LACP EtherChannel

EtherChannel bundles multiple physical switch links between switches into a single logical **port channel** interface. It is referred to as Link Aggregation Group (LAG). The advantages include fault tolerance (redundancy) and higher bandwidth per interface between connected switches.

Cisco switches support assigning at least eight switch ports per Etherchannel bundle. LACP standard enables a maximum of 16 switch ports. There are however only eight ports that can be active simultaneously. The additional switch ports are standby and operational only when any primary switch port fails. For example, bundling four Gigabit Ethernet switch ports into a single EtherChannel creates a single 4 Gbps port channel. Traffic is forwarded across all available links.

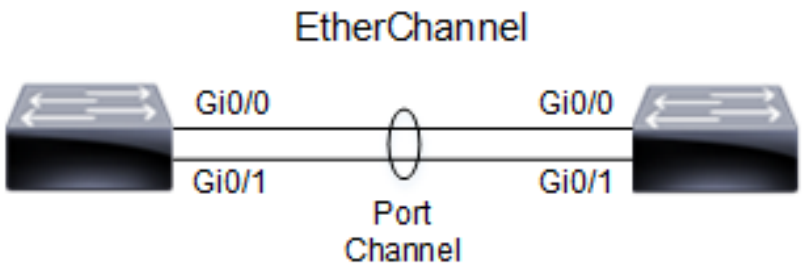
Table 1 EtherChannel Protocols (LAG)

LACP	PAgP
open standard (multivendor)	Cisco proprietary
bundle = 8 ports + 8 standby	bundle = 8 ports
passive mode (default)	auto mode (default)
active mode	desirable mode
any port active mode = etherchannel	any port desirable = etherchannel

1. Static mode **on** does not provide any dynamic channel negotiation. The **channel-group** is configured with **on** keyword for assigned switch ports.

2. LACP is an open standard that enables dynamic negotiation of an EtherChannel between Cisco switches. There is support for connecting multivendor equipment as well. LACP modes include **active and passive.**

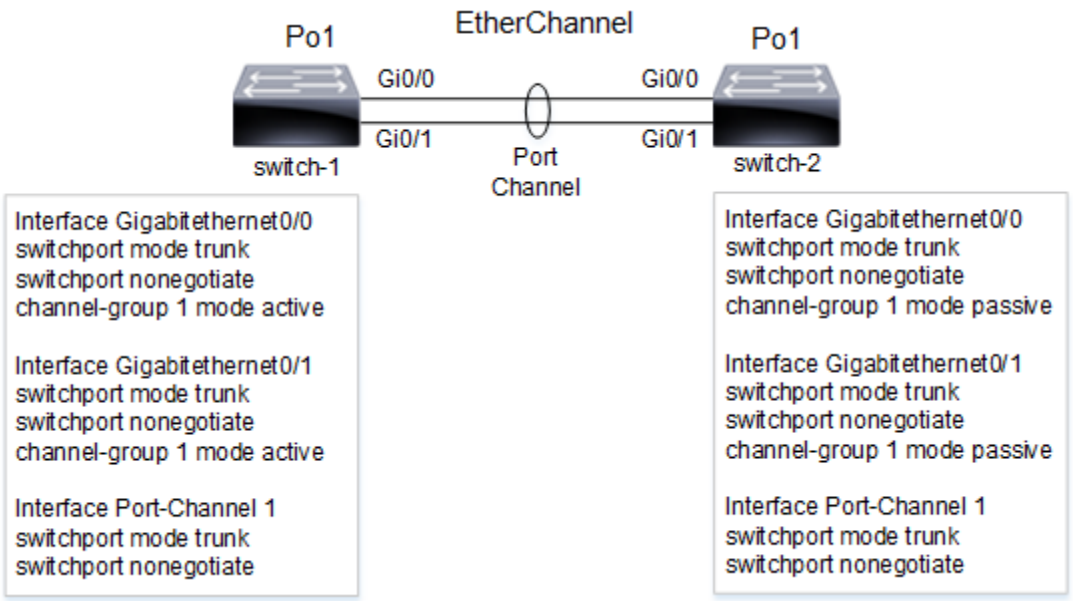
Figure 1 EtherChannel



LACP Configuration

The network topology is a Layer 2 EtherChannel with trunking between switches. All switch port settings that are assigned to a port channel must match to prevent err-disabled state. That includes switchport mode (trunk) speed, duplex, and protocol (LACP) to negotiate an Etherchannel. The IOS command **switchport nonegotiate** disables DTP frames across the static trunk as a best practice.

