VENDOR IMPLEMENTATION REPORT FOR DRAFT-IETF-IDR-BGP-BFD-STRICT-MODE

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Agenda

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3. Nokia BGP BFD Strict-Mode Config (SRoS 23.7)
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5. Summary
1. BGP BFD Default Mode (most vendors)

- BFD is initiated after BGP is established
  - BGP Route Updates commence as soon as BGP is UP
- There is a finite time between when BGP is established to BFD coming up
- If there’s a “break-in-middle” problem during this time, BGP session will require lengthy Hold time to timeout
  - No BFD for Fast Failure Detection
  - Traffic Blackhole for extended “Hold time” (90sec/180sec)
Sample BGP/BFD Up times on a Production router

Time from BGP Established to BFD UP = 00:51:08 – 00:50:57 ~ **11s**

```plaintext
user@router> show bgp summary group bgpGroup
Threading mode: BGP I/O
Groups: 4 Peers: 9 Down peers: 0
Table       Tot Paths  Act Paths Suppressed  History Damp State  Pending
inet.0      3880005  1190923  0  0  0  0
bgp.l3vpn.0  0  0  0  0  0  0

Peer       AS  InPkt    OutPkt    OutQ  Flaps Last Up/Dwn State|Active/Received/Accepted/Damped...
10.1.1.1    65001  7635586 93761  0  42 4w1d 22:40:55 Establ
inet.0: 699605/917238/917238/0

user@router> show log messages

May 26 00:50:46.950 2022  router bfdd[25859]: BFDD_STATE_UP_TO_DOWN: BFD Session 10.1.1.1 (IFL 397) state Up
May 26 00:50:46.950 2022  router bfdd[25859]: BFDD_TRAP_SHOP_STATE_DOWN: local discriminator: 171, new state: down,
interface: xe-7/0/1.0, peer addr: 10.1.1.1
May 26 00:50:46.984 2022  router rpd[26439]: RPD_BGP_NEIGHBOR_STATE_CHANGED: BGP peer 10.1.1.1 (External AS 65001)
changed state from Established to Idle (event BfdDown) (instance master)
May 26 00:50:47.012 2022  router rpd[26439]: bgp_bfd_callback:188: NOTIFICATION sent to 10.1.1.1 (External AS 65001):
code 6 (Cease) subcode 9 (Hard Reset), Reason: BFD Session Down

May 26 00:50:57.989 2022  router rpd[26439]: RPD_BGP_NEIGHBOR_STATE_CHANGED: BGP peer 10.1.1.1 (External AS 65001)
changed state from OpenConfirm to Established (event RecvKeepAlive) (instance master)
May 26 00:51:08.712 2022  router bfdd[25859]: BFDD_TRAP_SHOP_STATE_UP: local discriminator: 176, new state: up,
interface: xe-7/0/1.0, peer addr: 10.1.1.1
```
2. BGP BFD Strict-Mode

- BFD is initiated before BGP is “fully” established
- Dynamic Signaling of BGP BFD Strict-Mode in BGP Open Strict-Mode Capability Code 74 (0x4a)
  - “Default” Mode is used unless both sides advertise Strict-Mode Capability
- BFD Strict-Mode Protocol Change:
  After BGP OpenSent/OpenConfirm, delay sending BGP Keepalive until BFD session is Up
  - Ensure BFD Fast Failure Detection at all time
- BFD Strict-Mode with “Holddown”:
  After BGP OpenSent/OpenConfirm, delay sending BGP Keepalive until BFD session is Up for “Hold time” period
  - Useful in dampening flapping links
3. Nokia BGP BFD Strict-Mode Config (SRoS 23.7)

```
router "Base" {
    interface "eth-1/1/15.3009" {
        admin-state enable
        port 1/x1/1/c15/1:3009
        ipv4 {
            bfd {
                admin-state enable
                transmit-interval 150
                receive 150
                multiplier 3
            }
            primary {
                address 100.1.1.2
                prefix-length 30
            }
        }
    }
    bgp {
        admin-state enable
        group "bgpGroup" {
            admin-state enable
            peer-as 65001
            ..
        }
        neighbor "100.1.1.1" {
            admin-state enable
            bfd-liveness true
            group "bgpGroup"
            bfd-strict-mode {
                next-hop-reachability true
                advertise
            }
        }
    }
}
```
4. Juniper BGP BFD Strict-Mode Config (Junos 23.4)

```ini
interfaces {
  et-0/0/3 {
    vlan-tagging;
    mtu 9192;
    unit 3009 {
      vlan-id 3009;
      family inet {
        mtu 1500;
        address 100.1.1.1/30;
      }
    }
  }
  ...
}
protocols {
  bgp {
    group ebgp {
      peer-as 65002;
      neighbor 100.1.112 {
        bfd-liveness-detection {
          minimum-interval 150;
          multiplier 3;
          strict-bfd;
          holddown-interval 10000; /* msec */
        }
      }
    }
  }
}
```

Junos supports BFD Strict-Mode with “Holddown”, whereby BFD must be up for the configured period before BGP transitions from OpenSent/OpenConfirm to Established state.
Successful BGP Strict-Mode Interop Between Junos/SRoS

- Juniper Strict-Mode (with/without Holddown) could successfully Interop with Nokia Strict-Mode (currently no Holddown)
- BGP Strict-Mode Capability (Option 74) successfully Exchanged

**Juniper:**
user@Juniper> show bgp neighbor 100.1.1.2 | match strict
    Strict BFD configured locally
    Peer supports strict BFD

**Nokia:**
A:user@Nokia# show router bgp neighbor 100.1.1.1 | match Capability
Local Capability : RtRefresh MPBGP 4byte ASN BfdStrictMode
Remote Capability : RtRefresh MPBGP 4byte ASN BfdStrictMode
5. Summary

- BGP BFD Strict-Mode ensures that BFD is always available for Fast Failure Detection
  - Validated on Juniper/Nokia (successful Interop)
  - Support expected on 3rd Vendor soon
- Note that RFC9355 specifies similar BFD Strict-Mode for OSPF protocol, as supported by:
  - Juniper
  - Nokia
- BFD Strict Mode is recommended for all protocols
Questions?
Backup Slides..
BGP BFD "Default" Mode

After BGP is Established, some delay before BFD is initiated.

“Break-In-Middle” failure during this time will incur lengthy service outage.
After BGP Open/Open-Confirm State, Wait for BFD to come Up before sending BGP Keepalive
BGP BFD Strict-Mode with Holddown

After BGP Open/Open-Confirm State, Wait for BFD to come Up for “Holddown” time before sending BGP Keepalive
Juniper Proprietary BGP BFD Strict-Mode Config
(Available since Junos 15.1)

```plaintext
interfaces {
    et-0/0/3 {
        vlan-tagging;
        mtu 9192;
        unit 3009 {
            vlan-id 3009;
            family inet {
                mtu 1500;
                address 100.1.1.1/30;
            }
        }
    }

devices {
    protocols {
        bgp {
            group ebgp {
                peer-as 65002;
                bfd-liveness-detection {
                    minimum-interval 1000;
                    multiplier 3;
                }
            }
            neighbor 100.1.1.2 {
                bfd-liveness-detection {
                    minimum-interval 500;
                    multiplier 3;
                    holddown-interval 10000;
                }
            }
        }
    }
}
```

Proprietary implementation does not support Dynamic Strict-Mode Signaling
- Both sides must be configured with Strict-Mode
- BFD must be Up before TCP 3-Way Handshake begins
- Complicates deployment