Integrated Routing and Bridging Commands

This module describes the commands to configure Integrated Routing and Bridging (IRB) on the Cisco ASR 9000 Series Router.

To use commands of this module, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using any command, contact your AAA administrator for assistance.

interface bvi

To create a bridge-group virtual interface (BVI), use the **interface bvi** command in Global Configuration mode. To delete the BVI, use the **no** form of this command.

interface bvi *identifier*

Syntax Description

identifier	Number for the BVI interface from 1 to 65535.

Command Default

No BVI interface is configured.

Command Modes

Global Configuration mode

Command History

Release	Modification
Release 4.0.1	This command was introduced.

Usage Guidelines

The BVI is a virtual interface within the router that acts like a normal routed interface. The BVI does not support bridging itself, but acts as a gateway for the corresponding bridge-domain to a routed interface within the router.

Aside from supporting a configurable MAC address, a BVI supports only Layer 3 attributes, and has the following characteristics:

- Uses a MAC address taken from the local chassis MAC address pool, unless overridden at the BVI interface.
- Is configured as an interface type using the **interface bvi** command and uses an IPv4 or IPv6 address that is in the same subnet as the hosts on the segments of the bridged domain. The BVI also supports secondary addresses.
- The BVI identifier is independent of the bridge-domain identifier. These identifiers do not need to correlate like they do in Cisco IOS software.
- Is associated to a bridge group using the **routed interface bvi** command.
- The following interface commands are supported on a BVI:
  - **arp purge-delay**
  - **arp timeout**
  - **bandwidth** (The default is 10 Gbps and is used as the cost metric for routing protocols for the BVI.)
  - **ipv4**
  - **ipv6** (Supported on Gigabit Ethernet line cards only in Cisco IOS XR Release 4.1)
  - **mac-address**
  - **mtu** (The default is 1514 bytes.)
  - **shutdown**

- The BVI supports IP helper addressing and secondary IP addressing.

To display bridge group, bridge-domain, interface status, line protocol state, and packet counters for the specified BVI, use the **show l2vpn bridge domain interface bvi** form of the **show l2vpn bridge domain (VPLS)** command. To display the reason that a BVI is down, you can use the **detail** keyword option.

Task ID

Task ID	Operation
interface	read, write

The following example shows how to create a BVI interface and configure its IPv4 address:

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# interface bvi 50
RP/0/RSP0/CPU0:router(config-if)# ipv4 address 10.10.0.4 255.255.255.0
RP/0/RSP0/CPU0:router(config-if)# commit
```

Related Commands

Command	Description
routed interface bvi, on page 4	Associates the specified bridge group virtual interface (BVI) as the routed interface for the interfaces assigned to the bridge domain.
show interfaces bvi, on page 5	Displays interface status, line protocol state, and packet counters for the specified BVI.

routed interface bvi

To associate the specified bridge group virtual interface (BVI) as the routed interface for the interfaces assigned to the bridge domain, use the **routed interface bvi** command in L2VPN bridge group bridge domain configuration mode. To remove the BVI as the routed interface for the interfaces assigned to the bridge domain, use the **no** form of this command.

routed interface bvi *identifier*

Syntax Description

identifier	Number for the BVI interface from 1 to 65535.

Command Default

No routed interface is configured.

Command Modes

L2VPN bridge group bridge domain configuration mode (config-l2vpn-bg-bd)

Command History

Release	Modification
Release 4.0.1	This command was introduced.

Usage Guidelines

- Only one BVI can be configured in any bridge domain.
- The same BVI can not be configured in multiple bridge domains.

Task ID

Task ID	Operation
l2vpn	read, write

The following example shows association of a BVI interface numbered “50” on the bridge domain named “IRB”:

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# l2vpn
RP/0/RSP0/CPU0:router(config-l2vpn)# bridge group 10
RP/0/RSP0/CPU0:router(config-l2vpn-bg)# bridge-domain IRB
RP/0/RSP0/CPU0:router(config-l2vpn-bg-bd)# routed interface bvi 50
RP/0/RSP0/CPU0:router(config-l2vpn-bg-bd)# commit
```

Related Commands

Command	Description
interface bvi, on page 2	Creates a BVI interface.
show interfaces bvi, on page 5	Displays interface status, line protocol state, and packet counters for the specified BVI.

show interfaces bvi

To display interface status, line protocol state, and packet counters for the specified BVI, use the **show interfaces bvi** command in EXEC mode.

show interfaces bvi *identifier* [**accounting** | **brief** | **description** | **detail** | **location** *location*]

Syntax Description

identifier	Number for the BVI interface from 1 to 65535.
accounting	(Optional) Displays the number of packets of each protocol type that have been sent through the interface.
brief	(Optional) Displays summary information about the interface.
description	(Optional) Displays summary status information and the description for the interface.
detail	(Optional) Displays detailed information about the interface. This is the default.
location *location*	(Optional) Displays information the interface on the specified node. The *location* argument is entered in the *rack/slot/module* notation.

Command Default

Detailed information about the BVI interface is displayed.

