



Configuring Layer 3 Interfaces

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About Layer 3 Interfaces

Layer 3 interfaces forward IPv4 and IPv6 packets to another device using static or dynamic routing protocols. You can use Layer 3 interfaces for IP routing and inter-VLAN routing of Layer 2 traffic.

Routed Interfaces

You can configure a port as a Layer 2 interface or a Layer 3 interface. A routed interface is a physical port that can route IP traffic to another device. A routed interface is a Layer 3 interface only and does not support Layer 2 protocols, such as the Spanning Tree Protocol (STP).

All Ethernet ports are routed interfaces by default. You can change this default behavior with the CLI setup script.

You can assign an IP address to the port, enable routing, and assign routing protocol characteristics to this routed interface.

You can also create a Layer 3 port channel from routed interfaces. For more information about port channels, see the “Configuring Port Channels” section.

Routed interfaces and subinterfaces support exponentially decayed rate counters. Cisco NX-OS tracks the following statistics with these averaging counters:

- Input packets/sec
- Output packets/sec
- Input bytes/sec
- Output bytes/sec

Subinterfaces

You can create virtual subinterfaces on a parent interface configured as a Layer 3 interface. A parent interface can be a physical port.

Subinterfaces divide the parent interface into two or more virtual interfaces on which you can assign unique Layer 3 parameters such as IP addresses and dynamic routing protocols. The IP address for each subinterface should be in a different subnet from any other subinterface on the parent interface.

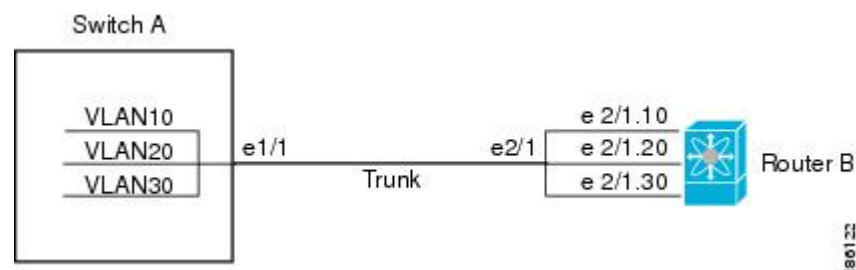
You create a subinterface with a name that consists of the parent interface name (for example, Ethernet 2/1) followed by a period and then by a number that is unique for that subinterface. For example, you could create a subinterface for Ethernet interface 2/1 named Ethernet 2/1.1 where .1 indicates the subinterface.

Cisco NX-OS enables subinterfaces when the parent interface is enabled. You can shut down a subinterface independent of shutting down the parent interface. If you shut down the parent interface, Cisco NX-OS shuts down all associated subinterfaces as well.

One use of subinterfaces is to provide unique Layer 3 interfaces to each virtual local area network (VLAN) supported by the parent interface. In this scenario, the parent interface connects to a Layer 2 trunking port on another device. You configure a subinterface and associate the subinterface to a VLAN ID using 802.1Q trunking.

The following figure shows a trunking port from a switch that connects to router B on interface E 2/1. This interface contains three subinterfaces that are associated with each of the three VLANs carried by the trunking port.

Figure 1: Subinterfaces for VLANs



For more information about VLANs, see the *Cisco Nexus 9000 Series NX-OS Layer 2 Switching Configuration Guide*.

VLAN Interfaces

A VLAN interface, or switch virtual interface (SVI), is a virtual routed interface that connects a VLAN on the device to the Layer 3 router engine on the same device. Only one VLAN interface can be associated with a VLAN, but you need to configure a VLAN interface for a VLAN only when you want to route between VLANs or to provide IP host connectivity to the device through a virtual routing and forwarding (VRF) instance that is not the management VRF. When you enable VLAN interface creation, Cisco NX-OS creates a VLAN interface for the default VLAN (VLAN 1) to permit remote switch administration.

You must enable the VLAN network interface feature before you can see configure it. The system automatically takes a checkpoint prior to disabling the feature, and you can roll back to this checkpoint. See the *Cisco Nexus 9000 Series NX-OS System Management Configuration Guide* for information on rollbacks and checkpoints.

