



# Configuring Layer 3 Interfaces

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- [About Layer 3 Interfaces, on page 1](#)
- [Prerequisites for Layer 3 Interfaces, on page 3](#)
- [Guidelines and Limitations for Layer 3 Interfaces, on page 3](#)
- [Default Settings, on page 4](#)
- [Configuring Layer 3 Interfaces, on page 4](#)
- [Verifying the Layer 3 Interfaces Configuration, on page 8](#)
- [Monitoring the Layer 3 Interfaces, on page 9](#)
- [Configuration Examples for Layer 3 Interfaces, on page 10](#)
- [Related Documents, on page 10](#)

## About Layer 3 Interfaces

Layer 3 interfaces forward IPv4 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.



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**Note** The default mode for the Cisco Nexus® 3550-T switch interface is Layer 3.

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

- Input packets/sec
- Output packets/sec



**Note** Layer 3 sub-interfaces are not supported in the Cisco Nexus® 3550-T 10.1(2t) release.

## 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. 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® 3550-T System Management Configuration* section for information on rollbacks and checkpoints.

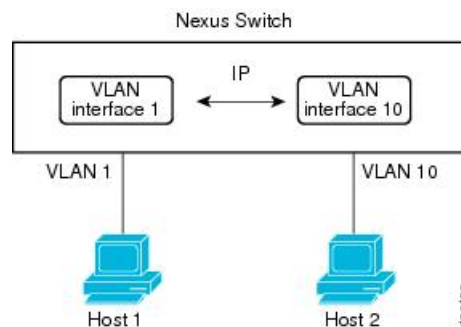


**Note** You cannot delete the VLAN interface for VLAN 1.

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® 3550-T Unicast Routing Configuration* section.

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 1: Connecting Two VLANs with VLAN interfaces**



**Note** In Cisco Nexus® 3550-T 10.1(2t) release, SVI interfaces are only supported in the default VRF instances.

## 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.

## 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® 3550-T Unicast Routing Configuration* section for more information about IP addressing.

## Guidelines and Limitations for Layer 3 Interfaces

Layer 3 interfaces have the following configuration guidelines and limitations:

- **show** commands with the **internal** keyword are not supported.
- The Dynamic Host Configuration Protocol (DHCP) option is not supported in *Cisco Nexus 3550-T - 10.1(2t) release*.
- Layer 3 sub-interfaces are not supported *Cisco Nexus 3550-T - 10.1(2t) release*.
- SVI interfaces are only supported in Default VRF instances in *Cisco Nexus 3550-T - 10.1(2t) release*.
- MTU Check is not supported in *Cisco Nexus 3550-T - 10.1(2t) release* and MTU CLI's do not take effect. Control-plane adjacencies would not be formed when peering devices send packets larger than 1518 bytes.
- *Cisco Nexus 3550-T - 10.1(2t) release* switch does cut-through forwarding; hence there is no MTU-check implemented.

Hardware buffering is not designed for jumbo packets and packets beyond regular MTU size 1516 is not supported.

- There is no support for VLAN packet and byte counters in *Cisco Nexus 3550-T - 10.1(2t) release*.
- *Cisco Nexus 3550-T - 10.1(2t) release* release does not support any byte counters on any interface. All these counters will display as 0.



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**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.

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## 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.

#### Procedure

	Command or Action	Purpose
<b>Step 1</b>	<b>configure terminal</b> <b>Example:</b> switch# <b>configure terminal</b> switch(config)#	Enters global configuration mode.
<b>Step 2</b>	<b>interface ethernet <i>slot/port</i></b> <b>Example:</b> switch(config)# <b>interface ethernet 1/1</b> switch(config-if)#	Enters interface configuration mode.
<b>Step 3</b>	<b>no switchport</b> <b>Example:</b> switch(config-if)# <b>no switchport</b>	Configures the interface as a Layer 3 interface.
<b>Step 4</b>	<b>[ip address]</b> <b>Example:</b> switch(config-if)# <b>ip address 192.0.2.1/8</b>	<ul style="list-style-type: none"> <li>Configures an IP address for this interface. See the <i>Cisco Nexus® 3550-T Unicast Routing Configuration</i> section for more information about IP addresses.</li> </ul>
<b>Step 5</b>	<b>show interfaces</b> <b>Example:</b> switch(config-if)# <b>show interfaces ethernet 1/1</b>	(Optional) Displays the Layer 3 interface statistics.

