes must be 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 must be in the up state.
- All cluster logical interfaces (LIFs) must be in the up state and on their home ports.

Broadcom-supported BES-53248 cluster switch configuration:

- The BES-53248 cluster switch must be fully functional on both switches.
- Both switches must have management network connectivity.
- There must be console access to the cluster switches.
- BES-53248 node-to-node switch and switch-to-switch connections must use 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 must be connected to ports 0/55 and 0/56 on both BES-53248 switches.
- Initial customization of both the BES-53248 switches must be completed. So that the:
  - BES-53248 switches are running the latest version of software
  - BES-53248 switches have optional port licenses installed, if purchased
  - Reference Configuration Files (RCFs) have been applied to the switches

    Any site customization, such as SMTP, SNMP, and SSH must be configured on the new switches.

About this task

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.

Steps

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. 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
   ```

4. 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
   ```

   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
```

5. Display the list of neighboring devices:

   `show isdp neighbors`

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

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
```

6. Verify that all cluster ports are `up`:

   `network port show -ipspace Cluster`

   Each port should display up for `Link` and `healthy` for `Health Status`.

```
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
```

7. Verify that all cluster LIFs are `up` and operational: `network interface show -vserver Cluster`

   Each cluster LIF should display `true` for `Is Home` and have a `Status Admin/Oper` of `up/up`

```
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
```

8. Verify that `auto-revert` is enabled on all cluster LIFs: `network interface show -vserver Cluster -fields auto-revert`

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

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

9. 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.

10. 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.
11. 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
```

12. Verify that all cluster LIFs are up, operational, and display as `true` for `Is Home`:

    `network interface show -vserver Cluster`

    The following example shows that all of the LIFs are up on node1 and node2 and that `Is Home` results are `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      169.254.209.69/16  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
```

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

    `cluster show`

    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
```

14. 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.
15. 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.
16. 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
```

17. Verify that all cluster ports are `up`:

    `network port show -ipspace Cluster`

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

```
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
```

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

    `network interface show -vserver Cluster`

    This might take several minutes to complete.

    The following example shows that all LIFs are up on node1 and node2 and that `Is Home` results are `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      169.254.209.69/16  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
```

19. Verify that both nodes each have one connection to each switch:

    `show isdp neighbors`

    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
```

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

    `network device-discovery show -protocol cdp`

```
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
```

21. Verify that the settings are disabled:

    `network options switchless-cluster show`

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
```

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

    `cluster show`

    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
```

23. Ensure that the cluster network has full connectivity using the command:

    `cluster ping-cluster -node node-name`

```
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)
```

24. Change the privilege level back to admin:

```
set -privilege admin
```

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

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

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

After you finish

See Install the Cluster Switch Health Monitor (CSHM) configuration file and Configure the cluster switch log collection feature for the steps required to enable cluster health switch log collection used for collecting switch-related log files.

Related information

NetApp Hardware Universe

Broadcom-supported BES-53248 switches setup and configuration

NetApp KB Article: How to suppress automatic case creation during scheduled maintenance windows

Upgrade a switch in an NDO/NDU environment

Upgrade a BES-53248 cluster switch in an NDO/NDU environment

Upgrading BES-53248 cluster switches starts with preparing the controller for upgrade, installing the EFOS software, licenses, and reference configuration file (RCF). After the installation, you can restore the controller configuration in a nondisruptive upgrade (NDU) and nondisruptive operation (NDO) environment.

Before you begin

The following conditions must exist before you install the EFOS software, licenses, and the RCF file on an existing NetApp BES-53248 cluster switch:

- The cluster must be a fully functioning cluster (no error log messages or other issues).
- The cluster must not contain any defective cluster network interface cards (NICs).
- All connected ports on both cluster switches must be functional.
- All cluster ports must be up.
- All cluster LIFs must be administratively and operationally up and on their home ports.
- The ONTAP `cluster ping-cluster -node node1` advanced privilege command must indicate that `larger than PMTU communication` is successful on all paths.
- There might be command dependencies between command syntax in the RCF and EFOS versions.

About this task

You must consult the switch compatibility table on the NetApp BES-53248 switches page for the supported EFOS, RCF, and ONTAP versions at: NetApp BES-53248 switches.

This procedure applies to a functioning cluster and allows for NDU and NDO. The examples in this procedure use the following switch and node nomenclature:

- The NetApp switch names are `cs1` and `cs2`.
- The example used in this procedure starts the upgrade 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 cluster switches are ports 0/55 and 0/56.
- The node connections supported for the NetApp cluster switches are ports 0/1 through 0/16 with default licensing.

