



CHAPTER 5

Configuring Port Channels

This chapter describes how to configure port channels and to apply and configure the Link Aggregation Control Protocol (LACP) for more efficient use of port channels in the software.

For more information about the Data Center Network Manager features, see the *Cisco Data Center Network Manager Fundamentals Guide*.



Note

Before using DCNM to configure port channels, you must set the logging level by entering the NX-OS global commands in the command line of your device:

```
--logging level port-channel 6  
--logging logfile messages 6  
--logging event link-status default
```

See the *Cisco NX-OS System Management Configuration Guide* for information on logging levels.

This chapter includes the following sections:

- [Information About Port Channels, page 5-1](#)
- [Licensing Requirements for Port Channeling, page 5-11](#)
- [Prerequisites for Port Channeling, page 5-11](#)
- [Guidelines and Limitations, page 5-11](#)
- [Configuring Port Channels, page 5-12](#)
- [Displaying Statistics, page 5-22](#)
- [Field Descriptions for Port Channeling and LACP, page 5-22](#)
- [Additional References, page 5-27](#)

Information About Port Channels

A port channel is an aggregation of multiple physical interfaces that creates a logical interface. You can bundle up to eight individual active links into a port channel 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 can create a Layer 2 port channel by bundling compatible Layer 2 interfaces, or you can create Layer 3 port channels by bundling compatible Layer 3 interfaces. After you create a Layer 3 port channel, you can add an IP address to the port-channel interface and create subinterfaces on the Layer 3 port channel. You cannot combine Layer 2 and Layer 3 interfaces in the same port channel.

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All ports in the port channel must be in the same device; you cannot configure port channels across devices.

You can also change the port channel from Layer 3 to Layer 2. See [Chapter 3, “Configuring Layer 2 Interfaces,”](#) for information on creating Layer 2 interfaces.

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, the software applies those parameters to each interface in the port channel.

You can create subinterfaces on a Layer 3 port channel, even though a subinterface is part of the logical port-channel interface. See the [“Subinterfaces” section on page 4-2](#) for more information on port-channel subinterfaces.

You can use static port channels, with no associated aggregation protocol, for a simplified configuration.

For more flexibility, 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.

See the [for information on LACP.](#)

This section includes the following topics:

- [Port Channels, page 5-2](#)
- [Port-Channel Interfaces, page 5-3](#)
- [Basic Settings, page 5-4](#)
- [Compatibility Requirements, page 5-4](#)
- [Load Balancing Using Port Channels, page 5-6](#)
- [LACP, page 5-7](#)
- [Virtualization Support, page 5-10](#)
- [High Availability, page 5-11](#)

Port Channels

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

You can bundle up to eight ports into a static port channel without using any aggregation protocol. However, you can enable the LACP to use port channels more flexibly. Configuring port channels with LACP and static port channels require slightly different steps (see the [“Configuring Port Channels” section on page 5-12](#)).



Note

The device does not support Port Aggregation Protocol (PAgP) for port channels.

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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 duplex mode (see the “[Compatibility Requirements](#)” section on page 5-4). When you run static port channels with no aggregation protocol, the physical links are all in the **on** channel mode; you cannot change this mode without enabling LACP (see the “[Port-Channel Modes](#)” section on page 5-8).

You can create port channels 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, the software creates a matching port channel automatically if the port channel does not already exist. In this instance, the port channel assumes the Layer 2 or Layer 3 configuration of the first interface. You can also create the port channel first. In this instance, the software creates an empty channel group with the same channel number as the port channel and takes the default Layer 2 or Layer 3 configuration, as well as the compatibility configuration (see the “[Compatibility Requirements](#)” section on page 5-4). See [Chapter 4, “Configuring Layer 3 Interfaces”](#) for more information on creating and deleting port-channel subinterfaces.



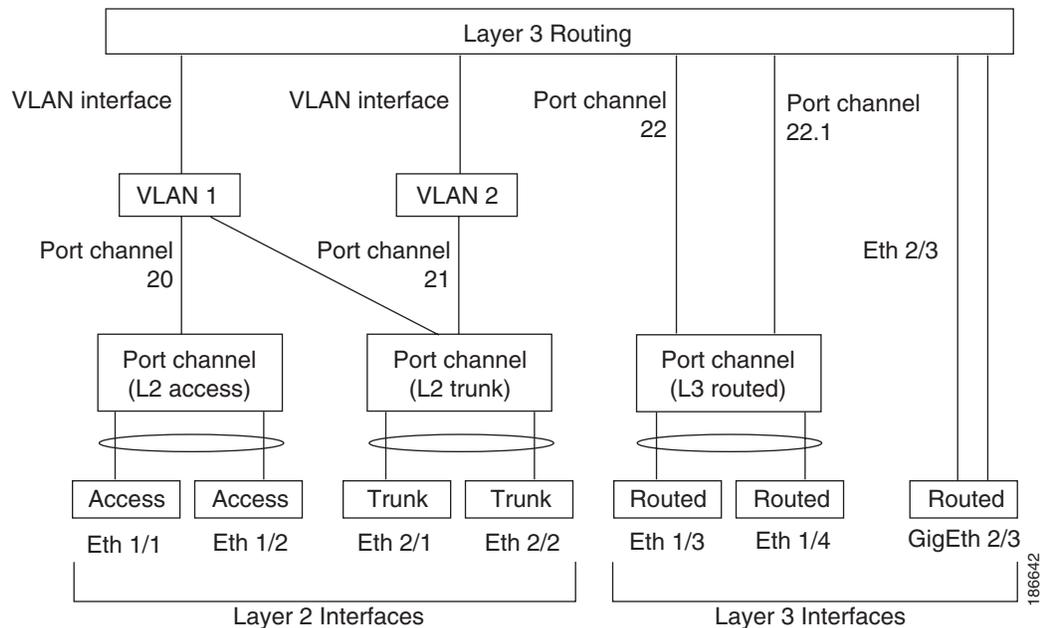
Note

The 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.

Port-Channel Interfaces

Figure 5-1 shows port-channel interfaces.

Figure 5-1 Port-Channel Interfaces



You can classify port-channel interfaces as Layer 2 or Layer 3 interfaces. In addition, you can configure Layer 2 port channels in either access or trunk mode. Layer 3 port-channel interfaces have routed ports as channel members and may have subinterfaces.

