



# Configuring Virtual Loopback and Null Interfaces on the Cisco ASR 9000 Series Router

This module describes the configuration of loopback and null interfaces on the Cisco ASR 9000 Series Aggregation Services Routers.

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 (RSP). The configuration and control plane are mirrored onto the standby RSP and, in the event of a failover, the virtual interfaces move to the ex-standby, which then becomes the newly active RSP.

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

Release	Modification
Release 3.7.2	This feature was introduced on the Cisco ASR 9000 Series Router.

## Contents

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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 required for each command. If you suspect user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

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## Information About Configuring Virtual Interfaces

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

- [Virtual Loopback Interface Overview, page 406](#)
- [Null Interface Overview, page 406](#)
- [Virtual Management Interface Overview, page 406](#)
- [Active and Standby RPs and Virtual Interface Configuration, page 407](#)

### Virtual Loopback Interface Overview

A virtual loopback interface is a virtual interface with a single endpoint that is always up. Any packet transmitted over a virtual loopback interface is immediately received by the selfsame interface. Loopback interfaces emulate a physical interface.

In Cisco IOS XR software, virtual loopback interfaces perform the following 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 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 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.

The Null 0 interface is created by default on the RSP during boot and cannot be removed. The **ipv4 unreachable** command can be configured for this interface, but most configuration is unnecessary because this interface just discards all the packets sent to it.

The Null 0 interface can be displayed with the **show interfaces null0** command.

### Virtual Management Interface Overview

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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 RSP is active. An IPv4 virtual address persists across route switch processor (RSP) failover situations. For this to happen, the virtual IPv4 address must share a common IPv4 subnet with a management Ethernet interface on both RPs.

On a Cisco ASR 9000 Series Router where each RSP has multiple management Ethernet interfaces, the virtual IPv4 address maps to the management Ethernet interface on the active RSP that shares the same IP subnet.

## Active and Standby RPs and Virtual Interface Configuration

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

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

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

After failover, the virtual interfaces all are present on the standby (now active) RSP. 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 RSP.



### 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 are not using the virtual mgmt ip address as their source by default. Use the command "ipv4 virtual address use-as-src-addr" to have the protocol use the virtual ipv4 address as its source address. Alternatively, you can also configure a loopback address with the designated/desired ipv4 address and set that as source for protocols such as TACACS+ via the command "tacacs source-interface"

## How to Configure Virtual Interfaces

This section contains the following procedures:

- [Configuring Virtual Loopback Interfaces, page 407](#) (Required)
- [Configuring Null Interfaces, page 409](#) (Required)
- [Configuring Virtual IPv4 Interfaces, page 410](#) (Required)

## Configuring Virtual Loopback Interfaces

This task explains how to configure a basic loopback interface.

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

**SUMMARY STEPS**

1. **configure**
2. **interface loopback** *instance*
3. **ipv4 address** *ip-address*
4. **end**  
or  
**commit**
5. **show interfaces** *type instance*

**DETAILED STEPS**

	<b>Command or Action</b>	<b>Purpose</b>
<b>Step 1</b>	<b>configure</b>  <b>Example:</b> RP/0/RSP0/CPU0:router# configure	Enters global configuration mode.
<b>Step 2</b>	<b>interface loopback</b> <i>instance</i>  <b>Example:</b> RP/0/RSP0/CPU0:router#(config)# interface Loopback 3	Enters interface configuration mode and names the new loopback interface.
<b>Step 3</b>	<b>ipv4 address</b> <i>ip-address</i>  <b>Example:</b> RP/0/RSP0/CPU0:router(config-if)# ipv4 address 172.18.189.38/32	Assigns an IP address and subnet mask to the virtual loopback interface using the <b>ipv4 address</b> configuration command.

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	Command or Action	Purpose
Step 4	<pre>end or commit</pre> <p><b>Example:</b>  RP/0/RSP0/CPU0:router(config-if)# end  OR  RP/0/RSP0/CPU0:router(config-if)# commit </p>	<p>Saves configuration changes.</p> <ul style="list-style-type: none"> <li>When you issue the <b>end</b> command, the system prompts you to commit changes:  <pre>Uncommitted changes found, commit them before exiting (yes/no/cancel)? [cancel]:</pre> <ul style="list-style-type: none"> <li>Entering <b>yes</b> saves configuration changes to the running configuration file, exits the configuration session, and returns the router to EXEC mode.</li> <li>Entering <b>no</b> exits the configuration session and returns the router to EXEC mode without committing the configuration changes.</li> <li>Entering <b>cancel</b> leaves the router in the current configuration session without exiting or committing the configuration changes.</li> </ul> </li> <li>Use the <b>commit</b> command to save the configuration changes to the running configuration file and remain within the configuration session.</li> </ul>
Step 5	<pre>show interfaces type instance</pre> <p><b>Example:</b>  RP/0/RSP0/CPU0:router# show interfaces Loopback  3 </p>	<p>(Optional) Displays the configuration of the loopback interface.</p>

## Configuring Null Interfaces

This task explains how to configure a basic null interface.

