

Example for Configuring MLAG with VXLAN

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Introduction

PICOS-powered Ethernet switches use Multi-Chassis Link Aggregation (MLAG) technology to connect devices, enabling each one to connect to a pair of Pica8 switches with all links running active/active to improve resiliency. There's no need to block certain links, as with the spanning tree protocol (STP), resulting in improved bandwidth utilization and performance. With STP, while redundant links may exist between switches, traffic can only flow over one of them at a time, which effectively cuts the amount of available bandwidth in half. MLAG still supports redundancy, however, because peer switches synchronize forwarding state between them, so if a leaf or spine switch fails, traffic is automatically rerouted for continuous uptime.

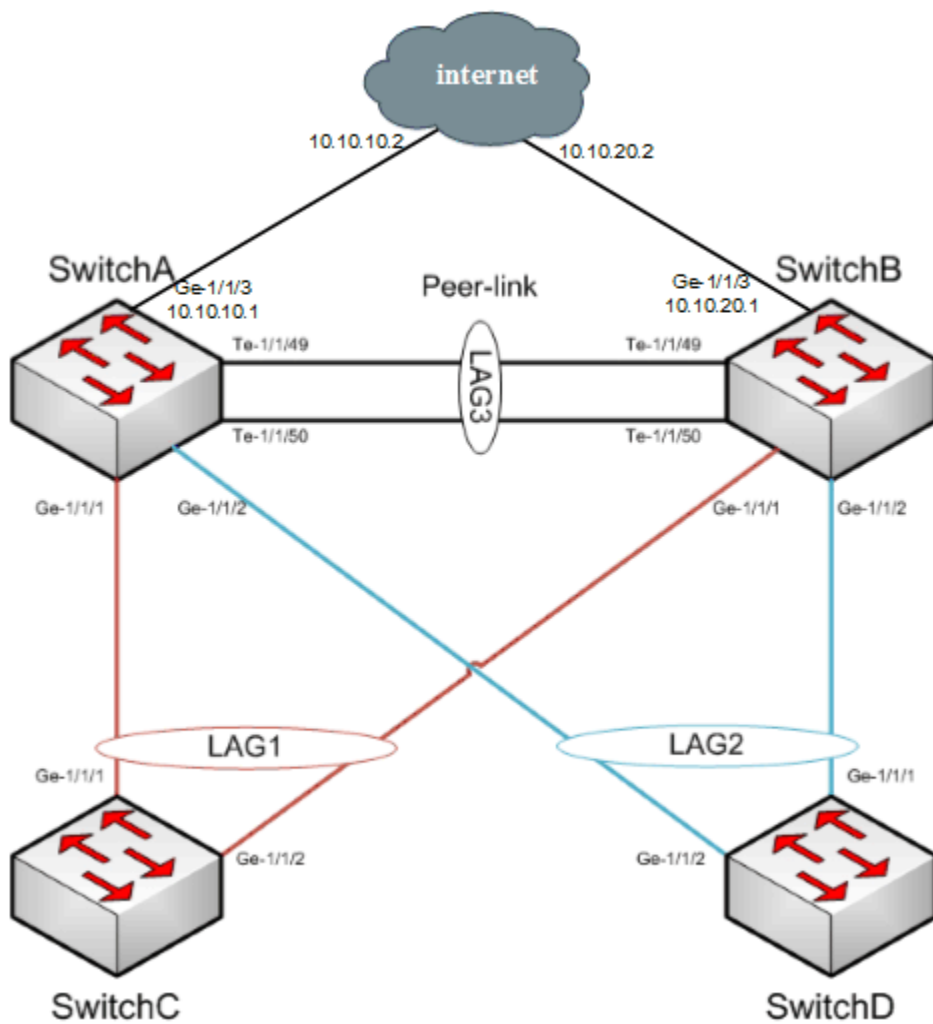
This document describes how to configure MLAG with a Virtual eXtensible LAN (VXLAN), a method for running a Layer 2 overlay network on Layer 3 infrastructure.

Networking Requirements

Figure 1 illustrates an MLAG configured between Switch A and Switch B, the MLAG connections between the neighboring switches, and two downstream Network Devices.

Access Switches SwitchC and SwitchD are dual-homed to an MLAG domain through a VXLAN tunnel, achieving that Layer 2 devices on the access side can communicate with each other over Layer 3 networks.

Figure 1 MLAG Topology with VXLAN



Follow the configuration roadmap below to complete the configuration:

- Configure MLAG. SwitchA, SwitchB and the aggregated port ae1 connected to SwitchC form an MLAG, link ID is 1; SwitchA, SwitchB and the aggregated port ae2 connected to SwitchD form another MLAG, link ID is 2. MLAG peer-link implements a backup link aggregation group ae3 between SwitchA and SwitchB to carry MLAG control messages and improve network reliability.
- Configure VXLAN functions on SwitchA and SwitchB.
- Configure LACP LAG ports on Switch C and Switch D to implement dual-homing access.

