AOS-CX 10.6 Update
November, 2020

aruba
a Hewlett Packard Enterprise company

BFD support for IPv6 BGP peering

Aruba Switching TME

BFD support for IPv6 BGP peering

Agenda

1. Overview
2. Use Cases
3. Details / Caveats
4. Configuration
5. Best Practices
6. Troubleshooting
7. Demo

Overview

aruba
a Hewlett Packard
Enterprise company

Definitions

Acronyms

- MP-BGP — **M**ulti-**P**rotocol **B**order **G**ateway **P**rotocol
- AF — **A**ddress **F**amily (Ex: IPv4, IPv6 or EVPN address families used in MP-BGP)
- VRF — **V**irtual **R**outing and **F**orwarding
- BFD — **B**idirectional **F**orwarding **D**etection

Overview

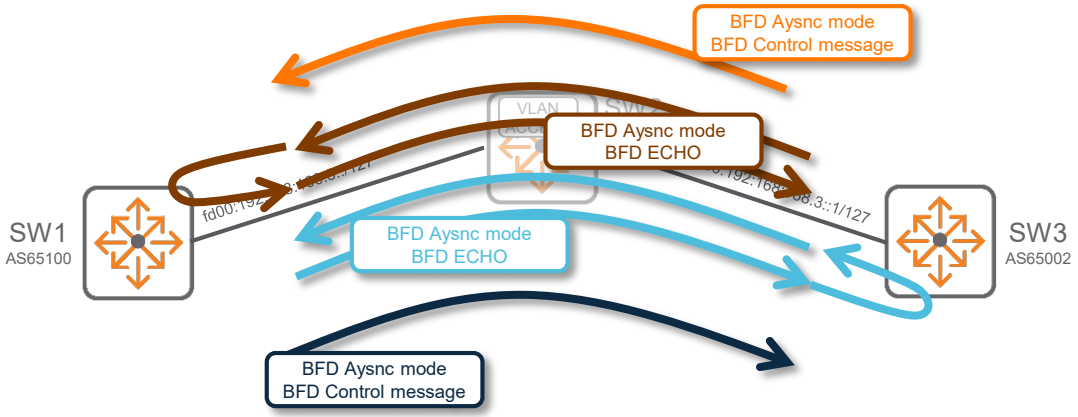
BFD

- **Bidirectional Forwarding Detection** is a standard general-purpose fast failure detection mechanism.
- After a BFD session is established, if no BFD control packet is received from the peer within the negotiated BFD interval, BFD notifies a failure to the protocol consuming the BFD service, which then takes appropriate action (like tearing down BGP session, and consequently clearing the routes).
- BFD can operate in two modes:
  - **Asynchronous mode**: BFD control packets are send periodically to the peer. If the other device does not receive BFD control packet from the peer within the specified interval, it tears down the BFD session.
  - **Demand mode**: Once a BFD session is established, one device may request that the other device stops sending BFD control packets, except when the connection must be explicitly validated, in which case a short sequence of BFD control packets is exchanged. **Not supported in AOS-CX**.
- **Echo** is a function that can improve both asynchronous and demand modes.
  It consists in **looping back** the received echo message to the sender **without processing** it. If the sender does not receive its echo message back, BFD tears down the session. This task is accelerated in the ASIC, alleviating the CPU load for BFD control messages, as the rate of the control message can be lower. No delay of processing. It must be implemented in each direction.
- Failure detection is unidirectional. The local node uses BFD control message to notify the peer that a BFD failure was detected.

Overview

BFD IPv6

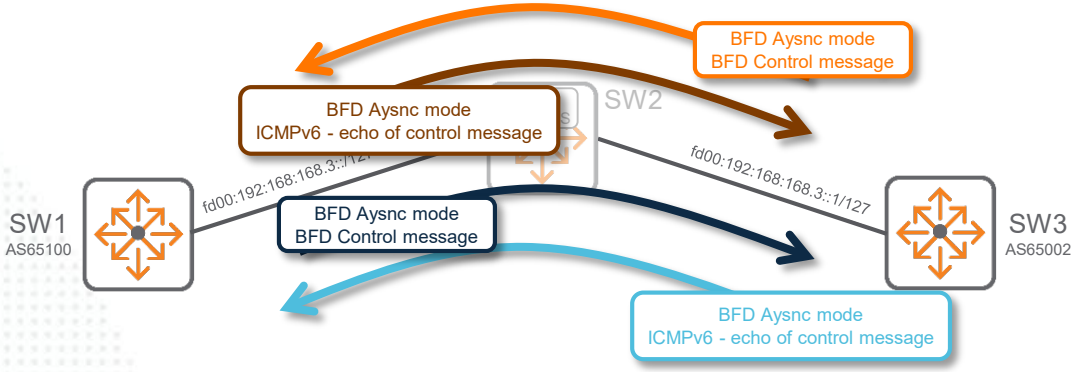
IPv4



Echo function triggered by SW3.

Echo function triggered by SW1

IPv6



Echo function disabled.

SW1 replies to SW3 with ICMPv6 including a copy of the probe sourced by SW3.

SW3 replies to SW1 with ICMPv6 including a copy of the probe sourced by SW1.

Use Cases

aruba
a Hewlett Packard
Enterprise company

Use cases

- BFD should be used **only for non direct point-to-point peering**, typically when a 3rd device is inserted between the two peers. This 3rd device can be L2 switch or a L1 optical switch not mirroring the state between physical ports.
- Most of the time, BFD is not much of use for BGP peering over a direct point-to-point L3 circuit:
  - For **eBGP**, **fast-external failover** will ensure that if the peering circuit fails, all the routes learnt behind the next-hop attached to the failed circuit will immediately get withdrawn (in milliseconds).
  - For **iBGP**, **neighbor fall-over** command **without bfd** extension, will force route withdrawn based on the next-hop reachability status in OSPF. As the link connecting the peer fails, OSPF will immediately withdraw Loopback routes and notify BGP protocol which will do the same within milliseconds.
- When enabling BFD for BGP, the objective is to track the availability of the physical links being monitored and not the reachability of the loopback. Consequently, the loopback address must not be used as BGP peering IP address. It is not suitable for:
  - iBGP (traditionally peering over loopbacks)
  - eBGP multihop

Details / Caveats

aruba
a Hewlett Packard
Enterprise company

BFD Details / Caveats

- **Version** BFDv1
- **Modes** asynchronous (SW). No support for Demand mode on any platforms.
- **Echo** Echo Function is implemented in HW. BFD Echo is supported back on 6400 since 10.6
- **IPv6** Echo mode is currently not supported in IPv6 for any platforms.
  IPv6 is supported in SW and only on applicable platforms.
- **Hop** Single hop. Multi-hop not currently supported for any platforms.
- **Interface** ROP, SVI, L3 LAG
- **Daemon** bfdd

Platform Support

10.6 – Supported protocols and operation modes

Mode / Protocols	6200	6300	6400	8360	8320	8325	8400
Asynchronous mode	N/A	SW	SW	SW	HW	HW	SW
Loopback support		Yes	Yes	Yes	No	No	Yes
Echo Global source address (v4 only)		Yes	Yes	Yes	No	No	Yes
Echo function (v4 only)		HW	HW	HW	HW	HW	HW
Demand mode		No	No	No	No	No	No
IPv4 transport		Yes	Yes	Yes	Yes	Yes	Yes
IPv6 transport		Yes SW only	Yes SW only	**No**	No	No	Yes SW only
OSPFv2		Yes	Yes	Yes	Yes	Yes	Yes
OSPFv3		Yes	Yes	**No**	No	No	Yes
BGP IPv4		Yes	Yes	Yes	Yes	Yes	Yes
BGP IPV6		Yes	Yes	**No**	No	No	Yes

Platform Support

10.6 – BFD Capacities

Routing Protocols	6200	6300	6400	8360	8320	8325	8400
bfd_sessions	N/A	256	256	256	256	256	256
bfd_min_rx_interval_lower_bound_ms		500	500	500	100	100	500
bfd_min_rx_interval_upper_bound_ms		20000	20000	20000	20000	20000	20000
bfd_min_tx_interval_lower_bound_ms		500	500	500	50	50	500
bfd_min_tx_interval_upper_bound_ms		20000	20000	20000	20000	20000	20000

BGP BFD

And Ingress ACL filtering

- **IPv4**
  BFD control UDP packet should not be filtered.
  No dependency on ICMP.

- **IPv6**
  BFD control UDP packet should not be filtered.
  And ICMPv6 should be permitted.

BGP IPv6 AF – BFD Best Practices

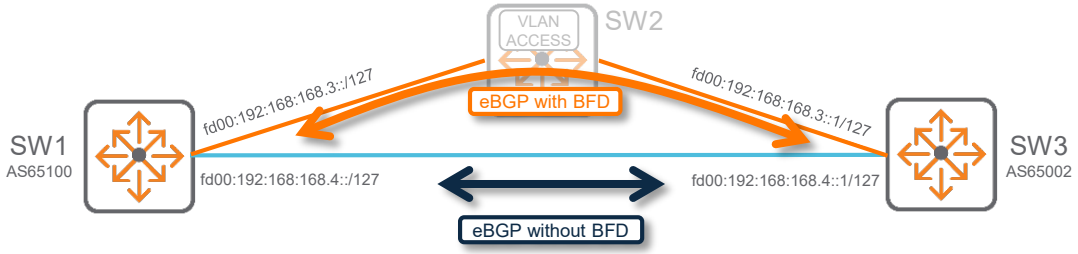
- BFD for MP-BGP IPv6 peering relies entirely on the availability of the control-plane.
- As a consequence, the combination of **BFD and Graceful-restart** might be tricky:
  - False Failure Detection:
    If BFD uses very short timer, peer failure might be detected before the control-plane is fully restarted (ex: during MM failover). This should be mitigated as **hpe-routing** and **bfdd** are dormant daemons on standby VSF or on SMM, ready to kick in after switchover.
  - If BFD uses default timers, control-plane handover on the VSF standby or SMM will happen before BFD timeout. It was successfully tested for IPv4 and for IPv6.