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See [Chapter 3, “Configuring Layer 2 Interfaces”](#) for information on configuring Layer 2 ports in access or trunk mode and [Chapter 4, “Configuring Layer 3 Interfaces”](#) for information on configuring Layer 3 interfaces and subinterfaces.

Basic Settings

You can configure the following basic settings for the port-channel interface:

- Description.
- Duplex.
- IP addresses—Both IPv4 and IPv6.
- Shutdown.
- Speed.

Compatibility Requirements

When you add an interface to a channel group, the software checks certain interface attributes to ensure that the interface is compatible with the channel group. For example, you cannot add a Layer 3 interface to a Layer 2 channel group. The software 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:

- Network layer
- (Link) speed capability
- Speed configuration
- Duplex capability
- Duplex configuration
- Port mode
- Access VLAN
- Trunk native VLAN
- Tagged or untagged
- Allowed VLAN list
- MTU size
- SPAN—cannot be a SPAN source or a destination port
- Layer 3 ports cannot have subinterfaces
- Storm control
- Flow-control capability
- Flow-control configuration

You can only add interfaces configured with the channel mode set to **on** to static port channels. And you can only add interfaces configured with the channel mode as **active** or **passive** to port channels that are running LACP. (See the [“LACP Marker Responders”](#) section on page 5-9 for information on port-channel modes.) You can configure these attributes on an individual member port. If you configure a member port with an incompatible attribute, the software suspends that port in the port channel.

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**Note**

See the *Cisco NX-OS Interfaces Configuration Guide* for information on forcing ports with incompatible parameters to join a port channel.

When the interface joins a port channel, some of its individual parameters are removed and replaced with the values on the port channel as follows:

- Bandwidth
- Delay
- Extended Authentication Protocol over UDP
- VRF
- IP address (v4 and v6)
- MAC address
- Spanning Tree Protocol
- NAC
- Service policy
- Quality of Service (QoS)
- Access control lists (ACLs)

Many interface parameters remain unaffected when the interface joins or leaves a port channel as follows:

- Beacon
- Description
- CDP
- LACP port priority
- Debounce
- UDLD
- MDIX
- Rate mode
- Shutdown
- SNMP trap

If you configure subinterfaces for the port-channel interface and remove a member port from the port channel, the configuration of the port-channel subinterface does not propagate to the member ports.

**Note**

When you delete the port channel, the software sets all member interfaces as if they were removed from the port channel.

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Load Balancing Using Port Channels

The software load balances traffic across all operational interfaces in a port channel by hashing 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. Port-channel load-balancing uses MAC addresses, IP addresses, or Layer 4 port numbers to select the link. Port-channel load balancing uses either source or destination addresses or ports, or both source and destination addresses or ports.

You can configure the load-balancing mode to apply to all port channels that are configured on the entire device or on specified modules. The per-module configuration takes precedence over the load-balancing configuration for the entire device. You can configure one load-balancing mode for the entire device, a different mode for specified modules, and another mode for the other specified modules. You cannot configure the load-balancing method per port channel.

You can configure the type of load-balancing algorithm used. You can choose the load-balancing algorithm that determines which member port to select for egress traffic by looking at the fields in the frame.



Note

The default load-balancing mode for Layer 3 interfaces is the source and destination IP address, and the default load-balancing mode for non-IP interfaces is the source and destination MAC address.

You can configure the device to use one of the following methods 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
- Source TCP/UDP port number
- Destination TCP/UDP port number
- Source and destination TCP/UDP port number

Non-IP and Layer 3 port channels both follow the configured load-balancing method, using the source, destination, or source and destination parameters. For example, when you configure load balancing to use the source IP address, all non-IP traffic uses the source MAC address to load balance the traffic while the Layer 3 traffic load balances the traffic using the source IP address. Similarly, when you configure the destination MAC address as the load-balancing method, all Layer 3 traffic uses the destination IP address while the non-IP traffic load balances using the destination MAC address.

You can configure load balancing either by the entire system or by specific modules, regardless of the VDC.

If the ingress traffic is Multiprotocol Label Switching (MPLS) traffic, the software looks under the labels for the IP address on the packet.

The load-balancing algorithms that use port channels do not apply to multicast traffic. Regardless of the load-balancing algorithm you have configured, multicast traffic uses the following methods for load balancing with port channels:

- Multicast traffic with Layer 4 information—Source IP address, source port, destination IP address, destination port

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- Multicast traffic without Layer 4 information—Source IP address, destination IP address
- Non-IP multicast traffic—Source MAC address, destination MAC address

LACP

LACP allows you to configure up to 16 interfaces into a port channel. A maximum of eight interfaces can be active, and a maximum of eight interfaces can be laced in a standby state.

This section includes the following topics:

- [LACP Overview, page 5-7](#)
- [Port-Channel Modes, page 5-8](#)
- [LACP ID Parameters, page 5-9](#)
- [LACP Marker Responders, page 5-9](#)
- [LACP-Enabled and Static Port Channels Differences, page 5-10](#)

LACP Overview



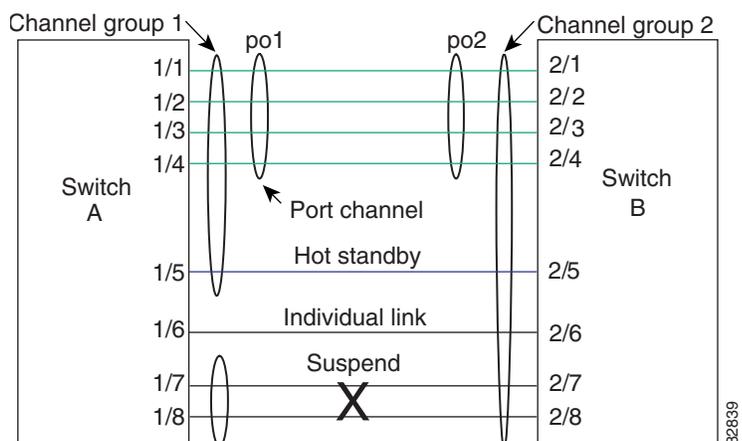
Note

You must enable LACP before you can use LACP. By default, LACP is disabled.

