

BFD Commands

- bfd, on page 2
- bfd address-family ipv4 destination, on page 4
- bfd address-family ipv4 echo minimum-interval, on page 5
- bfd address-family ipv4 fast-detect, on page 6
- bfd address-family ipv4 minimum-interval, on page 7
- bfd address-family ipv4 multiplier, on page 9
- bfd address-family ipv4 timers, on page 12
- bundle coexistence bob-blb, on page 13
- bfd dampening, on page 15
- bfd fast-detect, on page 18
- bfd minimum-interval, on page 20
- bfd mode, on page 22
- bfd multipath include location, on page 23
- bfd multiplier, on page 24
- clear bfd counters, on page 26
- clear bfd dampening, on page 28
- echo disable, on page 30
- interface (BFD), on page 32
- show bfd, on page 34
- show bfd client, on page 37
- show bfd counters, on page 38
- show bfd hw-offload voq-usage, on page 40
- show bfd mib session, on page 42
- show bfd multipath, on page 45
- show bfd session, on page 47
- show bfd summary, on page 53
- show bundle (BFD) , on page 55

bfd

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

bfd
no bfd

Command Default

No default behavior or values

Command Modes

Usage Guidelines

When you issue the **bfd** command in 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:

```
Router(config)# bfd
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 Router 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:

```
Router # configure
Router(config)# bfd
Router(config-bfd)#
```

Related Commands

Command	Description
Echo disable	
Interface bfd	
Show bfd	

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

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

Command Default

No destination IPv4 address is configured.

Command Modes

Interface configuration (config-if)

Usage Guidelines

This command is supported on bundle interfaces only.

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:

```
Router# configure
Router(config)# interface Bundle-Ether 1
Router(config-if)# bfd address-family ipv4 destination 10.20.20.1
```

bfd address-family ipv4 echo minimum-interval

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

Note The interface configuration of the echo timer value takes precedence over the global echo timer value.

bfd address-family ipv4 echo minimum-interval *milliseconds*

Syntax Description

milliseconds	Shortest interval between sending BFD echo packets to a neighbor. The range is 15 to 2000 milliseconds.

Command Default

The default value is the product of the async and multiplier values.

Command Modes

Interface configuration

Command History

Release	Modification
Release 7.0.12	This command was introduced.

Usage Guidelines

This command is supported on only on BFD over Bundle Per-Member Link Mode using Cisco standard.

This command allows to configure an echo interval to a value greater than async x bfd multiplier value.

Task ID

Task ID	Operations
bundle	read, write

Examples

The following example specifies that echo packets will be sent at a minimum interval of 900 ms for IPv4 BFD sessions on member links of an Ethernet bundle:

```
Router# configure
Router(config)# interface Bundle-Ether 1
Router(config-if)# bfd address-family ipv4 minimum-interval 200
Router(config-if)# bfd address-family ipv4 echo minimum-interval 900
```

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

Command Default

BFD sessions are disabled.

Command Modes

Interface configuration (config-if)

Usage Guidelines

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:

```
Router# configure
Router(config)# interface Bundle-Ether 1
Router(config-if)# bfd address-family ipv4 fast-detect
```

Related Commands

Command	Description
Bfd address family ipv4 destination	

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.

Command Default

The default is 150 ms.

Command Modes

Interface configuration (config-if)

Usage Guidelines

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* 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.
- Value of (*I* x *M*) x *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 number of all BFD sessions on the router is 1024.
- The maximum number of all BFD sessions on the router is 1440.

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 / 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 = (Min-interval x Multiplier)

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

  Ethernet bundle rate = (1000 / Echo interval) x 64

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

  Total bundle rate = Ethernet bundle rate + (Base asynchronous rate x 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:

```
Router# configure
Router(config)# interface Bundle-Ether 1
Router(config-if)# bfd address-family ipv4 minimum-interval 200
```

Related Commands

Command	Description
Bfd minimum-interval	
Bfd address-family ipv4 multiplier	

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

multiplier 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 (config-if)

Usage Guidelines

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* x *M*) x *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 number of all BFD sessions per linecard is 1024.
- The maximum number of all BFD sessions per linecard is 1440.

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 / 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 = (Min-interval x Multiplier)
- Calculate the overall rate supported for all members on the bundle:

  Ethernet bundle rate = (1000 / Echo interval) x 64
- Add the asynchronous base rate per bundle member to find the total rate for all bundle links:

  Total bundle rate = Ethernet bundle rate + (Base asynchronous rate x Number of links)

Task ID

Task ID	Operations
bundle	read, write

Task ID

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

