



## Configuring EtherChannels

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This chapter describes how to configure EtherChannel on Layer 2 and Layer 3 interfaces. EtherChannel provides fault-tolerant high-speed links between switches, routers, and servers. You can use it to increase the bandwidth between the wiring closets and the data center, and you can deploy it anywhere in the network where bottlenecks are likely to occur. EtherChannel provides automatic recovery for the loss of a link by redistributing the load across the remaining links. If a link fails, EtherChannel redirects traffic from the failed link to the remaining links in the channel without intervention.

**Note**

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For complete syntax and usage information for the commands used in this chapter, refer to the command reference for this release.

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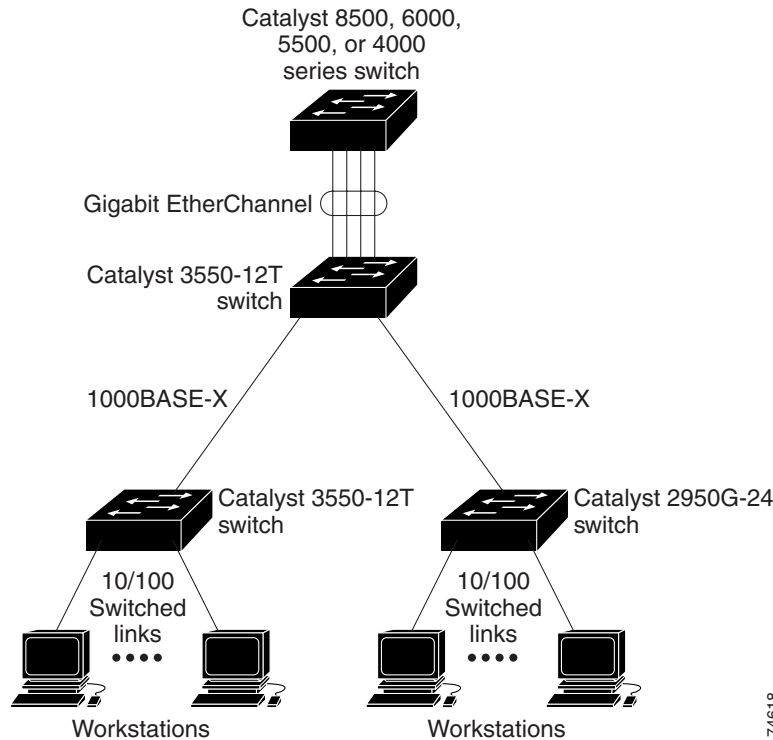
This chapter consists of these sections:

- [Understanding EtherChannels, page 28-1](#)
- [Configuring EtherChannels, page 28-7](#)
- [Displaying EtherChannel and PAgP Status, page 28-15](#)

## Understanding EtherChannels

An EtherChannel consists of individual Fast Ethernet or Gigabit Ethernet links bundled into a single logical link as shown in [Figure 28-1](#). The EtherChannel provides full-duplex bandwidth up to 800 Mbps (Fast EtherChannel) or 8 Gbps (Gigabit EtherChannel) between your switch and another switch or host.

Figure 28-1 Typical EtherChannel Configuration



Each EtherChannel can consist of up to eight compatibly configured Ethernet interfaces. All interfaces in each EtherChannel must be the same speed, and all must be configured as either Layer 2 or Layer 3 interfaces.

**Note**

The network device to which your switch is connected can impose its own limits on the number of interfaces in the EtherChannel. For Catalyst 3550 switches, the number of EtherChannels is limited to the number of ports of the same type.

If a link within an EtherChannel fails, traffic previously carried over that failed link changes to the remaining links within the EtherChannel. A trap is sent for a failure, identifying the switch, the EtherChannel, and the failed link. Inbound broadcast and multicast packets on one link in an EtherChannel are blocked from returning on any other link of the EtherChannel.

