Bidirectional Forwarding Commands

This chapter provides details of the commands used for configuring Bidirectional Forwarding for Label Switched Paths.

clear bfd counters

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

XR EXEC

Command History

Release	Modification
Release 6.1.42	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, write
ospf	read, write
isis	read, write
mpls-te	read, write

Examples

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

```
RP/0/RP0:hostname# clear bfd counters ipv4 timing location 0/5/cpu0
```

bfd address-family

Use the **bfd address-family** command in interface configuration mode to perform the following.

- Specify the destination address for BFD sessions on bundle member links.
- Enable IPv4 BFD sessions on bundle member links.
- Specify the minimum interval for asynchronous mode control packets on IPv4 BFD sessions on bundle member links.
- Specify a number that is used as a multiplier with the minimum interval to determine BFD control packet failure detection times and transmission intervals for IPv4 BFD sessions on bundle member links.

bfd address-family ipv4 {destination *ip-address* | **fast-detect** | **minimum-interval** *milliseconds* | **multiplier** *multiplier* **}**

Syntax Description

destination *ip-address*	32-bit IPv4 address in dotted-decimal format (A.B.C.D).
fast-detect	Enables IPv4 BFD sessions on bundle member links.
minimum-interval *milliseconds*	Shortest interval between sending BFD control packets to a neighbor. The range is from 4 to 30000.
multiplier *multiplier*	Number from 2 to 50. It is recommended to have multiplier value of 3.

Command Default

None.

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 6.5.31	This command was introduced.

Task ID

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

Examples

The following example shows how to use the **bfd-address-family** command to set specific parameters:

```
RP/0/RP0:hostname# configure
RP/0/RP0:hostname(config)# interface Bundle-Ether 1
RP/0/RP0:hostname(config-if)# bfd address-family ipv4 minimum-interval 2000
RP/0/RP0:hostname(config-if)# bfd address-family ipv4 multiplier 3
```

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
no bfd fast-detect

Syntax Description

No supported keywords or arguments

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 6.1.42	This command was introduced.

Usage Guidelines

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.

BFD can support multihop for internal and external BGP peers.

In OSPF 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 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.

Task ID

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

Examples

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

```
RP/0/RP0:hostname# configure
RP/0/RP0:hostname(config)# interface tunnel-te1
RP/0/RP0:hostname(config-te)# bfd fast-detect
```

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. For Flex LSP, the range is 4 to 2000 milliseconds.

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

Flex LSP *interval*: 100 milliseconds

Command Modes

Router configuration

Interface configuration

MPLS TE configuration

Router configuration

Area configuration

Area interface configuration

Router configuration

Area configuration

Interface configuration

Command History

Release	Modification
Release 6.1.42	This command was introduced.

Usage Guidelines

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 7000 pps.
  - The maximum rate for BFD sessions per linecard is 9600 pps.
  - The maximum rate for BFD sessions per linecard is 1334 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 all BFD sessions per linecard is 1024.
- The maximum number of all BFD sessions per linecard is 1440.
- When asynchronous mode is available, 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 1024 sessions, the failure detection interval must be greater than or equal to 150 milliseconds.
- When asynchronous mode is available, the minimum interval must be greater than or equal to 250 milliseconds, with a multiplier of 3 for up to 100 sessions per line card
- When asynchronous mode is available, 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 1440 sessions, the failure detection interval must be greater than or equal to 150 milliseconds.
- When echo mode is available, 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 1024 sessions, the failure detection interval must be less than or equal to 150 milliseconds.
- When echo mode is available, the minimum interval must be 50 milliseconds with a multiplier of 3.
- When echo mode is available, 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 1440 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

Examples

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

```
RP/0/RP0:hostname# configure
RP/0/RP0:hostname(config)# interface tunnel-te1
RP/0/RP0:hostname(config-te)# bfd minimum-interval 200
```

The following example shows the configuration of an OSPFv3 routing process named san_jose. The example shows two areas, each of which includes tengige 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, tengige 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 mode

Te enable IETF mode for BFD over bundle, use the **bfd mode** command in interface configuration mode.

bfd mode ietf

Syntax Description

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

Command Default

The default member mode is ietf.

