



Bidirectional Forwarding Detection Commands on the Cisco ASR 9000 Series Router

This module provides command line interface (CLI) commands for configuring Bidirectional Forwarding Detection (BFD) on the Cisco ASR 9000 Series Aggregation Services Routers.

address-family ipv4 unicast (BFD)

To enable Bidirectional Forwarding Detection (BFD) fast-detection on a specific IPV4 unicast destination address prefix and on the forwarding next-hop address, use the **address-family ipv4 unicast** command in static route configuration mode. To return the router to the default setting, use the **no** form of this command.

address-family ipv4 unicast *address nexthop* **bfd fast-detect** [**minimum interval** *interval*]
[**multiplier** *multiplier*]

no address-family ipv4 unicast *address nexthop* **bfd fast-detect** [**minimum interval** *interval*]
[**multiplier** *multiplier*]

Syntax Description		
	<i>address</i>	Specifies the IPv4 unicast destination address and prefix on which to enable BFD fast-detection.
	<i>nexthop</i>	Specifies the next-hop address on which to enable BFD fast-detection.
	bfd fast-detect	Enables BFD fast-detection on the specified IPV4 unicast destination address prefix and on the forwarding next-hop address.
	minimum interval <i>interval</i>	(Optional) Ensures that the next hop is assigned with the same hello interval. Replace <i>interval</i> with a number that specifies the interval in milliseconds. Range is from 10 through 10000.
	multiplier <i>multiplier</i>	(Optional) Ensures that the next hop is assigned with the same detect multiplier. Replace <i>multiplier</i> with a number that specifies the detect multiplier. Range is from 1 through 10.

Command Default	
	<i>interval</i> : 100
	<i>multiplier</i> : 3

Command Modes	
	Static route configuration mode

Command History.	Release	Modification
	Release 3.7.2	This command was introduced on the Cisco ASR 9000 Series Router.

Usage Guidelines	
	To use this command, you must be in a user group associated with a task group that includes the proper task IDs. If you suspect user group assignment is preventing you from using a command, contact your AAA administrator.
	If the multiplier is changed using the bfd multiplier command, the new parameter is used to update all existing BFD sessions for the protocol (BGP, IS-IS, MPLS-TE, or OSPF).

Task ID	Task ID	Operations
	static	read, write

Examples

The following example shows how to enable BFD on a static route. In this example, BFD sessions are established with the next-hop 3.3.3.3 when it becomes reachable.

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# router static
RP/0/RSP0/CPU0:router (config-static)# address-family ipv4 unicast 2.2.2.0/24 3.3.3.3 bfd
fast-detection
```

Related Commands

Command	Description
bfd fast-detect	Enables BFD for communication failure detection.
show bfd	Displays BFD information.

bfd

To enter Bidirectional Forwarding Detection (BFD) configuration mode, use the **bfd** command in global configuration mode. To exit BFD configuration mode and return to global configuration mode, use the **no** form of this command.

bfd

no bfd

Syntax Description This command has no arguments or keywords.

Command Default No default behavior or values

Command Modes Global configuration

Command History	Release	Modification
	Release 3.7.2	This command was introduced on the Cisco ASR 9000 Series Router.

Usage Guidelines To use this command, you must be in a user group associated with a task group that includes the proper task IDs. If you suspect user group assignment is preventing you from using a command, contact your AAA administrator.

When you issue the **bfd** command in global configuration mode, the CLI prompt changes to “config-bfd,” indicating that you have entered BFD configuration mode. In the following sample output, the question mark (?) online help function displays all the commands available under BFD configuration mode:

```
RP/0/RSP0/CPU0:router(config)# bfd
RP/0/RSP0/CPU0:router(config-bfd)#?
  commit      Commit the configuration changes to running
  describe    Describe a command without taking real actions
  do          Run an exec command
  echo        Configure BFD echo parameters
  exit        Exit from this submode
  interface   Configure BFD on an interface
  no          Negate a command or set its defaults
  root        Exit to the global configuration mode
  show        Show contents of configuration
```

Task ID	Task ID	Operations
	bgp	read, write
	ospf	read, write
	isis	read, write
	mpls-te	read, write

Examples

The following example shows how to enter BFD configuration mode:

```
RP/0/RSP0/CPU0:router # configure
RP/0/RSP0/CPU0:router(config)# bfd
RP/0/RSP0/CPU0:router(config-bfd)#
```

Related Commands

Command	Description
echo disable	Disables echo mode on an individual interface or on the entire router.
interface (BFD)	Enters BFD interface configuration mode.
show bfd	Displays BFD information.

bfd address-family ipv4 destination

To specify the destination address for BFD sessions on bundle member links, use the **bfd address-family ipv4 destination** command in interface configuration mode. To return to the default, use the **no** form of this command.

bfd address-family ipv4 destination *ip-address*

no bfd address-family ipv4 destination *ip-address*

Syntax Description	<i>ip-address</i>	32-bit IPv4 address in dotted-decimal format (A.B.C.D).
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Command Default	No destination IPv4 address is configured.
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Command Modes	Interface configuration
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Command History	Release	Modification
	Release 4.0.1	This command was introduced on the Cisco ASR 9000 Series Router.

Usage Guidelines	To use this command, you must be in a user group associated with a task group that includes the proper task IDs. If you suspect user group assignment is preventing you from using a command, contact your AAA administrator.
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This command is supported on bundle interfaces only.

Task ID	Task ID	Operations
	bundle	read, write

Examples	The following example specifies the IPv4 address of 10.20.20.1 as the destination address for the BFD session on an Ethernet bundle interface:
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```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# interface Bundle-Ether 1
RP/0/RSP0/CPU0:router (config-if)# bfd address-family ipv4 destination 10.20.20.1
```

The following example specifies the IPv4 address of 10.20.20.1 as the destination address for the BFD session on a POS bundle interface:

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# interface Bundle-POS 1
RP/0/RSP0/CPU0:router (config-if)# bfd address-family ipv4 destination 10.20.20.1
```

Related Commands	Command	Description
	bfd address-family ipv4 fast-detect	Enables IPv4 BFD sessions on bundle member links.

bfd address-family ipv4 fast-detect

To enable IPv4 BFD sessions on bundle member links, use the **bfd address-family ipv4 fast-detect** command in interface configuration mode. To return to the default, use the **no** form of this command.

bfd address-family ipv4 fast-detect

no bfd address-family ipv4 fast-detect

Syntax Description This command has no arguments or keywords.

Command Default BFD sessions are disabled.

Command Modes Interface configuration

Command History	Release	Modification
	Release 4.0.1	This command was introduced on the Cisco ASR 9000 Series Router.

Usage Guidelines To use this command, you must be in a user group associated with a task group that includes the proper task IDs. If you suspect user group assignment is preventing you from using a command, contact your AAA administrator.

This command is supported on bundle interfaces only.

Task ID	Task ID	Operations
	bundle	read, write

Examples The following example enables IPv4 BFD sessions on member links of an Ethernet bundle:

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# interface Bundle-Ether 1
RP/0/RSP0/CPU0:router (config-if)# bfd address-family ipv4 fast-detect
```

The following example enables IPv4 BFD sessions on member links of a POS bundle:

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# interface Bundle-POS 1
RP/0/RSP0/CPU0:router (config-if)# bfd address-family ipv4 fast-detect
```

Related Commands

Command	Description
bfd address-family ipv4 destination	Specifies the destination address for the BFD session on a bundle member link.

bfd address-family ipv4 minimum-interval

To specify the minimum interval for asynchronous mode control packets on IPv4 BFD sessions on bundle member links, use the **bfd address-family ipv4 minimum-interval** command in interface configuration mode. To return to the default, use the **no** form of this command.

bfd address-family ipv4 minimum-interval *milliseconds*

no bfd address-family ipv4 minimum-interval [*milliseconds*]

Syntax Description

milliseconds

Shortest interval between sending BFD control packets to a neighbor. The range is 15 to 30000 milliseconds.

Note Although the command allows you to configure a minimum of 15 ms, the supported minimum on the Cisco ASR 9000 Series Router is 50 ms.

Command Default

The default is 150 ms.

Command Modes

Interface configuration

Command History

Release	Modification
Release 4.0.1	This command was introduced on the Cisco ASR 9000 Series Router.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes the proper task IDs. If you suspect user group assignment is preventing you from using a command, contact your AAA administrator.

This command is supported on bundle interfaces only.

The BFD minimum interval is used with a configurable multiplier (**bfd address-family ipv4 multiplier** command) to determine the intervals and failure detection times for both control and echo packets in asynchronous mode on bundle member links.

For example, with a session interval of I and a multiplier of M , the following packet intervals and failure detection times apply for BFD asynchronous mode:

- Value of I —Minimum period between sending of BFD control packets.
- Value of $I \times M$
 - BFD control packet failure detection time. This is the maximum amount of time that can elapse without receipt of a BFD control packet before the session is declared down.
 - Minimum period between sending of BFD echo packets.
- Value of $(I \times M) \times M$ —BFD echo packet failure detection time. This is the maximum amount of time that can elapse without receipt of a BFD echo packet before the session is declared down.

When used with bundled VLANs, the following restrictions apply:

- The command specifies control packet intervals only because echo packets are not supported.
- The minimum interval is 250 ms.

The **bfd address-family ipv4 minimum-interval** command in bundle interface configuration overrides the minimum intervals specified by the **bfd minimum-interval** command in other areas of BFD configuration.



Note

When multiple applications share the same BFD session, the application with the most aggressive timer is used locally. Then, the result is negotiated with the peer router.

Keep the following router-specific rules in mind when configuring the minimum BFD interval:

- The maximum rate in packets-per-second (pps) for BFD sessions is linecard-dependent. If you have multiple linecards supporting BFD, then the maximum rate for BFD sessions per system is the supported linecard rate multiplied by the number of linecards.
 - The maximum rate for BFD sessions per linecard is 9600 pps.
- The maximum number of BFD sessions per linecard is 1250.

Calculating the Rate for BFD Sessions on Bundle Members

To calculate the rate for BFD sessions on bundle members running in asynchronous mode without echo:

- Divide 1000 by the value of the minimum interval (as specified by the **bfd address-family ipv4 minimum-interval** command). This is also the base rate used per member session with echo:

$$\text{Asynchronous rate per bundle member} = (1000 / \text{Min-interval})$$

To calculate the rate for BFD sessions on bundle members running in asynchronous mode with echo:

- Determine the echo interval, which is the value of the minimum interval (specified by the **bfd address-family ipv4 minimum-interval** command) multiplied by the multiplier value (specified by the **bfd address-family ipv4 multiplier** command).

$$\text{Echo interval} = (\text{Min-interval} \times \text{Multiplier})$$

- Calculate the overall rate supported for all members on the bundle:

$$\text{Ethernet bundle rate} = (1000 / \text{Echo interval}) \times 64$$

- Add the asynchronous base rate per bundle member to find the total rate for all bundle links:

$$\text{Total bundle rate} = \text{Ethernet bundle rate} + (\text{Base asynchronous rate} \times \text{Number of links})$$

Task ID	Task ID	Operations
	bundle	read, write

Examples

The following example specifies that control packets will be sent at a minimum interval of 200 ms for IPv4 BFD sessions on member links of an Ethernet bundle:

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# interface Bundle-Ether 1
RP/0/RSP0/CPU0:router (config-if)# bfd address-family ipv4 minimum-interval 200
```

