

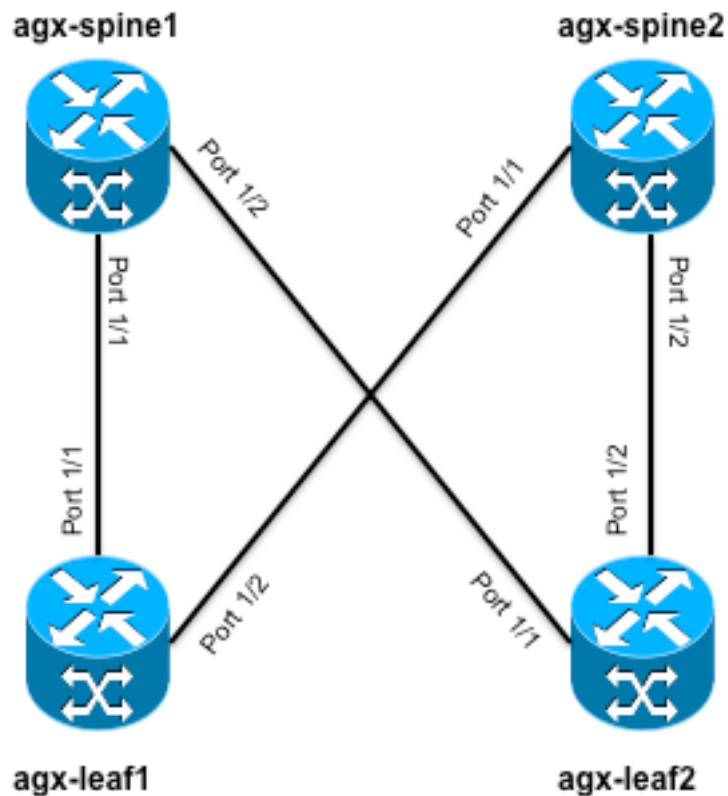
Data Center Network Topology: Cumulus Linux NOS on Agema Systems Switch

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Background

This document serves as a guide in setting up, configuring, and validating a Data Center network topology with two-leaf and two-spine on Agema Systems switches loaded with Cumulus Linux NOS.

Network Topology



Topology Notes

- **agx-leaf1** and **agx-leaf2** represent the access layer switches on the network.
- **agx-spine1** and **agx-spine2** represent the aggregation layer switches on the network.

Initial Switch Setup

1. Log into the **agx** switches using the default credentials:

*username: **cumulus***

*password: **CumulusLinux!***

2. (Optional) Create a new sudo user.

Example:

*cumulus@cumulus:~\$ sudo adduser **rcortes***

*password: **agema!***

Edit **/etc/sudoers** to add admin privileges.

Example:

cumulus@cumulus:~\$ sudo visudo

rcortes ALL=(ALL:ALL) ALL

Enter **Ctrl+X** and then select **Y** to save changes and exit.

Enter **exit** and then login as the new user.

3. As the sudo user, edit the **/etc/quagga/daemons** file in a text editor.

Set **zebra**, **bgpd**, and **ospfd** to **yes**, and save the file.

zebra=yes

bgpd=yes

ospfd=yes

...

Switch Network Configurations

Here are key configurations for two-leaf / two-spine Data Center setup. Each of the switches can be configured using the Network Command Line Utility (NCLU), or by configuring the **/etc/network/interfaces** and **/etc/quagga/Quagga.conf** files directly as the sudo user.

NCLU is similar to Cisco CLI although it's on Linux. Usage example:

```
rcortes@agx-leaf1:~$ sudo net add host<tab> # hitting tab will auto-complete hostname
```

1. Log into the **agx-leaf1** switch:

```
username: rcortes
```

```
password: agema!
```

2. Update the hostname.

```
rcortes@cumulus:~$ sudo net add hostname agx-leaf1
```

```
rcortes@cumulus:~$ sudo net commit
```

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

3. Execute the following commands to add the networking configurations on the switch:

```
rcortes@agx-leaf1:~$ sudo net add loopback lo ip address 10.100.1.1/32
```

```
rcortes@agx-leaf1:~$ sudo net add interface swp1 ip address 10.100.1.1/32
```

```
rcortes@agx-leaf1:~$ sudo net add interface swp2 ip address 10.100.1.1/32
```

```
rcortes@agx-leaf1:~$ sudo net add interface swp3 ip address 10.101.1.1/24
```

```
rcortes@agx-leaf1:~$ sudo net add interface swp1 ospf network point-to-point
```

```
rcortes@agx-leaf1:~$ sudo net add interface swp2 ospf network point-to-point
```

```
rcortes@agx-leaf1:~$ sudo net add ospf router-id 10.100.1.1
```

```
rcortes@agx-leaf1:~$ sudo net add ospf network 10.100.1.1/32 area 0.0.0.0
rcortes@agx-leaf1:~$ sudo net add ospf network 10.101.1.0/24 area 0.0.0.0
rcortes@agx-leaf1:~$ net pending  # this is to display the newly added configs for review
rcortes@agx-leaf1:~$ net commit  # this is to make the configs pushed to
                                # /etc/network/interfaces and /etc/quagga/Quagga.conf
```