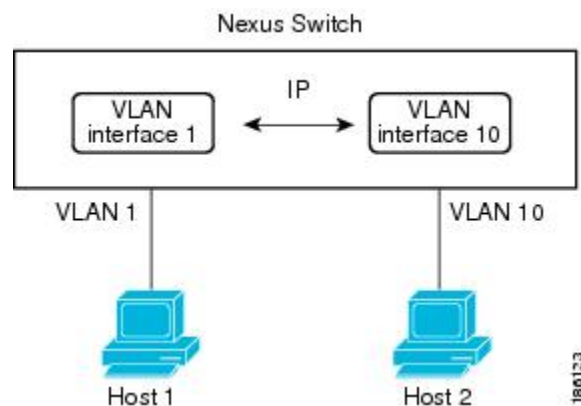


Note You cannot delete the VLAN interface for VLAN 1.

You can route across VLAN interfaces to provide Layer 3 inter-VLAN routing by configuring a VLAN interface for each VLAN that you want to route traffic to and assigning an IP address on the VLAN interface. For more information about IP addresses and IP routing, see the *Cisco Nexus 9000 Series NX-OS Unicast Routing Configuration Guide*.

The following figure shows two hosts connected to two VLANs on a device. You can configure VLAN interfaces for each VLAN that allows Host 1 to communicate with Host 2 using IP routing between the VLANs. VLAN 1 communicates at Layer 3 over VLAN interface 1 and VLAN 10 communicates at Layer 3 over VLAN interface 10.

Figure 2: Connecting Two VLANs with VLAN interfaces



Loopback Interfaces

A loopback interface is a virtual interface with a single endpoint that is always up. Any packet transmitted over a loopback interface is immediately received by this interface. Loopback interfaces emulate a physical interface. You can configure up to 1024 loopback interfaces, numbered 0 to 1023.

You can use loopback interfaces for performance analysis, testing, and local communications. Loopback interfaces can act as a termination address for routing protocol sessions. This loopback configuration allows routing protocol sessions to stay up even if some of the outbound interfaces are down.

High Availability

Layer 3 interfaces support stateful and stateless restarts. After the switchover, Cisco NX-OS applies the runtime configuration after the switchover.

See the *Cisco Nexus 9000 Series NX-OS High Availability and Redundancy Guide* for complete information about high availability.

Virtualization Support

Layer 3 interfaces support Virtual Routing and Forwarding instances (VRFs). VRFs exist within virtual device contexts (VDCs). By default, Cisco NX-OS places you in the default VDC and default VRF .

You can configure up to 1024 loopback interfaces per VDC.

You can associate the interface with a VRF. For VLAN interfaces, you must configure the VLAN interface in the same VDC as the VLAN.

See the *Cisco Nexus 9000 Series NX-OS Unicast Routing Configuration Guide* for information about configuring an interface in a VRF.



Note

You must assign an interface to a VRF before you configure the IP address for that interface.

Licensing Requirements for Layer 3 Interfaces

The following table shows the licensing requirements for this feature:

Product	License Requirement
Cisco NX-OS	Layer 3 interfaces require no license. Any feature not included in a license package is bundled with the Cisco NX-OS image and is provided at no extra charge to you.

Prerequisites for Layer 3 Interfaces

Layer 3 interfaces have the following prerequisites:

- You are familiar with IP addressing and basic configuration. See the *Cisco Nexus 9000 Series NX-OS Unicast Routing Configuration Guide* for more information about IP addressing.

Guidelines and Limitations

Layer 3 interfaces have the following configuration guidelines and limitations:

- If you change a Layer 3 interface to a Layer 2 interface, Cisco NX-OS shuts down the interface, reenables the interface, and removes all configuration specific to Layer 3.
- If you change a Layer 2 interface to a Layer 3 interface, Cisco NX-OS shuts down the interface, reenables the interface, and deletes all configuration specific to Layer 2.



Note

If you are familiar with the Cisco IOS CLI, be aware that the Cisco NX-OS commands for this feature might differ from the Cisco IOS commands that you would use.

Default Settings

The following table lists the default settings for Layer 3 interface parameters.

Table 1: Default Layer 3 Interface Parameters

Parameters	Default
Admin state	Shut

Configuring Layer 3 Interfaces

Configuring a Routed Interface

You can configure any Ethernet port as a routed interface.

