



# **Configure the MetroCluster IP switches**

## **ONTAP MetroCluster**

NetApp  
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# Configure the MetroCluster IP switches

## Choose the correct MetroCluster IP switch configuration procedure

You must configure the IP switches to provide backend MetroCluster IP connectivity. The procedure you follow depends on your switch vendor.

- [Configure Broadcom IP switches](#)
- [Configure Cisco IP switches](#)
- [Configure NVIDIA IP switches](#)

## Configure Broadcom IP switches for cluster interconnect and backend MetroCluster IP connectivity

You must configure the Broadcom IP switches for use as the cluster interconnect and for backend MetroCluster IP connectivity.



Your configuration requires additional licenses (6 x 100-Gb port license) in the following scenarios:

- You use ports 53 and 54 as a 40-Gbps or 100-Gbps MetroCluster ISL.
- You use a platform that connects the local cluster and MetroCluster interfaces to ports 49 - 52.

## Resetting 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 IP switches in the MetroCluster IP configuration.
- 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`

```
(IP_switch_A_1)> enable
(IP_switch_A_1) #
```

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

```
erase startup-config
```

```
(IP_switch_A_1) #erase startup-config  
  
Are you sure you want to clear the configuration? (y/n) y  
  
(IP_switch_A_1) #
```

This command does not erase the banner.

b. Remove the banner:

**no set clibanner**

```
(IP_switch_A_1) #configure  
(IP_switch_A_1) (Config) # no set clibanner  
(IP_switch_A_1) (Config) #
```

3. Reboot the switch: **(IP\_switch\_A\_1) #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:bdf8:fe56:87d7
Configured IPv4 Protocol..... None
Configured IPv6 Protocol..... None
IPv6 AutoConfig Mode..... Disabled
Burned In MAC Address..... D8:C4:97:56:87:D7

(Routing) #
```

9. 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.
- You must configure the SSH server in order to use log collection and other external tools.

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 521. Valid values are 256, 384 or 521.

```
(Routing) #configure
(Routing) (Config)#crypto key generate ecdsa 521
```

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
(Routing) (Config)#
```

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

For EFOS version 3.10.0.3 and later, use the `ntp` command, as shown in the following example:

```
> (Config)# ntp ?

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

>(Config)# ntp server ?

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

>(Config)# ntp server 10.99.99.5
```

## 12. Configure the switch name:

```
hostname IP_switch_A_1
```

The switch prompt will display the new name:

```
(Routing) # hostname IP_switch_A_1

(IP_switch_A_1) #
```

## 13. Save the configuration:

```
write memory
```

You receive prompts and output similar to the following example:

```
(IP_switch_A_1) #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!

```
(IP_switch_A_1) #
```

14. Repeat the previous steps on the other three switches in the MetroCluster IP configuration.

## Downloading and installing the Broadcom switch EFOS software

You must download the switch operating system file and RCF file to each switch in the MetroCluster IP configuration.

### About this task

This task must be repeated on each switch in the MetroCluster IP configuration.

#### 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.

### Steps

1. Download the switch firmware from the [Broadcom support site](#).
2. Check if your version of EFOS is FIPS compliant or non-FIPS compliant by using the `show fips status` command. In the following examples, `IP_switch_A_1` is using FIPS compliant EFOS and `IP_switch_A_2` is using non-FIPS compliant EFOS.

#### Example 1



```
IP_switch_A_1 #show fips status

System running in FIPS mode

IP_switch_A_1 #
```

## Example 2

```
IP_switch_A_2 #show fips status
                ^
% Invalid input detected at ``^` marker.

IP_switch_A_2 #
```

3. Use the following table to determine which method you must follow:

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	

- Method 1: [Steps to upgrade EFOS with downloading the software image to the backup boot partition](#)
- Method 2: [Steps to upgrade EFOS using the ONIE OS installation](#)

### Steps to upgrade EFOS with downloading the software image to the backup boot partition

You can perform the following steps only if both EFOS versions are non-FIPS compliant or both EFOS versions are FIPS compliant.



Do not use these steps if one version is FIPS compliant and the other version is non-FIPS compliant.

#### Steps

1. Copy the switch software to the switch: `copy sftp://user@50.50.50.50/switchsoftware/efos-3.4.4.6.stk backup`

In this example, the efos-3.4.4.6.stk operating system file is copied from the SFTP server at 50.50.50.50 to the backup partition. You need to use the IP address of your TFTP/SFTP server and the file name of the RCF file that you need to install.

```
(IP_switch_A_1) #copy sftp://user@50.50.50.50/switchsoftware/efos-3.4.4.6.stk backup
Remote Password:*****

Mode..... SFTP
Set Server IP..... 50.50.50.50
Path..... /switchsoftware/
Filename..... efos-3.4.4.6.stk
Data Type..... Code
Destination Filename..... backup

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...
SFTP Code transfer starting...

File transfer operation completed successfully.

(IP_switch_A_1) #
```

2. Set the switch to boot from the backup partition on the next switch reboot:

```
boot system backup
```

```
(IP_switch_A_1) #boot system backup
Activating image backup ..

(IP_switch_A_1) #
```

3. Verify that the new boot image will be active on the next boot:

```
show bootvar
```

```
(IP_switch_A_1) #show bootvar
```

Image Descriptions

active :

backup :

Images currently available on Flash

unit	active	backup	current-active	next-active
1	3.4.4.2	3.4.4.6	3.4.4.2	3.4.4.6

```
(IP_switch_A_1) #
```

#### 4. Save the configuration:

```
write memory
```

```
(IP_switch_A_1) #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

Configuration Saved!

```
(IP_switch_A_1) #
```

#### 5. Reboot the switch:

```
reload
```

```
(IP_switch_A_1) #reload
```

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

#### 6. Wait for the switch to reboot.



In rare scenarios the switch may fail to boot. Follow the [Steps to upgrade EFOS using the ONIE OS installation](#) to install the new image.

7. If you change the switch from EFOS 3.4.x.x to EFOS 3.7.x.x or vice versa then follow the following two procedures to apply the correct configuration (RCF):
  - a. [Resetting the Broadcom IP switch to factory defaults](#)
  - b. [Downloading and installing the Broadcom RCF files](#)
8. Repeat these steps on the remaining three IP switches in the MetroCluster IP configuration.

### Steps to 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.

#### 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**

```

(Routing) #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
(Routing) #

```

## 7. Complete the installation

The switch will reboot with no configuration applied and reset to factory defaults. Follow the two procedures to configure the switch basic settings and apply the RCF file as outlined in the following two documents:

- a. Configure the switch basic settings. Follow step 4 and later: [Resetting the Broadcom IP switch to factory defaults](#)
- b. Create and apply the RCF file as outlined in [Downloading and installing the Broadcom RCF files](#)

## Downloading and installing the Broadcom RCF files

You must generate and install the switch RCF file to each switch in the MetroCluster IP configuration.

### Before you begin

This task requires file transfer software, such as FTP, TFTP, SFTP, or SCP, to copy the files to the switches.

### About this task

These steps must be repeated on each of the IP switches in the MetroCluster IP configuration.

There are four RCF files, one for each of the four switches in the MetroCluster IP configuration. You must use the correct RCF files for the switch model you are using.

Switch	RCF file
IP_switch_A_1	v1.32_Switch-A1.txt
IP_switch_A_2	v1.32_Switch-A2.txt
IP_switch_B_1	v1.32_Switch-B1.txt
IP_switch_B_2	v1.32_Switch-B2.txt



The RCF files for EFOS version 3.4.4.6 or later 3.4.x.x. release and EFOS version 3.7.0.4 are different. You need to make sure that you have created the correct RCF files for the EFOS version that the switch is running.

EFOS version	RCF file version
3.4.x.x	v1.3x, v1.4x
3.7.x.x	v2.x

### Steps

1. Generate the Broadcom RCF files for MetroCluster IP.
  - a. Download the [RcfFileGenerator for MetroCluster IP](#)
  - b. Generate the RCF file for your configuration using the RcfFileGenerator for MetroCluster IP.



Modifications to the RCF files after download are not supported.



