Configuring Port Channels

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Information About Port Channels

A port channel bundles individual interfaces into a group to provide increased bandwidth and redundancy. Port channeling also load balances traffic across these physical interfaces. The port channel stays operational as long as at least one physical interface within the port channel is operational.

You create a port channel by bundling compatible interfaces. You can configure and run either static port channels or port channels running the Link Aggregation Control Protocol (LACP).

Any configuration changes that you apply to the port channel are applied to each member interface of that port channel. For example, if you configure Spanning Tree Protocol (STP) parameters on the port channel, Cisco NX-OS applies those parameters to each interface in the port channel.

You can use static port channels, with no associated protocol, for a simplified configuration. For more efficient use of the port channel, you can use the Link Aggregation Control Protocol (LACP), which is defined in IEEE 802.3ad. When you use LACP, the link passes protocol packets.

Related Topics

LACP Overview, on page 5

Understanding Port Channels

Using port channels, Cisco NX-OS provides wider bandwidth, redundancy, and load balancing across the channels.

You can collect ports into a static port channel or you can enable the Link Aggregation Control Protocol (LACP). Configuring port channels with LACP requires slightly different steps than configuring static port channels. For information on port channel configuration limits, see the *Verified Scalability* document for your platform. For more information about load balancing, see Load Balancing Using Port Channels, on page 4.

Note Cisco NX-OS does not support Port Aggregation Protocol (PAgP) for port channels.

A port channel bundles individual links into a channel group to create a single logical link that provides the aggregate bandwidth of several physical links. If a member port within a port channel fails, traffic previously carried over the failed link switches to the remaining member ports within the port channel.

Each port can be in only one port channel. All the ports in a port channel must be compatible; they must use the same speed and operate in full-duplex mode. When you are running static port channels without LACP, the individual links are all in the on channel mode; you cannot change this mode without enabling LACP.

Note You cannot change the mode from ON to Active or from ON to Passive.

You can create a port channel directly by creating the port-channel interface, or you can create a channel group that acts to aggregate individual ports into a bundle. When you associate an interface with a channel group, Cisco NX-OS creates a matching port channel automatically if the port channel does not already exist. You can also create the port channel first. In this instance, Cisco NX-OS creates an empty channel group with the same channel number as the port channel and takes the default configuration.

Note A port channel is operationally up when at least one of the member ports is up and that port's status is channeling. The port channel is operationally down when all member ports are operationally down.

Compatibility Requirements

When you add an interface to a port channel group, Cisco NX-OS checks certain interface attributes to ensure that the interface is compatible with the channel group. Cisco NX-OS also checks a number of operational attributes for an interface before allowing that interface to participate in the port-channel aggregation.

The compatibility check includes the following operational attributes:

- Port mode
- Access VLAN
- Trunk native VLAN
- Allowed VLAN list
- Speed
- 802.3x flow control setting
- MTU
- Broadcast/Unicast/Multicast Storm Control setting
- Priority-Flow-Control
- Untagged CoS

Use the **show port-channel compatibility-parameters** command to see the full list of compatibility checks that Cisco NX-OS uses.

You can only add interfaces configured with the channel mode set to on to static port channels. You can also only add interfaces configured with the channel mode as active or passive to port channels that are running LACP. You can configure these attributes on an individual member port.

When the interface joins a port channel, the following individual parameters are replaced with the values on the port channel:

- Bandwidth
- MAC address
- Spanning Tree Protocol

The following interface parameters remain unaffected when the interface joins a port channel:

- Description
- CDP
- LACP port priority
- Debounce

After you enable forcing a port to be added to a channel group by entering the **channel-group force** command, the following two conditions occur:

- When an interface joins a port channel, the following parameters are removed and they are operationally replaced with the values on the port channel; however, this change will not be reflected in the running configuration for the interface:
  - QoS
  - Bandwidth
  - Delay
  - STP
  - Service policy
  - ACLs
- When an interface joins or leaves a port channel, the following parameters remain unaffected:
  - Beacon
  - Description
  - CDP
  - LACP port priority
  - Debounce
  - UDLD
  - Shutdown

- SNMP traps

Load Balancing Using Port Channels

Cisco NX-OS load balances traffic across all operational interfaces in a port 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. Port channels provide load balancing by default.