Procedure

Configuring MLAG on SwitchA

Step1 Configure the aggregation interfaces with LACP mode.

```
admin@SwitchA# set interface aggregate-ethernet ae1 aggregated-ether-options lACP enable true
admin@SwitchA# set interface aggregate-ethernet ae2 aggregated-ether-options lACP enable true
```

Step2 Add member interfaces to a LAG.

```
admin@SwitchA# set interface gigabit-ethernet ge-1/1/1 ether-options 802.3ad ae1
admin@SwitchA# set interface gigabit-ethernet ge-1/1/2 ether-options 802.3ad ae2
admin@SwitchA# set interface gigabit-ethernet te-1/1/49 ether-options 802.3ad ae3
admin@SwitchA# set interface gigabit-ethernet te-1/1/50 ether-options 802.3ad ae3
```

Step3 Configure the VLANs.

```
admin@SwitchA# set vlans vlan-id 15
admin@SwitchA# set vlans vlan-id 16
admin@SwitchA# set vlans vlan-id 4088 l3-interface vlan-4088
admin@SwitchA# set interface aggregate-ethernet ae1 family ethernet-switching port-mode trunk
admin@SwitchA# set interface aggregate-ethernet ae1 family ethernet-switching vlan members 15
admin@SwitchA# set interface aggregate-ethernet ae1 family ethernet-switching vlan members 16
admin@SwitchA# set interface aggregate-ethernet ae2 family ethernet-switching port-mode trunk
admin@SwitchA# set interface aggregate-ethernet ae2 family ethernet-switching vlan members 15
admin@SwitchA# set interface aggregate-ethernet ae2 family ethernet-switching vlan members 16
admin@SwitchA# set interface aggregate-ethernet ae3 family ethernet-switching native-vlan-id 4088
admin@SwitchA# set interface aggregate-ethernet ae3 family ethernet-switching port-mode trunk
admin@SwitchA# set interface aggregate-ethernet ae3 family ethernet-switching vlan members 15
admin@SwitchA# set interface aggregate-ethernet ae3 family ethernet-switching vlan members 16
```

Step4 Configure the L3 Interface IP Address.

```
admin@SwitchA# set l3-interface vlan-interface 4088 address 10.10.0.1 prefix-length 24
```

Step5 Configure MLAG domain ID.

```
admin@SwitchA# set protocols mlag domain 10
```

NOTE: Currently, only one MLAG domain is allowed to be configured on one MLAG device.

Step6 Specify SwitchA as MLAG Node 0.

```
admin@SwitchA# set protocols mlag domain 10 node 0
```

Step7 Configure the peer IP address and peer link port.

```
admin@SwitchA# set protocols mlag domain 10 peer-ip 10.10.0.2 peer-link ae3
```

NOTE: Peer-link port should be configured as a LAG port.

Step8 Configure the L3 interface IP address for peer link port on local MLAG peer device.

```
admin@SwitchA# set l3-interface vlan-interface 4088 address 10.10.0.1 prefix-length 24
```

Step9 Configure link ID for the MLAG member port.

```
admin@SwitchA# set protocols mlag domain 10 interface ae1 link 1
```

```
admin@SwitchA# set protocols mlag domain 10 interface ae2 link 2
```

NOTE: The paired MLAG member ports must be bound to the same MLAG link ID.

Step10 Configure MLAG peer VLAN.

```
admin@SwitchA# set protocols mlag domain 10 peer-ip 10.10.0.2 peer-vlan 4088
```

Step11 Commit the configurations.

```
admin@SwitchA# commit
```

Configuring VXLAN on SwitchA

Step1 Configure VXLAN source interface.

```
admin@SwitchA# set l3-interface loopback lo address 10.10.10.1 prefix-length 32
```

```
admin@SwitchA# set vxlans source-interface loopback address 10.10.10.1
```

Step2 Create VXLAN VNI.

```
admin@SwitchA# set vxlans vni 100010
```

- Step3** Configure vtep address for VXLAN VNI.
admin@SwitchA# set vxlans vni 100010 flood vtep 20.20.20.1
- Step4** Add VXLAN port into VXLAN VNI.
admin@SwitchA# set vxlans vni 100010 vlan 15
Note that, in current version, only one VLAN is supported in one VNI.
- Step5** Configure a static route.
admin@SwitchA# set protocols static route 20.20.20.1/24 next-hop 10.10.10.2
- Step6** Enable IP routing.
admin@SwitchA# set ip routing enable true
- Step7** Commit the configurations.
admin@SwitchA# commit