SUMMARY STEPS

1. **configure terminal**
2. **interface ethernet *slot/port***
3. **no switchport**
4. **[ip address *ip-address/length* | ipv6 address *ipv6-address/length*]**
5. **show interfaces**
6. **no shutdown**
7. **copy running-config startup-config**

DETAILED STEPS

	Command or Action	Purpose
Step 1	configure terminal Example: switch# configure terminal switch(config)#	Enters global configuration mode.
Step 2	interface ethernet slot/port Example: switch(config)# interface ethernet 2/1 switch(config-if)#	Enters interface configuration mode.
Step 3	no switchport Example: switch(config-if)# no switchport	Configures the interface as a Layer 3 interface.
Step 4	[ip address ip-address/length ipv6 address ipv6-address/length] Example: switch(config-if)# ip address 192.0.2.1/8 Example: switch(config-if)# ipv6 address 2001:0DB8::1/8	<ul style="list-style-type: none"> • Configures an IP address for this interface. See the <i>Cisco Nexus 9000 Series NX-OS Unicast Routing Configuration Guide</i> for more information about IP addresses. • Configures an IPv6 address for this interface. See the <i>Cisco Nexus 9000 Series NX-OS Unicast Routing Configuration Guide</i> for more information about IPv6 addresses.
Step 5	show interfaces Example: switch(config-if)# show interfaces ethernet 2/1	(Optional) Displays the Layer 3 interface statistics.
Step 6	no shutdown Example: switch# switch(config-if)# int e2/1 switch(config-if)# no shutdown	(Optional) Clears the errors on the interfaces where policies correspond with hardware policies. This command allows policy programming to continue and the port to come up. If policies do not correspond, the errors are placed in an error-disabled policy state.
Step 7	copy running-config startup-config Example: switch(config)# copy running-config startup-config	(Optional) Saves the configuration change.

- Use the **medium** command to set the interface medium to either point to point or broadcast.

Command	Purpose
medium {broadcast p2p} Example: <pre>switch(config-if)# medium p2p medium p2p</pre>	Configures the interface medium as either point to point or broadcast.

**Note**

The default setting is **broadcast**, and this setting does not appear in any of the **show** commands. However, if you do change the setting to **p2p**, you will see this setting when you enter the **show running config** command.

- Use the **switchport** command to convert a Layer 3 interface into a Layer 2 interface.

Command	Purpose
switchport Example: <pre>switch(config-if)# switchportswitchport</pre>	Configures the interface as a Layer 2 interface and deletes any configuration specific to Layer 3 on this interface.

- This example shows how to configure a routed interface:

```
switch# configure terminal
switch(config)# interface ethernet 2/1
switch(config-if)# no switchport
switch(config-if)# ip address 192.0.2.1/8
switch(config-if)# copy running-config startup-config
```

The default setting for interfaces is routed. If you want to configure an interface for Layer 2, enter the **switchport** command. Then, if you change a Layer 2 interface to a routed interface, enter the **no switchport** command.

Configuring a Subinterface on a Routed Interface

You can configure one or more subinterfaces on a routed interface made from routed interfaces.

Before You Begin

Configure the parent interface as a routed interface.

See the “Configuring a Routed Interface” section.

SUMMARY STEPS

1. **configure terminal**
2. **interface ethernet *slot/port.number***
3. **[ip address *ip-address/length* | ipv6 address *ipv6-address/length*]**
4. **encapsulation dot1Q *vlan-id***
5. **show interfaces**
6. **copy running-config startup-config**