For a HIF port-channel, same hashing parameters are used by the FEX as a Cisco Nexus 5000 or Cisco Nexus 6000 series parent. If the number of interfaces is a power of 2, then there might be some difference between the outgoing port on the switch and on the FEX. Use the **show port-channel load-balance forwarding-path interface** command to get the display of the outgoing port. This is applicable to N2K-C2232PP-10GE, N2K-C2232TM-10GE, N2K-C2232TM-E-10GE, N2K-C2348UPQ-10GE, N2K-C2248TP-1GE, N2K-C2224TP-1GE, N2K-C2248TP-E-1GE, N2K-C2248PQ-10GE, N2K-C2348TQ, N2K-C2332TQ-10GE, N2K-C2348TQ-E.

The basic configuration uses the following criteria to select the link:

- For a Layer 2 frame, it uses the source and destination MAC addresses.
- For a Layer 3 frame, it uses the source and destination MAC addresses and the source and destination IP addresses.
- For a Layer 4 frame, it uses the source and destination MAC addresses and the source and destination IP addresses.

Note You have the option to include the source and destination port number for the Layer 4 frame.

You can configure the switch to use one of the following methods (see the following table for more details) to load balance across the port channel:

- Destination MAC address
- Source MAC address
- Source and destination MAC address
- Destination IP address
- Source IP address
- Source and destination IP address
- Destination TCP/UDP port number
- Source TCP/UDP port number
- Source and destination TCP/UDP port number

Table 1: Port Channel Load-Balancing Criteria

Configuration	Layer 2 Criteria	Layer 3 Criteria	Layer 4 Criteria
Destination MAC	Destination MAC	Destination MAC	Destination MAC
Source MAC	Source MAC	Source MAC	Source MAC
Source and destination MAC	Source and destination MAC	Source and destination MAC	Source and destination MAC
Destination IP	Destination MAC	Destination MAC, destination IP	Destination MAC, destination IP
Source IP	Source MAC	Source MAC, source IP	Source MAC, source IP
Source and destination IP	Source and destination MAC	Source and destination MAC, source and destination IP	Source and destination MAC, source and destination IP
Destination TCP/UDP port	Destination MAC	Destination MAC, destination IP	Destination MAC, destination IP, destination port
Source TCP/UDP port	Source MAC	Source MAC, source IP	Source MAC, source IP, source port
Source and destination TCP/UDP port	Source and destination MAC	Source and destination MAC, source and destination IP	Source and destination MAC, source and destination IP, source and destination port

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

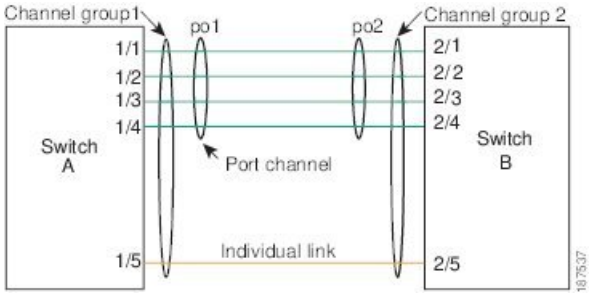
Understanding LACP

LACP Overview

Note You must enable the LACP feature before you can configure and use LACP functions.

The following figure shows how individual links can be combined into LACP port channels and channel groups as well as function as individual links.

Figure 1: Individual Links Combined into a Port Channel



With LACP, just like with static port channels, you can bundle up to 16 interfaces in a channel group.

Note When you delete the port channel, Cisco NX-OS automatically deletes the associated channel group. All member interfaces revert to their previous configuration.

You cannot disable LACP while any LACP configurations are present.

LACP ID Parameters

LACP uses the following parameters:

- LACP system priority—Each system that runs LACP has an LACP system priority value. You can accept the default value of 32768 for this parameter, or you can configure a value between 1 and 65535. LACP uses the system priority with the MAC address to form the system ID and also uses the system priority during negotiation with other devices. A higher system priority value means a lower priority.

Note The LACP system ID is the combination of the LACP system priority value and the MAC address.