Configuration

aruba
a Hewlett Packard
Enterprise company

BFD Configuration

For MP-BGP IPv6 AF



- BFD must be configured on both ends (SW1 and SW3). If only one end is configured, the BFD state will stay down (instead of going through **init**, then **up** state)

SW1

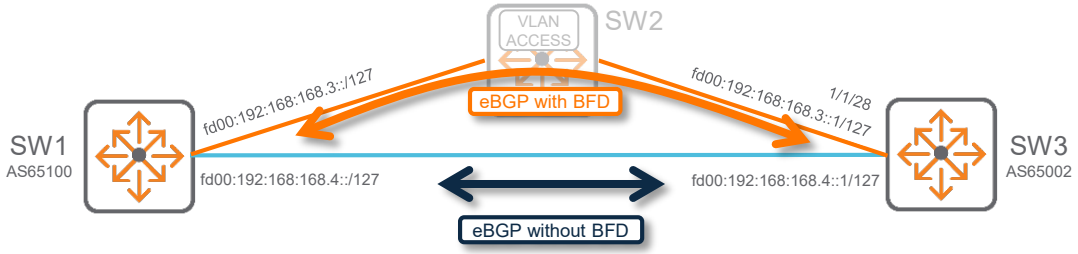
```
bfd
bfd min-receive-interval 500
bfd min-transmit-interval 500
bfd detect-multiplier 3
!
!
router bgp 65100
    bgp router-id 192.168.1.1
    bgp fast-external-fallover
    neighbor fd00:192:168:3::1 remote-as 65002
    neighbor fd00:192:168:3::1 weight 300
    neighbor fd00:192:168:3::1 fall-over bfd
    neighbor fd00:192:168:4::1 remote-as 65002
    neighbor fd00:192:168:4::1 weight 200
    address-family ipv6 unicast
        neighbor fd00:192:168:3:: activate
        neighbor fd00:192:168:4:: activate
        redistribute local loopback
    exit-address-family
```

SW3

```
bfd
bfd min-receive-interval 500
bfd min-transmit-interval 500
bfd detect-multiplier 3
!
!
router bgp 65002
    bgp router-id 192.168.1.2
    bgp fast-external-fallover
    neighbor fd00:192:168:3:: remote-as 65100
    neighbor fd00:192:168:3:: weight 300
    neighbor fd00:192:168:3:: fall-over bfd
    neighbor fd00:192:168:4:: remote-as 65100
    neighbor fd00:192:168:4:: weight 200
    address-family ipv6 unicast
        neighbor fd00:192:168:3:: activate
        neighbor fd00:192:168:4:: activate
        redistribute local loopback
    exit-address-family
```

BFD Configuration

For MP-BGP IPv6 AF



- MP-BGP BFD is configured globally and not per interface.
  The BGP network-service will create the BFD session on the associated interface of the BGP peering:

```
SW3# show bfd

Admin status: enabled
Echo source IP: <none>
Statistics:
Total number of control packets transmitted: 155443
Total number of control packets received: 155465
Total number of control packets dropped: 0
Session Interface VRF       Source IP                                Destination IP                           Echo     State        Protocol
------- --------- --------- ---------------------------------------- ---------------------------------------- -------- ------------ ------------
1       1/1/28    default   fd00:192:168:3::1                        fd00:192:168:3::                         enabled  up           bgp
```

- echo-source-ip-address can not be configured with IPv6 address.
  Echo function is not supported for IPv6 in 10.6.

Best Practices

aruba
a Hewlett Packard Enterprise company

BGP IPv6 AF – BFD Best Practices

- Use BFD for non direct point-to-point peering, typically when a 3rd device is inserted between the two peers.

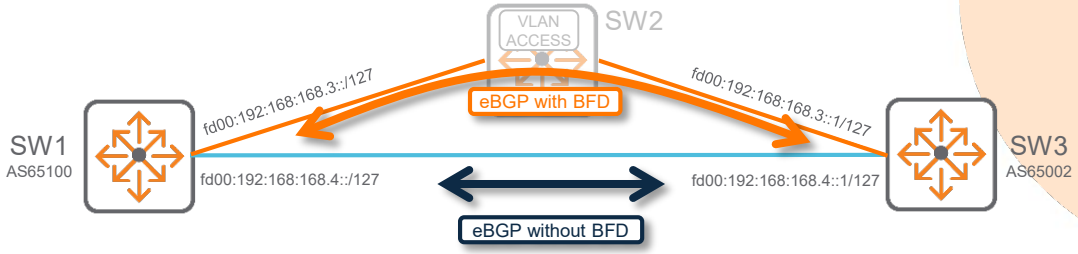
- **BFD Timers:** Detect Multiplier = **3**, Min_Rx = 500ms, Min_Tx = 500ms

Troubleshooting

aruba
a Hewlett Packard
Enterprise company

Troubleshooting BFD

show bfd




```
SW3# show bfd

Admin status: enabled
Echo source IP: <none>
Statistics:
Total number of control packets transmitted: 155443
Total number of control packets received: 155465
Total number of control packets dropped: 0
Session Interface VRF       Source IP                              Destination IP                         Echo     State        Protocol
------- --------- --------- -------------------------------------- -------------------------------------- -------- ------------ ------------
1       1/1/28    default   fd00:192:168:3::1                      fd00:192:168:3::                       enabled  up           bgp
```

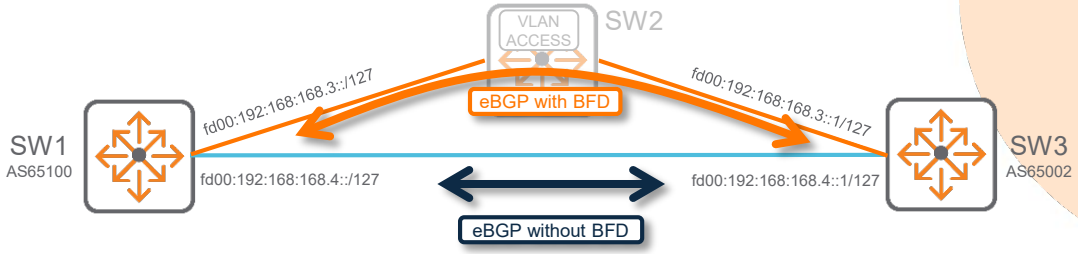
```
Sw3# show bfd summary

 Sessions
-------------------------------------------
 Admin Down    Down    Init    Up    Total
-------------------------------------------
         0       0       0     1        1
-------------------------------------------

 bgp has 1 total sessions
 Total protocols: 1
```

Troubleshooting BFD

show bfd session




```
SW3# show bfd session 1

BFD session information - Session 1
VRF: default
Min Tx interval (msec): 500
Min Rx interval (msec): 500
Min echo Rx interval (msec): 500
Detect multiplier: 2
Protocol(s): bgp
Local discriminator: 8725
Remote discriminator: 13211
Echo: enabled
Local diagnostic: no_diagnostic
Remote diagnostic: no_diagnostic
State flaps: 0
Interface Source IP                                Destination IP                          State        Pkt Rx   Pkt Tx   Pkt drop
--------- ---------------------------------------- --------------------------------------- ------------ -------- -------- --------
1/1/28    fd00:192:168:3::1                        fd00:192:168:3::                        up           155936   155913   0
```

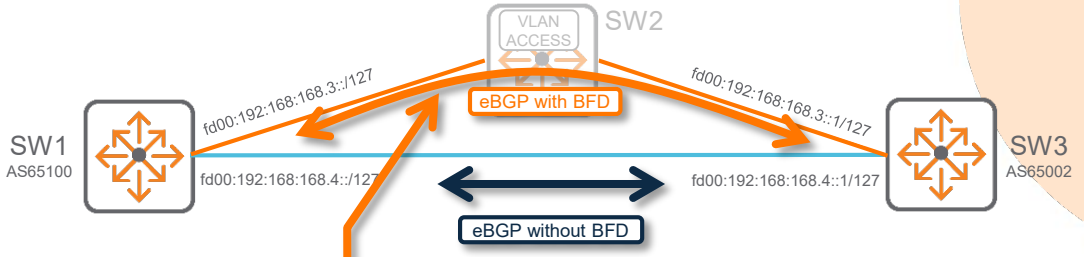
```
SW3# show bfd protocols

                                Sessions
                              -------------------------------------------
 Protocol          Type        Admin Down    Down    Init    Up    Total
-----------------------------------------------------------------------
 bgp               Single-hop           0       0       0     1        1
 ospf              Single-hop           0       0       0     0        0
 ospfv3            Single-hop           0       0       0     0        0
 pim               Single-hop           0       0       0     0        0
 pimv6             Single-hop           0       0       0     0        0
 static_routes     Single-hop           0       0       0     0        0
 vrrp              Single-hop           0       0       0     0        0
-----------------------------------------------------------------------
 Total                                  0       0       0     1        1
```