DETAILED STEPS

	Command or Action	Purpose
Step 1	configure terminal Example: <pre>switch# configure terminal switch(config)#</pre>	Enters global configuration mode.
Step 2	interface ethernet <i>slot/port.number</i> Example: <pre>switch(config)# interface ethernet 2/1.1 switch(config-subif)#</pre>	Creates a subinterface and enters subinterface configuration mode. The number range is from 1 to 4094.
Step 3	[ip address <i>ip-address/length</i> ipv6 address <i>ipv6-address/length</i>] Example: <pre>switch(config-subif)# ip address 192.0.2.1/8</pre> Example: <pre>switch(config-subif)# ipv6 address 2001:0DB8::1/8</pre>	<ul style="list-style-type: none"> • Configures an IP address for this subinterface. See the <i>Cisco Nexus 9000 Series NX-OS Unicast Routing Configuration Guide</i> for more information on IP addresses. • Configures an IPv6 address for this subinterface. See the <i>Cisco Nexus 9000 Series NX-OS Unicast Routing Configuration Guide</i> for more information on IPv6 addresses.
Step 4	encapsulation dot1Q <i>vlan-id</i> Example: <pre>switch(config-subif)# encapsulation dot1Q 33</pre>	Configures IEEE 802.1Q VLAN encapsulation on the subinterface. The range is from 2 to 4093.
Step 5	show interfaces Example: <pre>switch(config-subif)# show interfaces ethernet 2/1.1</pre>	(Optional) Displays the Layer 3 interface statistics.
Step 6	copy running-config startup-config Example: <pre>switch(config)# copy running-config startup-config</pre>	(Optional) Saves the configuration change.

- This example shows how to create a subinterface:

```
switch# configure terminal
switch(config)# interface ethernet 2/1.1
switch(config-if)# ip address 192.0.2.1/8
switch(config-if)# encapsulation dot1Q 33
switch(config-if)# copy running-config startup-config
```

- The output of the **show interface eth** command is enhanced for the subinterfaces as shown in the following :

```
switch# show interface ethernet 1/2.1
Ethernet1/2.1 is down (Parent Interface Admin down)
admin state is down, Dedicated Interface, [parent interface is Ethernet1/2]
Hardware: 40000 Ethernet, address: 0023.ac67.9bc1 (bia 4055.3926.61d4)
Internet Address is 10.10.10.1/24
MTU 1500 bytes, BW 40000000 Kbit, DLY 10 usec
reliability 255/255, txload 1/255, rxload 1/255
Auto-mdix is turned off
EtherType is 0x8100
L3 in Switched:
  ucast: 0 pkts, 0 bytes - mcast: 0 pkts, 0 bytes
L3 out Switched:
  ucast: 0 pkts, 0 bytes - mcast: 0 pkts, 0 bytes
```

Configuring a Subinterface on a Port-Channel Interface

You can configure one or more subinterfaces on a port-channel interface.



Note

Subinterfaces on a port-channel interface do not support multicast routing, router ACLs, QoS, policy-based routing (PBR), SPAN, or ERSPAN.

Before You Begin

Configure the parent interface as a port-channel interface.

See the “Configuring Port Channels” chapter.

SUMMARY STEPS

1. **configure terminal**
2. **interface port-channel** *channel-id.number*
3. [**ip address** *ip-address/length* | **ipv6 address** *ipv6-address/length*]
4. **encapsulation dot1Q** *vlan-id*
5. **show interfaces**
6. **copy running-config startup-config**

DETAILED STEPS

	Command or Action	Purpose
Step 1	configure terminal Example: switch# configure terminal switch(config)#	Enters global configuration mode.
Step 2	interface port-channel <i>channel-id.number</i> Example: switch(config)# interface port-channel 100.1 switch(config-subif)#	Creates a subinterface and enters subinterface configuration mode. The number range is from 1 to 4094.
Step 3	[ip address <i>ip-address/length</i> ipv6 address <i>ipv6-address/length</i>] Example: switch(config-subif)# ip address 192.0.2.1/8 Example: switch(config-subif)# ipv6 address 2001:0DB8::1/8	<ul style="list-style-type: none"> Configures an IP address for this subinterface. See the <i>Cisco Nexus 9000 Series NX-OS Unicast Routing Configuration Guide</i> for more information on IP addresses. Configures an IPv6 address for this subinterface. See the <i>Cisco Nexus 9000 Series NX-OS Unicast Routing Configuration Guide</i> for more information on IPv6 addresses.
Step 4	encapsulation dot1Q <i>vlan-id</i> Example: switch(config-subif)# encapsulation dot1Q 33	Configures IEEE 802.1Q VLAN encapsulation on the subinterface. The range is from 2 to 4093.
Step 5	show interfaces Example: switch(config-subif)# show interfaces ethernet 2/1.1	(Optional) Displays the Layer 3 interface statistics.
Step 6	copy running-config startup-config Example: switch(config)# copy running-config startup-config	(Optional) Saves the configuration change.