- LACP port priority—Each port configured to use LACP has an LACP port priority. You can accept the default value of 32768 for the LACP port priority, or you can configure a value between 1 and 65535. LACP uses the port priority with the port number to form the port identifier. LACP uses the port priority to decide which ports should be put in standby mode when there is a limitation that prevents all compatible ports from aggregating and which ports should be put into active mode. A higher port priority value means a lower priority for LACP. You can configure the port priority so that specified ports have a lower priority for LACP and are most likely to be chosen as active links, rather than hot-standby links.
- LACP administrative key—LACP automatically configures an administrative key value equal to the channel-group number on each port configured to use LACP. The administrative key defines the ability of a port to aggregate with other ports. A port's ability to aggregate with other ports is determined by these factors:
  - Port physical characteristics, such as the data rate, the duplex capability, and the point-to-point or shared medium state
  - Configuration restrictions that you establish

Channel Modes

Individual interfaces in port channels are configured with channel modes. When you run static port channels, with no protocol, the channel mode is always set to on. After you enable LACP globally on the device, you enable LACP for each channel by setting the channel mode for each interface to active or passive. You can configure either channel mode for individual links in the LACP channel group.

Note You must enable LACP globally before you can configure an interface in either the active or passive channel mode.

The following table describes the channel modes.

Table 2: Channel Modes for Individual Links in a Port Channel

Channel Mode	Description
passive	LACP mode that places a port into a passive negotiating state, in which the port responds to LACP packets that it receives but does not initiate LACP negotiation.
active	LACP mode that places a port into an active negotiating state, in which the port initiates negotiations with other ports by sending LACP packets.
on	All static port channels, that is, that are not running LACP, remain in this mode. If you attempt to change the channel mode to active or passive before enabling LACP, the device returns an error message. You enable LACP on each channel by configuring the interface in that channel for the channel mode as either active or passive. When an LACP attempts to negotiate with an interface in the on state, it does not receive any LACP packets and becomes an individual link with that interface; it does not join the LACP channel group.

Both the passive and active modes allow LACP to negotiate between ports to determine if they can form a port channel, based on criteria such as the port speed and the trunking state. The passive mode is useful when you do not know whether the remote system, or partner, supports LACP.

Ports can form an LACP port channel when they are in different LACP modes as long as the modes are compatible as in the following examples:

- A port in active mode can form a port channel successfully with another port that is in active mode.
- A port in active mode can form a port channel with another port in passive mode.
- A port in passive mode cannot form a port channel with another port that is also in passive mode because neither port will initiate negotiation.
- A port in on mode is not running LACP.

LACP Marker Responders

Using port channels, data traffic may be dynamically redistributed due to either a link failure or load balancing. LACP uses the Marker Protocol to ensure that frames are not duplicated or reordered because of this redistribution. Cisco NX-OS supports only Marker Responders.

LACP-Enabled and Static Port Channel Differences

The following table provides a brief summary of major differences between port channels with LACP enabled and static port channels. For information about the maximum configuration limits, see the *Verified Scalability* document for your device.

Table 3: Port Channels with LACP Enabled and Static Port Channels

Configurations	Port Channels with LACP Enabled	Static Port Channels
Protocol applied	Enable globally.	Not applicable.
Channel mode of links	Can be either: • Active • Passive	Can only be On.

LACP Port-Channel MinLinks and MaxBundle

A port channel aggregates similar ports to provide increased bandwidth in a single manageable interface.

The introduction of the minlinks and maxbundle feature further refines LACP port-channel operation and provides increased bandwidth in one manageable interface.

The LACP port-channel MinLink feature does the following:

- Configures the minimum number of ports that must be linked up and bundled in the LACP port channel.
- Prevents the low-bandwidth LACP port channel from becoming active.
- Causes the LACP port channel to become inactive if there are few active members ports to supply the required minimum bandwidth.

The LACP MaxBundle defines the maximum number of bundled ports allowed in a LACP port channel.

The LACP MaxBundle feature does the following:

- Defines an upper limit on the number of bundled ports in an LACP port channel.
- Allows hot-standby ports with fewer bundled ports. (For example, in an LACP port channel with five ports, you can designate two of those ports as hot-standby ports.)

Note The minlink and maxbundle feature works only with LACP port channels. However, the device allows you to configure this feature in non-LACP port channels, but the feature is not operational.

The LACP minlink and maxbundle configurations are not applicable to FEX HIF port-channels.

The minlink/maxbundle configuration can be applied to a non-LACP HIF PO, but the feature is not operational. Configuring a minlink/maxbundle configuration on a LACP HIF PO is not allowed and is rejected.

