



CHAPTER 36

Configuring EtherChannels

This chapter describes how to configure EtherChannels on Layer 2 and Layer 3 ports on the Cisco ME 3800X and ME 3600X switch. 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

Although EtherChannels are not supported on ports configured with service instances, you can configure a service instance on an EtherChannel port channel.

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

- [Understanding EtherChannels, page 36-1](#)
- [Configuring EtherChannels, page 36-9](#)
- [Displaying EtherChannel, PAgP, and LACP Status, page 36-29](#)

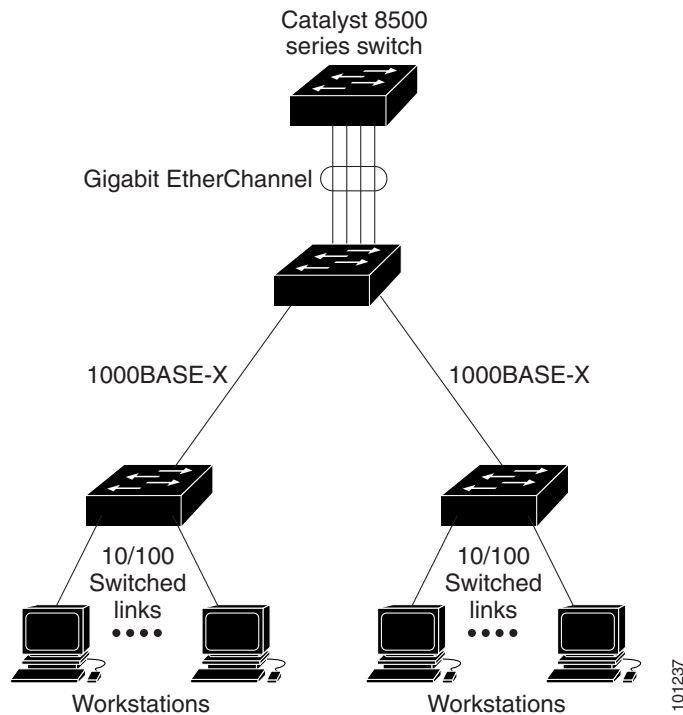
Understanding EtherChannels

- [EtherChannel Overview, page 36-2](#)
- [Port-Channel Interfaces, page 36-3](#)
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EtherChannel Overview

An EtherChannel consists of individual ports bundled into a single logical link as shown in [Figure 36-1](#).

Figure 36-1 Typical EtherChannel Configuration



The EtherChannel provides full-duplex bandwidth of up to 800 Mbps between your switch and another switch or host for Fast EtherChannel on a switch with 24 Fast Ethernet ports. For Gigabit EtherChannel, you can configure up to 8 Gbps (8 ports of 1 Gbps), depending on the number of supported Gigabit Ethernet interfaces.

Each EtherChannel can consist of up to eight compatibly configured Ethernet ports. All ports in each EtherChannel must be configured as either Layer 2 or Layer 3 ports. The number of EtherChannels is limited to 48. For more information, see the [“EtherChannel Configuration Guidelines”](#) section on [page 36-10](#). The EtherChannel Layer 3 ports are made up of routed ports. Routed ports are physical ports configured to be in Layer 3 mode by using the `no switchport` interface configuration command. For more information, see the [Chapter 10, “Configuring Interfaces.”](#)

You can configure an EtherChannel in one of these modes: Port Aggregation Protocol (PAgP), Link Aggregation Control Protocol (LACP), or On mode. Configure both ends of the EtherChannel in the same mode:

- When you configure one end of an EtherChannel in either PAgP or LACP mode, the system negotiates with the other end of the channel to determine which ports should become active. Incompatible ports are suspended.
- When you configure an EtherChannel in the **on** mode, no negotiations take place. The switch forces all compatible ports to become active in the EtherChannel. The other end of the channel (on the other switch) must also be configured in the **on** mode; otherwise, packet loss can occur.

The local port is put into an independent state and continues to carry data traffic as would any other single link. The port configuration does not change, but the port does not participate in the EtherChannel.

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.

Port-Channel Interfaces

When you create an EtherChannel, a port-channel logical interface is involved:

- With Layer 2 ports, use the **channel-group** interface configuration command to dynamically create the port-channel logical interface.

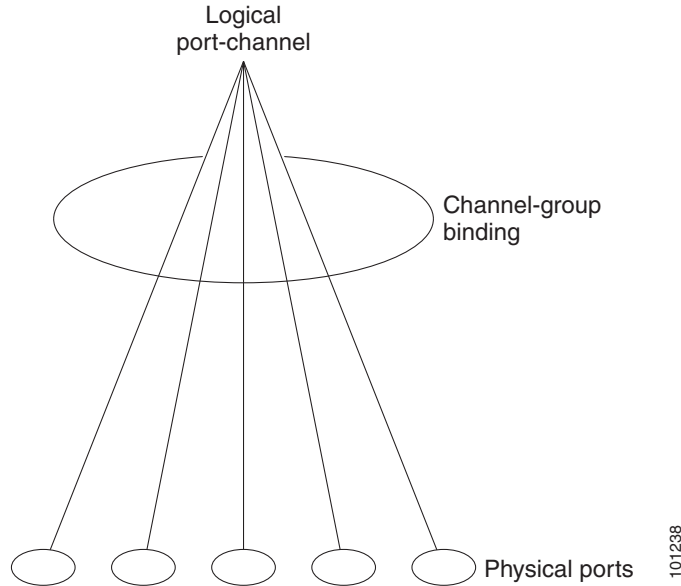
You also can use the **interface port-channel** *port-channel-number* global configuration command to manually create the port-channel logical interface, but then you must use the **channel-group** *channel-group-number* command to bind the logical interface to a physical port. The *channel-group-number* can be the same as the *port-channel-number*, or you can use a new number. If you use a new number, the **channel-group** command dynamically creates a new port channel.

- With Layer 3 ports, you should manually create the logical interface by using the **interface port-channel** global configuration command followed by the **no switchport** interface configuration command. Then you manually assign an interface to the EtherChannel by using the **channel-group** interface configuration command.

For both Layer 2 and Layer 3 ports, the **channel-group** command binds the physical port and the logical interface together as shown in [Figure 36-2](#).

Each EtherChannel has a port-channel logical interface numbered from 1 to 48. This port-channel interface number corresponds to the one specified with the **channel-group** interface configuration command.