This example shows how to create a subinterface:

```
switch# configure terminal
switch(config)# interface port-channel 115.3
switch(config-subif)# ip address 141.143.101.2/24
switch(config-subif)# encapsulation dot1q 3
switch(config-subif)# copy running-config startup-config
```

Configuring the Bandwidth on an Interface

You can configure the bandwidth for a routed interface, port channel, or subinterface. Higher layer protocols use a bandwidth parameter to calculate path costs. You can configure the bandwidth on a subinterface with one of the following methods:

- **Explicit**—Sets the bandwidth value for the subinterface directly
- **Inherit**—Sets the bandwidth that all subinterfaces inherit from the parent interface as either a specific value or as the bandwidth of the parent interface.

If you do not set the subinterface bandwidth or configure it to inherit the bandwidth from the parent interface, Cisco NX-OS determines the subinterface bandwidth as follows:

- If the parent interface is up, the bandwidth of the subinterface is the same as the operational speed of the parent interface. For ports, the subinterface bandwidth is the configured or negotiated link speed. For port channels, the subinterface bandwidth is the aggregate of the link speeds of individual members of the port channel.
- If the parent interface is down, the bandwidth of the subinterface depends on the type of parent interface:
 - 1-Gb/s Ethernet ports have 1-Gb/s bandwidth for subinterfaces.
 - 10-Gb/s Ethernet ports have 10-Gb/s bandwidth for subinterfaces.
 - 100-Gb/s Ethernet ports have 100-Gb/s bandwidth for subinterfaces.

To configure the bandwidth of an interface, use the following command in interface mode:

Command	Purpose
bandwidth Example: <pre>switch(config-if)# 100000bandwidth 100000</pre>	Configures the bandwidth parameter for a routed interface, port channel, or subinterface.

To configure subinterfaces to inherit the bandwidth from the parent interface, use the following command in interface mode:

Command	Purpose
bandwidth inherit [value] Example: <pre>switch(config-if)# inherit bandwidth inherit 10000000</pre>	Configures all subinterfaces of this interface to inherit the bandwidth value configured. If you do not configure the value, the subinterfaces inherit the bandwidth of the parent interface. The range is from 1 to 10000000, in kilobytes.

Configuring a VLAN Interface

You can create VLAN interfaces to provide inter-VLAN routing.

SUMMARY STEPS

1. **configure terminal**
2. **feature interface-vlan**
3. **interface vlan *number***
4. **[ip address *ip-address/length* | ipv6 address *ipv6-address/length*]**
5. **show interface vlan *number***
6. **show interface status error policy [detail]**
7. **no shutdown**
8. **copy running-config startup-config**

DETAILED STEPS

	Command or Action	Purpose
Step 1	configure terminal Example: switch# configure terminal switch(config)#	Enters configuration mode.
Step 2	feature interface-vlan Example: switch(config)# feature interface-vlan	Enables VLAN interface mode.
Step 3	interface vlan <i>number</i> Example: switch(config)# interface vlan 10 switch(config-if)#	Creates a VLAN interface. The number range is from 1 to 4094.
Step 4	[ip address <i>ip-address/length</i> ipv6 address <i>ipv6-address/length</i>] Example: switch(config-if)# ip address 192.0.2.1/8 Example: switch(config-if)# ipv6 address 2001:0DB8::1/8	<ul style="list-style-type: none"> • Configures an IP address for this VLAN interface. See the <i>Cisco Nexus 9000 Series NX-OS Unicast Routing Configuration Guide</i> for more information on IP addresses. • Configures an IPv6 address for this VLAN interface. See the <i>Cisco Nexus 9000 Series NX-OS Unicast Routing Configuration Guide</i> for more information on IPv6 addresses.
Step 5	show interface vlan <i>number</i> Example: switch(config-if)# show interface vlan 10	(Optional) Displays the Layer 3 interface statistics.
Step 6	show interface status error policy [detail] Example: switch(config-if)# show interface status error policy detail	<p>(Optional) Displays the interfaces and VLANs that produce an error during policy programming. This command ensures that policies are consistent with hardware policies.</p> <p>Use the detail command to display the details of the interfaces that produce an error.</p>

	Command or Action	Purpose
Step 7	no shutdown Example: switch(config)# int e3/1 switch(config)# no shutdown	(Optional) Clears the errors on the interfaces where policies correspond with hardware policies. This command allows policy programming to continue and the port to come up. If policies do not correspond, the errors are placed in an error-disabled policy state.
Step 8	copy running-config startup-config Example: switch(config-if)# copy running-config startup-config	(Optional) Saves the configuration change.