Configuring Port Channels

Default Settings

Table 4: Default Port-Channel Parameters

Parameters	Default
Port channel	Admin up
Load balancing method for Layer 3 interfaces	Source and destination IP address
Load balancing method for Layer 2 interfaces	Source and destination MAC address
Load balancing per module	Disabled
RBH modulo mode	Disabled
LACP	Disabled
Channel mode	on
LACP system priority	32768
LACP port priority	32678
Minimum links for LACP	1
Minimum links for FEX fabric port channel	1
Maxbundle	16

LACP Port-Channel Min Links

A port channel aggregates similar ports to provide increased bandwidth in a single manageable interface.

The introduction of the minimum links feature further refines LACP port-channel operation and provides increased bandwidth in one manageable interface.

The LACP port-channel minimum links feature does the following:

- Configures the minimum number of ports that must be linked up and bundled in the LACP port channel.
- Prevents the low-bandwidth LACP port channel from becoming active.
- Causes the LACP port channel to become inactive if there are few active members ports to supply the required minimum bandwidth.

Note The minimum links feature works only with LACP port channels. However, the device allows you to configure this feature in non-LACP port channels, but the feature is not operational.

Creating a Port Channel

You can create a port channel before creating a channel group. Cisco NX-OS automatically creates the associated channel group.

Note If you want LACP-based port channels, you need to enable LACP.

Procedure

	Command or Action	Purpose
Step 1	switch# **configure terminal**	Enters global configuration mode.
Step 2	switch(config)# **interface port-channel** *channel-number*	Specifies the port-channel interface to configure, and enters the interface configuration mode. The range is from 1 to 4096. Cisco NX-OS automatically creates the channel group if it does not already exist.
Step 3	switch(config)# **no interface port-channel** *channel-number*	Removes the port channel and deletes the associated channel group.

Example

This example shows how to create a port channel:

```
switch# configure terminal
switch (config)# interface port-channel 1
```

Adding a Port to a Port Channel

You can add a port to a new channel group or to a channel group that already contains ports. Cisco NX-OS creates the port channel associated with this channel group if the port channel does not already exist.

Note If you want LACP-based port channels, you need to enable LACP.

Procedure

	Command or Action	Purpose
Step 1	switch# **configure terminal**	Enters global configuration mode.
Step 2	switch(config)# **interface** *type slot/port*	Specifies the interface that you want to add to a channel group and enters the interface configuration mode.

	Command or Action	Purpose
Step 3	(Optional) switch(config-if)# **switchport mode trunk**	Configures the interface as a trunk port.
Step 4	(Optional) switch(config-if)# **switchport trunk** {**allowed vlan** *vlan-id* | **native vlan** *vlan-id*}	Configures necessary parameters for a trunk port.
Step 5	switch(config-if)# **channel-group** *channel-number*	Configures the port in a channel group and sets the mode. The channel-number range is from 1 to 4096. Cisco NX-OS creates the port channel associated with this channel group if the port channel does not already exist. This is called implicit port channel creation.
Step 6	(Optional) switch(config-if)# **no channel-group**	Removes the port from the channel group. The port reverts to its original configuration.

Example

This example shows how to add an Ethernet interface 1/4 to channel group 1:

```
switch# configure terminal
switch (config)# interface ethernet 1/4
switch(config-if)# switchport mode trunk
switch(config-if)# channel-group 1
```

Configuring Load Balancing Using Port Channels

You can configure the load-balancing algorithm for port channels that applies to the entire device.

Note If you want LACP-based port channels, you need to enable LACP.

Note For load-balancing FC traffic across SAN PO members in Nexus 5672UP-16G switch, the **port-channel load-balance ethernet** command is not needed. The load-balancing happens by default.

Procedure

	Command or Action	Purpose
Step 1	switch# **configure terminal**	Enters global configuration mode.
Step 2	switch(config)# **port-channel load-balance ethernet** {[**destination-ip** | **destination-mac** | **destination-port** | **source-dest-ip** | **source-dest-mac** | **source-dest-port** | **source-ip** | **source-mac** | **source-port**] | **crc-poly**}	Specifies the load-balancing algorithm for the device. The range depends on the device. The default is **source-dest-ip**.