Figure 36-2 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 ports assigned to the port-channel interface. Configuration changes applied to the physical port affect only the port to which you apply the configuration. To change the parameters of all ports in an EtherChannel, apply the configuration commands to the port-channel interface.

Port Aggregation Protocol

The Port Aggregation Protocol (PAgP) is a Cisco-proprietary protocol that can be run only on Cisco switches and on those switches licensed by vendors to support PAgP. PAgP facilitates the automatic creation of EtherChannels by exchanging PAgP packets between Ethernet ports.

By using PAgP, the switch learns the identity of partners capable of supporting PAgP and the capabilities of each port. It then dynamically groups similarly configured ports into a single logical link (channel or aggregate port). Similarly configured ports are grouped based on hardware, administrative, and port parameter constraints. For example, PAgP groups the ports 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 36-1 shows the user-configurable EtherChannel PAGP modes for the **channel-group** interface configuration command on a port.

Table 36-1 EtherChannel PAGP Modes

Mode	Description
auto	Places a port into a passive negotiating state in which the port responds to PAGP packets it receives but does not start PAGP packet negotiation. This setting minimizes the transmission of PAGP packets.
desirable	Places a port into an active negotiating state in which the port starts negotiations with other ports by sending PAGP packets.

Switch ports exchange PAGP packets only with partner ports configured in the **auto** or **desirable** modes. Ports configured in the **on** mode do not exchange PAGP packets.

Both the **auto** and **desirable** modes enable ports to negotiate with partner ports to form an EtherChannel based on criteria such as port speed and, for Layer 2 EtherChannels, trunking state and VLAN numbers.

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

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

A port in the **auto** mode cannot form an EtherChannel with another port that is also in the **auto** mode because neither port starts PAGP negotiation.

If your switch is connected to a partner that is PAGP-capable, you can configure the switch port 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.

Use the silent mode 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 port to a channel group, and to use the port for transmission.

PAGP Interaction with Other Features

Cisco Discovery Protocol (CDP) sends and receives packets over the physical ports in the EtherChannel.

Trunk ports send and receive PAGP protocol data units (PDUs) on the lowest numbered VLAN.

In Layer 2 EtherChannels, the first port in the channel that comes up provides its MAC address to the EtherChannel. If this port is removed from the bundle, one of the remaining ports in the bundle provides its MAC address to the EtherChannel.

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

Link Aggregation Control Protocol

The LACP is defined in IEEE 802.3ad standard and enables Cisco switches to manage Ethernet channels between switches that conform to the standard. LACP facilitates the automatic creation of EtherChannels by exchanging LACP packets between Ethernet ports.

By using LACP, the switch learns the identity of partners capable of supporting LACP and the capabilities of each port. It then dynamically groups similarly configured ports into a single logical link (channel or aggregate port). Similarly configured ports are grouped based on hardware, administrative, and port parameter constraints. For example, LACP groups the ports with the same speed, duplex mode, native VLAN, VLAN range, and trunking status and type. After grouping the links into an EtherChannel, LACP adds the group to the spanning tree as a single switch port.

LACP Modes

Table 36-2 shows the user-configurable EtherChannel LACP modes for the **channel-group** interface configuration command on a port.

Table 36-2 EtherChannel LACP Modes

Mode	Description
active	Places a port into an active negotiating state in which the port starts negotiations with other ports by sending LACP packets.
passive	Places a port into a passive negotiating state in which the port responds to LACP packets that it receives, but does not start LACP packet negotiation. This setting minimizes the transmission of LACP packets.

Both the **active** and **passive LACP** modes enable ports to negotiate with partner ports to an EtherChannel based on criteria such as port speed and, for Layer 2 EtherChannels, trunking state and VLAN numbers.

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

- A port in the **active** mode can form an EtherChannel with another port that is in the **active** or **passive** mode.
- A port in the **passive** mode cannot form an EtherChannel with another port that is also in the **passive** mode because neither port starts LACP negotiation.

LACP Interaction with Other Features

The CDP sends and receives packets over the physical ports in the EtherChannel. Trunk ports send and receive LACP PDUs on the lowest numbered VLAN.

In Layer 2 EtherChannels, the first port in the channel that comes up provides its MAC address to the EtherChannel. If this port is removed from the bundle, one of the remaining ports in the bundle provides its MAC address to the EtherChannel.

LACP sends and receives LACP PDUs only from ports that are up and have LACP enabled for the active or passive mode.

EtherChannel On Mode

EtherChannel **on** mode can be used to manually configure an EtherChannel. The **on** mode forces a port to join an EtherChannel without negotiations. It can be useful if the remote device does not support PAgP or LACP. With the **on** mode, a usable EtherChannel exists only when both ends of the link are configured in the **on** mode.

Ports that are configured in the **on** mode in the same channel group must have compatible port characteristics, such as speed and duplex. Ports that are not compatible are suspended, even though they are configured in the **on** mode.

**Caution**

You should use care when using the **on** mode. This is a manual configuration, and ports on both ends of the EtherChannel must have the same configuration. If the group is misconfigured, packet loss or spanning-tree loops can occur.

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 MAC addresses or IP addresses, source or destination addresses, or both source and destination addresses. The selected mode applies to all EtherChannels configured on the switch. You configure the load balancing and forwarding method by using the **port-channel load-balance** global configuration command.

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.

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 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.

The switch supports load distribution based on the destination host MAC address supports for only four ports per EtherChannel. When you configure EtherChannel destination-MAC address load balancing, the traffic is balanced only among four ports in the channel group. If you configure more than four ports in an EtherChannel with destination host MAC address load distribution, only four of the ports receive distributed traffic. This limitation does not apply to the other load distribution methods.

With source-and-destination MAC address forwarding, when packets are forwarded to an EtherChannel, they are distributed across the ports in the channel based on both the source and destination MAC addresses. This forwarding method, a combination source-MAC and destination-MAC address forwarding methods of load distribution, can be used if it is not clear whether source-MAC or destination-MAC address forwarding is better suited on a particular switch. With source-and-destination MAC-address forwarding, packets sent from host A to host B, host A to host C, and host C to host B could all use different ports in the channel.