This example shows how to create a VLAN interface:

```
switch# configure terminal
switch(config)# feature interface-vlan
switch(config)# interface vlan 10
switch(config-if)# ip address 192.0.2.1/8
switch(config-if)# copy running-config startup-config
```

Configuring a Loopback Interface

You can configure a loopback interface to create a virtual interface that is always up.

Before You Begin

Ensure that the IP address of the loopback interface is unique across all routers on the network.

SUMMARY STEPS

1. **configure terminal**
2. **interface loopback *instance***
3. [**ip address *ip-address/length* | ipv6 address *ipv6-address/length***]
4. **show interface loopback *instance***
5. **copy running-config startup-config**

DETAILED STEPS

	Command or Action	Purpose
Step 1	configure terminal Example: switch# configure terminal switch(config)#	Enters configuration mode.

	Command or Action	Purpose
Step 2	interface loopback <i>instance</i> Example: switch(config)# interface loopback 0 switch(config-if)#	Creates a loopback interface. The range is from 0 to 1023.
Step 3	[ip address <i>ip-address/length</i> ipv6 address <i>ipv6-address/length</i>] Example: switch(config-if)# ip address 192.0.2.1/8 Example: switch(config-if)# ipv6 address 2001:0DB8::1/8	<ul style="list-style-type: none"> Configures an IP address for this interface. See the <i>Cisco Nexus 9000 Series NX-OS Unicast Routing Configuration Guide</i> for more information about IP addresses. Configures an IPv6 address for this interface. See the <i>Cisco Nexus 9000 Series NX-OS Unicast Routing Configuration Guide</i> for more information about IPv6 addresses.
Step 4	show interface loopback <i>instance</i> Example: switch(config-if)# show interface loopback 0	(Optional) Displays the loopback interface statistics.
Step 5	copy running-config startup-config Example: switch(config-if)# copy running-config startup-config	(Optional) Saves the configuration change.

This example shows how to create a loopback interface:

```
switch# configure terminal
switch(config)# interface loopback 0
switch(config-if)# ip address 192.0.2.1/8
switch(config-if)# copy running-config startup-config
```

Assigning an Interface to a VRF

You can add a Layer 3 interface to a VRF.

SUMMARY STEPS

- configure terminal**
- interface** *interface-type number*
- vrf member** *vrf-name*
- ip address** *ip-prefix/length*
- show vrf** [*vrf-name*] **interface** *interface-type number*
- copy running-config startup-config**

DETAILED STEPS

	Command or Action	Purpose
Step 1	configure terminal Example: switch# configure terminal switch(config)#	Enters configuration mode.
Step 2	interface <i>interface-type number</i> Example: switch(config)# interface loopback 0 switch(config-if)#	Enters interface configuration mode.
Step 3	vrf member <i>vrf-name</i> Example: switch(config-if)# vrf member RemoteOfficeVRF	Adds this interface to a VRF.
Step 4	ip address <i>ip-prefix/length</i> Example: switch(config-if)# ip address 192.0.2.1/16	Configures an IP address for this interface. You must do this step after you assign this interface to a VRF.
Step 5	show vrf [<i>vrf-name</i>] interface <i>interface-type number</i> Example: switch(config-vrf)# show vrf Enterprise interface loopback 0	(Optional) Displays VRF information.
Step 6	copy running-config startup-config Example: switch(config-if)# copy running-config startup-config	(Optional) Saves the configuration change.