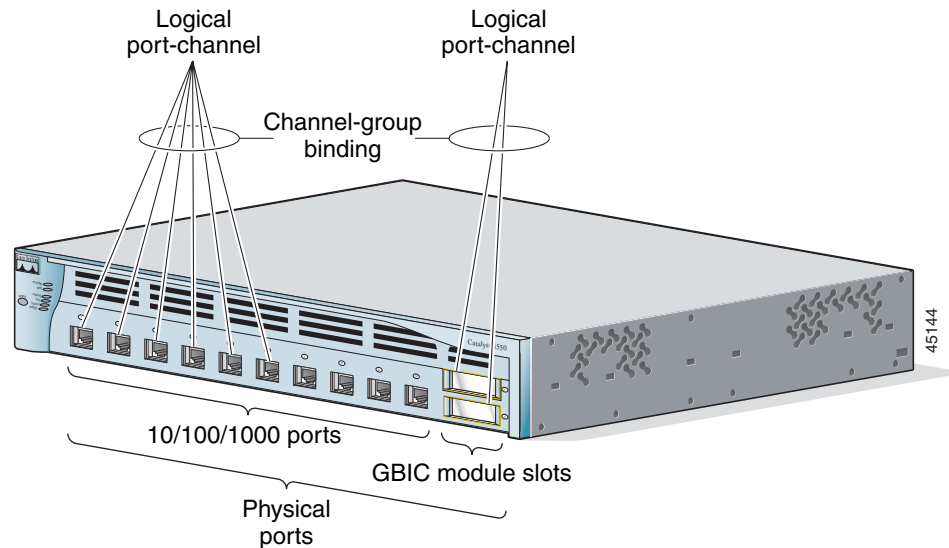
## Understanding Port-Channel Interfaces

You create an EtherChannel for Layer 2 interfaces differently from Layer 3 interfaces. Both configurations involve logical interfaces.

- With Layer 3 interfaces, you manually create the logical interface by using the **interface port-channel** global configuration command.
- With Layer 2 interfaces, the logical interface is dynamically created.
- With both Layer 3 and 2 interfaces, you manually assign an interface to the EtherChannel by using the **channel-group** interface configuration command. This command binds the physical and logical ports together as shown in [Figure 28-2](#).

Each EtherChannel has a logical port-channel interface numbered from 1 to 64. The channel groups are also numbered from 1 to 64.

**Figure 28-2 Relationship of Physical Ports, Logical Port Channels, and Channel Groups**



After you configure an EtherChannel, configuration changes applied to the port-channel interface apply to all the physical interfaces assigned to the port-channel interface. Configuration changes applied to the physical interface affect only the interface where you apply the configuration. To change the parameters of all ports in an EtherChannel, apply configuration commands to the port-channel interface, for example, spanning-tree commands or commands to configure a Layer 2 EtherChannel as a trunk.

## Understanding the Port Aggregation Protocol

The Port Aggregation Protocol (PAgP) facilitates the automatic creation of EtherChannels by exchanging packets between Ethernet interfaces. By using PAgP, the switch learns the identity of partners capable of supporting PAgP and learns the capabilities of each interface. It then dynamically groups similarly configured interfaces into a single logical link (channel or aggregate port); these interfaces are grouped based on hardware, administrative, and port parameter constraints. For example, PAgP groups the interfaces with the same speed, duplex mode, native VLAN, VLAN range, and trunking status and type. After grouping the links into an EtherChannel, PAgP adds the group to the spanning tree as a single switch port.

## PAgP Modes

Table 28-1 shows the user-configurable EtherChannel modes for the **channel-group** interface configuration command: **on**, **auto**, and **desirable**. Switch interfaces exchange PAgP packets only with partner interfaces configured in the **auto** or **desirable** modes; interfaces configured in the **on** mode do not exchange PAgP packets.

**Table 28-1 EtherChannel Modes**

Mode	Description
<b>auto</b>	Places an interface into a passive negotiating state, in which the interface responds to PAgP packets it receives but does not start PAgP packet negotiation. This setting minimizes the transmission of PAgP packets.
<b>desirable</b>	Places an interface into an active negotiating state, in which the interface starts negotiations with other interfaces by sending PAgP packets.
<b>on</b>	Forces the interface to channel without PAgP. With the <b>on</b> mode, a usable EtherChannel exists only when an interface group in the <b>on</b> mode is connected to another interface group in the <b>on</b> mode.

Both the **auto** and **desirable** modes allow interfaces to negotiate with partner interfaces to determine if they can form an EtherChannel based on criteria such as interface speed and, for Layer 2 EtherChannels, trunking state and VLAN numbers.