Troubleshooting BFD

BFD Control sequences

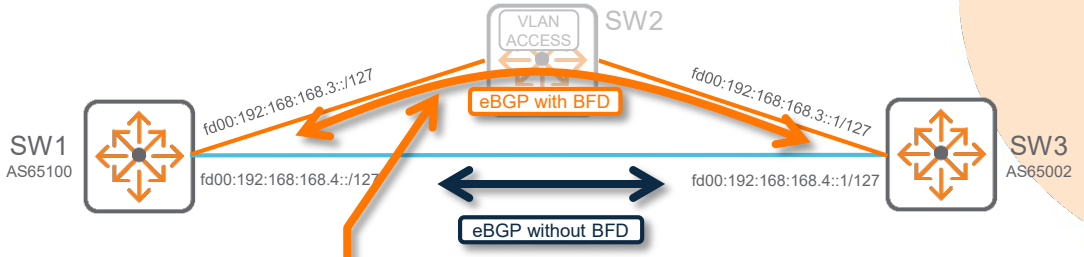
8320-4_bfd2.pcap



No.	Time	Source	Destination	Protocol	Length	Info
48	169758.518…	fd00:192:168:3::1	fd00:192:168:3::	TCP	98	58786 → 179 [SYN] Seq=0 Win=28800 Len=0 MSS=1440 SACK_PERM=1 TSval=486400227 TSecr=0 WS=1
49	169758.518…	fd00:192:168:3::	fd00:192:168:3::1	TCP	98	179 → 58786 [SYN, ACK] Seq=0 Ack=1 Win=28560 Len=0 MSS=1440 SACK_PERM=1 TSval=3896163718 TSecr=4
50	169758.518…	fd00:192:168:3::1	fd00:192:168:3::	TCP	90	58786 → 179 [ACK] Seq=1 Ack=1 Win=28800 Len=0 TSval=486400227 TSecr=3896163718
51	169758.519…	fd00:192:168:3::	fd00:192:168:3::1	BGP	147	OPEN Message
52	169758.519…	fd00:192:168:3::1	fd00:192:168:3::	BGP	147	OPEN Message
53	169758.519…	fd00:192:168:3::1	fd00:192:168:3::	TCP	90	58786 → 179 [ACK] Seq=58 Ack=58 Win=28800 Len=0 TSval=486400228 TSecr=3896163718
54	169758.519…	fd00:192:168:3::	fd00:192:168:3::1	TCP	90	179 → 58786 [ACK] Seq=58 Ack=58 Win=28672 Len=0 TSval=3896163719 TSecr=486400228
55	169758.520…	fd00:192:168:3::	fd00:192:168:3::1	BGP	109	KEEPALIVE Message
56	169758.520…	fd00:192:168:3::1	fd00:192:168:3::	BGP	109	KEEPALIVE Message
57	169758.560…	fd00:192:168:3::	fd00:192:168:3::1	TCP	90	179 → 58786 [ACK] Seq=77 Ack=77 Win=28672 Len=0 TSval=3896163760 TSecr=486400229
58	169758.561…	fd00:192:168:3::1	fd00:192:168:3::	BGP	304	UPDATE Message, UPDATE Message, UPDATE Message
59	169758.561…	fd00:192:168:3::	fd00:192:168:3::1	BGP	304	UPDATE Message, UPDATE Message, UPDATE Message
60	169758.567…	fd00:192:168:3::1	fd00:192:168:3::	BFD Control	90	Diag: No Diagnostic, State: Down, Flags: 0x00
61	169758.567…	fd00:192:168:3::	fd00:192:168:3::1	ICMPv6	138	Destination Unreachable (Port unreachable)
62	169758.604…	fd00:192:168:3::1	fd00:192:168:3::	TCP	90	58786 → 179 [ACK] Seq=291 Ack=291 Win=29480 Len=0 TSval=486400313 TSecr=3896163760
63	169758.871…	fd00:192:168:3::	fd00:192:168:3::1	BFD Control	90	Diag: No Diagnostic, State: Init, Flags: 0x20
64	169759.267…	fd00:192:168:3::1	fd00:192:168:3::	BFD Control	90	Diag: No Diagnostic, State: Down, Flags: 0x00
65	169759.267…	fd00:192:168:3::	fd00:192:168:3::1	ICMPv6	138	Destination Unreachable (Port unreachable)
66	169759.772…	fd00:192:168:3::	fd00:192:168:3::1	BFD Control	90	Diag: No Diagnostic, State: Init, Flags: 0x20
67	169759.772…	fd00:192:168:3::1	fd00:192:168:3::	ICMPv6	138	Destination Unreachable (Port unreachable)
68	169760.168…	fd00:192:168:3::1	fd00:192:168:3::	BFD Control	90	Diag: No Diagnostic, State: Down, Flags: 0x00
69	169760.168…	fd00:192:168:3::	fd00:192:168:3::1	ICMPv6	138	Destination Unreachable (Port unreachable)
70	169760.473…	fd00:192:168:3::	fd00:192:168:3::1	BFD Control	90	Diag: No Diagnostic, State: Init, Flags: 0x20
71	169760.473…	fd00:192:168:3::1	fd00:192:168:3::	ICMPv6	138	Destination Unreachable (Port unreachable)
72	169760.868…	fd00:192:168:3::1	fd00:192:168:3::	BFD Control	90	Diag: No Diagnostic, State: Down, Flags: 0x00
73	169760.869…	fd00:192:168:3::	fd00:192:168:3::1	ICMPv6	138	Destination Unreachable (Port unreachable)
74	169761.273…	fd00:192:168:3::	fd00:192:168:3::1	BFD Control	90	Diag: No Diagnostic, State: Init, Flags: 0x20
75	169761.273…	fd00:192:168:3::1	fd00:192:168:3::	ICMPv6	138	Destination Unreachable (Port unreachable)
76	169761.769…	fd00:192:168:3::1	fd00:192:168:3::	BFD Control	90	Diag: No Diagnostic, State: Down, Flags: 0x00
77	169761.769…	fd00:192:168:3::	fd00:192:168:3::1	ICMPv6	138	Destination Unreachable (Port unreachable)
78	169761.974…	fd00:192:168:3::	fd00:192:168:3::1	BFD Control	90	Diag: No Diagnostic, State: Init, Flags: 0x20
79	169762.670…	fd00:192:168:3::1	fd00:192:168:3::	BFD Control	90	Diag: No Diagnostic, State: Down, Flags: 0x00
80	169762.670…	fd00:192:168:3::	fd00:192:168:3::1	ICMPv6	138	Destination Unreachable (Port unreachable)
81	169762.874…	fd00:192:168:3::	fd00:192:168:3::1	BFD Control	90	Diag: No Diagnostic, State: Init, Flags: 0x20
82	169762.874…	fd00:192:168:3::1	fd00:192:168:3::	ICMPv6	138	Destination Unreachable (Port unreachable)
83	169763.470…	fd00:192:168:3::1	fd00:192:168:3::	BFD Control	90	Diag: No Diagnostic, State: Down, Flags: 0x00
84	169763.471…	fd00:192:168:3::	fd00:192:168:3::1	ICMPv6	138	Destination Unreachable (Port unreachable)
85	169763.559…	fd00:192:168:3::1	fd00:192:168:3::	BFD Control	90	Diag: No Diagnostic, State: Down, Flags: 0x10
86	169763.559…	fd00:192:168:3::1	fd00:192:168:3::	BFD Control	90	Diag: No Diagnostic, State: Up, Flags: 0x20
87	169763.559…	fd00:192:168:3::	fd00:192:168:3::1	ICMPv6	138	Destination Unreachable (Port unreachable)
88	169763.559…	fd00:192:168:3::	fd00:192:168:3::1	ICMPv6	138	Destination Unreachable (Port unreachable)
89	169763.559…	fd00:192:168:3::	fd00:192:168:3::1	BFD Control	90	Diag: No Diagnostic, State: Init, Flags: 0x00
90	169763.559…	fd00:192:168:3::	fd00:192:168:3::1	BFD Control	90	Diag: No Diagnostic, State: Init, Flags: 0x10
91	169763.559…	fd00:192:168:3::	fd00:192:168:3::1	BFD Control	90	Diag: No Diagnostic, State: Up, Flags: 0x20
92	169763.559…	fd00:192:168:3::1	fd00:192:168:3::	ICMPv6	138	Destination Unreachable (Port unreachable)
93	169763.561…	fd00:192:168:3::1	fd00:192:168:3::	BFD Control	90	Diag: No Diagnostic, State: Up, Flags: 0x10
94	169763.561…	fd00:192:168:3::1	fd00:192:168:3::	BFD Control	90	Diag: No Diagnostic, State: Up, Flags: 0x10
95	169763.561…	fd00:192:168:3::1	fd00:192:168:3::	BFD Control	90	Diag: No Diagnostic, State: Up, Flags: 0x10

