Configure NVIDIA IP switches

ONTAP MetroCluster

NetApp
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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
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cluster and MetroCluster interfaces
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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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