### SUMMARY STEPS

1. **configure**
2. **interface null 0**
3. **end**  
or  
**commit**
4. **show interface null 0**

**REVIEW DRAFT – CISCO CONFIDENTIAL****DETAILED STEPS**

	<b>Command or Action</b>	<b>Purpose</b>
<b>Step 1</b>	<b>configure</b>  <b>Example:</b> RP/0/RSP0/CPU0:router# configure	Enters global configuration mode.
<b>Step 2</b>	<b>interface null 0</b>  <b>Example:</b> RP/0/RSP0/CPU0:router#(config)# interface null 0	Enters the null 0 interface configuration mode.
<b>Step 3</b>	<b>end</b> or <b>commit</b>  <b>Example:</b> RP/0/RSP0/CPU0:router(config-null0)# end or RP/0/RSP0/CPU0:router(config-null0)# commit	Saves configuration changes. <ul style="list-style-type: none"> <li>When you issue the <b>end</b> command, the system prompts you to commit changes:  <pre>Uncommitted changes found, commit them before exiting(yes/no/cancel)? [cancel]:</pre> <ul style="list-style-type: none"> <li>Entering <b>yes</b> saves configuration changes to the running configuration file, exits the configuration session, and returns the router to EXEC mode.</li> <li>Entering <b>no</b> exits the configuration session and returns the router to EXEC mode without committing the configuration changes.</li> <li>Entering <b>cancel</b> leaves the router in the current configuration session without exiting or committing the configuration changes.</li> </ul> </li> <li>Use the <b>commit</b> command to save the configuration changes to the running configuration file and remain within the configuration session.</li> </ul>
<b>Step 4</b>	<b>show interfaces null 0</b>  <b>Example:</b> RP/0/RSP0/CPU0:router# show interfaces null 0	Verifies the configuration of the null interface.

**Configuring Virtual IPv4 Interfaces**

This task explains how to configure an IPv4 virtual interface.

**SUMMARY STEPS**

- configure**
- ipv4 address virtual address *ipv4-address subnet mask***
- end**  
or  
**commit**

**REVIEW DRAFT – CISCO CONFIDENTIAL****DETAILED STEPS**

	<b>Command or Action</b>	<b>Purpose</b>
<b>Step 1</b>	<b>configure</b>  <b>Example:</b> RP/0/RSP0/CPU0:router# configure	Enters global configuration mode.
<b>Step 2</b>	<b>ipv4 address virtual address ipv4-address subnet mask</b>  <b>Example:</b> RP/0/RSP0/CPU0:router(config)# ipv4 virtual address 10.3.32.154/8	Defines an IPv4 virtual address for the management Ethernet interface.
<b>Step 3</b>	<b>end</b> OR <b>commit</b>  <b>Example:</b> RP/0/RSP0/CPU0:router(config-null0)# end OR RP/0/RSP0/CPU0:router(config-null0)# commit	Saves configuration changes. <ul style="list-style-type: none"> <li>When you issue the <b>end</b> command, the system prompts you to commit changes: Uncommitted changes found, commit them before exiting (yes/no/cancel)? [cancel]: <ul style="list-style-type: none"> <li>Entering <b>yes</b> saves configuration changes to the running configuration file, exits the configuration session, and returns the router to EXEC mode.</li> <li>Entering <b>no</b> exits the configuration session and returns the router to EXEC mode without committing the configuration changes.</li> <li>Entering <b>cancel</b> leaves the router in the current configuration session without exiting or committing the configuration changes.</li> </ul> </li> <li>Use the <b>commit</b> command to save the configuration changes to the running configuration file and remain within the configuration session.</li> </ul>

## Configuration Examples for Virtual Interfaces

This section provides the following configuration examples:

- [Configuring a Loopback Interface: Example, page 411](#)
- [Configuring a Null Interface: Example, page 412](#)

### Configuring a Loopback Interface: Example

The following example indicates how to configure a loopback interface:

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# interface Loopback 3
RP/0/RSP0/CPU0:router(config-if)# ipv4 address 172.18.189.38/32
RP/0/RSP0/CPU0:router(config-if)# end
Uncommitted changes found, commit them? [yes]: yes
```

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```
RP/0/RSP0/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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# interface Null 0
RP/0/RSP0/CPU0:router(config-null0)# ipv4 unreachable
RP/0/RSP0/CPU0:router(config-null0)# end
Uncommitted changes found, commit them? [yes]: yes
RP/0/RSP0/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/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
```

## Additional References

The following sections provide references related to loopback and null interface configuration.



**REVIEW DRAFT – CISCO CONFIDENTIAL****Related Documents**

Related Topic	Document Title
Cisco ASR 9000 Series Router master command reference	<i>Cisco ASR 9000 Series Router Master Commands List</i>
Cisco ASR 9000 Series Router interface configuration commands	<i>Cisco ASR 9000 Series Router Interface and Hardware Component Command Reference</i>
Initial system bootup and configuration information for a Cisco ASR 9000 Series Router using the Cisco IOS XR Software.	<i>Cisco ASR 9000 Series Router Getting Started Guide</i>
Information about user groups and task IDs	<i>Cisco ASR 9000 Series Router Interface and Hardware Component Command Reference</i>
Information about configuring interfaces and other components on the Cisco ASR 9000 Series Router from a remote Craft Works Interface (CWI) client management application	<i>Cisco ASR 9000 Series Router Craft Works Interface Configuration Guide</i>

**Standards**

Standards	Title
No new or modified standards are supported by this feature, and support for existing standards has not been modified by this feature.	—

**MIBs**

MIBs	MIBs Link
There are no applicable MIBs for this module.	To locate and download MIBs for selected platforms using Cisco IOS XR Software, use the Cisco MIB Locator found at the following URL:  <a href="http://cisco.com/public/sw-center/netmgmt/cmtk/mibs.shtml">http://cisco.com/public/sw-center/netmgmt/cmtk/mibs.shtml</a>

**RFCs**

RFCs	Title
No new or modified RFCs are supported by this feature, and support for existing RFCs has not been modified by this feature.	—

**REVIEW DRAFT – CISCO CONFIDENTIAL****Technical Assistance**

Description	Link
The Cisco Technical Support website contains thousands of pages of searchable technical content, including links to products, technologies, solutions, technical tips, and tools. Registered Cisco.com users can log in from this page to access even more content.	<a href="http://www.cisco.com/techsupport">http://www.cisco.com/techsupport</a>