- The examples in this procedure use two nodes, but you can have up to 24 nodes in a cluster.
- Repeat all procedures in this section to upgrade the EFOS software and RCF file on the other switch, **cs1**.

Prepare the controller for a cluster switch upgrade

You can use 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.

   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`

   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`

   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 the EFOS software

You can use this procedure to install the EFOS software on the BES-53248 cluster switch. You can download the applicable Broadcom EFOS software for your cluster switches from the Broadcom Ethernet Switch Support site.

About this task

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 to 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.

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) 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. 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. 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. 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. 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. The switch configuration and license information will be lost.
	FIPS compliant	Non-FIPS compliant	

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 channels are marked in the **Down** state. See this KB article 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.

   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`

```
(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`

```
(cs2) # show version

Switch: 1

System Description.............................. Quanta IX8-B 48x25GB SFP
8x100GB QSFP, 3.4.3.3, Linux 4.4.117-ceeeb99d, 2016.05.00.04
Machine Type.................................... Quanta IX8-B 48x25GB SFP
8x100GB QSFP
Machine Model................................... IX8-B
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.

```
(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`

```
(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`

```
(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`

```
(cs2) # show version

Switch: 1

System Description.............................. x86_64-
quanta_common_rglbmc-r0, 3.4.4.6, Linux 4.4.211-28a6fe76, 2016.05.00.04
Machine Type.................................... x86_64-
quanta_common_rglbmc-r0
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
```

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.

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 the following screen appears:

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

   After selecting **ONIE"**, the switch will then load and present you with the following choices:

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

   The switch now will boot into ONIE installation mode.

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

   Once the following message appears press <Enter> to invoke the ONIE console:

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

The ONIE discovery will continue and messages will be 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:

```
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
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 will install and then reboot the switch. Let the switch reboot normally into the new EFOS version.

6. Verify that the new switch software is installed: `show bootvar`

```
(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.

Related information

Broadcom Ethernet Switch Support

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. New ports can be added by purchasing more licenses.

The following licenses are 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	SW-BES53248-24P-1025G-LIC
Broadcom 24Port 10G25G License Key, X190005/R	EFOS 3.4.4.6 and later

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.

   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
   ```

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

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

```
(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`

```
(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.

```
(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`

```
(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`

```
(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`

```
(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. Re-applying an RCF to an existing working production switch is not advisable.

Restrictions and limitations

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

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

```
(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 following log output is returned:

```
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 backup port licenses to the server:

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

See Installing licenses for BES-53248 cluster switches for details of the firmware versions supported for available licenses.

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.

Edit the Reference Configuration File (RCF)

In order 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.

If you try to edit a previously installed RCF, the process might fail because there is an existing configuration for other areas in the RCF, see Edit a previously installed RCF file.

For details of the available license types for use on the BES-53248 cluster switch, see Installing licenses for BES-53248 cluster switches.

For example to activate the SW-BES54248-40-100G-LIC license, you must uncomment the following section in the RCF:

```
.
.
!
! 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
- 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.

Edit a previously installed RCF file

After you edit a previously installed RCF file and run the `script apply` command, you might get the following error message:

```
(CS1)# script apply BES-53248_RCF_v1.6-Cluster-HA.scr
Are you sure you want to apply the configuration script? (y/n) y
```

After you select **y**, you get the following error message:

```
config
 ...
 match cos 5
 Unrecognized command : match cos 5
 Error! in configuration script file at line number 40.
 CLI Command :: match cos 5.
 Aborting script.
```

To avoid or resolve this issue, you can choose one of the following options:

- To avoid the error, you can use following procedure:
  1. Create a second RCF containing only the new port configuration.
  2. Copy the second RCF to the switch.
  3. Apply the script to the switch using the command: `script apply`.
- To resolve the error, see the Knowledge Base article: Error! in configuration script file at line number XX when applying a new RCF

Install the Reference Configuration File (RCF)

You can install the RCF after setting up the BES-53248 cluster switch for the first time and after the new license or licenses have been applied. 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 following KB article for details.

Reset the Broadcom IP switch to factory defaults

Before installing a new switch software version and RCFs, you must erase the Broadcom switch settings and perform basic configuration.

About this task

- You must repeat these steps on each of the cluster switches.
- You must be connected to the switch using the serial console.
- This task resets the configuration of the management network.

Steps

1. Change to the elevated command prompt (#): `enable`

```
(cs2)> enable
(cs2)#
```

2. Erase the startup configuration and remove the banner
   a. Erase the startup configuration:

erase startup-config