	Command or Action	Purpose
		Note • source-dest-ip-only • source-dest-port-only • source-dest-ip • source-dest-port • source-dest-ip-gre The Cisco Nexus 5500 Platform switches support 8 hash polynomials that can be used for compression on the hash-parameters. Depending on variations in the hash parameters for egress traffic flows from a port channel, different polynomials could provide different load distribution results. The default hash polynomial is CRC8a. The variable can be configured as follows: • CRC8a • CRC8b • CRC8c • CRC8d • CRC8e • CRC8f • CRC8g
Step 3	(Optional) switch(config)# **no port-channel load-balance ethernet**	Restores the default load-balancing algorithm of source-dest-ip.
Step 4	(Optional) switch# **show port-channel load-balance**	Displays the port-channel load-balancing algorithm.

Example

This example shows how to configure source IP load balancing for port channels:

```
switch# configure terminal
switch (config)# port-channel load-balance ethernet source-ip
```

Enabling LACP

LACP is disabled by default; you must enable LACP before you begin LACP configuration. You cannot disable LACP while any LACP configuration is present.

LACP learns the capabilities of LAN port groups dynamically and informs the other LAN ports. Once LACP identifies correctly matched Ethernet links, it facilitates grouping the links into an port channel. The port channel is then added to the spanning tree as a single bridge port.

Procedure

	Command or Action	Purpose
Step 1	switch# **configure terminal**	Enters global configuration mode.
Step 2	switch(config)# **feature lacp**	Enables LACP on the switch.
Step 3	(Optional) switch(config)# **show feature**	Displays enabled features.

Example

This example shows how to enable LACP:

```
switch# configure terminal
switch(config)# feature lacp
```

Configuring the Channel Mode for a Port

You can configure the channel mode for each individual link in the LACP port channel as active or passive. This channel configuration mode allows the link to operate with LACP.

When you configure port channels with no associated protocol, all interfaces on both sides of the link remain in the on channel mode.

Before you begin

Ensure that you have enabled the LACP feature.

Procedure

	Command or Action	Purpose
Step 1	switch# **configure terminal**	Enters global configuration mode.
Step 2	switch(config)# **interface** *type slot/port*	Specifies the interface to configure, and enters the interface configuration mode.
Step 3	switch(config-if)# **channel-group** *channel-number* [**force**] [**mode** {**on** | **active** | **passive**}]	Specifies the port mode for the link in a port channel. After LACP is enabled, you configure each link or the entire channel as active or passive.

	Command or Action	Purpose
		force—Specifies that the LAN port be forcefully added to the channel group. **mode**—Specifies the port channel mode of the interface. **active**—Specifies that when you enable LACP, this command enables LACP on the specified interface. The interface is in an active negotiating state in which the port initiates negotiations with other ports by sending LACP packets. **on**—(Default mode) Specifies that all port channels that are not running LACP remain in this mode. **passive**—Enables LACP only if an LACP device is detected. The interface is in a passive negotiation state in which the port responds to LACP packets that it receives but does not initiate LACP negotiation. When you run port channels with no associated protocol, the channel mode is always on.
Step 4	switch(config-if)# **no channel-group** *number* **mode**	Returns the port mode to on for the specified interface.

Example

This example shows how to set the LACP-enabled interface to active port-channel mode for Ethernet interface 1/4 in channel group 5:

```
switch# configure terminal
switch (config)# interface ethernet 1/4
switch(config-if)# channel-group 5 mode active
```

This example shows how to forcefully add an interface to the channel group 5:

```
switch(config)# interface ethernet 1/1
switch(config-if)# channel-group 5 force
switch(config-if)#
```

Configuring LACP Port-Channel Minimum Links

You can configure the LACP minimum links feature. Although minimum links work only in LACP, you can enter the CLI commands for this feature for non-LACP port channels, but these commands are nonoperational.

Before you begin

Ensure that you are in the correct port-channel interface.