With source-IP-address-based forwarding, when packets are forwarded to an EtherChannel, they are distributed across the ports in the EtherChannel based on the source-IP address of the incoming packet. Therefore, to provide load-balancing, packets from different IP addresses use different ports in the channel, but packets from the same IP address use the same port in the channel.

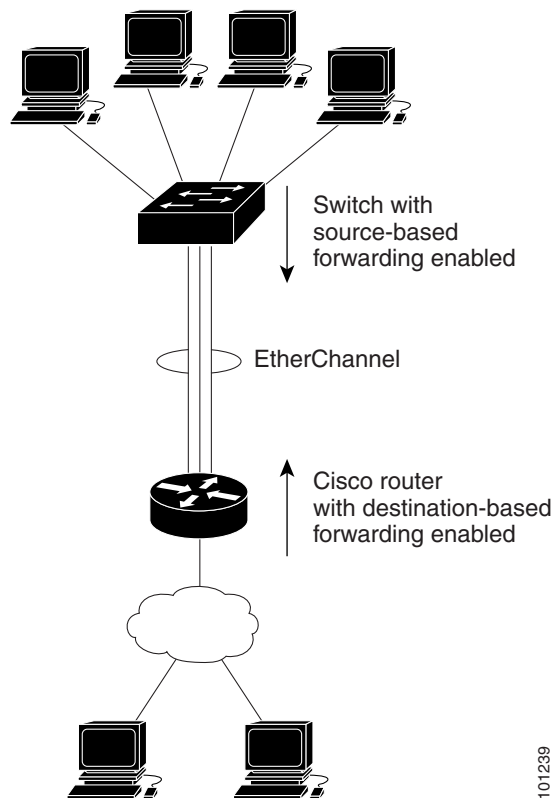
With destination-IP-address-based forwarding, when packets are forwarded to an EtherChannel, they are distributed across the ports in the EtherChannel based on the destination-IP address of the incoming packet. Therefore, to provide load-balancing, packets from the same IP source address sent to different IP destination addresses could be sent on different ports in the channel. But packets sent from different source IP addresses to the same destination IP address are always sent on the same port in the channel.

With source-and-destination IP address-based forwarding, when packets are forwarded to an EtherChannel, they are distributed across the ports in the EtherChannel based on both the source and destination IP addresses of the incoming packet. This forwarding method, a combination of source-IP and destination-IP address-based forwarding, can be used if it is not clear whether source-IP or destination-IP address-based forwarding is better suited on a particular switch. In this method, packets sent from the IP address A to IP address B, from IP address A to IP address C, and from IP address C to IP address B could all use different ports in the channel.

Different load-balancing methods have different advantages, and the choice of a particular load-balancing method should be based on the position of the switch in the network and the kind of traffic that needs to be load-distributed. In Figure 36-3, 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 36-3 Load Distribution and Forwarding Methods



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- [Default EtherChannel Configuration](#), page 36-9
- [EtherChannel Configuration Guidelines](#), page 36-10
- [Configuring Layer 2 EtherChannels](#), page 36-11 (required)
- [Configuring Layer 3 EtherChannels](#), page 36-13 (required)
- [Configuring EtherChannel Load Balancing](#), page 36-16 (optional)
- [Configuring the PAgP Learn Method and Priority](#), page 36-17 (optional)
- [Configuring LACP Hot-Standby Ports](#), page 36-18 (optional)
- [Configuring LACP Maximum Bundles](#), page 36-20
- [Configuring LACP Fast Switchover](#), page 36-21
- [Configuring LACP Fast Rate](#), page 36-23
- [Configuring the EtherChannel Min-Links Feature](#), page 36-23 (optional)
- [EtherChannels and Ethernet Flow Points \(EFPs\)](#), page 36-28 (optional)


Note

Make sure that the ports are correctly configured. For more information, see the [“EtherChannel Configuration Guidelines”](#) section on page 36-10.


Note

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

Default EtherChannel Configuration

Table 36-3 shows the default EtherChannel configuration.

Table 36-3 *Default EtherChannel Configuration*

Feature	Default Setting
Channel groups	None assigned.
Port-channel logical interface	None defined.
PAgP mode	No default.
PAgP learn method	Aggregate-port learning.
PAgP priority	128.
LACP mode	No default.
LACP learn method	Aggregate-port learning.
LACP port priority	32768.
LACP system priority	32768.

Table 36-3 *Default EtherChannel Configuration (continued)*

Feature	Default Setting
LACP system ID	LACP system priority and the switch MAC address.
Load balancing	Load distribution on the switch is based on the source-MAC address of the incoming packet.

EtherChannel Configuration Guidelines

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

- Do not try to configure more than 26 EtherChannels on the switch.
- Configure all ports in an EtherChannel to operate at the same speeds and duplex modes.
- Enable all ports in an EtherChannel. A port 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 ports in the EtherChannel. ME 3800X and ME 3600X ports are enabled by default.
- 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
- Do not configure a port to be a member of more than one EtherChannel group.
- Do not configure an EtherChannel in both the PAgP and LACP modes. EtherChannel groups running PAgP and LACP can coexist on the same switch. Individual EtherChannel groups can run either PAgP or LACP, but they cannot interoperate.
- For Layer 2 EtherChannels:
 - Assign all ports in the EtherChannel to the same VLAN, or configure them as trunks. Ports with different native VLANs cannot form an EtherChannel.
 - You cannot assign a port configured with a service instance to an EtherChannel.
 - If you configure an EtherChannel from trunk ports, verify that the trunking mode is the same on all the trunks. Inconsistent trunk modes on EtherChannel ports can have unexpected results.
 - An EtherChannel supports the same allowed range of VLANs on all the ports in a trunking Layer 2 EtherChannel. If the allowed range of VLANs is not the same, the ports do not form an EtherChannel even when PAgP is set to the **auto** or **desirable** mode.
 - Ports 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 ports 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 ports in the channel.
- For configuring Ethernet Virtual Connections (EVCs), you can add a service instance to an EtherChannel port channel.

Configuring Layer 2 EtherChannels

You configure Layer 2 EtherChannels by assigning ports to a channel group with the **channel-group** interface configuration command. This command automatically creates the port-channel logical interface.



Note

Although you cannot assign a port configured with an EFP service instance to an EtherChannel, you can configure service instances on EtherChannel port channels.

Beginning in privileged EXEC mode, follow these steps to assign a Layer 2 Ethernet port to a Layer 2 EtherChannel. This procedure is required.