See the “[Enabling LACP](#)” section on page 5-20 for information on enabling LACP.

[Figure 5-2](#) shows how individual links can be combined into LACP port channels and channel groups as well as function as individual links.

Figure 5-2 Individual Links Combined into a Port Channel



With LACP, you can bundle up to 16 interfaces in a channel group. If the channel group has more than eight interfaces, the remaining interfaces are in hot standby for the port channel associated with this channel group.



Note

When you delete the port channel, the software automatically deletes the associated channel group. All member interfaces revert to their original configuration.

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You cannot disable LACP while any LACP configurations are present.

Port-Channel Modes

Individual interfaces in port channels are configured with channel modes. When you run static port channels with no aggregation 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 when you are adding the links to the channel group.



Note

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

Table 5-1 describes the channel modes.

Table 5-1 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 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. The default port-channel mode is on .

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 if 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 and cannot form a port channel with another port that is in **active** or **passive** mode.

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LACP ID Parameters

This section describes the LACP parameters in the following topics:

- [LACP System Priority, page 5-9](#)
- [LACP Port Priority, page 5-9](#)
- [LACP Administrative Key, page 5-9](#)

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.

The system ID is different for each VDC.



Note

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

LACP Port Priority

Each port that is 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 and the duplex capability
- Configuration restrictions that you establish

LACP Marker Responders

You can dynamically redistribute the data traffic by using port channels. This redistribution may result from a removed or added link or a change in the load-balancing scheme. Traffic redistribution that occurs in the middle of a traffic flow can cause misordered frames.

LACP uses the Marker Protocol to ensure that frames are not duplicated or reordered due to this redistribution. The Marker Protocol detects when all the frames of a given traffic flow are successfully received at the remote end. LACP sends Marker PDUs on each of the port-channel links. The remote system responds to the Marker PDU once it receives all the frames received on this link prior to the Marker PDU. The remote system then sends a Marker Responder. Once the Marker Responders are

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received by the local system on all member links of the port channel, the local system can redistribute the frames in the traffic flow with no chance of misordering. The software supports only Marker Responders.

LACP-Enabled and Static Port Channels Differences

Table 5-2 summarizes the major differences between port channels with LACP enabled and static port channels.

Table 5-2 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: <ul style="list-style-type: none"> • Active • Passive 	Can only be On
Maximum number of links in channel	16	8

Virtualization Support

You must configure the member ports and other port channel-related configuration from the virtual device context (VDC) that contains the port channel and member ports. You can configure up to 192 port channels across all VDCs. You can use the numbers from 1 to 4096 in each VDC to number the port channels and you can reuse these port channel numbers in different VDCs. For example, you can configure port channel 100 in VDC1 and also configure a different port channel 100 in VDC2.

However, the LACP system ID is different for each VDC. For more information on LACP, see the “[LACP Overview](#)” section on page 5-7.



Note

See the *Cisco DCNM Virtual Device Context Configuration Guide* for complete information on VDCs and assigning resources.

All ports and VLANs in one port channel must be in the same VDC. When you are using LACP, all possible eight active ports and all the possible eight standby ports must be in the same VDC. Because port channels are created globally, you need to be aware of which member ports are assigned to each VDC before you configure the member port in a port channel. The port channels can originate in one VDC (with all ports in that channel in the same VDC) and partner with a port channel in another VDC (again, all ports in that channel must be in that VDC).



Note

The port-channeling load-balancing mode works either for a single module or across the entire device. You must configure load balancing using port channels in the default VDC. You cannot configure load balancing using port channels within specified VDCs. See the “[Load Balancing Using Port Channels](#)” section on page 5-6 for more information on load balancing.

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High Availability

Port channels provide high availability by load balancing traffic across multiple ports. If a physical port fails, the port channel is still operational if there is an active member in the port channel. You can bundle ports from different modules and create a port channel that remains operational even if a module fails if the settings are common across the module.

Port channels support stateful and stateless restarts. A stateful restart occurs on a supervisor switchover. After the switchover, the software applies the runtime configuration after the switchover.



Note

See the *Cisco NX-OS High Availability and Redundancy Configuration Guide* for complete information on high-availability features.

Licensing Requirements for Port Channeling

The following table shows the licensing requirements for this feature:

Product	License Requirement
DCNM	Port channeling requires no license. Any feature not included in a license package is bundled with the Cisco DCNM and is provided at no charge to you. For a complete explanation of the DCNM licensing scheme, see the <i>Cisco DCNM Licensing Guide</i> .
NX-OS	Port channeling requires no license. Any feature not included in a license package is bundled with the Cisco NX-OS system images and is provided at no extra charge to you. For a complete explanation of the NX-OS licensing scheme, see the <i>Cisco NX-OS Licensing Guide</i> .

However, using VDCs requires an Advanced Services license.

Prerequisites for Port Channeling

Port channeling has the following prerequisites:

- You must be logged onto the device.
- Before using DCNM to configure port channels, you must set the logging level by entering the NX-OS global command **logging-level port-channel 6** in the command line of your device. See the *Cisco NX-OS System Management Configuration Guide* for information on logging levels.
- All ports for a single port channel must be either Layer 2 or Layer 3 ports.
- All ports for a single port channel must meet the compatibility requirements. See the “[Compatibility Requirements](#)” section on page 5-4 for more information on the compatibility requirements.
- You must configure load balancing from the default VDC.

Guidelines and Limitations

Port channeling has the following guidelines and restrictions:

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- You can configure up to 192 port channels across all VDCs,
- You must enable LACP before you can use that feature.
- You can configure multiple port channels on a device.
- All Ethernet ports on all modules, including those ports on a redundant supervisor engine, support port channels (with a maximum of eight active ports) with no requirement that the ports be physically contiguous or on the same module.
- Do not put shared and dedicated ports into the same port channel. (See [Chapter 2, “Configuring Basic Interface Parameters”](#) for information on shared and dedicated ports.)
- For Layer 2 port channels, ports with different STP port path costs can form a port channel if they are compatibly configured with each other.
- In STP, the port-channel bundle is considered as a single port. The port cost is the aggregation of all the configured port costs that are assigned to that channel.
- After you configure a port channel, the configuration that you apply to the port-channel interface affects the port-channel member ports. The configuration that you apply to the member ports affects only the member port where you apply the configuration.
- LACP does not support half-duplex mode. Half-duplex ports in an LACP port channels are put in the suspended state.
- You must remove the port-security information from a port before you can add that port to a port channel. Similarly, you cannot apply the port-security configuration to a port that is a member of a channel group.
- Do not configure ports that belong to a port channel group as private VLAN ports. While a port is part of the private VLAN configuration, the port channel configuration becomes inactive.
- Channel member ports cannot be a source or destination SPAN port.

