

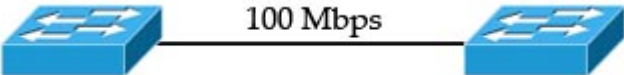


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EtherChannel Tutorial

January 17th, 2014 [Go to comments](#)

EtherChannel is the technology which is used to combine several physical links between switches or routers into one logical connection and treat them as a single link. Let's take an example to see the benefits of this technology: Suppose your company has two switches connecting with each other via a FastEthernet link

(100Mbps):  Your company is growing and you need to transfer more than 100 Mbps between these switches. If you only connect other links between the two switches it will not work because Spanning-tree protocol (STP) will block redundant links to prevent a loop:



To extend the capacity of the link you have two ways:

- + Buy two 1000Mbps (1Gbps) interfaces
 - + Use EtherChannel technology to bundle them into a bigger link
- The first solution is expensive with the new hardware installed on the two switches. By using EtherChannel you only need some more unused ports



on your switches:

EtherChannel bundles the physical links into one logical link with the combined bandwidth and it is awesome! STP sees this link as a single link so STP will not block any links! EtherChannel also does load balancing among the links in the channel automatically. If a link within the EtherChannel bundle fails, traffic previously carried over the failed link is carried over the remaining links within the EtherChannel. If one of the links in the channel fails but at least one of the links is up, the logical link (EtherChannel link) remains up. EtherChannel also works well for



router connections:

When an EtherChannel is created, a logical interface will be created on the switches or routers representing for that EtherChannel. You can configure this logical interface in the way you want. For example, assign access/trunk mode on switches or assign IP address for the logical interface on routers...

Note: A maximum of 8 Fast Ethernet or 8 Gigabit Ethernet ports can be grouped together when forming an EtherChannel. There are three mechanisms you can choose to configure EtherChannel:

- + Port Aggregation Protocol (PAgP)
- + Link Aggregation Control Protocol (LACP)
- + Static ("On")

LACP is the IEEE Standard (IEEE 802.3ad) and is the most common dynamic ether-channel protocol, whereas **PAgP is a Cisco proprietary** protocol and works only between supported vendors and Cisco devices. All ports in an EtherChannel must use the same protocol; you cannot run two protocols on two ends. In other words, PAgP and LACP are not compatible so both ends of a channel must use the same protocol.

The Static Persistence (or “on” mode) bundles the links unconditionally and no negotiation protocol is used. In this mode, neither PAgP nor LACP packets are sent or received. (Reference: http://www.cisco.com/en/US/tech/tk389/tk213/technologies_tech_note09186a0080094714.shtml)

Next we will learn more about the three EtherChannel mechanisms above.

Port Aggregation Protocol (PAgP)

PAgP dynamically negotiates the formation of a channel. There are two PAgP modes:

| | |
|------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Auto | Responds to PAgP messages but does not aggressively negotiate a PAgP EtherChannel. A channel is formed only if the port on the other end is set to Desirable. This is the default mode. |
| Desirable | Port actively negotiates channeling status with the interface on the other end of the link. A channel is formed if the other side is Auto or Desirable. |

The table below lists if an EtherChannel will be formed or not for PAgP:

| PAgP | Desirable | Auto |
|------------------|------------------|-------------|
| Desirable | Yes | Yes |
| Auto | Yes | No |

Link Aggregation Protocol (LACP)

LACP also dynamically negotiates the formation of a channel. There are two LACP modes:

| | |
|----------------|-------------------------------------------------------------------------------------------------------------------------------------------------|
| Passive | Responds to LACP messages but does not aggressively negotiate a LACP EtherChannel. A channel is formed only if the other end is set to Active |
| Active | Port actively negotiates channeling with the interface on the other end of the link. A channel is formed if the other side is Passive or Active |

The table below lists if an EtherChannel will be formed or not for LACP:

| LACP | Active | Passive |
|----------------|---------------|----------------|
| Active | Yes | Yes |
| Passive | Yes | No |

In general, **Auto** mode in PAgP is the same as **Passive** mode in LACP and **Desirable** mode is same as **Active** mode. Auto = Passive Desirable = Active

Static (“On”)

In this mode, no negotiation is needed. The interfaces become members of the EtherChannel immediately. When using this mode make sure the other end must use this mode too because they will not check if port parameters match. Otherwise the EtherChannel would not come up and may cause some troubles (like loop...). Note: All interfaces in an EtherChannel must be configured identically to form an EtherChannel. Specific settings that must be identical include:

- + Speed settings
- + Duplex settings
- + STP settings
- + VLAN membership (for access ports)
- + Native VLAN (for trunk ports)
- + Allowed VLANs (for trunk ports)
- + Trunking Encapsulation (ISL or 802.1Q, for trunk ports)

Note: EtherChannels will not form if either dynamic VLANs or port security are enabled on the participating EtherChannel interfaces. In the next part we will learn how to configure EtherChannel on switch/router interfaces.

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1. Patrick

June 1st, 2021

is the static on an open standard?

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