2. Copy the RCF files to the switches:

- a. Copy the RCF files to the first switch: `copy sftp://user@FTP-server-IP-address/RcfFiles/switch-specific-RCF/BES-53248_v1.32_Switch-A1.txt nvram:script BES-53248_v1.32_Switch-A1.scr`

In this example, the "BES-53248\_v1.32\_Switch-A1.txt" RCF file is copied from the SFTP server at "50.50.50.50" to the local bootflash. You need to use the IP address of your TFTP/SFTP server and the file name of the RCF file that you need to install.

```

(IP_switch_A_1) #copy sftp://user@50.50.50.50/RcfFiles/BES-
53248_v1.32_Switch-A1.txt nvram:script BES-53248_v1.32_Switch-A1.scr

Remote Password:*****

Mode..... SFTP
Set Server IP..... 50.50.50.50
Path..... /RcfFiles/
Filename..... BES-
53248_v1.32_Switch-A1.txt
Data Type..... Config Script
Destination Filename..... BES-
53248_v1.32_Switch-A1.scr

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...
File transfer operation completed successfully.

Validating configuration script...

config

set clibanner
"*****
*****

* NetApp Reference Configuration File (RCF)

*

* Switch      : BES-53248

...
The downloaded RCF is validated. Some output is being logged here.
...

Configuration script validated.
File transfer operation completed successfully.

(IP_switch_A_1) #

```

b. Verify that the RCF file is saved as a script:

```
script list
```

```
(IP_switch_A_1) #script list

Configuration Script Name          Size(Bytes)  Date of Modification
-----
BES-53248_v1.32_Switch-A1.scr      852         2019 01 29 18:41:25

1 configuration script(s) found.
2046 Kbytes free.
(IP_switch_A_1) #
```

c. Apply the RCF script:

```
script apply BES-53248_v1.32_Switch-A1.scr
```

```
(IP_switch_A_1) #script apply BES-53248_v1.32_Switch-A1.scr

Are you sure you want to apply the configuration script? (y/n) y

config

set clibanner
"*****
*****

* NetApp Reference Configuration File (RCF)

*

* Switch      : BES-53248

...
The downloaded RCF is validated. Some output is being logged here.
...

Configuration script 'BES-53248_v1.32_Switch-A1.scr' applied.

(IP_switch_A_1) #
```

d. Save the configuration:

```
write memory
```

```
(IP_switch_A_1) #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

Configuration Saved!

```
(IP_switch_A_1) #
```

e. Reboot the switch:

```
reload
```

```
(IP_switch_A_1) #reload
```

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

- f. Repeat the previous steps for each of the other three switches, being sure to copy the matching RCF file to the corresponding switch.

3. Reload the switch:

```
reload
```

```
IP_switch_A_1# reload
```

4. Repeat the previous steps on the other three switches in the MetroCluster IP configuration.

## Disable unused ISL ports and port channels

NetApp recommends disabling unused ISL ports and port channels to avoid unnecessary health alerts.

1. Identify the unused ISL ports and port channels using the RCF file banner:



If the port is in breakout mode, the port name you specify in the command might be different than the name stated in the RCF banner. You can also use the RCF cabling files to find the port name.

**For ISL port details**

Run the command `show port all`.

**For port channel details**

Run the command `show port-channel all`.

## 2. Disable the unused ISL ports and port channels.

You must run the following commands for each identified unused port or port channel.

```
(SwitchA_1)> enable
(SwitchA_1)# configure
(SwitchA_1) (Config)# <port_name>
(SwitchA_1) (Interface 0/15)# shutdown
(SwitchA_1) (Interface 0/15)# end
(SwitchA_1)# write memory
```

# Configure Cisco IP switches

## Configure Cisco IP switches for cluster interconnect and backend MetroCluster IP connectivity

You must configure the Cisco IP switches for use as the cluster interconnect and for backend MetroCluster IP connectivity.

**About this task**

Several of the procedures in this section are independent procedures and you only need to execute those you are directed to or are relevant to your task.

**Resetting the Cisco IP switch to factory defaults**

Before installing any RCF file, you must erase the Cisco switch configuration and perform basic configuration. This procedure is required when you want to reinstall the same RCF file after a previous installation failed, or if you want to install a new version of an RCF file.

**About this task**

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

**Steps**

1. Reset the switch to factory defaults:
  - a. Erase the existing configuration:

```
write erase
```

b. Reload the switch software:

```
reload
```

The system reboots and enters the configuration wizard. During the boot, if you receive the prompt “Abort Auto Provisioning and continue with normal setup? (yes/no)[n]”, you should respond `yes` to proceed.

c. In the configuration wizard, enter the basic switch settings:

- Admin password
- Switch name
- Out-of-band management configuration
- Default gateway
- SSH service (RSA)

After completing the configuration wizard, the switch reboots.

d. When prompted, enter the user name and password to log in to the switch.

The following example shows the prompts and system responses when configuring the switch. The angle brackets (<<<) show where you enter the information.

```
---- System Admin Account Setup ----
Do you want to enforce secure password standard (yes/no) [y]:y
**<<<**

    Enter the password for "admin": password
    Confirm the password for "admin": password
        ---- Basic System Configuration Dialog VDC: 1 ----

This setup utility will guide you through the basic configuration of
the system. Setup configures only enough connectivity for management
of the system.

Please register Cisco Nexus3000 Family devices promptly with your
supplier. Failure to register may affect response times for initial
service calls. Nexus3000 devices must be registered to receive
entitled support services.

Press Enter at anytime to skip a dialog. Use ctrl-c at anytime
to skip the remaining dialogs.
```

You enter basic information in the next set of prompts, including the switch name, management address, and gateway, and select SSH with RSA.



This example shows the minimum information required to configure the RCF, additional options can be configured after the RCF has been applied. For example, you can configure SNMPv3, NTP, or SCP/SFTP after you have applied the RCF.

```
Would you like to enter the basic configuration dialog (yes/no): yes
Create another login account (yes/no) [n]:
Configure read-only SNMP community string (yes/no) [n]:
Configure read-write SNMP community string (yes/no) [n]:
Enter the switch name : switch-name **<<<
Continue with Out-of-band (mgmt0) management configuration?
(yes/no) [y]:
  Mgmt0 IPv4 address : management-IP-address  **<<<
  Mgmt0 IPv4 netmask : management-IP-netmask  **<<<
  Configure the default gateway? (yes/no) [y]: y **<<<
  IPv4 address of the default gateway : gateway-IP-address  **<<<
  Configure advanced IP options? (yes/no) [n]:
  Enable the telnet service? (yes/no) [n]:
  Enable the ssh service? (yes/no) [y]: y  **<<<
  Type of ssh key you would like to generate (dsa/rsa) [rsa]: rsa
**<<<
  Number of rsa key bits <1024-2048> [1024]:
  Configure the ntp server? (yes/no) [n]:
  Configure default interface layer (L3/L2) [L2]:
  Configure default switchport interface state (shut/noshut)
[noshut]: shut **<<<
  Configure CoPP system profile (strict/moderate/lenient/dense)
[strict]:
```

The final set of prompts completes the configuration:

The following configuration will be applied:

```
password strength-check
switchname IP_switch_A_1
vrf context management
ip route 0.0.0.0/0 10.10.99.1
exit
no feature telnet
ssh key rsa 1024 force
feature ssh
system default switchport
system default switchport shutdown
copp profile strict
interface mgmt0
ip address 10.10.99.10 255.255.255.0
no shutdown
```

Would you like to edit the configuration? (yes/no) [n]:

Use this configuration and save it? (yes/no) [y]:

2017 Jun 13 21:24:43 A1 %\$ VDC-1 %\$ %COPP-2-COPP\_POLICY: Control-Plane is protected with policy copp-system-p-policy-strict.

[#####] 100%  
Copy complete.