Configuring MLAG on SwitchB

- Step1** Configure the aggregation interfaces with LACP mode.
admin@SwitchB# set interface aggregate-ethernet ae1 aggregated-ether-options lACP enable true
admin@SwitchB# set interface aggregate-ethernet ae2 aggregated-ether-options lACP enable true
- Step2** Add the member interfaces to the LAG ports.
admin@SwitchB# set interface gigabit-ethernet ge-1/1/1 ether-options 802.3ad ae1
admin@SwitchB# set interface gigabit-ethernet ge-1/1/2 ether-options 802.3ad ae2
admin@SwitchB# set interface gigabit-ethernet te-1/1/49 ether-options 802.3ad ae3
admin@SwitchB# set interface gigabit-ethernet te-1/1/50 ether-options 802.3ad ae3
- Step3** Configure the VLANs.
admin@SwitchB# set vlans vlan-id 15
admin@SwitchB# set vlans vlan-id 16
admin@SwitchB# set vlans vlan-id 4088 l3-interface vlan-4088
admin@SwitchB# set interface aggregate-ethernet ae1 family ethernet-switching port-mode trunk
admin@SwitchB# set interface aggregate-ethernet ae1 family ethernet-switching vlan members 15
admin@SwitchB# set interface aggregate-ethernet ae1 family ethernet-switching vlan members 16
admin@SwitchB# set interface aggregate-ethernet ae2 family ethernet-switching port-mode trunk
admin@SwitchB# set interface aggregate-ethernet ae2 family ethernet-switching vlan members 15
admin@SwitchB# set interface aggregate-ethernet ae2 family ethernet-switching vlan members 16
admin@SwitchB# set interface aggregate-ethernet ae3 family ethernet-switching native-vlan-id 4088
admin@SwitchB# set interface aggregate-ethernet ae3 family ethernet-switching port-mode trunk
admin@SwitchB# set interface aggregate-ethernet ae3 family ethernet-switching vlan members 15
admin@SwitchB# set interface aggregate-ethernet ae3 family ethernet-switching vlan members 16
- Step4** Configure the L3 Interface IP Address.
admin@SwitchB# set l3-interface vlan-interface 4088 address 10.10.0.2 prefix-length 24
- Step5** Configure MLAG domain ID.
admin@SwitchB# set protocols mlag domain 10
NOTE: Currently, only one MLAG domain is allowed to be configured on one MLAG device.

- Step6** Specify SwitchB as MLAG Node 1.
- ```
admin@SwitchB# set protocols mlag domain 10 node 1
```
- Step7** Configure the peer IP address and peer link port.
- ```
admin@SwitchB# set protocols mlag domain 10 peer-ip 10.10.0.1 peer-link ae3
```
- NOTE: Peer-link port should be configured as a LAG port.
- Step8** Configure the L3 interface IP address for peer link port on local MLAG peer device.
- ```
admin@SwitchB# set l3-interface vlan-interface 4088 address 10.10.0.2 prefix-length 24
```
- Step9** Configure link ID for the MLAG member port.
- ```
admin@SwitchB# set protocols mlag domain 10 interface ae1 link 1
```
- ```
admin@SwitchB# set protocols mlag domain 10 interface ae2 link 2
```
- NOTE: The paired MLAG member ports must be bound to the same MLAG link ID.
- Step10** Configure MLAG peer VLAN.
- ```
admin@SwitchB# set protocols mlag domain 10 peer-ip 10.10.0.1 peer-vlan 4088
```
- Step11** Commit the configurations.
- ```
admin@SwitchB# commit
```

## Configuring VXLAN on SwitchB

- Step1** Configure VXLAN source interface.
- ```
admin@SwitchB# set l3-interface loopback lo address 10.10.10.1 prefix-length 32
```
- ```
admin@SwitchB# set vxlans source-interface loopback address 10.10.10.1
```
- Step2** Create VXLAN VNI.
- ```
admin@SwitchB# set vxlans vni 100010
```
- Step3** Configure vtep address for VXLAN VNI.
- ```
admin@SwitchB# set vxlans vni 100010 flood vtep 20.20.20.1
```
- Step4** Add VXLAN port into VXLAN VNI.
- ```
admin@SwitchB# set vxlans vni 100010 vlan 15
```
- Note that, in current version, only one VLAN is supported in one VNI.
- Step5** Configure a static route.
- ```
admin@SwitchB# set protocols static route 20.20.20.1/24 next-hop 10.10.20.2
```
- Step6** Enable IP routing.
- ```
admin@SwitchB# set ip routing enable true
```
- Step7** Commit the configurations.
- ```
admin@SwitchB# commit
```