```
(cs2)# erase startup-config
Are you sure you want to clear the configuration? (y/n) y
(cs2)#
```

This command does not erase the banner.

b. Remove the banner:

no set clibanner

```
(cs2)# configure
(cs2)(Config)# no set clibanner
(cs2)(Config)#
```

3. Reboot the switch: **(cs2) #reload**

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

If the system asks whether to save the unsaved or changed configuration before reloading the switch, select **No**.

4. Wait for the switch to reload, and then log in to the switch.

The default user is “admin”, and no password is set. A prompt similar to the following is displayed:

```
(Routing)>
```

5. Change to the elevated command prompt:

`enable`

```
Routing)> enable
(Routing)#
```

6. Set the service port protocol to `none`:

`serviceport protocol none`

```
(Routing)# serviceport protocol none
Changing protocol mode will reset ip configuration.
Are you sure you want to continue? (y/n) y
(Routing) #
```

7. Assign the IP address to the service port:

   `serviceport ip ip-address netmask gateway`

   The following example shows a service port assigned IP address "10.10.10.10" with subnet "255.255.255.0" and gateway "10.10.10.1":

```
(Routing)# serviceport ip 10.10.10.10 255.255.255.0 10.10.10.1
```

8. Verify that the service port is correctly configured:

   `show serviceport`

   The following example shows that the port is up and the correct addresses have been assigned:

```
(Routing)# show serviceport
Interface Status.............................. Up
IP Address..................................... 10.10.10.10
Subnet Mask.................................... 255.255.255.0
Default Gateway................................ 10.10.10.1
IPv6 Administrative Mode....................... Enabled
IPv6 Prefix is ................................
fe80::dac4:97ff:fe56:87d7/64
IPv6 Default Router............................ fe80::222:bdff:fef8:19ff
Configured IPv4 Protocol....................... None
Configured IPv6 Protocol....................... None
IPv6 AutoConfig Mode........................... Disabled
Burned In MAC Address.......................... D8:C4:97:56:87:D7
(Routing) #
```

9. If desired, configure the SSH server.

   The RCF file disables the Telnet protocol. If you do not configure the SSH server, you can only access the bridge using the serial port connection.

   a. Generate RSA keys.

```
(Routing)# configure
(Routing) (Config)# crypto key generate rsa
```

b. Generate DSA keys (optional)

```
(Routing)# configure
(Routing) (Config)# crypto key generate dsa
```

c. If you are using the FIPS compliant version of EFOS, generate the ECDSA keys. The following example creates the keys with a length of 256. Valid values are 256, 384 or 521.

```
(Routing)# configure
(Routing) (Config)# crypto key generate ecdsa 256
```

d. Enable the SSH server.

If necessary, exit the configuration context.

```
(Routing) (Config)# end
(Routing)# ip ssh server enable
```

If keys already exist, then you might be asked to overwrite them.

10. If desired, configure the domain and name server:

`configure`

The following example shows the `ip domain` and `ip name server` commands:

```
(Routing)# configure
(Routing) (Config)# ip domain name lab.netapp.com
(Routing) (Config)# ip name server 10.99.99.1 10.99.99.2
(Routing) (Config)# exit
```

11. If desired, configure the time zone and time synchronization (SNTP).

The following example shows the `sntp` commands, specifying the IP address of the SNTP server and the relative time zone.

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

12. Configure the switch name:

```
hostname cs2
```

The switch prompt will display the new name:

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

13. Save the configuration:

```
write memory
```

You receive prompts and output similar to the following 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!
```

Install the Reference Configuration File (RCF)

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 connectivity 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.

   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. Install the RCF on the BES-53248 cluster switch using the copy command.

```
(cs2)# copy sftp://172.19.2.1/tmp/BES-53248_RCF_v1.6-Cluster-HA.txt
nvram:script BES-53248_RCF_v1.6-Cluster-HA.scr

Remote Password:**

Mode..................................... SFTP
Set Server IP.............................. 172.19.2.1
Path....................................... //tmp/
Filename................................... BES-53248_RCF_v1.6-
Cluster-HA.txt
Data Type.................................. Config Script
Destination Filename....................... BES-53248_RCF_v1.6-
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.
```

Depending on your environment, you might need to use a double slash in the copy command, for example: `copy sftp://172.19.2.1//tmp/BES-53248_RCF_v1.6-Cluster-HA.txt nvram:script BES-53248_RCF_v1.6-Cluster-HA.scr`.

