



# Configuring Virtual Loopback and Null Interfaces

This module describes the configuration of loopback and null interfaces. Loopback and null interfaces are considered virtual interfaces.

A virtual interface represents a logical packet switching entity within the router. Virtual interfaces have a global scope and do not have an associated location. Virtual interfaces have instead a globally unique numerical ID after their names. Examples are Loopback 0, Loopback 1, and Loopback 99999. The ID is unique per virtual interface type to make the entire name string unique such that you can have both Loopback 0 and Null 0.

Loopback and null interfaces have their control plane presence on the active route switch processor (RP). The configuration and control plane are mirrored onto the standby RP and, in the event of a failover, the virtual interfaces move to the ex-standby, which then becomes the newly active RP.

## Feature History for Configuring Loopback and Null Interfaces on Cisco IOS XR Software

Release	Modification
Release 7.0.11	This feature was introduced.

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## Prerequisites for Configuring Virtual Interfaces

You must be in a user group associated with a task group that includes the proper task IDs. The command reference guides include the task IDs that you need for each command. If you suspect a user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

## Information About Configuring Virtual Interfaces

To configure virtual interfaces, you must understand the following concepts:

## Virtual Loopback Interface Overview

A virtual loopback interface is a virtual interface with a single endpoint that is always up or active. Any packet that the system transmits over a virtual loopback interface is immediately received by the same interface. Loopback interfaces emulate a physical interface.

In Cisco IOS XR Software, virtual loopback interfaces perform these functions:

- Loopback interfaces can act as a termination address for routing protocol sessions. This allows routing protocol sessions to stay up even if the outbound interface is down.
- You can ping the loopback interface to verify that the router IP stack is working properly.

In applications where other routers or access servers attempt to reach a virtual loopback interface, you must configure a routing protocol to distribute the subnet assigned to the loopback address.

Packets routed to the loopback interface are rerouted back to the router or access server, and processed locally. IP packets routed out to the loopback interface but not destined to the loopback interface are dropped. Under these two conditions, the loopback interface can behave like a null interface.

## Null Interface Overview

A null interface functions similarly to the null devices available on most operating systems. This interface is always up and can never forward or receive traffic; encapsulation always fails. The null interface provides an alternative method of filtering traffic. You can avoid the overhead that is involved with using access lists by directing undesired network traffic to the null interface.

The only interface configuration command that you can specify for the null interface is the **ipv4 unreachable** command. With the **ipv4 unreachable** command, if the software receives a nonbroadcast packet destined for itself that uses a protocol it does not recognize, it sends an Internet Control Message Protocol (ICMP) protocol unreachable message to the source. If the software receives a datagram that it cannot deliver to its ultimate destination because it knows of no route to the destination address, it replies to the originator of that datagram with an ICMP host unreachable message. By default, the system enables the **ipv4 unreachable** command. If we do not want ICMP to send protocol unreachable, then you need to configure using the **ipv4 icmp unreachable disable** command.

By default, the system creates the Null 0 interface during boot process and you cannot remove it. You can configure the **ipv4 unreachable** command for this interface, but most configuration is unnecessary because this interface just discards all the packets that the system sends.

Use the **show interfaces null0** command to display the Null 0 interface.

## Virtual Management Interface Overview

Configuring an IPv4 virtual address enables you to access the router from a single virtual address with a management network without prior knowledge of which RP is active. An IPv4 virtual address persists across route switch processor (RP) failover situations. For this to happen, the virtual IPv4 address must share a common IPv4 subnet with a management Ethernet interface on both the RPs.

On a router where each RP has multiple management Ethernet interfaces, the virtual IPv4 address maps to the management Ethernet interface on the active RP that shares the same IP subnet.

## Active and Standby RPs and Virtual Interface Configuration

The standby RP is available and in a state in which it can take over the work from the active RPs should that prove necessary. Conditions that necessitate the standby RP to become the active RP and assume the active RP's duties include:

- Failure detection by a watchdog
- Administrative command to take over
- Removal of the active RP from the chassis

If a second RP is not present in the chassis while the first is in operation, a second RP may be inserted and automatically becomes the standby RP. The standby RP may also be removed from the chassis with no effect on the system other than loss of RP redundancy.

After failover, the virtual interfaces all are present on the standby (now active) RP. Their state and configuration are unchanged and there has been no loss of forwarding (in the case of tunnels) over the interfaces during the failover. The routers use nonstop forwarding (NSF) over bundles and tunnels through the failover of the host RP.




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**Note** The user need not configure anything to guarantee that the standby interface configurations are maintained. Protocol configuration such as tacacs source-interface, snmp-server trap-source, ntp source, logging source-interface do not use the virtual management IP address as their source by default. Use the **ipv4 virtual address use-as-src-addr** command to ensure that the protocol uses the virtual IPv4 address as its source address. Alternatively, you can also configure a loopback address with the designated or desired IPv4 address and set that as the source for protocols such as TACACS+ using the **tacacs source-interface** command.

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## How to Configure Virtual Interfaces

This section contains the following procedures:

### Configuring Virtual Loopback Interfaces

This task explains how to configure a basic loopback interface.