```
User Access Verification
IP_switch_A_1 login: admin
Password:
Cisco Nexus Operating System (NX-OS) Software
.
.
.
IP_switch_A_1#
```

## 2. Save the configuration:

```
IP_switch-A-1# copy running-config startup-config
```

## 3. Reboot the switch and wait for the switch to reload:

```
IP_switch-A-1# reload
```

## 4. Repeat the previous steps on the other three switches in the MetroCluster IP configuration.



## Downloading and installing the Cisco switch NX-OS software

You must download the switch operating system file and RCF file to each switch in the MetroCluster IP configuration.

### About this task

This task requires file transfer software, such as FTP, TFTP, SFTP, or SCP, to copy the files to the switches.

These steps must be repeated on each of the IP switches in the MetroCluster IP configuration.

You must use the supported switch software version.

[NetApp Hardware Universe](#)

### Steps

1. Download the supported NX-OS software file.

[Cisco Software Download](#)

2. Copy the switch software to the switch:

```
copy sftp://root@server-ip-address/tftpboot/NX-OS-file-name bootflash: vrf  
management
```

In this example, the nxos.7.0.3.I4.6.bin file and EPLD image is copied from SFTP server 10.10.99.99 to the local bootflash:

```

IP_switch_A_1# copy sftp://root@10.10.99.99/tftpboot/nxos.7.0.3.I4.6.bin
bootflash: vrf management
root@10.10.99.99's password: password
sftp> progress
Progress meter enabled
sftp> get /tftpboot/nxos.7.0.3.I4.6.bin
/bootflash/nxos.7.0.3.I4.6.bin
Fetching /tftpboot/nxos.7.0.3.I4.6.bin to /bootflash/nxos.7.0.3.I4.6.bin
/tftpboot/nxos.7.0.3.I4.6.bin 100% 666MB 7.2MB/s
01:32
sftp> exit
Copy complete, now saving to disk (please wait)...
Copy complete.

IP_switch_A_1# copy sftp://root@10.10.99.99/tftpboot/n9000-
epld.9.3.5.img bootflash: vrf management
root@10.10.99.99's password: password
sftp> progress
Progress meter enabled
sftp> get /tftpboot/n9000-epld.9.3.5.img /bootflash/n9000-
epld.9.3.5.img
Fetching /tftpboot/n9000-epld.9.3.5.img to /bootflash/n9000-
epld.9.3.5.img
/tftpboot/n9000-epld.9.3.5.img 161MB 9.5MB/s 00:16
sftp> exit
Copy complete, now saving to disk (please wait)...
Copy complete.

```

3. Verify on each switch that the switch NX-OS files are present in each switch's bootflash directory:

```
dir bootflash:
```

The following example shows that the files are present on IP\_switch\_A\_1:

```

IP_switch_A_1# dir bootflash:
      .
      .
      .
698629632   Jun 13 21:37:44 2017   nxos.7.0.3.I4.6.bin
      .
      .
      .

Usage for bootflash://sup-local
 1779363840 bytes used
13238841344 bytes free
15018205184 bytes total
IP_switch_A_1#

```

#### 4. Install the switch software:

```
install all nxos bootflash:nxos.version-number.bin
```

The switch will reload (reboot) automatically after the switch software has been installed.

The following example shows the software installation on IP\_switch\_A\_1:

```

IP_switch_A_1# install all nxos bootflash:nxos.7.0.3.I4.6.bin
Installer will perform compatibility check first. Please wait.
Installer is forced disruptive

Verifying image bootflash:/nxos.7.0.3.I4.6.bin for boot variable "nxos".
[#####] 100% -- SUCCESS

Verifying image type.
[#####] 100% -- SUCCESS

Preparing "nxos" version info using image
bootflash:/nxos.7.0.3.I4.6.bin.
[#####] 100% -- SUCCESS

Preparing "bios" version info using image
bootflash:/nxos.7.0.3.I4.6.bin.
[#####] 100% -- SUCCESS          [#####] 100%
-- SUCCESS

Performing module support checks.          [#####] 100%
-- SUCCESS

Notifying services about system upgrade.    [#####] 100%

```

```
-- SUCCESS
```

Compatibility check is done:

Module	bootable	Impact	Install-type	Reason
1	yes	disruptive	reset	default upgrade is not hitless

Images will be upgraded according to following table:

Module	Image	Running-Version(pri:alt)	New-Version	Upg-Required
1	nxos	7.0(3)I4(1)	7.0(3)I4(6)	yes
1	bios	v04.24(04/21/2016)	v04.24(04/21/2016)	no

Switch will be reloaded for disruptive upgrade.

Do you want to continue with the installation (y/n)? [n] y

Install is in progress, please wait.

Performing runtime checks. [#####] 100% --  
SUCCESS

Setting boot variables.  
[#####] 100% -- SUCCESS

Performing configuration copy.  
[#####] 100% -- SUCCESS

Module 1: Refreshing compact flash and upgrading bios/loader/bootrom.  
Warning: please do not remove or power off the module at this time.  
[#####] 100% -- SUCCESS

Finishing the upgrade, switch will reboot in 10 seconds.  
IP\_switch\_A\_1#

5. Wait for the switch to reload and then log in to the switch.

After the switch has rebooted the login prompt is displayed:

```
User Access Verification
IP_switch_A_1 login: admin
Password:
Cisco Nexus Operating System (NX-OS) Software
TAC support: http://www.cisco.com/tac
Copyright (C) 2002-2017, Cisco and/or its affiliates.
All rights reserved.
.
.
.
MDP database restore in progress.
IP_switch_A_1#

The switch software is now installed.
```

6. Verify that the switch software has been installed:  
show version

The following example shows the output:

```
IP_switch_A_1# show version
Cisco Nexus Operating System (NX-OS) Software
TAC support: http://www.cisco.com/tac
Copyright (C) 2002-2017, Cisco and/or its affiliates.
All rights reserved.
.
.
.

Software
  BIOS: version 04.24
  NXOS: version 7.0(3)I4(6)   **<<< switch software version**
  BIOS compile time: 04/21/2016
  NXOS image file is: bootflash:///nxos.7.0.3.I4.6.bin
  NXOS compile time: 3/9/2017 22:00:00 [03/10/2017 07:05:18]

Hardware
  cisco Nexus 3132QV Chassis
  Intel(R) Core(TM) i3- CPU @ 2.50GHz with 16401416 kB of memory.
  Processor Board ID FOC20123GPS

  Device name: A1
  bootflash: 14900224 kB
  usb1: 0 kB (expansion flash)

Kernel uptime is 0 day(s), 0 hour(s), 1 minute(s), 49 second(s)

Last reset at 403451 usecs after Mon Jun 10 21:43:52 2017

Reason: Reset due to upgrade
System version: 7.0(3)I4(1)
Service:

plugin
  Core Plugin, Ethernet Plugin
IP_switch_A_1#
```

7. Upgrade the EPLD image and reboot the switch.

```
IP_switch_A_1# install epld bootflash:n9000-epld.9.3.5.img module 1
```

```
Compatibility check:
```

Module	Type	Upgradable	Impact	Reason
1	SUP	Yes	disruptive	Module Upgradable

```
Retrieving EPLD versions.... Please wait.
```

```
Images will be upgraded according to following table:
```

Module	Type	EPLD	Running-Version	New-Version	Upg-Required
--------	------	------	-----------------	-------------	--------------

1	SUP	MI FPGA	0x07	0x07	No
1	SUP	IO FPGA	0x17	0x19	Yes
1	SUP	MI FPGA2	0x02	0x02	No

```
The above modules require upgrade.
```

```
The switch will be reloaded at the end of the upgrade
```

```
Do you want to continue (y/n) ? [n] y
```

```
Proceeding to upgrade Modules.
```

```
Starting Module 1 EPLD Upgrade
```

```
Module 1 : IO FPGA [Programming] : 100.00% ( 64 of 64 sectors)
```

```
Module 1 EPLD upgrade is successful.
```

Module	Type	Upgrade-Result
--------	------	----------------

1	SUP	Success
---	-----	---------

```
EPLDs upgraded.
```

```
Module 1 EPLD upgrade is successful.
```

- After the switch reboot, log in again and verify that the new version of EPLD loaded successfully.