Troubleshooting BFD

BFD Control negotiation



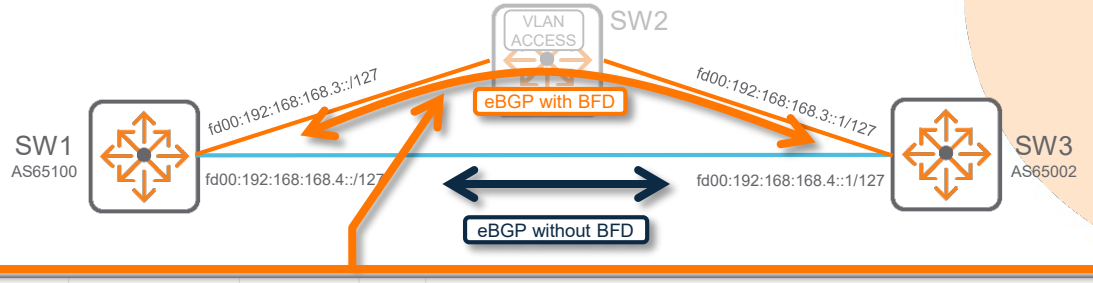
No.	Time	Source	Destination	Protocol	Length	Info
48	169758.518…	fd00:192:168:3::1	fd00:192:168:3::	TCP	98	58786 → 179 [SYN] Seq=0 Win=28800 Len=0 MSS=1440 SACK_PERM=1 TSval=486400227 TSecr=0 WS=1
49	169758.518…	fd00:192:168:3::	fd00:192:168:3::1	TCP	98	179 → 58786 [SYN, ACK] Seq=0 Ack=1 Win=28560 Len=0 MSS=1440 SACK_PERM=1 TSval=3896163718 TSecr=4
50	169758.518…	fd00:192:168:3::1	fd00:192:168:3::	TCP	90	58786 → 179 [ACK] Seq=1 Ack=1 Win=28800 Len=0 TSval=486400227 TSecr=3896163718
51	169758.519…	fd00:192:168:3::	fd00:192:168:3::1	BGP	147	OPEN Message
52	169758.519…	fd00:192:168:3::1	fd00:192:168:3::	BGP	147	OPEN Message
53	169758.519…	fd00:192:168:3::1	fd00:192:168:3::	TCP	90	58786 → 179 [ACK] Seq=58 Ack=58 Win=28800 Len=0 TSval=486400228 TSecr=3896163718
54	169758.519…	fd00:192:168:3::	fd00:192:168:3::1	TCP	90	179 → 58786 [ACK] Seq=58 Ack=58 Win=28672 Len=0 TSval=3896163719 TSecr=486400228
55	169758.520…	fd00:192:168:3::	fd00:192:168:3::1	BGP	109	KEEPALIVE Message
56	169758.520…	fd00:192:168:3::1	fd00:192:168:3::	BGP	109	KEEPALIVE Message
57	169758.560…	fd00:192:168:3::	fd00:192:168:3::1	TCP	90	179 → 58786 [ACK] Seq=77 Ack=77 Win=28672 Len=0 TSval=3896163760 TSecr=486400229
58	169758.561…	fd00:192:168:3::1	fd00:192:168:3::	BGP	304	UPDATE Message, UPDATE Message, UPDATE Message
59	169758.561…	fd00:192:168:3::	fd00:192:168:3::1	BGP	304	UPDATE Message, UPDATE Message, UPDATE Message
60	169758.567…	fd00:192:168:3::1	fd00:192:168:3::	BFD Control	90	Diag: No Diagnostic, State: Down, Flags: 0x00
61	169758.567…	fd00:192:168:3::	fd00:192:168:3::1	ICMPv6	138	Destination Unreachable (Port unreachable)
62	169758.604…	fd00:192:168:3::1	fd00:192:168:3::	TCP	90	58786 → 179 [ACK] Seq=291 Ack=291 Win=29480 Len=0 TSval=486400313 TSecr=3896163760
63	169758.871…	fd00:192:168:3::	fd00:192:168:3::1	BFD Control	90	Diag: No Diagnostic, State: Init, Flags: 0x20
64	169759.267…	fd00:192:168:3::1	fd00:192:168:3::	BFD Control	90	Diag: No Diagnostic, State: Down, Flags: 0x00
					138	Destination Unreachable (Port unreachable)
					90	Diag: No Diagnostic, State: Init, Flags: 0x20
					138	Destination Unreachable (Port unreachable)
					90	Diag: No Diagnostic, State: Down, Flags: 0x00
					138	Destination Unreachable (Port unreachable)
					90	Diag: No Diagnostic, State: Init, Flags: 0x20
					138	Destination Unreachable (Port unreachable)
					90	Diag: No Diagnostic, State: Down, Flags: 0x00
					138	Destination Unreachable (Port unreachable)
					90	Diag: No Diagnostic, State: Init, Flags: 0x20
					138	Destination Unreachable (Port unreachable)
					90	Diag: No Diagnostic, State: Down, Flags: 0x00
					138	Destination Unreachable (Port unreachable)
					90	Diag: No Diagnostic, State: Init, Flags: 0x20
					90	Diag: No Diagnostic, State: Down, Flags: 0x00
					138	Destination Unreachable (Port unreachable)
					90	Diag: No Diagnostic, State: Init, Flags: 0x20
					138	Destination Unreachable (Port unreachable)
					90	Diag: No Diagnostic, State: Down, Flags: 0x00
					138	Destination Unreachable (Port unreachable)
					90	Diag: No Diagnostic, State: Down, Flags: 0x10
					90	Diag: No Diagnostic, State: Up, Flags: 0x20
					138	Destination Unreachable (Port unreachable)
					138	Destination Unreachable (Port unreachable)
					90	Diag: No Diagnostic, State: Init, Flags: 0x00
					90	Diag: No Diagnostic, State: Init, Flags: 0x10
					90	Diag: No Diagnostic, State: Up, Flags: 0x20
					138	Destination Unreachable (Port unreachable)
					90	Diag: No Diagnostic, State: Up, Flags: 0x10
					90	Diag: No Diagnostic, State: Up, Flags: 0x10
95	169763.561…	fd00:192:168:3::1	fd00:192:168:3::	BFD Control	90	Diag: No Diagnostic, State: Up, Flags: 0x10

```
No.     Time           Source                Destination           Protocol Length Info
63 169758.871977680 fd00:192:168:3::      fd00:192:168:3::1     BFD Control 90     Diag: No Diagnostic, State: Init, Flags: 0x20

Frame 63: 90 bytes on wire (720 bits), 90 bytes captured (720 bits) on interface MirrorRxNet, id 0
Ethernet II, Src: HewlettP_1d:ad:00 (94:f1:28:1d:ad:00), Dst: ArubaaHe_ae:73:c0 (88:3a:30:ae:73:c0)
802.1Q Virtual LAN, PRI: 0, DEI: 0, ID: 7
Internet Protocol Version 6, Src: fd00:192:168:3::, Dst: fd00:192:168:3::1
User Datagram Protocol, Src Port: 49152, Dst Port: 3784
BFD Control message
    001. .... = Protocol Version: 1
    ...0 0000 = Diagnostic Code: No Diagnostic (0x00)
    10.. .... = Session State: Init (0x2)
    Message Flags: 0xa0, Poll: Set
        1... .. = Poll: Set
        .0.. .. = Final: Not set
        ..0. .. = Control Plane Independent: Not set
        ...0 .. = Authentication Present: Not set
        .... 0. = Demand: Not set
        .... .0 = Multipoint: Not set
    Detect Time Multiplier: 2 (= 2000 ms Detection time)
    Message Length: 24 bytes
    My Discriminator: 0x0000339b
    Your Discriminator: 0x0000313a
    Desired Min TX Interval: 1000 ms (1000000 us)
    Required Min RX Interval:  500 ms (500000 us)
    Required Min Echo Interval:  500 ms (500000 us)
```

Troubleshooting BFD

BFD Control – State Up



No.	Time	Source	Destination	Protocol	Length	Info
48	169758.518…	fd00:192:168:3::1	fd00:192:168:3::	TCP	98	58786 → 179 [SYN] Seq=0 Win=28800 Len=0 MSS=1440 SACK_PERM=1 TSval=486400227 TSecr=0 WS=1
49	169758.518…	fd00:192:168:3::	fd00:192:168:3::1	TCP	98	179 → 58786 [SYN, ACK] Seq=0 Ack=1 Win=28560 Len=0 MSS=1440 SACK_PERM=1 TSval=3896163718 TSecr=4
50	169758.518…	fd00:192:168:3::1	fd00:192:168:3::	TCP	90	58786 → 179 [ACK] Seq=1 Ack=1 Win=28800 Len=0 TSval=486400227 TSecr=3896163718
51	169758.519…	fd00:192:168:3::	fd00:192:168:3::1	BGP	147	OPEN Message
52	169758.519…	fd00:192:168:3::1	fd00:192:168:3::	BGP	147	OPEN Message
53	169758.519…	fd00:192:168:3::1	fd00:192:168:3::	TCP	90	58786 → 179 [ACK] Seq=58 Ack=58 Win=28800 Len=0 TSval=486400228 TSecr=3896163718
54	169758.519…	fd00:192:168:3::	fd00:192:168:3::1	TCP	90	179 → 58786 [ACK] Seq=58 Ack=58 Win=28672 Len=0 TSval=3896163719 TSecr=486400228
55	169758.520…	fd00:192:168:3::	fd00:192:168:3::1	BGP	109	KEEPALIVE Message
56	169758.520…	fd00:192:168:3::1	fd00:192:168:3::	BGP	109	KEEPALIVE Message
57	169758.560…	fd00:192:168:3::	fd00:192:168:3::1	TCP	90	179 → 58786 [ACK] Seq=77 Ack=77 Win=28672 Len=0 TSval=3896163760 TSecr=486400229
58	169758.561…	fd00:192:168:3::1	fd00:192:168:3::	BGP	304	UPDATE Message, UPDATE Message, UPDATE Message
59	169758.561…	fd00:192:168:3::	fd00:192:168:3::1	BGP	304	UPDATE Message, UPDATE Message, UPDATE Message
60	169758.567…	fd00:192:168:3::1	fd00:192:168:3::	BFD Control	90	Diag: No Diagnostic, State: Down, Flags: 0x00
61	169758.567…	fd00:192:168:3::	fd00:192:168:3::1	ICMPv6	138	Destination Unreachable (Port unreachable)
62	169758.604…	fd00:192:168:3::1	fd00:192:168:3::	TCP	90	58786 → 179 [ACK] Seq=291 Ack=291 Win=29480 Len=0 TSval=486400313 TSecr=3896163760
63	169758.871…	fd00:192:168:3::	fd00:192:168:3::1	BFD Control	90	Diag: No Diagnostic, State: Init, Flags: 0x20
64	169759.267…	fd00:192:168:3::1	fd00:192:168:3::	BFD Control	90	Diag: No Diagnostic, State: Down, Flags: 0x00
					138	Destination Unreachable (Port unreachable)
					90	Diag: No Diagnostic, State: Init, Flags: 0x20
					138	Destination Unreachable (Port unreachable)
					90	Diag: No Diagnostic, State: Down, Flags: 0x00
					138	Destination Unreachable (Port unreachable)
					90	Diag: No Diagnostic, State: Init, Flags: 0x20
					138	Destination Unreachable (Port unreachable)
					90	Diag: No Diagnostic, State: Down, Flags: 0x00
					138	Destination Unreachable (Port unreachable)
					90	Diag: No Diagnostic, State: Init, Flags: 0x20
					138	Destination Unreachable (Port unreachable)
					90	Diag: No Diagnostic, State: Down, Flags: 0x00
					138	Destination Unreachable (Port unreachable)
					90	Diag: No Diagnostic, State: Init, Flags: 0x20
					90	Diag: No Diagnostic, State: Down, Flags: 0x00
					138	Destination Unreachable (Port unreachable)
					90	Diag: No Diagnostic, State: Init, Flags: 0x20
					138	Destination Unreachable (Port unreachable)
					90	Diag: No Diagnostic, State: Down, Flags: 0x00
					138	Destination Unreachable (Port unreachable)
					90	Diag: No Diagnostic, State: Down, Flags: 0x10
					90	Diag: No Diagnostic, State: Up, Flags: 0x20
					138	Destination Unreachable (Port unreachable)
					138	Destination Unreachable (Port unreachable)
					90	Diag: No Diagnostic, State: Init, Flags: 0x00
					90	Diag: No Diagnostic, State: Init, Flags: 0x10
					90	Diag: No Diagnostic, State: Up, Flags: 0x20
					138	Destination Unreachable (Port unreachable)
					90	Diag: No Diagnostic, State: Up, Flags: 0x10
					90	Diag: No Diagnostic, State: Up, Flags: 0x10
95	169763.561…	fd00:192:168:3::1	fd00:192:168:3::	BFD Control	90	Diag: No Diagnostic, State: Up, Flags: 0x10