Configuring Port Channels

This section includes the following topics:

- [Creating a Port Channel, page 5-13](#)
- [Deleting a Port Channel, page 5-13](#)
- [Adding a Layer 2 Port to a Port Channel, page 5-14](#)
- [Adding a Layer 3 Port to a Port Channel, page 5-16](#)
- [Deleting a Port from a Port Channel, page 5-17](#)
- [Shutting Down and Restarting the Port-Channel Interface, page 5-17](#)
- [Configuring a Port-Channel Description, page 5-18](#)
- [Configuring the Speed and Duplex Settings for a Port-Channel Interface, page 5-18](#)
- [Configuring Load Balancing Using Port Channels, page 5-19](#)
- [Enabling LACP, page 5-20](#)
- [Configuring LACP Port-Channel Port Modes, page 5-20](#)
- [Configuring the LACP System Priority, page 5-21](#)
- [Configuring the LACP Port Priority, page 5-21](#)

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Creating a Port Channel

You can create a port channel before you create a channel group. The software automatically creates the associated channel group.

BEFORE YOU BEGIN

Enable LACP if you want LACP-based port channels.

Ensure that you are in the correct device (or choose **Virtual Devices** from the Feature Selector pane).

You use the Port Channel panel to create a port channel. You create switched, or Layer 2, port channels separately from routed, or Layer 3, port channels.

DETAILED STEPS

To create a port channel, follow these steps:

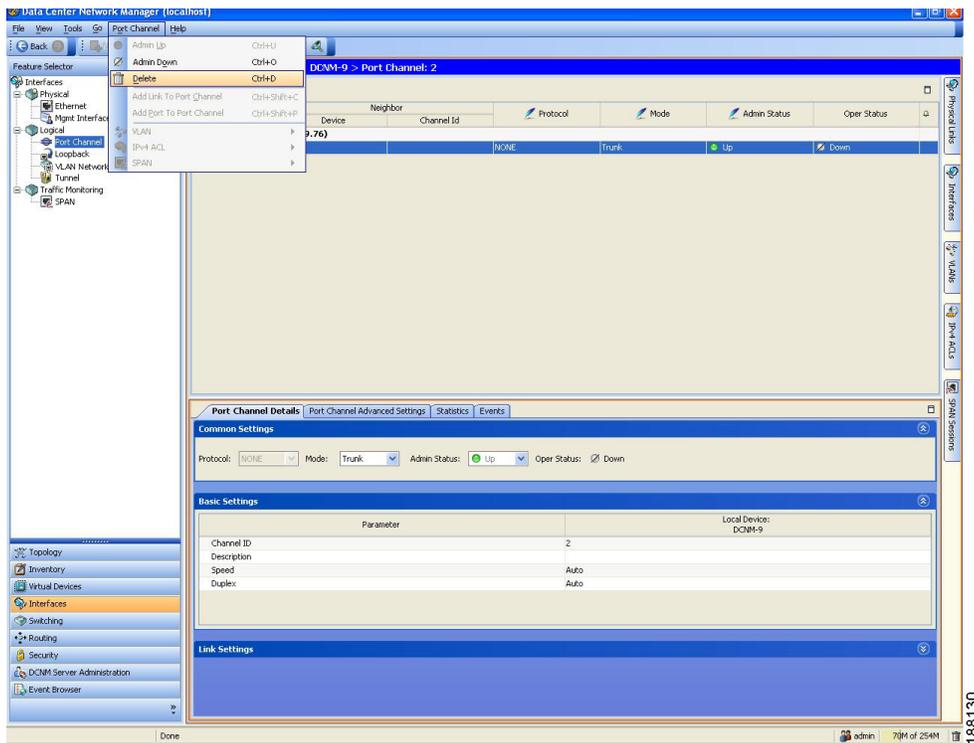
-
- Step 1** From the Feature Selector pane, choose **Interfaces > Logical > Port Channel** to open the Port Channel pane.
 - Step 2** From the Contents pane, in the Summary pane, click the device in which you want to create a port channel.
The software highlights that device.
 - Step 3** From the menu bar, choose **New > Switched Port Channel** to create a Layer 2 port channel.
The software adds a line with the newly created port channel.
 - Step 4** From the menu bar, choose **New > Routed Port Channel** to create a Layer 3 port channel.
The software adds a line with the newly created port channel.
 - Step 5** Enter the numerical value for the Channel ID.
 - Step 6** From the menu bar, choose **File > Deploy** to apply your changes to the device.
-

Deleting a Port Channel

You use the Port Channel pane to delete a port channel (see [Figure 5-3](#)).

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Figure 5-3 Configuring a Port Channel



DETAILED STEPS

To delete a port channel, follow these steps:

- Step 1** From the Feature Selector pane, choose **Interfaces > Logical > Port Channel** to open the Port Channel pane.
- Step 2** From the Contents pane, in the Summary pane, double-click the device in which you want to delete the port channel.
The software highlights that device.
- Step 3** Click the port channel that you want to delete.
The software highlights that port channel
- Step 4** From the menu bar, choose **Port Channel > Delete**.
- Step 5** From the menu bar, choose **File > Deploy** to apply your changes to the device.

Adding a Layer 2 Port to a Port Channel

You can add a Layer 2 port to a new channel group or to a channel group that already contains Layer 2 ports. The software creates the port channel associated with this channel group if the port channel does not already exist.

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BEFORE YOU BEGIN

Before you begin, ensure the following:

- Enable LACP if you want LACP-based port channels.
- All Layer 2 member ports must run in full-duplex mode and at the same speed.