Interfaces can form an EtherChannel when they are in different PAgP modes as long as the modes are compatible. For example:

- An interface in the **desirable** mode can form an EtherChannel with another interface that is in the **desirable** or **auto** mode.
- An interface in the **auto** mode can form an EtherChannel with another interface in the **desirable** mode.

An interface in the **auto** mode cannot form an EtherChannel with another interface that is also in the **auto** mode because neither interface starts PAgP negotiation.

An interface in the **on** mode that is added to a port channel is forced to have the same characteristics as the already existing **on** mode interfaces in the channel.



### Caution

You should exercise care when setting the mode to **on** (manual configuration). All ports configured in the **on** mode are bundled in the same group and are forced to have similar characteristics. If the group is misconfigured, packet loss or spanning-tree loops might occur.

If your switch is connected to a partner that is PAgP-capable, you can configure the switch interface for nonsilent operation by using the **non-silent** keyword. If you do not specify **non-silent** with the **auto** or **desirable** mode, silent mode is assumed.

The silent mode is used when the switch is connected to a device that is not PAgP-capable and seldom, if ever, sends packets. An example of a silent partner is a file server or a packet analyzer that is not generating traffic. In this case, running PAgP on a physical port connected to a silent partner prevents that switch port from ever becoming operational; however, the silent setting allows PAgP to operate, to attach the interface to a channel group, and to use the interface for transmission.

## Physical Learners and Aggregate-Port Learners

Network devices are classified as PAgP physical learners or aggregate-port learners. A device is a physical learner if it learns addresses by physical ports and directs transmissions based on that knowledge. A device is an aggregate-port learner if it learns addresses by aggregate (logical) ports.

When a device and its partner are both aggregate-port learners, they learn the address on the logical port-channel. The device sends packets to the source by using any of the interfaces in the EtherChannel. With aggregate-port learning, it is not important on which physical port the packet arrives.

PAgP cannot automatically detect when the partner device is a physical learner and the local device is an aggregate-port learner. Therefore, you must manually set the learning method on the local device or source-based distribution by using the **pagp learn-method** interface configuration command. With source-based distribution, any given source MAC address is always sent on the same physical port.

You can also configure a single interface within the group for all transmissions and use other interfaces for hot standby. The unused interfaces in the group can be swapped into operation in just a few seconds if the selected single interface loses hardware-signal detection. You can configure which interface is always selected for packet transmission by changing its priority by using the **pagp port-priority** interface configuration command. The higher the priority, the more likely that the port will be selected.

## PAgP Interaction with Other Features

The Dynamic Trunking Protocol (DTP) and Cisco Discovery Protocol (CDP) send and receive packets over the physical interfaces in the EtherChannel. Trunk ports send and receive PAgP protocol data units (PDUs) on the lowest numbered VLAN.

Spanning tree sends packets over the first interface in the EtherChannel.

The MAC address of a Layer 3 EtherChannel is the MAC address of the first interface in the port-channel.

PAgP sends and receives PAgP PDUs only from interfaces that are up and have PAgP enabled for the auto or desirable mode.

## Understanding Load Balancing and Forwarding Methods

EtherChannel balances the traffic load across the links in a channel by reducing part of the binary pattern formed from the addresses in the frame to a numerical value that selects one of the links in the channel. EtherChannel load balancing can use either source-MAC or destination-MAC address forwarding.

With source-MAC address forwarding, when packets are forwarded to an EtherChannel, they are distributed across the ports in the channel based on the source-MAC address of the incoming packet. Therefore, to provide load balancing, packets from different hosts use different ports in the channel, but packets from the same host use the same port in the channel (and the MAC address learned by the switch does not change).