	Command	Purpose
Step 1	configure terminal	Enter global configuration mode.
Step 2	interface <i>interface-id</i>	Specify a physical port, and enter interface configuration mode. For a PAgP EtherChannel, you can configure up to eight ports of the same type and speed for the same group. For a LACP EtherChannel, you can configure up to 16 Ethernet ports of the same type. Up to eight ports can be active, and up to eight ports can be in standby mode. Note An EtherChannel port cannot be a port configured with a service instance.
Step 3	switchport mode { access trunk } switchport access vlan <i>vlan-id</i>	Assign all ports as static-access ports in the same VLAN, or configure them as trunks. If you configure the port as a static-access port, assign it to only one VLAN. The range is 1 to 4094.

Command	Purpose
Step 4 channel-group <i>channel-group-number</i> mode { auto [non-silent] desirable [non-silent] on } { active passive }	Assign the port to a channel group, and specify the PAgP or the LACP mode. For <i>channel-group-number</i> , the range is 1 to 26. For mode , select one of these keywords: <ul style="list-style-type: none"> • auto—Enables PAgP only if a PAgP device is detected. It places the port into a passive negotiating state, in which the port responds to PAgP packets it receives but does not start PAgP packet negotiation. • desirable—Unconditionally enables PAgP. It places the port into an active negotiating state, in which the port starts negotiations with other ports by sending PAgP packets. • on—Forces the port to channel without PAgP or LACP. With the on mode, a usable EtherChannel exists only when a port group in the on mode is connected to another port group in the on mode. • non-silent—(Optional) If your switch is connected to a partner that is PAgP-capable, configure the switch port for nonsilent operation when the port is in the auto or desirable mode. If you do not specify non-silent, silent is assumed. The silent setting is for connections to file servers or packet analyzers. This setting allows PAgP to operate, to attach the port to a channel group, and to use the port for transmission. • active—Enables LACP only if a LACP device is detected. It places the port into an active negotiating state in which the port starts negotiations with other ports by sending LACP packets. • passive—Enables LACP on the port and places it into a passive negotiating state in which the port responds to LACP packets that it receives, but does not start LACP packet negotiation. For information on compatible modes for the switch and its partner, see the “PAgP Modes” section on page 36-5 and the “LACP Modes” section on page 36-6.
Step 5 end	Return to privileged EXEC mode.
Step 6 show running-config	Verify your entries.
Step 7 copy running-config startup-config	(Optional) Save your entries in the configuration file.

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

This example shows how to configure an EtherChannel. It assigns two ports as static-access ports in VLAN 10 to channel 5 with the PAgP mode **desirable**:

```
Switch# configure terminal
Switch(config)# interface range gigabitethernet0/1 -2
Switch(config-if-range)# switchport mode access
Switch(config-if-range)# switchport access vlan 10
Switch(config-if-range)# channel-group 5 mode desirable non-silent
Switch(config-if-range)# end
```

This example shows how to configure an EtherChannel. It assigns two ports as static-access ports in VLAN 10 to channel 5 with the LACP mode **active**:

```
Switch# configure terminal
Switch(config)# interface range gigabitethernet0/1 -2
Switch(config-if-range)# switchport mode access
Switch(config-if-range)# switchport access vlan 10
Switch(config-if-range)# channel-group 5 mode active
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 ports into the port-channel as described in the next two sections.

Creating Port-Channel Logical Interfaces

When configuring Layer 3 EtherChannels, you should first manually create the port-channel logical interface by using the **interface port-channel** global configuration command. Then you put the logical interface into the channel group by using the **channel-group** interface configuration command.



Note

To move an IP address from a physical port to an EtherChannel, you must delete the IP address from the physical port 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. This procedure is required.

	Command	Purpose
Step 1	configure terminal	Enter global configuration mode.
Step 2	interface port-channel <i>port-channel-number</i>	Specify the port-channel logical interface, and enter interface configuration mode. For <i>port-channel-number</i> , the range is 1 to 26.
Step 3	ip address <i>ip-address mask</i>	Assign an IP address and subnet mask to the EtherChannel.
Step 4	end	Return to privileged EXEC mode.
Step 5	show etherchannel <i>channel-group-number detail</i>	Verify your entries.
Step 6	copy running-config startup-config	(Optional) Save your entries in the configuration file.
Step 7		Assign an Ethernet port to the Layer 3 EtherChannel. For more information, see the “Configuring the Physical Interfaces” section on page 36-14.

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 port to a Layer 3 EtherChannel. This procedure is required.

	Command	Purpose
Step 1	configure terminal	Enter global configuration mode.
Step 2	interface <i>interface-id</i>	Specify a physical port, and enter interface configuration mode. Valid interfaces include physical ports. For a PAgP EtherChannel, you can configure up to eight ports of the same type and speed for the same group. For a LACP EtherChannel, you can configure up to 16 Ethernet ports of the same type. Up to eight ports can be active, and up to eight ports can be in standby mode.
Step 3	no ip address	Ensure that there is no IP address assigned to the physical port.
Step 4	no switchport	Put the port into Layer 3 mode.

	Command	Purpose
Step 5	channel-group <i>channel-group-number</i> mode { auto [non-silent] desirable [non-silent] on } { active passive }	<p>Assign the port to a channel group, and specify the PAgP or the LACP mode.</p> <p>For <i>channel-group-number</i>, the range is 1 to 26. This number must be the same as the <i>port-channel-number</i> (logical port) configured in the “Creating Port-Channel Logical Interfaces” section on page 36-13.</p> <p>For mode, select one of these keywords:</p> <ul style="list-style-type: none"> • auto—Enables PAgP only if a PAgP device is detected. It places the port into a passive negotiating state, in which the port responds to PAgP packets it receives but does not start PAgP packet negotiation. • desirable—Unconditionally enables PAgP. It places the port into an active negotiating state, in which the port starts negotiations with other ports by sending PAgP packets. • on—Forces the port to channel without PAgP or LACP. With the on mode, a usable EtherChannel exists only when a port group in the on mode is connected to another port group in the on mode. • non-silent—(Optional) If your switch is connected to a partner that is PAgP capable, configure the switch port for nonsilent operation when the port is in the auto or desirable mode. If you do not specify non-silent, silent is assumed. The silent setting is for connections to file servers or packet analyzers. This setting allows PAgP to operate, to attach the port to a channel group, and to use the port for transmission. • active—Enables LACP only if a LACP device is detected. It places the port into an active negotiating state in which the port starts negotiations with other ports by sending LACP packets. • passive—Enables LACP on the port and places it into a passive negotiating state in which the port responds to LACP packets that it receives, but does not start LACP packet negotiation. <p>For information on compatible modes for the switch and its partner, see the “PAgP Modes” section on page 36-5 and the “LACP Modes” section on page 36-6.</p>
Step 6	end	Return to privileged EXEC mode.
Step 7	show running-config	Verify your entries.
Step 8	copy running-config startup-config	(Optional) Save your entries in the configuration file.

This example shows how to configure an EtherChannel. It assigns two ports to channel 5 with the LACP mode **active**:

```
Switch# configure terminal
Switch(config)# interface range gigabitethernet0/1 -2
Switch(config-if-range)# no ip address
Switch(config-if-range)# no switchport
Switch(config-if-range)# channel-group 5 mode active
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 [“Load Balancing and Forwarding Methods” section on page 36-7](#).

Beginning in privileged EXEC mode, follow these steps to configure EtherChannel load balancing. This procedure is optional.

	Command	Purpose
Step 1	configure terminal	Enter global configuration mode.
Step 2	port-channel load-balance { dst-ip dst-mac src-dst-ip src-dst-mac src-ip src-mac }	Configure an EtherChannel load-balancing method. The default is src-mac . Select one of these load-distribution methods: <ul style="list-style-type: none"> • dst-ip—Load distribution is based on the destination-host IP address. • dst-mac—Load distribution is based on the destination-host MAC address of the incoming packet. • src-dst-ip—Load distribution is based on the source-and-destination host-IP address. • src-dst-mac—Load distribution is based on the source-and-destination host-MAC address. • src-ip—Load distribution is based on the source-host IP address. • src-mac—Load distribution is based on the source-MAC address of the incoming packet.
Step 3	end	Return to privileged EXEC mode.
Step 4	show etherchannel load-balance	Verify your entries.
Step 5	copy running-config startup-config	(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 (logical) ports. The learn method must be configured the same at both ends of the link.

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 ports 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 when the local device is an aggregate-port learner. Therefore, you must manually set the learning method on the local device to learn addresses by physical ports. You also must set the load-distribution method to source-based distribution, so that any given source MAC address is always sent on the same physical port.

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



Note

The switch 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.

When the link partner to the switch is a physical learner, we recommend that you configure the Cisco ME switch as a physical-port learner by using the **pagp learn-method physical-port** interface configuration command. Set the load-distribution method based on the source MAC address by using the **port-channel load-balance src-mac** global configuration command. The switch then sends packets to the physical learner switch using the same port in the EtherChannel from which it learned the source address. 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. This procedure is optional.

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

	Command	Purpose
Step 3	pagp learn-method physical-port	Select the PAgP learning method. By default, aggregation-port learning is selected, which means the switch sends packets to the source by using any of the ports in the EtherChannel. With aggregate-port learning, it is not important on which physical port the packet arrives. Select physical-port to connect with another switch that is a physical learner. Make sure to configure the port-channel load-balance global configuration command to src-mac as described in the “ Configuring EtherChannel Load Balancing ” section on page 36-16. The learning method must be configured the same at both ends of the link.
Step 4	pagp port-priority <i>priority</i>	Assign a priority so that the selected port 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 port will be used for PAgP transmission.
Step 5	end	Return to privileged EXEC mode.
Step 6	show running-config or show pagp channel-group-number internal	Verify your entries.
Step 7	copy running-config startup-config	(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.

Configuring LACP Hot-Standby Ports

When enabled, LACP tries to configure the maximum number of LACP-compatible ports in a channel, up to a maximum of 16 ports. A maximum of eight LACP links can be active at one time. The software places any additional links in a hot-standby mode. If one of the active links becomes inactive, a link that is in the hot-standby mode becomes active in its place.

If you configure more than eight links for an EtherChannel group, the software automatically decides which of the hot-standby ports to make active based on the LACP priority. The software assigns to every link between systems that operate LACP a unique priority made up of these elements (in priority order):

- LACP system priority
- System ID (a combination of the LACP system priority and the switch MAC address)
- LACP port priority
- Port number

In priority comparisons, numerically lower values have higher priority. The priority decides which ports should be put in standby mode when there is a hardware limitation that prevents all compatible ports from aggregating.

Ports are considered for active use in aggregation in link-priority order starting with the port attached to the highest priority link. Each port is selected for active use if the preceding higher priority selections can also be maintained. Otherwise, the port is selected for standby mode.

You can change the default values of the LACP system priority and the LACP port priority to affect how the software selects active and standby links. For more information, see the “[Configuring the LACP System Priority](#)” section on page 36-19 and the “[Configuring the LACP Port Priority](#)” section on page 36-19.

Configuring the LACP System Priority

You can configure the system priority for all of the EtherChannels that are enabled for LACP by using the **lacp system-priority** global configuration command. You cannot configure a system priority for each LACP-configured channel. By changing this value from the default, you can affect how the software selects active and standby links.

You can use the **show etherchannel summary** privileged EXEC command to see which ports are in the hot-standby mode (denoted with an H port-state flag).

Beginning in privileged EXEC mode, follow these steps to configure the LACP system priority. This procedure is optional.

	Command	Purpose
Step 1	configure terminal	Enter global configuration mode.
Step 2	lacp system-priority <i>priority</i>	Configure the LACP system priority. For <i>priority</i> , the range is 1 to 65535. The default is 32768. The lower the value, the higher the system priority.
Step 3	end	Return to privileged EXEC mode.
Step 4	show running-config or show lacp sys-id	Verify your entries.
Step 5	copy running-config startup-config	(Optional) Save your entries in the configuration file.

To return the LACP system priority to the default value, use the **no lacp system-priority** global configuration command.

Configuring the LACP Port Priority

By default, all ports use the same port priority. If the local system has a lower value for the system priority and the system ID than the remote system, you can affect which of the hot-standby links become active first by changing the port priority of LACP EtherChannel ports to a lower value than the default. The hot-standby ports that have lower port numbers become active in the channel first. You can use the **show etherchannel summary** privileged EXEC command to see which ports are in the hot-standby mode (denoted with an H port-state flag).