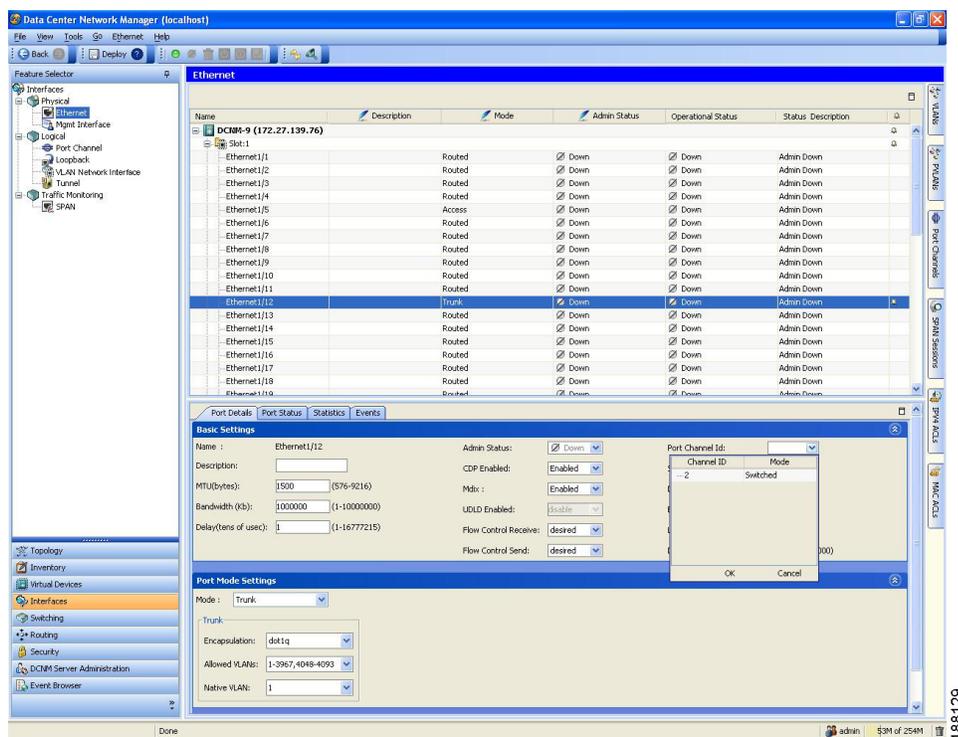


Note

If you cannot add a particular interface to a particular port channel, the software returns an error message that specifies the compatibility problem.

You use the Ethernet pane to add Layer 2 ports to switched port channels (see [Figure 5-4](#)).

Figure 5-4 Adding Ports



DETAILED STEPS

To add a Layer 2 interface to a switched port channel, follow these steps:

- Step 1** From the Feature Selector pane, choose **Interfaces > Physical > Ethernet** to open the Ethernet pane.
- Step 2** From the Contents pane, in the Summary pane, double-click the device to display the interfaces.
- Step 3** Click the slot to display the list of interfaces.
- Step 4** Click the interface.
The system highlights the interface in the Summary pane, and tabs appear in the Details pane.
- Step 5** In the Details pane, click the **Port Details** tab.
- Step 6** Click the **Basic Settings** section.

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- Step 7** From the Port Channel Id drop-down list, choose the switched port channel to which you want to add the Layer 2 port.
 - Step 8** Click **OK**.
 - Step 9** From the menu bar, choose **File > Deploy** to apply your changes to the device.
-

Adding a Layer 3 Port to a Port Channel

You can add a Layer 3 port to a new channel group or to a channel group that is already configured with Layer 3 ports. The software creates the port channel associated with this channel group if the port channel does not already exist.

If the Layer 3 port that you are adding has a configured IP address, the system removes that IP address before adding the port to the port channel. After you create a Layer 3 port channel, you can assign an IP address to the port-channel interface. You can also add subinterfaces to an existing Layer 3 port channel.

BEFORE YOU BEGIN

Before you begin, ensure the following:

- Enable LACP if you want LACP-based port channels.
- Remove any IP addresses configured on the Layer 3 interface.

You use the Ethernet pane to add a Layer 3 port to a routed port channel (see [Figure 5-4](#)).

DETAILED STEPS

To add a routed port to a routed port channel, follow these steps:

-
- Step 1** From the Feature Selector pane, choose **Interfaces > Physical > Ethernet** to open the Ethernet pane.
 - Step 2** From the Contents pane, in the Summary pane, double-click the device to display the interfaces.
 - Step 3** Click the slot to display the list of interfaces.
 - Step 4** Click the interface.
The system highlights the interface in the Summary pane, and tabs appear in the Details pane.
 - Step 5** In the Details pane, click the **Port Details** tab.
 - Step 6** Click the **Port Mode Settings** section.
 - Step 7** Delete the IP address information.
 - Step 8** Click the **Basic Settings** section.
 - Step 9** From the Port Channel Id drop-down list, choose the routed port channel to which you want to add the routed port.
 - Step 10** Click **OK**.
 - Step 11** From the menu bar, choose **File > Deploy** to apply your changes to the device.
-

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(See Chapter 4, “Configuring Layer 3 Interfaces” for information on assigning IP addresses and adding subinterfaces.)

Deleting a Port from a Port Channel

You use the Port Channel pane to delete a port from a port channel (see Figure 5-3).

DETAILED STEPS

To delete a port from a port channel, follow these steps:

-
- Step 1** From the Feature Selector pane, choose **Interfaces > Logical > Port Channel** to open the Port Channel pane.
 - Step 2** From the Contents pane, in the Summary pane, double-click the device to display the port channels.
 - Step 3** Click the port channel from which you want to delete a port.
The system highlights the port channel in the Summary pane, and tabs appear in the Details pane.
 - Step 4** In the Details pane, click the **Port Channel Details** tab.
 - Step 5** Click the **Link Settings** section.
 - Step 6** Click the port that you want to delete.
 - Step 7** From the menu bar, choose **Port Channel > Delete** to delete the port from the port channel.
 - Step 8** From the menu bar, choose **File > Deploy** to apply your changes to the device.
-

Shutting Down and Restarting the Port-Channel Interface

You can shut down and restart the port-channel interface. When you shut down a port-channel interface, no traffic passes and the interface is administratively down.