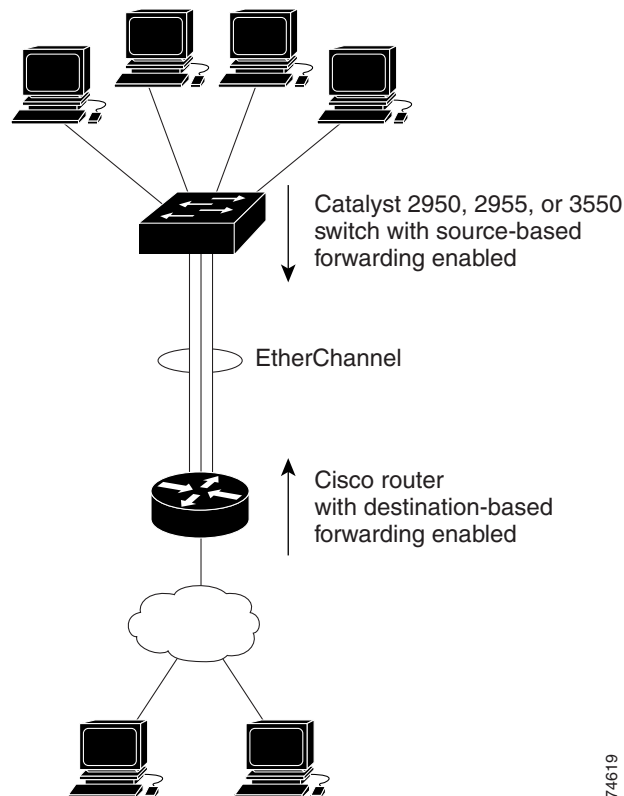
When source-MAC address forwarding is used, load distribution based on the source and destination IP address is also enabled for routed IP traffic. All routed IP traffic chooses a port based on the source and destination IP address. Packets between two IP hosts always use the same port in the channel, and traffic between any other pair of hosts can use a different port in the channel.

With destination-MAC address forwarding, when packets are forwarded to an EtherChannel, they are distributed across the ports in the channel based on the destination host's MAC address of the incoming packet. Therefore, packets to the same destination are forwarded over the same port, and packets to a different destination are sent on a different port in the channel. You configure the load balancing and forwarding method by using the **port-channel load-balance** global configuration command.

In [Figure 28-3](#), an EtherChannel of four workstations communicates with a router. Because the router is a single-MAC-address device, source-based forwarding on the switch EtherChannel ensures that the switch uses all available bandwidth to the router. The router is configured for destination-based forwarding because the large number of workstations ensures that the traffic is evenly distributed from the router EtherChannel.

Use the option that provides the greatest variety in your configuration. For example, if the traffic on a channel is going only to a single MAC address, using the destination-MAC address always chooses the same link in the channel; using source addresses or IP addresses might result in better load balancing.

**Figure 28-3 Load Distribution and Forwarding Methods**



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# Configuring EtherChannels

These sections describe how to configure EtherChannel on Layer 2 and Layer 3 interfaces:

- [Default EtherChannel Configuration, page 28-7](#)
- [EtherChannel Configuration Guidelines, page 28-8](#)
- [Configuring Layer 2 EtherChannels, page 28-9](#)
- [Configuring Layer 3 EtherChannels, page 28-11](#)
- [Configuring EtherChannel Load Balancing, page 28-13](#)
- [Configuring the PAgP Learn Method and Priority, page 28-14](#)


**Note**

Make sure that the interfaces are correctly configured (see the “[EtherChannel Configuration Guidelines](#)” section on page 28-8).


**Note**

After you configure an EtherChannel, configuration changes applied to the port-channel interface apply to all the physical interfaces assigned to the port-channel interface, and configuration changes applied to the physical interface affect only the interface where you apply the configuration.

## Default EtherChannel Configuration

[Table 28-2](#) shows the default EtherChannel configuration.

**Table 28-2 Default EtherChannel Configuration**

Feature	Default Setting
Channel groups	None assigned.
Layer 3 port-channel logical interface	None defined.
PAgP mode	Auto and silent (The interface is in a passive negotiating state; it responds to PAgP packets it receives but does not start PAgP packet negotiation. PAgP is enabled only if a PAgP device is detected.)
PAgP learn method	Aggregate-port learning on all interfaces.
PAgP priority	128 on all interfaces.
Load balancing	Load distribution on the switch is based on the source-MAC address of the incoming packet. Load distribution based on the source and destination IP address is also enabled for routed IP traffic.

## EtherChannel Configuration Guidelines

If improperly configured, some EtherChannel interfaces are automatically disabled to avoid network loops and other problems. Follow these guidelines to avoid configuration problems:

- Configure an EtherChannel with up to eight Ethernet interfaces of the same type.



