

Module 6: EtherChannel

Switching, Routing and Wireless
Essentials v7.0 (SRWE)

EtherChannel Operation Link Aggregation

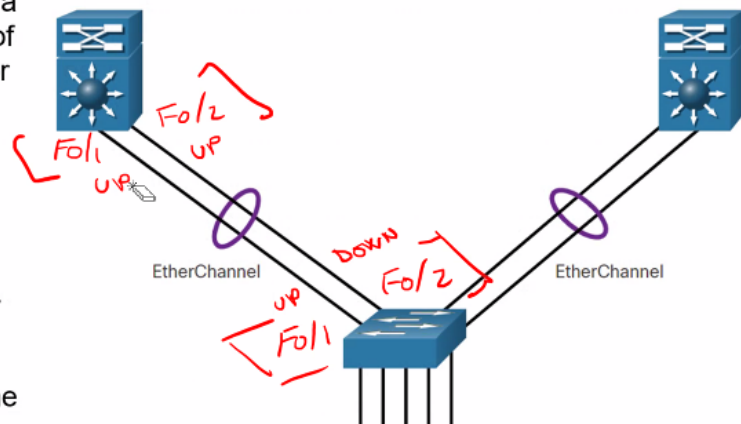
- There are scenarios in which more bandwidth or redundancy between devices is needed than what can be provided by a single link. Multiple links could be connected between devices to increase bandwidth. However, Spanning Tree Protocol (STP), which is enabled on Layer 2 devices like Cisco switches by default, will block redundant links to prevent switching loops.
- A link aggregation technology is needed that allows redundant links between devices that will not be blocked by STP. That technology is known as EtherChannel.
- EtherChannel is a link aggregation technology that groups multiple physical Ethernet links together into one single logical link. It is used to provide fault-tolerance, load sharing, increased bandwidth, and redundancy between switches, routers, and servers.
- EtherChannel technology makes it possible to combine the number of physical links between the switches to increase the overall speed of switch-to-switch communication.

EtherChannel Operation

EtherChannel

EtherChannel technology was originally developed by Cisco as a LAN switch-to-switch technique of grouping several Fast Ethernet or Gigabit Ethernet ports into one logical channel.

When an EtherChannel is configured, the resulting virtual interface is called a port channel. The physical interfaces are bundled together into a port channel interface, as shown in the figure.



```
Switch>en
Switch#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#int range f0/1-2
Switch(config-if-range)#channel-g
Switch(config-if-range)#channel-group ?
    <1-6> Channel group number
Switch(config-if-range)#channel-group 1 mode ac
Switch(config-if-range)#channel-group 1 mode active
Switch(config-if-range)#
Creating a port-channel interface Port-channel 1

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1,
changed state to down

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1,
changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/2,
changed state to down

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/2,
changed state to up

Switch(config-if-range)#
```

EtherChannel Operation Implementation Restrictions

SI [INT RANGE FO/1-2
INT RANGE GO/1-2
NO -> INT RANGE FO/1, GO/1

EtherChannel has certain implementation restrictions, including the following:

- Interface types cannot be mixed. For example, Fast Ethernet and Gigabit Ethernet cannot be mixed within a single EtherChannel.
- Currently each EtherChannel can consist of up to eight compatibly-configured Ethernet ports. EtherChannel provides full-duplex bandwidth up to 800 Mbps (Fast EtherChannel) or 8 Gbps (Gigabit EtherChannel) between one switch and another switch or host.
- The Cisco Catalyst 2960 Layer 2 switch currently supports up to six EtherChannels.
- The individual EtherChannel group member port configuration must be consistent on both devices. If the physical ports of one side are configured as trunks, the physical ports of the other side must also be configured as trunks within the same native VLAN. Additionally, all ports in each EtherChannel link must be configured as Layer 2 ports.
- Each EtherChannel has a logical port channel interface. A configuration applied to the port channel interface affects all physical interfaces that are assigned to that interface.



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EtherChannel Operation AutoNegotiation Protocols

EtherChannels can be formed through negotiation using one of two protocols, Port Aggregation Protocol (PAgP) or Link Aggregation Control Protocol (LACP). These protocols allow ports with similar characteristics to form a channel through dynamic negotiation with adjoining switches.

Note: It is also possible to configure a static or unconditional EtherChannel without PAgP or LACP.



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EtherChannel Operation PAgP Operation (Cont.)

PAgP helps create the EtherChannel link by detecting the configuration of each side and ensuring that links are compatible so that the EtherChannel link can be enabled when needed. The modes for PAgP as follows:

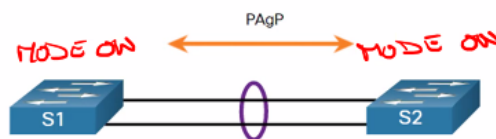
- **On** - This mode forces the interface to channel without PAgP. Interfaces configured in the on mode do not exchange PAgP packets.
- **PAgP desirable** - This PAgP mode places an interface in an active negotiating state in which the interface initiates negotiations with other interfaces by sending PAgP packets. *ATTIVA*
- **PAgP auto** - This PAgP mode places an interface in a passive negotiating state in which the interface responds to the PAgP packets that it receives but does not initiate PAgP negotiation. *PASSIVA*

The modes must be compatible on each side. If one side is configured to be in auto mode, it is placed in a passive state, waiting for the other side to initiate the EtherChannel negotiation. If the other side is also set to auto, the negotiation never starts and the EtherChannel does not form. If all modes are disabled by using the **no** command, or if no mode is configured, then the EtherChannel is disabled. The on mode manually places the interface in an EtherChannel, without any negotiation. It works only if the other side is also set to on. If the other side is set to negotiate parameters through PAgP, no EtherChannel forms, because the side that is set to on mode does not negotiate. No negotiation between the two switches means there is no checking to make sure that all the links in the EtherChannel are terminating on the other side, or that there is PAgP compatibility on the other switch.



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EtherChannel Operation PAgP Mode Settings Example



The table shows the various combination of PAgP modes on S1 and S2 and the resulting channel establishment outcome.

S1	S2	Channel Establishment
On	On	Yes
On	<u>Desirable/Auto</u>	No
Desirable	Desirable	Yes
Desirable	Auto	Yes
Auto	Desirable	Yes
Auto	Auto	No



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