```
Router# configure
Router(config)# interface Bundle-Ether 1
Router(config-if)# bfd address-family ipv4 minimum-interval 200
Router(config-if)# bfd address-family ipv4 multiplier 3
```

Related Commands

Command	Description
Bfd address family ipv4 minimum-interval	
Bfd minimum-interval	

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 *seconds*	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.
nbr-unconfig *seconds*	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.

Command Default

No timers are configured.

Command Modes

Interface configuration (config-if)

Usage Guidelines

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:

```
Router# configure
Router(config)# interface Bundle-Ether 1
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:

```
Router# configure
Router(config)# interface Bundle-Ether 1
Router(config-if)# bfd address-family ipv4 timers nbr-unconfig 60
```

bundle coexistence bob-blb

To configure a coexistence mechanism between BFD over Bundle (BoB) and BFD over Logical Bundle (BLB), use the **bundle coexistence bob-blb** command in BFD configuration mode. To disable this feature use the **no** form of this command.

bundle coexistence bob-blb { **inherit** | **logical** }
no bundle coexistence bob-blb { **inherit** | **logical** }

Syntax Description

inherit	Specifies inheritance as the coexistence mechanism.
logical	Specifies to use BFD logical bundle natively for coexistence.

Command Default

No coexistence configuration is enabled. The BLB configuration behaves the same as the BVLAN configuration.

Command Modes

BFD configuration

Usage Guidelines

The default behavior for BLB without any coexistence configuration behaves exactly as the BVLAN configuration.

When the "inherited" coexistence mode is configured, the BLB session always uses the inherited mode. It always creates a virtual session, and never a BFD session with real packets. This mode prevents the automatic conversion between BLB and the inherited mode, which could happen in default mode, depending on the sequence in which the configuration is applied. The "inherited" session is in "Down" state when BoB is not enabled.

The "logical" mode always creates BFD session with real packets.

Task ID

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

This example shows how to configure the coexistence mechanism between BFD over Bundle (BoB) and BFD over Logical Bundle (BLB) as being "inherited":

```
Router#configure
Router(config)#bfd
Router(config-bfd)#bundle coexistence bob-blb inherit
```

This example shows how to configure the coexitence mechanism between BFD over Bundle (BoB) and BFD over Logical Bundle (BLB) as being "logical":

```
Router#configure
Router(config)#bfd
Router(config-bfd)#bundle coexistence bob-blb logical
```

bfd dampening

To configure a device to dampen a flapping Bidirectional Forwarding Detection (BFD) session, use the **bfd dampening** command in global configuration mode. To restore the values of the dampening timers to their default values, use the **no** form of this command.

bfd dampening [**bundle-member**] { **initial-wait** | **l3-only-mode** | **maximum-wait** | **secondary-wait** | **extension down-monitoring** | **threshold** } *milliseconds*
no bfd dampening [**bundle-member**] { **initial-wait** | **l3-only-mode** | **maximum-wait** | **secondary-wait** | **extension down-monitoring** | **threshold** } *milliseconds*

Syntax Description

bundle-member	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.
l3-only-mode	Applies dampening, if the failure is Layer 3 (L3)-specific.
maximum-wait	Specifies the maximum delay in milliseconds before starting a BFD session. **Note** The maximum delay must be greater than the initial delay.
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.
extensions down-monitoring	Enables session monitoring extensions in down state.
threshold	Specifies a stability threshold to enable dampening in milliseconds. Range 6000 to 360000. The default is 120000.
milliseconds	For bundle members, the range is 1-518400000. For non-bundle interfaces, the range is 1-3600000.

Command Default BFD dampening is enabled by default.

Command Modes Global configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 4.0.0	The **bundle-member** keyword was added.
Release 4.2.0	The **l3-only-mode** keyword was added to the other dampening options.
Release 5.1	The **extensions** and **down-monitoring** keywords were added.

Usage Guidelines



Note The **initial-wait**, **maximum-wait**, and **secondary-wait** keywords are dampening timers.