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**Note** Do not configure a GigaStack GBIC port as part of an EtherChannel.

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- Configure all interfaces in an EtherChannel to operate at the same speeds and duplex modes.
- Enable all interfaces in an EtherChannel. An interface in an EtherChannel that is disabled by using the **shutdown** interface configuration command is treated as a link failure, and its traffic is transferred to one of the remaining interfaces in the EtherChannel.
- When a group is first created, all ports follow the parameters set for the first port to be added to the group. If you change the configuration of one of these parameters, you must also make the changes to all ports in the group:
  - Allowed-VLAN list
  - Spanning-tree path cost for each VLAN
  - Spanning-tree port priority for each VLAN
  - Spanning-tree Port Fast setting
- An EtherChannel does not form if one of the interfaces is a Switch Port Analyzer (SPAN) destination port.
- Do not configure a port that belongs to an EtherChannel port group as a secure port.
- Before enabling 802.1X on the port, you must first remove it from the EtherChannel. If you try to enable 802.1X on an EtherChannel or on an active port in an EtherChannel, an error message appears, and 802.1X is not enabled. If you enable 802.1X on a not-yet active port of an EtherChannel, the port does not join the EtherChannel.
- For Layer 2 EtherChannels:
  - Assign all interfaces in the EtherChannel to the same VLAN, or configure them as trunks. Interfaces with different native VLANs cannot form an EtherChannel.
  - If you configure an EtherChannel from trunk interfaces, verify that the trunking mode (ISL or 802.1Q) is the same on all the trunks. Inconsistent trunk modes on EtherChannel interfaces can have unexpected results.
  - An EtherChannel supports the same allowed range of VLANs on all the interfaces in a trunking Layer 2 EtherChannel. If the allowed range of VLANs is not the same, the interfaces do not form an EtherChannel even when PAgP is set to the **auto** or **desirable** mode.
  - Interfaces with different spanning-tree path costs can form an EtherChannel if they are otherwise compatibly configured. Setting different spanning-tree path costs does not, by itself, make interfaces incompatible for the formation of an EtherChannel.
- For Layer 3 EtherChannels, assign the Layer 3 address to the port-channel logical interface, not to the physical interfaces in the channel.

## Configuring Layer 2 EtherChannels

You configure Layer 2 EtherChannels by configuring the Ethernet interfaces with the **channel-group** interface configuration command, which creates the port-channel logical interface.


**Note**

Layer 2 interfaces must be connected and functioning for IOS to create port-channel interfaces.

Beginning in privileged EXEC mode, follow these steps to assign a Layer 2 Ethernet interface to a Layer 2 EtherChannel:

	Command	Purpose
Step 1	<b>configure terminal</b>	Enter global configuration mode.
Step 2	<b>interface</b> <i>interface-id</i>	Enter interface configuration mode, and specify a physical interface to configure.  Valid interfaces include physical interfaces.  Up to eight interfaces of the same type and speed can be configured for the same group.
Step 3	<b>switchport mode</b> { <b>access</b>   <b>trunk</b> } <b>switchport access vlan</b> <i>vlan-id</i>	Assign all interfaces as static-access ports in the same VLAN, or configure them as trunks.  If you configure the interface as a static-access port, assign it to only one VLAN. The range is 1 to 4094.