Related Commands	Command	Description
	bfd minimum-interval	Specifies the minimum control packet interval on BFD sessions for the corresponding BFD configuration scope.
	bfd address-family ipv4 multiplier	Specifies a number that is used as a multiplier with the minimum interval to determine BFD control and echo packet failure detection times and echo packet transmission intervals for IPv4 BFD sessions on bundle member links.

bfd address-family ipv4 multiplier

To specify a number that is used as a multiplier with the minimum interval to determine BFD control and echo packet failure detection times and echo packet transmission intervals for IPv4 BFD sessions on bundle member links, use the **bfd address-family ipv4 multiplier** command in interface configuration mode. To return to the default, use the **no** form of this command.

bfd address-family ipv4 multiplier *multiplier*

no bfd address-family ipv4 multiplier [*multiplier*]

Syntax Description	<i>multiplier</i>	Number from 2 to 50.
		Note Although the command allows you to configure a minimum of 2, the supported minimum is 3.

Command Default The default multiplier is 3.

Command Modes Interface configuration

Command History	Release	Modification
	Release 4.0.1	This command was introduced on the Cisco ASR 9000 Series Router.

Usage Guidelines To use this command, you must be in a user group associated with a task group that includes the proper task IDs. If you suspect user group assignment is preventing you from using a command, contact your AAA administrator.

This command is supported on bundle interfaces only.

The BFD multiplier is used with a configurable minimum interval (**bfd address-family ipv4 minimum-interval** command) to determine the intervals and failure detection times for both control and echo packets in asynchronous mode on bundle member links.

For example, with a session interval of *I* and a multiplier of *M*, the following packet intervals and failure detection times apply for BFD asynchronous mode:

- Value of *I*—Minimum period between sending of BFD control packets.
- Value of *I* x *M*
 - BFD control packet failure detection time. This is the maximum amount of time that can elapse without receipt of a BFD control packet before the session is declared down.
 - Minimum period between sending of BFD echo packets.



Note The maximum echo packet interval for BFD on bundle member links is the minimum of either 30 seconds or the asynchronous control packet failure detection time.

- Value of $(I \times M) \times M$ —BFD echo packet failure detection time. This is the maximum amount of time that can elapse without receipt of a BFD echo packet before the session is declared down.

Keep the following router-specific rules in mind when configuring the minimum BFD interval:

- The maximum rate in packets-per-second (pps) for BFD sessions is linecard-dependent. If you have multiple linecards supporting BFD, then the maximum rate for BFD sessions per system is the supported linecard rate multiplied by the number of linecards.
 - The maximum rate for BFD sessions per linecard is 9600 pps.
- The maximum number of BFD sessions per linecard is 1250.

Calculating the Rate for BFD Sessions on Bundle Members

To calculate the rate for BFD sessions on bundle members running in asynchronous mode without echo:

- Divide 1000 by the value of the minimum interval (as specified by the **bfd address-family ipv4 minimum-interval** command). This is also the base rate used per member session with echo:

Asynchronous rate per bundle member = $(1000 / \text{Min-interval})$

To calculate the rate for BFD sessions on bundle members running in asynchronous mode with echo:

- Determine the echo interval, which is the value of the minimum interval (specified by the **bfd address-family ipv4 minimum-interval** command) multiplied by the multiplier value (specified by the **bfd address-family ipv4 multiplier** command).

Echo interval = $(\text{Min-interval} \times \text{Multiplier})$

- Calculate the overall rate supported for all members on the bundle:

Ethernet bundle rate = $(1000 / \text{Echo interval}) \times 64$

- Add the asynchronous base rate per bundle member to find the total rate for all bundle links:

Total bundle rate = Ethernet bundle rate + $(\text{Base asynchronous rate} \times \text{Number of links})$

Task ID

Task ID	Operations
bundle	read, write

Examples

The following example specifies the following packet intervals and failure detection times for IPv4 BFD sessions on member links with asynchronous echo mode on an Ethernet bundle:

- 200 ms control packet interval
- 600 ms control packet failure detection interval
- 600 ms echo packet interval
- 1800 ms echo packet failure detection interval

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# interface Bundle-Ether 1
RP/0/RSP0/CPU0:router (config-if)# bfd address-family ipv4 minimum-interval 200
RP/0/RSP0/CPU0:router (config-if)# bfd address-family ipv4 multiplier 3
```

Related Commands

Command	Description
<code>bfd address-family ipv4 minimum-interval</code>	Specifies the minimum interval for asynchronous mode control packets on IPv4 BFD sessions on bundle member links.
<code>bfd minimum-interval</code>	Specifies the minimum control packet interval on BFD sessions for the corresponding BFD configuration scope.

bfd address-family ipv4 timers

To configure timers to allow for delays in receipt of BFD state change notifications (SCNs) from peers before declaring a link bundle BFD session down for IPv4 BFD sessions on bundle member links, use the **bfd address-family ipv4 timers** command in interface configuration mode. To return to the default, use the **no** form of this command.

bfd address-family ipv4 timers [**start** | **nbr-unconfig**] *seconds*

no bfd address-family ipv4 timers [**start** | **nbr-unconfig**] *seconds*

Syntax Description	start <i>seconds</i>	Number of seconds after startup of a BFD member link session to wait for the expected notification from the BFD peer to be received, so that the session can be declared up. If the SCN is not received after that period of time, the BFD session is declared down. The range is 60 to 3600.
	Note	In Cisco IOS XR Releases 4.0 and 4.0.1, the available minimum is 30, but is not recommended.
Syntax Description	nbr-unconfig <i>seconds</i>	Number of seconds to wait after receipt of notification that the BFD configuration has been removed by a BFD neighbor, so that any configuration inconsistency between the BFD peers can be fixed. If the BFD configuration issue is not resolved before the specified timer is reached, the BFD session is declared down. The range is 60 to 3600.
	Note	In Cisco IOS XR Releases 4.0 and 4.0.1, the available minimum is 30, but is not recommended.

Command Default No timers are configured.

Command Modes Interface configuration

Command History	Release	Modification
	Release 4.0.1	This command was introduced on the Cisco ASR 9000 Series Router.

Usage Guidelines To use this command, you must be in a user group associated with a task group that includes the proper task IDs. If you suspect user group assignment is preventing you from using a command, contact your AAA administrator.

This command is supported on bundle interfaces only.

Task ID	Task ID	Operations
	bundle	read, write

Examples

The following example configures a timer for members of the specified Ethernet bundle that allows up to 1 minute (60 seconds) after startup of a BFD member link session to wait for receipt of the expected notification from the BFD peer to declare the session up:

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# interface Bundle-Ether 1
RP/0/RSP0/CPU0:router (config-if)# bfd address-family ipv4 timers start 60
```

The following example configures a timer for members of the specified Ethernet bundle that allows up to 1 minute (60 seconds) to wait after receipt of notification that the BFD configuration has been removed by a BFD neighbor, before declaring a BFD session down:

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# interface Bundle-Ether 1
RP/0/RSP0/CPU0:router (config-if)# bfd address-family ipv4 timers nbr-unconfig 60
```

bfd fast-detect

To enable Bidirectional Forwarding Detection (BFD) to detect failures in the path between adjacent forwarding engines, use the **bfd fast-detect** command in the appropriate configuration mode. To return the software to the default state in which BFD is not enabled, use the **no** form of this command.

bfd fast-detect [**disable** | **ipv4**]

no bfd fast-detect

Syntax Description

disable	Disables the detection of failures in the path between adjacent forwarding engines for a specified entity, such as a BGP neighbor or OSPF interface. Note The disable keyword is available in the following modes only: BGP configuration, OSPF area configuration, OSPF area interface configuration, OSPFv3 area configuration, and OSPFv3 area interface configuration.
ipv4	Enables Intermediate System-to-Intermediate System (IS-IS) BFD detection of failures in the path between adjacent forwarding engines. Note The ipv4 keyword is available in IS-IS router configuration mode only.

Command Default

BFD detection of failures in the path between adjacent forwarding engines is disabled.

Command Modes

BGP router configuration mode

Neighbor configuration
Session group configuration
Neighbor group configuration

IS-IS router configuration mode

Interface configuration

MPLS TE configuration mode

Interface configuration

OSPF router configuration mode

Router configuration
Area configuration
Area interface configuration

OSPFv3 router configuration mode

Router configuration
Area configuration
Area interface configuration

Router PIM configuration mode

Interface configuration

Command History

Release	Modification
Release 3.7.2	This command was introduced on the Cisco ASR 9000 Series Router.
Release 4.0.0	The bfd fast-detect command was supported on the Cisco ASR 9000 Series Router in the following modes: OSPFv3 router configuration, OSPFv3 area configuration, and OSPFv3 area interface configuration.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes the proper task IDs. If you suspect user group assignment is preventing you from using a command, contact your AAA administrator.

**Note**

BFD is supported on IPv4 directly connected external BGP peers.

Use the **bfd fast-detect** command to provide protocol- and media-independent, short-duration failure detection of the path between adjacent forwarding engines, including the interfaces and data links.

BFD must be configured on directly connected neighbors for a BFD session to be established between the neighbors.

When MPLS-TE tunnels are protected by backup tunnels, BFD failure triggers fast reroute on affected tunnels.

In OSPF and OSPFv3 environments, the setting of the **bfd fast-detect** command is inherited from the highest-level configuration mode in which the command was configured. From the lowest to the highest configuration modes, the inheritance rules are as follows:

- If you enable BFD in area interface configuration mode, it is enabled on the specified interface only.
- If you enable BFD in area configuration mode, it is enabled on all interfaces in the specified area.
- If you enable BFD in router configuration mode, it is enabled on all areas and all associated interfaces in the specified routing process.

The **disable** keyword is available in the following modes: BGP configuration, OSPF area configuration, OSPF area interface configuration, OSPFv3 area configuration, and OSPFv3 area interface configuration. In OSPF and OSPFv3 environments, the **disable** option enables you to override the inheritance rules described previously. For example, if you enable BFD in an OSPF area, BFD is enabled on all interfaces in that area. If you do not want BFD running on one of the interfaces in that area, you must specify the **bfd fast-detect disable** command for that interface only.

To disable BFD or return the software to the default state in which BFD is not enabled in IS-IS router configuration mode and MPLS-TE configuration mode, you must enter the **no bfd fast-detect** command.

Task ID

Task ID	Operations
bgp	read, write
isis	read, write
mpls-te	read, write
ospf	read, write
multicast	read, write

Examples

The following example shows how to configure BFD on a BGP router:

```
RP/0/RSP0/CPU0:router # configure
RP/0/RSP0/CPU0:router(config)# router bgp 65000
RP/0/RSP0/CPU0:router(config-bgp)# neighbor 192.168.70.24
RP/0/RSP0/CPU0:router(config-bgp-nbr)# remote-as 2
RP/0/RSP0/CPU0:router(config-bgp-nbr)# bfd fast-detect
```

The following example shows the configuration of an OSPFv3 routing process named `san_jose`. The example shows two areas, each of which includes Gigabit Ethernet interfaces. In area 0, BFD is enabled at the area level, which means that by virtue of the inheritance rules, BFD is enabled on all interfaces within the area except those on which BFD is explicitly disabled. Given this rule, BFD is enabled on Gigabit Ethernet interfaces 1/0/0/0 and 2/0/0/0 and is disabled on interface 3/0/0/0.

In area 1, BFD is enabled on Gigabit Ethernet interface 5/0/0/0 only. Because BFD is not enabled at the area level nor explicitly enabled on interface 4/0/0/0, it is disabled on this interface.

```
router ospfv3 san_jose
  area 0
    bfd fast-detect
    ...
    int gige 1/0/0/0
    !
    int gige 2/0/0/0
    ...
    int gige 3/0/0/0
      bfd fast-detect disable
  !
  area 1
    int gige 4/0/0/0
    !
    int gige 5/0/0/0
      bfd fast-detect
    !
  !
```

Related Commands

Command	Description
address-family ipv4 unicast (BFD)	Enables BFD fast-detection, and sets the BFD interval and multiplier for a static route.
bfd minimum-interval	Sets the BFD interval.
bfd multiplier	Sets the BFD multiplier.
show bfd	Displays BFD information.

bfd minimum-interval

To specify the minimum control packet interval for BFD sessions for the corresponding BFD configuration scope, use the **bfd minimum-interval** command in the appropriate configuration mode. To return the router to the default setting, use the **no** form of this command.

bfd minimum-interval *milliseconds*

no bfd minimum-interval [*milliseconds*]

Syntax Description

<i>milliseconds</i>	Interval between sending BFD hello packets to the neighbor. The range is 15 to 30000 milliseconds. For MPLS-TE, the range is 15 to 200 milliseconds.
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Command Default

BGP *interval*: 50 milliseconds
 IS-IS *interval*: 150 milliseconds
 OSPF and OSPFv3 *interval*: 150 milliseconds
 MPLS-TE *interval*: 15 milliseconds
 PIM *interval*: 150 milliseconds

Command Modes

BGP configuration mode
 Router configuration

IS-IS configuration mode
 Interface configuration

MPLS-TE configuration mode
 MPLS TE configuration

OSPF router configuration mode
 Router configuration
 Area configuration
 Area interface configuration

OSPFv3 router configuration mode
 Router configuration
 Area configuration
 Area interface configuration

Router PIM configuration mode
 Interface configuration

Command History

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

Release 4.0.0

The **bfd minimum-interval** command was supported on the Cisco ASR 9000 Series Router in the following modes: OSPFv3 router configuration, OSPFv3 area configuration, and OSPFv3 area interface configuration.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes the proper task IDs. If you suspect user group assignment is preventing you from using a command, contact your AAA administrator.

In OSPF and OSPFv3 environments, the setting of the **bfd minimum-interval** command is inherited from the highest-level configuration mode in which the command was configured. From the lowest to the highest configuration modes, the inheritance rules are as follows:

- If you configure the minimum interval in area interface configuration mode, the updated interval affects the BFD sessions on the specified interface only.
- If you configure the minimum interval in area configuration mode, the updated interval affects the BFD sessions on all interfaces in the specified area.
- If you configure the minimum interval in router configuration mode, the updated interval affects the BFD sessions in all areas and all associated interfaces in the specified routing process.

If desired, you can override these inheritance rules by explicitly configuring the **bfd minimum-interval** command for a specific area interface or area.



Note

When multiple applications share the same BFD session, the application with the most aggressive timer wins locally. Then, the result is negotiated with the peer router.

Keep the following router-specific rules in mind when configuring the minimum BFD interval:

- The maximum rate in packets-per-second (pps) for BFD sessions is linecard-dependent. If you have multiple linecards supporting BFD, then the maximum rate for BFD sessions per system is the supported linecard rate multiplied by the number of linecards.
 - The maximum rate for BFD sessions per linecard is 9600 pps.
- If a session is running in asynchronous mode without echo, then PPS used for this session is (1000 / asynchronous interval in milliseconds).
- If a session is running in asynchronous mode with echo, then PPS used for this session is (1000 / echo interval in milliseconds).

This is calculated as: 1000 / value of the **bfd minimum-interval** command.



Note

The rate for BFD sessions on bundle member links is calculated differently. For more information, see the **bfd address-family ipv4 minimum-interval** command.

- The maximum number of BFD sessions per linecard is 1250.
- When asynchronous mode is available on the Cisco ASR 9000 Series Router, the minimum interval must be greater than or equal to 15 milliseconds for up to 100 sessions on the line card. If you are running the maximum of 1250 sessions, the failure detection interval must be greater than or equal to 150 milliseconds.

- When echo mode is available on the Cisco ASR 9000 Series Router, the minimum interval must be greater than or equal to 15 milliseconds for up to 100 sessions on the line card. If you are running the maximum of 1250 sessions, the failure detection interval must be less than or equal to 150 milliseconds.

Task ID	Task ID	Operations
	bgp	read, write
	isis	read, write
	mpls-te	read, write
	ospf	read, write
	multicast	read, write

Examples

The following example shows how to set the BFD minimum interval for a BGP routing process:

```
RP/0/RSP0/CPU0:router(config)# router bgp 6500
RP/0/RSP0/CPU0:router(config-bgp)# bfd minimum-interval 275
```

The following example shows the configuration of an OSPFv3 routing process named san_jose. The example shows two areas, each of which includes Gigabit Ethernet interfaces. In area 0, the minimum interval is set to 200 at the area level, which means that by virtue of the inheritance rules, the same value is set on all interfaces within the area except those on which a different value is explicitly configured. Given this rule, Gigabit Ethernet interface 1/0/0/0 uses the interval of 200, which is inherited from the area, while interface 2/0/0/0 uses the explicitly configured value of 300.

In area 1, the minimum interval is not configured at the area or interface levels, which means that interfaces 3/0/0/0 and 4/0/0/0 use the default interval of 150.