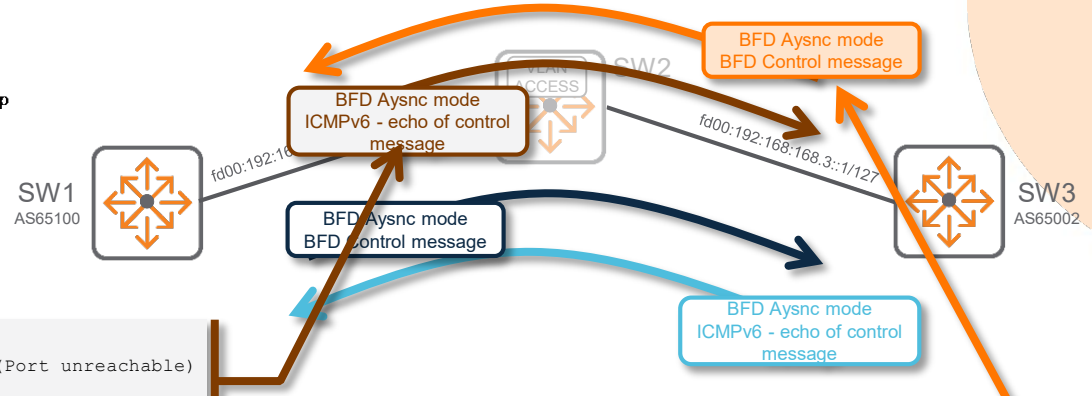
```
No.     Time           Source                Destination           Protocol Length Info
235 169781.987483112 fd00:192:168:3::      fd00:192:168:3::1     BFD Control 90     Diag: No Diagnostic, State: Up, Flags: 0x00

Frame 235: 90 bytes on wire (720 bits), 90 bytes captured (720 bits) on interface MirrorRxNet, id 0
Ethernet II, Src: HewlettP_1d:ad:00 (94:f1:28:1d:ad:00), Dst: ArubaaHe_ae:73:c0 (88:3a:30:ae:73:c0)
802.1Q Virtual LAN, PRI: 0, DEI: 0, ID: 7
Internet Protocol Version 6, Src: fd00:192:168:3::, Dst: fd00:192:168:3::1
User Datagram Protocol, Src Port: 49152, Dst Port: 3784
BFD Control message
    001. .... = Protocol Version: 1
    ...0 0000 = Diagnostic Code: No Diagnostic (0x00)
    11.. .... = Session State: Up (0x3)
    Message Flags: 0xc0
        0... .. = Poll: Not set
        .0.. .. = Final: Not set
        ..0. .. = Control Plane Independent: Not set
        ...0 .. = Authentication Present: Not set
        .... 0. = Demand: Not set
        .... .0 = Multipoint: Not set
    Detect Time Multiplier: 2 (= 1000 ms Detection time)
    Message Length: 24 bytes
    My Discriminator: 0x0000339b
    Your Discriminator: 0x0000313a
    Desired Min TX Interval:  500 ms (500000 us)
    Required Min RX Interval:  500 ms (500000 us)
    Required Min Echo Interval:  500 ms (500000 us)
```

Troubleshooting BFD

BFD Control Message and ICMPv6

8320-4_1-1-52.pcap




```
No.     Time           Source                Destination           Protocol Length Info
21 2.468103896    fd00:192:168:3::      fd00:192:168:3::1     ICMPv6   138    Destination Unreachable (Port unreachable)

Frame 21: 138 bytes on wire (1104 bits), 138 bytes captured (1104 bits) on interface MirrorRxNet, id 0
Ethernet II, Src: HewlettP_1d:ad:00 (94:f1:28:1d:ad:00), Dst: ArubaaHe_ae:73:c0 (88:3a:30:ae:73:c0)
802.1Q Virtual LAN, PRI: 0, DEI: 0, ID: 7
Internet Protocol Version 6, Src: fd00:192:168:3::, Dst: fd00:192:168:3::1
Internet Control Message Protocol v6
    Type: Destination Unreachable (1)
    Code: 4 (Port unreachable)
    Checksum: 0x8c86 [correct]
    [Checksum Status: Good]
    Reserved: 00000000
    Internet Protocol Version 6, Src: fd00:192:168:3::1, Dst: fd00:192:168:3::
    User Datagram Protocol, Src Port: 49152, Dst Port: 3784
    BFD Control message
        001. .... = Protocol Version: 1
        ...0 0000 = Diagnostic Code: No Diagnostic (0x00)
        11.. .... = Session State: Up (0x3)
        Message Flags: 0xc0
            0... .. = Poll: Not set
            .0.. .. = Final: Not set
            ..0. .. = Control Plane Independent: Not set
            ...0 .. = Authentication Present: Not set
            .... 0. = Demand: Not set
            .... .0 = Multipoint: Not set
        Detect Time Multiplier: 2 (= 1000 ms Detection time)
        Message Length: 24 bytes
        My Discriminator: 0x0000086f
        Your Discriminator: 0x00000009
        Desired Min TX Interval:  500 ms (500000 us)
        Required Min RX Interval:  500 ms (500000 us)
        Required Min Echo Interval:  500 ms (500000 us)
```

```
No.     Time           Source                Destination           Protocol Length Info
20 2.467804966    fd00:192:168:3::1     fd00:192:168:3::      BFD Control 90     Diag: No Diagnostic, State: Up, Flags: 0x00

Frame 20: 90 bytes on wire (720 bits), 90 bytes captured (720 bits) on interface MirrorRxNet, id 0
Ethernet II, Src: ArubaaHe_ae:73:c0 (88:3a:30:ae:73:c0), Dst: HewlettP_1d:ad:00 (94:f1:28:1d:ad:00)
802.1Q Virtual LAN, PRI: 1, DEI: 0, ID: 7
Internet Protocol Version 6, Src: fd00:192:168:3::1, Dst: fd00:192:168:3::
User Datagram Protocol, Src Port: 49152, Dst Port: 3784
BFD Control message
    001. .... = Protocol Version: 1
    ...0 0000 = Diagnostic Code: No Diagnostic (0x00)
    11.. .... = Session State: Up (0x3)
    Message Flags: 0xc0
        0... .. = Poll: Not set
        .0.. .. = Final: Not set
        ..0. .. = Control Plane Independent: Not set
        ...0 .. = Authentication Present: Not set
        .... 0. = Demand: Not set
        .... .0 = Multipoint: Not set
    Detect Time Multiplier: 2 (= 1000 ms Detection time)
    Message Length: 24 bytes
    My Discriminator: 0x0000086f
    Your Discriminator: 0x00000009
    Desired Min TX Interval:  500 ms (500000 us)
    Required Min RX Interval:  500 ms (500000 us)
    Required Min Echo Interval:  500 ms (500000 us)
```

Troubleshooting BFD

Debug bfd (initialization)

```
6300F-4# show debug buffer
-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------
show debug buffer
-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------
2020-10-21:19:04:12.040831|bfdd|LOG_DEBUG|MSTR|1|BFD|BFD_SESSION|Async session state transition | stimulus=RemoteSessionDown, initial_state=PendingRemoteDiscriminator, final_state=Init,
session_id=1, vrf=0, op_mode=AsyEcho, src_port=1/1/28, dst_ip=fd00:192:168:3:: |

2020-10-21:19:04:12.040861|bfdd|LOG_DEBUG|MSTR|1|BFD|BFD_SESSION|Async session state transition | stimulus=PacketReceived, initial_state=PendingRemoteDiscriminator, final_state=Init,
session_id=1, vrf=0, op_mode=AsyEcho, src_port=1/1/28, dst_ip=fd00:192:168:3:: |

2020-10-21:19:04:12.045121|ops-switchd|LOG_WARN|MSTR|1|BFD|BFD_SESSION|IPv6 Sessions not HW supported|session_id = 1port_type=system session_type=async_and_echo

2020-10-21:19:04:12.045145|ops-switchd|LOG_DEBUG|MSTR|1|BFD|BFD_SESSION|bfd_is_session_type_asic_supported|session_id = 1, hw_support=false, type=async_and_echo

2020-10-21:19:04:12.045163|ops-switchd|LOG_DEBUG|MSTR|1|BFD|BFD_SESSION|Session type async_and_echo not supported by asic

2020-10-21:19:04:17.044647|bfdd|LOG_DEBUG|MSTR|1|BFD|BFD_SESSION|Async session state transition | stimulus=RemoteSessionUp, initial_state=Init, final_state=Up, session_id=1, vrf=0,
op_mode=AsyEcho, src_port=1/1/28, dst_ip=fd00:192:168:3:: |

2020-10-21:19:04:17.044670|bfdd|LOG_DEBUG|MSTR|1|BFD|BFD_SESSION|Async session state transition | stimulus=PacketReceived, initial_state=Init, final_state=Up, session_id=1, vrf=0,
op_mode=AsyEcho, src_port=1/1/28, dst_ip=fd00:192:168:3:: |

2020-10-21:19:04:17.049326|ops-switchd|LOG_WARN|MSTR|1|BFD|BFD_SESSION|IPv6 Sessions not HW supported|session_id = 1port_type=system session_type=async_and_echo

2020-10-21:19:04:17.049350|ops-switchd|LOG_DEBUG|MSTR|1|BFD|BFD_SESSION|bfd_is_session_type_asic_supported|session_id = 1, hw_support=false, type=async_and_echo

2020-10-21:19:04:17.049370|ops-switchd|LOG_DEBUG|MSTR|1|BFD|BFD_SESSION|Session type async_and_echo not supported by asic
```