```
show version module 1 epld
```

- Repeat these steps on the remaining three IP switches in the MetroCluster IP configuration.

## Downloading and installing the Cisco IP RCF files

You must generate and install the RCF file to each switch in the MetroCluster IP configuration.

### About this task

This task requires file transfer software, such as FTP, TFTP, SFTP, or SCP, to copy the files to the switches.

These steps must be repeated on each of the IP switches in the MetroCluster IP configuration.

You must use the supported switch software version.

## NetApp Hardware Universe

If you are using a QSFP-to-SFP+ adapter, you might need to configure the ISL port in native speed mode instead of breakout speed mode. Refer to your switch vendor documentation to determine the ISL port speed mode.

There are four RCF files, one for each of the four switches in the MetroCluster IP configuration. You must use the correct RCF files for the switch model you are using.

Switch	RCF file
IP_switch_A_1	NX3232_v1.80_Switch-A1.txt
IP_switch_A_2	NX3232_v1.80_Switch-A2.txt
IP_switch_B_1	NX3232_v1.80_Switch-B1.txt
IP_switch_B_2	NX3232_v1.80_Switch-B2.txt

### Steps

1. Generate the Cisco RCF files for MetroCluster IP.
  - a. Download the [RcfFileGenerator for MetroCluster IP](#)
  - b. Generate the RCF file for your configuration using the RcfFileGenerator for MetroCluster IP.



Modifications to the RCF files after download are not supported.

2. Copy the RCF files to the switches:
  - a. Copy the RCF files to the first switch:

```
copy sftp://root@FTP-server-IP-address/tftpboot/switch-specific-RCF
bootflash: vrf management
```

In this example, the NX3232\_v1.80\_Switch-A1.txt RCF file is copied from the SFTP server at 10.10.99.99 to the local bootflash. You must use the IP address of your TFTP/SFTP server and the file name of the RCF file that you need to install.



```

IP_switch_A_1# copy
sftp://root@10.10.99.99/tftpboot/NX3232_v1.80_Switch-A1.txt
bootflash: vrf management
root@10.10.99.99's password: password
sftp> progress
Progress meter enabled
sftp> get /tftpboot/NX3232_v1.80_Switch-A1.txt
/bootflash/NX3232_v1.80_Switch-A1.txt
Fetching /tftpboot/NX3232_v1.80_Switch-A1.txt to
/bootflash/NX3232_v1.80_Switch-A1.txt
/tftpboot/NX3232_v1.80_Switch-A1.txt          100% 5141      5.0KB/s
00:00
sftp> exit
Copy complete, now saving to disk (please wait)...
IP_switch_A_1#

```

b. Repeat the previous substep for each of the other three switches, being sure to copy the matching RCF file to the corresponding switch.

3. Verify on each switch that the RCF file is present in each switch's bootflash directory:

```
dir bootflash:
```

The following example shows that the files are present on IP\_switch\_A\_1:

```

IP_switch_A_1# dir bootflash:
.
.
.
5514   Jun 13 22:09:05 2017  NX3232_v1.80_Switch-A1.txt
.
.
.

Usage for bootflash://sup-local
1779363840 bytes used
13238841344 bytes free
15018205184 bytes total
IP_switch_A_1#

```

4. Configure the TCAM regions on Cisco 3132Q-V and Cisco 3232C switches.



Skip this step if you do not have Cisco 3132Q-V or Cisco 3232C switches.

a. On Cisco 3132Q-V switch, set the following TCAM regions:

```
conf t
hardware access-list tcam region span 0
hardware access-list tcam region racl 256
hardware access-list tcam region e-racl 256
hardware access-list tcam region qos 256
```

- b. On Cisco 3232C switch, set the following TCAM regions:

```
conf t
hardware access-list tcam region span 0
hardware access-list tcam region racl-lite 0
hardware access-list tcam region racl 256
hardware access-list tcam region e-racl 256
hardware access-list tcam region qos 256
```

- c. After setting the TCAM regions, save the configuration and reload the switch:

```
copy running-config startup-config
reload
```

5. Copy the matching RCF file from the local bootflash to the running configuration on each switch:

```
copy bootflash:switch-specific-RCF.txt running-config
```

6. Copy the RCF files from the running configuration to the startup configuration on each switch:

```
copy running-config startup-config
```

You should see output similar to the following:

```
IP_switch_A_1# copy bootflash:NX3232_v1.80_Switch-A1.txt running-config
IP_switch-A-1# copy running-config startup-config
```

7. Reload the switch:

```
reload
```

```
IP_switch_A_1# reload
```

8. Repeat the previous steps on the other three switches in the MetroCluster IP configuration.

## Setting Forward Error Correction for systems using 25-Gbps connectivity

If your system is configured using 25-Gbps connectivity, you need to set the Forward Error Correction (fec) parameter manually to off after applying the RCF file. The RCF file does not apply this setting.

### About this task

The 25-Gbps ports must be cabled prior to performing this procedure.

### [Platform port assignments for Cisco 3232C or Cisco 9336C switches](#)

This task only applies to platforms using 25-Gbps connectivity:

- AFF A300
- FAS 8200
- FAS 500f
- AFF A250

This task must be performed on all four switches in the MetroCluster IP configuration.

### Steps

1. Set the fec parameter to off on each 25-Gbps port that is connected to a controller module, and then copy the running configuration to the startup configuration:
  - a. Enter configuration mode: `conf t`
  - b. Specify the 25-Gbps interface to configure: `interface interface-ID`
  - c. Set fec to off: `fec off`
  - d. Repeat the previous steps for each 25-Gbps port on the switch.
  - e. Exit configuration mode: `exit`

The following example shows the commands for interface Ethernet1/25/1 on switch IP\_switch\_A\_1:

```
IP_switch_A_1# conf t
IP_switch_A_1(config)# interface Ethernet1/25/1
IP_switch_A_1(config-if)# fec off
IP_switch_A_1(config-if)# exit
IP_switch_A_1(config-if)# end
IP_switch_A_1# copy running-config startup-config
```

2. Repeat the previous step on the other three switches in the MetroCluster IP configuration.

## Disable unused ISL ports and port channels

NetApp recommends disabling unused ISL ports and port channels to avoid unnecessary health alerts.

1. Identify the unused ISL ports and port channels:

```
show interface brief
```

## 2. Disable the unused ISL ports and port channels.

You must run the following commands for each identified unused port or port channel.

```
SwitchA_1# config t
Enter configuration commands, one per line. End with CNTL/Z.
SwitchA_1(config)# int Eth1/14
SwitchA_1(config-if)# shutdown
SwitchA_12(config-if)# exit
SwitchA_1(config-if)# copy running-config startup-config
[#####] 100%
Copy complete, now saving to disk (please wait)...
Copy complete.
```

## Configure MACsec encryption on Cisco 9336C switches in a MetroCluster IP site

You can configure MACsec encryption on the WAN ISL ports that run between the sites. You must configure MACsec after applying the correct RCF file.



MACsec encryption can only be applied to the WAN ISL ports.

### Configure MACsec encryption on Cisco 9336C switches

You must only configure MACsec encryption on the WAN ISL ports that run between the sites. You must configure MACsec after applying the correct RCF file.

#### Licensing requirements for MACsec

MACsec requires a security license. For a complete explanation of the Cisco NX-OS licensing scheme and how to obtain and apply for licenses, see the [Cisco NX-OS Licensing Guide](#)

#### Enable Cisco MACsec Encryption WAN ISLs in MetroCluster IP configurations

You can enable MACsec encryption for Cisco 9336C switches on the WAN ISLs in a MetroCluster IP configuration.

#### Steps

1. Enter global configuration mode:

```
configure terminal
```

```
IP_switch_A_1# configure terminal
IP_switch_A_1(config)#
```

2. Enable MACsec and MKA on the device:

```
feature macsec
```

```
IP_switch_A_1(config)# feature macsec
```

3. Copy the running configuration to the startup configuration:

```
copy running-config startup-config
```

```
IP_switch_A_1(config)# copy running-config startup-config
```

### Configure a MACsec key chain and keys

You can create a MACsec key chain or keys on your configuration.

### Key Lifetime and Hitless Key Rollover

A MACsec keychain can have multiple pre-shared keys (PSKs), each configured with a key ID and an optional lifetime. A key lifetime specifies at which time the key activates and expires. In the absence of a lifetime configuration, the default lifetime is unlimited. When a lifetime is configured, MKA rolls over to the next configured pre-shared key in the keychain after the lifetime is expired. The time zone of the key can be local or UTC. The default time zone is UTC. A key can roll over to a second key within the same keychain if you configure the second key (in the keychain) and configure a lifetime for the first key. When the lifetime of the first key expires, it automatically rolls over to the next key in the list. If the same key is configured on both sides of the link at the same time, then the key rollover is hitless (that is, the key rolls over without traffic interruption).

### Steps

1. Enter the global configuration mode:

```
configure terminal
```

```
IP_switch_A_1# configure terminal  
IP_switch_A_1(config)#
```

2. To hide the encrypted key octet string, replace the string with a wildcard character in the output of the `show running-config` and `show startup-config` commands:

```
IP_switch_A_1(config)# key-chain macsec-psk no-show
```



The octet string is also hidden when you save the configuration to a file.

By default, PSK keys are displayed in encrypted format and can easily be decrypted. This command applies only to MACsec key chains.

3. Create a MACsec key chain to hold a set of MACsec keys and enter MACsec key chain configuration mode:

```
key chain name macsec
```

```
IP_switch_A_1(config)# key chain 1 macsec
IP_switch_A_1(config-macseckeychain)#
```

4. Create a MACsec key and enter MACsec key configuration mode:

```
key key-id
```

The range is from 1 to 32 hex digit key-string, and the maximum size is 64 characters.

```
IP_switch_A_1 switch(config-macseckeychain)# key 1000
IP_switch_A_1 (config-macseckeychain-macseckey)#
```

5. Configure the octet string for the key:

```
key-octet-string octet-string cryptographic-algorithm AES_128_CMAC |
AES_256_CMAC
```

```
IP_switch_A_1(config-macseckeychain-macseckey)# key-octet-string
abcdef0123456789abcdef0123456789abcdef0123456789abcdef0123456789
cryptographic-algorithm AES_256_CMAC
```



The octet-string argument can contain up to 64 hexadecimal characters. The octet key is encoded internally, so the key in clear text does not appear in the output of the `show running-config macsec` command.

6. Configure a send lifetime for the key (in seconds):

```
send-lifetime start-time duration duration
```

```
IP_switch_A_1(config-macseckeychain-macseckey)# send-lifetime 00:00:00
Oct 04 2020 duration 100000
```

By default, the device treats the start time as UTC. The start-time argument is the time of day and date that the key becomes active. The duration argument is the length of the lifetime in seconds. The maximum length is 2147483646 seconds (approximately 68 years).

7. Copy the running configuration to the startup configuration:

```
copy running-config startup-config
```

```
IP_switch_A_1(config)# copy running-config startup-config
```

8. Displays the keychain configuration:

show key chain name

```
IP_switch_A_1(config-macseckeychain-macseckey)# show key chain 1
```

## Configure a MACsec policy

### Steps

1. Enter global configuration mode:

configure terminal

```
IP_switch_A_1# configure terminal
IP_switch_A_1(config)#
```

2. Create a MACsec policy:

macsec policy name

```
IP_switch_A_1(config)# macsec policy abc
IP_switch_A_1(config-macsec-policy)#
```

3. Configure one of the following ciphers, GCM-AES-128, GCM-AES-256, GCM-AES-XPB-128, or GCM-AES-XPB-256:

cipher-suite name

```
IP_switch_A_1(config-macsec-policy)# cipher-suite GCM-AES-256
```

4. Configure the key server priority to break the tie between peers during a key exchange:

key-server-priority number

```
switch(config-macsec-policy)# key-server-priority 0
```

5. Configure the security policy to define the handling of data and control packets:

security-policy security policy

Choose a security policy from the following options:

- must-secure — packets not carrying MACsec headers are dropped
- should-secure — packets not carrying MACsec headers are permitted (this is the default value)

```
IP_switch_A_1(config-macsec-policy)# security-policy should-secure
```

6. Configure the replay protection window so the secured interface does not accept a packet that is less than the configured window size: `window-size number`



The replay protection window size represents the maximum out-of-sequence frames that MACsec accepts and are not discarded. The range is from 0 to 596000000.

```
IP_switch_A_1(config-macsec-policy)# window-size 512
```

7. Configure the time in seconds to force an SAK rekey:

```
sak-expiry-time time
```

You can use this command to change the session key to a predictable time interval. The default is 0.

```
IP_switch_A_1(config-macsec-policy)# sak-expiry-time 100
```

8. Configure one of the following confidentiality offsets in the layer 2 frame where encryption begins:

```
conf-offsetconfidentiality offset
```

Choose from the following options:

- CONF-OFFSET-0.
- CONF-OFFSET-30.
- CONF-OFFSET-50.

```
IP_switch_A_1(config-macsec-policy)# conf-offset CONF-OFFSET-0
```



This command might be necessary for intermediate switches to use packet headers (dmac, smac, etype) like MPLS tags.

9. Copy the running configuration to the startup configuration:

```
copy running-config startup-config
```

```
IP_switch_A_1(config)# copy running-config startup-config
```

10. Display the MACsec policy configuration:

```
show macsec policy
```



```
IP_switch_A_1(config-macsec-policy)# show macsec policy
```

### Enable Cisco MACsec encryption on the interfaces

1. Enter global configuration mode:

```
configure terminal
```

```
IP_switch_A_1# configure terminal
IP_switch_A_1(config)#
```

2. Select the interface that you configured with MACsec encryption.

You can specify the interface type and identity. For an Ethernet port, use ethernet slot/port.

```
IP_switch_A_1(config)# interface ethernet 1/15
switch(config-if)#
```

3. Add the keychain and policy to be configured on the interface to add the MACsec configuration:

```
macsec keychain keychain-name policy policy-name
```

```
IP_switch_A_1(config-if)# macsec keychain 1 policy abc
```

4. Repeat steps 1 and 2 on all interfaces where MACsec encryption is to be configured.
5. Copy the running configuration to the startup configuration:

```
copy running-config startup-config
```

```
IP_switch_A_1(config)# copy running-config startup-config
```

### Disable Cisco MACsec Encryption WAN ISLs in MetroCluster IP configurations

You might need to disable MACsec encryption for Cisco 9336C switches on the WAN ISLs in a MetroCluster IP configuration.

#### Steps

1. Enter global configuration mode:

```
configure terminal
```

```
IP_switch_A_1# configure terminal
IP_switch_A_1(config)#
```

2. Disable the MACsec configuration on the device:

```
macsec shutdown
```

```
IP_switch_A_1(config)# macsec shutdown
```



Selecting the “no” option restores the MACsec feature.

3. Select the interface that you already configured with MACsec.

You can specify the interface type and identity. For an Ethernet port, use ethernet slot/port.

```
IP_switch_A_1(config)# interface ethernet 1/15
switch(config-if)#
```

4. Remove the keychain and policy configured on the interface to remove the MACsec configuration:

```
no macsec keychain keychain-name policy policy-name
```

```
IP_switch_A_1(config-if)# no macsec keychain 1 policy abc
```

5. Repeat steps 3 and 4 on all interfaces where MACsec is configured.

6. Copy the running configuration to the startup configuration:

```
copy running-config startup-config
```

```
IP_switch_A_1(config)# copy running-config startup-config
```

## Verifying the MACsec configuration

### Steps

1. Repeat **all** of the previous procedures on the second switch within the configuration to establish a MACsec session.
2. Run the following commands to verify that both switches are successfully encrypted:
  - a. Run: `show macsec mka summary`
  - b. Run: `show macsec mka session`
  - c. Run: `show macsec mka statistics`

You can verify the MACsec configuration using the following commands:

Command	Displays information about...
<code>show macsec mka session interface typeslot/port number</code>	The MACsec MKA session for a specific interface or for all interfaces
<code>show key chain name</code>	The key chain configuration
<code>show macsec mka summary</code>	The MACsec MKA configuration
<code>show macsec policy policy-name</code>	The configuration for a specific MACsec policy or for all MACsec policies

## Configure NVIDIA IP switches

### Configure NVIDIA IP SN2100 switch for cluster interconnect and backend MetroCluster IP connectivity

You must configure the NVIDIA SN2100 IP switches for use as the cluster interconnect and for backend MetroCluster IP connectivity.

#### Reset the NVIDIA IP SN2100 switch to factory defaults

You can choose from the following methods to reset a switch to factory default settings.

- [Reset the switch using the RCF file option](#)
- [Download and install the Cumulus software](#)

#### Reset the switch using the RCF file option

Before installing a new RCF configuration you must revert the NVIDIA switch settings.

#### About this task

To restore the switch to default settings, run the RCF file with the `restoreDefaults` option. This option copies the original backed up files to their original location and then reboots the switch. After reboot, the switch comes online with the original configuration that existed when you first ran the RCF file to configure the switch.

The following configuration details are not reset:

- User and credential configuration
- Configuration of the management network port, eth0



All other configuration changes that occur during application of the RCF file are reverted to the original configuration.

#### Before you begin

- You must configure the switch according to [Download and install the NVIDIA RCF file](#). If you have not

configured in this manner, or you have configured additional features before running the RCF file, you cannot use this procedure.

- You must repeat these steps on each of the IP switches in the MetroCluster IP configuration.
- You must be connected to the switch with a serial console connection.
- This task resets the configuration of the management network.

### Steps

1. Verify that the RCF configuration was successfully applied with the same or a compatible RCF file version and that the backup files exist.



The output can show backup files, preserved files, or both. If backup files or preserved files do not appear in the output, you cannot use this procedure.

```

cumulus@IP_switch_A_1:mgmt:~$ sudo python3
SN2100_v2.0.0_IP_switch_A_1.py
[sudo] password for cumulus:
>>> Opened RcfApplyLog
A RCF configuration has been successfully applied.
Backup files exist.
Preserved files exist.
Listing completion of the steps:
    Success: Step: 1: Performing Backup and Restore
    Success: Step: 2: updating MOTD file
    Success: Step: 3: Disabling apt-get
    Success: Step: 4: Disabling cdp
    Success: Step: 5: Adding lldp config
    Success: Step: 6: Creating interfaces
    Success: Step: 7: Configuring switch basic settings: Hostname,
SNMP
    Success: Step: 8: Configuring switch basic settings: bandwidth
allocation
    Success: Step: 9: Configuring switch basic settings: ecn
    Success: Step: 10: Configuring switch basic settings: cos and
dscp remark
    Success: Step: 11: Configuring switch basic settings: generic
egress cos mappings
    Success: Step: 12: Configuring switch basic settings: traffic
classification
    Success: Step: 13: Configuring LAG load balancing policies
    Success: Step: 14: Configuring the VLAN bridge
    Success: Step: 15: Configuring local cluster ISL ports
    Success: Step: 16: Configuring MetroCluster ISL ports
    Success: Step: 17: Configuring ports for MetroCluster-1, local
cluster and MetroCluster interfaces
    Success: Step: 18: Configuring ports for MetroCluster-2, local
cluster and MetroCluster interfaces
    Success: Step: 19: Configuring ports for MetroCluster-3, local
cluster and MetroCluster interfaces
    Success: Step: 20: Configuring L2FC for MetroCluster interfaces
    Success: Step: 21: Configuring the interface to UP
    Success: Step: 22: Final commit
    Success: Step: 23: Final reboot of the switch
Exiting ...
<<< Closing RcfApplyLog
cumulus@IP_switch_A_1:mgmt:~$

```

2. Run the RCF file with the option to restore defaults: `restoreDefaults`

```
cumulus@IP_switch_A_1:mgmt:~$ sudo python3
SN2100_v2.0.0_IP_switch_A_2.py restoreDefaults
[sudo] password for cumulus:
>>> Opened RcfApplyLog
Can restore from backup directory. Continuing.
This will reboot the switch !!!
Enter yes or no: yes
```

3. Respond 'yes' to the prompt. The switch reverts to the original configuration and reboots.
4. Wait for the switch to reboot.

The switch is reset and retains the initial configuration such as management network configuration and current credentials as they existed before applying the RCF file. After reboot, you can apply a new configuration by using the same or a different version of the RCF file.

## Download and install the Cumulus software

### About this task

Use these steps if you want to reset the switch completely by applying the Cumulus image.

### Before you begin

- You must be connected to the switch with a serial console connection.
- The Cumulus switch software image is accessible through HTTP.



For more information about installing Cumulus Linux, see [Overview of installation and configuration for NVIDIA SN2100 switches](#)

- You must have the root password for `sudo` access to the commands.

### Steps

1. From the Cumulus console download and queue the switch software installation with the command `onie-install -a -i` followed by the file path to the switch software:

In this example, the firmware file `cumulus-linux-4.4.3-mlx-amd64.bin` is copied from the HTTP server '50.50.50.50' to the local switch.

```
cumulus@IP_switch_A_1:mgmt:~$ sudo onie-install -a -i
http://50.50.50.50/switchsoftware/cumulus-linux-4.4.3-mlx-amd64.bin
Fetching installer: http://50.50.50.50/switchsoftware/cumulus-linux-
4.4.3-mlx-amd64.bin
Downloading URL: http://50.50.50.50/switchsoftware/cumulus-linux-4.4.3-
mlx-amd64.bin
#####
# 100.0%
Success: HTTP download complete.
tar: ./sysroot.tar: time stamp 2021-01-30 17:00:58 is 53895092.604407122
```

```
s in the future
tar: ./kernel: time stamp 2021-01-30 17:00:58 is 53895092.582826352 s in
the future
tar: ./initrd: time stamp 2021-01-30 17:00:58 is 53895092.509682557 s in
the future
tar: ./embedded-installer/bootloader/grub: time stamp 2020-12-10
15:25:16 is 49482950.509433937 s in the future
tar: ./embedded-installer/bootloader/init: time stamp 2020-12-10
15:25:16 is 49482950.509336507 s in the future
tar: ./embedded-installer/bootloader/uboot: time stamp 2020-12-10
15:25:16 is 49482950.509213637 s in the future
tar: ./embedded-installer/bootloader: time stamp 2020-12-10 15:25:16 is
49482950.509153787 s in the future
tar: ./embedded-installer/lib/init: time stamp 2020-12-10 15:25:16 is
49482950.509064547 s in the future
tar: ./embedded-installer/lib/logging: time stamp 2020-12-10 15:25:16 is
49482950.508997777 s in the future
tar: ./embedded-installer/lib/platform: time stamp 2020-12-10 15:25:16
is 49482950.508913317 s in the future
tar: ./embedded-installer/lib/utility: time stamp 2020-12-10 15:25:16 is
49482950.508847367 s in the future
tar: ./embedded-installer/lib/check-onie: time stamp 2020-12-10 15:25:16
is 49482950.508761477 s in the future
tar: ./embedded-installer/lib: time stamp 2020-12-10 15:25:47 is
49482981.508710647 s in the future
tar: ./embedded-installer/storage/blk: time stamp 2020-12-10 15:25:16 is
49482950.508631277 s in the future
tar: ./embedded-installer/storage/gpt: time stamp 2020-12-10 15:25:16 is
49482950.508523097 s in the future
tar: ./embedded-installer/storage/init: time stamp 2020-12-10 15:25:16
is 49482950.508437507 s in the future
tar: ./embedded-installer/storage/mbr: time stamp 2020-12-10 15:25:16 is
49482950.508371177 s in the future
tar: ./embedded-installer/storage/mtd: time stamp 2020-12-10 15:25:16 is
49482950.508293856 s in the future
tar: ./embedded-installer/storage: time stamp 2020-12-10 15:25:16 is
49482950.508243666 s in the future
tar: ./embedded-installer/platforms.db: time stamp 2020-12-10 15:25:16
is 49482950.508179456 s in the future
tar: ./embedded-installer/install: time stamp 2020-12-10 15:25:47 is
49482981.508094606 s in the future
tar: ./embedded-installer: time stamp 2020-12-10 15:25:47 is
49482981.508044066 s in the future
tar: ./control: time stamp 2021-01-30 17:00:58 is 53895092.507984316 s
in the future
tar: .: time stamp 2021-01-30 17:00:58 is 53895092.507920196 s in the
```

```
future
Staging installer image...done.
WARNING:
WARNING: Activating staged installer requested.
WARNING: This action will wipe out all system data.
WARNING: Make sure to back up your data.
WARNING:
Are you sure (y/N)? y
Activating staged installer...done.
Reboot required to take effect.
cumulus@IP_switch_A_1:mgmt:~$
```

2. Respond `y` to the prompt to confirm the installation when the image is downloaded and verified.
3. Reboot the switch to install the new software: `sudo reboot`

```
cumulus@IP_switch_A_1:mgmt:~$ sudo reboot
```



The switch reboots and enters the switch software installation which takes some time. When the installation is complete, the switch reboots and remains at the 'log-in' prompt.

4. Configure the basic switch settings
  - a. When the switch is booted and at the log-in prompt, log in and change the password.



The username is 'cumulus' and the default password is 'cumulus'.



