Configuring Virtual Loopback and Null Interfaces

This module describes the configuration of loopback and null interfaces on the Cisco NCS 6000 Series Router.

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

Feature History for Configuring Loopback and Null Interfaces

Release	Modification
Release 5.0.0	This feature was introduced on the Cisco NCS 6000 Series Router.

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.

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

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 processor (RP) switchover 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 NCS 6000 Series 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 RP 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 switchover, 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 switchover. The routers use nonstop forwarding (NSF) over bundles and tunnels through the switchover of the host RP.

Note The user need not configure anything to guarantee that the standby interface configurations are maintained.

Note 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.

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.

Note 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** *interface-path-id*
3. **ipv4 address** *ip-address*
4. Do one of the following:

   - **end**
   - **commit**

5. **show interfaces** *type interface-path-id*

DETAILED STEPS

	Command or Action	**Purpose**
Step 1	configure	Enters XR configuration mode.
	Example:	

	Command or Action	**Purpose**
	`RP/0/RP0/CPU0:router# configure`	
Step 2	**interface loopback** *interface-path-id* **Example:** `RP/0/RP0/CPU0:router#(config)# interface Loopback 3`	Enters interface configuration mode and names the new loopback interface.
Step 3	**ipv4 address** *ip-address* **Example:** `RP/0/RP0/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 **ipv4 address** configuration command.

Step 4	Do one of the following:
	
	     • **end**
	     • **commit**
	
	 Example:
	
	 `RP/0/RP0/CPU0:router(config-if)# end`
	
	 Example:
	 Example:
	
	 `RP/0/RP0/CPU0:router(config-if)# commit`
		Saves configuration changes.
		
		 • 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 XR EXEC mode.
		     • Entering **no** exits the configuration session and returns the router to XR 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.

Step 5	**show interfaces** *type interface-path-id* **Example:** `RP/0/RP0/CPU0:router# show interfaces Loopback 3`	(Optional) Displays the configuration of the loopback interface.

Configuring Null Interfaces

This task explains how to configure a basic null interface.

SUMMARY STEPS

    1. **configure**

   2. **interface null 0**

   3. Do one of the following:

      • **end**

      •

      • **commit**

   4. **show interfaces null 0**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**configure** **Example:** `RP/0/RP0/CPU0:router# configure`	Enters XR configuration mode.
Step 2	**interface null 0** **Example:** `RP/0/RP0/CPU0:router#(config)# interface null 0`	Enters null0 interface configuration mode.

Step 3	Do one of the following:
	
	  • **end**
	  •
	  • **commit**
	
	Example:
	
	`RP/0/RP0/CPU0:router(config-null0)# end`
	
	Example:
	Example:
	
	`RP/0/RP0/CPU0:router(config-null0)# commit`
		Saves configuration changes.
		
		  • 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 XR EXEC mode.
		    • Entering **no** exits the configuration session and returns the router to XR 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.

Step 4	**show interfaces null 0** **Example:** `RP/0/RP0/CPU0:router# show interfaces null0`	Verifies the configuration of the null interface.

Configuring Virtual IPv4 Interfaces

This task explains how to configure an IPv4 virtual interface.

SUMMARY STEPS

1. **configure**
2. **ipv4 address virtual address** *ipv4 address/mask*
3. Do one of the following:
   - **end**
   -
   - **commit**

DETAILED STEPS

	Command or Action	**Purpose**
Step 1	**configure** **Example:** `RP/0/RP0/CPU0:router# configure`	Enters XR configuration mode.
Step 2	**ipv4 address virtual address** *ipv4 address/mask* **Example:** `RP/0/RP0/CPU0:router(config)# ipv4 virtual address 10.3.32.154/8`	Defines an IPv4 virtual address for the management Ethernet interface.

Step 3	Do one of the following:
	   • **end**
	   •
	   • **commit**
	
	Example:
	
	`RP/0/RP0/CPU0:router(config-null0)# end`
	
	Example:
	Example:
	
	`RP/0/RP0/CPU0:router(config-null0)# commit`
		Saves configuration changes.
		
		• 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 XR EXEC mode.
		  • Entering **no** exits the configuration session and returns the router to XR 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.

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)# 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
```