Troubleshooting BFD

Debug bfd (link failure)

```
6300F-4# show debu buffer
--------------------------------------------------------------------------------------------------------------------------------------------------------------
show debug buffer
--------------------------------------------------------------------------------------------------------------------------------------------------------------
2020-10-21:19:04:12.040831|bfdd|LOG_DEBUG|MSTR|1|BFD|BFD_SESSION|Async session state transition | stimulus=RemoteSessionDown, initial_state=PendingRemoteDiscriminator, final_state=Init, session_id=1,
vrf=0, op_mode=AsyEcho, src_port=1/1/28, dst_ip=fd00:192:168:3:: |
2020-10-21:19:04:12.040861|bfdd|LOG_DEBUG|MSTR|1|BFD|BFD_SESSION|Async session state transition | stimulus=PacketReceived, initial_state=PendingRemoteDiscriminator, final_state=Init, session_id=1, vrf=0,
op_mode=AsyEcho, src_port=1/1/28, dst_ip=fd00:192:168:3:: |
2020-10-21:19:04:12.045121|ops-switchd|LOG_WARN|MSTR|1|BFD|BFD_SESSION|IPv6 Sessions not HW supported|session_id = 1port_type=system session_type=async_and_echo
2020-10-21:19:04:12.045145|ops-switchd|LOG_DEBUG|MSTR|1|BFD|BFD_SESSION|bfd_is_session_type_asic_supported|session_id = 1, hw_support=false, type=async_and_echo
2020-10-21:19:04:12.045163|ops-switchd|LOG_DEBUG|MSTR|1|BFD|BFD_SESSION|Session type async_and_echo not supported by asic
2020-10-21:19:04:17.044647|bfdd|LOG_DEBUG|MSTR|1|BFD|BFD_SESSION|Async session state transition | stimulus=RemoteSessionUp, initial_state=Init, final_state=Up, session_id=1, vrf=0, op_mode=AsyEcho,
src_port=1/1/28, dst_ip=fd00:192:168:3:: |
2020-10-21:19:04:17.044670|bfdd|LOG_DEBUG|MSTR|1|BFD|BFD_SESSION|Async session state transition | stimulus=PacketReceived, initial_state=Init, final_state=Up, session_id=1, vrf=0, op_mode=AsyEcho,
src_port=1/1/28, dst_ip=fd00:192:168:3:: |
2020-10-21:19:04:17.049326|ops-switchd|LOG_WARN|MSTR|1|BFD|BFD_SESSION|IPv6 Sessions not HW supported|session_id = 1port_type=system session_type=async_and_echo
2020-10-21:19:04:17.049350|ops-switchd|LOG_DEBUG|MSTR|1|BFD|BFD_SESSION|bfd_is_session_type_asic_supported|session_id = 1, hw_support=false, type=async_and_echo
2020-10-21:19:04:17.049370|ops-switchd|LOG_DEBUG|MSTR|1|BFD|BFD_SESSION|Session type async_and_echo not supported by asic

2020-10-21:19:08:08.975686|bfdd|LOG_DEBUG|MSTR|1|BFD|BFD_SESSION|Async session state transition | stimulus=Tick, initial_state=Up, final_state=PendingRemoteDiscriminator, session_id=1, vrf=0,
op_mode=AsyEcho, src_port=1/1/28, dst_ip=fd00:192:168:3:: |
2020-10-21:19:08:08.979936|ops-switchd|LOG_WARN|MSTR|1|BFD|BFD_SESSION|IPv6 Sessions not HW supported|session_id = 1port_type=system session_type=async_and_echo
2020-10-21:19:08:08.979958|ops-switchd|LOG_DEBUG|MSTR|1|BFD|BFD_SESSION|bfd_is_session_type_asic_supported|session_id = 1, hw_support=false, type=async_and_echo
2020-10-21:19:08:08.979978|ops-switchd|LOG_DEBUG|MSTR|1|BFD|BFD_SESSION|Session type async_and_echo not supported by asic
```

```
6300F-4# sh bfd session 1

BFD session information - Session 1
VRF: default
Min Tx interval (msec): 1000
Min Rx interval (msec): 500
Min echo Rx interval (msec): 500
Detect multiplier: 2
Protocol(s): bgp
Local discriminator: 12602
Remote discriminator: 0
Echo: enabled
Local diagnostic: control_detection_time_expired
Remote diagnostic: no_diagnostic
State flaps: 1
Interface Source IP                                Destination IP                             State        Pkt Rx   Pkt Tx   Pkt drop
--------- ---------------------------------------- ---------------------------------------- ------------ -------- -------- --------
1/1/28    fd00:192:168:3::1                        fd00:192:168:3::                           down         13466    13843    0
```

Troubleshooting BFD

```
2020-10-21:19:21:07.221234|hpe-routing|LOG_INFO|MSTR|1|BGP|BGP|Local address:  (none)
2020-10-21:19:21:07.221249|hpe-routing|LOG_INFO|MSTR|1|BGP|BGP|Local port:     0
2020-10-21:19:21:07.221266|hpe-routing|LOG_INFO|MSTR|1|BGP|BGP|Remote address: FD00:192:168:3::
2020-10-21:19:21:07.221280|hpe-routing|LOG_INFO|MSTR|1|BGP|BGP|Remote port:    0
2020-10-21:19:21:07.221294|hpe-routing|LOG_INFO|MSTR|1|BGP|BGP|Scope ID:       0
2020-10-21:19:21:07.221308|hpe-routing|LOG_INFO|MSTR|1|BGP|BGP|Neg hold time:  180
2020-10-21:19:21:07.221321|hpe-routing|LOG_INFO|MSTR|1|BGP|BGP|Passive:?       False
2020-10-21:19:21:07.221336|hpe-routing|LOG_INFO|MSTR|1|BGP|BGP|Entity index:   268763136VRF Name = default.
2020-10-21:19:21:07.221501|hpe-routing|LOG_INFO|MSTR|1|BGP|BGP|BGP 268763136 established a session with peer FD00:192:168:3::.
2020-10-21:19:21:07.221516|hpe-routing|LOG_INFO|MSTR|1|BGP|BGP|Configured local address and port:  (none):0
2020-10-21:19:21:07.221529|hpe-routing|LOG_INFO|MSTR|1|BGP|BGP|Connection local address and port:  FD00:192:168:3::1:179
2020-10-21:19:21:07.221543|hpe-routing|LOG_INFO|MSTR|1|BGP|BGP|Configured remote address and port: FD00:192:168:3:::0
2020-10-21:19:21:07.221556|hpe-routing|LOG_INFO|MSTR|1|BGP|BGP|Connection remote port:             42396
2020-10-21:19:21:07.221572|hpe-routing|LOG_INFO|MSTR|1|BGP|BGP|Scope ID:                          0
2020-10-21:19:21:07.221585|hpe-routing|LOG_INFO|MSTR|1|BGP|BGP|Local AS number:                    65002
2020-10-21:19:21:07.221599|hpe-routing|LOG_INFO|MSTR|1|BGP|BGP|Remote AS number:                   65100VRF Name = default.
2020-10-21:19:21:07.221777|hpe-routing|LOG_INFO|MSTR|1|BGP|BGP|A connection's FSM state has deteriorated.
2020-10-21:19:21:07.221792|hpe-routing|LOG_INFO|MSTR|1|BGP|BGP|Entity index              = 268763136
2020-10-21:19:21:07.221805|hpe-routing|LOG_INFO|MSTR|1|BGP|BGP|Local address              = (none)
2020-10-21:19:21:07.221820|hpe-routing|LOG_INFO|MSTR|1|BGP|BGP|Local port               = 0
2020-10-21:19:21:07.221834|hpe-routing|LOG_INFO|MSTR|1|BGP|BGP|Remote address             = FD00:192:168:3::
2020-10-21:19:21:07.221848|hpe-routing|LOG_INFO|MSTR|1|BGP|BGP|Remote port               = 0
2020-10-21:19:21:07.221861|hpe-routing|LOG_INFO|MSTR|1|BGP|BGP|Scope ID                  = 0
2020-10-21:19:21:07.221875|hpe-routing|LOG_INFO|MSTR|1|BGP|BGP|Incoming?                 = False
2020-10-21:19:21:07.221889|hpe-routing|LOG_INFO|MSTR|1|BGP|BGP|Previous state             = 0X01
2020-10-21:19:21:07.221902|hpe-routing|LOG_INFO|MSTR|1|BGP|BGP|New state                 = 0X00
2020-10-21:19:21:07.221916|hpe-routing|LOG_INFO|MSTR|1|BGP|BGP|FSM Input                 = 0X01VRF Name = default.
2020-10-21:19:21:07.223037|hpe-routing|LOG_INFO|MSTR|1|BGP|BGP_EVENT|VRF : Peer fd00:192:168:3:: state changed to Established.
2020-10-21:19:21:07.223058|hpe-routing|LOG_DEBUG|MSTR|1|BGP|BGP_EVENT|Peer status - 6, vrfId - 0
2020-10-21:19:21:07.223079|hpe-routing|LOG_DEBUG|MSTR|1|BGP|BGP_EVENT|send_bgpEstablished Trap Remote Address= fd00:192:168:3::  LastError = ,  status 6 , vrf name default
2020-10-21:19:21:07.223157|hpe-routing|LOG_INFO|MSTR|1|BGP|BGP|Initiated BFD session monitoring for a BGP connection.
2020-10-21:19:21:07.223173|hpe-routing|LOG_INFO|MSTR|1|BGP|BGP|Entity index    = 268763136
2020-10-21:19:21:07.223191|hpe-routing|LOG_INFO|MSTR|1|BGP|BGP|Local address   = FD00:192:168:3::1
2020-10-21:19:21:07.223205|hpe-routing|LOG_INFO|MSTR|1|BGP|BGP|Local port      = 0
2020-10-21:19:21:07.223222|hpe-routing|LOG_INFO|MSTR|1|BGP|BGP|Remote address  = FD00:192:168:3::
2020-10-21:19:21:07.223236|hpe-routing|LOG_INFO|MSTR|1|BGP|BGP|Remote port     = 0
2020-10-21:19:21:07.223250|hpe-routing|LOG_INFO|MSTR|1|BGP|BGP|Scope ID        = 0VRF Name = default.
2020-10-21:19:21:07.223377|hpe-routing|LOG_INFO|MSTR|1|BGP|BGP|A BFD session has been established
2020-10-21:19:21:07.223392|hpe-routing|LOG_INFO|MSTR|1|BGP|BGP|Entity index    = 268763136
2020-10-21:19:21:07.223406|hpe-routing|LOG_INFO|MSTR|1|BGP|BGP|Local address   = FD00:192:168:3::1
2020-10-21:19:21:07.223420|hpe-routing|LOG_INFO|MSTR|1|BGP|BGP|Local port      = 0
2020-10-21:19:21:07.223434|hpe-routing|LOG_INFO|MSTR|1|BGP|BGP|Remote address  = FD00:192:168:3::
2020-10-21:19:21:07.223447|hpe-routing|LOG_INFO|MSTR|1|BGP|BGP|Remote port     = 0
2020-10-21:19:21:07.223462|hpe-routing|LOG_INFO|MSTR|1|BGP|BGP|Scope ID        = 0VRF Name = default.
2020-10-21:19:21:07.227592|hpe-routing|LOG_INFO|MSTR|1|BGP|BGP|DC-BGP Policy Manager has rejected a received a route with a looped AS
2020-10-21:19:21:07.227612|hpe-routing|LOG_INFO|MSTR|1|BGP|BGP|path.
2020-10-21:19:21:07.227628|hpe-routing|LOG_INFO|MSTR|1|BGP|BGP|RIB Manager entity index:      268763136
2020-10-21:19:21:07.227645|hpe-routing|LOG_INFO|MSTR|1|BGP|BGP|Received route neighbor index: 2
2020-10-21:19:21:07.227661|hpe-routing|LOG_INFO|MSTR|1|BGP|BGP|Received route prefix:         FD00:192:168:12::1/128
2020-10-21:19:21:07.227677|hpe-routing|LOG_INFO|MSTR|1|BGP|BGP|Received route prefix length:  128
2020-10-21:19:21:07.227691|hpe-routing|LOG_INFO|MSTR|1|BGP|BGP|Received route next hop:
2020-10-21:19:21:07.227707|hpe-routing|LOG_INFO|MSTR|1|BGP|BGP|   FD00:0192:0168:0003:0000:0000:0000:0000:FE80:0000:0000:0000:94F1:2808:0C1D:AD00VRF Name = default.
2020-10-21:19:21:09.732235|bfdd|LOG_DEBUG|MSTR|1|BFD|BFD_SESSION|Async session state transition | stimulus=RemoteSessionUp, initial_state=Init, final_state=Up, session_id=1, vrf=0, op_mode=AsyEcho, src_port=1/1/28, dst_ip=fd00:192:168:3:: |
2020-10-21:19:21:09.732264|bfdd|LOG_DEBUG|MSTR|1|BFD|BFD_SESSION|Async session state transition | stimulus=PacketReceived, initial_state=Init, final_state=Up, session_id=1, vrf=0, op_mode=AsyEcho, src_port=1/1/28, dst_ip=fd00:192:168:3:: |
2020-10-21:19:21:09.736927|ops-switchd|LOG_WARN|MSTR|1|BFD|BFD_SESSION|IPv6 Sessions not HW supported|session_id = 1port_type=system session_type=async_and_echo
2020-10-21:19:21:09.736948|ops-switchd|LOG_DEBUG|MSTR|1|BFD|BFD_SESSION|bfd_is_session_type_asic_supported|session_id = 1, hw_support=false, type=async_and_echo
2020-10-21:19:21:09.736966|ops-switchd|LOG_DEBUG|MSTR|1|BFD|BFD_SESSION|Session type async_and_echo not supported by asic
2020-10-21:19:21:09.739064|hpe-routing|LOG_INFO|MSTR|1|BGP|BGP|A BFD session has been established
2020-10-21:19:21:09.739084|hpe-routing|LOG_INFO|MSTR|1|BGP|BGP|Entity index    = 268763136
2020-10-21:19:21:09.739100|hpe-routing|LOG_INFO|MSTR|1|BGP|BGP|Local address   = FD00:192:168:3::1
2020-10-21:19:21:09.739116|hpe-routing|LOG_INFO|MSTR|1|BGP|BGP|Local port      = 0
2020-10-21:19:21:09.739131|hpe-routing|LOG_INFO|MSTR|1|BGP|BGP|Remote address  = FD00:192:168:3::
2020-10-21:19:21:09.739146|hpe-routing|LOG_INFO|MSTR|1|BGP|BGP|Remote port     = 0
2020-10-21:19:21:09.739160|hpe-routing|LOG_INFO|MSTR|1|BGP|BGP|Scope ID        = 0VRF Name = default.
```