Note

If LACP is not able to aggregate all the ports that are compatible (for example, the remote system might have more restrictive hardware limitations), all the ports that cannot be actively included in the EtherChannel are put in the hot-standby state and are used only if one of the channeled ports fails.

Beginning in privileged EXEC mode, follow these steps to configure the LACP port priority. This procedure is optional.

	Command	Purpose
Step 1	configure terminal	Enter global configuration mode.
Step 2	interface <i>interface-id</i>	Specify the port to be configured, and enter interface configuration mode.
Step 3	lacp port-priority <i>priority</i>	Configure the LACP port priority. For <i>priority</i> , the range is 1 to 65535. The default is 32768. The lower the value, the more likely that the port will be used for LACP transmission.
Step 4	end	Return to privileged EXEC mode.
Step 5	show running-config or show lacp [<i>channel-group-number</i>] internal	Verify your entries.
Step 6	copy running-config startup-config	(Optional) Save your entries in the configuration file.

To return the LACP port priority to the default value, use the **no lacp port-priority** interface configuration command.

Configuring LACP Maximum Bundles

You can configure the maximum number of members that can be bundled. Any members in excess of this maximum number are kept in hot-standby state and are transitioned to bundled state when one of the bundled members goes down.

To configure the LACP maximum number of ports to bundle in a port channel, complete these steps:

	Command	Purpose
Step 1	configure terminal	Enter global configuration mode.
Step 2	interface port-channel <i>port-channel-number</i>	Specify the port channel and enter the port channel interface configuration mode.
Step 3	lacp max-bundle <i>number-of-bundles</i>	Enter the maximum number of ports to bundle in the port channel. <ul style="list-style-type: none"> max-bundle—Value range is from 1 through 8. Default is 8 bundles.
Step 4	end	Return to privileged EXEC mode.
Step 5	show running-configuration interface port-channel <i>port-channel-number</i>	Display the maximum bundles in the port channel.

Configuration Example

This example shows the maximum number of bundles is 1 on port channel 10.

```
Switch# show running-config interface port-channel 10
Building configuration...
```

```
Current configuration : 228 bytes
!
interface Port-channel10
  lacp max-bundle 1
end
```

Use this command to show the status of hot-standby interfaces.

```
Switch# show etherchannel summary
Flags: D - down          P - bundled in port-channel
       I - stand-alone  s - suspended
       H - Hot-standby (LACP only)
       R - Layer3       S - Layer2
       U - in use       f - failed to allocate aggregator

       M - not in use, minimum links not met
       u - unsuitable for bundling
       w - waiting to be aggregated
       d - default port
```

```
Number of channel-groups in use: 1
Number of aggregators:          1
```

```
Group  Port-channel  Protocol  Ports
-----+-----+-----+-----
10     Po10(SU)          LACP     Gi0/1(P)  Gi0/3(H)
```

```
Switch# show lacp internal
Flags: S - Device is requesting Slow LACPDUs
       F - Device is requesting Fast LACPDUs
       A - Device is in Active mode          P - Device is in Passive mode
```

```
Channel group 10

Port      Flags  State  LACP port  Admin  Oper  Port  Port
-----  -
Gi0/1    SA     bndl   32768      0xA    0xA   0x102 0x3D
Gi0/3    FA     hot-stby 32768      0xA    0xA   0x104 0x7
```

Configuring LACP Fast Switchover

When a port from a hot-standby state moves to a bundled state, the default time is two seconds. Enabling fast switchover on the port channel changes this time to 50 ms. This faster time allows the port to quickly transition to the bundled state, and the port channel continues to stay up.

To enable LACP fast switchover on a port channel, complete these steps:

	Command	Purpose
Step 1	configure terminal	Enter global configuration mode.
Step 2	interface port-channel <i>port-channel-number</i>	Specify the port channel and enter the port channel interface configuration mode.
Step 3	lacp fast-switchover	Enable fast switchover on the port channel.

	Command	Purpose
Step 4	end	Return to privileged EXEC mode.
Step 5	show etherchannel <i>port-channel-number</i> port-channel	Display whether or not fast switchover is enabled on the port channel.

Configuration Example

Use the commands in these examples to show that fast switchover is enabled.

```
Switch# show etherchannel 10 port-channel
      Port-channels in the group:
      -----

Port-channel: Po6      (Primary Aggregator)

-----

Age of the Port-channel   = 0d:01h:54m:42s
Logical slot/port        = 14/3           Number of ports = 1
Port state                = Port-channel Ag-Inuse
Protocol                  = LACP
Fast-switchover          = enabled

Ports in the Port-channel:

Index  Load  Port    EC state    No of bits
-----+-----+-----+-----+-----
   0    FF   Gi0/1   Active      8

Time since last port bundled:   0d:01h:54m:03s   Fa2/44

Switch# show etherchannel 10 detail
Group state = L2
Ports: 2   Maxports = 16
Port-channels: 1 Max Port-channels = 16
Protocol: LACP
Minimum Links: 0
      Ports in the group:
      -----
...
<snip>
...
      Port-channels in the group:
      -----

Port-channel: Po6      (Primary Aggregator)

-----

Age of the Port-channel   = 0d:02h:14m:09s
Logical slot/port        = 14/3           Number of ports = 1
Port state                = Port-channel Ag-Inuse
Protocol                  = LACP
Fast-switchover          = enabled
```

Ports in the Port-channel:

Index	Load	Port	EC state	No of bits
0	FF	Fa0/1	Active	8

Time since last port bundled: 0d:02h:13m:30s Fa2/44

Configuring LACP Fast Rate

To assist with early detection of a member link failure, you can request the peer to send LACPDUs at a rate of one second. The default rate is 30 seconds.

To enable LACP fast rate, complete these steps:

	Command	Purpose
Step 1	configure terminal	Enter global configuration mode.
Step 2	interface <i>type slot/port</i>	Specify the physical ethernet interface type and enter the interface configuration mode.
Step 3	lacp rate fast	Enable LACP packets to be ingressed at the rate of 1 second for this interface. The normal option returns rate of LACP ingressed packets to 30 seconds once the link is established
Step 4	end	Return to privileged EXEC mode.
Step 5	show lacp internal	Display the flag for fast rate. "F" indicates fast rate is configured. "A" indicates the normal rate.