Command Modes

Interface configuration

Command History

Release	Modification
Release 6.5.31	This command was introduced.

Usage Guidelines

If the BFD modeis 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. This command is supported on only the bundle interfaces.

Task ID

Task ID	Operations
bundle	read, write

Examples

The following example shows how to enable IETF mode for BFD over bundle for the specified bundle.

```
RP/0/RP0:hostname# configure
RP/0/RP0:hostname(config)# interface Bundle-Ether 1
RP/0/RP0:hostname(config-if)# bfd address-family ipv4 fast-detect
RP/0/RP0:hostname(config-if)# bfd mode ietf
```

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
- OSPF and OSPFv3—2 to 50
- PIM—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

Command History

Release	Modification
Release 6.1.42	This command was introduced.

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 (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

Examples

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

```
RP/0/RP0:hostname# configure
RP/0/RP0:hostname(config)# interface tunnel-te1
RP/0/RP0:hostname(config-te)# bfd multiplier 2
```

bundle minimum-active

To set the minimum amount of bandwidth required before a user can bring up a specific bundle or to set the number of active links required to bring up a specific bundle, use the **bundle minimum-active** command in interface configuration mode.

bundle minimum-active {bandwidth *kbps* **| links** *links* **}**

Syntax Description

kbps	Sets the minimum amount of bandwidth required before a bundle can be brought up or remain up. The range is from 1 through a number that varies depending on the platform and the bundle type.
links	Sets the number of active links required before a bundle can be brought up or remain up. The range is from 1 to 16.

Command Default

No default behavior or values

Command Modes

Interface configuration

Command History

Release	Modification
Release 6.5.31	This command was introduced.

Task ID

Task ID	Operations
bundle	read, write

Examples

The following example shows how to configure the minimum thresholds to maintain an active bundle.

```
RP/0/RP0:hostname# configure
RP/0/RP0:hostname(config)# interface Bundle-Ether 1
RP/0/RP0:hostname(config-if)# bundle minimum-active bandwidth 580000
RP/0/RP0:hostname(config-if)# bundle minimum-active links 2
```

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** | }] | **all**|**label**}]**interface**[{**destination** | }] [**location** *node-id*]

Syntax Description

ipv4	(Optional) Displays BFD over IPv4 information only.
multihop	(Optional) Displays BFD multihop information only.
singlehop	(Optional) Displays BFD singlehop information only.
all	(Optional) Displays BFD over IPv4 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

Command History

Release	Modification
Release 6.1.42	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:

```
RP/0/RP0:hostname# 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:hostname# 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
```

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 6.1.42	This command was introduced.

Usage Guidelines

No specific usage guidelines.

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:hostname# show bfd client

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

Table 1: show bfd client Field Descriptions

Field	Description
Name	Name of the BFD client.
Node	Location of the BFD client.

Field	Description
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 EXEC mode.

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

Syntax Description

ipv4	(Optional) Displays BFD over IPv4 information only.
singlehop	(Optional) Displays BFD singlehop information only.
multihop	(Optional) Displays BFD multihop information only.
all	(Optional) Displays BFD over IPv4 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

EXEC

Command History

Release	Modification
Release 6.1.42	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 shows the output from the **show bfd counters packet** command for IPv4:

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

IPv4 Singlehop:
 tengige0/0/1/2                  Recv       Xmit                 Recv       Xmit
      Async:                             4148      4137       Echo: (   47136)     80192
tengige0/1/1/2                  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)
 33.15.151.4/33.16.151.4/0x12345678      Recv       Xmit
      Async:                             0       570337
```

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 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

EXEC

Command History

Release	Modification
Release 6.1.42	This command was introduced.

Usage Guidelines

No specific guidelines.

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:hostname#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:hostname#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
```