BGP Step 1 - Establish BGP Session

Establish iBGP session
Topology:
BGP_session1.png

Procedure:
Step 1. FRR config initialization (refer to this article)

Step 2. Configure IP address properly for BGP session (refer to this article)

Step 3. Enter Vty shell.

admin@sonic:~$ vtysh

Hello, this is FRRouting (version 7.2.1-sonic).
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sonic#
Note: vtysh provides a combined frontend to all FRR daemons in a single combined
session.

Step 4. Assign the Router ID

Switch#1
sonic# configure terminal
sonic(config)# router-id 3.3.3.3

Switch#2
sonic# configure terminal
sonic(config)# router-id 4.4.4.4
Caution: Router ID is used to identify routers in AS(autonomous systems). Router
ID must be unique for each BGP router in the network. Otherwise, it's failed to
establish BGP session.

Step 5. Configuring BGP Neighbor Session

Switch#1's setting.
sonic# configure terminal
sonic(config)# router bgp 65101
sonic(config-router)# neighbor 10.3.0.2 remote-as 65101
Switch#2's setting.
sonic# configure terminal
sonic(config)# router bgp 65101
sonic(config-router)# neighbor 10.3.0.3 remote-as 65101
Note:

AS (autonomous systems) is a unique identifier and it used to exchange routing
information with other AS.Its available pool of 16-bit AS numbers.
1 ~ 64511 reserve to the public, you need to apply for it form IANA (Internet
Assigned Numbers Authority)

64512~ 65534 reserve for private.

Since AS numbers are not enough, IANA extended the AS Number field to 32 bits in
size.
131072 - 4199999999 reserve for public and 4200000000-4294967294 reserve for
private.
Step 6. Checking the neighbor status.