The above configurations using NCLU would produce the following in
/etc/network/interfaces and **/etc/quagga/Quagga.conf** files:

/etc/network/interfaces

```
# The loopback network interface
auto lo
iface lo inet loopback
address 10.100.1.1/32

# The primary network interface; comes in by default
auto eth0
iface eth0 inet dhcp

auto swp1
iface swp1
address 10.100.1.1/32

auto swp2
iface swp2
address 10.100.1.1/32

auto swp3
iface swp3
address 10.101.1.1/24
```

/etc/quagga/Quagga.conf

```
service integrated-vtysh-config
!
interface swp1
    ip ospf network point-to-point
!
interface swp2
    ip ospf network point-to-point
!
router-id 10.100.1.1
!
router ospf
    ospf router-id 10.100.1.1
    network 10.100.1.1/32 area 0.0.0.0
    network 10.101.1.0/24 area 0.0.0.0
```

4. Execute the following to activate the configurations:

```
rcortes@agx-leaf1:~$ sudo systemctl restart networking.service
rcortes@agx-leaf1:~$ sudo systemctl restart quagga.service
```

5. Repeat the above steps to configure **agx-leaf2**, **agx-spine1**, and **agx-spine2**. Use either NCLU or directly edit **/etc/network/interfaces** and **/etc/quagga/Quagga.conf** files.

agx-leaf2**/etc/network/interfaces**

```
# The loopback network interface
```

```
auto lo
    iface lo inet loopback
    address 10.100.1.2/32
# The primary network interface; comes in by default
auto eth0
    iface eth0 inet dhcp

auto swp1
    iface swp1
    address 10.100.1.2/32

auto swp2
    iface swp2
    address 10.100.1.2/32

auto swp3
    iface swp3
    address 10.101.2.1/24
```

/etc/quagga/Quagga.conf

```
service integrated-vtysh-config
!
interface swp1
    ip ospf network point-to-point
!
interface swp2
    ip ospf network point-to-point
!
router-id 10.100.1.2
!
```

```
router ospf
  ospf router-id 10.100.1.2
  network 10.100.1.2/32 area 0.0.0.0
  network 10.101.2.0/24 area 0.0.0.0
```

agx-spine1**/etc/network/interfaces**

```
# The loopback network interface
auto lo
  iface lo inet loopback
  address 10.100.1.3/32
# The primary network interface; comes in by default
auto eth0
  iface eth0 inet dhcp

auto swp1
  iface swp1
  address 10.100.1.3/32

auto swp2
  iface swp2
  address 10.100.1.3/32

auto swp3
  iface swp3
```

/etc/quagga/Quagga.conf

```
service integrated-vtysh-config
```



```
!  
interface swp1  
    ip ospf network point-to-point  
!  
interface swp2  
    ip ospf network point-to-point  
!  
router-id 10.100.1.3  
!  
router ospf  
    ospf router-id 10.100.1.3  
    network 10.100.1.3/32 area 0.0.0.0
```

agx-spine2**/etc/network/interfaces**

```
# The loopback network interface  
auto lo  
    iface lo inet loopback  
    address 10.100.1.4/32  
# The primary network interface; comes in by default  
auto eth0  
    iface eth0 inet dhcp  
  
auto swp1  
    iface swp1  
    address 10.100.1.4/32  
  
auto swp2
```

```
iface swp2
address 10.100.1.4/32

auto swp3
iface swp3

/etc/quagga/Quagga.conf

service integrated-vtysh-config
!
interface swp1
ip ospf network point-to-point
!
interface swp2
ip ospf network point-to-point
!
router-id 10.100.1.4
!
router ospf
ospf router-id 10.100.1.4
network 10.100.1.4/32 area 0.0.0.0
```

Network Validation and Troubleshooting

1. Issue pings to all the other switches from agx-leaf1 to ensure connectivity.

```
rcortes@agx-leaf1:~$ ping 10.100.1.2
```

```
rcortes@agx-leaf1:~$ ping 10.100.1.3
```

```
rcortes@agx-leaf1:~$ ping 10.100.1.4
```

2. Check SW version.

```

rcortes@agx-leaf1:~$ sudo net show version
NCLU_VERSION=1.0
DISTRIB_ID="Cumulus Linux"
DISTRIB_RELEASE=3.3.0
DISTRIB_DESCRIPTION="Cumulus Linux 3.3.0"
rcortes@agx-leaf1:~$ _