	Command or Action	Purpose
<b>Step 6</b>	<b>no shutdown</b> <b>Example:</b> <pre>switch# switch(config-if)# int e1/1 switch(config-if)# no shutdown</pre>	(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.
<b>Step 7</b>	<b>copy running-config startup-config</b> <b>Example:</b> <pre>switch(config)# copy running-config startup-config</pre>	(Optional) Saves the configuration change.

### Example

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

Command	Purpose
<b>switchport</b> <b>Example:</b> <pre>switch(config-if)# switchport</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 1/1
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 VLAN Interface

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

### Procedure

	Command or Action	Purpose
<b>Step 1</b>	<b>configure terminal</b> <b>Example:</b> <pre>switch# configure terminal switch(config)#</pre>	Enters configuration mode.

	Command or Action	Purpose
<b>Step 2</b>	<b>feature interface-vlan</b>  <b>Example:</b> switch(config)# <b>feature interface-vlan</b>	Enables VLAN interface mode.
<b>Step 3</b>	<b>interface vlan number</b>  <b>Example:</b> switch(config)# <b>interface vlan 10</b> switch(config-if)#	Creates a VLAN interface. The number range is from 1 to 4094.
<b>Step 4</b>	<b>[ip address ip-address/length]</b>  <b>Example:</b> switch(config-if)# <b>ip address 192.0.2.1/8</b>	<ul style="list-style-type: none"> <li>Configures an IP address for this VLAN interface. See the <i>Cisco Nexus® 3550-T Unicast Routing Configuration</i> section for more information on IP addresses.</li> </ul>
<b>Step 5</b>	<b>show interface vlan number</b>  <b>Example:</b> switch(config-if)# <b>show interface vlan 10</b>	(Optional) Displays the Layer 3 interface statistics.
<b>Step 6</b>	<b>copy running-config startup-config</b>  <b>Example:</b> switch(config-if)# <b>copy running-config startup-config</b>	(Optional) Saves the configuration change.

### Example

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.

## Procedure

	Command or Action	Purpose
<b>Step 1</b>	<b>configure terminal</b>  <b>Example:</b> switch# <b>configure terminal</b> switch(config)#	Enters configuration mode.
<b>Step 2</b>	<b>interface loopback <i>instance</i></b>  <b>Example:</b> switch(config)# <b>interface loopback 0</b> switch(config-if)#	Creates a loopback interface. The range is from 0 to 1023.
<b>Step 3</b>	[ <b>ip address <i>ip-address/length</i></b> ]  <b>Example:</b> switch(config-if)# <b>ip address 192.0.2.1/8</b>	<ul style="list-style-type: none"> <li>Configures an IP address for this interface. See the <i>Cisco Nexus® 3550-T Unicast Routing Configuration</i> section for more information about IP addresses.</li> </ul>
<b>Step 4</b>	<b>show interface loopback <i>instance</i></b>  <b>Example:</b> switch(config-if)# <b>show interface loopback 0</b>	(Optional) Displays the loopback interface statistics.
<b>Step 5</b>	<b>copy running-config startup-config</b>  <b>Example:</b> switch(config-if)# <b>copy running-config startup-config</b>	(Optional) Saves the configuration change.