#### Restrictions

- The IP address of a loopback interface must be unique across all routers on the network.
- That IP address must not be used by another interface on the router.
- The IP address must not be used by an interface on any other router on the network.

```
RP/0/RP0/CPU0:router# configure
/* Enters interface configuration mode and names the new loopback interface */
RP/0/RP0/CPU0:router#(config)# interface Loopback 3
/* Assigns an IP address and subnet mask to the virtual loopback interface */
```

```
RP/0/RP0/CPU0:router(config-if)# ipv4 address 172.18.189.38/32

RP/0/RP0/CPU0:router(config-if)# end
RP/0/RP0/CPU0:router(config-if)# commit
```

- When you issue the **end** command, the system prompts you to commit changes:

```
Uncommitted changes found, commit them before exiting(yes/no/cancel)?
[cancel]:
```

- Entering **yes** saves configuration changes to the running configuration file, exits the configuration session, and returns the router to EXEC mode.
- Entering **no** exits the configuration session and returns the router to EXEC mode without committing the configuration changes.
- Entering **cancel** leaves the router in the current configuration session without exiting or committing the configuration changes.
- Use the **commit** command to save the configuration changes to the running configuration file and remain within the configuration session.

```
/* Display the configuration of the loopback interface */
RP/0/RP0/CPU0:router# show interfaces Loopback 3
```

## Configuring Null Interfaces

This task explains how to configure a basic null interface.

```
/* Enters global configuration mode. */

RP/0/RP0/CPU0:router# configure

/* Enter the null 0 interface configuration mode. */

RP/0/RP0/CPU0:router#(config)# interface null 0

/* Save configuration changes. */

RP/0/RP0/CPU0:router(config-null0)# end

/* Verif the configuration of the null interface. */

RP/0/RP0/CPU0:router# show interfaces null 0
```

## Configuring Virtual IPv4 Interfaces

This task explains how to configure an IPv4 virtual interface.

```
RP/0/RP0/CPU0:router# configure

/* Define an IPv4 virtual address for the management Ethernet interface. */
```

```
RP/0/RSP0/CPU0:router(config)# ipv4 virtual address 10.3.32.154/8
RP/0/RSP0/CPU0:router(config-null0)# end
or
RP/0/RSP0/CPU0:router(config-null0)# commit
```

- When you issue the **end** command, the system prompts you to commit changes:

```
Uncommitted changes found, commit them before
exiting(yes/no/cancel)?
[cancel]:
```

- Entering **yes** saves configuration changes to the running configuration file, exits the configuration session, and returns the router to EXEC mode.
- Entering **no** exits the configuration session and returns the router to EXEC mode without committing the configuration changes.
- Entering **cancel** leaves the router in the current configuration session without exiting or committing the configuration changes.
- Use the **commit** command to save the configuration changes to the running configuration file and remain within the configuration session.

This is an example for configuring a virtual IPv4 interface:

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ipv4 virtual address 10.3.32.154/8
RP/0/RSP0/CPU0:router(config-null0)# commit
```

## Configuration Examples for Virtual Interfaces

This section provides the following configuration examples:

### Configuring a Loopback Interface: Example

The following example indicates how to configure a loopback interface:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface Loopback 3
RP/0/RP0/CPU0:router(config-if)# ipv4 address 172.18.189.38/32
RP/0/RP0/CPU0:router(config-if)# end
Uncommitted changes found, commit them? [yes]: yes
RP/0/RP0/CPU0:router# show interfaces Loopback 3
```

```
Loopback3 is up, line protocol is up
Hardware is Loopback interface(s)
Internet address is 172.18.189.38/32
MTU 1514 bytes, BW Unknown
  reliability 0/255, txload Unknown, rxload Unknown
Encapsulation Loopback, loopback not set
Last clearing of "show interface" counters never
5 minute input rate 0 bits/sec, 0 packets/sec
5 minute output rate 0 bits/sec, 0 packets/sec
  0 packets input, 0 bytes, 0 total input drops
```

```

0 drops for unrecognized upper-level protocol
Received 0 broadcast packets, 0 multicast packets
0 packets output, 0 bytes, 0 total output drops
Output 0 broadcast packets, 0 multicast packets

```

## Configuring a Null Interface: Example

The following example indicates how to configure a null interface:

```

RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface Null 0
RP/0/RP0/CPU0:router(config-null0)# ipv4 unreachable
RP/0/RP0/CPU0:router(config-null0)# end
Uncommitted changes found, commit them? [yes]: yes
RP/0/RP0/CPU0:router# show interfaces Null 0

```

```

Null0 is up, line protocol is up
Hardware is Null interface
Internet address is Unknown
MTU 1500 bytes, BW Unknown
  reliability 0/255, txload Unknown, rxload Unknown
Encapsulation Null, loopback not set
Last clearing of "show interface" counters never
5 minute input rate 0 bits/sec, 0 packets/sec
5 minute output rate 0 bits/sec, 0 packets/sec
  0 packets input, 0 bytes, 0 total input drops
  0 drops for unrecognized upper-level protocol
  Received 0 broadcast packets, 0 multicast packets
  0 packets output, 0 bytes, 0 total output drops
  Output 0 broadcast packets, 0 multicast packets

```

## Configuring a Virtual IPv4 Interface: Example

```

RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# ipv4 virtual address 10.3.32.154/8
RP/0/RP0/CPU0:router(config-null0)# commit

```