## Configuring LAG on SwitchC

- Step1** Configure the aggregation interface with LACP mode.
- ```
admin@SwitchC# set interface aggregate-ethernet ae1 aggregated-ether-options lacp enable true
```
- Step2** Add the member interfaces to the LAG ports.
- ```
admin@SwitchC# set interface gigabit-ethernet ge-1/1/1 ether-options 802.3ad ae1
```
- ```
admin@SwitchC# set interface gigabit-ethernet ge-1/1/2 ether-options 802.3ad ae1
```
- Step3** Configure the VLANs.

```

admin@SwitchC# set vlans vlan-id 15
admin@SwitchC# set vlans vlan-id 16
admin@SwitchC# set interface aggregate-ethernet ae1 family ethernet-switching port-mode trunk
admin@SwitchC# set interface aggregate-ethernet ae1 family ethernet-switching vlan members 15
admin@SwitchC# set interface aggregate-ethernet ae1 family ethernet-switching vlan members 16

```

Step4 Commit the configurations.

```
admin@SwitchC# commit
```

Configuring LAG on SwitchD

Step1 Configure the aggregation interface with LACP mode.

```
admin@SwitchD# set interface aggregate-ethernet ae2 aggregated-ether-options lACP enable true
```

Step2 Add the member interfaces to the LAG ports.

```

admin@SwitchD# set interface gigabit-ethernet ge-1/1/1 ether-options 802.3ad ae2
admin@SwitchD# set interface gigabit-ethernet ge-1/1/2 ether-options 802.3ad ae2

```

Step3 Configure the VLANs.

```

admin@SwitchD# set vlans vlan-id 15
admin@SwitchD# set vlans vlan-id 16
admin@SwitchD# set interface aggregate-ethernet ae2 family ethernet-switching port-mode trunk
admin@SwitchD# set interface aggregate-ethernet ae2 family ethernet-switching vlan members 15
admin@SwitchD# set interface aggregate-ethernet ae2 family ethernet-switching vlan members 16

```

Step4 Commit the configurations.

```
admin@SwitchD# commit
```

Verify the Configuration

- You can use the **run show vxlan vni** and **run show vxlan tunnel** commands to display the information of VXLAN tunnel.

```

admin@SwitchA# run show vxlan vni 100010
Interface  ID          Type          Egress      Vlan ID
-----
ae1        0x80000001  Access        100078      15
ae2        0x80000002  Access        100083      15
ge-1/1/3   0x80000005  Network(UC)   100085

admin@SwitchA# run show vxlan tunnel
Total number of tunnels: 1

VNI 100010, Encap:service-vlan-delete, Decap:service-vlan-add-replace
src addr:10.10.10.1, dst addr:20.20.20.1, state:UP
traffic type:all
nexthops:10.10.10.2
output ports:ge-1/1/3

```

- You can use the **run show vxlan address-table** and **run show mac-address table** commands to display the VXLAN MAC address information.

```

admin@SwitchA# run show vxlan address-table
VNID          MAC address      Type      Interface      VTEP
-----
100010        20:04:0f:0f:49:d1  Dynamic   -----
100010        22:22:22:44:44:44  Dynamic   20.20.20.1
20.20.20.1

admin@SwitchB# run show vxlan address-table
VNID          MAC address      Type      Interface      VT EP
-----
100010        20:04:0f:0f:49:d1  Sync      -----
100010        22:22:22:44:44:44  Sync      10.10.10.1
10.10.10.1

admin@SwitchB# run show mac-address table
Total entries in switching table: 3909
Static entries in switching table: 6
Dynamic entries in switching table: 3903

VLAN          MAC address      Type      Age      Interfaces      User
-----
15            a0:01:0f:0f:49:f1  Dynamic   300      ae2              xorp
N/A           20:04:0f:0f:49:d1  Peer-Sync 300      vxlan           xorp
N/A           22:22:22:44:44:44  Peer-Sync 300      vxlan           xorp

```

- You can use the **run show mlag domain** command to display the MLAG domain information.

```

admin@SwitchA# run show mlag domain summary
Domain ID: 10   Domain MAC: 48:6E:73:FF:00:0a   Node ID: 0

Peer Link Peer IP      Peer Vlan Neighbor Status Config Matched MAC Synced # of Links
-----
ae3        10.10.10.2   4088      ESTABLISHED Yes           Yes           2

```

- You can use the **run show mlag link** command to display MLAG link information.

```

admin@SwitchA# run show mlag link summary
# of Links: 2
Link  Local LAG  Link Status  Local Status  Peer-Status  Config Matched  Flood
-----
1     ae1       IDLE        UP            UNKNOWN      No              No
2     ae2       IDLE        UP            UNKNOWN      No              No

```

- After the configuration is complete, the access switches SwitchC and SwitchD can communicate with each other normally.