Troubleshooting BFD

Debug bfd + bgp (link failure)

```
6300F-4# show debug buffer
-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------
show debug buffer
-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------
2020-10-21:19:16:53.348454|bfdd|LOG_DEBUG|MSTR|1|BFD|BFD_SESSION|Async session state transition | stimulus=Tick, initial_state=Up, final_state=PendingRemoteDiscriminator, session_id=1, vrf=0,
op_mode=AsyEcho, src_port=1/1/28, dst_ip=fd00:192:168:3:: |
2020-10-21:19:16:53.352805|ops-switchd|LOG_WARN|MSTR|1|BFD|BFD_SESSION|IPv6 Sessions not HW supported|session_id = 1port_type=system session_type=async_and_echo
2020-10-21:19:16:53.352830|ops-switchd|LOG_DEBUG|MSTR|1|BFD|BFD_SESSION|bfd_is_session_type_asic_supported|session_id = 1, hw_support=false, type=async_and_echo
2020-10-21:19:16:53.352849|ops-switchd|LOG_DEBUG|MSTR|1|BFD|BFD_SESSION|Session type async_and_echo not supported by asic
2020-10-21:19:16:53.361422|hpe-routing|LOG_INFO|MSTR|1|BGP|BGP|A BFD session "down" indication has been received and the cause is
2020-10-21:19:16:53.361796|hpe-routing|LOG_INFO|MSTR|1|BGP|BGP|neither administrator action nor no contact.
2020-10-21:19:16:53.362111|hpe-routing|LOG_INFO|MSTR|1|BGP|BGP|Entity index              = 268763136
2020-10-21:19:16:53.362829|hpe-routing|LOG_INFO|MSTR|1|BGP|BGP|Local address             = FD00:192:168:3::1
2020-10-21:19:16:53.363203|hpe-routing|LOG_INFO|MSTR|1|BGP|BGP|Local port               = 0
2020-10-21:19:16:53.363487|hpe-routing|LOG_INFO|MSTR|1|BGP|BGP|Remote address            = FD00:192:168:3::
2020-10-21:19:16:53.363771|hpe-routing|LOG_INFO|MSTR|1|BGP|BGP|Remote port               = 0
2020-10-21:19:16:53.364051|hpe-routing|LOG_INFO|MSTR|1|BGP|BGP|Scope ID                  = 0
2020-10-21:19:16:53.364416|hpe-routing|LOG_INFO|MSTR|1|BGP|BGP|Session diagnostic code   = 1
2020-10-21:19:16:53.364707|hpe-routing|LOG_INFO|MSTR|1|BGP|BGP|Control plane independent = 1VRF Name = default.
2020-10-21:19:16:53.365196|hpe-routing|LOG_INFO|MSTR|1|BGP|BGP|A connection's FSM state has deteriorated.
2020-10-21:19:16:53.365228|hpe-routing|LOG_INFO|MSTR|1|BGP|BGP|Entity index               = 268763136
2020-10-21:19:16:53.365877|hpe-routing|LOG_INFO|MSTR|1|BGP|BGP|Local address              = (none)
2020-10-21:19:16:53.365902|hpe-routing|LOG_INFO|MSTR|1|BGP|BGP|Local port                = 0
2020-10-21:19:16:53.365918|hpe-routing|LOG_INFO|MSTR|1|BGP|BGP|Remote address             = FD00:192:168:3::
2020-10-21:19:16:53.365933|hpe-routing|LOG_INFO|MSTR|1|BGP|BGP|Remote port               = 0
2020-10-21:19:16:53.365947|hpe-routing|LOG_INFO|MSTR|1|BGP|BGP|Scope ID                  = 0
2020-10-21:19:16:53.365962|hpe-routing|LOG_INFO|MSTR|1|BGP|BGP|Incoming?                 = False
2020-10-21:19:16:53.365976|hpe-routing|LOG_INFO|MSTR|1|BGP|BGP|Previous state             = 0X06
2020-10-21:19:16:53.365990|hpe-routing|LOG_INFO|MSTR|1|BGP|BGP|New state                 = 0X00
2020-10-21:19:16:53.366005|hpe-routing|LOG_INFO|MSTR|1|BGP|BGP|FSM Input                 = 0X13VRF Name = default.
2020-10-21:19:16:53.368671|hpe-routing|LOG_INFO|MSTR|1|BGP|BGP|A connection has left Established state.
2020-10-21:19:16:53.368693|hpe-routing|LOG_INFO|MSTR|1|BGP|BGP|Local address:  (none)
2020-10-21:19:16:53.368709|hpe-routing|LOG_INFO|MSTR|1|BGP|BGP|Local port:     0
2020-10-21:19:16:53.368724|hpe-routing|LOG_INFO|MSTR|1|BGP|BGP|Remote address: FD00:192:168:3::
2020-10-21:19:16:53.368739|hpe-routing|LOG_INFO|MSTR|1|BGP|BGP|Remote port:    0
2020-10-21:19:16:53.368754|hpe-routing|LOG_INFO|MSTR|1|BGP|BGP|Scope ID:       0
2020-10-21:19:16:53.368768|hpe-routing|LOG_INFO|MSTR|1|BGP|BGP|Neg hold time:  180
2020-10-21:19:16:53.368782|hpe-routing|LOG_INFO|MSTR|1|BGP|BGP|Passive:?       False
2020-10-21:19:16:53.368796|hpe-routing|LOG_INFO|MSTR|1|BGP|BGP|Entity index:   268763136VRF Name = default.
2020-10-21:19:16:53.370856|hpe-routing|LOG_DEBUG|MSTR|1|BGP|BGP_EVENT|Peer status - 1, vrfId - 0
2020-10-21:19:16:53.370885|hpe-routing|LOG_DEBUG|MSTR|1|BGP|BGP_EVENT|send_bgpBackwardTransition Trap Remote Address= fd00:192:168:3::   LastError = ,  status 1, vrf name default
2020-10-21:19:16:53.371010|hpe-routing|LOG_INFO|MSTR|1|BGP|BGP|A BFD session has been terminated
2020-10-21:19:16:53.371075|hpe-routing|LOG_INFO|MSTR|1|BGP|BGP|Entity index    = 268763136
2020-10-21:19:16:53.371094|hpe-routing|LOG_INFO|MSTR|1|BGP|BGP|Local address   = (none)
2020-10-21:19:16:53.371155|hpe-routing|LOG_INFO|MSTR|1|BGP|BGP|Local port      = 0
2020-10-21:19:16:53.371171|hpe-routing|LOG_INFO|MSTR|1|BGP|BGP|Remote address  = FD00:192:168:3::
2020-10-21:19:16:53.371185|hpe-routing|LOG_INFO|MSTR|1|BGP|BGP|Remote port     = 0
2020-10-21:19:16:53.371200|hpe-routing|LOG_INFO|MSTR|1|BGP|BGP|Scope ID        = 0VRF Name = default.
```