```

3. Check interfaces status (UP/DN) and assigned IP addresses.

```

rcortes@agx-leaf1:~$ sudo net show interface

```

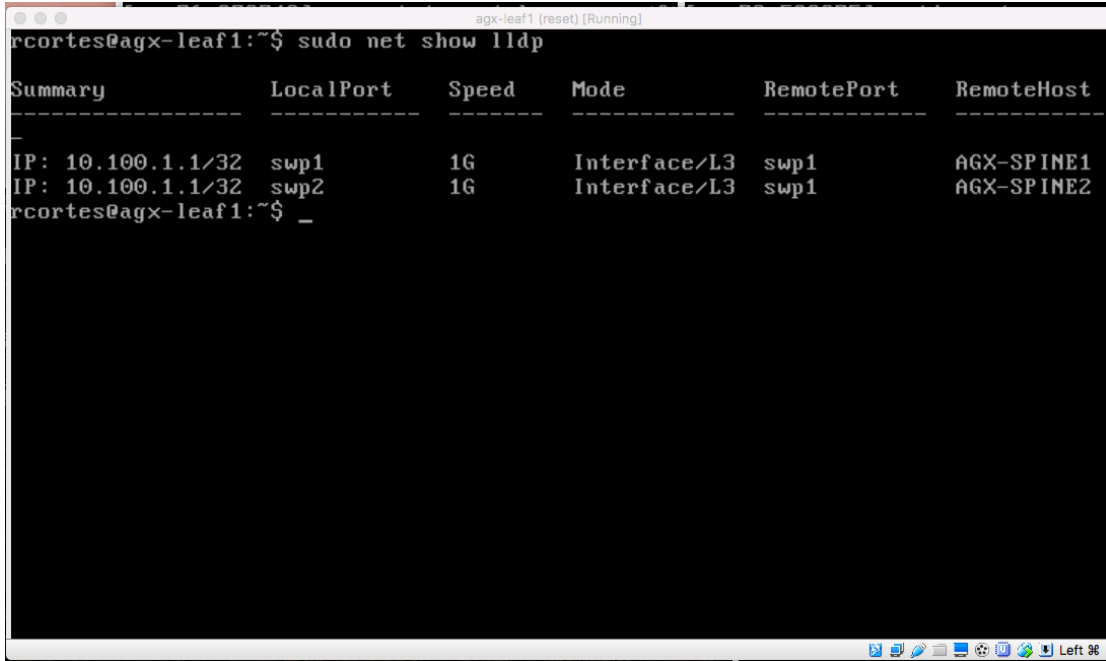
	Name	Master	Speed	MTU	Mode	Remote Host	Remote Port
	Summary						
UP	lo	None	N/A	65536	Loopback		
	IP: 10.100.1.1/32, 127.0.0.1/8, ::1/128						
DN	eth0	None	N/A	1500	Mgmt		
UP	swp1	None	1G	1500	Interface/L3	AGX-SPINE1	swp1
	IP: 10.100.1.1/32						
UP	swp2	None	1G	1500	Interface/L3	AGX-SPINE2	swp1
	IP: 10.100.1.1/32						
DN	swp3	None	N/A	1500	Interface/L3		
	IP: 10.101.1.1/24						

```

rcortes@agx-leaf1:~$ _

```

4. Check LLDP neighbors. This shows which interfaces of the **agx-leaf1** are connected to which switch neighbor and their interfaces.



```
rcortes@agx-leaf1:~$ sudo net show lldp
```

Summary	LocalPort	Speed	Mode	RemotePort	RemoteHost
IP: 10.100.1.1/32	swp1	1G	Interface/L3	swp1	AGX-SPINE1
IP: 10.100.1.1/32	swp2	1G	Interface/L3	swp1	AGX-SPINE2

```
rcortes@agx-leaf1:~$ _
```

5. Check the OSPF routing info.

```
agx-leaf1 (reset) [Running]
rcortes@agx-leaf1:~$ sudo net show route ospf
RIB entry for ospf
=====
Codes: K - kernel route, C - connected, S - static, R - RIP,
       O - OSPF, I - IS-IS, B - BGP, P - PIM, T - Table, v - UNC,
       U - VPN,
       > - selected route, * - FIB route

O    10.100.1.1/32 [110/0] is directly connected, lo, 00:06:06
O>*  10.100.1.2/32 [110/20] via 10.100.1.4, swp2 onlink, 00:05:49
      *                via 10.100.1.3, swp1 onlink, 00:05:49
O>*  10.100.1.3/32 [110/10] via 10.100.1.3, swp1 onlink, 00:05:55
O>*  10.100.1.4/32 [110/10] via 10.100.1.4, swp2 onlink, 00:05:55
rcortes@agx-leaf1:~$ _
```