Command Modes

EXEC mode

Command History

Release	Modification
Release 4.0.1	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operation
interface	read

The following example shows sample output for the **show interfaces bvi** command:

```
RP/0/RSP0/CPU0:router# show interfaces bvi 50
Wed Feb 16 16:05:11.508 PST
BVI50 is up, line protocol is up
  Interface state transitions: 3
  Hardware is Bridge-Group Virtual Interface, address is 0000.0000.0002
  Description: IRB Routed Example
  Internet address is 172.16.0.1/24
  MTU 9014 bytes, BW 10000000 Kbit (Max: 10000000 Kbit)
     reliability 255/255, txload 0/255, rxload 0/255
  Encapsulation ARPA,  loopback not set,
  ARP type ARPA, ARP timeout 04:00:00
  Last input 00:00:37, output 00:00:00
  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
```

```
25643 packets input, 1641152 bytes, 0 total input drops
0 drops for unrecognized upper-level protocol
Received 0 broadcast packets, 25445 multicast packets
208 packets output, 9472 bytes, 0 total output drops
Output 8 broadcast packets, 0 multicast packets
```

Table 1: show interfaces bvi Field Descriptions

Field	Description
BVI*x* is	Displays the state of the specified BVI interface, where *x* is the number of the interface. The possible values are: administratively down, down, or up.
line protocol is	Displays the stateof the line protocol for the BVI interface. The possible values are: administratively down, down, or up. **Note** The line protocol state is not the same as the protocol state displayed in the **show ip interfaces** command, because it is the state of Layer 2 (media) rather than Layer 3 (IP protocol).
Interface state transitions:	Displays the number of times the interface has changed states.
Hardware is	Displays Bridge-Group Virtual Interface for a BVI.
address is	Layer 2 MAC address of the BVI.
Description:	Displays the description of the interface when configured.
Internet address is *n.n.n.n*/*n*	Layer 3 IP address of the BVI in dotted decimal format.
MTU	Displays the maximum transmission unit (MTU) for the interface. The MTU is the maximum packet size that can be transmitted over the interface. 1514 is the default.
BW *x* Kbit	Displays the current bandwidth of the interface in kilobits per second.
Max:	Displays the maximum bandwidth available on the interface in kilobits per second.
reliability	Displays the proportion of packets that are not dropped and do not have errors. **Note** The reliability is shown as a fraction of 255.

Field	Description
txload	Indicates the traffic flowing out of the interface as a proportion of the bandwidth. **Note** The txload is shown as a fraction of 255.
rxload	Indicates the traffic flowing into the interface as a proportion of the bandwidth. **Note** The rxload is shown as a fraction of 255.
Encapsulation	Layer 2 encapsulation on the interface.
loopback	Always displays “not set” for a BVI because loopbacks are not supported.
ARP type	Address Resolution Protocol (ARP) type used on the interface.
ARP timeout	ARP timeout in the format hours:mins:secs. This value is configurable using the **arp timeout** command.
Last input	Number of hours, minutes, and seconds since the last packet was successfully received by an interface and processed locally on the router. Useful for knowing when a dead interface failed.
output	Number of hours, minutes, and seconds since the last packet was successfully transmitted by the interface. Useful for knowing when a dead interface failed.
Last clearing of “show interface” counters	Time since the counters in this command were last cleared using the **clear counters** Exec command in hours:mins:secs.

Field	Description
5 minute input rate	Average number of bits and packets received per second in the last 5 minutes. If the interface is not in promiscuous mode, it senses network traffic that it sends and receives (rather than all network traffic). **Note** The 5-minute period referenced in the command output is a load interval that is configurable under the interface. The default value is 5 minutes. **Note** The 5-minute input should be used only as an approximation of traffic per second during a given 5-minute period. This rate is exponentially weighted average with a time constant of 5 minutes. A period of four time constants must pass before the average will be within two percent of the instantaneous rate of a uniform stream of traffic over that period.
5 minute output rate	Average number of bits and packets transmitted per second in the last 5 minutes. If the interface is not in promiscuous mode, it senses network traffic that it sends and receives (rather than all network traffic). **Note** The 5-minute period referenced in the command output is a load interval that is configurable under the interface. The default value is 5 minutes. **Note** The 5-minute output should be used only as an approximation of traffic per second during a given 5-minute period. This rate is exponentially weighted average with a time constant of 5 minutes. A period of four time constants must pass before the average will be within two percent of the instantaneous rate of a uniform stream of traffic over that period.
packets input	Number of packets received on the interface that were successfully delivered to higher layers.
bytes	Number of bytes received on the interface.
total input drops	Total number of valid packets that were dropped after they were received. This includes packets that were dropped due to configured quality of service (QoS) or access control list (ACL) policies. This does not include drops due to unknown Layer 3 protocol.

Field	Description
drops for unrecognized upper-level protocol	Total number of packets that could not be delivered because the necessary protocol was not configured on the interface.
Received *x* broadcast packets	Total number of Layer 2 broadcast packets received on the interface. This is a subset of the total input packet count.
multicast packets	Total number of Layer 2 multicast packets received on the interface. This is a subset of the total input packet count.
packets output	Number of packets sent from the interface.
bytes	Total number of bytes successfully sent from the interface.
total output drops	Number of packets that were dropped before being transmitted.
Output *x* broadcast packets	Number of Layer 2 broadcast packets transmitted on the interface. This is a subset of the total output packet count.
multicast packets	Total number of Layer 2 multicast packets received on the interface. This is a subset of the total output packet count.

Related Commands

Command	Description
interface bvi, on page 2	Creates a BVI interface.