You do not have to configure the BFD startup timers. If you do configure the initial wait startup timer (using the **initial-wait** keyword), then it must be less than the value of the maximum-wait timer.

You do not have to configure the BFD startup timers. If you do configure the initial wait startup timer (using the **initial-wait** keyword), then it must be less than the value of the maximum-wait timer.

By default, BFD dampening is applied to all sessions in the following manner:

- If a session is brought down, then dampening is applied before a session is allowed to transition to initial/up states.
- Length of time a session is dampened grows exponentially with continuous session flap.
- If a session remains up for minimum two minutes, then the length of time a session dampens with the next session flap is reset to the initial dampening value.

BFD on bundle member applies dampening, only if the detected failure is specific to layer 3. BFD dampening is not invoked for L1 or L2 failures. BFD is started after Layer 1 and Layer 2 (LACP) is up to prevent a race condition and false triggers. BFD is notified to stop/ignore when L1 or L2 goes down and must be notified to start/resume when L1 or L2 recovers for a given/affected link/member.

BFD applies dampening till the session transitions from up to down state and the session is not removed. Whenever there is a failure detected at L1 or L2 , the bundle manager removes BFD session on a member.

When dampening is removed a syslog message ‘Exponential backoff dampening for BFD session has been cleared for specified BFD session. When/if same session gets created by application(s), only calculated initial wait time will be applied’ is generated. If this is the desired behavior, then dampening can be enabled by configuring the BFD configuration, by using the command **bfd dampening bundle-member l3-failure-only**.

This example shows how to configure BFD dampening by specifying an initial and maximum delay for BFD session startup on BFD bundle members:

```
Router# configure
Router(config)# bfd dampening bundle-member initial-wait 1000
```

```
Router(config)# bfd dampening bundle-member maximum-wait 3000
```

This example shows how to configure BFD dampening on a non-bundle interface:

```
Router# configure
Router(config)# bfd dampening initial-wait 1000
Router(config)# bfd dampening maximum-wait 3000
```

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.
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

Neighbor configuration

Session group configuration

Neighbor group configuration

Interface configuration

Interface configuration

Router configuration

Area configuration

Area interface configuration

Interface configuration

Command History

Release	Modification
Release 6.1x	This command was introduced.

Usage Guidelines

Note BFD can support multihop for internal and 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.

In OSPF and OSPF3 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.

In OSPF 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, you must enter the **no bfd fast-detect** command.

Task ID

Task ID	Operations
bgp	read, write
isis	read, write
ospf	read, write

Examples

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

```
Router(config)# route-policy pass-all
Router(config-rpl)# pass
Router(config-rpl)# end-policy
Router(config-rpl)# end
Router# configure
Router(config)# router bgp 65000
Router(config-bgp)# bfd minimum-interval 3
Router(config-bgp)# address-family ipv4 unicast\
Router(config-bgp-af)# exit
Router(config-bgp)# neighbor 192.168.70.24
Router(config-bgp-nbr)# remote-as 2
Router(config-bgp-nbr)# address-family ipv4 unicast
Router(config-bgp-nbr)# bfd fast-detect
Router(config-bgp-nbr)# route-policy pass-all in
Router(config-bgp-nbr)# route-policy pass-all out
```

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

milliseconds	Interval between sending BFD hello packets to the neighbor. The range is 300 to 30000 milliseconds.

Command Modes

Router configuration

Interface configuration

Router configuration

Area configuration

Area interface configuration

Interface configuration

Command History

Release	Modification
Release 7.3.1	This command was introduced.

Usage Guidelines

In OSPF 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 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.

- 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.

- The table below defines the maximum number of BFD sessions that is allowed per line card.

Table 1: Supported Scale

Timer Value	Maximum Number of Sessions Supported in a line card.	Maximum Number of Sessions Supported in a system.
300 ms	250	500
1 second	250	500
2 seconds	250	500

Examples

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

```
Router(config)# router bgp 6500
Router(config-bgp)# bfd minimum-interval 300
```

bfd mode

To enable the option to use Cisco or IETF mode for BFD over bundle, use the **bfd mode** command in interface configuration mode. To disable the option to use Cisco or IETF mode for BFD over bundle, use the **no** form of this command.

bfd mode { **cisco** | **ietf** }

no bfd mode

Syntax Description

cisco	Specifies the use of Cisco mode for BFD over bundle.
ietf	Specifies the use of IETF mode for BFD over bundle.