```
router ospfv3 san_jose
  bfd fast-detect
  area 0
    bfd minimum-interval 200
    int gige 1/0/0/0
    !
    int gige 2/0/0/0
    bfd minimum-interval 300
    !
  !
  area 1
    int gige 3/0/0/0
    !
    int gige 4/0/0/0
    !
  !
```

■ bfd minimum-interval

Related Commands	Command	Description
	address-family ipv4 unicast (BFD)	Enables BFD fast-detection, and sets the BFD interval and multiplier for a static route.
	bfd fast-detect	Enables BFD for communication failure detection.
	bfd multiplier	Sets the BFD multiplier.
	show bfd	Displays BFD information.

bfd multiplier

To set the Bidirectional Forwarding Detection (BFD) multiplier, use the **bfd multiplier** command in the appropriate configuration mode. To return the router to the default setting, use the **no** form of this command.

bfd multiplier *multiplier*

no bfd multiplier [*multiplier*]

Syntax Description	<i>multiplier</i>	Number of times a packet is missed before BFD declares the neighbor down. The ranges are as follows:
		<ul style="list-style-type: none"> BGP—2 to 16 IS-IS—2 to 50 MPLS-TE—2 to 10 OSPF and OSPFv3—2 to 50 PIM—2 to 50

Command Default The default multiplier is 3.

Command Modes	BGP configuration mode Router configuration IS-IS configuration mode Interface configuration MPLS-TE configuration mode MPLS-TE configuration OSPF router configuration mode Router configuration Area configuration Area interface configuration OSPFv3 router configuration mode Router configuration Area configuration Area interface configuration Router PIM configuration mode Interface configuration
---------------	--

Command History.

Release	Modification
Release 3.7.2	This command was introduced on the Cisco ASR 9000 Series Router.
Release 4.0.0	The bfd multiplier command was supported on the Cisco ASR 9000 Series Router in the following modes: OSPFv3 router configuration, OSPFv3 area configuration, and OSPFv3 area interface configuration.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes the proper task IDs. If you suspect user group assignment is preventing you from using a command, contact your AAA administrator.

In OSPF and OSPFv3 environments, the setting of the **bfd multiplier** command is inherited from the highest-level configuration mode in which the command was configured. From the lowest to the highest configuration modes, the inheritance rules are as follows:

- If you configure a multiplier in area interface configuration mode, the updated multiplier affects the BFD sessions on the specified interface only.
- If you configure a multiplier in area configuration mode, the updated multiplier affects the BFD sessions on all interfaces in the specified area.
- If you configure a multiplier in router configuration mode, the updated multiplier affects the BFD sessions in all areas and all associated interfaces in the specified routing process.

If desired, you can override these inheritance rules by explicitly configuring the **bfd multiplier** command for a specific area interface or area.

If the multiplier is changed using the **bfd multiplier** command, the new value is used to update all existing BFD sessions for the protocol (BGP, IS-IS, MPLS-TE, OSPF, or OSPFv3).

Task ID

Task ID	Operations
bgp	read, write
isis	read, write
mpls-te	read, write
ospf	read, write
multicast	read, write

Examples

The following example shows how to set the BFD multiplier in a BGP routing process:

```
RP/0/RSP0/CPU0:router(config)# router bgp 65000
RP/0/RSP0/CPU0:router(config-bgp)# bfd multiplier 2
```

The following example shows the configuration of an OSPFv3 routing process named san_jose. The example shows two areas, each of which includes Gigabit Ethernet interfaces. In area 0, the multiplier is set to 5 at the area level, which means that by virtue of the inheritance rules, the same value is set on all interfaces within the area except those on which a different value is explicitly configured. Given this rule, Gigabit Ethernet interface 1/0/0/0 uses a multiplier of 5, which is inherited from the area, while interface 2/0/0/0 uses the explicitly configured multiplier of 2.

In area 1, a multiplier is not configured at the area or interface levels, which means that interfaces 3/0/0/0 and 4/0/0/0 use the default value of 3.

```
router ospfv3 san_jose
  bfd fast-detect
  area 0
    bfd multiplier 5
    int gige 1/0/0/0
    !
    int gige 2/0/0/0
      bfd multiplier 2
    !
  !
  area 1
    int gige 3/0/0/0
    !
    int gige 4/0/0/0
    !
  !
```

Related Commands

Command	Description
address-family ipv4 unicast (BFD)	Enables BFD fast-detection, and sets the BFD interval and multiplier for a static route.
bfd fast-detect	Enables BFD for communication failure detection.
bfd minimum-interval	Sets the BFD interval.
show bfd	Displays BFD information.

clear bfd counters

To clear Bidirectional Forwarding Detection (BFD) counters, use the **clear bfd counters** command in EXEC mode.

```
clear bfd counters [ipv4 | ipv6 | all] [packet] [timing] [interface type interface-path-id] location
node-id
```

Syntax Description	
ipv4	(Optional) Clears BFD over IPv4 information only.
ipv6	(Optional) Clears BFD over IPv6 information only.
all	(Optional) Clears both BFD over IPv4 and BFD over IPv6 information.
packet	(Optional) Specifies that packet counters are cleared.
timing	(Optional) Specifies that timing counters are cleared.
interface	(Optional) Specifies the interface from which the BFD packet counters are cleared.
<i>type</i>	Specifies the interface type. For more information, use the question mark (?) online help function.
<i>interface-path-id</i>	Physical interface or virtual interface. Note Use the show interfaces command to see a list of all interfaces currently configured on the router. For more information about the syntax for the router, use the question mark (?) online help function.
location <i>node-id</i>	Clears BFD counters from the specified location. The <i>node-id</i> argument is entered in the <i>rack/slot/module</i> notation.

Command Default The default is the default address family identifier (AFI) that is set by the **set default-afi** command, IPv4 or IPv6.

Command Modes EXEC

Command History	Release 3.7.2	This command was introduced on the Cisco ASR 9000 Series Router.
	Release 4.0.0	Support for the ipv6 keyword was added.

Usage Guidelines To use this command, you must be in a user group associated with a task group that includes the proper task IDs. If you suspect user group assignment is preventing you from using a command, contact your AAA administrator.

For the *interface-path-id* argument, use the following guidelines:

- If specifying a physical interface, the naming notation is *rack/slot/module/port*. The slash between values is required as part of the notation. An explanation of each component of the naming notation is as follows:

- *rack*: Chassis number of the rack.
 - *slot*: Physical slot number of the line card.
 - *module*: Module number. A physical layer interface module (PLIM) is always 0.
 - *port*: Physical port number of the interface.
 - If specifying a virtual interface, the number range varies, depending on interface type.
- Both IPv4 and IPv6 BFD sessions can run simultaneously on the same line card.

Task ID

Examples

The following example shows how to clear the BFD IPv6 packet counters on a POS interface:

```
RP/0/RP0/CPU0:router# clear bfd counters packet ipv6 interface POS 0/1/0/0 location 0/1/cpu0
```

The following example shows how to clear the BFD IPv4 timing counters:

```
RP/0/RSP0/CPU0:router# clear bfd counters ipv4 timing location 0/5/cpu0
```

Related Commands

Command	Description
bfd fast-detect	Enables BFD for communication failure detection.
bfd minimum-interval	Sets the BFD interval.
bfd multiplier	Sets the BFD multiplier.
show bfd	Displays BFD information.

dampening (BFD)

To specify delays for BFD session startup, use the **dampening** command in Bidirectional Forwarding Detection (BFD) configuration mode. To return to the default, use the **no** form of this command.

dampening [**bundle-member**]{**initial-wait** | **maximum-wait** | **secondary-wait**} *milliseconds*

no dampening [**bundle-member**]{**initial-wait** | **maximum-wait** | **secondary-wait**} *milliseconds*

Syntax Description

bundle-member	(Optional) Specifies initial, maximum, or secondary delays in milliseconds for BFD session startup on BFD bundle members.
initial-wait	Specifies the initial delay in milliseconds before starting a BFD session. For bundle members, the default is 16000. For non-bundle interfaces, the default is 2000.
maximum-wait	Specifies the maximum delay in milliseconds before starting a BFD session. For bundle members, the default is 600000. For non-bundle interfaces, the default is 12000.
secondary-wait	Specifies a secondary delay in milliseconds before starting a BFD session. For bundle members, the default is 20000. For non-bundle interfaces, the default is 5000.
<i>milliseconds</i>	Number from 1 to 3600000.

Command Default

When dampening is not configured, the default delay is 5 seconds before a down BFD session can transition to INIT state.

Command Modes

BFD configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced on the Cisco ASR 9000 Series Router.
Release 4.0.1	The bundle-member keyword was added.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes the proper task IDs. If you suspect user group assignment is preventing you from using a command, contact your AAA administrator.

Task ID

Task ID	Operations
bgp	read, write
ospf	read, write
isis	read, write
mpls-te	read, write

Examples

The following example shows how to configure an initial and maximum delay for BFD session startup on BFD bundle members:

```
RP/0/RSP0/CPU0:router # configure
RP/0/RSP0/CPU0:router(config)# bfd
RP/0/RSP0/CPU0:router(config-bfd)# dampening bundle-member initial-wait 8000
RP/0/RSP0/CPU0:router(config-bfd)# dampening bundle-member maximum-wait 15000
```

The following example shows how to change the default initial-wait for BFD on a non-bundle interface:

```
RP/0/RSP0/CPU0:router # configure
RP/0/RSP0/CPU0:router(config)# bfd
RP/0/RSP0/CPU0:router(config-bfd)# dampening initial-wait 30000
```

Related Commands

Command	Description
bfd	Enters BFD configuration mode.
show bfd	Displays BFD information.

echo disable

To disable echo mode on a router or on an individual interface or bundle, use the **echo disable** command in Bidirectional Forwarding Detection (BFD) configuration mode. To return the router to the default configuration where echo mode is enabled, use the **no** form of this command.

echo disable

no echo disable

Syntax Description This command has no arguments or keywords.

Command Default No default behavior or values

Command Modes BFD configuration
BFD interface configuration

Command History	Release	Modification
	Release 3.7.2	This command was introduced on the Cisco ASR 9000 Series Router.

Usage Guidelines To use this command, you must be in a user group associated with a task group that includes the proper task IDs. If you suspect user group assignment is preventing you from using a command, contact your AAA administrator.

If you are using BFD with Unicast Reverse Path Forwarding (uRPF), you need to use the **echo disable** command to disable echo mode; otherwise, echo packets are rejected.



Note

To enable or disable IPv4 uRPF checking on an IPv4 interface, use the **[no] ipv4 verify unicast source reachable-via** command in interface configuration mode. To enable or disable loose IPv6 uRPF checking on an IPv6 interface, use the **[no] ipv6 verify unicast source reachable-via any** command in interface configuration mode.

Task ID	Task ID	Operations
	bgp	read, write
	ospf	read, write
	isis	read, write
	mpls-te	read, write

Examples The following example shows how to disable echo mode on a router:

```
RP/0/RSP0/CPU0:router # configure
RP/0/RSP0/CPU0:router(config)# bfd
RP/0/RSP0/CPU0:router(config-bfd)# echo disable
```

The following example shows how to disable echo mode on an individual interface:

```
RP/0/RSP0/CPU0:router # configure
RP/0/RSP0/CPU0:router(config)# bfd
RP/0/RSP0/CPU0:router(config-bfd)# interface gigabitethernet 0/1/0/0
RP/0/RSP0/CPU0:router(config-bfd-if)# echo disable
```

Related Commands

Command	Description
bfd	Enters BFD configuration mode.
interface (BFD)	Enters BFD interface configuration mode.
ipv4 verify unicast source reachable-via any	Enables and disables IPv4 uRPF checking on an IPv4 interface.
ipv6 verify unicast source reachable-via any	Enables and disables loose IPv6 uRPF checking on an IPv6 interface.
show bfd	Displays BFD information.

echo ipv4 source

To specify the IP address that you want to use as the source address for BFD echo packets, use the **echo ipv4 source** command in BFD or BFD interface configuration mode. To return to the default, use the **no** form of this command.

echo ipv4 source *ip-address*

no echo ipv4 source *ip-address*

Syntax Description

<i>ip-address</i>	32-bit IPv4 address in dotted-decimal format (A.B.C.D).
-------------------	---

Command Default

The IP address of the output interface, or the IP address in the **router-id** command (if configured), is the default address used for an echo packet when the **echo ipv4 source** command is not configured.

Command Modes

BFD configuration
BFD interface configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes the proper task IDs. If you suspect user group assignment is preventing you from using a command, contact your AAA administrator.

If you do not configure the IPv4 source address for echo packets, then BFD uses the IP address of the output interface or the address in the **router-id** command if specified.

You can override the default address for BFD echo packets by specifying an IPv4 source address for echo packets globally for all BFD sessions on the router and at an individual interface. Specifying the IP address at an individual interface will override any value specified globally for BFD on the router.

Task ID

Task ID	Operations
bgp	read, write
ospf	read, write
isis	read, write
mpls-te	read, write

Examples

The following example shows how to specify the IP address 10.10.10.1 as the source address for BFD echo packets for all BFD sessions on the router:

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# bfd
RP/0/RSP0/CPU0:router(config-bfd)# echo ipv4 source 10.10.10.1
```

The following example shows how to specify the IP address 10.10.10.1 as the source address for BFD echo packets on an individual Gigabit Ethernet interface:

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# bfd
RP/0/RSP0/CPU0:router(config-bfd)# interface gigabitethernet 0/1/0/0
RP/0/RSP0/CPU0:router(config-bfd-if)# echo ipv4 source 10.10.10.1
```

The following example shows how to specify the IP address 10.10.10.1 as the source address for BFD echo packets on an individual Packet-over-SONET (POS) interface:

```
RP/0/RSP0/CPU0:router # configure
RP/0/RSP0/CPU0:router(config)# bfd
RP/0/RSP0/CPU0:router(config-bfd)# interface pos 0/1/0/0
RP/0/RSP0/CPU0:router(config-bfd-if)# echo ipv4 source 10.10.10.1
```

Related Commands

Command	Description
bfd	Enters BFD configuration mode.
echo disable	Disables echo mode on an individual interface or on the entire router.

echo latency detect

To enable latency detection for BFD echo packets, use the **echo latency detect** command in BFD configuration mode. To return to the default, use the **no** form of this command.

echo latency detect [**percentage** *percent-value* [**count** *packet-count*]]

no echo latency detect [**percentage** *percent-value* [**count** *packet-count*]]

Syntax Description

percentage <i>percent-value</i>	(Optional) Percentage of the echo failure detection time to be detected as bad latency. The range is 100 to 250. The default is 100.
count <i>packet-count</i>	(Optional) Number of consecutive packets received with the detected bad latency that will take down a BFD session. The range is 1 to 10. The default is 1.

Command Default

Echo latency detection is disabled.

Command Modes

BFD configuration

Command History

Release	Modification
Release 4.0.1	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes the proper task IDs. If you suspect user group assignment is preventing you from using a command, contact your AAA administrator.



Note

Latency detection is only valid where echo mode is supported for BFD. However, it is not supported on bundle interfaces.

Without latency detection, standard BFD echo failure detection tracks only the absence of receipt of echo packets within a period of time based on a counter. However, this standard echo failure detection does not address latency between transmission and receipt of any specific echo packet, which can build beyond desired tolerances over the course of the BFD session.

When latency detection is enabled, a percentage is multiplied to the echo failure detection value ($I \times M \times \%$), and the roundtrip delay is computed for the echo packet. If this delay is greater than ($I \times M \times \%$), then the BFD session is taken down.

If you have specified a packet count, then the system tracks the number of packets received back-to-back with bad latency before taking down the session.

Task ID	Task ID	Operations
	bgp	read, write
	ospf	read, write
	isis	read, write
	mpls-te	read, write

Examples

In the following examples, consider that the BFD minimum interval is 50 ms, and the multiplier is 3 for the BFD session.

The following example shows how to enable echo latency detection using the default values of 100% of the echo failure period (I x M) for a packet count of 1. In this example, when one echo packet is detected with a roundtrip delay greater than 150 ms, the session is taken down:

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# bfd
RP/0/RSP0/CPU0:router(config-bfd)# echo latency detect
```

The following example shows how to enable echo latency detection based on 200% (two times) of the echo failure period for a packet count of 1. In this example, when one packet is detected with a roundtrip delay greater than 300 ms, the session is taken down:

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# bfd
RP/0/RSP0/CPU0:router(config-bfd)# echo latency detect percentage 200
```

The following example shows how to enable echo latency detection based on 100% of the echo failure period for a packet count of 3. In this example, when three consecutive echo packets are detected with a roundtrip delay greater than 150 ms, the session is taken down:

```
RP/0/RSP0/CPU0:router # configure
RP/0/RSP0/CPU0:router(config)# bfd
RP/0/RSP0/CPU0:router(config-bfd)# echo latency detect percentage 100 count 3
```

Related Commands

Command	Description
bfd	Enters BFD configuration mode.
bfd minimum-interval	Specifies the minimum control packet interval for BFD sessions for the corresponding BFD configuration scope.
bfd multiplier	Specifies the number of times a packet is missed before BFD declares the neighbor down.
echo startup validate	Enables verification of the echo packet path before starting a BFD session.

echo startup validate

To enable verification of the echo packet path before starting a BFD session, use the **echo startup validate** command in BFD configuration mode. To return to the default, use the **no** form of this command.

echo startup [force]

no echo startup [force]

Syntax Description	force (Optional) Ignores the remote 'Required Min Echo RX Interval' setting.
---------------------------	---

Command Default	Echo startup validation is disabled.
------------------------	--------------------------------------

Command Modes	BFD configuration
----------------------	-------------------

Command History	Release	Modification
	Release 4.0.1	This command was introduced.

Usage Guidelines	To use this command, you must be in a user group associated with a task group that includes the proper task IDs. If you suspect user group assignment is preventing you from using a command, contact your AAA administrator.
-------------------------	---



Note

Echo validation is only valid where echo mode is supported for BFD. However, it is not supported on bundle interfaces.

When a BFD session is down and the **echo startup validate** command is configured, an echo packet is periodically transmitted on the link while it is down to verify successful transmission within the configured latency before allowing the BFD session to change state.

Without the **force** option, the echo validation test only runs if the last received control packet contains a non-zero "Required Min Echo RX Interval" value. When the **force** keyword is configured, the echo validation test runs regardless of this value.

Task ID	Task ID	Operations
	bgp	read, write
	ospf	read, write
	isis	read, write
	mpls-te	read, write

Examples

The following example shows how to enable echo startup validation for BFD sessions on non-bundle interfaces if the last received control packet contains a non-zero “Required Min Echo RX Interval” value:

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# bfd
RP/0/RSP0/CPU0:router(config-bfd)# echo startup validate
```

The following example shows how to enable echo startup validation for BFD sessions on non-bundle interfaces regardless of the “Required Min Echo RX Interval” value in the last control packet:

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# bfd
RP/0/RSP0/CPU0:router(config-bfd)# echo startup validate force
```

Related Commands

Command	Description
bfd	Enters BFD configuration mode.
echo latency detect	Enables latency detection for BFD echo packets.

interface (BFD)

To enter Bidirectional Forwarding Detection (BFD) interface configuration mode, where you can disable echo mode on an interface, use the **interface** command in BFD configuration mode. To return to BFD configuration mode, use the **no** form of this command.

