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 (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.

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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 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.

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.

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. 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.

Procedure

Step 1 **configure**

Example:

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

Enters global configuration mode.

Step 2 **interface loopback** *instance*

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 100.100.100.69 255.255.255.255
```

Assigns an IP address and subnet mask to the virtual loopback interface using the **ipv4 address** configuration command.

Step 4 **end** or **commit**

Example:

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

or

```
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 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.

Step 5 **show interfaces***type instance*

Example:

```
RP/0/RP0/CPU0:router# show interfaces Loopback0
```

(Optional) Displays the configuration of the loopback interface.

Example

This example shows how to configure a loopback interface:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface Loopback0
RP/0/RP0/CPU0:router(config-if)# ipv4 address 100.100.100.69 255.255.255.255
RP/0/RP0/CPU0:router(config-if)# ipv6 address 100::69/128
RP/0/RP0/CPU0:router(config-if)# end
Uncommitted changes found, commit them? [yes]: yes
RP/0/RP0/CPU0:router# show interfaces Loopback0

Loopback0 is up, line protocol is up
  Interface state transitions: 1
  Hardware is Loopback interface(s)
  Internet address is 100.100.100.69/32
  MTU 1500 bytes, BW 0 Kbit
     reliability Unknown, txload Unknown, rxload Unknown
  Encapsulation Loopback,  loopback not set,
  Last link flapped 01:57:47
  Last input Unknown, output Unknown
  Last clearing of "show interface" counters Unknown
  Input/output data rate is disabled.
```

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 unreachables** command. With the **ipv4 unreachables** command, if the software receives a non-broadcast 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 **ipv4 unreachables** command is enabled. If we do not want ICMP to send protocol unreachable, then we need to configure using the **ipv4 icmp unreachable disable** command.

The Null 0 interface is created by default during boot process and cannot be removed. The **ipv4 unreachables** 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.

Configuring Null Interfaces

This task explains how to configure a basic null interface.

Procedure

Step 1 **configure**

Example:

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

Enters global configuration mode.

Step 2 **interface null 0**

Example:

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

Enters the null 0 interface configuration mode.

Step 3 **ipv4 icmp unreachables disable**

Example:

```
RP/0/RP0/CPU0:router(config-null0)# ipv4 icmp unreachables disable
```

This command disables the generation of IPv4 Internet Control Message Protocol (ICMP) unreachable messages.

Step 4 **end** or **commit**

Example:

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

or

```
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 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.

Step 5 **show interfaces null 0**

Example:

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

Verifies the configuration of the null interface.

Example

This example shows 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 icmp unreachables disable
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
Interface state transitions: 1
Hardware is Null interface
Internet address is Unknown
MTU 1500 bytes, BW 0 Kbit
reliability 255/255, txload Unknown, rxload Unknown
Encapsulation Null, loopback not set,
Last link flapped 4d20h
Last input never, output never
Last clearing of "show interface" counters 05:42:04
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 Virtual IPv4 Interfaces

This task explains how to configure an IPv4 virtual interface.

Procedure

Step 1 **configure**

Example:

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

Enters global configuration mode.

Step 2 **ipv4 virtual address** *ipv4-*

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.

Note
While configuring the IPv4 virtual address, ensure that you match the IP address on the Management interface in the same network.

Step 3 **end** or **commit**

Example:

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

or

```
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 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.

Example

This is an example for configuring a virtual IPv4 interface:

```
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
```