Procedure

	Command or Action	Purpose
Step 1	switch# **configure terminal**	Enters global configuration mode.
Step 2	switch(config)# **interface port-channel** *number*	Specifies the interface to configure, and enters the interface configuration mode.
Step 3	switch(config-if)# **lacp min-links** *number*	Specifies the port-channel interface to configure the number of minimum links and enters the interface configuration mode. The range is from 1 to 16.
Step 4	(Optional) switch(config-if)# **show running-config interface port-channel** *number*	Displays the port-channel minimum links configuration. **Note** When you upgrade from an earlier Cisco NX-OS release to Cisco NX-OS release 7.2(1)N1(1) or a later release, then an additional configuration line, **no lacp suspend-individual**, is displayed in the **show** command output of the **show running-config interface port-channel** *number* command.

Example

The following example shows how to configure LACP port-channel minimum links.

```
switch# configure terminal
switch(config)# interface port-channel 3
switch(config-if)# lacp min-links 3
switch(config-if)# show running-config interface port-channel 3
interface port-channel 3
lacp min-links 3
```

Configuring the LACP Port-Channel MaxBundle

You can configure the LACP minlinks feature. Although minlinks and maxbundles work only in LACP, you can enter the CLI commands for these features for non-LACP port channels, but these commands are nonoperational.

Before you begin

Ensure that you are in the correct port-channel interface.

Procedure

	Command or Action	Purpose
Step 1	switch# **configure terminal**	Enters global configuration mode.
Step 2	switch(config)# **interface port-channel** *number*	Specifies the interface to configure, and enters the interface configuration mode.
Step 3	switch(config-if)# **lacp max-bundle** *number*	Specifies the port-channel interface to configure max-bundle, and enters the interface configuration mode. The default value for the port-channel max-bundle is 16. The allowed range is from 1 to 16. **Note** Even if the default value is 16, the number of active members in a port channel is the minimum of the pc_max_links_config and pc_max_active_members that is allowed in the port channel. The min-links and max-bundle features work well when both ends of the port-channel are configured with the same value. Mismatched min/max-bundle values might result in port flap, traffic drops, and unnecessary port suspension.
Step 4	switch(config-if)# **show running config interface port-channel** *number*	

Example

This example shows how to configure the port channel interface max-bundle on module 3:

```
switch# configure terminal
switch(config)# lacp max-bundle 3
```

Configuring the LACP Fast Timer Rate

You can change the LACP timer rate to modify the duration of the LACP timeout. Use the **lacp rate** command to set the rate at which LACP control packets are sent to an LACP-supported interface. You can change the timeout rate from the default rate (30 seconds) to the fast rate (1 second). This command is supported only on LACP-enabled interfaces.

Before you begin

Ensure that you have enabled the LACP feature.

Procedure

	Command or Action	Purpose
Step 1	switch# **configure terminal**	Enters global configuration mode.
Step 2	switch(config)# **interface** *type slot/port*	Specifies the interface to configure and enters the interface configuration mode.
Step 3	switch(config-if)# **lacp rate fast**	Configures the fast rate (one second) at which LACP control packets are sent to an LACP-supported interface.

Example

This example shows how to configure the LACP fast rate on Ethernet interface 1/4:

```
switch# configure terminal
switch(config)# interface ethernet 1/4
switch(config-if)# lacp rate fast
```

This example shows how to restore the LACP default rate (30 seconds) on Ethernet interface 1/4.

```
switch# configure terminal
switch(config)# interface ethernet 1/4
switch(config-if)# no lacp rate fast
```

Configuring the LACP Short-timeout

You can change the LACP Short-timeout value for the lacp rate fast command to modify the duration of the LACP Fast Rate timeout. Use the **lacp rate fast** command to set the fast rate at which LACP control packets are sent to an LACP-supported interface. You can change the short timeout value from 15 seconds (default timeout) to 3 seconds (IEEE802.3ad recommended standard).

Note The **lacp short-timeout** command is supported only on LACP-enabled interfaces.

BFD feature is not supported, when LACP Short-timeout is configured.

LACP rate fast is not recommended on vPC multichassis Etherchannel trunk (MCT) ports.

Before you begin

Ensure that you have enabled the LACP Rate Fast feature.

Procedure

Step 1 switch# **configure terminal**

Enters global configuration mode.

Step 2 switch(config)# **lacp short-timeout**

Configures the short-timeout value for LACP fast rate at which LACP control packets are sent to an LACP-supported interface. Valid range value is from 3 to 15 seconds. The default short-timeout value is 15 seconds.

Note The LACP Short-timeout default configuration is not displayed in the running configuration.