Command Default

The default member mode is **cisco**.

Command Modes

Interface configuration (config-if)

Usage Guidelines

If the BFD mode is configured when the bundle is being created, the configuration goes through. This is because, both the BFD state as well as the bundle state are 'down' during bundle creation. To apply the mode change for existing sessions, bring down and then recreate the BFD sessions for that bundle.

A BFD session on the member interfaces can belong to only one mode (Cisco or IETF mode). Mix of the modes within the same bundle is not supported. This command is supported on bundle interfaces only.

Task ID

Task ID	Operations
bundle	read, write

Examples

This example shows how to enable **ietf** mode for the BFD session on an Ethernet bundle interface:

```
Router# configure
Router(config)#  interface bundle-ether 1
Router(config-if)#   bfd mode ietf
```

bfd multipath include location

To include specific linecards to host BFD multiple path sessions, use the **bfd multipath include location** command in the XR configuration mode. To remove the configuration, use the **no** form of this command.

bfd multipath include location *node-id*
no bfd multipath include location *node-id*

Syntax Description

location *node-id*	Configures BFD multipath on the specified location. The *node-id* variable is mentioned in the *rack/slot/module* notation.

Command Default

No default behavior or values

Command Modes

XR Config mode

Command History

Release	Modification
Release 6.3x	This command was introduced.

Task ID

Task ID	Operation
bgp	read, write
ospf	read, write
isis	read, write

Example

This example shows how to run the **bfd multipath include location** command on a specific location:

```
Router# configure
Router(config)# bfd multipath include location 0/5/CPU0
```

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

multiplier	Number of times a packet is missed before BFD declares the neighbor down. The ranges are as follows: • BGP—2 to 16 • IS-IS—2 to 50

Command Default

The default multiplier is 3.

Command Modes

Router configuration

Interface configuration

Router configuration

Area configuration

Area interface configuration

Interface configuration

Usage Guidelines

In OSPF 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.

Task ID

Task ID	Operations
bgp	read, write
isis	read, write
ospf	read, write

Examples

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

```
Router(config)# router bgp 65000
Router(config-bgp)# bfd multiplier 3
```

clear bfd counters

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

clear bfd counters { **ipv4** | [**singlehop** |] | [**singlehop** |] | **all** | **label** } [**packet**] [**timing**] [**interface** *type* *interface-path-id*] **location** *node-id*

Syntax Description

ipv4	(Optional) Clears BFD over IPv4 information only.
all	(Optional) Clears BFD over IPv4 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.
type	Specifies the interface type. For more information, use the question mark (**?**) online help function.
interface-path-id	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 *node-id*	Clears BFD counters from the specified location. The *node-id* argument is entered in the *rack/slot/module* notation.

Command Default

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

Command Modes

Usage Guidelines

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.

Examples

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

```
Router# clear bfd counters ipv4 timing location 0/5/cpu0
```

Related Commands

Command	Description
Bfd fast detect	
Bfd minimum-interval	
Bfd multiplier	
Show bfd	

clear bfd dampening

To reset BFD dampening counters, use the **clear bfd dampening** command in mode.

clear bfd dampening { [**interface** *type interface-path-id*] | **location** *node-id all* | **type** [**bundle-logical** | **bundle-per-member**] }

Syntax Description

interface	Specifies the interface from which the BFD dampening sessions are cleared.
type	Specifies the interface type. For more information, use the question mark (**?**) online help function.
interface-path-id	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 *node-id*	Clears BFD dampening sessions from the specified location. The *node-id* argument is entered in the *rack/slot/module* notation.
all	(Optional) Clears BFD dampening session on all locations.
type	Specifies the BFD session type. For more information, use the question mark (**?**) online help function.
bundle-per-member	Clears BFD dampening over the member links of BFD over bundle sessions.
bundle-logical	Clears BFD dampening of the BFD over logical bundle session.

Command Modes

Usage Guidelines

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.

