



CHAPTER 5

Configuring Port Channels

This chapter describes how to configure port channels and includes the following topics:

- [Information About Port Channels, page 5-1](#)
- [High Availability, page 5-12](#)
- [Prerequisites for Port Channels, page 5-12](#)
- [Guidelines and Limitations, page 5-12](#)
- [Default Settings, page 5-13](#)
- [Configuring Port Channels, page 5-14](#)
- [Verifying Port Channels, page 5-47](#)
- [Monitoring Port Channels, page 5-49](#)
- [Configuration Examples for Port Channels, page 5-49](#)
- [Additional References, page 5-50](#)
- [Feature History for Port Channels, page 5-51](#)

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

This section includes the following topics:

- [Port Channels, page 5-2](#)
- [Compatibility Checks, page 5-2](#)
- [Load Balancing Using Port Channels, page 5-4](#)
- [LACP, page 5-5](#)
- [vPC Host Mode, page 5-8](#)
- [Subgroup Creation, page 5-9](#)
- [Static Pinning, page 5-9](#)
- [MAC Pinning, page 5-10](#)

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- [Network State Tracking for VPC-HM, 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.

**Note**

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

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 Checks” section on page 5-2](#)). When you run static port channels with no aggregation protocol, the physical links are all in the **on** channel mode.

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 configuration of the first interface. You can also create the port channel first. In this instance, the Cisco Nexus 1000V creates an empty channel group with the same channel number as the port channel and takes the default Layer 2 configuration, as well as the compatibility configuration (see the [“Compatibility Checks” section on page 5-2](#)).

**Note**

The port channel is operationally up when at least one of the member ports is up and is in the channeling state. The port channel is operationally down when all member ports are operationally down.

Compatibility Checks

When you add an interface to a port channel group, the following compatibility checks are made before allowing the interface to participate in the port channel:

- 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

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- SPAN—cannot be a SPAN source or a destination port
- Storm control

To view the full list of compatibility checks performed by the Cisco Nexus 1000V, use the **show port-channel compatibility-parameters**.

You can only add interfaces configured with the channel mode set to **on** to static port channels. You can configure these attributes on an individual member port. If you configure a member port with an incompatible attribute, the Cisco Nexus 1000V suspends that port in the port channel.

Alternatively, you can force ports with incompatible parameters to join the port channel if the following parameters are the same:

- (Link) speed capability
- Speed configuration
- Duplex capability
- Duplex configuration

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)

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

- Description
- CDP
- MDIX
- Rate mode
- Shutdown
- SNMP trap

**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 Cisco Nexus 1000V 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 method uses source MAC addresses.

You can configure 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 and VLAN
- Source IP address and VLAN
- Source and destination IP address and VLAN
- Destination TCP/UDP port number
- Source TCP/UDP port number
- Source and destination TCP/UDP port number
- Destination IP address and TCP/UDP port number
- Source IP address and TCP/UDP port number
- Source and destination IP address and TCP/UDP port number
- Destination IP address, TCP/UDP port number, and VLAN
- Source IP address, TCP/UDP port number, and VLAN
- Source and destination IP address, TCP/UDP port number, and VLAN
- Destination IP address
- Source IP address
- Source and Destination IP address
- VLAN only
- Source Virtual Port ID

When you configure source IP address load balancing, the source MAC address is used to balance the traffic load. When you configure the destination MAC address load balancing method, the traffic load is balanced using the destination MAC address.

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The load balancing methods that use port channels do not apply to multicast traffic. Regardless of the method 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, and destination port
- Multicast traffic without Layer 4 information—Source IP address and destination IP address
- Non-IP multicast traffic—Source MAC address and destination MAC address

To configure port channel load balancing, see the “[Configuring Port Channel Load Balancing](#)” procedure on page 5-40.

LACP

Link Aggregation Control Protocol (LACP) lets you 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 placed in a standby state. [Figure 5-1](#) shows how individual links can be combined into LACP port channels and channel groups as well as function as individual links.



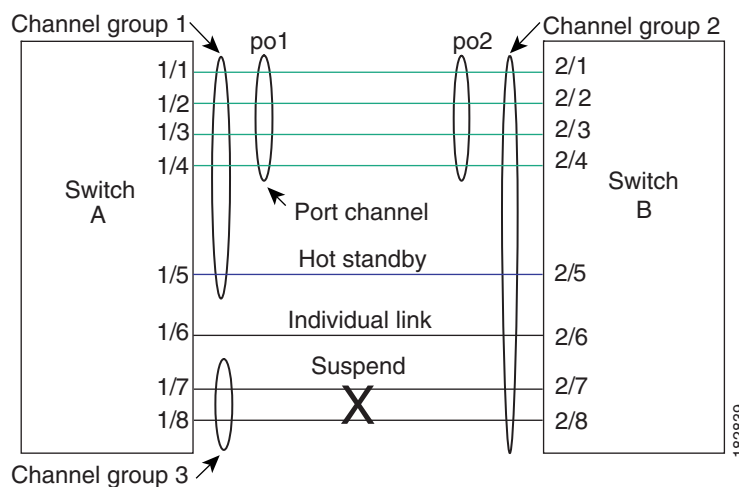
Note

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

This section includes the following topics:

- [VEM Management of LACP, page 5-6](#)
- [Port Channel Modes, page 5-6](#)
- [LACP ID Parameters, page 5-7](#)
- [LACP Marker Responders, page 5-7](#)
- [LACP-Enabled and Static Port Channels Differences, page 5-8](#)

Figure 5-1 Individual Links Combined into a Port Channel



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VEM Management of LACP

You can offload operation of the LACP protocol from the VSM to the VEMs. This prevents a situation where the VSM cannot negotiate LACP with the upstream switch when the VEM is disconnected from the VSM (referred to as headless mode). VEM management of LACP allows it to re-establish port channels after the reboot of a headless VEM.

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**.

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.

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	<p>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 displays an error message.</p> <p>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.</p> <p>The default port channel mode is on.</p>

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 5-7](#)
- [LACP Port Priority, page 5-7](#)
- [LACP Administrative Key, page 5-7](#)

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 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 that is 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 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.

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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

vPC Host Mode

vPC-HM is a way of creating a port channel when connecting to multiple upstream switches that are not clustered. In the Cisco Nexus 1000V, the port channel is divided into subgroups or logical smaller port channels, each representing one or more uplinks to one upstream physical switch.

Links that connect to the same physical switch are bundled in the same subgroup automatically by using information gathered from the Cisco Discovery Protocol packets from the upstream switch. Interfaces can also be manually assigned a specific subgroup. For more information, see the following procedures:

- [Pinning a vEthernet Interface to a Subgroup, page 5-24](#) (configured on the port profile)
- [Configuring Static Pinning for an Interface, page 5-33](#) (configured on the interface)

When vPC-HM is used, each vEthernet interface on the VEM is mapped to one of two subgroups in a round-robin method. All traffic from the vEthernet interface uses the assigned subgroup unless it is unavailable, in which case the vEthernet interface fails over to the remaining subgroup. When the original subgroup becomes available again, traffic shifts back to it. Traffic from each vEthernet interface is then balanced based on the configured hashing algorithm.

When multiple uplinks are attached to the same subgroup, the upstream switch must be configured in a port channel, the links bundled together. The port channel must also be configured with the **channel-group auto mode on** (active and passive modes use LACP).

If the upstream switches do not support port channels, you can use MAC pinning to assign each Ethernet port member to a particular port channel subgroup. For more information, see the [“MAC Pinning” section on page 5-10](#).



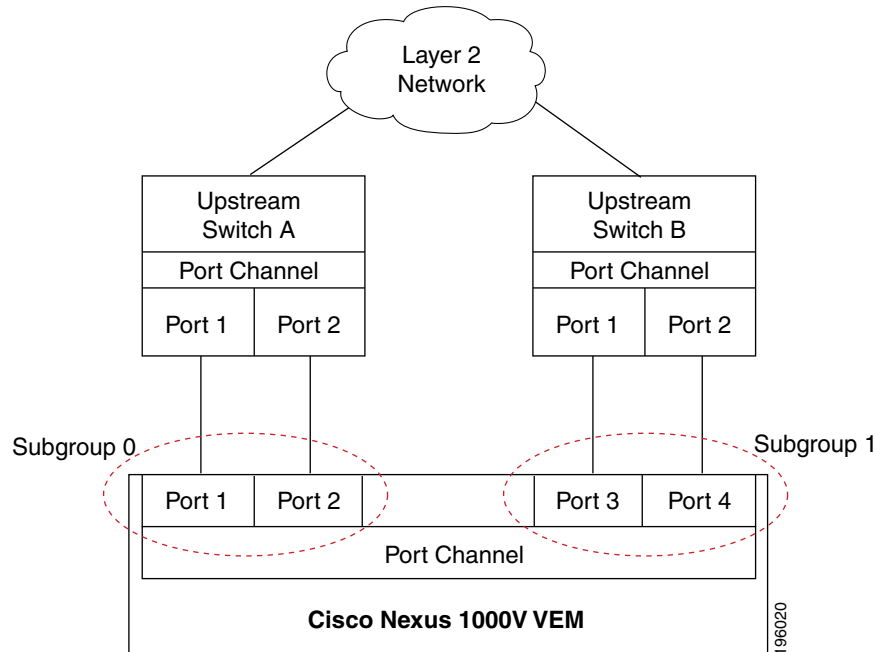
Note

Do not configure vPC-HM on the Cisco Nexus 1000V when the upstream switch ports that connect to the VEMs have vPC configured. In this case, the connection can be interrupted or disabled.

Figure 5-2 shows traffic separation using vPC-HM by assigning member ports 1 and 2 to subgroup ID 0 and member ports 3 and 4 to subgroup ID 1.

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Figure 5-2 Using vPC-HM to Connect a Port Channel to Multiple Upstream Switches



To configure a port profile in vPC-HM, see the [“Connecting to Multiple Upstream Switches” procedure on page 5-17](#).

Subgroup Creation

If Cisco Discovery Protocol (CDP) is enabled on the upstream switches, then subgroups are automatically created using information gathered from the Cisco Discovery Protocol packets. If not, then you must use the [“Manually Configuring Interface Subgroups” procedure on page 5-22](#).

Static Pinning

Static pinning allows you to pin the virtual ports behind a VEM to a particular subgroup within the channel. Instead of allowing round robin dynamic assignment between the subgroups, you can assign (or pin) a static vEthernet interface, control VLAN, or packet VLAN to a specific port channel subgroup. With static pinning, traffic is forwarded only through the member ports in the specified subgroup.

You can use the following procedures to designate the subgroup to communicate with the network.

- [“Pinning a vEthernet Interface to a Subgroup” section on page 5-24](#)
- [“Pinning a Control or Packet VLAN to a Subgroup” section on page 5-27](#)

You can also pin vEthernet interfaces to subgroups in interface configuration mode using the [“Configuring Static Pinning for an Interface” procedure on page 5-33](#).