Configuration Example

This example shows that fast rate is configured.

```
Switch# show lacp internal
Flags: S - Device is requesting Slow LACPDUs
       F - Device is requesting Fast LACPDUs
       A - Device is in Active mode           P - Device is in Passive mode

Channel group 10

Port      Flags  State  LACP port  Admin  Oper  Port  Port
Port      Flags  State  Priority   Key    Key   Number State
Gi0/1    FA     bndl   32768     0xA    0xA   0x102 0x7D
```

Configuring the EtherChannel Min-Links Feature

The EtherChannel min-links feature is supported on LACP EtherChannels. This feature allows you to configure the minimum number of member ports that must be in the link-up state and bundled in the EtherChannel for the port channel interface to transition to the link-up state. You can use the EtherChannel min-links feature to prevent low-bandwidth LACP EtherChannels from becoming active.

This feature also causes LACP EtherChannels to become inactive if they have too few active member ports to supply your required minimum bandwidth. In addition, when LACP max-bundle values are specified in conjunction with min-links, the configuration is verified and an error message is returned if the min-links value is not compatible with (equal to or less than) the max-bundle value.

To configure the EtherChannel min-links feature, perform this task:

	Command	Purpose
Step 1	configure terminal	Enter global configuration mode.
Step 2	interface port-channel <i>group_number</i>	Selects an LACP port channel interface.
Step 3	port-channel min-links <i>number</i>	Configures the minimum number of member ports that must be in the link-up state and bundled in the EtherChannel for the port channel interface to transition to the link-up state. A minimum of 2 active links must be bundled together under a port channel to activate the min-link feature.
Step 4	end	Exits configuration mode.
Step 5	show running-config interface port-channel <i>group_number</i> show interfaces <i>type</i> ¹ <i>slot/port etherchannel</i>	Verifies the configuration.
Step 6	show etherchannel port-channel interface detail	Displays the usage of min-link on the portchannel. Displays additional information

1. *type* = fastethernet, gigabitethernet, or tengigabitethernet

Use the **no port-channel min-links** *number* command to restore default etherchannel min-links configuration.

Where a bundle fails to meet the criteria for min-link configuration an error message is displayed. Use the **show etherchannel port-channel interface detail** command to display additional information not provided in the error message to determine the reason for the failure.



Note

Although the EtherChannel min-links feature works correctly when configured only on one end of an EtherChannel, for best results, configure the same number of minimum links on both ends of the EtherChannel.

This example shows how to configure port channel interface 1 to be inactive if fewer than two member ports are active in the EtherChannel:

```
Switch# configure terminal
Switch(config)# interface port-channel 1
Switch(config-if)# port-channel min-links 2
Switch(config-if)# end
```

This example shows the output from the **show etherchannel port-channel interface detail** command:

```
Switch# show etherchannel 10 detail
Group state = L2
Ports: 3 Maxports = 16
Port-channels: 1 Max Port-channels = 16
Protocol: LACP
Minimum Links: 3
```



```

Ports in the group:
-----
Port: Gi0/12
-----

Port state = Up Mstr In-Bndl
Channel group = 10 Mode = Active Gcchange = -
Port-channel = Po10 GC = - Pseudo port-channel = Po10
Port index = 0 Load = 0x00 Protocol = LACP
Mode = LACP

Flags: S - Device is sending Slow LACPDUs F - Device is sending fast LACPDUs.
A - Device is in active mode. P - Device is in passive mode.

Local information:
LACP port Admin Oper Port Port
Port Flags State Priority Key Key Number State
Gi0/12 SA bndl 32768 0xA 0xA 0x10D 0x3D

Partner's information:

Partner Partner LACP Partner Partner Partner Partner Partner
Port Flags State Port Priority Admin Key Oper Key Port Number Port State
Gi0/12 SA bndl 32768 0x0 0xA 0x114 0x3D

Age of the port in the current state: 1d:00h:24m:51s

Port: Gi0/13
-----

Port state = Up Mstr In-Bndl
Channel group = 10 Mode = Active Gcchange = -
Port-channel = Po10 GC = - Pseudo port-channel = Po10
Port index = 0 Load = 0x00 Protocol = LACP
Mode = LACP

Flags: S - Device is sending Slow LACPDUs F - Device is sending fast LACPDUs.
A - Device is in active mode. P - Device is in passive mode.

Local information:
LACP port Admin Oper Port Port
Port Flags State Priority Key Key Number State
Gi0/13 SA bndl 32768 0xA 0xA 0x10E 0x3D

Partner's information:

Partner Partner LACP Partner Partner Partner Partner Partner
Port Flags State Port Priority Admin Key Oper Key Port Number Port State
Gi0/13 SA bndl 32768 0x0 0xA 0x104 0x3D

Age of the port in the current state: 1d:00h:24m:48s

Port: Gi0/20
-----

Port state = Up Mstr In-Bndl
Channel group = 10 Mode = Active Gcchange = -
Port-channel = Po10 GC = - Pseudo port-channel = Po10
Port index = 0 Load = 0x00 Protocol = LACP
Mode = LACP

Flags: S - Device is sending Slow LACPDUs F - Device is sending fast LACPDUs.
A - Device is in active mode. P - Device is in passive mode.

```

```

Local information:
LACP port Admin Oper Port Port
Port Flags State Priority Key Key Number State
Gi0/20 SA bndl 32768 0xA 0xA 0x115 0x3D

Partner's information:

Partner Partner LACP Partner Partner Partner Partner Partner
Port Flags State Port Priority Admin Key Oper Key Port Number Port State
Gi0/20 SA bndl 32768 0x0 0xA 0x115 0x3D

Age of the port in the current state: 1d:00h:24m:43s

Port-channels in the group:
-----

Port-channel: Po10 (Primary Aggregator)

-----

Age of the Port-channel = 1d:00h:36m:54s
Logical slot/port = 2/10 Number of ports = 3
HotStandBy port = null
Port state = Port-channel Ag-Inuse
Protocol = LACP
Fast-switchover = disabled
Direct Load Swap = disabled

Ports in the Port-channel:

Index Load Port EC state No of bits
-----+-----+-----+-----+-----+-----+-----
0 00 Gi0/12 Active 0
0 00 Gi0/13 Active 0
0 00 Gi0/20 Active 0

Time since last port bundled: 1d:00h:24m:43s Gi0/20
Time since last port Un-bundled: 1d:00h:24m:45s Gi0/20

Last applied Hash Distribution Algorithm: -
Channel-group Iedge Counts:
-----:
Access ref count : 0
Iedge session count : 0

+++++

Switch#
009215: 1d00h: %EC-5-MINLINKS_NOTMET: Port-channel Po10 is down bundled ports (2) doesn't
meet min-links <<<<<<<<<<<< Error message thrown on member
009216: 1d00h: %LINK-3-UPDOWN: Interface Port-channel10, changed state to down Link
Failure
009217: 1d00h: %LINK-3-UPDOWN: Interface GigabitEthernet0/20, changed state to down
009218: 1d00h: %LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/20,
changed state to down
009219: 1d00h: %LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/12,
changed state to down
009220: 1d00h: %LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/13,
changed state to down
009221: 1d00h: %LINEPROTO-5-UPDOWN: Line protocol on Interface Port-channel10, changed
state to down

+++++

