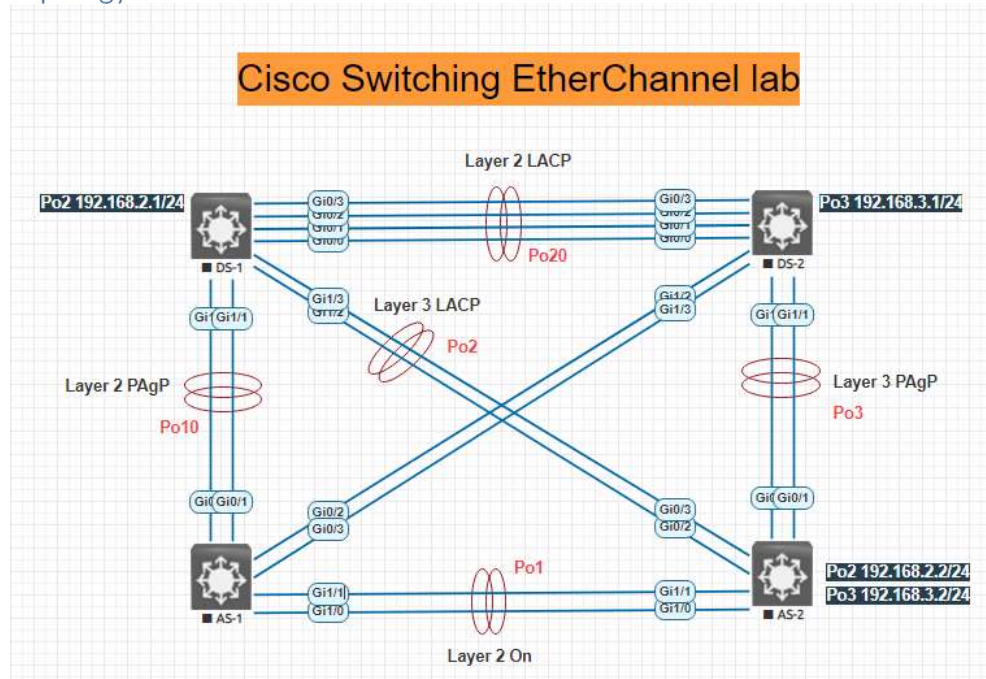


CCNP Switching EtherChannels Lab

Topology



Objectives

1. Configure Basic Device Settings
2. Configure Layer 2 EtherChannel mode On
3. Configure Layer 2 EtherChannel PAGP
4. Configure Layer 2 EtherChannel LACP
5. Configure Layer 3 EtherChannel PAGP
6. Configure Layer 3 EtherChannel LACP
7. Create static routes

An EtherChannel can be established using one of three mechanisms:

- **PAgP** - Cisco's proprietary negotiation protocol;
- **LACP (IEEE 802.3ad)** - Standards-based negotiation protocol;
- **Static Persistence ("On")** - No negotiation protocol is used;

LACP			PAgP		
	Active	Passive		Desirable	Auto
Active	Yes	Yes	Desirable	Yes	Yes
Passive	Yes	No	Auto	Yes	No

Task 1: Configure Basic

Switch DS-1

```
hostname DS-1
spanning-tree mode rapid-pvst
line con 0
exec-timeout 0 0
logging synchronous
exit
interface range g2/0-3
shutdown
exit
```

Switch DS-2

```
hostname DS-2
spanning-tree mode rapid-pvst
line con 0
exec-timeout 0 0
logging synchronous
exit
interface range g1/2-3, g2/0-3
shutdown
exit
```

Switch AS-1

```
hostname AS-1
spanning-tree mode rapid-pvst
line con 0
exec-timeout 0 0
logging synchronous
exit
interface range g0/2-3, g1/2-3
shutdown
exit
```

Switch AS-2

CCNP Switching EtherChannels Lab

```
hostname AS-2
spanning-tree mode rapid-pvst
line con 0
  exec-timeout 0 0
  logging synchronous
  exit
interface range g1/2-3
  shutdown
  exit
```

Task 2: Configure Layer 2 EtherChannel mode On Switch AS-1

```
interface range g1/0-1
  switchport trunk encapsulation dot1q
  switchport mode trunk
  shutdown
  channel-group 1 mode on
  no shutdown
```