Examples

The following example shows how to clear BFD dampening:

- To clear BFD dampening on all BFD sessions:

```
Router# clear bfd dampening location all
```

- To clear BFD dampening on BFD sessions over bundle interfaces:

```
Router# clear bfd dampening type bundle-per-member
```

- To clear bfd dampening on BFD sessions over bundle logical interfaces:

```
Router# clear bfd dampening type bundle-logical
```

- To clear bfd dampening on BFD sessions over specific interface:

```
Router# clear bfd dampening interface gigabitEthernet 0/3/0/0
```

clear bfd dampening log sample

The following is a sample syslog output of the **clear bfd dampening** command:

```
LC/0/3/CPU0:Oct  6 16:52:40.632 : bfd_agent[127]: %L2-BFD-6-SESSION_DAMPENING_CLR : Dampening
 for BFD session to neighbor 10.1.1.2
on interface GigabitEthernet0/3/0/0 has been cleared
```

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

Command Default

No default behavior or values

Command Modes

BFD configuration

BFD interface configuration

Usage Guidelines

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.

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:

```
Router# configure
Router(config)# bfd
Router(config-bfd)# echo disable
```

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

```
Router# configure
Router(config)# bfd
Router(config-bfd)# interface gigabitethernet 0/1/0/0
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	Enables and disables IPv4 uRPF checking on an IPv4 interface.
Show bfd	Displays BFD information.

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

type	Interface type. For more information, use the question mark (**?**) online help function.
interface-path-id	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

Usage Guidelines

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.

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:

```
Router# configure
Router(config)# bfd
Router(config-bfd)# interface gigabitethernet 0/1/0/0
Router(config-bfd-if)#
```

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

```
Router# configure
Router(config)# bfd
Router(config-bfd)# interface pos 0/1/0/0
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.
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** | [**singlehop | multihop**] | **ipv6 [singlehop | multihop] | all** | **label**] **interface** [**destination | source**] [**location** *node-id*]

Syntax Description

ipv4	(Optional) Displays BFD over IPv4 information only.
singlehop	(Optional) Displays BFD singlehop information only.
ipv6	(Optional) Displays BFD over IPv6 information only.
all	(Optional) Displays both BFD over IPv4 and BFD over IPv6 information.
label	(Optional) Displays the BFD label information.
interface	Specifies the BFD interface.
destination	(Optional) Specifies the destination IPv4 unicast address.
source	(Optional) Specifies the source IPv4 unicast address.
location *node-id*	Displays BFD information for the specified location. The *node-id* argument is entered in the *rack/slot/module* notation.

Command Default

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

Command Modes

EXEC mode

Command History

Release	Modification
Release 7.0.12	This command was introduced.

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:

```
Router# show bfd
```

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

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

```
Router# show bfd all

IPv4:
-----
IPV4 Sessions Up: 20, Down: 0, Unknown/Retry: 2, Total: 22
IPv6:
-----
IPV6 Sessions Up: 128, Down: 2, Unknown/Retry: 1, Total: 131
Label:
-----
Label Sessions Up: 10, Down: 0, Unknown/Retry: 1, Total: 11
```

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

```
Router# show bfd ipv4

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

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

```
Router# show bfd ipv6 session detail interface tenGigE 0/0/0/0.100

I/f: TenGigE0/0/0/0.100, Location: 0/0/CPU0
Dest: 1001:1:1:1:1:1:1:2
Src: 1001:1:1:1:1:1:1:1
 State: UP for 0d:1h:37m:3s, number of times UP: 1
 Session type: PR/V6/SH
Received parameters:
 Version: 1, desired tx interval: 300 ms, required rx interval: 300 ms
 Required echo rx interval: 0 us, multiplier: 3, diag: None
 My discr: 2148076695, your discr: 2148075550, state UP, D/F/P/C/A: 0/0/0/1/0
Transmitted parameters:
 Version: 1, desired tx interval: 300 ms, required rx interval: 300 ms
 Required echo rx interval: 0 us, multiplier: 3, diag: None
 My discr: 2148075550, your discr: 2148076695, state UP, D/F/P/C/A: 0/1/0/1/0
Timer Values:
 Local negotiated async tx interval: 300 ms
 Remote negotiated async tx interval: 300 ms
 Desired echo tx interval: 0 s, local negotiated echo tx interval: 0 us
 Echo detection time: 0 us(0 us*3), async detection time: 900 ms(300 ms*3)
Local Stats:
 Intervals between async packets:
   Tx: Number of intervals=3, min=10 ms, max=2290 ms, avg=824 ms
       Last packet transmitted 5823 s ago
   Rx: Number of intervals=6, min=3 ms, max=2 s, avg=461 ms
       Last packet received 5823 s ago
Intervals between echo packets:
   Tx: Number of intervals=0, min=0 s, max=0 s, avg=0 s
       Last packet transmitted 0 s ago
   Rx: Number of intervals=0, min=0 s, max=0 s, avg=0 s
       Last packet received 0 s ago
 Latency of echo packets (time between tx and rx):
   Number of packets: 0, min=0 us, max=0 us, avg=0 us
Session owner information:
```