```

```

Switch# show etherchannel 10 detail
Group state = L2
Ports: 3 Maxports = 16
Port-channels: 1 Max Port-channels = 16
Protocol: LACP
Minimum Links: 3
Ports in the group:
-----
Port: Gi0/12
-----

Port state = Up Mstr In-Bndl
Channel group = 10 Mode = Active Gcchange = -
Port-channel = Po10 GC = - Pseudo port-channel = Po10
Port index = 0 Load = 0x00 Protocol = LACP
Mode = LACP

Flags: S - Device is sending Slow LACPDUs F - Device is sending fast LACPDUs.
A - Device is in active mode. P - Device is in passive mode.

Local information:
LACP port Admin Oper Port Port
Port Flags State Priority Key Key Number State
Gi0/12 SA bndl 32768 0xA 0xA 0x10D 0x3D

Partner's information:

Partner Partner LACP Partner Partner Partner Partner Partner
Port Flags State Port Priority Admin Key Oper Key Port Number Port State
Gi0/12 SA bndl 32768 0x0 0xA 0x114 0x3D

Age of the port in the current state: 1d:00h:26m:00s

Port: Gi0/13
-----

Port state = Up Mstr In-Bndl
Channel group = 10 Mode = Active Gcchange = -
Port-channel = Po10 GC = - Pseudo port-channel = Po10
Port index = 0 Load = 0x00 Protocol = LACP
Mode = LACP

Flags: S - Device is sending Slow LACPDUs F - Device is sending fast LACPDUs.
A - Device is in active mode. P - Device is in passive mode.

Local information:
LACP port Admin Oper Port Port
Port Flags State Priority Key Key Number State
Gi0/13 FA bndl 32768 0xA 0xA 0x10E 0x3D

Partner's information:

Partner Partner LACP Partner Partner Partner Partner Partner
Port Flags State Port Priority Admin Key Oper Key Port Number Port State
Gi0/13 SA bndl 32768 0x0 0xA 0x104 0xF

Age of the port in the current state: 1d:00h:25m:57s

Port: Gi0/20
-----

Port state = Down Not-in-Bndl
Channel group = 10 Mode = Active Gcchange = -

```

```
Port-channel = null GC = - Pseudo port-channel = Po10
Port index = 0 Load = 0x00 Protocol = LACP
Mode = Unknown
```

```
Flags: S - Device is sending Slow LACPDUs F - Device is sending fast LACPDUs.
A - Device is in active mode. P - Device is in passive mode.
```

```
Local information:
LACP port Admin Oper Port Port
Port Flags State Priority Key Key Number State
Gi0/20 SA down 32768 0xA 0xA 0x115 0x7
```

Partner's information:

```
Partner Partner LACP Partner Partner Partner Partner Partner
Port Flags State Port Priority Admin Key Oper Key Port Number Port State
Gi0/20 FP down 32768 0x0 0xA 0x115 0x34
```

Age of the port in the current state: 1d:00h:25m:51s

Port-channels in the group:

```
-----
```

Port-channel: Po10 (Primary Aggregator)

```
-----
```

```
Age of the Port-channel = 1d:00h:38m:03s
Logical slot/port = 2/10 Number of ports = 2
HotStandBy port = null
Port state = Port-channel Ag-MinLink-Not-Inuse <<<<<<<<<<<<<<<<<<<<<<<<<<<< Reason as to why the link is
down
Protocol = LACP
Fast-switchover = disabled
Direct Load Swap = disabled
```

Ports in the Port-channel:

```
Index Load Port EC state No of bits
-----+-----+-----+-----+-----+-----
0 00 Gi0/12 Active 0
0 00 Gi0/13 Active 0
```

```
Time since last port bundled: 1d:00h:25m:51s Gi0/20
Time since last port Un-bundled: 0d:00h:00m:10s Gi0/20
```

Last applied Hash Distribution Algorithm: -

Channel-group Iedge Counts:

```
-----:
```

```
Access ref count : 0
Iedge session count : 0
```

EtherChannels and Ethernet Flow Points (EFPs)

For an LACP or PAgP port to peer with a neighbor on a port that has an Ethernet Virtual Connection (EVC) EFP service instance configured, you need to enter the **l2 protocol peer lacp** or **l2 protocol peer lacp** service-instance configuration command on the service instance. See the “[Configuring Ethernet Virtual Connections \(EVCs\)](#)” chapter for more information on EFPs.

This example shows how to configure Layer 2 protocol LACP peer on a service instance:

```
Switch (config)# interface gigabitethernet0/1
Switch (config-if)# switchport mode trunk
Switch (config-if)# switchport trunk allowed vlan none
Switch (config-if)# service instance 1 Ethernet
Switch (config-if-srv)# encapsulation untagged
Switch (config-if-srv)# l2protocol peer lacp
Switch (config-if-srv)# bridge-domain 10
Switch (config-if-srv)# end
```

Displaying EtherChannel, PAgP, and LACP Status

To display EtherChannel, PAgP, and LACP status information, use the privileged EXEC commands described in [Table 36-4](#):

Table 36-4 Commands for Displaying EtherChannel, PAgP, and LACP Status

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

You can clear PAgP channel-group information and traffic counters by using the **clear pagp** {*channel-group-number* **counters** | **counters**} privileged EXEC command.

You can clear LACP channel-group information and traffic counters by using the **clear lacp** {*channel-group-number* **counters** | **counters**} privileged EXEC command.

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