```
Debian GNU/Linux 10 cumulus ttyS0

cumulus login: cumulus
Password:
You are required to change your password immediately (administrator
enforced)
Changing password for cumulus.
Current password:
New password:
Retype new password:
Linux cumulus 4.19.0-cl-1-amd64 #1 SMP Cumulus 4.19.206-1+cl4.4.3u1
(2021-12-18) x86_64

Welcome to NVIDIA Cumulus (R) Linux (R)

For support and online technical documentation, visit
http://www.cumulusnetworks.com/support

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LMI,
the exclusive licensee of Linus Torvalds, owner of the mark on a world-
wide
basis.

cumulus@cumulus:mgmt:~$
```

## 5. Configure the management network interface.

The commands you use depend on the switch firmware version you are running.



The following example commands configure the hostname as `IP_switch_A_1`, the IP address as `10.10.10.10`, the netmask as `255.255.255.0` (24), and the gateway address as `10.10.10.1`.

### Cumulus 4.4.x

The following example commands configure the hostname, IP address, netmask, and gateway on a switch running Cumulus 4.4.x.

```
cumulus@cumulus:mgmt:~$ net add hostname IP_switch_A_1
cumulus@cumulus:mgmt:~$ net add interface eth0 ip address
10.0.10.10/24
cumulus@cumulus:mgmt:~$ net add interface eth0 ip gateway 10.10.10.1
cumulus@cumulus:mgmt:~$ net pending
```

```
.
```

```
cumulus@cumulus:mgmt:~$ net commit
```

```
.
```

net add/del commands since the last "net commit"

User Timestamp Command

```
cumulus 2021-05-17 22:21:57.437099 net add hostname Switch-A-1
cumulus 2021-05-17 22:21:57.538639 net add interface eth0 ip address
10.10.10.10/24
cumulus 2021-05-17 22:21:57.635729 net add interface eth0 ip gateway
10.10.10.1
```

```
cumulus@cumulus:mgmt:~$
```

### Cumulus 5.4.x and later

The following example commands configure the hostname, IP address, netmask, and gateway on a switch running Cumulus 5.4.x. or later.

```
cumulus@cumulus:mgmt:~$ nv set system hostname IP_switch_A_1

cumulus@cumulus:mgmt:~$ nv set interface eth0 ip address
10.0.10.10/24

cumulus@cumulus:mgmt:~$ nv set interface eth0 ip gateway 10.10.10.1

cumulus@cumulus:mgmt:~$ nv config apply

cumulus@cumulus:mgmt:~$ nv config save
```

6. Reboot the switch using the `sudo reboot` command.

```
cumulus@cumulus:~$ sudo reboot
```

When the switch reboots, you can apply a new configuration using the steps in [Download and install the NVIDIA RCF file](#).

### Download and install the NVIDIA RCF files

You must generate and install the switch RCF file to each switch in the MetroCluster IP configuration.

#### Before you begin

- You must have the root password for `sudo` access to the commands.
- The switch software is installed and the management network is configured.
- You followed the steps to initially install the switch by using either method 1 or method 2.
- You did not apply any additional configuration after the initial installation.



If you perform further configuration after resetting the switch and before applying the RCF file, you cannot use this procedure.

#### About this task

You must repeat these steps on each of the IP switches in the MetroCluster IP configuration (new installation) or on the replacement switch (switch replacement).

If you are using a QSFP-to-SFP+ adapter, you might need to configure the ISL port in native speed mode instead of breakout speed mode. Refer to your switch vendor documentation to determine the ISL port speed mode.

#### Steps

1. Generate the NVIDIA RCF files for MetroCluster IP.
  - a. Download the [RcfFileGenerator for MetroCluster IP](#).
  - b. Generate the RCF file for your configuration by using the RcfFileGenerator for MetroCluster IP.

- c. Navigate to your home directory. If you are logged as 'cumulus', the file path is /home/cumulus.

```
cumulus@IP_switch_A_1:mgmt:~$ cd ~
cumulus@IP_switch_A_1:mgmt:~$ pwd
/home/cumulus
cumulus@IP_switch_A_1:mgmt:~$
```

- d. Download the RCF file to this directory. The following example shows that you use SCP to download the file SN2100\_v2.0.0\_IP\_switch\_A\_1.txt from server '50.50.50.50' to your home directory and save it as SN2100\_v2.0.0\_IP\_switch\_A\_1.py:

```
cumulus@Switch-A-1:mgmt:~$ scp
username@50.50.50.50:/RcfFiles/SN2100_v2.0.0_IP_switch_A_1.txt
./SN2100_v2.0.0_IP_switch-A1.py
The authenticity of host '50.50.50.50 (50.50.50.50)' can't be
established.
RSA key fingerprint is
SHA256:B5gBtOmNZvdKiY+dPhh8=ZK9DaKG7g6sv+2gFlGVF8E.
Are you sure you want to continue connecting (yes/no)? yes
Warning: Permanently added '50.50.50.50' (RSA) to the list of known
hosts.
*****
**
Banner of the SCP server
*****
**
username@50.50.50.50's password:
SN2100_v2.0.0_IP_switch_A1.txt 100% 55KB 1.4MB/s 00:00
cumulus@IP_switch_A_1:mgmt:~$
```

2. Execute the RCF file. The RCF file requires an option to apply one or more steps. Unless instructed by technical support, run the RCF file without the command line option. To verify the completion status of the various steps of the RCF file, use the option '-1' or 'all' to apply all (pending) steps.

```
cumulus@IP_switch_A_1:mgmt:~$ sudo python3
SN2100_v2.0.0_IP_switch_A_1.py
all
[sudo] password for cumulus:
The switch will be rebooted after the step(s) have been run.
Enter yes or no: yes
```

... the steps will apply - this is generating a lot of output ...

Running Step 24: Final reboot of the switch

... The switch will reboot if all steps applied successfully ...

### 3. If your configuration uses DAC cables, enable the DAC option on the switch ports:

```
cumulus@IP_switch_A_1:mgmt:~$ sudo python3 SN2100_v2.0.0-X10_Switch-
A1.py runCmd <switchport> DacOption [enable | disable]
```

The following example enables the DAC option for port swp7:

```
cumulus@IP_switch_A_1:mgmt:~$ sudo python3 SN2100_v2.00_Switch-A1.py
runCmd swp7 DacOption enable
Running cumulus version : 5.4.0
Running RCF file version : v2.00
Running command: Enabling the DacOption for port swp7
runCmd: 'nv set interface swp7 link fast-linkup on', ret: 0
runCmd: committed, ret: 0
Completion: SUCCESS
cumulus@IP_switch_A_1:mgmt:~$
```

### 4. Reboot the switch after enabling the DAC option on the switch ports:

```
sudo reboot
```



When you set the DAC option for multiple switch ports, you only need to reboot the switch once.

## Set Forward Error Correction for systems using 25-Gbps connectivity

If your system is configured using 25-Gbps connectivity, set the Forward Error Correction (fec) parameter manually to off after applying the RCF. The RCF does not apply this setting.

### About this task

- This task only applies to platforms using 25-Gbps connectivity. Refer to [Platform port assignments for NVIDIA supported SN2100 IP switches](#).
- This task must be performed on all four switches in the MetroCluster IP configuration.
- You must update each switch port individually, you cannot specify multiple ports or port ranges in the command.

### Steps

1. Set the `fec` parameter to off for the first switch port that uses 25-Gbps connectivity:

```
sudo python3 SN2100_v2.0_Switch-A1.py runCmd <switchport> fec off
```

2. Repeat the step for each 25-Gbps switch port that is connected to a controller module.

## Set the switch port speed for the MetroCluster IP interfaces

### About this task

- Use this procedure to set the switch port speed to 100G for the following systems:
  - AFF A70, AFF A90, AFF A1K, AFF C80
  - AFF A30, AFF C30, AFF A50, AFF C60
  - FAS50, FAS70, FAS90
- You must update each switch port individually, you cannot specify multiple ports or port ranges in the command.

### Step

1. Use the RCF file with the `runCmd` option to set the speed. This applies the setting and saves the configuration.

The following commands set the speed for the MetroCluster interfaces `swp7` and `swp8`:

```
sudo python3 SN2100_v2.20 _Switch-A1.py runCmd swp7 speed 100
```

```
sudo python3 SN2100_v2.20 _Switch-A1.py runCmd swp8 speed 100
```

### Example

```
cumulus@Switch-A-1:mgmt:~$ sudo python3 SN2100_v2.20_Switch-A1.py runCmd
swp7 speed 100
[sudo] password for cumulus: <password>
Running cumulus version : 5.4.0
Running RCF file version : v2.20
Running command: Setting switchport swp7 to 100G speed
runCmd: 'nv set interface swp7 link auto-negotiate off', ret: 0
runCmd: 'nv set interface swp7 link speed 100G', ret: 0
runCmd: committed, ret: 0
Completion: SUCCESS
cumulus@Switch-A-1:mgmt:~$
```

## Disable unused ISL ports and port channels

NetApp recommends disabling unused ISL ports and port channels to avoid unnecessary health alerts. You must disable each port or port channel individually, you cannot specify multiple ports or port ranges in the command.

### Steps

1. Identify the unused ISL ports and port channels using the RCF file banner:



If the port is in breakout mode, the port name you specify in the command might be different than the name stated in the RCF banner. You can also use the RCF cabling files to find the port name.

```
net show interface
```

2. Disable the unused ISL ports and port channels using the RCF file.

```

cumulus@mcc1-integrity-a1:mgmt:~$ sudo python3 SN2100_v2.0_IP_Switch-
A1.py runCmd
[sudo] password for cumulus:
    Running cumulus version   : 5.4.0
    Running RCF file version  : v2.0
Help for runCmd:
    To run a command execute the RCF script as follows:
    sudo python3 <script> runCmd <option-1> <option-2> <option-x>
    Depending on the command more or less options are required. Example
to 'up' port 'swp1'
    sudo python3 SN2100_v2.0_IP_Switch-A1.py runCmd swp1 up
Available commands:
    UP / DOWN the switchport
        sudo python3 SN2100_v2.0_IP_Switch-A1.py runCmd <switchport>
state <up | down>
    Set the switch port speed
        sudo python3 SN2100_v2.0_Switch-A1.py runCmd <switchport>
speed <10 | 25 | 40 | 100 | AN>
    Set the fec mode on the switch port
        sudo python3 SN2100_v2.0_Switch-A1.py runCmd <switchport>
fec <default | auto | rs | baser | off>
    Set the [localISL | remoteISL] to 'UP' or 'DOWN' state
        sudo python3 SN2100_v2.0_Switch-A1.py runCmd [localISL |
remoteISL] state [up | down]
    Set the option on the port to support DAC cables. This option
does not support port ranges.
    You must reload the switch after changing this option for
the required ports. This will disrupt traffic.
    This setting requires Cumulus 5.4 or a later 5.x release.
        sudo python3 SN2100_v2.0_Switch-A1.py runCmd <switchport>
DacOption [enable | disable]
cumulus@mcc1-integrity-a1:mgmt:~$

```

The following example command disables port "swp14":

```
sudo python3 SN2100_v2.0_Switch-A1.py runCmd swp14 state down
```

Repeat this step for each identified unused port or port channel.

## Install the Ethernet Switch Health Monitor configuration file for a NVIDIA SN2100 MetroCluster IP switch

To configure Ethernet switch health monitoring on NVIDIA Ethernet switches, follow this procedure.

These instructions apply if NVIDIA X190006-PE and X190006-PI switches are not detected properly, which can



be confirmed by running `system switch ethernet show` and checking if **OTHER** is shown for your model. To identify your NVIDIA switch model, find the part-number with the command `nv show platform hardware` for NVIDIA CL 5.8 and earlier or `nv show platform` for later versions.



These steps are also recommended if you want health monitoring and log collection to work as intended when using NVIDIA CL 5.11.x with the following ONTAP releases. While health monitoring and log collection might still function without these steps, following them ensures everything operates correctly.

- 9.10.1P20, 9.11.1P18, 9.12.1P16, 9.13.1P8, 9.14.1, 9.15.1 and later patch releases

### Before you begin

- Make sure that the ONTAP cluster is up and running.
- Enable SSH on the switch to use all of the features available in CSHM.
- Clear the `/mroot/etc/cshm_nod/nod_sign/` directory on all nodes:

- a. Enter the nodeshell:

```
system node run -node <name>
```

- b. Change to advanced privilege:

```
priv set advanced
```

- c. List the configuration files in the `/etc/cshm_nod/nod_sign` directory. If the directory exists and contains configuration files, it lists the file names.

```
ls /etc/cshm_nod/nod_sign
```

- d. Delete all configuration files corresponding to your connected switch models.

If you are unsure, remove all configuration files for the supported models listed above, then download and install the latest configuration files for those same models.

```
rm /etc/cshm_nod/nod_sign/<filename>
```

- e. Confirm that the deleted configuration files are no longer in the directory:

```
ls /etc/cshm_nod/nod_sign
```

### Steps

1. Download the Ethernet switch health monitor configuration zip file based on the corresponding ONTAP release version. This file is available from the [NVIDIA Ethernet switches](#) page.
  - a. On the NVIDIA SN2100 Software download page, select **Nvidia CSHM File**.
  - b. On the Caution/Must read page, select the check box to agree.
  - c. On the End User License Agreement page, select the check box to agree and click **Accept & Continue**.
  - d. On the Nvidia CSHM File - Download page, select the applicable configuration file. The following files are available:

**ONTAP 9.15.1 and later**

- MSN2100-CB2FC-v1.4.zip
- MSN2100-CB2RC-v1.4.zip
- X190006-PE-v1.4.zip
- X190006-PI-v1.4.zip

**ONTAP 9.11.1 through 9.14.1**

- MSN2100-CB2FC\_PRIOR\_R9.15.1-v1.4.zip
- MSN2100-CB2RC\_PRIOR\_R9.15.1-v1.4.zip
- X190006-PE\_PRIOR\_9.15.1-v1.4.zip
- X190006-PI\_PRIOR\_9.15.1-v1.4.zip

2. Upload the applicable zip file to your internal web server.
3. Access the advanced mode setting from one of the ONTAP systems in the cluster.

```
set -privilege advanced
```

4. Run the switch health monitor configure command.

```
cluster1::> system switch ethernet configure-health-monitor
```

5. Verify that the command output ends with the following text for your ONTAP version:

**ONTAP 9.15.1 and later**

Ethernet switch health monitoring installed the configuration file.

**ONTAP 9.11.1 through 9.14.1**

SHM installed the configuration file.

**ONTAP 9.10.1**

CSHM downloaded package processed successfully.

If an error occurs, contact NetApp support.

6. Wait up to twice the Ethernet switch health monitor polling interval, found by running `system switch ethernet polling-interval show`, before completing the next step.
7. Run the command `system switch ethernet configure-health-monitor show` on the ONTAP system and make sure that the cluster switches are discovered with the monitored field set to **True** and the serial number field not showing **Unknown**.

```
cluster1::> system switch ethernet configure-health-monitor show
```



If your model is still showing **OTHER** after applying the configuration file, contact NetApp support.

See the [system switch ethernet configure-health-monitor](#) command for further details.

#### **What's next?**

[Configure switch health monitoring.](#)

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