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MAC Pinning

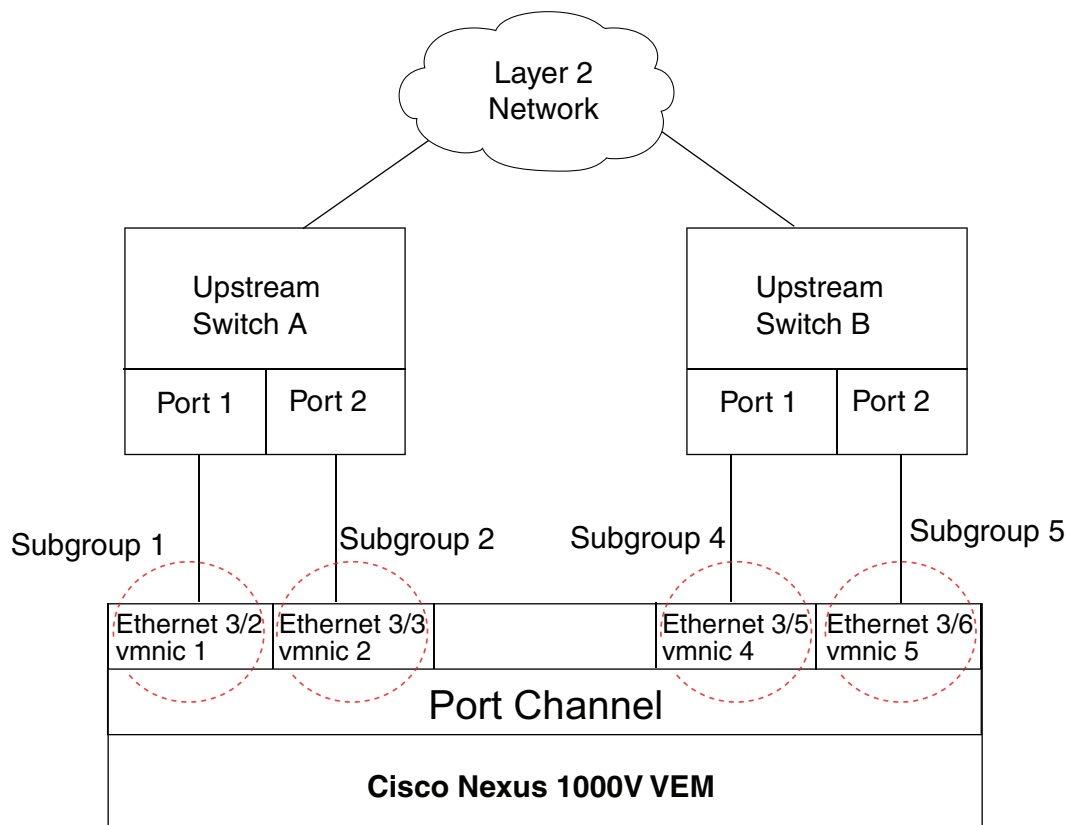
If you are connecting to multiple upstream switches that do not support port channels, then MAC pinning is the preferred configuration. MAC pinning divides the uplinks from your server into standalone links and pins the MAC addresses to those links in a round-robin method. This ensures that the MAC address of a virtual machine is never seen on multiple upstream switch interfaces. Therefore no upstream configuration is required to connect the VEM to upstream switches.

MAC pinning does not rely on any protocol to distinguish upstream switches so the configuration is independent of upstream hardware or design.

In case of a failure, the Cisco Nexus 1000V first sends a gratuitous ARP packet to the upstream switch indicating that the VEM MAC address will now be learned on a different link. It also allows for sub-second failover time.

Figure 5-3 shows each member port that is assigned to a specific port channel subgroup using MAC pinning.

Figure 5-3 Using MAC Pinning to Connect a Port Channel to Multiple Upstream Switches



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MAC Pinning Relative

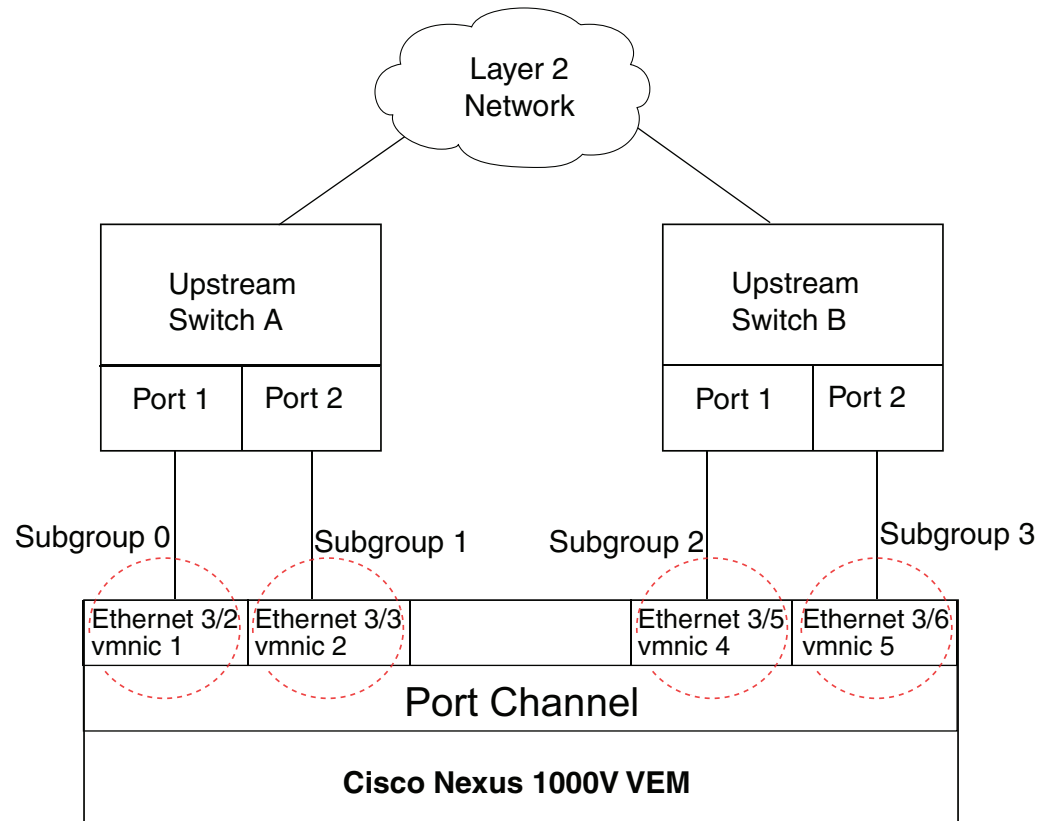
This feature modifies the existing algorithm for MAC pinning where the port-channel uses the port number (vmnic number) as the subgroup ID for an Ethernet member port.

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The new algorithm assigns zero-based logical subgroup IDs to Ethernet member ports. The member port having the lowest port number (vmnic number) is assigned subgroup ID 0.

Figure 5-4 shows each member port that is assigned to a specific port channel subgroup using MAC pinning relative.

Figure 5-4 Using MAC Pinning Relative to Connect a Port Channel to Multiple Upstream Switches



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Network State Tracking for VPC-HM

Network state tracking for VPC-HM identifies link failures where other detection methods fail, and verifies Layer 2 connectivity between vPC-HM channel sub groups. It is not intended to detect network configuration problems.

Network state tracking selects one uplink interface in each sub group for broadcasting packets to a tracking VLAN. The tracking VLAN is usually the lowest forwarding VLAN for trunk ports and the primary VLAN for promiscuous access ports. Packets received back from the network on each sub group are tracked as are the number of consecutively missed broadcasts. If the missed broadcasts for a sub group exceed the threshold, the port channel is considered to be in split mode. When in split mode, the interfaces are marked as inactive, and traffic is pinned to active interfaces.

System messages indicate when a port channel enters or recovers from split mode; and interfaces are marked active or inactive.

For more information, see the [“Configuring Network State Tracking for vPC-HM” procedure on page 5-31](#).

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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.

Port channels support stateful and stateless restarts. A stateful restart occurs on a supervisor switchover. After the switchover, the Cisco Nexus 1000V applies the runtime configuration after the switchover.

Prerequisites for Port Channels

Port channeling has the following prerequisites:

- You are logged into the Cisco Nexus 1000V in EXEC mode.
- All ports for a single port channel must meet the compatibility requirements. See the “[Compatibility Checks](#)” section on page 5-2 for more information about the compatibility requirements.
- You can use virtual vPC-HM to configure a port channel even when the physical ports are connected to two different switches.

Guidelines and Limitations

Port channeling has the following guidelines and restrictions:

- All ports in the port channel must be in the same Cisco Nexus 1000V module; you cannot configure port channels across Cisco Nexus 1000V modules.
- Port channels can be formed with multiple upstream links only when they satisfy the compatibility requirements and under the following conditions:
 - The uplinks from the host are going to the same upstream switch.
 - The uplinks from the host going to multiple upstream switches are configured with vPC-HM.
- You can configure multiple port channels on a device.
- 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.
- 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.
- You can configure ports that belong to a port channel group as PVLAN ports.
- Any configuration changes that you apply to the port channel is applied to every member interface of that port channel.
- Channel member ports cannot be a source or destination SPAN port.
- In order to support LACP when inband/AIPC are also carried over the link, you must configure the following commands on the ports connected to the ESX host:
 - **spanning-tree portfast trunk**
 - **spanning-tree bpdupfilter enable**

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Note If you have a separate dedicated NIC for control traffic, these settings are not required.

- There should be at least two links that connect two switches when inband/AIPC are also carried over the LACP channel.
- If you configure LACP and your upstream switch uses the LACP suspend feature, make sure this feature is disabled. For more information, see the documentation for your upstream switch, such as *Cisco Nexus 7000 Series NX-OS Interfaces Configuration Guide, Release 5.x*
- If you are connecting to an upstream switch or switches that do not support port channels, then MAC pinning is the preferred configuration. MAC pinning divides the uplinks from your server into standalone links and pins the MAC addresses to those links in a round-robin method. The drawback is that you cannot leverage the load sharing performance that LACP provides.
- Once a port profile is created, you cannot change its type (Ethernet or vEthernet).
- The server administrator should not assign more than one uplink on the same VLAN without port channels. It is not supported to assign more than one uplink on the same host to a profile without port channels or port profiles that share one or more VLANs.



Caution

Disruption of connectivity may result if you configure vPC-HM on the Cisco Nexus 1000V when vPC is also configured on the ports of upstream switches that connect to its VEMs.

- You must have already configured the Cisco Nexus 1000V software using the setup routine. For information, see the *Cisco Nexus 1000V Getting Started Guide, Release 4.2(1)SV1(4a)*.
- The Cisco Nexus 1000V must be connected to the vCenter Server.
- You are logged in to the CLI in EXEC mode.
- When you create a port channel, an associated channel group is automatically created.
- If LACP support is required for the port channel, then the LACP feature must be enabled before you can configure it.
- Network State Tracking is only supported with HP Virtual Connect where one physical link from the Flex-10 fabric appears as four Flex-10 NICs (physical NICs) to the VMkernel. For more information, see the [“Network State Tracking for VPC-HM” section on page 5-11](#).

Default Settings

The following table lists the default settings for port channels.

Parameters	Default
Port profile type	vEthernet
Port profile administrative state	all ports disabled
Port channel	Admin up
LACP	Disabled
	Note If upgrading to Release 4.2(1)SV1(4a) from a previous release, LACP is enabled by default.