Step 3 (Optional) switch(config)# **show run | include lacp**

Displays the LACP configuration on an interface.

Example

This example shows how to configure the LACP short-timeout value of 3 seconds for LACP fast rate:

```
switch# configure terminal
switch(config)#
```

This example shows how to restore the LACP short-timeout default timeout (15 seconds) for LACP fast rate:

```
switch# configure terminal
switch(config)# no lacp short-timeout
```

Procedure to revert when BFD Feature and LACP Short-timeout are configured Together

Do not enable BFD feature along with the LACP Short-timeout configuration. This configuration is not supported. You must wait for 30 seconds after configuring **lacp** *short-timeout*. The command prompts error when you attempt to enable BFD feature.

If you have enabled the BFD feature along with the LACP short-timeout, you must do the following procedure to exit this configuration:

Procedure

Step 1 Use the **no lacp short-timeout** command to disable the lacp short-timeout.

Step 2 Use the **no feature BFD** command to disable the feature BFD.

Configuring the LACP System Priority and System ID

The LACP system ID is the combination of the LACP system priority value and the MAC address.

Before you begin

Ensure that you have enabled the LACP feature.

Procedure

	Command or Action	Purpose
Step 1	switch# **configure terminal**	Enters global configuration mode.
Step 2	switch(config)# **lacp system-priority** *priority*	Configures the system priority for use with LACP. Valid values are 1 through 65535, and higher numbers have lower priority. The default value is 32768.
Step 3	(Optional) switch# **show lacp system-identifier**	Displays the LACP system identifier.

Example

This example shows how to set the LACP system priority to 2500:

```
switch# configure terminal
switch(config)# lacp system-priority 2500
```

Configuring the LACP Port Priority

You can configure each link in the LACP port channel for the port priority.

Before you begin

Ensure that you have enabled the LACP feature.

Procedure

	Command or Action	Purpose
Step 1	switch# **configure terminal**	Enters global configuration mode.
Step 2	switch(config)# **interface** *type slot/port*	Specifies the interface to configure, and enters the interface configuration mode.
Step 3	switch(config-if)# **lacp port-priority** *priority*	Configures the port priority for use with LACP. Valid values are 1 through 65535, and higher numbers have lower priority. The default value is 32768.

Example

This example shows how to set the LACP port priority for Ethernet interface 1/4 to 40000:

```
switch# configure terminal
switch (config)# interface ethernet 1/4
switch(config-if)# lacp port priority 40000
```

Disabling LACP Graceful Convergence

Before you begin

- Enable the LACP feature.
- Confirm that the port channel is in the administratively down state.
- Ensure that you are in the correct VDC. To switch to the correct VDC, enter the **switchto vdc** command.

Procedure

	Command or Action	Purpose

Step 1	**configure terminal**
	Example:
	`switch# configure terminal`
	`switch(config)#`
		Enters global configuration mode.

Step 2	**interface port-channel** *number*
	Example:
	`switch(config)# interface port-channel 1`
	`switch(config) #`
		Specifies the port channel interface to configure, and enters interface configuration mode.

Step 3	Required: **shutdown**
	Example:
	`switch(config-if)# shutdown`
	`switch(config-if) #`
		Administratively shuts down the port channel.

Step 4	Required: **no lacp graceful-convergence**
	Example:
	`switch(config-if)# no lacp graceful-convergence`
	`switch(config-if) #`
		Disables LACP graceful convergence on the specified port channel.

Step 5	Required: **no shutdown**
	Example:
	`switch(config-if)# no shutdown`
	`switch(config-if) #`
		Administratively brings the port channel up.

Step 6	(Optional) **copy running-config startup-config** **Example:** `switch(config-if)# copy running-config startup-config`	Saves the change persistently through reboots and restarts by copying the running configuration to the startup configuration.

Example

The following example disables LACP graceful convergence on a port channel:

```
switch# configure terminal
switch(config) # interface port-channel 1
switch(config-if) # shutdown
switch(config-if) # no lacp graceful-convergence
switch(config-if) # no shutdown
switch(config-if) #
```

Reenabling LACP Graceful Convergence

Before you begin

- Enable the LACP feature.
- Confirm that the port channel is in the administratively down state.
- Ensure that you are in the correct VDC. To switch to the correct VDC, enter the **switchto vdc** command.