### Example

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
```

## Configuring a DHCP Client on an Interface

You can configure the DHCP client on an SVI, a management interface, or a physical Ethernet interface for IPv4 address

## Procedure

	Command or Action	Purpose
<b>Step 1</b>	switch# <b>configure terminal</b>	Enters global configuration mode.

	Command or Action	Purpose
<b>Step 2</b>	switch(config)# <b>interface</b>   <b>mgmt 0</b>   <b>vlan</b> <i>vlan id</i>	Selects a management interface.
<b>Step 3</b>	switch(config-if)# [ <b>no</b> ] [ <b>ip</b>   <b>ipv4</b> ] <b>address dhcp</b>	Requests the DHCP server for an IPv4 address. The <b>no</b> form of this command removes any address that was acquired.
<b>Step 4</b>	switch# <b>configure terminal</b>	Enters global configuration mode.

### Example

This example shows how to configure the IP address of a DHCP client on an SVI:

```
switch# configure terminal
switch(config)# interface mgmt 0
switch(config-if)# ip address dhcp
```

## Verifying the Layer 3 Interfaces Configuration

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

Command	Purpose
<b>show interface ethernet</b> <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 rates).
<b>show interface ethernet</b> <i>slot/port</i> <b>brief</b>	Displays the Layer 3 interface operational status.
<b>show interface ethernet</b> <i>slot/port</i> <b>capabilities</b>	Displays the Layer 3 interface capabilities, including port type, speed, and duplex.
<b>show interface ethernet</b> <i>slot/port</i> <b>description</b>	Displays the Layer 3 interface description.
<b>show interface ethernet</b> <i>slot/port</i> <b>status</b>	Displays the Layer 3 interface administrative status, port mode, speed, and duplex.
<b>show interface loopback</b> <i>number</i>	Displays the loopback interface configuration, status, and counters.
<b>show interface loopback</b> <i>number</i> <b>brief</b>	Displays the loopback interface operational status.
<b>show interface loopback</b> <i>number</i> <b>description</b>	Displays the loopback interface description.
<b>show interface loopback</b> <i>number</i> <b>status</b>	Displays the loopback interface administrative status and protocol status.



Command	Purpose
<b>show interface vlan</b> <i>number</i>	Displays the VLAN interface configuration, status, and counters.
<b>show interface vlan</b> <i>number</i> <b>brief</b>	Displays the VLAN interface operational status.
<b>show interface vlan</b> <i>number</i> <b>description</b>	Displays the VLAN interface description.
<b>show interface vlan</b> <i>number</i> <b>status</b>	Displays the VLAN interface administrative status and protocol status.

## Monitoring the Layer 3 Interfaces

Use the following commands to display Layer 3 statistics:

Command	Purpose
<b>load- interval</b> { <i>interval seconds</i> { <b>1</b>   <b>2</b>   <b>3</b> }}	Cisco Nexus® 3550-T devices set three different sampling intervals to 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.
<b>show interface ethernet</b> <i>slot/port</i> <b>counters</b>	Displays the Layer 3 interface statistics (unicast, multicast, and broadcast).
<b>show interface ethernet</b> <i>slot/port</i> <b>counters brief</b>	Displays the Layer 3 interface input and output counters.
<b>show interface ethernet errors</b> <i>slot/port</i> <b>detailed</b> [ <b>all</b> ]	Displays the Layer 3 interface statistics. You can optionally include all 32-bit and 64-bit packet and byte counters (including errors).
<b>show interface ethernet errors</b> <i>slot/port</i> <b>counters errors</b>	Displays the Layer 3 interface input and output errors.
<b>show interface ethernet errors</b> <i>slot/port</i> <b>counters snmp</b>	Displays the Layer 3 interface counters reported by SNMP MIBs.
<b>show interface loopback</b> <i>number</i> <b>counters</b>	Displays the loopback interface input and output counters (unicast, multicast, and broadcast).
<b>show interface loopback</b> <i>number</i> <b>detailed</b> [ <b>all</b> ]	Displays the loopback interface statistics. You can optionally include all 32-bit and 64-bit packet and byte counters (including errors).
<b>show interface loopback</b> <i>number</i> <b>counters errors</b>	Displays the loopback interface input and output errors.

## Configuration Examples for Layer 3 Interfaces

This example shows how to configure Ethernet subinterfaces:

```
interface ethernet 1/1.10
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® 3550-T Unicast Routing Configuration</i> section
VLANs	<i>Cisco Nexus® 3550-T Layer 2 Switching Configuration</i> section