You use the Port Channel pane to configure the port-channel interface as administratively up or down (see Figure 5-3).

DETAILED STEPS

To set a port-channel interface to be administratively up or down, follow these steps:

-
- Step 1** From the Feature Selector pane, choose **Interfaces > Logical > Port Channel** to open the Port Channel pane.
 - Step 2** From the Contents pane, in the Summary pane, double-click the device to display the port channels.
 - Step 3** Click the port channel that you want to work with.
The system highlights the port channel in the Summary pane, and tabs appear in the Details pane.
 - Step 4** In the Details pane, click the **Port Channel Details** tab.

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- Step 5** Click the **Common Settings** section.
 - Step 6** From the Admin Status drop-down list, choose Up or Down.
The default setting is Up.
 - Step 7** From the menu bar, choose **File > Deploy** to apply your changes to the device.
-

Configuring a Port-Channel Description

You can configure a description for a port channel.

You use the Port Channel pane to add or modify the description of the port-channel interface (see [Figure 5-3](#)).

DETAILED STEPS

To configure the description for a port-channel interface, follow these steps:

- Step 1** From the Feature Selector pane, choose **Interfaces > Logical > Port Channel** to open the Port Channel pane.
 - Step 2** From the Contents pane, in the Summary pane, double-click the device to display the port channels.
 - Step 3** Click the port channel that you want to work with.
The system highlights the port channel in the Summary pane, and tabs appear in the Details pane.
 - Step 4** In the Details pane, click the **Port Channel Details** tab.
 - Step 5** Click the **Basic Settings** section.
 - Step 6** In the Local Device:switch area, double-click the Description row to add or modify the description.
The default is blank.
 - Step 7** From the menu bar, choose **File > Deploy** to apply your changes to the device.
-

Configuring the Speed and Duplex Settings for a Port-Channel Interface

You can configure the speed and duplex settings for a port-channel interface.

You use the Port Channel pane to configure the speed and duplex settings for the port-channel interface (see [Figure 5-3](#)).

DETAILED STEPS

To configure the speed and duplex settings for a port-channel interface, follow these steps:

- Step 1** From the Feature Selector pane, choose **Interfaces > Logical > Port Channel** to open the Port Channel pane.

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- Step 2** From the Contents pane, in the Summary pane, double-click the device to display the port channels.
 - Step 3** Click the port channel that you want to work with.
The system highlights the port channel in the Summary pane, and tabs appear in the Details pane.
 - Step 4** In the Details pane, click the **Port Channel Details** tab.
 - Step 5** Click the **Basic Settings** section.
 - Step 6** In the Local Device:switch area, double-click the Speed setting to set the speed.
 - Step 7** Choose the speed that you want from the drop-down list.
 - Step 8** In the Local Device:switch area, double-click the Duplex setting to set the duplex setting.
 - Step 9** Choose the duplex setting that you want from the drop-down list.
 - Step 10** From the menu bar, choose **File > Deploy** to apply your changes to the device.
-

Configuring Load Balancing Using Port Channels

You can configure the load-balancing algorithm for port channels that applies to the entire device or to only one module. Module-based load balancing takes precedence over device-based load balancing.

You use the Port Channel pane to configure load balancing using port channeling.

DETAILED STEPS

To configure load balancing using port channels, follow these steps:

- Step 1** From the Feature Selector pane, choose **Interfaces > Logical > Port Channel** to open the Port Channel pane.
The system displays the devices in the Contents pane, and tabs appear in the Details pane.
 - Step 2** From the Contents pane, in the Summary pane, click the device that you want.
Tabs appear in the Details pane.
 - Step 3** In the Details pane, click the **Configuration** tab.
 - Step 4** From the Load Balancing Algorithm drop-down list, choose the load-balancing method that you want.
The default for Layer 2 port channels is Source Destination MAC, and the default for Layer 3 port channels is Source Destination IP.
 - Step 5** (Optional) In the Network Card Loadbalance Settings area, click the row with the other module in the chassis that you want to configure for load balancing.
 - Step 6** (Optional) In the Load Balancing Algorithm field, choose the load-balancing method that you want for the other module.
Repeat Steps 5 and 6 to configure the load-balancing method for any other modules in the chassis.
 - Step 7** From the menu bar, choose **File > Deploy** to apply your changes to the device.
-

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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 group the links into a port channel. The port channel is then added to the spanning tree as a single bridge port.

You enable the LACP feature using the Port Channel pane.

DETAILED STEPS

To enable LACP, follow these steps:

-
- Step 1** From the Feature Selector pane, choose **Interfaces > Logical > Port Channel** to open the Port Channel pane.
 - Step 2** From the Contents pane, in the Summary pane, click the device.
 - Step 3** From the menu bar, choose **Port Channel > Enable LACP Service**.
The default is disabled.
 - Step 4** (Optional) To disable LACP, from the menu bar, choose **Port Channel > Disable LACP Service**.
 - Step 5** From the menu bar, choose **File > Deploy** to apply your changes to the device.
-

Configuring LACP Port-Channel Port Modes

After you enable LACP, 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 aggregation protocol, all interfaces on both sides of the link remain in the **on** channel mode.

You configure the LACP channel mode using the Port Channel pane (see [Figure 5-3](#)).

DETAILED STEPS

To configure the LACP channel mode, follow these steps:

-
- Step 1** From the Feature Selector pane, choose **Interfaces > Logical > Port Channel** to open the Port Channel pane.
 - Step 2** From the Contents pane, in the Summary pane, double-click the device to display the port channels.
The system highlights the device in the Summary pane, and tabs appear in the Details pane.
 - Step 3** Click the port channel.
The system highlights the port channel in the Summary pane, and tabs appear in the Details pane.
 - Step 4** Click the **Port Channel Details** tab.
 - Step 5** Click the **Link Settings** section.
The system displays the individual links in the port channel.

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- Step 6** Click the link that you want to configure.
 - Step 7** In the Ports (switch) area, click the Mode field and choose **Active** or **Passive** from the drop-down list.
 - Step 8** From the menu bar, choose **File > Deploy** to apply your changes to the device.
-

Configuring the LACP System Priority

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

BEFORE YOU BEGIN

Enable LACP.