Procedure

	Command or Action	Purpose

Step 1	**configure terminal**
	Example:
	`switch# configure terminal`
	`switch(config)#`
		Enters global configuration mode.

Step 2	**interface port-channel** *number*
	Example:
	`switch(config)# interface port-channel 1`
	`switch(config) #`
		Specifies the port channel interface to configure, and enters interface configuration mode.

Step 3	Required: **shutdown**
	Example:
	`switch(config-if)# shutdown`
	`switch(config-if) #`
		Administratively shuts down the port channel.

Step 4	Required: **lacp graceful-convergence**
	Example:
	`switch(config-if)# lacp graceful-convergence`
	`switch(config-if) #`
		Enables LACP graceful convergence on the specified port channel.

Step 5	Required: **no shutdown**
	Example:
	`switch(config-if)# no shutdown`
	`switch(config-if) #`
		Administratively brings the port channel up.

	Command or Action	Purpose
Step 6	(Optional) **copy running-config startup-config** **Example:** `switch(config-if)# copy running-config startup-config`	Saves the change persistently through reboots and restarts by copying the running configuration to the startup configuration.

Example

The following example disables LACP graceful convergence on a port channel:

```
switch# configure terminal
switch(config) # interface port-channel 1
switch(config-if) # shutdown
switch(config-if) # lacp graceful-convergence
switch(config-if) # no shutdown
switch(config-if) #
```

Verifying Port Channel Configuration

Use the following command to verify the port channel configuration information:

Command	Purpose
show interface port channel*channel-number*	Displays the status of a port channel interface.
show feature	Displays enabled features.
show resource	Displays the number of resources currently available in the system.
show lacp {**counters** | **interface** *type slot/port* | **neighbor** | **port-channel** | **system-identifier**}	Displays LACP information.
show port-channel compatibility-parameters	Displays the parameters that must be the same among the member ports in order to join a port channel.
show port-channel database [**interface port-channel** *channel-number*]	Displays the aggregation state for one or more port-channel interfaces.
show port-channel summary	Displays a summary for the port channel interfaces.
show port-channel traffic	Displays the traffic statistics for port channels.
show port-channel usage	Displays the range of used and unused channel numbers.
show port-channel database	Displays information on current running of the port channel feature.

Command	Purpose
show port-channel load-balance	Displays information about load-balancing using port channels. Based on the system—Source and destination IP, and MAC addresses are used for port channel load balance calculation. By default the **source-destination-ip** address is used. Based on protocol—For non-IP traffic, only the source and destination MAC address is used, and for IP traffic, both source and destination IP and MAC addresses are used for the port channel load balance calculation.

Verifying the Load-Balancing Outgoing Port ID

Command Guidelines

The **show port-channel load-balance** command allows you to verify which ports a given frame is hashed to on a port channel. You need to specify the VLAN and the destination MAC in order to get accurate results.

Note Certain traffic flows are not subject to hashing such as when there is a single port in a port-channel.

To display the load-balancing outgoing port ID, perform one of the tasks:

Command	Purpose
switch# **show port-channel load-balance forwarding-path interface port-channel** *port-channel-id* **vlan** vlan-id **dst-ip src-ip dst-mac src-mac l4-src-port** *port-id* **l4-dst-port** *port-id*	Displays the outgoing port ID.

Example

This example shows how to display the load balancing outgoing port ID:

```
switch# show port-channel load-balance forwarding-path interface port-channel 10 vlan 1
dst-ip 1.225.225.225 src-ip 1.1.10.10 src-mac aa:bb:cc:dd:ee:ff
l4-src-port 0 l4-dst-port 1
Missing params will be substituted by 0's. Load-balance Algorithm on switch: source-dest-port
 crc8_hash:204 Outgoing port id: Ethernet 1/1 Param(s) used to calculate load balance:
dst-port: 0
src-port: 0
dst-ip: 1.225.225.225
src-ip: 1.1.10.10
dst-mac: 0000.0000.0000
src-mac: aabb.ccdd.eeff
```

Feature History for Configuring Port Channels

Table 5: Feature History for Configuring Port Channels

Feature Name	Release	Feature Information
Min Links	6.0(2)N1(2)	This feature was introduced.
LACP Short-timeout	7.3(0)N1(1)	This feature was introduced.