```
interface type interface-path-id
```

```
no interface type interface-path-id
```

Syntax Description

<i>type</i>	Interface type. For more information, use the question mark (?) online help function.
<i>interface-path-id</i>	Physical interface or virtual interface.
	Note Use the show interfaces command to see a list of all interfaces currently configured on the router.
	For more information about the syntax for the router, use the question mark (?) online help function.

Command Default

No default behavior or values

Command Modes

BFD configuration

Command History

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

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes the proper task IDs. If you suspect user group assignment is preventing you from using a command, contact your AAA administrator.

For the *interface-path-id* argument, use the following guidelines:

- If specifying a physical interface, the naming notation is *rack/slot/module/port*. The slash between values is required as part of the notation. An explanation of each component of the naming notation is as follows:
 - *rack*: Chassis number of the rack.
 - *slot*: Physical slot number of the line card.
 - *module*: Module number. A physical layer interface module (PLIM) is always 0.
 - *port*: Physical port number of the interface.
- If specifying a virtual interface, the number range varies, depending on interface type.

If you are using BFD with Unicast Reverse Path Forwarding (uRPF) on a particular interface, then you need to use the **echo disable** command in BFD interface configuration mode to disable echo mode on that interface; otherwise, echo packets are rejected by the interface.

**Note**

To enable or disable IPv4 uRPF checking on an IPv4 interface, use the **[no] ipv4 verify unicast source reachable-via** command in interface configuration mode. To enable or disable loose IPv6 uRPF checking on an IPv6 interface, use the **[no] ipv6 verify unicast source reachable-via any** command in interface configuration mode.

Task ID

Task ID	Operations
bgp	read, write
ospf	read, write
isis	read, write
mpls-te	read, write

Examples

The following example shows how to enter BFD interface configuration mode for a Gigabit Ethernet interface:

```
RP/0/RSP0/CPU0:router # configure
RP/0/RSP0/CPU0:router(config)# bfd
RP/0/RSP0/CPU0:router(config-bfd)# interface gigabitethernet 0/1/0/0
RP/0/RSP0/CPU0:router(config-bfd-if)#
```

The following example shows how to enter BFD interface configuration mode for a Packet-over-SONET/SDH (POS) interface:

```
RP/0/RSP0/CPU0:router # configure
RP/0/RSP0/CPU0:router(config)# bfd
RP/0/RSP0/CPU0:router(config-bfd)# interface pos 0/1/0/0
RP/0/RSP0/CPU0:router(config-bfd-if)#
```

Related Commands

Command	Description
bfd	Enters BFD configuration mode.
echo disable	Disables echo mode on an individual interface or on the entire router.
ipv4 verify unicast source reachable-via	Enables and disables IPv4 uRPF checking on an IPv4 interface.
ipv6 verify unicast source reachable-via any	Enables and disables loose IPv6 uRPF checking on an IPv6 interface.
show bfd	Displays BFD information.

ipv6 checksum

To enable and disable IPv6 checksum calculations on BFD UDP packets globally or on a BFD interface, use the **ipv6 checksum** command in Bidirectional Forwarding Detection (BFD) or BFD interface configuration mode. To return to the default, use the **no** form of this command.

BFD Configuration

ipv6 checksum disable

no ipv6 checksum disable

BFD Interface Configuration

ipv6 checksum [disable]

no ipv6 checksum [disable]

Syntax Description	disable	(Optional for BFD interface configuration only) Disables IPv6 checksum calculations.
---------------------------	----------------	--

Command Default	IPv6 checksum calculations on BFD UDP packets is disabled.
------------------------	--

Command Modes	BFD configuration BFD interface configuration
----------------------	--

Command History	Release	Modification
	Release 4.0.0	This command was introduced on the Cisco ASR 9000 Series Router.

Usage Guidelines	To use this command, you must be in a user group associated with a task group that includes the proper task IDs. If you suspect user group assignment is preventing you from using a command, contact your AAA administrator.
-------------------------	---

IPv6 checksum calculations for UDP packets are disable by default for BFD sessions. You can enable IPv6 checksum support either globally for all BFD sessions, or on an individual interface.

Task ID	Task ID	Operations
	bgp	read, write
	ospf	read, write
	isis	read, write
	mpls-te	read, write

Examples

The following example shows how to enable IPv6 checksum calculations for UDP packets for all BFD sessions on the router:

```
RP/0/RSP0/CPU0:router # configure
RP/0/RSP0/CPU0:router(config)# bfd
RP/0/RSP0/CPU0:router(config-bfd)# no ipv6 checksum disable
```

The following example shows how to disable IPv6 checksum calculations for UDP packets for all BFD sessions on the router:

```
RP/0/RSP0/CPU0:router # configure
RP/0/RSP0/CPU0:router(config)# bfd
RP/0/RSP0/CPU0:router(config-bfd)# ipv6 checksum disable
```

The following example shows how to enable echo mode for BFD sessions on an individual interface:

```
RP/0/RSP0/CPU0:router # configure
RP/0/RSP0/CPU0:router(config)# bfd
RP/0/RSP0/CPU0:router(config-bfd)# interface gigabitethernet 0/1/0/0
RP/0/RSP0/CPU0:router(config-bfd-if)# ipv6 checksum
```

The following example shows how to disable echo mode for BFD sessions on an individual interface:

```
RP/0/RSP0/CPU0:router # configure
RP/0/RSP0/CPU0:router(config)# bfd
RP/0/RSP0/CPU0:router(config-bfd)# interface gigabitethernet 0/1/0/0
RP/0/RSP0/CPU0:router(config-bfd-if)# ipv6 checksum disable
```

Related Commands

Command	Description
bfd	Enters BFD configuration mode.
interface (BFD)	Enters BFD interface configuration mode.
show bfd	Displays BFD information.

show bfd

To display Bidirectional Forwarding Detection (BFD) information for a specific location, use the **show bfd** command in EXEC mode.

```
show bfd [ipv4 | ipv6 | all] [location node-id]
```

Syntax Description	
ipv4	(Optional) Displays BFD over IPv4 information only.
ipv6	(Optional) Displays BFD over IPv6 information only.
all	(Optional) Displays both BFD over IPv4 and BFD over IPv6 information.
location <i>node-id</i>	Displays BFD information for the specified location. The <i>node-id</i> argument is entered in the <i>rack/slot/module</i> notation.

Command Default The default is the default address family identifier (AFI) that is set by the **set default-afi** command, IPv4 or IPv6.

Command Modes EXEC

Command History	Release	Modification
	Release 3.7.2	This command was introduced on the Cisco ASR 9000 Series Router.
	Release 4.0.0	Support for the ipv6 keyword was added.

Usage Guidelines To use this command, you must be in a user group associated with a task group that includes the proper task IDs. If you suspect user group assignment is preventing you from using a command, contact your AAA administrator.

Task ID	Task ID	Operations
	bgp	read
	ospf	read
	isis	read
	mpls-te	read

Examples The following example shows the output from the **show bfd** command:

```
RP/0/RP0/CPU0:router# show bfd
IPV4 Sessions Up: 0, Down: 0, Total: 0
```

The following example shows the output from the **show bfd all** command:

```
RP/0/RP0/CPU0:router# show bfd all
```

```
IPV4 Sessions Up: 0, Down: 1, Standby: 0, Total: 1
```

The following example shows the output from the **show bfd ipv4** command:

```
RP/0/RP0/CPU0:router# show bfd ipv4
```

```
IPV4 Sessions Up: 0, Down: 0, Total: 0
```

The following example shows the output from the **show bfd ipv6** command:

```
RP/0/RP0/CPU0:router# show bfd ipv6
```

```
IPV6 Sessions Up: 0, Down: 0, Total: 0
```

The following example shows the output from the **show bfd ipv4 location** command:

```
RP/0/RP0/CPU0:router# show bfd ipv4 location 0/3/cpu0
```

```
IPV4 Sessions Up: 0, Down: 1, Standby: 0, Total: 1
```

Related Commands

Command	Description
bfd fast-detect	Enables BFD for communication failure detection.
bfd minimum-interval	Sets the BFD interval.
bfd multiplier	Sets the BFD multiplier.

show bfd client

To display Bidirectional Forwarding Detection (BFD) client information, use the **show bfd client** command in EXEC mode.

show bfd client [detail]

Syntax Description	detail	(Optional) Specifies detailed client information including number of sessions and client reconnects.
Command Default	Enter the show bfd client command without specifying the detail keyword to display summarized BFD client information.	
Command Modes	EXEC	
Command History	Release	Modification
	Release 3.7.2	This command was introduced on the Cisco ASR 9000 Series Router.
Usage Guidelines	To use this command, you must be in a user group associated with a task group that includes the proper task IDs. If you suspect user group assignment is preventing you from using a command, contact your AAA administrator.	
Task ID	Task ID	Operations
	bgp	read
	ospf	read
	isis	read
	mpls-te	read

Examples

The following example shows the output from the **show bfd client** command:

```
RP/0/RSP0/CPU0:router# show bfd client
```

```
Name           Node           Num sessions
-----
bgp             0/RSP0/CPU0  0
isis           0/RSP0/CPU0  0
isis           0/RSP0/CPU0  0
```

Table 1 describes the significant fields shown in the display.

Table 1 *show bfd client Field Descriptions*

Field	Description
Name	Name of the BFD client.
Node	Location of the BFD client.
Num sessions	Number of active sessions for the BFD client.

Related Commands

Command	Description
bfd fast-detect	Enables BFD for communication failure detection.
bfd minimum-interval	Sets the BFD interval.
bfd multiplier	Sets the BFD multiplier.
show bfd	Displays BFD information.

show bfd counters

To display Bidirectional Forwarding Detection (BFD) counter information, use the **show bfd counters** command in EXEC mode.

```
show bfd counters [ipv4 | ipv6 | all] packet [interface type interface-path-id] location node-id
```

Syntax Description

ipv4	(Optional) Displays BFD over IPv4 information only.
ipv6	(Optional) Displays BFD over IPv6 information only.
all	(Optional) Displays both BFD over IPv4 and BFD over IPv6 information.
packet	Specifies that packet counters are displayed.
interface	(Optional) Specifies the interface for which to show counters.
<i>type</i>	Interface type. For more information, use the question mark (?) online help function.
<i>interface-path-id</i>	Physical interface or virtual interface. Note Use the show interfaces command to see a list of all interfaces currently configured on the router. For more information about the syntax for the router, use the question mark (?) online help function.
location <i>node-id</i>	Displays BFD counters from the specified location. The <i>node-id</i> argument is entered in the <i>rack/slot/module</i> notation.

Command Default

The default is the default address family identifier (AFI) that is set by the **set default-afi** command, IPv4 or IPv6.

Command Modes

EXEC

Command History

Release	Modification
Release 3.7.2	This command was introduced on the Cisco ASR 9000 Series Router.
Release 4.0.0	Support for the ipv6 keyword was added.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes the proper task IDs. If you suspect user group assignment is preventing you from using a command, contact your AAA administrator.

For the *interface-path-id* argument, use the following guidelines:

- If specifying a physical interface, the naming notation is *rack/slot/module/port*. The slash between values is required as part of the notation. An explanation of each component of the naming notation is as follows:
 - *rack*: Chassis number of the rack.

- *slot*: Physical slot number of the line card.
- *module*: Module number. A physical layer interface module (PLIM) is always 0.
- *port*: Physical port number of the interface.
- If specifying a virtual interface, the number range varies, depending on interface type.

Task ID	Task ID	Operations
	bgp	read
	ospf	read
	isis	read
	mpls-te	read

Examples

The following example shows the output from the **show bfd counters packet** command for both IPv4 and IPv6:

```
RP/0/RP0/CPU0:router# show bfd counters packet all interface POS 0/1/0/0 location 0/1/cpu0

Mon Nov  5 08:49:51.950 UTC
IPv4:
-----
  POS 0/1/0/0          Recv      Xmit
  Async:              520        515      Echo:      9400      9400

IPv6:
-----
  POS 0/1/0/0          Recv      Xmit
  Async:              237        237      Echo:         0         0
```

The following example shows the output from the **show bfd counters packet** command for IPv4:

```
RP/0/RSP0/CPU0:Router# show bfd counters ipv4 packet
Mon Jul 19 11:42:57.138 DST
GigabitEthernet0/1/0/18 Recv      Xmit
  Async:              134591  128868      Echo:      4540723  4540723
GigabitEthernet0/1/0/23 Recv      Xmit
  Async:              128934  128876      Echo:      4540955  4540955
TenGigE0/4/0/0          Recv      Xmit
  Async:              128959  128875      Echo:      4541869  4541869
```

[Table 2](#) describes the significant fields shown in the display.

Table 2 *show bfd counters packet* Field Descriptions

Field	Description
Async	Number of asynchronous mode (control) packets that were received or transmitted on the specified interface.
Echo	Number of echo packets that were received or transmitted on the specified interface.

Related Commands

■ show bfd counters

Command	Description
bfd fast-detect	Enables BFD for communication failure detection.
bfd minimum-interval	Sets the BFD interval.
bfd multiplier	Sets the BFD multiplier.
show bfd	Displays BFD information.

show bfd mib session

To display IPv4 and IPv6 Bidirectional Forwarding Detection (BFD) MIB session information, use the **show bfd mib session** command in EXEC mode.

```
show bfd mib session [location node-id]
```

Syntax Description	location <i>node-id</i> (Optional) Displays all IPv4 and IPv6 BFD MIB session information stored on the specified node. The <i>node-id</i> argument is entered in the <i>rack/slot/module</i> notation.
---------------------------	--

Command Default	When <i>node-id</i> is not specified, information for all IPv4 and IPv6 BFD MIB sessions, stored on the route processor node, is displayed.
------------------------	---

Command Modes	EXEC
----------------------	------

Command History	Release	Modification
	Release 3.9.0	This command was introduced on the Cisco ASR 9000 Series Router.
	Release 4.0.0	Support for the display of IPv6 BFD MIB session information was added.

Usage Guidelines	To use this command, you must be in a user group associated with a task group that includes the proper task IDs. If you suspect user group assignment is preventing you from using a command, contact your AAA administrator.
-------------------------	---

When *node-id* is not specified, information for all IPv4 and IPv6 BFD MIB sessions, stored on the route processor node, is displayed, and this information is populated and updated only after SNMP operations for those BFD MIB sessions are performed.

When *node-id* is specified, information for all IPv4 and IPv6 BFD MIB sessions, stored on the specified node (linecard), is displayed, and this information is updated automatically without SNMP operations being performed.

Task ID	Task ID	Operations
	bgp	read
	ospf	read
	isis	read
	mpls-te	read

Examples	The following example displays all IPv4 and IPv6 BFD MIB session information stored on the RP node: RP/0/RSP0/CPU0:router# show bfd mib session
-----------------	---

■ show bfd mib session

```

Tue Sep  9 07:49:30.828 PST DST
Local Discr: 327681(0x50001), Remote Discr: 0(0x0)
BFD session: GigabitEthernet0_1_5_2(0x11800c0), 10.27.4.7
  Current State: ADMIN DOWN, Number of Times UP: 0
  Running Version: 0, Last Down Diag: None
  Last Up Time (s.ns): 0.0
  Last Down Time (s.ns): 0.0
  Detection Multiplier: 0
  Desired Min TX Interval: 0
  Required Min RX Interval: 0
  Required Min RX Echo Interval: 0
  Packets in/out: 0/0
  Current Trap Bitmap: 0x0
  Last Time Cached: Not yet cached

```

The following example displays all IPv4 and IPv6 BFD MIB session information stored on 0/1/CPU0:

```
RP/0/RSP0/CPU0:router# show bfd mib session location 0/1/CPU0
```

```

Tue Sep  9 07:44:49.190 PST DST
Local Discr: 327681(0x50001), Remote Discr: 0(0x0)
BFD session: GigabitEthernet0_1_5_2(0x11800c0), 10.27.4.7
  Number of times UP: 0
  Last Down Diag: None
  Last Up Time (s.ns): 0.0
  Last Down Time (s.ns): 0.0
  Packets in/out: 0/1140134

```

Table 3 describes the significant fields shown in the display.

Table 3 show bfd mib Field Descriptions

Field	Description
<i>date and timestamp</i>	Date and time stamp during which a snapshot of the BFD MIB session information is taken.
Local Discr	Local discriminator (in decimal and hexadecimal) that uniquely identifies the BFD MIB session.
Remote Discr	Session discriminator (in decimal and hexadecimal) that was chosen by the remote system for the BFD MIB session.
BFD session	Index of interface upon which the BFD MIB session is running. Also, neighboring IP address that is monitored with the BFD MIB session.
Current State	Current state of the BFD MIB session.
Number of Times UP	Number of times the BFD MIB session has gone into the up state since the router was last rebooted.
Running Version	BFD protocol version number in which the BFD MIB session is running.
Last Down Diag	Diagnostic value associated with the last time the BFD MIB session went down.
Last Up Time (s.ns)	Value of sysUpTime, in <i>seconds.nanoseconds</i> , during which the BFD MIB session last came up. If such an event does not exist, a zero is displayed.

Table 3 *show bfd mib Field Descriptions (continued)*

Field	Description
Last Down Time (s.ns)	Value of sysUpTime, in <i>seconds.nanoseconds</i> , during which communication was last lost with the neighbor. If such an event does not exist, a zero is displayed.
Detection Multiplier	Failure detection multiplier.
Desired Min TX Interval	Minimum interval, in microseconds, preferred by the local system when transmitting BFD control packets.
Required Min RX Interval	Minimum interval, in microseconds, that the local system supports between received BFD control packets.
Required Min RX Echo Interval	Minimum interval, in microseconds, that the local system supports between received BFD echo packets.
Packets in/out	Total number of BFD messages received and transmitted for the BFD MIB session.
Current Trap Bitmap	Bits that control the trap for the BFD MIB session. A nonzero value indicates that the trap is generated when the next trap event is triggered.
Last Time Cached	When information for the BFD MIB session was last cached. Typically, the information is cached when SNMP operations for the BFD MIB session are performed.

Related Commands

Command	Description
show bfd session	Displays BFD session information.

show bfd session

To display Bidirectional Forwarding Detection (BFD) session information, use the **show bfd session** command in EXEC mode.