	Command	Purpose
Step 4	<b>channel-group</b> <i>channel-group-number</i> <b>mode</b> { <b>auto</b> [ <b>non-silent</b> ]   <b>desirable</b> [ <b>non-silent</b> ]   <b>on</b> }	<p>Assign the interface to a channel group, and specify the PAgP mode. The default mode is <b>auto silent</b>.</p> <p>For <i>channel-group-number</i>, the range is 1 to 64. Each EtherChannel can have up to eight compatibly configured Ethernet interfaces.</p> <p>For <b>mode</b>, select one of these keywords:</p> <ul style="list-style-type: none"> <li>• <b>auto</b>—Enables PAgP only if a PAgP device is detected. It places an interface into a passive negotiating state, in which the interface responds to PAgP packets it receives but does not start PAgP packet negotiation.</li> <li>• <b>desirable</b>—Unconditionally enables PAgP. It places an interface into an active negotiating state, in which the interface starts negotiations with other interfaces by sending PAgP packets.</li> <li>• <b>on</b>—Forces the interface to channel without PAgP. With the <b>on</b> mode, a usable EtherChannel exists only when an interface group in the <b>on</b> mode is connected to another interface group in the <b>on</b> mode.</li> <li>• <b>non-silent</b>—If your switch is connected to a partner that is PAgP-capable, you can configure the switch interface for nonsilent operation. You can configure an interface with the <b>non-silent</b> keyword for use with the <b>auto</b> or <b>desirable</b> mode. If you do not specify <b>non-silent</b> with the <b>auto</b> or <b>desirable</b> mode, silent is assumed. The silent setting is for connections to file servers or packet analyzers; this setting allows PAgP to operate, to attach the interface to a channel group, and to use the interface for transmission.</li> </ul> <p>For information on compatible PAgP modes for the switch and its partner, see the “PAgP Modes” section on page 28-4.</p>
Step 5	<b>end</b>	Return to privileged EXEC mode.
Step 6	<b>show running-config</b>	Verify your entries.
Step 7	<b>copy running-config startup-config</b>	(Optional) Save your entries in the configuration file.

To remove an interface from the EtherChannel group, use the **no channel-group** interface configuration command.

This example shows how to assign Gigabit Ethernet interfaces 0/4 and 0/5 as static-access ports in VLAN 10 to channel 5 with the PAgP mode **desirable**:

```
Switch# configure terminal
Switch(config)# interface range gigabitethernet0/4 -5
Switch(config-if-range)# switchport mode access
Switch(config-if-range)# switchport access vlan 10
Switch(config-if-range)# channel-group 5 mode desirable
Switch(config-if-range)# end
```

## Configuring Layer 3 EtherChannels

To configure Layer 3 EtherChannels, you create the port-channel logical interface and then put the Ethernet interfaces into the port-channel as described in the next two sections.

### Creating Port-Channel Logical Interfaces



#### Note

To move an IP address from a physical interface to an EtherChannel, you must delete the IP address from the physical interface before configuring it on the port-channel interface.

Beginning in privileged EXEC mode, follow these steps to create a port-channel interface for a Layer 3 EtherChannel:

	Command	Purpose
Step 1	<b>configure terminal</b>	Enter global configuration mode.
Step 2	<b>interface port-channel</b> <i>port-channel-number</i>	Enter interface configuration mode, and create the port-channel logical interface. For <i>port-channel-number</i> , the range is 1 to 64.
Step 3	<b>no switchport</b>	Put the interface into Layer 3 mode.
Step 4	<b>ip address</b> <i>ip-address mask</i>	Assign an IP address and subnet mask to the EtherChannel.
Step 5	<b>end</b>	Return to privileged EXEC mode.
Step 6	<b>show etherchannel</b> <i>channel-group-number detail</i>	Verify your entries.
Step 7	<b>copy running-config startup-config</b>	(Optional) Save your entries in the configuration file.
Step 8		Assign an Ethernet interface to the Layer 3 EtherChannel. For more information, see the <a href="#">“Configuring the Physical Interfaces”</a> section on page 28-12.

To remove the port-channel, use the **no interface port-channel** *port-channel-number* global configuration command.

This example shows how to create the logical port channel (5) and assign 172.10.20.10 as its IP address:

```
Switch# configure terminal
Switch(config)# interface port-channel 5
Switch(config-if)# no switchport
Switch(config-if)# ip address 172.10.20.10 255.255.255.0
Switch(config-if)# end
```

## Configuring the Physical Interfaces

Beginning in privileged EXEC mode, follow these steps to assign an Ethernet interface to a Layer 3 EtherChannel:

	Command	Purpose
Step 1	<b>configure terminal</b>	Enter global configuration mode.
Step 2	<b>interface</b> <i>interface-id</i>	Enter interface configuration mode, and specify a physical interface to configure.  Valid interfaces include physical interfaces.  Up to eight interfaces of the same type and speed can be configured for the same group.
Step 3	<b>no ip address</b>	Ensure that there is no IP address assigned to the physical interface.
Step 4	<b>channel-group</b> <i>channel-group-number</i> <b>mode</b> { <b>auto</b> [ <b>non-silent</b> ]   <b>desirable</b> [ <b>non-silent</b> ]   <b>on</b> }	Assign the interface to a channel group, and specify the PAgP mode (the default mode is <b>auto silent</b> ).  For <i>channel-group-number</i> , the range is 1 to 64. This number must be the same as the <i>port-channel-number</i> (logical port) configured in the <a href="#">“Creating Port-Channel Logical Interfaces” section on page 28-11</a> .  Each EtherChannel can consist of up to eight compatibly configured Ethernet interfaces.  For <b>mode</b> , select one of these keywords: <ul style="list-style-type: none"> <li>• <b>auto</b>—Enables PAgP only if a PAgP device is detected. It places an interface into a passive negotiating state, in which the interface responds to PAgP packets it receives but does not start PAgP packet negotiation.</li> <li>• <b>desirable</b>—Unconditionally enables PAgP. It places an interface into an active negotiating state, in which the interface starts negotiations with other interfaces by sending PAgP packets.</li> <li>• <b>on</b>—Forces the interface to channel without PAgP. With the <b>on</b> mode, a usable EtherChannel exists only when an interface group in the <b>on</b> mode is connected to another interface group in the <b>on</b> mode.</li> <li>• <b>non-silent</b>—If your switch is connected to a partner that is PAgP capable, you can configure the switch interface for nonsilent operation. You can configure an interface with the <b>non-silent</b> keyword for use with the <b>auto</b> or <b>desirable</b> mode. If you do not specify <b>non-silent</b> with the <b>auto</b> or <b>desirable</b> mode, silent is assumed. The silent setting is for connections to file servers or packet analyzers; this setting allows PAgP to operate, to attach the interface to a channel group, and to use the interface for transmission.</li> </ul> For information on compatible PAgP modes for the switch and its partner, see the <a href="#">“PAgP Modes” section on page 28-4</a> .

	Command	Purpose
Step 5	<b>end</b>	Return to privileged EXEC mode.
Step 6	<b>show running-config</b>	Verify your entries.
Step 7	<b>copy running-config startup-config</b>	(Optional) Save your entries in the configuration file.

To remove an interface from the EtherChannel group, use the **no channel-group** interface configuration command.

This example shows how to assign Gigabit Ethernet interfaces 0/4 and 0/5 to channel 5 with the PAgP mode **desirable**:

```
Switch# configure terminal
Switch(config)# interface range gigabitethernet0/4 -5
Switch(config-if-range)# no ip address
Switch(config-if-range)# channel-group 5 mode desirable
Switch(config-if-range)# end
```

## Configuring EtherChannel Load Balancing

This section describes how to configure EtherChannel load balancing by using source-based or destination-based forwarding methods. For more information, see the [“Understanding Load Balancing and Forwarding Methods”](#) section on page 28-5.

Beginning in privileged EXEC mode, follow these steps to configure EtherChannel load balancing:

	Command	Purpose
Step 1	<b>configure terminal</b>	Enter global configuration mode.
Step 2	<b>port-channel load-balance {dst-mac   src-mac}</b>	<p>Configure an EtherChannel load-balancing method.</p> <p>The default is <b>src-mac</b>.</p> <p>Select one of these keywords to determine the load-distribution method:</p> <ul style="list-style-type: none"> <li>• <b>dst-mac</b>—Load distribution is based on the destination-host MAC address of the incoming packet. Packets to the same destination are sent on the same port, but packets to different destinations are sent on different ports in the channel.</li> <li>• <b>src-mac</b>—Load distribution is based on the source-MAC address of the incoming packet. Packets from different hosts use different ports in the channel, but packets from the same host use the same port in the channel.</li> </ul> <p>When <b>src-mac</b> is used, load distribution based on the source and destination IP address is also enabled. For all IP traffic being routed, the switch chooses a port for transmission based on the source and destination IP address. Packets between two IP hosts always use the same port for packet transmission, but packets between any other pair of hosts might use a different transmission port.</p>
Step 3	<b>end</b>	Return to privileged EXEC mode.

