

Cisco Switch: Port Channel and Virtual Port Channel

In this tutorial, we will discuss step-by-step what Port Channel (EtherChannel) and Virtual Port Channel (vPC) are, the benefits they bring to Cisco switch-based networks, and provide detailed configuration instructions on both Catalyst (IOS) and Nexus (NX-OS) switches. We will start by explaining the basic concepts, then move on to practical configuration examples, and finally summarise best practice and application scenarios.

What is a Port Channel (EtherChannel)

Definition

Port Channel, also known as EtherChannel, is a technology that combines multiple physical Ethernet ports into a single logical interface to increase throughput and redundancy [Wikipedia](#)

Advantages of

- Bandwidth aggregation: With aggregation of up to 8 ports, aggregate throughputs of up to 80 Gbps (for 10 Gbps ports) can be achieved.
- Redundancy and fault tolerance: In the event of loss of one link, traffic is automatically redirected to the remaining links, with no interruption in transmission.
- STP compatibility: Spanning Tree Protocol treats the EtherChannel as a single link, allowing all physical connections to be used without the risk of loops

Aggregation protocols

- LACP (IEEE 802.3ad): An open standard that allows automatic aggregation negotiation (up to 8 active and 8 passive ports)
- PAgP (Cisco-proprietary): Cisco protocol for automatic aggregation (up to 8 active ports).
- Manual: Manual configuration without protocol, requiring compatible configuration on both sides.

EtherChannel configuration on Cisco Catalyst switches (IOS)

Requirements

- Physical ports with the same parameters (speed, duplex, VLAN).
- Unoccupied port-channel number (e.g. Port-channel1).

Example of LACP configuration

```
Switch(config)# interface range GigabitEthernet1/0/1 - 2
Switch(config-if-range)# channel-group 1 mode active
Switch(config-if-range)# exit
Switch(config)# interface Port-channel1
Switch(config-if)# switchport mode trunk
Switch(config-if)# switchport trunk allowed vlan 10,20,30
```

- mode active starts LACP in active mode, negotiating aggregation with peers

Status verification

```
Switch# show etherchannel summary
```

- The command will show the status of the individual ports in the channel.

What is Virtual Port Channel (vPC)

Definition

Virtual Port Channel (vPC) is a solution available on Cisco Nexus switches that allows the configuration of a Multichassis EtherChannel - the aggregation of ports between two physically independent switches into a single logical Port Channel

Advantages and differences

- Loop control: vPC eliminates STP blockages between two devices, using both active connections simultaneously.
- Double redundancy: In the event of failure of one switch, the other takes over the traffic without interrupting the session.
- Separate control planes: vPC maintains independent controllers (control planes) on both switches, unlike VSS or Stack.

vPC architecture on Nexus switches

Requirements

- One vPC domain ID on both switches.
- Dedicated vPC peer-link (preferably consisting of at least two ports)
- Peer-keepalive channel (ICMP or BFD protocol) for monitoring the control status.

Key elements

- vPC Domain: The area in which a pair of vPC Peers operate.
- Peer-link: The physical Port Channel connecting the two vPC sides.
- Peer-keepalive: A channel for exchanging heartbeat messages.

Configuring vPCs on Cisco Nexus switches (NX-OS)

The following example assumes Nexus1 and Nexus2 switches.

Enabling the vpc function

```
Nexus(config)# feature vpc
Nexus(config)# feature interface-vlan
```

Configuring the vPC domain and keepalive

```
Nexus(config)# vpc domain 10
Nexus(config-vpc-domain)# peer-keepalive destination 192.168.0.2 source
192.168.0.1
```

- domain 10 - vPC domain identifier; must be the same on both devices
- peer-keepalive - IP addresses on dedicated management interface

Peer-link configuration

```
Nexus(config)# interface ethernet1/1-2
Nexus(config-if-range)# channel-group 100 mode active
Nexus(config-if-range)# exit
Nexus(config)# interface port-channel100
Nexus(config-if)# switchport
Nexus(config-if)# switchport mode trunk
Nexus(config-if)# vpc peer-link
```

- mode active enables LACP on the link
- vpc peer-link indicates Port Channel as peer-link

vPC configuration for end devices

```
Nexus(config)# interface ethernet1/10-11
Nexus(config-if-range)# channel-group 200 mode active
Nexus(config-if-range)# exit
Nexus(config)# interface port-channel200
Nexus(config-if)# switchport
Nexus(config-if)# switchport mode trunk
Nexus(config-if)# vpc 200
```

- vpc 200 assigns a Port Channel to a vPC domain as an individual vPC

Verification

```
Nexus# show vpc brief
Nexus# show vpc consistency-parameters
```

- Commands to assess the status of the vPC domain, peer-link and individual vPCs.

Best practice

- Use at least two physical peer-links for increased resilience.
- Configure the same port parameters (MTU, trunking, VLAN) on both sides.
- Monitor status using show vpc and system logs regularly.

Applications

- Data centres: Redundant server connections with dual active path.
- Network core: Aggregation of traffic between two core switches.
- Critical applications: Ensuring high availability and minimising points of failure.

With Port Channel and vPC, you can flexibly scale your network, increase bandwidth and ensure high availability while eliminating single points of failure.

Sources

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