```
show bfd [ipv4 | ipv6 | all] session [interface type interface-path-id [destination ip-address]
[detail]] [location node-id]
```

Syntax Description

ipv4	(Optional) Displays BFD over IPv4 information only.
ipv6	(Optional) Displays BFD over IPv6 information only.
all	(Optional) Displays both BFD over IPv4 and BFD over IPv6 information.
interface	(Optional) Specifies the interface for which to show information.
<i>type</i>	Interface type. For more information, use the question mark (?) online help function.
<i>interface-path-id</i>	Physical interface or virtual interface. Note Use the show interfaces command to see a list of all interfaces currently configured on the router. For more information about the syntax for the router, use the question mark (?) online help function.
destination ip-address	(Optional) Displays the BFD session destined for the specified IP address.
detail	(Optional) Displays detailed session information, including statistics and number of state transitions.
location node-id	(Optional) Displays BFD sessions hosted from the specified location. The <i>node-id</i> argument is entered in the <i>rack/slot/module</i> notation.

Command Default

The default is the default address family identifier (AFI) that is set by the **set default-afi** command, IPv4 or IPv6.

Command Modes

EXEC

Command History

Release	Modification
Release 3.7.2	This command was introduced on the Cisco ASR 9000 Series Router.
Release 4.0.0	Support for the ipv6 keyword was added.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes the proper task IDs. If you suspect user group assignment is preventing you from using a command, contact your AAA administrator.

For the *interface-path-id* argument, use the following guidelines:

- If specifying a physical interface, the naming notation is *rack/slot/module/port*. The slash between values is required as part of the notation. An explanation of each component of the naming notation is as follows:
 - *rack*: Chassis number of the rack.
 - *slot*: Physical slot number of the line card.
 - *module*: Module number. A physical layer interface module (PLIM) is always 0.
 - *port*: Physical port number of the interface.
- If specifying a virtual interface, the number range varies, depending on interface type.

Task ID	Task ID	Operations
	bgp	read
	ospf	read
	isis	read
	mpls-te	read

Examples

The following example shows the output from the **show bfd session** command with the **detail** keyword and IPv4 as the default:

```
RP/0/RP0/CPU0:router# show bfd session detail

I/f:TenGigE0/2/0/0.6, Location:0/2/CPU0, dest:10.0.6.2, src:10.0.6.1
State:UP for 0d:0h:3m:4s, number of times UP:1
Received parameters:
Version:1, desired tx interval:2 s, required rx interval:2 s
Required echo rx interval:1 ms, multiplier:3, diag:None
My discr:589830, your discr:590028, state UP, D/F/P/C/A:0/0/0/1/0
Transmitted parameters:
Version:1, desired tx interval:2 s, required rx interval:2 s
Required echo rx interval:1 ms, multiplier:3, diag:None
My discr:590028, your discr:589830, state UP, D/F/P/C/A:0/0/0/1/0
Timer Values:
Local negotiated async tx interval:2 s
Remote negotiated async tx interval:2 s
Desired echo tx interval:250 ms, local negotiated echo tx interval:250 ms
Echo detection time:750 ms(250 ms*3), async detection time:6 s(2 s*3)
Local Stats:
Intervals between async packets:
Tx:Number of intervals=100, min=952 ms, max=2001 ms, avg=1835 ms
   Last packet transmitted 606 ms ago
Rx:Number of intervals=100, min=1665 ms, max=2001 ms, avg=1828 ms
   Last packet received 1302 ms ago
Intervals between echo packets:
Tx:Number of intervals=100, min=250 ms, max=252 ms, avg=250 ms
   Last packet transmitted 188 ms ago
Rx:Number of intervals=100, min=250 ms, max=252 ms, avg=250 ms
   Last packet received 187 ms ago
Latency of echo packets (time between tx and rx):
Number of packets:100, min=1 ms, max=2 ms, avg=1 ms
Session owner information:
Client          Desired interval      Multiplier
-----
bgp-            250 ms                3
```

■ show bfd session

The following example shows the output from the **show bfd session** command with the **all** keyword, which displays both IPv4 and IPv6 information:

```
RP/0/RP0/CPU0:router# show bfd all session location 0/1/CPU0

Mon Nov  5 08:51:50.339 UTC
IPv4:
-----
Interface          Dest Addr          Local det time(int*mult)  State
                   Echo              Async
-----
PO0/1/0/0          10.0.0.2           300ms(100ms*3)          6s(2s*3)          UP

IPv6:
-----
Interface          Dest Addr          Local det time(int*mult)  State
                   Echo              Async
-----
PO0/1/0/0          abcd::2            0s(0s*0)                 15s(5s*3)          UP
```

Table 4 describes the significant fields shown in the display.

Table 4 show bfd session detail command Field Descriptions

Field	Description
I/f	Interface type.
Location	Location of the node that hosts the local endpoint of the connection, in the <i>rack/slot/module</i> notation
dest	IP address of the destination endpoint.
src	IP address of the source endpoint.
State	Current state of the connection, and the number of days, hours, minutes, and seconds that this connection has been active.
number of times UP	Number of times this connection has been brought up.
Received parameters	Provides information on the last transmitted control packet for the session: <ul style="list-style-type: none"> Version—Version number of the BFD protocol. desired tx interval—Desired transmit interval. required rx interval—Required receive interval. Required echo rx interval—Required echo receive interval. multiplier— Number of times a packets is missed before BFD declares the neighbor down. diag—diagnostic code specifying the peer system's reason for the last transition of the session from Up to some other state. My discr —unique, nonzero discriminator value generated by the transmitting system, used to demultiplex multiple BFD sessions between the same pair of systems. your discr— discriminator received from the corresponding remote system. This field reflects back the received value of My discr, or is zero if that value is unknown.

Table 4 *show bfd session detail command Field Descriptions (continued)*

Field	Description
Transmitted parameters	<p>Provides information on the last transmitted control packet for the session:</p> <ul style="list-style-type: none"> • Version—Version number of the BFD protocol. • desired tx interval—Desired transmit interval. • required rx interval—Required receive interval • Required echo rx interval—Required echo receive interval • multiplier— Number of times a packets is missed before BFD declares the neighbor down. • diag—diagnostic code specifying the local system's reason for the last transition of the session from Up to some other state. • My discr —unique, nonzero discriminator value generated by the transmitting system, used to demultiplex multiple BFD sessions between the same pair of systems. • your discr— discriminator received from the corresponding remote system. This field reflects back the received value of My discr, or is zero if that value is unknown.
Timer Values	<p>Provides information on the timer values used by the local and remote ends, as follows:</p> <ul style="list-style-type: none"> • Local negotiated async tx interval—interval at which control packets are being transmitted by the local end. • Remote negotiated async tx interval—interval at which control packets should be transmitted by the remote end. • Desired echo tx interval—interval at which the local end would like to transmit echo packets. • local negotiated echo tx interval—interval at which echo packets are being transmitted by the local end. • Echo detection time—local failure detection time of echo packets. It is the product of the local negotiated echo tx interval and the local multiplier. • async detection time—local failure detection time of the asynchronous mode (control packets). It is the product of the remote negotiated async tx interval and the remote multiplier.

Table 4 *show bfd session detail command Field Descriptions (continued)*

Field	Description
Local Stats	<p>Displays the local transmit and receive statistics,</p> <ul style="list-style-type: none"> • Intervals between async packets—provides measurements on intervals between control packets (tx and rx): <ul style="list-style-type: none"> – Number of intervals—number of sampled intervals between control packets – min—minimum measured interval between 2 consecutive control packets – max—maximum measured interval between 2 consecutive control packets – avg—average measured interval between 2 consecutive control packets – Last packet received/transmitted—indicates how long ago the last control packet was received/transmitted. • Intervals between echo packets—provides measurements on intervals between echo packets (tx and rx). The measurements have the same meaning as for async packets. • Latency of echo packets (time between tx and rx)—provides measurements on latency of echo packets, i.e. the time between tx and rx of echo packets: <ul style="list-style-type: none"> – Number of packets—number of sampled echo packets. – min—minimum measured latency for echo packets. – max—maximum measured latency of echo packets. – avg—average measured latency of echo packets.
Session owner information	<p>Provides the following information about the session owner.</p> <ul style="list-style-type: none"> • Client—name of the client application process. • Desired interval—desired interval provided by the client, in milliseconds. • Multiplier—multiplier value provided by the client.

Related Commands

Command	Description
bfd fast-detect	Enables BFD for communication failure detection.
bfd minimum-interval	Sets the BFD interval.
bfd multiplier	Sets the BFD multiplier.
show bfd mib session	Displays BFD MIB session information.