Switch AS-2

```
interface range g1/0-1
  switchport trunk encapsulation dot1q
  switchport mode trunk
  shutdown
  channel-group 1 mode on
  no shutdown
```

Verification:

```
AS-1#show etherchannel summary
Flags:  D - down          P - bundled in port-channel
        I - stand-alone  s - suspended
        H - Hot-standby (LACP only)
        R - Layer3       S - Layer2
        U - in use       N - not in use, no aggregation
        f - failed to allocate aggregator
        M - not in use, minimum links not met
        m - not in use, port not aggregated due to minimum links not met
        u - unsuitable for bundling
        w - waiting to be aggregated
        d - default port
        A - formed by Auto LAG

Number of channel-groups in use: 1
Number of aggregators:          1
```

CCNP Switching EtherChannels Lab

Group	Port-channel	Protocol	Ports
1	Po1 (SU)	-	Gi1/0 (P) Gi1/1 (P)

Task 3: Configure Layer 2 EtherChannel PAGP

Switch DS-1

```
interface range g1/0-1
  switchport trunk encapsulation dot1q
  switchport mode trunk
  shutdown
  channel-protocol pagp
  channel-group 10 mode desirable
  no shutdown
```

Switch AS-1

```
interface range g0/0-1
  switchport trunk encapsulation dot1q
  switchport mode trunk
  shutdown
  channel-protocol pagp
  channel-group 10 mode auto
  no shutdown
```

Verification:

```
DS-1#show etherchannel 10 port
      Ports in the group:
      -----
Port: Gi1/0
-----
Port state      = Up Mstr In-Bndl
Channel group = 10      Mode = Desirable-Sl      Gcchange = 0
Port-channel   = Po10   GC   = 0x000A0001      Pseudo port-channel = Po10
Port index     = 0      Load = 0x00          Protocol = PAGP

Flags: S - Device is sending Slow hello.  C - Device is in Consistent state.
      A - Device is in Auto mode.          P - Device learns on physical port.
      d - PAGP is down.

Timers: H - Hello timer is running.        Q - Quit timer is running.
       S - Switching timer is running.      I - Interface timer is running.

Local information:

      Hello   Partner  PAGP   Learning  Group
Port   Flags State  Timers Interval Count  Priority Method  Ifindex
Gi1/0  SC   U6/S7  H      30s      1      128    Any     14
```

CCNP Switching EtherChannels Lab

Partner's information:

	Partner	Partner	Partner	Partner	Group	
Port	Name	Device ID	Port	Age	Flags	Cap.
Gi1/0	AS-1	500a.0003.800C	Gi0/0	22s	SAC	A0001

Age of the port in the current state: 0d:00h:05m:27s

Port: Gi1/1

Port state = Up Mstr In-Bndl

Channel group = 10 Mode = Desirable-S1 Gcchange = 0
Port-channel = Po10 GC = 0x000A0001 Pseudo port-channel = Po10
Port index = 0 Load = 0x00 Protocol = PAgP

Flags: S - Device is sending Slow hello. C - Device is in Consistent state.
A - Device is in Auto mode. P - Device learns on physical port.
d - PAgP is down.
Timers: H - Hello timer is running. Q - Quit timer is running.
S - Switching timer is running. I - Interface timer is running.

Local information:

				Hello	Partner	PAgP	Learning	Group
Port	Flags	State	Timers	Interval	Count	Priority	Method	Ifindex
Gi1/1	SC	U6/S7	H	30s	1	128	Any	14

Partner's information:

	Partner	Partner	Partner	Partner	Group	
Port	Name	Device ID	Port	Age	Flags	Cap.
Gi1/1	AS-1	500a.0003.800C	Gi0/1	19s	SAC	A0001

Age of the port in the current state: 0d:00h:05m:21s

DS-1#show etherchannel 10 detail

Group state = L2

Ports: 2 Maxports = 4

Port-channels: 1 Max Port-channels = 1

Protocol: PAgP

Minimum Links: 0

Ports in the group:

Port: Gi1/0

CCNP Switching EtherChannels Lab

```

Port state      = Up Mstr In-Bndl
Channel group = 10      Mode = Desirable-S1      Gchange = 0
Port-channel   = Po10   GC   = 0x000A0001      Pseudo port-channel = Po10
Port index     = 0      Load = 0x00          Protocol = PAgP

Flags: S - Device is sending Slow hello.  C - Device is in Consistent state.
      A - Device is in Auto mode.          P - Device learns on physical port.
      d - PAgP is down.

Timers: H - Hello timer is running.        Q - Quit timer is running.
      S - Switching timer is running.      I - Interface timer is running.

Local information:

```

Port	Flags	State	Timers	Hello Interval	Partner Count	PAgP Priority	Learning Method	Group Ifindex
Gi1/0	SC	U6/S7	H	30s	1	128	Any	14

```

Partner's information:

```

Port	Partner Name	Partner Device ID	Partner Port	Partner Age	Partner Flags	Partner Group Cap.
Gi1/0	AS-1	500a.0003.8000	Gi0/0	1s	SAC	A0001

```

Age of the port in the current state: 0d:00h:14m:39s

Port: Gi1/1
-----
Port state      = Up Mstr In-Bndl
Channel group = 10      Mode = Desirable-S1      Gchange = 0
Port-channel   = Po10   GC   = 0x000A0001      Pseudo port-channel = Po10
Port index     = 0      Load = 0x00          Protocol = PAgP

Flags: S - Device is sending Slow hello.  C - Device is in Consistent state.
      A - Device is in Auto mode.          P - Device learns on physical port.
      d - PAgP is down.

Timers: H - Hello timer is running.        Q - Quit timer is running.
      S - Switching timer is running.      I - Interface timer is running.

Local information:

```

Port	Flags	State	Timers	Hello Interval	Partner Count	PAgP Priority	Learning Method	Group Ifindex
Gi1/1	SC	U6/S7	H	30s	1	128	Any	14

```

Partner's information:

```

Port	Partner Name	Partner Device ID	Partner Port	Partner Age	Partner Flags	Partner Group Cap.
------	--------------	-------------------	--------------	-------------	---------------	--------------------

CCNP Switching EtherChannels Lab

```
Gi1/1    AS-1                500a.0003.8000    Gi0/1    23s SAC    A0001

Age of the port in the current state: 0d:00h:14m:34s

      Port-channels in the group:
      -----

Port-channel: Po10
-----
Age of the Port-channel    = 0d:00h:16m:42s
Logical slot/port    = 16/0            Number of ports = 2
GC                    = 0x000A0001    HotStandBy port = null
Port state            = Port-channel Ag-Inuse
Protocol              = PAgP
Port security         = Disabled
Load share deferral   = Disabled

Ports in the Port-channel:
Index  Load  Port    EC state    No of bits
-----+-----+-----+-----+-----
  0     00   Gi1/0   Desirable-S1    0
  0     00   Gi1/1   Desirable-S1    0

Time since last port bundled: 0d:00h:14m:34s    Gi1/1
```

Task 4: Configure Layer 2 EtherChannel LACP

Switch DS-1

```
interface range g0/0-3
  switchport trunk encapsulation dot1q
  switchport mode trunk
  shutdown
  channel-protocol lacp
  channel-group 20 mode active
  no shutdown
```

Switch DS-2

```
interface range g0/0-3
  switchport trunk encapsulation dot1q
  switchport mode trunk
  shutdown
  channel-protocol lacp
  channel-group 20 mode passive
  no shutdown
```

Verification:

```
DS-2#show etherchannel summary
Flags:  D - down          P - bundled in port-channel
        I - stand-alone s - suspended
        H - Hot-standby (LACP only)
        R - Layer3        S - Layer2
        U - in use        N - not in use, no aggregation
        f - failed to allocate aggregator
        M - not in use, minimum links not met
        m - not in use, port not aggregated due to minimum links not met
        u - unsuitable for bundling
        w - waiting to be aggregated
        d - default port
        A - formed by Auto LAG

Number of channel-groups in use: 1
Number of aggregators:          1

Group  Port-channel  Protocol    Ports
-----+-----+-----+-----
20     Po20 (SU)       LACP        Gi0/0 (P)  Gi0/1 (P)  Gi0/2 (P)
                               Gi0/3 (P)
```