The `.scr` extension must be set as part of the file name before invoking the script. This extension is the extension for the EFOS operating system. The switch validates the script automatically when it is downloaded to the switch, and the output goes to the console. Also, you can change the name of the `.scr` to fit your console screen for easier readability, for example: `copy sftp://172.19.2.1/tmp/BES-53248_RCF_v1.6-Cluster-HA.txt nvram:script RCF_v1.6-Cluster-HA.scr`.

The file name must not include the symbols `\/:*?"<>|` and the maximum length allowed is 32 chars.

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

```
script list
```

```
(cs2)# script list

Configuration Script Name                    Size(Bytes)  Date of
Modification
-----------------------------------------  -----------
--------------------
BES-53248_RCF_v1.6-Cluster-HA.scr          2241         2020 09 30
05:41:00

1 configuration script(s) found.
```

5. Apply the script to the switch.

   `script apply`

```
(cs2)# script apply BES-53248_RCF_v1.6-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_v1.6-Cluster-HA.scr' applied.
```

6. Verify the ports for an additional license after the RCF is applied:

   `show port all | exclude Detach`

```
(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
```

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

```
show running-config
```

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

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

   `write memory`

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

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

Config file 'startup-config' created successfully.

Configuration Saved!
```

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

   `reload`

```
(cs2)# reload

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

System will now restart!
```

Once the RCF is installed on the first switch, repeat these steps to install the RCF on the second cluster switch.

See this KB for further information when installing an RCF for MetroCluster.

Install the Cluster Switch Health Monitor (CSHM) configuration file

You can use this procedure to install the applicable configuration file for cluster switch health monitoring of BES-53248 cluster switches. In ONTAP releases 9.5P7 and earlier and 9.6P2 and earlier, you must download the cluster switch health monitor configuration file separately. In ONTAP releases 9.5P8 and later, 9.6P3 and later, and 9.7 and later, the cluster switch health monitor configuration file is bundled with ONTAP.

What you'll need

Before you setup the switch health monitor for BES-53248 cluster switches, you must ensure that the ONTAP cluster is up and running.

It is advisable to enable SSH in order to use all features available in CSHM.

Steps

1. Download the cluster switch health monitor configuration zip file based on the corresponding ONTAP release version. This file is available from the page: NetApp Software download
   a. On the Software download page, select **Switch Health Monitor Configuration Files**
   b. Select Platform = **ONTAP** and click **Go!**
   c. On the Switch Health Monitor Configuration Files for ONTAP page, click **View & Download**
   d. On the Switch Health Monitor Configuration Files for ONTAP - Description page, click **Download** for the applicable cluster switch model, for example: **Broadcom-supported BES-53248**
   e. On the End User License Agreement page, click **Accept**
   f. On the Switch Health Monitor Configuration Files for ONTAP - Download page, select the applicable configuration file, for example, **Broadcom_BES-53248.zip**
2. Upload the applicable zip file to your internal web server where the IP address is X.X.X.X.

   For an internal web server IP address of 192.168.2.20 and assuming a /usr/download directory exists, you can upload your zip file to your web server using scp:

   ```
   % scp Broadcom_BES-53248.zip
   admin@192.168.2.20:/usr/download/Broadcom_BES-53248.zip
   ```

3. Access the advanced mode setting from one of the ONTAP systems in the cluster, using the command `set -privilege advanced`:

   ```
   cluster1::> set -privilege advanced
   ```

4. Run the switch health monitor configure command `system cluster-switch configure-health-monitor -node * -package-url http://server/file-location`:

   ```
   cluster1::> system cluster-switch configure-health-monitor -node *
   -package-url
   http://192.168.2.20/usr/download/Broadcom_BES-53248.zip
   ```

5. Verify that the command output contains the text string "downloaded package processed successfully". If an error occurs, contact NetApp support.
6. Run the command `system cluster-switch show` on the ONTAP system and ensure that the cluster switches are discovered with the monitored field set to "True".

   ```
   cluster1::> system cluster-switch show
   ```

If at any time you revert to an earlier version of ONTAP, you will need to install the CSHM configuration file again to enable switch health monitoring of BES-53248 cluster switches.

Configure the cluster switch log collection feature

The cluster switch health monitor log collection feature is used to collect switch-related log files in ONTAP. You must make sure that you have set up your environment using the BES-53248 cluster switch CLI as detailed here.

Steps

1. Generate the SSH keys:

```
crypto key generate
```

```
(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
SCP server Administrative Mode: ..... Disabled

(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 ssh pubkey-auth
(switch)# ip scp server enable
(switch)# write memory
This operation may take a few minutes.
Management interfaces will not be available during this time.
Are you sure you want to save? (y/n) y

Config file 'startup-config' created successfully.