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Parameters	Default
Load balancing method for Layer 2 interfaces	Source and destination MAC address
Load balancing per module	Disabled
Channel mode	on
LACP offload (Offloading LACP management to VEMs)	Enabled Note If upgrading to Release 4.2(1)SV1(4a) from a previous release, LACP offload is disabled by default.
Network State Tracking:	
Broadcast interval	5 seconds
Split-network mode action	repin
Maximum threshold miss count	5 seconds
State	Disabled

Configuring Port Channels

This section includes the following topics:

- [Creating a Port Profile for a Port Channel, page 5-14](#)
- [Manually Configuring Interface Subgroups, page 5-22](#)
- [Migrating a Channel Group to a Port Profile, page 5-29](#)
- [Migrating Port Profile Types in a Port Profile, page 5-30](#)
- [Configuring Network State Tracking for vPC-HM, page 5-31](#)
- [Configuring Static Pinning for an Interface, page 5-33](#)
- [Removing a Port Channel Group from a Port Profile, page 5-35](#)
- [Shutting Down and Restarting a Port Channel Interface, page 5-36](#)
- [Adding a Description to a Port Channel Interface, page 5-37](#)
- [Configuring the Speed and Duplex Settings for a Port Channel Interface, page 5-38](#)
- [Configuring Port Channel Load Balancing, page 5-40](#)
- [Restoring the Default Load-Balancing Method, page 5-41](#)
- [Configuring LACP for Port Channels, page 5-42](#)



Note

Be aware that the Cisco Nexus 1000V commands may differ from the Cisco IOS commands.

Creating a Port Profile for a Port Channel

You can use the procedures in this section to define a port channel in a port profile and, if needed, to configure and pin interface or VLAN subgroups.

- [Connecting to a Single Upstream Switch, page 5-15](#)

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- [Connecting to Multiple Upstream Switches](#), page 5-17
- [Manually Configuring Interface Subgroups](#), page 5-22
- [Pinning a vEthernet Interface to a Subgroup](#), page 5-24
- [Pinning a Control or Packet VLAN to a Subgroup](#), page 5-27

Connecting to a Single Upstream Switch

You can use this procedure to configure a port channel whose ports are connected to the same upstream switch.

BEFORE YOU BEGIN

Before beginning this procedure, you must know or do the following:

- If the ports are connected to multiple upstream switches, see the [“Connecting to Multiple Upstream Switches”](#) section on page 5-17.
- The channel group number assignment is made automatically when the port profile is assigned to the first interface.

SUMMARY STEPS

1. **config t**
2. **port-profile [type {ethernet | vethernet}] name**
3. **channel-group auto [mode {on | active | passive} [sub-group {cdp | manual}]] [mac-pinning [relative]]**
4. **show port-profile [brief | expand-interface | usage] [name profile-name]**
5. **copy running-config startup-config**

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DETAILED STEPS

	Command	Description
Step 1	<pre>config t</pre> <p>Example: n1000v# config t n1000v(config)#</p>	Enters global configuration mode.
Step 2	<pre>port-profile [type {ethernet vethernet}] name</pre> <p>Example: n1000v(config)# port-profile AccessProf n1000v(config-port-prof)#</p>	<p>Enters port profile configuration mode for the named port profile.</p> <ul style="list-style-type: none"> name—Specifies the port profile name, which can be up to 80 characters and must be unique for each port profile on the Cisco Nexus 1000V. type—(Optional) Specifies the port profile as an Ethernet or vEthernet type. Once configured, this setting cannot be changed. The default is the vEthernet type. <p>For configuring port channels, specify the port profile as an Ethernet type.</p> <p>Defining a port profile as an Ethernet type allows the port profile to be used for physical (Ethernet) ports. In the vCenter Server, the corresponding port group can be selected and assigned to physical ports (PNICs).</p> <p>Note If a port profile is configured as an Ethernet type, then it cannot be used to configure VMware virtual ports.</p>
Step 3	<pre>channel-group auto [mode {on active passive}] [mac-pinning [relative]]</pre> <p>Example: n1000v(config-port-prof)# channel-group auto mode on n1000v(config-port-prof)#</p> <p>Example: n1000v(config-port-prof)# channel-group auto mode on mac-pinning n1000v(config-port-prof)#</p> <p>Example: n1000v(config-port-prof)# channel-group auto mode on mac-pinning relative n1000v(config-port-prof)#</p>	<p>Defines a port channel group in which a unique port channel is created and automatically assigned when the port profile is assigned to the first interface.</p> <p>Each additional interface that belongs to the same module is added to the same port channel. In VMware environments, a different port channel is created for each module.</p> <ul style="list-style-type: none"> mode—Sets the port channel mode to on, active, or passive (active and passive use LACP). mac-pinning—If the upstream switch does not support port channels, this designates that one subgroup per Ethernet member port must be automatically assigned, <ul style="list-style-type: none"> relative - The subgroup numbering begins at zero and continues numbering the subgroups consecutively.

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	Command	Description
Step 4	<pre>show port-profile [brief expand-interface usage] [name profile-name] Example: n1000v(config-port-prof)# show port-profile name AccessProf</pre>	(Optional) Displays the configuration for verification.
Step 5	<pre>copy running-config startup-config Example: n1000v(config-port-prof)# copy running-config startup-config</pre>	(Optional) Saves the running configuration persistently through reboots and restarts by copying it to the startup configuration.

EXAMPLES

This example shows how to configure a port channel that connects to one upstream switch:

```
Example:
n1000v# config t
n1000v(config)# port-profile AccessProf
n1000v(config-port-prof)# channel-group auto mode on
n1000v(config-port-prof)# show port-profile name AccessProf
port-profile AccessProf
  description: allaccess4
  status: disabled
capability l3control: no
  pinning control-vlan: -
  pinning packet-vlan: -
  system vlans: none
  port-group:
  max ports: 32
  inherit:
  config attributes:
    channel-group auto mode on
  evaluated config attributes:
    channel-group auto mode on
  assigned interfaces:
n1000v(config-port-prof)#
```

Connecting to Multiple Upstream Switches

You can use this procedure to create a port channel that connects to multiple upstream switches,.

BEFORE YOU BEGIN

Before beginning this procedure, you must know or do the following:

- You are logged in to the CLI in EXEC mode.
- If the ports are connected to a single upstream switch, see the [“Connecting to a Single Upstream Switch” procedure on page 5-15](#).
- You can use this procedure to configure an uplink port profile to be used by the physical NICs in the VEM in virtual port channel-host mode (vPC-HM) when the ports connect to multiple upstream switches.
- If you are connecting to multiple upstream switches that do not support port channels, then MAC pinning is the preferred configuration. You can configure MAC pinning using this procedure. For more information about the feature, see the [“MAC Pinning” section on page 5-10](#).
- The channel group mode must be set to **on** (active and passive modes use LACP).

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- You need to know whether CDP is configured in the upstream switches.
 - If configured, then CDP packets from the upstream switch are used to automatically create a subgroup for each upstream switch to manage its traffic separately.
 - If not configured, then, after completing this procedure, you must manually configure subgroups to manage the traffic flow on the separate switches. See the “[Manually Configuring Interface Subgroups](#)” procedure on page 5-22.

**Caution**

Connectivity may be disrupted for up to 60 seconds if the CDP timer is set to 60 seconds (the default).

**Caution**

The VMs behind the Cisco Nexus 1000V receive duplicate packets from the network for unknown unicasts, multicast floods, and broadcasts if vPC-HM is not configured when port channels connect to two different upstream switches.

SUMMARY STEPS

1. **config t**
2. **port-profile [type {ethernet | vethernet}] name**
3. **channel-group auto mode on [sub-group {cdp | manual}] [mac-pinning [relative]]**
4. **show port-profile [brief | expand-interface | usage] [name profile-name]**
5. **copy running-config startup-config**

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DETAILED STEPS

	Command	Description
Step 1	<pre>config t</pre> <p>Example: <pre>n1000v# config t n1000v(config)#</pre></p>	Enters global configuration mode.
Step 2	<pre>port-profile [type {ethernet vethernet}] name</pre> <p>Example: <pre>n1000v(config)# port-profile uplinkProf n1000v(config-port-prof)#</pre></p>	<p>Creates an Ethernet type port profile (the default) and enters port profile configuration mode for that port profile.</p> <ul style="list-style-type: none"> name—Specifies the port profile name, which can be up to 80 characters and must be unique for each port profile on the Cisco Nexus 1000V. type—(Optional) Specifies the port profile as an Ethernet or vEthernet type. Once configured, this setting cannot be changed. The default is the vEthernet type. <p>For configuring port channels, specify the port profile as an Ethernet type.</p> <p>Defining a port profile as an Ethernet type allows the port profile to be used for physical (Ethernet) ports. In the vCenter Server, the corresponding port group can be selected and assigned to physical ports (PNICs).</p> <p>Note If a port profile is configured as an Ethernet type, then it cannot be used to configure VMware virtual ports.</p>

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	Command	Description
Step 3	<p>channel-group auto mode on [sub-group {cdp manual}] [mac-pinning [relative]]</p> <p>Example—CDP is configured on the upstream switches: n1000v(config-port-prof)# channel-group auto mode on sub-group cdp n1000v(config-port-prof)#</p> <p>Example—CDP is not configured on the upstream switches: n1000v(config-port-prof)# channel-group auto mode on manual n1000v(config-port-prof)#</p> <p>Example—Upstream switches do not support port channels: n1000v(config-port-prof)# channel-group auto mode on mac-pinning n1000v(config-port-prof)#</p> <p>Example—MAC pinning relative: n1000v(config-port-prof)# channel-group auto mode on mac-pinning relative n1000v(config-port-prof)#</p>	<p>Creates a unique asymmetric port channel (also known as vPC-HM) and automatically assigns it when the port profile is assigned to the first interface.</p> <p>Each additional interface that belongs to the same module is added to the same port channel. In VMware environments, a different port channel is created for each module.</p> <p>The following options are also defined:</p> <ul style="list-style-type: none"> • mode—Sets the port channel mode to on (active and passive use LACP). • sub-group—Identifies this channel group as asymmetric, or connected to more than one switch. <ul style="list-style-type: none"> – cdp—Specifies that CDP information is used to automatically create subgroups for managing the traffic flow. – manual—Specifies that subgroups are configured manually. This option is used if CDP is not configured on the upstream switches. To configure subgroups, see the “Manually Configuring Interface Subgroups” procedure on page 5-22. • mac-pinning—Specifies that Ethernet member ports are assigned to subgroups automatically, one subgroup per member port. This option is used if the upstream switch does not support port channels. <ul style="list-style-type: none"> – relative - The subgroup numbering begins at zero and continues numbering the subgroups consecutively.
Step 4	<p>show port-profile [brief expand-interface usage] [name profile-name]</p> <p>Example: n1000v(config-port-prof)# show port-profile name AccessProf</p>	(Optional) Displays the configuration for verification.
Step 5	<p>copy running-config startup-config</p> <p>Example: n1000v(config-port-prof)# copy running-config startup-config</p>	(Optional) Saves the running configuration persistently through reboots and restarts by copying it to the startup configuration.