You configure the LACP system priority using the Port Channel pane.

DETAILED STEPS

To configure the LACP system priority, follow these steps:

- Step 1** From the Feature Selector pane, choose **Interfaces > Logical > Port Channel** to open the Port Channel pane.
 - Step 2** From the Contents pane, in the Summary pane, click the device.
 - Step 3** In the Details pane, click the **Configuration** tab.
 - Step 4** In the LACP System Priority field, enter the value that you want for the system ID.
The default value is 32768.
 - Step 5** From the menu bar, choose **File > Deploy** to apply your changes to the device.
-

Configuring the LACP Port Priority

When you enable LACP, you can configure each link in the LACP port channel for the port priority.

BEFORE YOU BEGIN

Enable LACP.

You configure the LACP port priority using the Port Channel pane (see [Figure 5-3](#)).

DETAILED STEPS

To configure the LACP port priority, follow these steps:

- Step 1** From the Feature Selector pane, choose **Interfaces > Logical > Port Channel** to open the Port Channel pane.
- Step 2** From the Contents pane, in the Summary pane, double-click the device to display the port channels.

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The system highlights the device in the Summary pane, and tabs appear in the Details pane.

Step 3 Click the port channel.

The system highlights the port channel in the Summary pane, and tabs appear in the Details pane.

Step 4 Click the **Port Channel Details** tab.

Step 5 Click the **Link Settings** section.

The system displays the individual links in the port channel.

Step 6 Click the link that you want to configure.

Step 7 In the Ports (switch) area, double-click the Priority field and enter the value that you want for the port priority.

The default value is 32768.

Step 8 From the menu bar, choose **File > Deploy** to apply your changes to the device.

Displaying Statistics

The following window appears in the Statistics tab:

- Port Traffic Statistics—Displays information on load, balancing traffic rates, and utilization.
- Port Error Counters—Displays errors on the port channel.

Field Descriptions for Port Channeling and LACP

These field descriptions are used for configuring port channeling and LACP. This section includes the following topics:

- [Device: Configuration Tab, page 5-22](#)
- [Port Channel: Port Channel Details: Common Settings Section, page 5-23](#)
- [Port Channel: Port Channel Details: Basic Settings Section, page 5-23](#)
- [Port Channel: Port Channel Details: Link Settings Section, page 5-23](#)
- [Port Channel: Port Channel Advanced Settings for Switched Port Channels: VLAN Settings Section, page 5-25](#)
- [Port Channel: Port Channel Advanced Settings for Routed Port Channels: IP Address Section, page 5-25](#)
- [Port Channel: Port Channel Advanced Settings: Advanced Settings Section, page 5-26](#)

Device: Configuration Tab

Table 5-3 *Device: Configuration Tab*

Field	Description
LACP System Priority	System priority for LACP. The default is 32768.

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Table 5-3 Device: Configuration Tab (continued)

Field	Description
Load Balancing Algorithm	Algorithm used to distribute traffic among the interfaces in the port channel. The default for Layer 3 port channels is Source Destination IP, and the default for Layer 2 port channels is Source Destination MAC.
Network Card Loadbalance Settings.	
Module Number	Number of the module.
Module Name	<i>Display only.</i> Name of the module in that slot.
Load Balancing Algorithm	Load-balancing algorithm currently configured for that module.

Port Channel: Port Channel Details: Common Settings Section

Table 5-4 Port Channel: Port Channel Details: Common Settings Section

Field	Description
Protocol	Port-channeling protocol. The default is None.
Mode	Mode of the port channel that you configured. For Switched port channels, the default is taken from the mode of the first channel in the Switched port channel. You can change between access and trunk mode for Switched port channels.
Admin Status	Administrative status for the port channel. The default is Up.
Oper Status	<i>Display only.</i> Status of the interface in the port channel.

Port Channel: Port Channel Details: Basic Settings Section

Table 5-5 Port Channel: Port Channel Details: Basic Settings Section

Field	Description
Channel ID	<i>Display only.</i> Channel number assigned to the port channel.
Description	Name of the port channel. The default is blank.
Speed	Transmission speed of the port channel. The default is auto for autonegotiation.
Duplex	Duplex operation of the port channel. The default is auto for autonegotiation.

Port Channel: Port Channel Details: Link Settings Section

Table 5-6 Port Channel: Port Channel Details: Link Settings Section

Field	Description
Ports (switch)	
Note	This part provides details of the link in the local device.

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Table 5-6 Port Channel: Port Channel Details: Link Settings Section (continued)

Field	Description
Name	<i>Display only.</i> Name of the port in the port-channel interface.
Mode	<p><i>Display only.</i> Port-channel mode of that interface. Valid modes are as follows:</p> <ul style="list-style-type: none"> • Active • Passive • On <p>The default is On when you are not running LACP. When you are running LACP, the default is Active.</p>
Priority	Priority for that interface for LACP. Enter a value between 1 and 65535. The default value is 32768.
Status	<p><i>Display only.</i> The status of the interface in the port channel is one of the following:</p> <ul style="list-style-type: none"> • Down • Bundled • Standalone • Suspended • Hot Standby

Neighbor Devices

Note This part provides details on the physical links on the neighboring device.

Device	<i>Display only.</i> Hostname configured in the neighbor device.
Name	<i>Display only.</i> Name of the port in the neighbor device that is part of the port-channel interface.
Mode	<p><i>Display only.</i> Port-channel mode of that interface. Valid modes are as follows:</p> <ul style="list-style-type: none"> • Active • Passive • On <p>The default is On when you are not running LACP. When you are running LACP, the default is Active.</p>
Priority	<i>Display only.</i> Priority for that interface for LACP. The range is from 1 to 65535. The default value is 32768.