Configuration Saved!
```

2. 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
SCP server Administrative Mode: ..... Disabled
```

3. For ONTAP 9.8 and later, enable the cluster switch health monitor log collection feature for collecting switch-related log files, using the commands:

   `system switch ethernet log setup-password` and `system switch ethernet log enable-collection`

   Enter: `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
RSA key fingerprint is e5:8b:c6:dc:e2:18:18:09:36:63:d9:63:dd:03:d9:cc
Do you want to continue? {y|n}::[n] y

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
RSA key fingerprint is 57:49:86:a1:b9:80:6a:61:9a:86:8e:3c:e3:b7:1f:b1
Do you want to continue? {y|n}:: [n] y

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

Followed by: `system switch ethernet log enable-collection`

```
cluster1::*> system switch ethernet log enable-collection

Do you want to enable cluster log collection for all nodes in the
cluster?
{y|n}: [n] y

Enabling cluster switch log collection.

cluster1::*>
```

4. For ONTAP 9.5P15, 9.6P11, 9.7P8 and later patch releases, enable the cluster switch health monitor log collection feature for collecting switch-related log files, using the commands:

   `system cluster-switch log setup-password` and `system cluster-switch log enable-collection`

   Enter: `system cluster-switch log setup-password`

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

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

Enter the switch name: cs1
RSA key fingerprint is e5:8b:c6:dc:e2:18:18:09:36:63:d9:63:dd:03:d9:cc
Do you want to continue? {y|n}::[n] y

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

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

Enter the switch name: cs2
RSA key fingerprint is 57:49:86:a1:b9:80:6a:61:9a:86:8e:3c:e3:b7:1f:b1
Do you want to continue? {y|n}:: [n] y

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

Followed by: `system cluster-switch log enable-collection`

```
cluster1::*> system cluster-switch log enable-collection

Do you want to enable cluster log collection for all nodes in the
cluster?
{y|n}: [n] y

Enabling cluster switch log collection.
```

The log collect command is not available at this time. See Bug 1225042 for further details.

If any of these commands return an error, contact NetApp support.

Verify the configuration after a BES-53248 cluster switch upgrade

You can use the commands provided here to verify that all is operational 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`.

   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. Verify that for each LIF `Is Home` is `true` and `Status Admin/Oper` is `up` on both nodes using the command:

   `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    169.254.217.125/16 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`

```
cluster1::> cluster show

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

Replace a Broadcom-supported BES-53248 cluster switch

Replacing a defective Broadcom-supported BES-53248 cluster switch in a cluster network is a nondisruptive procedure (NDU).

Before you begin

The following conditions must exist before performing the switch replacement in the current environment and on the replacement switch.

- Existing cluster and network infrastructure:
  - The existing cluster must be verified as completely functional, with at least one fully connected cluster switch.
  - All cluster ports must be up.
  - All cluster logical interfaces (LIFs) must be administratively and operationally up and on their home ports.
  - The ONTAP `cluster ping-cluster -node node1` command must indicate that `basic`

`connectivity` and `larger than PMTU communication` are successful on all paths.

- BES-53248 replacement cluster switch:
  - Management network connectivity on the replacement switch must be functional.
  - Console access to the replacement switch must be in place.
  - The node connections are ports 0/1 through 0/16 with default licensing.
  - All Inter-Switch Link (ISL) ports must be disabled on ports 0/55 and 0/56.
  - The desired reference configuration file (RCF) and EFOS operating system switch image must be loaded onto the switch.
  - Initial customization of the switch must be complete, as detailed in Configuring a new Broadcom-supported BES-53248 switch.

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

About this task

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::>`

The following procedure is based on the following cluster network 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. Install the appropriate 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.

2. 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).

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.

No password is required to enter `enable` mode.

```
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)#
```

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

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

```
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
```

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

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

5. Remove all cables from the BES-53248 cs2 switch, and then connect them to the same ports on the BES-53248 newcs2 switch.
6. 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.

   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
```

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

   If you purchased additional licenses for additional ports, shut down these ports too.

```
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
```

8. Verify that port e0b is `up`:

   `network port show -ipspace Cluster`

   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
```

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

   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
```

10. Display information about the nodes in a cluster: `cluster show`

    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
```

11. 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
```

12. Verify that the cluster network is healthy:

```
show isdp neighbors
```

```
(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
```

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

Related information

NetApp Support Site

NetApp Hardware Universe

Broadcom-supported BES-53248 switches setup and configuration