```
                          Desired              Adjusted
  Client                Interval   Multiplier Interval   Multiplier
  --------------------- ---------- ---------- ---------- ----------
  ipv6_static           300 ms     3          300 ms     3
  ipv6_static           300 ms     3          300 ms     3

H/W Offload Info:
 H/W Offload capability : Y, Hosted NPU     : 0/0/CPU0/NPU0
 Async Offloaded        : Y, Echo Offloaded : N
 Async rx/tx            : 7/4

Platform Info:
NPU ID: 0
Async RTC ID        : 1          Echo RTC ID        : 0
Async Feature Mask  : 0x8        Echo Feature Mask  : 0x0
Async Session ID    : 0x3c07     Echo Session ID    : 0x0
Async Tx Key        : 0x3c070801  Echo Tx Key        : 0x0
Async Tx Stats addr : 0x3f69e800   Echo Tx Stats addr : 0x0
Async Rx Stats addr : 0x4069e800   Echo Rx Stats addr : 0x0
```

show bfd client

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

XR EXEC mode

Release	Modification
Release 7.0.12	This feature was introduced.

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/RP0/CPU0:router# show bfd client

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

Table 2: 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.

show bfd counters

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

show bfd counters [**ipv4** | [**singlehop** | **mulithop**] | **ipv6** [**singlehop** | **mulithop**] **all**| **label**] **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.
singlehop	(Optional) Displays BFD singlehop information only.
multihop	(Optional) Displays BFD multihopinformation only.
all	(Optional) Displays 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.
type	Interface type. For more information, use the question mark (**?**) online help function.
interface-path-id	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 *node-id*	Displays BFD counters from the specified location. The *node-id* argument is entered in the *rack/slot/module* notation.

Command Default

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

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 7.0.12	This command was introduced.

Usage Guidelines

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 displays the output from the **show bfd counters packet** for both IPv4.

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

IPv4 Singlehop:
 GigabitEthernet0/0/1/2                  Recv       Xmit                 Recv       Xmit
      Async:                             4148       4137       Echo: (   47136)     80192
 GigabitEthernet0/1/1/2                  Recv       Xmit                 Recv       Xmit
      Async:                             116876     125756       Echo: ( 2268192)   2301312
 Bundle-Ether10                          Recv       Xmit                 Recv       Xmit
      Async:                             2          0       Echo:        0          0
 Bundle-Ether20                          Recv       Xmit                 Recv       Xmit
      Async:                             91         0       Echo:         0          0

IPv4 Multihop: (Src IP/Dst IP/Vrf Id)
 10.15.151.4/10.16.151.4/0x12345678      Recv       Xmit
      Async:                             0       570337
```

show bfd hw-offload voq-usage

To display VOQ assignments for hardware-offloaded BFD sessions, use the **show bfd hw-offload voq-usage** command in EXEC mode.

show bfd hw-offload voq-usage { **all** | **discriminator** *discriminator* } **location** *location-id*

Syntax Description

all	Displays every eligible hardware-offloaded BFD session.
discriminator *discriminator*	Displays the hardware-offloaded BFD session that has the specified local discriminator.
location *location-id*	Displays VOQ information for the specified location. Enter the *location-id* argument in *rack/slot/module* notation.

Command Default

None

Command Modes

EXEC mode

Command History

Release	Modification
Release 26.3.1	This command was introduced.

Usage Guidelines

- Enter the local discriminator that a BFD session command displays to get the detailed output.
- The detailed output presents the discriminator in decimal and hexadecimal formats.
- The command supports hardware-offloaded IPv4 and IPv6 single-hop BFD sessions.
- The command does not display multihop BFD sessions.