Troubleshooting BFD

ovs-appctl –t bfdd fastlog show

```
fastlog clientName="bfdd-error" ,instance=0: ,moduleName ="fastlog_bfdd" 0/1024 entries

fastlog clientName="bfdd-fsm-debug" ,instance=0: ,moduleName ="fastlog_bfdd" 56/1024 entries
(20 Oct 20 22:29:23.496302240): State Machine transition | initial_state=InterfaceDown, stimulus=LinkUp, final_state=AdmDnPndCpty,
(20 Oct 20 22:29:23.496303720):   session_id=1, vrf=0, op_mode=AsyEcho, src_port=1/1/28, dest_ip=fd00:192:168:3:: |
(20 Oct 20 22:29:23.496345440): State Machine transition | initial_state=AdmDnPndCpty, stimulus=CptyAvailable, final_state=AdmDnNbrUnres,
(20 Oct 20 22:29:23.496346520):   session_id=1, vrf=0, op_mode=AsyEcho, src_port=1/1/28, dest_ip=fd00:192:168:3:: |
(20 Oct 20 22:32:28.992928600): State Machine transition | initial_state=AdmDnNbrUnres, stimulus=BfdEnabled, final_state=PendingNeighbor,
(20 Oct 20 22:32:28.992929840):   session_id=1, vrf=0, op_mode=AsyEcho, src_port=1/1/28, dest_ip=fd00:192:168:3:: |
(20 Oct 20 22:32:29.005608120): State Machine transition | initial_state=PendingNeighbor, stimulus=NbrResolved, final_state=PndRemoteDiscr,
(20 Oct 20 22:32:29.005609480):   session_id=1, vrf=0, op_mode=AsyEcho, src_port=1/1/28, dest_ip=fd00:192:168:3:: |
(20 Oct 20 22:32:47.916525480): State Machine transition | initial_state=PndRemoteDiscr, stimulus=RemoteSessDn, final_state=Init,
(20 Oct 20 22:32:47.916527320):   session_id=1, vrf=0, op_mode=AsyEcho, src_port=1/1/28, dest_ip=fd00:192:168:3:: |
(20 Oct 20 22:32:47.916532840): State Machine transition | initial_state=PndRemoteDiscr, stimulus=PacketReceived, final_state=Init,
(20 Oct 20 22:32:47.916533920):   session_id=1, vrf=0, op_mode=AsyEcho, src_port=1/1/28, dest_ip=fd00:192:168:3:: |
(20 Oct 20 22:32:55.220711120): State Machine transition | initial_state=Init, stimulus=RemoteSessionUp, final_state=Up,
(20 Oct 20 22:32:55.220712400):   session_id=1, vrf=0, op_mode=AsyEcho, src_port=1/1/28, dest_ip=fd00:192:168:3:: |
(20 Oct 20 22:32:55.220717280): State Machine transition | initial_state=Init, stimulus=PacketReceived, final_state=Up,
(20 Oct 20 22:32:55.220718440):   session_id=1, vrf=0, op_mode=AsyEcho, src_port=1/1/28, dest_ip=fd00:192:168:3:: |
(20 Oct 20 22:34:54.368893280): State Machine transition | initial_state=Up, stimulus=LinkDown, final_state=IfaceDnPndNbr,
(20 Oct 20 22:34:54.368894600):   session_id=1, vrf=0, op_mode=AsyEcho, src_port=1/1/28, dest_ip=fd00:192:168:3:: |
(20 Oct 20 22:34:54.387123280): State Machine transition | initial_state=IfaceDnPndNbr, stimulus=SessDestroyed, final_state=CleanUp,
(20 Oct 20 22:34:54.387124400):   session_id=1, vrf=0, op_mode=AsyEcho, src_port=1/1/28, dest_ip=fd00:192:168:3:: |
(20 Oct 20 22:35:56.420248560): State Machine transition | initial_state=InterfaceDown, stimulus=LinkUp, final_state=PndCapacities,
(20 Oct 20 22:35:56.420249800):   session_id=1, vrf=0, op_mode=AsyEcho, src_port=1/1/28, dest_ip=fd00:192:168:3:: |
(20 Oct 20 22:35:56.420297080): State Machine transition | initial_state=PndCapacities, stimulus=CptyAvailable, final_state=PendingNeighbor,
(20 Oct 20 22:35:56.420298160):   session_id=1, vrf=0, op_mode=AsyEcho, src_port=1/1/28, dest_ip=fd00:192:168:3:: |
(20 Oct 20 22:35:56.443733400): State Machine transition | initial_state=PendingNeighbor, stimulus=NbrResolved, final_state=PndRemoteDiscr,
(20 Oct 20 22:35:56.443734680):   session_id=1, vrf=0, op_mode=AsyEcho, src_port=1/1/28, dest_ip=fd00:192:168:3:: |
(20 Oct 20 22:36:25.825165720): State Machine transition | initial_state=PndRemoteDiscr, stimulus=SessDestroyed, final_state=CleanUp,
(20 Oct 20 22:36:25.825166960):   session_id=1, vrf=0, op_mode=AsyEcho, src_port=1/1/28, dest_ip=fd00:192:168:3:: |
(20 Oct 20 22:36:25.839195080): State Machine transition | initial_state=InterfaceDown, stimulus=LinkUp, final_state=PndCapacities,
(20 Oct 20 22:36:25.839196240):   session_id=1, vrf=0, op_mode=AsyEcho, src_port=1/1/28, dest_ip=fd00:192:168:3:: |
(20 Oct 20 22:36:25.839230520): State Machine transition | initial_state=PndCapacities, stimulus=CptyAvailable, final_state=PendingNeighbor,
(20 Oct 20 22:36:25.839231600):   session_id=1, vrf=0, op_mode=AsyEcho, src_port=1/1/28, dest_ip=fd00:192:168:3:: |
(20 Oct 20 22:36:25.859366680): State Machine transition | initial_state=PendingNeighbor, stimulus=NbrResolved, final_state=PndRemoteDiscr,
(20 Oct 20 22:36:25.859367880):   session_id=1, vrf=0, op_mode=AsyEcho, src_port=1/1/28, dest_ip=fd00:192:168:3:: |
(20 Oct 20 22:36:30.861503320): State Machine transition | initial_state=PndRemoteDiscr, stimulus=RemoteSessInit, final_state=Up,
(20 Oct 20 22:36:30.861504560):   session_id=1, vrf=0, op_mode=AsyEcho, src_port=1/1/28, dest_ip=fd00:192:168:3:: |
(20 Oct 20 22:36:30.861510120): State Machine transition | initial_state=PndRemoteDiscr, stimulus=PacketReceived, final_state=Up,
(20 Oct 20 22:36:30.861511160):   session_id=1, vrf=0, op_mode=AsyEcho, src_port=1/1/28, dest_ip=fd00:192:168:3:: |
(20 Oct 20 22:38:08.463663040): No action for minimum interval changed, port override with same value than the System | initial_state=Up, stimulus=PacketReceived,
(20 Oct 20 22:38:08.463665760):   session_id=1, vrf=0, op_mode=AsyEcho, src_port=1/1/28, dest_ip=fd00:192:168:3:: |
(20 Oct 20 22:41:38.699952280): No action for minimum interval changed, port override with same value than the System | initial_state=Up, stimulus=PacketReceived,
(20 Oct 20 22:41:38.699954280):   session_id=1, vrf=0, op_mode=AsyEcho, src_port=1/1/28, dest_ip=fd00:192:168:3:: |
(20 Oct 20 22:42:20.271554560): State Machine transition | initial_state=Up, stimulus=LinkDown, final_state=IfaceDnPndNbr,
(20 Oct 20 22:42:20.271555920):   session_id=1, vrf=0, op_mode=AsyEcho, src_port=1/1/28, dest_ip=fd00:192:168:3:: |
(20 Oct 20 22:42:20.279533000): State Machine transition | initial_state=IfaceDnPndNbr, stimulus=SessDestroyed, final_state=CleanUp,
(20 Oct 20 22:42:20.279534080):   session_id=1, vrf=0, op_mode=AsyEcho, src_port=1/1/28, dest_ip=fd00:192:168:3:: |
(20 Oct 20 22:43:05.225256160): State Machine transition | initial_state=InterfaceDown, stimulus=LinkUp, final_state=PndCapacities,
(20 Oct 20 22:43:05.225257240):   session_id=1, vrf=0, op_mode=AsyEcho, src_port=1/1/28, dest_ip=fd00:192:168:3:: |
(20 Oct 20 22:43:05.225292080): State Machine transition | initial_state=PndCapacities, stimulus=CptyAvailable, final_state=PendingNeighbor,
(20 Oct 20 22:43:05.225293040):   session_id=1, vrf=0, op_mode=AsyEcho, src_port=1/1/28, dest_ip=fd00:192:168:3:: |
(20 Oct 20 22:43:05.253347360): State Machine transition | initial_state=PendingNeighbor, stimulus=NbrResolved, final_state=PndRemoteDiscr,
(20 Oct 20 22:43:05.253349520):   session_id=1, vrf=0, op_mode=AsyEcho, src_port=1/1/28, dest_ip=fd00:192:168:3:: |
(20 Oct 20 22:43:10.259654880): State Machine transition | initial_state=PndRemoteDiscr, stimulus=RemoteSessInit, final_state=Up,
(20 Oct 20 22:43:10.259656160):   session_id=1, vrf=0, op_mode=AsyEcho, src_port=1/1/28, dest_ip=fd00:192:168:3:: |
```

Troubleshooting BFD

ovsdb-client

```
6300F-4:/home/admin# ovsdb-client list-tables | grep BFD
BFD_Session


6300F-4:/home/admin# ovsdb-client dump BFD_Session
BFD_Session table
_uuid                                bfd_min_rx_interval                  bfd_min_tx_interval                  diagnostic                           dst_ip
dst_mac                              effective_min_rx_interval            effective_min_tx_interval            egress_phy_port                      from
from_instance_id                     inner_dst_mac                        ip_address_family                    local_discriminator                  operating_mode
protocol_disabled                    remote_discriminator                 remote_min_echo_rx_interval          remote_min_rx_interval               remote_min_tx_interval
remote_multiplier                    selected_src_ip                      session_id                           src_ip                               src_port
state                                statistics                           status                               vrf
------------------------------------ ------------------------------------ ------------------------------------ ------------------------------------ ------------------------------------
- ------------------------------------ ------------------------------------ ------------------------------------ ------------------------------------ ------------------------------------
--- ------------------------------------ ------------------------------------ ------------------------------------ ------------------------------------ ------------------------------------
----- ------------------------------------ ------------------------------------ ------------------------------------ ------------------------------------ ------------------------------------
------- ------------------------------------ ------------------------------------ ------------------------------------ ------------------------------------ ------------------------------------
--------- ------------------------------------ ------------------------------------ ------------------------------------ ------------------------------------
8b0cbc41-50d0-4db5-9512-141c7599921e []                   []                   {local=no_diagnostic, remote=no_diagnostic} "fd00:192:168:3::" "94:f1:28:1d:ad:00" 500
500                       a2050919-4f43-41eb-b282-50e0964edb8a bgp  1                  ""                   "ipv6"               12602                 async_and_echo []                  13211
500000                      500                      500                      2                  "fd00:192:168:3::1" 1          "fd00:192:168:3::1" a2050919-4f43-41eb-b282-50e0964edb8a
{async=up, remote=up, session=up} {control_dropped=0, control_rx=12206, control_tx=12210, flap_count=0} {capacity=allocated, safe_to_delete="false"} 7db060fa-087a-4ec0-a456-
e6da816420ab
```

Demo

aruba

a Hewlett Packard Enterprise company

Thank you

vincent.giles@hpe.com