Task 5: Configure Layer 3 EtherChannel PAGP**Switch DS-2**

```
interface Port-channel3
no switchport
ip address 192.168.3.1 255.255.255.0
exit
```

```
interface range g1/0-1
no switchport
channel-protocol pagp
channel-group 3 mode desirable
exit
```

Switch AS-2

```
interface Port-channel3
no switchport
ip address 192.168.3.2 255.255.255.0
exit
```

```
interface range g0/0-1
no switchport
```


CCNP Switching EtherChannels Lab

```
channel-protocol pagp
channel-group 3 mode desirable
exit
```

Verification:

```
DS-2#show etherchannel 3 summary
Flags:  D - down          P - bundled in port-channel
        I - stand-alone  s - suspended
        H - Hot-standby (LACP only)
        R - Layer3       S - Layer2
        U - in use       N - not in use, no aggregation
        f - failed to allocate aggregator
        M - not in use, minimum links not met
        m - not in use, port not aggregated due to minimum links not met
        u - unsuitable for bundling
        w - waiting to be aggregated
        d - default port

        A - formed by Auto LAG

Number of channel-groups in use: 2
Number of aggregators:          2

Group  Port-channel  Protocol    Ports
-----+-----+-----+-----
3      Po3(RU)        PAGP        Gi1/0(P)  Gi1/1(P)
```

```
DS-2#ping 192.168.3.2
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.3.2, timeout is 2 seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 4/8/22 ms
```

Task 6: Configure Layer 3 EtherChannel LACP

Switch DS-1

```
interface Port-channel2
no switchport
ip address 192.168.2.1 255.255.255.0
exit

interface range g1/2-3
no switchport
channel-protocol lacp
channel-group 2 mode active
```

CCNP Switching EtherChannels Lab

```
exit
```

Switch AS-2

```
interface Port-channel2
no switchport
ip address 192.168.2.2 255.255.255.0
exit
```

```
interface range g0/2-3
no switchport
channel-protocol lacp
channel-group 2 mode active
exit
```

Verification:

```
DS-1#show etherchannel 2 summary
```

```
Flags: D - down          P - bundled in port-channel
       I - stand-alone s - suspended
       H - Hot-standby (LACP only)
       R - Layer3        S - Layer2
       U - in use        N - not in use, no aggregation
       f - failed to allocate aggregator
       M - not in use, minimum links not met
       m - not in use, port not aggregated due to minimum links not met
       u - unsuitable for bundling
       w - waiting to be aggregated
       d - default port
       A - formed by Auto LAG
```

```
Number of channel-groups in use: 3
```

```
Number of aggregators:          3
```

Group	Port-channel	Protocol	Ports
2	Po2 (RU)	LACP	Gi1/2 (P) Gi1/3 (P)

```
DS-1#ping 192.168.2.2
```

```
Type escape sequence to abort.
```

```
Sending 5, 100-byte ICMP Echos to 192.168.2.2, timeout is 2 seconds:
```

```
!!!!
```

```
Success rate is 100 percent (5/5), round-trip min/avg/max = 3/17/27 ms
```

Task 7: Create static routes

Create static routes that DS-1 Po2 interface can reach DS-2 Po3 interface and vice versa.

CCNP Switching EtherChannels Lab

Switch DS-1

```
ip route 192.168.3.0 255.255.255.0 192.168.2.2
```

Switch DS-2

```
ip route 192.168.2.0 255.255.255.0 192.168.3.2
```

Verification:

```
DS-1#ping 192.168.3.1
```

```
Type escape sequence to abort.
```

```
Sending 5, 100-byte ICMP Echos to 192.168.3.1, timeout is 2 seconds:
```

```
!!!!
```

```
Success rate is 100 percent (5/5), round-trip min/avg/max = 13/17/27 ms
```

```
DS-2#ping 192.168.2.1
```

```
Type escape sequence to abort.
```

```
Sending 5, 100-byte ICMP Echos to 192.168.2.1, timeout is 2 seconds:
```

```
!!!!
```

```
Success rate is 100 percent (5/5), round-trip min/avg/max = 13/16/25 ms
```