EXAMPLES

This example shows how to create a port channel that connects to multiple upstream switches that support CDP:

```
n1000v(config)# port-profile UpLinkProfile2
n1000v(config-port-prof)# channel-group auto mode on sub-group cdp
n1000v(config-port-prof)# show port-profile name UpLinkProfile2
port-profile UpLinkProfile2
  description:
  type: ethernet
  status: disabled
```

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```

capability l3control: no
pinning control-vlan: -
pinning packet-vlan: -
system vlans: none
port-group:
max ports: 32
inherit:
config attributes:
  channel-group auto mode on sub-group cdp
evaluated config attributes:
  channel-group auto mode on sub-group cdp
assigned interfaces:
n1000v(config-port-prof)# copy running-config startup-config

```

This example shows how to create a port channel that connects to multiple upstream switches that do not support CDP:

```

n1000v(config)# port-profile UplinkProfile3
n1000v(config-port-prof)# channel-group auto mode on sub-group manual
n1000v(config-port-prof)# exit
n1000v(config)# interface ethernet3/2-3
n1000v(config-if)# sub-group-id 0
n1000v(config-port-prof)# show port-profile name
n1000v(config-port-prof)# show port-profile name UplinkProfile3
port-profile UplinkProfile3
description:
type: ethernet
status: enabled
capability l3control: no
pinning control-vlan: -
pinning packet-vlan: -
system vlans: none
port-group: UplinkProfile3
max ports: -
inherit:
config attributes:
  channel-group auto mode on sub-group manual
evaluated config attributes:
  channel-group auto mode on sub-group manual
assigned interfaces:
n1000v(config-port-prof)# copy running-config startup-config

```

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This example shows how to create a port channel that connects to multiple upstream switches that do not support port channels:

```
n1000v(config)# port-profile UpLinkProfile1
n1000v(config-port-prof)# channel-group auto mode on mac-pinning
n1000v(config-port-prof)# show port-profile name UpLinkProfile1
port-profile UpLinkProfile1
  description:
  type: ethernet
  status: disabled
  capability l3control: no
  pinning control-vlan: -
  pinning packet-vlan: -
  system vlans: none
  port-group:
  max ports: 32
  inherit:
  config attributes:
    channel-group auto mode on mac-pinning
  evaluated config attributes:
    channel-group auto mode on mac-pinning
  assigned interfaces:
n1000v(config-port-prof)# copy running-config startup-config
```

Manually Configuring Interface Subgroups

You can use this procedure to manually configure port channel subgroups to manage the traffic flow on multiple upstream switches. This is required for a port channel that connects to multiple upstream switches where CDP is not configured.

BEFORE YOU BEGIN

Before beginning this procedure, you must know or do the following:

- You are logged in to the CLI in EXEC mode.
- You have already configured the port profile for the port channel using the [“Connecting to Multiple Upstream Switches” procedure on page 5-17](#).
- You know the interface range and the subgroup IDs (0-31) for traffic to the upstream switches.

SUMMARY STEPS

1. **config t**
2. **interface ethernet** *range*
3. **sub-group-id** *number*
4. Repeat step 2 and 3 for each port connected to an upstream switch where CDP is not configured.
5. **show interface ethernet** *range*
6. **copy running-config startup-config**

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DETAILED STEPS

	Command	Description
Step 1	config t Example: n1000v# config t n1000v(config)#	Enters global configuration mode.
Step 2	interface ethernet range Example: n1000v(config)# interface ethernet3/2-3 n1000v(config-if)#	Enters interface configuration mode for the specified interface range.
Step 3	sub-group id number Example: n1000v(config-if)# sub-group-id 0 n1000v(config-if)#	Manually configures a subgroup to manage traffic for the upstream switch. Allowable subgroup numbers are from 0 to 31.
Step 4	Repeat Step 2 and Step 3 for each port connected to an upstream switch where CDP is not configured.	
Step 5	show interface ethernet range Example: n1000v(config-if)# show interface ethernet 3/2-3	(Optional) Displays the configuration for verification.
Step 6	copy running-config startup-config Example: n1000v(config-if)# copy running-config startup-config	(Optional) Saves the running configuration persistently through reboots and restarts by copying it to the startup configuration.

EXAMPLES

This example shows how to manually configure port channel subgroups for a host in module 3 which has four physical ports. The upstream switches do not support CDP. Ethernet ports 3/2 and 3/3 connect to one upstream switch and the Ethernet ports 3/4 and 3/5 connect to another.

```
n1000v# conf t
n1000v(config)# int eth3/2
n1000v(config-if)# sub-group-id 0
n1000v(config-if)# int eth3/3
n1000v(config-if)# sub-group-id 0
n1000v(config-if)# int eth3/4
n1000v(config-if)# sub-group-id 1
n1000v(config-if)# int eth3/5
n1000v(config-if)# sub-group-id 1
n1000v(config-if)# show running-config interface
. . .
interface Ethernet3/2
  inherit port-profile system-uplink-pvlan
  sub-group-id 0
interface Ethernet3/3
  inherit port-profile system-uplink-pvlan
  sub-group-id 0
interface Ethernet3/4
  inherit port-profile system-uplink-pvlan
  sub-group-id 1
interface Ethernet3/5
  inherit port-profile system-uplink-pvlan
  sub-group-id 1
```

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Pinning a vEthernet Interface to a Subgroup

You can use this procedure to pin a vEthernet interface to a specific port channel subgroup in the port profile configuration.



Note

You can also pin a subgroup to a vEthernet interface in the interface configuration. For information, see the “[Configuring Static Pinning for an Interface](#)” procedure on page 5-33.

BEFORE YOU BEGIN

Before beginning this procedure, you must know or do the following:

- You are logged in to the CLI in EXEC mode.
- You know the subgroup ID (0-31) for the vEthernet interface.

SUMMARY STEPS

1. **config t**
2. **port-profile type vethernet *name***
3. **pinning id *subgroup_id* [**backup** *subgroup_id1...subgroup_id7*]**
4. **show port-profile [**brief** | **expand-interface** | **usage**] [**name** *profile-name*]**
5. **copy running-config startup-config**

DETAILED STEPS

	Command	Description
Step 1	config t Example: n1000v# config t n1000v(config)#	Enters global configuration mode.
Step 2	port-profile type vethernet <i>name</i> Example: n1000v(config)# port-profile type vethernet PortProfile1 n1000v(config-port-prof)#	Enters port profile configuration mode for the named profile.
Step 3	pinning id <i>subgroup_id</i> [backup <i>subgroup_id1...subgroup_id7</i>] Example: n1000v(config-port-prof)# pinning id 3 backup 4	For the named port profile, assigns (or pins) a vEthernet interface to a port channel subgroup (0–31). backup - Optionally specify an ordered list of backup sub-groups for pinning to be used if the primary sub-group is not available.

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	Command	Description
Step 4	<pre>show port-profile [brief expand-interface usage] [name profile-name] Example: n1000v(config-port-prof)# show port-profile PortProfile1</pre>	(Optional) Displays the configuration for verification.
Step 5	<pre>copy running-config startup-config Example: n1000v(config-port-prof)# copy running-config startup-config</pre>	(Optional) Saves the running configuration persistently through reboots and restarts by copying it to the startup configuration.

EXAMPLES

This example shows how to create a vEthernet port profile and pin it to port channel subgroup 3:

```
n1000v# config t
n1000v(config)# port-profile type vethernet PortProfile1
n1000v(config-port-prof)# pinning id 3
n1000v(config-port-prof)# show port-profile name PortProfile1
port-profile PortProfile1
  description:
  type: vethernet
  status: disabled
  capability l3control: no
  pinning control-vlan: -
  pinning packet-vlan: -
  system vlans: none
  port-group:
  max ports: 32
  inherit:
  config attributes:
    pinning id 3
  evaluated config attributes:
    pinning id 3
  assigned interfaces:
n1000v(config-port-prof)# copy running-config startup-config
```

This example shows how to create a vEthernet port profile and pin it to port channel subgroup 3 and backup subgroups 4 and 6.:

```
n1000v# config t
n1000v(config)# port-profile type vethernet PortProfile1
n1000v(config-port-prof)# pinning id 3 backup 4 6
n1000v(config-port-prof)# show port-profile name PortProfile1
port-profile PortProfile1
  description:
  type: vethernet
  status: disabled
  capability l3control: no
  pinning control-vlan: -
  pinning packet-vlan: -
  system vlans: none
  port-group:
  max ports: 32
  inherit:
  config attributes:
```

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```

pinning id 3 backup 4 6
evaluated config attributes:
  pinning id 3
assigned interfaces:
n1000v(config-port-prof)# copy running-config startup-config

```

Pinning a vEthernet Interface to a Subgroup

You can use this procedure to pin a vEthernet interface to a specific port channel subgroup in the port profile configuration.



Note

You can also pin a subgroup to a vEthernet interface in the interface configuration. For information, see the [“Configuring Static Pinning for an Interface” procedure on page 5-33](#).

BEFORE YOU BEGIN

Before beginning this procedure, you must know or do the following:

- You are logged in to the CLI in EXEC mode.
- You know the subgroup ID (0-31) for the vEthernet interface.

SUMMARY STEPS

1. **config t**
2. **port-profile type vethernet *name***
3. **pinning id *subgroup_id* [**backup** *subgroup_id1...subgroup_id7*]**
4. **show port-profile [brief | expand-interface | usage] [*name profile-name*]**
5. **copy running-config startup-config**

DETAILED STEPS

	Command	Description
Step 1	config t Example: n1000v# config t n1000v(config)#	Enters global configuration mode.
Step 2	port-profile type vethernet <i>name</i> Example: n1000v(config)# port-profile type vethernet PortProfile1 n1000v(config-port-prof)#	Enters port profile configuration mode for the named profile.
Step 3	pinning id <i>subgroup_id</i> [backup <i>subgroup_id1...subgroup_id7</i>] Example: n1000v(config-port-prof)# pinning id 3 backup 4	For the named port profile, assigns (or pins) a vEthernet interface to a port channel subgroup (0–31). backup - Optionally specify an ordered list of backup sub-groups for pinning to be used if the primary sub-group is not available.

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	Command	Description
Step 4	<pre>show port-profile [brief expand-interface usage] [name profile-name]</pre> <p>Example: n1000v(config-port-prof)# show port-profile PortProfile1</p>	(Optional) Displays the configuration for verification.
Step 5	<pre>copy running-config startup-config</pre> <p>Example: n1000v(config-port-prof)# copy running-config startup-config</p>	(Optional) Saves the running configuration persistently through reboots and restarts by copying it to the startup configuration.

EXAMPLES

This example shows how to create a vEthernet port profile and pin it to port channel subgroup 3:

```
n1000v# config t
n1000v(config)# port-profile type vethernet PortProfile1
n1000v(config-port-prof)# pinning id 3
n1000v(config-port-prof)# show port-profile name PortProfile1
port-profile PortProfile1
  description:
  type: vethernet
  status: disabled
  capability l3control: no
  pinning control-vlan: -
  pinning packet-vlan: -
  system vlans: none
  port-group:
  max ports: 32
  inherit:
  config attributes:
    pinning id 3
  evaluated config attributes:
    pinning id 3
  assigned interfaces:
n1000v(config-port-prof)# copy running-config startup-config
```

Pinning a Control or Packet VLAN to a Subgroup

You can use this procedure to pin a control or packet VLAN to a specific subgroup.

BEFORE YOU BEGIN

Before beginning this procedure, you must know or do the following:

- You are logged in to the CLI in EXEC mode.
- The existing port profile must be a system port profile.
- The port profile must be an Ethernet type.
- If you are pinning a control or packet VLAN, it must already be in the port profile.
 - If you are pinning a control VLAN, the control VLAN must already be one of the system VLANs in the port profile.

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SUMMARY STEPS

1. **config t**
2. **port-profile name**
3. **pinning {control-vlan | packet-vlan} subgroup_id**
4. **show port-profile [brief | expand-interface | usage] [name profile-name]**
5. **copy running-config startup-config**

DETAILED STEPS

	Command	Description
Step 1	config t Example: n1000v# config t n1000v(config)#	Enters global configuration mode.
Step 2	port-profile name Example: n1000v(config)# port-profile SystemProfile1 n1000v(config-port-prof)#	Enters port profile configuration mode for the named port profile.
Step 3	pinning {control-vlan packet-vlan} subgroup_id Example: n1000v(config-port-prof)# pinning control-vlan 3 n1000v(config-port-prof)#	Assigns (or pins) a control VLAN or packet VLAN to a port channel subgroup (0–31).
Step 4	show port-profile [brief expand-interface usage] [name profile-name] Example: n1000v(config-port-prof)# show port-profile SystemProfile1	(Optional) Displays the configuration for verification.
Step 5	copy running-config startup-config Example: n1000v(config-port-prof)# copy running-config startup-config	(Optional) Saves the running configuration persistently through reboots and restarts by copying it to the startup configuration.