This example shows how to add a Layer 3 interface to the VRF:

```
switch# configure terminal
switch(config)# interface loopback 0
switch(config-if)# vrf member RemoteOfficeVRF
switch(config-if)# ip address 209.0.2.1/16
switch(config-if)# copy running-config startup-config
```

Verifying the Layer 3 Interfaces Configuration

To display the Layer 3 configuration, perform one of the following tasks:

Command	Purpose
show interface ethernet <i>slot/port</i>	Displays the Layer 3 interface configuration, status, and counters (including the 5-minute exponentially decayed moving average of inbound and outbound packet and byte rates).
show interface ethernet <i>slot/port brief</i>	Displays the Layer 3 interface operational status.
show interface ethernet <i>slot/port capabilities</i>	Displays the Layer 3 interface capabilities, including port type, speed, and duplex.
show interface ethernet <i>slot/port description</i>	Displays the Layer 3 interface description.
show interface ethernet <i>slot/port status</i>	Displays the Layer 3 interface administrative status, port mode, speed, and duplex.
show interface ethernet <i>slot/port.number</i>	Displays the subinterface configuration, status, and counters (including the f-minute exponentially decayed moving average of inbound and outbound packet and byte rates).
show interface port-channel <i>channel-id.number</i>	Displays the port-channel subinterface configuration, status, and counters (including the 5-minute exponentially decayed moving average of inbound and outbound packet and byte rates).
show interface loopback <i>number</i>	Displays the loopback interface configuration, status, and counters.
show interface loopback <i>number brief</i>	Displays the loopback interface operational status.
show interface loopback <i>number description</i>	Displays the loopback interface description.
show interface loopback <i>number status</i>	Displays the loopback interface administrative status and protocol status.
show interface vlan <i>number</i>	Displays the VLAN interface configuration, status, and counters.
show interface vlan <i>number brief</i>	Displays the VLAN interface operational status.
show interface vlan <i>number description</i>	Displays the VLAN interface description.
show interface vlan <i>number status</i>	Displays the VLAN interface administrative status and protocol status.

Command	Purpose
show interface status error policy [<i>detail</i>]	Displays errors about interfaces and VLANs that are inconsistent with hardware policies. The detail command displays the details of the interfaces that receive an error.

Monitoring the Layer 3 Interfaces

Use the following commands to display Layer 3 statistics:

Command	Purpose
load- interval { <i>interval seconds</i> { 1 2 3 }}	Cisco Nexus 9000 Series devices set three different sampling intervals to bit-rate and packet-rate statistics. The range for VLAN network interface is 60 to 300 seconds, and the range for Layer interfaces is 30 to 300 seconds.
show interface ethernet <i>slot/port</i> counters	Displays the Layer 3 interface statistics (unicast, multicast, and broadcast).
show interface ethernet <i>slot/port</i> counters brief	Displays the Layer 3 interface input and output counters.
show interface ethernet errors <i>slot/port</i> detailed [all]	Displays the Layer 3 interface statistics. You can optionally include all 32-bit and 64-bit packet and byte counters (including errors).
show interface ethernet errors <i>slot/port</i> counters errors	Displays the Layer 3 interface input and output errors.
show interface ethernet errors <i>slot/port</i> counters snmp	Displays the Layer 3 interface counters reported by SNMP MIBs.
show interface ethernet <i>slot/port.number</i> counters	Displays the subinterface statistics (unicast, multicast, and broadcast).
show interface port-channel <i>channel-id.number</i> counters	Displays the port-channel subinterface statistics (unicast, multicast, and broadcast).
show interface loopback <i>number</i> counters	Displays the loopback interface input and output counters (unicast, multicast, and broadcast).
show interface loopback <i>number</i> detailed [all]	Displays the loopback interface statistics. You can optionally include all 32-bit and 64-bit packet and byte counters (including errors).

Command	Purpose
show interface loopback <i>number</i> counters errors	Displays the loopback interface input and output errors.
show interface vlan <i>number</i> counters	Displays the VLAN interface input and output counters (unicast, multicast, and broadcast).
show interface vlan <i>number</i> counters detailed [all]	Displays the VLAN interface statistics. You can optionally include all Layer 3 packet and byte counters (unicast and multicast).
show interface vlan <i>number</i> counters snmp	Displays the VLAN interface counters reported by SNMP MIBs.

Configuration Examples for Layer 3 Interfaces

This example shows how to configure Ethernet subinterfaces:

```
interface ethernet 2/1.10
description Layer 3
ip address 192.0.2.1/8
```

This example shows how to configure a loopback interface:

```
interface loopback 3
ip address 192.0.2.2/32
```

Related Documents

Related Documents	Document Title
IP	<i>Cisco Nexus 9000 Series NX-OS Unicast Routing Configuration Guide</i>
VLANs	<i>Cisco Nexus 9000 Series NX-OS Layer 2 Switching Configuration Guide</i>