Figure 2 Layer 2 LACP EtherChannel Configuration



LACP is enabled on switches with the **channel-group** [number] [mode] command. It is switch-1 that is sending negotiating LACP negotiation frames with **active** mode enabled. The neighbor switch is configured to listen for LACP frames however you could configure active mode on each. EtherChannel across a trunk require native VLAN, allowed VLANs and encapsulation type to match as well.

Port Channel

There are Layer 2 and Layer 3 port channel interfaces. The **channel-group** number binds an Etherchannel to a port channel logical interface. The Layer 2 port channel is a logical interface comprised of Etherchannel access ports or trunk ports. The Layer 2 port channel is created automatically based on the **channel-group** number. with channel-group numbers from 1 - 4096.

Layer 3 port channel is a routed interface that has no concept of access ports, trunk ports, or VLANs. All traffic arriving on a routed interface are forwarded to next hop unless there is filtering.

The configuration shown is on a multilayer switch where routed ports are supported. The same **channel-group** command binds multiple physical switch ports of an EtherChannel to a Layer 3 port channel interface. There is also protocol mode specified with the channel-group command to enable dynamic (LACP/PAgP) or static (on) EtherChannel mode.

```
switch(config)# interface port-channel 1
switch(config-if)# no switchport
switch(config-if)# ip address 172.16.1.1 255.255.255.0

switch(config)# interface range gigabitethernet 0/1-4
switch(config-if)# channel-group 1 mode active
```

The following IOS command lists the operational status of all active port channels, channel group number and switch ports assigned.

```
switch# show etherchannel summary
```

The following IOS show command list the operational status of all active Layer 3 port channels and switch port members assigned.

```
switch# show interface port-channel
```

LACP System Priority

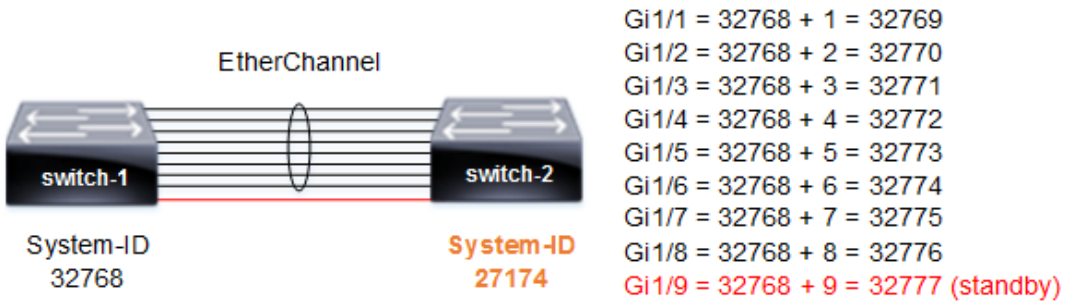
Cisco switches are assigned a LACP EtherChannel system ID. The purpose is to designate a switch that will determine what ports are active and standby. It is only applicable when there are more than eight switch ports in an EtherChannel. The system ID value is calculated by adding switch MAC address + system priority. Cisco assigns default system priority of 32768 to all switches and each physical switch port.

The switch with **lowest system ID** determines what switch ports are active for an EtherChannel. In this example, switch-2 has a lower system ID and selects up to eight switch ports with the **lowest port ID** as active. The switch port ID is calculated by adding port number + 32768. Based on consecutive port numbers, it is switch port Gi1/9 that is in standby mode.

The following IOS command manually designates a switch to select ports that are active within LACP EtherChannel bundle. As mentioned, the default priority is 32768, and assignable range is from 1-65535 for system or port priority.

```
switch(config)# lacp system-priority 27000
```

Figure 3 LACP EtherChannel System and Port Priority



The following IOS command manually configures switch port priority to control what ports are selected as active within LACP EtherChannel bundle. It is an alternative to automatic assignment based on existing port ID value.

```
switch(config)# interface gigabitethernet1/9
switch(config-if)# lacp port-priority 2000
```