EXAMPLES

This example shows how to configure static pinning on a control VLAN:

```
n1000v# config t
n1000v(config)# port-profile SystemProfile1
n1000v(config-port-prof)# pinning control-vlan 3
n1000v(config-port-prof)# show port-profile SystemProfile1
port-profile SystemProfile1
  description:
  type: ethernet
  status: disabled
  capability l3control: no
  pinning control-vlan: 3
  pinning packet-vlan: -
```

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```

system vlans: 1
port-group: SystemProfile1
max ports: -
inherit:
config attributes:
  switchport mode trunk
  switchport trunk allowed vlan 1-5
  no shutdown
evaluated config attributes:
  switchport mode trunk
  switchport trunk allowed vlan 1-5
  no shutdown
assigned interfaces:
n1000v(config-port-prof)# copy running-config startup-config

```

This example shows how to configure static pinning on a packet VLAN:

```

n1000v# config t
n1000v(config)# port-profile SystemProfile1
n1000v(config-port-prof)# pinning packet-vlan 0
n1000v(config-port-prof)# show port-profile name SystemProfile1
port-profile SystemProfile1
description:
type: ethernet
status: disabled
capability l3control: no
pinning control-vlan: -
pinning packet-vlan: 0
system vlans: 1
port-group:
max ports: -
inherit:
config attributes:
  switchport mode access
  switchport access vlan 1
  switchport trunk native vlan 1
  no shutdown
evaluated config attributes:
  switchport mode access
  switchport access vlan 1
  switchport trunk native vlan 1
  no shutdown
assigned interfaces:
n1000v(config-port-prof)# copy running-config startup-config

```

Migrating a Channel Group to a Port Profile

You can migrate a channel group to a port profile.

BEFORE YOU BEGIN

Before beginning this procedure, you must know or do the following:

- You are logged in to the CLI in EXEC mode.
- You are logged into vCenter server on the host server.

Step 1 Place the host in maintenance mode.

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- Step 2** Do one of the following:
- If distributed resource scheduling (DRS) is enabled, make sure to wait until the virtual machines are migrated to other host(s).
 - Otherwise, manually migrate the virtual machines.
- Step 3** When all the virtual machines are successfully migrated, from the Cisco Nexus 1000V CLI, create a new Ethernet type port profile for the uplink ports on this host with the needed parameters including the following:
- One of the following:
 - **channel-group auto mode active/passive**
 - **channel-group auto mode on mac-pinning.**
 - CLI overrides on the existing port channels.
- Step 4** Remove the port channel configuration from the uplink switches.
- Step 5** From vCenter on the host, move the port(s) to the new port profile.
- Step 6** Verify that the port(s) are successfully bundled into the new port channel.



Note The new port channel has a new port channel ID.

- Step 7** When all the port(s) are moved from the old port profile, use the following command from the Cisco Nexus 1000V CLI to delete the port channels with zero members:
- ```
no interface port-channel id
```
- Step 8** Bring the host out of maintenance mode.
- Step 9** Migrate the virtual machines back to this host.
- Step 10** Use the following command from the Cisco Nexus 1000V to save the running configuration persistently through reboots and restarts by copying it to the startup configuration.
- ```
copy running-config startup-config
```
- Step 11** Create the port channel type in the upstream switch. For more information, see [Creating a Port Profile for a Port Channel, page 5-14](#).
-

Migrating Port Profile Types in a Port Profile

To move port profile types in a port profile, you tear down the existing port channel then recreate the port channel. These steps use procedures documented in other sections of this chapter.


BEFORE YOU BEGIN

Before beginning this procedure, you must know or do the following:

- You are logged in to the CLI in EXEC mode.

-
- Step 1** Place the host in maintenance mode.
- Step 2** Do one of the following:

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- If distributed resource scheduling (DRS) is enabled, make sure to wait until the virtual machines are migrated to other host(s).
 - Otherwise, manually migrate the virtual machines.
- Step 3** When all the virtual machines are successfully migrated, from the Cisco Nexus 1000V CLI, create a new Ethernet type port profile for the uplink ports on this host with the needed parameters including the following.
- One of the following:
 - **channel-group auto mode active/passive**
 - **channel-group auto mode on mac-pinning.**
 - CLI overrides on the existing port channels.
- Step 4** Remove the port channel you want to migrate in the upstream switch. For more information, see [Removing a Port Channel Group from a Port Profile, page 5-35](#).
- Step 5** Remove the port channel in the upstream switch.
- Step 6** Manually configure subgroup IDs in the Nexus 1000V Ethernet interface. For more information, see [Manually Configuring Interface Subgroups, page 5-22](#).
-
-  **Note** Follow this step if you want the to use the port channel in manual mode.
-
- Step 7** Change the port channel type in the Nexus 1000v port profile. For more information, see [Migrating a Channel Group to a Port Profile, page 5-29](#).
- Step 8** Change the port channel type in the Nexus 1000v port profile. For more information, see [Connecting to a Single Upstream Switch, page 5-15](#).
- Step 9** Bring the host out of maintenance mode.
- Step 10** Migrate the virtual machines back to this host.
- Step 11** Use the following command from the Cisco Nexus 1000V to save the running configuration persistently through reboots and restarts by copying it to the startup configuration.
- ```
copy running-config startup-config
```
- Step 12** Create the port channel type you want in the upstream switch. For more information, see [Creating a Port Profile for a Port Channel, page 5-14](#).
- 

## Configuring Network State Tracking for vPC-HM

You can use this procedure to configure Network State Tracking to pinpoint link failures on port channels configured for vPC-HM.

### BEFORE YOU BEGIN

Before beginning this procedure, you must know or do the following:

- You are logged in to the CLI in EXEC mode.
- Once enabled, Network State Tracking is used on every VEM that is configured with a vPC-HM port profile.

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- If you specify repinning (the default) and a split network is detected, then Ethernet interfaces are inactivated, and the vEths are redistributed among all interfaces including the reactivated Ethernet interfaces. Restoration to the earlier pinned state is not guaranteed.
- For more information about Network State Tracking, see the “[Network State Tracking for VPC-HM](#)” section on page 5-11.

### SUMMARY STEPS

1. **config t**
2. **track network-state enable**
3. (Optional) **track network-state interval *seconds***
4. (Optional) **track network-state split action [repin | log-only]**
5. (Optional) **track network-state threshold miss-count *count***
6. **show network-state tracking config**
7. **copy running-config startup-config**

### DETAILED STEPS

|        | Command                                                                                                                                                              | Purpose                                                                                                                                                                                                                                              |
|--------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Step 1 | <b>config t</b><br><br><b>Example:</b><br>n1000v# config t<br>n1000v(config)#                                                                                        | Enters global configuration mode.                                                                                                                                                                                                                    |
| Step 2 | <b>track network-state enable</b><br><br><b>Example:</b><br>n1000v(config)# track network-state enable<br>n1000v(config)#                                            | Enables Network State Tracking on all interfaces in vPC-HM port-channels.                                                                                                                                                                            |
| Step 3 | <b>track network-state interval <i>seconds</i></b><br><br><b>Example:</b><br>n1000v(config)# track network-state interval 8<br>n1000v(config)#                       | (Optional) Specifies the interval of time, from 1 to 10 seconds, between which tracking broadcasts are sent; and the interval for tracking packets. The default interval is 5 seconds between broadcasts.                                            |
| Step 4 | <b>track network-state split action [repin   log-only]</b><br><br><b>Example:</b><br>n1000v(config)# track network-state split action repin<br>n1000v(config)#       | (Optional) Specifies the action to be taken if a split network is detected. <ul style="list-style-type: none"> <li>• <b>repin</b>: pins traffic to another uplink. (the default)</li> <li>• <b>no repin</b>: leaves vEths where they are.</li> </ul> |
| Step 5 | <b>track network-state threshold miss-count <i>count</i></b><br><br><b>Example:</b><br>n1000v(config)# track network-state threshold miss-count 7<br>n1000v(config)# | (Optional) Specifies the maximum number of broadcasts that can be missed successively (from 3 to 7) before a split network is declared. The default is 5 missed broadcasts.                                                                          |



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|        | Command                                                                                                                                                                                                                                                               | Purpose                                                                                                               |
|--------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|
| Step 6 | <b>show network-state tracking config</b><br><br><b>Example:</b><br><pre>n1000v(config)# show network-state tracking config Tracking mode      : disabled Tracking Interval  : 8 sec Miss count threshold : 7 pkts Split-network action : repin n1000v(config)#</pre> | (Optional) Displays the Network State Tracking configuration for verification.                                        |
| Step 7 | <b>copy running-config startup-config</b><br><br><b>Example:</b><br><pre>n1000v(config-if)# copy running-config startup-config</pre>                                                                                                                                  | Saves the running configuration persistently through reboots and restarts by copying it to the startup configuration. |

## EXAMPLES

The following example shows how to configure Network State Tracking with an 8 second interval between each sent broadcast, repinning traffic to another uplink if a split network is detected, and a maximum of 7 missed broadcasts before declaring a split network:

```
config t
track network-state enable
track network-state interval 8
track network-state split action repin
track network-state threshold miss-count 7
show network-state tracking config
Tracking mode : enabled
Tracking Interval : 8 sec
Miss count threshold : 7 pkts
Split-network action : repin
n1000v(config)#
```

## Configuring Static Pinning for an Interface

You can use this procedure to configure static pinning on a vEthernet interface.



### Note

You can also pin a subgroup to a vEthernet interface in the port profile configuration. For information, see the [“Pinning a vEthernet Interface to a Subgroup” procedure on page 5-24](#).

## BEFORE YOU BEGIN

Before beginning this procedure, you must know or do the following:

- You are logged in to the CLI in EXEC mode.

## SUMMARY STEPS

- config t**
- interface vethernet** *interface-number*
- pinning id** *subgroup\_id* [**backup** *subgroup\_id1*...*subgroup\_id7*]

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4. **show running-config interface vethernet** *interface-number*
5. **module vem** *module\_number* **execute vemcmd show pinning**
6. **module vem** *module\_number* **execute vemcmd show static pinning config**
7. **copy running-config startup-config**

## DETAILED STEPS

|        | Command                                                                                                                                                                                    | Description                                                                                                                                                                                                                                  |
|--------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Step 1 | <b>config t</b><br><br><b>Example:</b><br>n1000v# config t<br>n1000v(config)#                                                                                                              | Enters global configuration mode.                                                                                                                                                                                                            |
| Step 2 | <b>interface vethernet</b> <i>interface-number</i><br><br><b>Example:</b><br>n1000v(config)# interface vethernet 1<br>n1000v(config-if)#                                                   | Enters interface configuration mode for the specified interface (from 1 to 1048575).                                                                                                                                                         |
| Step 3 | <b>pinning id</b> <i>subgroup_id</i> [ <b>backup</b> <i>subgroup_id1...subgroup_id7</i> ]<br><br><b>Example:</b><br>n1000v(config-if)# pinning id 0 backup 1 2                             | Assigns (or pins) a vEthernet interface to a specific port channel subgroup (from 0 to 31).<br><br><b>backup</b> - Optionally specify an ordered list of backup sub-groups for pinning to be used if the primary sub-group is not available. |
| Step 4 | <b>show running-config interface vethernet</b> <i>interface-number</i><br><br><b>Example:</b><br>n1000v(config-if)# show running-config interface vethernet 1                              | (Optional) Displays the pinning configuration of the specified interface.                                                                                                                                                                    |
| Step 5 | <b>module vem</b> <i>module_number</i> <b>execute vemcmd show pinning</b><br><br><b>Example:</b><br>n1000v(config-if)# module vem 3 execute vemcmd show pinning                            | (Optional) Displays the pinning configuration on the specified VEM.                                                                                                                                                                          |
| Step 6 | <b>module vem</b> <i>module_number</i> <b>execute vemcmd show static pinning config</b><br><br><b>Example:</b><br>n1000v(config-if) module vem 3 execute vemcmd show static pinning config | (Optional) Displays the VSM configured pinning subgroups.                                                                                                                                                                                    |
| Step 7 | <b>copy running-config startup-config</b><br><br><b>Example:</b><br>n1000v(config-if)# copy running-config startup-config                                                                  | (Optional) Saves the running configuration persistently through reboots and restarts by copying it to the startup configuration.                                                                                                             |

## EXAMPLES

The following example shows how to pin subgroup ID 0 to vEthernet interface 1:

```
n1000v(config)# config t
n1000v(config)# interface vethernet 1
n1000v(config-if)# pinning id 0
```

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```
n1000v(config-if)# show running-config interface vethernet 1
version 4.0(4)SV1(2)

interface Vethernet3
 service-policy type qos input policy1
 pinning id 0

n1000v(config-if)# exit
n1000v(config)# exit
n1000v# module vem 3 execute vemcmd show pinning
LTL IfIndex PC_LTL VSM_SGID VEM_SGID Eff_SGID
 48 1b040000 304 0 0 0
```

The following example shows the output after configuring backup subgroups for pinning:

```
n1000v(config-if)# module vem 4 execute vemcmd show static pinning config
LTL IfIndex VSM_SGID Backup_SGID
 48 1c0000a0 0, 1,2
 50 1c000100 0, 1

n1000v(config-if)# copy running-config startup-config
```

## Removing a Port Channel Group from a Port Profile

You can use this procedure to remove a port channel group from a port profile.

### BEFORE YOU BEGIN

Before beginning this procedure, you must know or do the following:

- You are logged in to the CLI in EXEC mode.

### SUMMARY STEPS

- config t**
- port-profile name**
- no channel-group auto**
- show**
- copy running-config startup-config**

### DETAILED STEPS

|        | Command                                                                                                               | Purpose                                                                 |
|--------|-----------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------|
| Step 1 | <b>config t</b><br><br><b>Example:</b><br>n1000v# config t<br>n1000v(config)#                                         | Enters global configuration mode.                                       |
| Step 2 | <b>port-profile name</b><br><br><b>Example:</b><br>n1000v(config)# port-profile testProf<br>n1000v(config-port-prof)# | Specifies the port profile from which the port channel will be removed. |

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|        | Command                                                                                                                                    | Purpose                                                                                                                          |
|--------|--------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|
| Step 3 | <b>no channel-group auto</b><br><br><b>Example:</b><br>n1000v(config-port-prof)# <b>no channel-group auto</b><br>n1000v(config-port-prof)# | Removes the channel group configuration from all member interfaces in the specified port profile.                                |
| Step 4 | <b>show port-profile name</b><br><br><b>Example:</b><br>n1000v(config)# <b>show port-profile testProf</b>                                  | Displays the configuration for verification.                                                                                     |
| Step 5 | <b>copy running-config startup-config</b><br><br><b>Example:</b><br>n1000v(config-if)# <b>copy running-config startup-config</b>           | (Optional) Saves the running configuration persistently through reboots and restarts by copying it to the startup configuration. |

## Shutting Down and Restarting a Port Channel Interface

You can use this procedure to shut down and restart a port channel interface.

### BEFORE YOU BEGIN

Before beginning this procedure, you must know or do the following:

- You are logged in to the CLI in EXEC mode.
- When you shut down a port channel interface, no traffic passes, and the interface is administratively down.

### SUMMARY STEPS

1. **config t**
2. **interface port-channel** *channel-number*
3. **shutdown | no shutdown**
4. **show interface port-channel** *channel-number*
5. **copy running-config startup-config**

### DETAILED STEPS

|        | Command                                                                                                                                            | Purpose                                                                       |
|--------|----------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------|
| Step 1 | <b>config t</b><br><br><b>Example:</b><br>n1000v# <b>config t</b><br>n1000v(config)#                                                               | Enters global configuration mode.                                             |
| Step 2 | <b>interface port-channel</b> <i>channel-number</i><br><br><b>Example:</b><br>n1000v(config)# <b>interface port-channel 2</b><br>n1000v(config-if) | Enters interface configuration mode for the specified port channel interface. |

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|        | Command                                                                                                                                   | Purpose                                                                                                                                                                |
|--------|-------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Step 3 | <b>shutdown</b><br><br><b>Example:</b><br>n1000v(config-if)# shutdown                                                                     | Shuts down the interface. No traffic passes and the interface displays as administratively down. The default is <b>no shutdown</b> .                                   |
|        | <b>no shutdown</b><br><br><b>Example:</b><br>n1000v(config-if)# no shutdown                                                               | Brings the interface back up. The interface displays as administratively up. If there are no operational problems, traffic passes. The default is <b>no shutdown</b> . |
| Step 4 | <b>show interface port-channel</b><br><i>channel-number</i><br><br><b>Example:</b><br>n1000v(config-if)# show interface<br>port-channel 2 | (Optional) Displays interface information for the specified port channel.                                                                                              |
| Step 5 | <b>copy running-config startup-config</b><br><br><b>Example:</b><br>n1000v(config-if)# copy running-config<br>startup-config              | (Optional) Saves the running configuration persistently through reboots and restarts by copying it to the startup configuration.                                       |

## EXAMPLES

The following example shows how to bring up the interface for port channel 2:

```
n1000v# config t
n1000v(config)# interface port-channel 2
n1000v(config-if)# no shutdown
```

## Adding a Description to a Port Channel Interface

You can use this procedure to add a description to a port channel interface.

### BEFORE YOU BEGIN

Before beginning this procedure, you must know or do the following:

- You are logged in to the CLI in EXEC mode.

### SUMMARY STEPS

- config t**
- interface port-channel** *channel-number*
- description** *string*
- show interface port-channel** *channel-number*
- copy running-config startup-config**

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## DETAILED STEPS

|        | Command                                                                                                                                     | Purpose                                                                                                                                                                                                                                                                         |
|--------|---------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Step 1 | <b>config t</b><br><br><b>Example:</b><br>n1000v# config t<br>n1000v(config)#                                                               | Enters global configuration mode.                                                                                                                                                                                                                                               |
| Step 2 | <b>interface port-channel</b> <i>channel-number</i><br><br><b>Example:</b><br>n1000v(config)# interface port-channel 2<br>n1000v(config-if) | Places you into interface configuration mode for the specified port channel interface.<br><br>For <i>channel number</i> , the range is from 1 to 4096. The port channel associated with this channel group is automatically created if the port channel does not already exist. |
| Step 3 | <b>description</b> <i>string</i><br><br><b>Example:</b><br>n1000v(config-if)# description<br>engineering                                    | Adds a description to the port channel interface.<br><br>For <i>string</i> , the description can be up to 80 alphanumeric characters.<br><br><b>Note</b> You do not need to use quotations around descriptions that include spaces.                                             |
| Step 4 | <b>show interface port-channel</b> <i>channel-number</i><br><br><b>Example:</b><br>n1000v(config-if)# show interface<br>port-channel 2      | (Optional) Displays interface information for the specified port channel.                                                                                                                                                                                                       |
| Step 5 | <b>copy running-config startup-config</b><br><br><b>Example:</b><br>n1000v(config-if)# copy running-config<br>startup-config                | (Optional) Saves the running configuration persistently through reboots and restarts by copying it to the startup configuration.                                                                                                                                                |

## EXAMPLES

The following example shows how to add a description to port channel 2:

```
n1000v# config t
n1000v(config)# interface port-channel 2
n1000v(config-if)# description engineering
```

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

You can use this procedure to configure the speed and duplex settings for a port channel interface.

### BEFORE YOU BEGIN

Before beginning this procedure, you must know or do the following:

- You are logged in to the CLI in EXEC mode.

### SUMMARY STEPS

1. **config t**

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2. **interface port-channel** *channel-number*
3. **speed** {10 | 100 | 1000 | auto}
4. **duplex** {auto | full | half}
5. **show interface port-channel** *channel-number*
6. **copy running-config startup-config**

## DETAILED STEPS

|        | Command                                                                                                                                     | Purpose                                                                                                                                             |
|--------|---------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|
| Step 1 | <b>config t</b><br><br><b>Example:</b><br>n1000v# config t<br>n1000v(config)#                                                               | Enters global configuration mode.                                                                                                                   |
| Step 2 | <b>interface port-channel</b> <i>channel-number</i><br><br><b>Example:</b><br>n1000v(config)# interface port-channel 2<br>n1000v(config-if) | Specifies the port channel interface that you want to configure and enters the interface mode.<br><br>Allowable channel numbers are from 1 to 4096. |
| Step 3 | <b>speed</b> {10   100   1000   auto}<br><br><b>Example:</b><br>n1000v(config-if)# speed auto                                               | Sets the speed for the port channel interface. The default is <b>auto</b> for autonegotiation.                                                      |
| Step 4 | <b>duplex</b> {auto   full   half}<br><br><b>Example:</b><br>n1000v(config-if)# speed auto                                                  | Sets the duplex mode for the port channel interface. The default is <b>auto</b> for autonegotiation.                                                |
| Step 5 | <b>show interface port-channel</b><br><i>channel-number</i><br><br><b>Example:</b><br>n1000v(config-if)# show interface<br>port-channel 2   | (Optional) Displays interface information for the specified port channel.                                                                           |
| Step 6 | <b>copy running-config startup-config</b><br><br><b>Example:</b><br>n1000v(config-if)# copy running-config<br>startup-config                | (Optional) Saves the running configuration persistently through reboots and restarts by copying it to the startup configuration.                    |

## EXAMPLES

The following example shows how to set port channel 2 to 100 Mbps:

```
n1000v# config t
n1000v(config)# interface port channel 2
n1000v(config-if)# speed 100
```

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## Configuring Port Channel Load Balancing

You can use this procedure to configure port channel load balancing.

### BEFORE YOU BEGIN

Before beginning this procedure, you must know or do the following:

- You are logged in to the CLI in EXEC mode.
- You can configure port channel load balancing for the entire device or for a single module.
- Module-based load balancing takes precedence over device-based load balancing.
- The default load balancing method is the source MAC address.
- For more information about port channel load balance, see the [“Load Balancing Using Port Channels” section on page 5-4](#).