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Table 5-6 Port Channel: Port Channel Details: Link Settings Section (continued)

Field	Description
Status	<p><i>Display only.</i> The status of the interface in the port channel is one of the following:</p> <ul style="list-style-type: none"> • Down • Bundled • Standalone • Suspended • Hot Standby

Port Channel: Port Channel Advanced Settings for Switched Port Channels: VLAN Settings Section

Table 5-7 Port Channel: Port Channel Advanced Settings: VLAN Settings Section

Field	Description
Access	
Access VLAN	Access VLAN for this access port channel. The default access VLAN is the default VLAN or VLAN1.
Trunk	
Encapsulation	Field unavailable. IEEE 802.1Q is the only supported encapsulation method.
Allowed VLANs	<p>VLANs allowed to transmit data on this port channel. The range is from 1 to 4094. The default is 1.</p> <p>Note VLANs 3968 to 4047 and 4094 are allocated for internal device use and do not carry data traffic.</p>
Native VLAN	Native VLAN for this trunk port channel. The default native VLAN is the default VLAN or VLAN1.

Port Channel: Port Channel Advanced Settings for Routed Port Channels: IP Address Section

Table 5-8 Port Channel: Port Channel Advanced Settings: IP Address Settings Section

Field	Description
IPv4 Address Settings	
IP Address	IPv4 address in dotted decimal notation.
Net Mask	Network mask for the IPv4 address in dotted decimal notation.

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Table 5-8 Port Channel: Port Channel Advanced Settings: IP Address Settings Section

Field	Description
Secondary IP Address	Secondary IPv4 address in dotted decimal notation. You can configure multiple secondary addresses for an interface.
Secondary NetMask	Network mask for the secondary IPv4 address, in dotted decimal notation.
Helper IP Address	Helper address used to enable the forwarding of User Datagram Protocol (UDP) broadcasts. You must enable DHCP in the box if you want to use this feature.
IPv6 Address Settings	
Primary/Prefix-length	IPv6 prefix in x:x:x::x/length format.
EUI64	IPv6 address in the extended universal identifier (EUI)-64 format.
Link Local	IPv6 link local address in x:x:x::x format.
Use local only	Link local address that overrides an automatically generated IPv6 address.
IPv6 Addresses	List of IPv6 addresses and whether or not it is in an EUI-64 format. You can configure multiple secondary addresses for an interface.

Port Channel: Port Channel Advanced Settings: Advanced Settings Section

Table 5-9 Port Channel: Port Channel Advanced Settings: Advanced Settings Section

Field	Description
IPv4 ACL	
Incoming Traffic	IPv4 ACL that filters ingress traffic on the port channel.
Outgoing Traffic	IPv4 ACL that filters egress traffic on the port channel.
IPv6 ACL	
Incoming Traffic	IPv6 ACL that filters ingress traffic on the port channel.
Outgoing Traffic	IPv6 ACL that filters egress traffic on the port channel.
SPAN	
Use Interface as SPAN	Source or destination for this interface.
Session ID	<i>Display only.</i> SPAN session ID where the interface is applied.
Type	<i>Display only.</i> Session type.
Direction: Ingress	Ingress packets that are to be monitored.
Direction: Egress	Egress packets that are to be monitored.
Security	
Traffic Storm Control	<i>Display only.</i> Whether traffic storm control is enabled or disabled.
IP Source Guard	<i>Display only.</i> Whether IP Source Guard is enabled or disabled.
Port Security	<i>Display only.</i> Whether port security is enabled or disabled.

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Port Channel Subinterface: Subinterface Details: Basic Settings Section

Table 5-10 Port Channel Subinterface: Subinterface Details: Basic Settings Section

Field	Description
Name	<i>Display only.</i> Name of the port-channel subinterface.
Description	String that describes the port-channel subinterface. The default is blank.
Admin State	Administrative status of the port-channel subinterface. The default is up.
Oper Status	<i>Display only.</i> Status of the subinterface in the port channel.
Bandwidth	Data rate configured in kbps. The default is 1,000,000.
Delay	Throughput on port-channel subinterface in tens of seconds. The default is 1.
VLAN ID	Used to assign VLANs to run on this port-channel subinterface.

Port Channel Subinterface: Subinterface Details: IP Address Settings Section

Table 5-11 Port Channel Subinterface: Subinterface Details: IP Address Settings Section

Field	Description
IPv4 Address Settings	
IP Address	IPv4 Address, in dotted decimal notation.
Net Mask	Network mask for the IPv4 address, in dotted decimal notation.
Secondary IP Address	Secondary IPv4 Address, in dotted decimal notation. You can configure multiple secondary addresses for an interface.
Secondary NetMask	Network mask for the secondary IPv4 address, in dotted decimal notation.
Helper IP Address	Helper address used to enable the forwarding of User Datagram Protocol (UDP) broadcasts. You must enable DHCP in the box if you want to use this feature.
IPv6 Address Settings	
Primary/Prefix-length	IPv6 prefix in x:x::x/length format.
EUI64	IPv6 address is in the extended universal identifier (EUI)-64 format.
Link Local	IPv6 link local address in x:x::x format.
Use local only	Link local address overrides automatically generated IPv6 address.
IPv6 Addresses	List of IPv6 addresses and whether or not in EUI-64 format. You can configure multiple secondary addresses for an interface.

Additional References

For additional information related to implementing port channels, see the following sections:

- [Related Documents, page 5-28](#)
- [MIBs, page 5-28](#)

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Related Documents

Related Topic	Document Title
Configuring Layer 2 interface	Chapter 3, “Configuring Layer 2 Interfaces”
Configuring Layer 3 interfaces	Chapter 4, “Configuring Layer 3 Interfaces”
Shared and dedicated ports	Chapter 2, “Configuring Basic Interface Parameters”
Interfaces	<i>Cisco NX-OS Interfaces Configuration Guide</i>
System management	<i>Cisco NX-OS System Management Configuration Guide</i>
High availability	<i>Cisco NX-OS High Availability and Redundancy Guide</i>
VDCs	<i>Cisco DCNM Virtual Device Context Configuration Guide</i>
Licensing	<i>Cisco DCNM Licensing Guide</i>
Release Notes	<i>Cisco DCNM Release Notes, Release 4.0</i>

Standards

Standards	Title
IEEE 802.3ad	—

MIBs

MIBs	MIBs Link
<ul style="list-style-type: none"> • IEEE8023-LAG-CAPABILITY • CISCO-LAG-MIB 	To locate and download MIBs, go to the following URL: http://www.cisco.com/public/sw-center/netmgmt/cmtk/mibs.shtml