Note For BFD over Logical Bundle (BLB), BFD over Bundle (BOB), and tunnel sessions, the command can display None for fields that have no corresponding session value.

Task ID

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

Examples

This example displays the VOQ assignments for all eligible sessions:

```
Router# show bfd hw-offload voq-usage all location 0/RP0/CPU0

0/RP0/CPU0
-----------------
Discr        Interface    Type       State      TX VOQ     RX VOQ     NPU      Slot   SysPort
-----        ---------    ----       -----      ------     ------     ---      ----   -------
2147549185   Hu0/0/0/2    SH-v4       UP          656        288        0        0      16
2147549189   Hu0/1/0/1    SH-v6       UP          680        288        0        1      13

Total BFD HW-offloaded sessions: 2
```

This example displays detailed VOQ information for one session:

```
Router# show bfd hw-offload voq-usage discriminator 2147549189 location 0/RP0/CPU0

0/RP0/CPU0
-----------------
Session Discriminator: 2147549189 (0x80010005)
Interface:             Hu0/1/0/1 (0x780000cc)
Session Type:          SH-v6
Local State:           UP
TX VOQ Base:           680
RX VOQ Base:           288
NPU ID:                0
Slot:                  1
System Port:           13
```

Table 3: Output field descriptions for show bfd hw-offload voq-usage

Field	Description
`Discr`	Identifies the local session discriminator.
`Interface`	Identifies the egress interface for the session.
`Type`	Identifies the BFD session type.
`State`	Displays the local BFD session state.
`TX VOQ`	Displays the transmit VOQ base queue number.
`RX VOQ`	Displays the receive punt VOQ base queue number.
`NPU`	Identifies the network processing unit.
`Slot`	Identifies the line card slot.
`SysPort`	Identifies the system port.
`Total BFD HW-offloaded sessions`	Displays the total number of hardware-offloaded BFD sessions.

show bfd mib session

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

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

Syntax Description

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

Command Default

When *node-id* is not specified, information for all IPv4 and IPv6 BFD MIB sessions, stored on the route processor node, is displayed.

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 7.0.12	This command was introduced.

Usage Guidelines

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:

```
Router# 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:

```
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 4: show bfd mib Field Descriptions

Field	Description
date and timestamp	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 *seconds.nanoseconds*, during which the BFD MIB session last came up. If such an event does not exist, a zero is displayed.
Last Down Time (s.ns)	Value of sysUpTime, in *seconds.nanoseconds*, 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.

Field	Description
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.

show bfd multipath

To display information concerning only BFD multipath sessions, use the **show bfd multipath** command in the XR EXEC mode mode.

show bfd multipath {**ipv4** | **ipv6** | **label** | **all**} **location** *node-id*

Syntax Description

ipv4	Displays BFD over IPv4 information only.
ipv6	Displays BFD over IPv6 information only.
label	Displays BFD label information.
all	Displays both BFD over IPv4 and BFD over IPv6 information.
location *node-id*	Displays BFD counters from the specified location. The *node-id* argument is entered in the *rack/slot/module* notation.

Command Default

No default behavior or values

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 7.0.12	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

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

Example

This example shows the sample output for **show bfd multipath** command:

```
RP/0/RP0/CPU0:router#show bfd multipath location 0/5/cpu0

Int/Src Addr    Label/Dest Addr VRF ID     Discr      Node      State
--------------- --------------- ---------- ---------- --------- --------
```

```
pw-ether 1      10.10.10.10     0x00000002 0x4        0/5/CPU0  DOWN
tunnel-ip 1     1.1.1.1         0x8        0x5        0/5/CPU0  UP
```

show bfd session

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

show bfd [**ipv4** | [**singlehop** | **multihop**] | [**singlehop** | **multihop**] | **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.
singlehop	(Optional) Displays BFD singlehop information only.
multihop	(Optional) Displays BFD multihop information only.
all	(Optional) Displays both BFD over IPv4 and BFD over IPv6 information.
interface	(Optional) Specifies the interface for which to show information.
type	Interface type. For more information, use the question mark (?) online help function.
interface-path-id	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 *node-id* argument is entered in the *rack/slot/module* notation.

Command Default

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

Command Modes

XR EXEC mode

Usage Guidelines

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.