### SUMMARY STEPS

1. `config t`
2. `port-channel load-balance ethernet {dest-ip-port | dest-ip-port-vlan | destination-ip-vlan | destination-mac | destination-port | source-dest-ip-port | source-dest-ip-port-vlan | source-dest-ip-vlan | source-dest-mac | source-dest-port | source-ip-port | source-ip-port-vlan | source-ip-vlan | source-mac | source-port | source-virtual-port-id | vlan-only} [module module_number]`
3. `show port-channel load-balance`
4. `copy running-config startup-config`

### DETAILED STEPS

|        | Command                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Purpose                                                                                                                                                         |
|--------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Step 1 | <pre>config t</pre> <p><b>Example:</b></p> <pre>n1000v# config t n1000v(config)#</pre>                                                                                                                                                                                                                                                                                                                                                                                                      | Enters global configuration mode.                                                                                                                               |
| Step 2 | <pre>port-channel load-balance ethernet {dest-ip-port   dest-ip-port-vlan   destination-ip-vlan   destination-mac   destination-port   source-dest-ip-port   source-dest-ip-port-vlan   source-dest-ip-vlan   source-dest-mac   source-dest-port   source-ip-port   source-ip-port-vlan   source-ip-vlan   source-mac   source-port   source-virtual-port-id   vlan-only}</pre> <p><b>Example:</b></p> <pre>n1000v(config)# port-channel load-balance ethernet source-destination-mac</pre> | Configures the load balance method for the device or module. The range depends on the device.<br>The default load balancing method uses the source MAC address. |



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|        | Command                                                                                                                | Purpose                                                                                                                          |
|--------|------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|
| Step 3 | <b>show port-channel load-balance</b><br><br><b>Example:</b><br>n1000v(config)# show port-channel load-balance         | (Optional) Displays the port channel load-balancing method.                                                                      |
| Step 4 | <b>copy running-config startup-config</b><br><br><b>Example:</b><br>n1000v(config)# copy running-config startup-config | (Optional) Saves the running configuration persistently through reboots and restarts by copying it to the startup configuration. |

## EXAMPLES

The following example shows how to configure the source IP load-balancing method for port channels on module 5:

```
n1000v# config t
n1000v(config)# port-channel load-balance ethernet source-ip module 5
```

## Restoring the Default Load-Balancing Method

You can use this procedure to restore the default load-balancing method.

### BEFORE YOU BEGIN

Before beginning this procedure, you must know or do the following:

- You are logged in to the CLI in EXEC mode.

### SUMMARY STEPS

- config t**
- no port-channel load-balance ethernet**
- show port-channel load-balance**
- copy running-config startup-config**

### DETAILED STEPS

|        | Command                                                                                                                      | Purpose                                                                      |
|--------|------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------|
| Step 1 | <b>config t</b><br><br><b>Example:</b><br>n1000v# config t<br>n1000v(config)#                                                | Enters global configuration mode.                                            |
| Step 2 | <b>no port-channel load-balance ethernet</b><br><br><b>Example:</b><br>n1000v(config)# no port-channel load-balance ethernet | Restores the default load-balancing method, which is the source MAC address. |

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|        | Command                                                                                                                                 | Purpose                                                                                                                          |
|--------|-----------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|
| Step 3 | <pre>show port-channel load-balance</pre> <p><b>Example:</b><br/> <pre>n1000v(config)# show port-channel load-balance</pre></p>         | (Optional) Displays the port channel load-balancing method.                                                                      |
| Step 4 | <pre>copy running-config startup-config</pre> <p><b>Example:</b><br/> <pre>n1000v(config)# copy running-config startup-config</pre></p> | (Optional) Saves the running configuration persistently through reboots and restarts by copying it to the startup configuration. |

## Configuring LACP for Port Channels

This section includes the following procedures:

- [Configuring an LACP Port Channel, page 5-42](#)
- [Configuring VEM Management of LACP, page 5-46](#)

### Configuring an LACP Port Channel

You can use this procedure to configure the following requirements for LACP:

- Enable LACP support for port channels.
- Configure the individual port channel links so that they are allowed to operate with LACP.
- Configure a system uplink port profile for LACP.

#### BEFORE YOU BEGIN

Before beginning this procedure, you must know or do the following:

- You are logged in to the CLI in EXEC mode.
- The default port channel mode is **on**.
- The LACP feature support must be enabled before you can configure LACP. This procedure has a step for enabling the LACP feature.
- When you configure port channels with no associated aggregation protocol, all interfaces on both sides of the link remain in the **on** channel mode.
- The LACP mode for individual links in an LACP port channel indicates that the link is allowed to operate with LACP.
- You have defined a native VLAN for the trunk port. Although it may not be used for data, the native VLAN is used for LACP negotiation. If you want traffic forwarded on the native VLAN of the trunk port, the native VLAN must be in the allowed VLAN list and system VLAN list.

This procedure includes steps to add VLANs to the allowed VLAN list and system VLAN list for the port channel.

#### SUMMARY STEPS

1. **config t**
2. **feature lacp**

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3. **port-profile** [type {ethernet | vethernet}] name
4. **vmware port-group** [pg\_name]
5. **switchport mode** {access | private-vlan {host | promiscuous} | trunk}
6. **switchport trunk allowed vlan** vlan-id-list
7. **channel-group auto** [mode {on | active | passive}] mac-pinning
8. **system vlan** vlan-id-list
9. **state** enabled
10. **show port-channel summary**
11. **copy running-config startup-config**

## DETAILED STEPS

|        | Command                                                                                                                                                                           | Purpose                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|--------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Step 1 | <pre>config t</pre> <p><b>Example:</b><br/> n1000v# config t<br/> n1000v(config)#</p>                                                                                             | Enters global configuration mode.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Step 2 | <pre>feature lacp</pre> <p><b>Example:</b><br/> n1000v(config)# feature lacp<br/> n1000v(config)#</p>                                                                             | Enables LACP support for port channels.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Step 3 | <pre>port-profile [type {ethernet   vethernet}] name</pre> <p><b>Example:</b><br/> n1000v(config-if)# port-profile type ethernet system-uplink<br/> n1000v(config-port-prof)#</p> | <p>Enters port profile configuration mode for the named port profile.</p> <ul style="list-style-type: none"> <li>• <b>name</b>—Specifies the port profile name, which can be up to 80 characters and must be unique for each port profile on the Cisco Nexus 1000V.</li> <li>• <b>type</b>—(Optional) Specifies the port profile as an Ethernet or vEthernet type. Once configured, this setting cannot be changed. The default is the vEthernet type.</li> </ul> <p>For configuring port channels, specify the port profile as an Ethernet type.</p> <p>Defining a port profile as an Ethernet type allows the port profile to be used for physical (Ethernet) ports. In the vCenter Server, the corresponding port group can be selected and assigned to physical ports (PNICs).</p> <p><b>Note</b> If a port profile is configured as an Ethernet type, then it cannot be used to configure VMware virtual ports.</p> |

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|        | Command                                                                                                                                                                                     | Purpose                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|--------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Step 4 | <pre>vmware port-group [pg_name]</pre> <p><b>Example:</b></p> <pre>n1000v(config-port-prof)# vmware port-group lacp n1000v(config-port-prof)#</pre>                                         | <p>Designates the port profile as a VMware port group.</p> <p>The port profile is mapped to a VMware port group of the same name unless you specify a name here. When you connect the VSM to vCenter Server, the port group is distributed to the virtual switch on the vCenter Server.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Step 5 | <pre>switchport mode {access   private-vlan {host   promiscuous}   trunk}</pre> <p><b>Example:</b></p> <pre>n1000v(config-port-prof)# switchport mode trunk n1000v(config-port-prof)#</pre> | <p>Designates how the interfaces are to be used.</p> <p>Allowable port modes:</p> <ul style="list-style-type: none"> <li>• access</li> <li>• private-vlan <ul style="list-style-type: none"> <li>– host</li> <li>– promiscuous</li> </ul> </li> <li>• trunk</li> </ul> <p>A trunk port transmits untagged packets for the native VLAN and transmits encapsulated, tagged packets for all other VLANs.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Step 6 | <pre>switchport trunk allowed vlan vlan-id-list</pre> <p><b>Example:</b></p> <pre>n1000v(config-port-prof)# switchport trunk allowed vlan 1-100 n1000v(config-port-prof)#</pre>             | <p>Designates the port profile as trunking and defines VLAN access to it as follows:</p> <ul style="list-style-type: none"> <li>• <b>allowed-vlans</b>—Defines VLAN IDs that are allowed on the port.</li> <li>• <b>add</b>—Lists VLAN IDs to add to the list of those allowed on the port.</li> <li>• <b>except</b>—Lists VLAN IDs that are not allowed on the port.</li> <li>• <b>remove</b>—Lists VLAN IDs whose access is to be removed from the port.</li> <li>• <b>all</b>—Indicates that all VLAN IDs are allowed on the port, unless exceptions are also specified.</li> <li>• <b>none</b>—Indicates that no VLAN IDs are allowed on the port.</li> </ul> <p>If you do not configure allowed VLANs, then the default VLAN 1 is used as the allowed VLAN.</p> <p>If you want traffic forwarded on the native VLAN of the trunk port, the native VLAN must be in the allowed VLAN list.</p> |

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|         | Command                                                                                                                                                                                                                            | Purpose                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|---------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Step 7  | <p><b>channel-group auto</b> [<b>mode</b> {<b>on</b>   <b>active</b>   <b>passive</b>}] <b>mac-pinning</b></p> <p><b>Example:</b><br/> n1000v(config-port-prof)# channel-group auto mode active<br/> n1000v(config-port-prof)#</p> | <p>Defines a port channel group in which a unique port channel is created and automatically assigned when the port profile is assigned to the first interface.</p> <p>Each additional interface that belongs to the same module is added to the same port channel. In VMware environments, a different port channel is created for each module.</p> <ul style="list-style-type: none"> <li>• <b>mode</b>—Sets the port channel mode to <b>on</b>, <b>active</b>, or <b>passive</b> (active and passive use LACP).</li> <li>• <b>mac-pinning</b>—If the upstream switch does not support port channels, this designates that one subgroup per Ethernet member port must be automatically assigned,</li> </ul> |
| Step 8  | <p><b>system vlan</b> <i>vlan-id-list</i></p> <p><b>Example:</b><br/> n1000v(config-port-prof)# system vlan 1,10,20<br/> n1000v(config-port-prof)#</p>                                                                             | <p>Adds system VLANs to this port profile.</p> <p>If you want traffic forwarded on the native VLAN of the trunk port, the native VLAN must be in the system VLAN list.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Step 9  | <p><b>state enabled</b></p> <p><b>Example:</b><br/> n1000v(config-port-prof)# state enabled<br/> n1000v(config-port-prof)#</p>                                                                                                     | <p>Enables the port profile and applies its configuration to the assigned ports. If the port profile is a VMware port group, the port group will be created in the vswitch on vCenter Server.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Step 10 | <p><b>show port-channel summary</b></p> <p><b>Example:</b><br/> n1000v(config-if)# show port-channel summary</p>                                                                                                                   | <p>(Optional) Displays summary information about the port channels.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Step 11 | <p><b>copy running-config startup-config</b></p> <p><b>Example:</b><br/> n1000v(config-if)# copy running-config startup-config</p>                                                                                                 | <p>(Optional) Saves the running configuration persistently through reboots and restarts by copying it to the startup configuration.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |

## EXAMPLE CONFIGURATION

The following example shows how to set the LACP-enabled interface to the active port channel mode for Ethernet interface 1/4 in channel group 5; and then configure an LACP port profile.

```

config t
feature lacp
interface ethernet 1/4
channel-group 5 mode active
port-profile type ethernet system-uplink
vmware port-group lacp
switchport mode trunk
switchport trunk allowed vlan 1-100
channel-group auto mode active
system vlan 1,10,20
state enabled
show port-channel summary
copy running-config startup-config

```

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## Configuring VEM Management of LACP

Use this procedure to offload management of LACP from the VSM to the VEMs.