	Command	Purpose
Step 4	<b>show etherchannel load-balance</b>	Verify your entries.
Step 5	<b>copy running-config startup-config</b>	(Optional) Save your entries in the configuration file.

To return EtherChannel load balancing to the default configuration, use the **no port-channel load-balance** global configuration command.

## Configuring the PAgP Learn Method and Priority

Network devices are classified as PAgP physical learners or aggregate-port learners. A device is a physical learner if it learns addresses by physical ports and directs transmissions based on that knowledge. A device is an aggregate-port learner if it learns addresses by aggregate ports.

For compatibility with Catalyst 1900 series switches, configure the PAgP learning method on the Catalyst 3550 switches to learn source-MAC addresses on the physical port. The switch then sends packets to the Catalyst 1900 switch using the same interface in the EtherChannel from which it learned the source address.



### Note

The Catalyst 3550 supports address learning only on aggregate ports even though the **physical-port** keyword is provided in the CLI. The **pagp learn-method** command and the **pagp port-priority** command have no effect on the switch hardware, but they are required for PAgP interoperability with devices that only support address learning by physical ports, such as the Catalyst 1900 switch.

When the link partner to the Catalyst 3550 switch is a physical learner, we recommend that you configure the switch as a physical-port learner by using the **pagp learn-method physical-port** interface configuration command and to set the load-distribution method based on the source MAC address by using the **port-channel load-balance src-mac** global configuration command. Use the **pagp learn-method** command only in this situation.

Beginning in privileged EXEC mode, follow these steps to configure your switch as a PAgP physical-port learner and to adjust the priority so that the same port in the bundle is selected for sending packets:

	Command	Purpose
Step 1	<b>configure terminal</b>	Enter global configuration mode.
Step 2	<b>interface</b> <i>interface-id</i>	Enter interface configuration mode, and specify the interface for transmission.

	Command	Purpose
Step 3	<b>pagp learn-method physical-port</b>	Select the PAgP learning method.  By default, <b>aggregation-port</b> learning is selected, which means the switch sends packets to the source by using any of the interfaces in the EtherChannel. With aggregate-port learning, it is not important on which physical port the packet arrives.  Select <b>physical-port</b> to connect with another switch that is a physical learner. Make sure to configure the <b>port-channel load-balance</b> global configuration command to <b>src-mac</b> as described in the “ <a href="#">Configuring EtherChannel Load Balancing</a> ” section on page 28-13.  The learning method must be configured the same at both ends of the link.
Step 4	<b>pagp port-priority</b> <i>priority</i>	Assign a priority so that the selected interface is chosen for packet transmission.  For <i>priority</i> , the range is 0 to 255. The default is 128. The higher the priority, the more likely that the interface will be used for PAgP transmission.
Step 5	<b>end</b>	Return to privileged EXEC mode.
Step 6	<b>show running-config</b>  or <b>show pagp</b> <i>channel-group-number</i> <b>internal</b>	Verify your entries.
Step 7	<b>copy running-config startup-config</b>	(Optional) Save your entries in the configuration file.

To return the priority to its default setting, use the **no pagp port-priority** interface configuration command. To return the learning method to its default setting, use the **no pagp learn-method** interface configuration command.

## Displaying EtherChannel and PAgP Status

You can use the privileged EXEC commands described in [Table 28-3](#) to display EtherChannel and PAgP status information:

**Table 28-3** Commands for Displaying EtherChannel and PAgP Status

Command	Description
<b>show etherchannel</b> [ <i>channel-group-number</i> ] { <b>brief</b>   <b>detail</b>   <b>load-balance</b>   <b>port</b>   <b>port-channel</b>   <b>summary</b> }	Displays EtherChannel information in a brief, detailed, and one-line summary form. Also displays the load-balance or frame-distribution scheme, port, and port-channel information.
<b>show pagp</b> [ <i>channel-group-number</i> ] { <b>counters</b>   <b>internal</b>   <b>neighbor</b> } <sup>1</sup>	Displays PAgP information such as traffic information, the internal PAgP configuration, and neighbor information.

1. You can clear PAgP channel-group information and traffic filters by using the **clear pagp** [*channel-group-number*] [**counters**] [**counters**] privileged EXEC command.

For detailed information about the fields in the displays, refer to the command reference for this release.