Examples

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

```
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
```

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

```
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
```

Table 5: 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 *rack/slot/module* 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.

Field	Description
Received parameters	Provides information on the last transmitted control packet for the session: • 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.
Transmitted parameters	Provides information on the last transmitted control packet for the session: • 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 • multiplierNumber 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.

Field	Description
Timer Values	Provides information on the timer values used by the local and remote ends, as follows: • 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.

Local Stats	Displays the local transmit and receive statistics,
	• Intervals between async packets—provides measurements on intervals between control packets (tx and rx):
	  • 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:
	  • 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.

Field	Description
Session owner information	Provides the following information about the session owner. • Client—name of the client application process. • Desired interval—desired interval provided by the client, in milliseconds. • Multiplier—multiplier value provided by the client.

Use the **show bfd label** session to verify the configuration at each BFD label.

```
Router#show bfd label session
Fri Dec  2 17:12:21.497 UTC

Interface           Label              Local det time(int*mult)      State
                                     Echo             Async
H/W                 NPU
------------------- --------------- ---------------- ---------------- ----------
tt1 (LSP:103)       24001           n/a              150ms(50ms*3)    UP
Yes                 0/1/CPU0
tt2 (LSP:102)       24002           n/a              150ms(50ms*3)    UP
Yes                 0/1/CPU0
tt3 (LSP:101)       24004           n/a              150ms(50ms*3)    UP
Yes                 0/1/CPU0
tt4 (LSP:103)       24005           n/a              150ms(50ms*3)    UP
Yes                 0/1/CPU0
tt5 (LSP:104)       24006           n/a              150ms(50ms*3)    UP
Yes                 0/1/CPU0
```

show bfd summary

To display the percentage of PPS rate in use per line card, maximum usage of PPS, and total number of sessions, use the **show bfd summary** command in the XR EXEC mode.

show bfd summary [**private**]**location***node-id*

Syntax Description

private	Displays the private information.
location *node-id*	Displays BFD counters from the specified location. The *node-id* argument is entered in the *rack/slot/module* notation.

Command Default

No default behavior or values

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 7.0.12	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

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

Example

This example shows the sample output from the **show bfd summary** command for a specified location:

```
RP/0/RP0/CPU0:router#show bfd summary location 0/1/cpu0

Node       PPS rate usage  Session number
           %   Used  Max   Total   Max
---------- --------------- --------------
0/1/CPU0   0   80    9600  4       4000
```

This example shows the sample output from the **show bfd summary** command:

```
RP/0/RP0/CPU0:router#show bfd summary
Node       PPS rate usage  Session number
           %   Used  Max   Total   Max
```

```
---------- --------------- --------------
0/0/CPU0   0   0     9600  0       4000
0/1/CPU0   0   0     9600  0       4000
0/2/CPU0   0   0     9600  0       4000
0/5/CPU0   0   0     9600  0       4000
0/6/CPU0   0   0     9600  0       4000
0/7/CPU0   0   0     9600  0       4000
```

show bundle (BFD)

To display the IPV6 BFD configured, use the **show bundle** command in the EXEC mode.

Example

This example shows the output of the show bundle bundle-ether command with IPv6 Bfd configured:

```
#sh bundle bundle-ether 1

bundle-ether1
  Status:                                  Down
  Local links <active/standby/configured>:   0 / 0 / 1
  Local bandwidth <effective/available>:     0 (0) kbps
  MAC address (source):                    000a.000b.000c (Configured)
  Inter-chassis link:                      No
  Minimum active links / bandwidth:        1 / 1 kbps
  Maximum active links:                    64
  Wait while timer:                        2000 ms
  Load balancing:
    Link order signaling:                  Not configured
    Hash type:                             Default
    Locality threshold:                    None
  LACP:                                    Operational
    Flap suppression timer:                Off
    Cisco extensions:                      Disabled
    Non-revertive:                         Enabled
  mLACP:                                   Not configured
IPv4 BFD:                                 Not configured
  IPv6 BFD:                                Operational
    State:                                 Down
    Mode:                                  Not configured
    Fast detect:                           Enabled
    Start timer:                           Off
    Neighbor-unconfigured timer:           Off
    Preferred min interval:                150 ms
    Preferred multiple:                    3
    Destination address:                   1::1
```