### BEFORE YOU BEGIN

Before beginning this procedure, you must know or do the following:

- You are logged in to the CLI in EXEC mode.
- After offloading the management of LACP from the VSM to the VEM, you must preserve the running configuration in the startup configuration and reload the VSM before the offload takes effect. This procedure has steps for doing this.
- Offloading of LACP management to the VEMs is enabled by default on the VSM.



**Note** If you have upgraded from a previous release, then offloading of LACP management to the VEMs is disabled by default.

You can enable or disable the feature using the **[no] lacp offload** command.

### SUMMARY STEPS

1. **config t**
2. **[no] lacp offload**
3. **copy running-config startup-config**
4. **show lacp offload status**
5. **reload**
6. **show lacp offload status**

### DETAILED STEPS

|        | Command                                                                       | Purpose                           |
|--------|-------------------------------------------------------------------------------|-----------------------------------|
| Step 1 | <b>config t</b><br><br><b>Example:</b><br>n1000v# config t<br>n1000v(config)# | Enters global configuration mode. |

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|        | Command                                                                                                                                                                                                                                                                                                                                                                                                                              | Purpose                                                                                                                                                                                                                                                                                                                                                                  |
|--------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Step 2 | <p><b>lACP offload</b></p> <p><b>Example:</b><br/> n1000v(config)# lACP offload<br/> Please do a "copy running startup" to ensure the new setting takes effect on next reboot<br/> LACP Offload Status can be verified using "show lACP offload status"<br/> Change in LACP Offload Status takes effect only on the next VSM Reboot<br/> This can potentially cause modules with LACP uplinks to flap</p> <pre>n1000v(config)#</pre> | <p>(Optional) Offloads LACP management from the VSM to the VEMs.</p> <p>If enabling LACP offload, a message displays to let you know that a reload is required.</p> <p>Offload of LACP management to the VEMs is enabled by default.</p> <p><b>Note</b> If you upgraded from a previous release, then offload of LACP management to the VEMs is disabled by default.</p> |
| Step 3 | <p><b>copy running-config startup-config</b></p> <p><b>Example:</b><br/> n1000v(config-if)# copy running-config startup-config<br/> [#####] 100%<br/> n1000v(config-if)#</p>                                                                                                                                                                                                                                                         | <p>(Optional) Saves the running configuration persistently through reboots and restarts by copying it to the startup configuration.</p>                                                                                                                                                                                                                                  |
| Step 4 | <p><b>show lACP offload status</b></p> <p><b>Example:</b><br/> n1000v(config)# show lACP offload status<br/> Current Status : Disabled<br/> Running Config Status : Enabled<br/> Saved Config Status : Enabled<br/> n1000v(config)#</p>                                                                                                                                                                                              | <p>(Optional) Displays the LACP offload status for verification.</p> <p><b>Note</b> Current status does not change to enabled until after reload.</p>                                                                                                                                                                                                                    |
| Step 5 | <p><b>reload</b></p> <p><b>Example:</b><br/> n1000v(config)# reload<br/> This command will reboot the system.<br/> (y/n)? [n] y<br/> 2010 Sep 3 11:33:35 n1000v<br/> %PLATFORM-2-PFM_SYSTEM_RESET: Manual system restart from Command Line Interface</p>                                                                                                                                                                             | <p>Reboots both the primary and secondary VSM.</p>                                                                                                                                                                                                                                                                                                                       |
| Step 6 | <p><b>show lACP offload status</b></p> <p><b>Example:</b><br/> n1000v# show lACP offload status<br/> Current Status : Enabled<br/> Running Config Status : Enabled<br/> Saved Config Status : Enabled<br/> n1000v(config)#</p>                                                                                                                                                                                                       | <p>(Optional) After system reload, displays the LACP offload status for verification.</p> <p><b>Note</b> Current status should now show enabled.</p>                                                                                                                                                                                                                     |

## Verifying Port Channels

Use the following commands to display the port channel configuration.

For more information about the command output, see the *Cisco Nexus 1000V Command Reference, Release 4.2(1)SV1(4)*.

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| Command                                                                                               | Purpose                                                                                                                                                                                                         |
|-------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>show feature</b>                                                                                   | Displays the features available, such as LACP, and whether they are enabled.                                                                                                                                    |
| <b>show interface port-channel</b> <i>channel-number</i>                                              | Displays the status of a port channel interface.                                                                                                                                                                |
| <b>show lacp port-channel</b> [ <b>interface port-channel</b> <i>channel-number</i> ]                 | Displays information about LACP port channels.                                                                                                                                                                  |
| <b>show lacp interface ethernet</b> <i>slot/port</i>                                                  | Displays information about specific LACP interfaces.                                                                                                                                                            |
| <b>show lacp offload status</b>                                                                       | Displays whether LACP management is offloaded to the VEMs. <ul style="list-style-type: none"> <li>• <b>Enabled:</b> LACP is managed by VEMs.</li> <li>• <b>Disabled:</b> LACP is managed by the VSM.</li> </ul> |
| <b>show network-state tracking config</b>                                                             | Displays the Network State Tracking configuration for verification.                                                                                                                                             |
| <b>show network-state tracking</b> { <b>module</b> <i>modID</i>   <b>interface</b> <i>channelID</i> } | Displays the Network State Tracking status for a module or interface.                                                                                                                                           |
| <b>show port-channel compatibility-parameters</b>                                                     | Displays the parameters that must be the same among the member ports in order to join a port channel.                                                                                                           |
| <b>show port-channel database</b> [ <b>interface port-channel</b> <i>channel-number</i> ]             | Displays the aggregation state for one or more port channel interfaces.                                                                                                                                         |
| <b>show port-channel load-balance</b>                                                                 | Displays the type of load balancing in use for port channels.                                                                                                                                                   |
| <b>show port-channel summary</b>                                                                      | Displays a summary for the port channel interfaces.                                                                                                                                                             |
| <b>show port-channel traffic</b>                                                                      | Displays the traffic statistics for port channels.                                                                                                                                                              |
| <b>show port-channel usage</b>                                                                        | Displays the range of used and unused channel numbers.                                                                                                                                                          |
| <b>show running-config interface ethernet</b> <i>port/slot</i>                                        | Displays information about the running configuration of the specified Ethernet interface.                                                                                                                       |
| <b>show running-config interface port-channel</b> <i>channel-number</i>                               | Displays information on the running configuration of the port channel.                                                                                                                                          |
| <b>show running-config interface vethernet</b> <i>interface-number</i>                                | Displays information about the running configuration of the specified vEthernet interface.                                                                                                                      |



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## Monitoring Port Channels

Use the following commands to monitor the port channel interface configuration.

| Command                                                                           | Purpose                                                                                     |
|-----------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|
| <b>clear counters interface port-channel</b><br><i>channel-number</i>             | Clears the counters.                                                                        |
| <b>show interface counters</b> [ <b>module</b> <i>module</i> ]                    | Displays input and output octets unicast packets, multicast packets, and broadcast packets. |
| <b>show interface counters detailed</b> [all]                                     | Displays input packets, bytes, and multicast and output packets and bytes.                  |
| <b>show interface counters errors</b> [ <b>module</b> <i>module</i> ]             | Displays information on the number of error packets.                                        |
| <b>show lacp counters</b> [ <b>interface port-channel</b> <i>channel-number</i> ] | Displays information about LACP statistics.                                                 |

## Configuration Examples for Port Channels

This section includes the following examples:

- [Configuration Example: Create a Port Channel and Add Interfaces, page 5-49](#)
- [Configuration Example: Create an LACP Port Channel, page 5-49](#)
- [Configuration Example: Configuring Network State Tracking for vPC-HM, page 5-50](#)

### Configuration Example: Create a Port Channel and Add Interfaces

The following example shows how to create a port channel and add two Layer 2 interfaces to that port channel:

```
config t
interface port-channel 5
interface ethernet 1/4
switchport
channel-group 5 mode active
interface ethernet 1/7
switchport
channel-group 5 mode
```

### Configuration Example: Create an LACP Port Channel

The following example shows how to set the LACP-enabled interface to the active port channel mode for Ethernet interface 1/4 in channel group 5; and then configure an LACP port profile for the port channel.

```
config t
feature lacp
interface ethernet 1/4
channel-group 5 mode active
port-profile type ethernet system-uplink
vmware port-group lacp
```

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```
switchport mode trunk
switchport trunk allowed vlan 1-100
channel-group auto mode active
system vlan 1,10,20
state enabled
show port-channel summary
copy running-config startup-config
```

### Configuration Example: Configuring Network State Tracking for vPC-HM

The following example shows how to configure Network State Tracking with an 8 second interval between sent broadcasts, a maximum of 7 missed broadcasts before declaring a split network, and repin traffic to another uplink if a split network is detected:

```
config t
track network-state enable
track network-state interval 8
track network-state split action repin
track network-state threshold miss-count 7
show network-state tracking config
Tracking mode : enabled
Tracking Interval : 8 sec
Miss count threshold : 7 pkts
Split-network action : repin
n1000v(config)#
```

## Additional References

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

- [Related Documents, page 5-50](#)
- [Standards, page 5-51](#)

## Related Documents

| Related Topic                                                                                                                         | Document Title                                                                        |
|---------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| Complete command syntax, command modes, command history, defaults, usage guidelines, and examples for all Cisco Nexus 1000V commands. | <i>Cisco Nexus 1000V Command Reference, Release 4.2(1)SV1(4)</i>                      |
| Configuring Layer 2 interface                                                                                                         | <a href="#">Chapter 3, “Configuring Layer 2 Interfaces”</a>                           |
| System management                                                                                                                     | <i>Cisco Nexus 1000V System Management Configuration Guide, Release 4.2(1)SV1(4a)</i> |
| Release Notes                                                                                                                         | <i>Cisco Nexus 1000V Release Notes, Release 4.2(1)SV1(4a)</i>                         |
| Port Profiles                                                                                                                         | <i>Cisco Nexus 1000V Port Profile Configuration Guide, Release 4.2(1)SV1(4a)</i>      |

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## Standards

| Standards    | Title            |
|--------------|------------------|
| IEEE 802.3ad | Link Aggregation |

## Feature History for Port Channels

This section provides the feature history for port channels.

| Feature Name                                    | Releases      | Feature Information                                                                                                                         |
|-------------------------------------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------|
| Backup subgroups                                | 4.2(1)SV1(4a) | You can assign up to seven backup subgroups when pinning the primary subgroup.                                                              |
| Port channel relative numbering                 | 4.2(1)SV1(4a) | The subgroup numbering begins at zero and is not tied to the vmnic number.                                                                  |
| Port channel vPC-HM                             | 4.2(1)SV1(4)  | The interface <b>sub-group cdp</b> command is removed from port channel vPC-HM configuration when connecting to multiple upstream switches. |
| Network State Tracking for vPC-HM port channels | 4.2(1)SV1(4)  | Pinpoints link failure on a port channel configured for vPC-HM.                                                                             |
| VEM management of LACP                          | 4.2(1)SV1(4)  | Offloading management of LACP from the VSM to the VEMs.                                                                                     |
| Enabling the LACP port channel function         | 4.2(1)SV1(4)  | The command, <b>feature lacp</b> , is added to enable support of LACP port-channels. Previously LACP was enabled automatically.             |
| vPC-Host Mode                                   | 4.0(4)SV1(2)  | Support for manual creation of subgroups.                                                                                                   |
| Static Pinning                                  | 4.0(4)SV1(2)  | Support for attaching (or pinning) a vEthernet interface to a specific port channel subgroup.                                               |
| Port Channels                                   | 4.0(4)SV1(1)  | This feature was introduced.                                                                                                                |

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