Switch#1
sonic# show bgp summary

IPv4 Unicast Summary:

```
BGP router identifier 3.3.3.3, local AS number 65101 vrf-id 0
BGP table version 0
RIB entries 0, using 0 bytes of memory
Peers 1, using 20 KiB of memory

Neighbor         V         AS MsgRcvd MsgSent   TblVer  InQ OutQ  Up/Down
State/PfxRcd
10.3.0.2         4      65101       5       5        0    0    0 00:02:13
0


Total number of neighbors 1

sonic# show bgp neighbors
BGP neighbor is 10.3.0.2, remote AS 65101, local AS 65101, internal link
Hostname: sonic
BGP version 4, remote router ID 4.4.4.4, local router ID 3.3.3.3
BGP state = Established, up for 00:00:26
Last read 00:00:25, Last write 00:00:25
Hold time is 180, keepalive interval is 60 seconds
Neighbor capabilities:
4 Byte AS: advertised and received
AddPath:
IPv4 Unicast: RX advertised IPv4 Unicast and received
Route refresh: advertised and received(old & new)
Address Family IPv4 Unicast: advertised and received
Hostname Capability: advertised (name: sonic,domain name: n/a) received (name:
sonic,domain name: n/a)
Graceful Restart Capabilty: advertised and received
Remote Restart timer is 120 seconds
Address families by peer:
none
Graceful restart information:
End-of-RIB send: IPv4 Unicast
End-of-RIB received: IPv4 Unicast
Message statistics:
Inq depth is 0
Outq depth is 0
Sent Rcvd
Opens: 3 3
Notifications: 4 0
Updates: 2 2
Keepalives: 9 9
Route Refresh: 0 0
Capability: 0 0
Total: 18 14
Minimum time between advertisement runs is 0 seconds

For address family: IPv4 Unicast
Update group 2, subgroup 2
Packet Queue length 0
Community attribute sent to this neighbor(all)
0 accepted prefixes

Connections established 2; dropped 1
Last reset 00:00:28, No AFI/SAFI activated for peer
Message received that caused BGP to send a NOTIFICATION:
FFFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF
004E0104 FE4D00B4 04040404 31020601
04000100 01020280 00020202 00020641
040000FE 4D020645 04000101 01020949
0705736F 6E696300 02044002 0078
Local host: 10.3.0.3, Local port: 179
Foreign host: 10.3.0.2, Foreign port: 49374
Nexthop: 10.3.0.3
```

```
Nexthop global: fe80::3e2c:99ff:fe8b:41bc
Nexthop local: fe80::3e2c:99ff:fe8b:41bc
BGP connection: shared network
BGP Connect Retry Timer in Seconds: 120
Read thread: on Write thread: on FD used: 2


Switch#2
sonic# show bgp summary

IPv4 Unicast Summary:
BGP router identifier 4.4.4.4, local AS number 65101 vrf-id 0
BGP table version 0
RIB entries 0, using 0 bytes of memory
Peers 1, using 20 KiB of memory

Neighbor        V        AS MsgRcvd MsgSent   TblVer  InQ OutQ  Up/Down
State/PfxRcd
10.3.0.3        4     65101       4       4        0    0    0 00:01:31
0


Total number of neighbors 1

sonic# show bgp neighbors
BGP neighbor is 10.3.0.3, remote AS 65101, local AS 65101, internal link
Hostname: sonic
BGP version 4, remote router ID 3.3.3.3, local router ID 4.4.4.4
BGP state = Established, up for 00:00:31
Last read 00:00:30, Last write 00:00:30
Hold time is 180, keepalive interval is 60 seconds
Neighbor capabilities:
4 Byte AS: advertised and received
AddPath:
IPv4 Unicast: RX advertised IPv4 Unicast and received
Route refresh: advertised and received(old & new)
Address Family IPv4 Unicast: advertised and received
Hostname Capability: advertised (name: sonic,domain name: n/a) received (name:
sonic,domain name: n/a)
Graceful Restart Capabilty: advertised and received
Remote Restart timer is 120 seconds
Address families by peer:
none
Graceful restart information:
End-of-RIB send: IPv4 Unicast
End-of-RIB received: IPv4 Unicast
Message statistics:
Inq depth is 0
Outq depth is 0
Sent Rcvd
Opens: 2 2
Notifications: 0 2
Updates: 2 2
Keepalives: 9 9
Route Refresh: 0 0
Capability: 0 0
Total: 13 15

Minimum time between advertisement runs is 0 seconds

For address family: IPv4 Unicast
Update group 2, subgroup 2
Packet Queue length 0
Community attribute sent to this neighbor(all)
0 accepted prefixes
```

```
Connections established 2; dropped 1
Last reset 00:00:33, Notification sent (Cease/Other Configuration Change)
Local host: 10.3.0.2, Local port: 49374
Foreign host: 10.3.0.3, Foreign port: 179
Nexthop: 10.3.0.2
Nexthop global: fe80::6f8:f8ff:fe8d:81e1
Nexthop local: fe80::6f8:f8ff:fe8d:81e1
BGP connection: shared network
BGP Connect Retry Timer in Seconds: 120
Read thread: on Write thread: on FD used: 28
Notice. If the BGP session is failed, user can run the bellowing command to
quickly understand the reason for the failure.

sonic# show bgp summary failed
Step 7. Save the routing setting.

sonic# write
Note: this version of vtysh never writes vtysh.conf
Building Configuration...
Integrated configuration saved to /etc/frr/frr.conf
[OK]
Establish eBGP session
Topology:
BGP_session2.png

Procedure:
Step 1. FRR config initialization (refer to this article)

Step 2. Configure IP address properly for BGP session (refer to this article)

Step 3. Enter Vty shell.

admin@sonic:~$ vtysh

Hello, this is FRRouting (version 7.2.1-sonic).
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sonic#
Note: vtysh provides a combined frontend to all FRR daemons in a single combined
session.

Step 4. Assign the Router ID

Switch#1
sonic# configure terminal
sonic(config)# router-id 3.3.3.3

Switch#2
sonic# configure terminal
sonic(config)# router-id 4.4.4.4
Note: Router ID is used to identify routers in AS(autonomous systems).
Caution: Router ID must be unique for each BGP router in the network.
Otherwise, it's failed to establish BGP session.

Step 5. Configuring BGP Neighbor Session

Switch#1
sonic# configure terminal
sonic(config)# router bgp 65000
sonic(config-router)# neighbor 10.3.0.2 remote-as 65001

Switch#2
sonic# configure terminal
sonic(config)# router bgp 65001
```

```
sonic(config-router)# neighbor 10.3.0.3 remote-as 65000
Step 6. Checking the neighbor status.(If the version is above the 202012 branch,
please refer to the restrictions to avoid encountering a policy error.)


Switch#1
sonic# show bgp summary

IPv4 Unicast Summary:
BGP router identifier 3.3.3.3, local AS number 65000 vrf-id 0
BGP table version 0
RIB entries 0, using 0 bytes of memory
Peers 1, using 20 KiB of memory

Neighbor          V          AS MsgRcvd MsgSent   TblVer  InQ OutQ  Up/Down
State/PfxRcd
10.3.0.2          4       65001      13      22        0    0    0 00:00:41
0


Total number of neighbors 1

sonic# show bgp neighbors
BGP neighbor is 10.3.0.2, remote AS 65001, local AS 65000, external link
Hostname: sonic
  BGP version 4, remote router ID 4.4.4.4, local router ID 3.3.3.3
  BGP state = Established, up for 00:00:44
  Last read 00:00:43, Last write 00:00:43
  Hold time is 180, keepalive interval is 60 seconds
  Neighbor capabilities:
    4 Byte AS: advertised and received
    AddPath:
      IPv4 Unicast: RX advertised IPv4 Unicast and received
    Route refresh: advertised and received(old & new)
    Address Family IPv4 Unicast: advertised and received
    Hostname Capability: advertised (name: sonic,domain name: n/a) received
(name: sonic,domain name: n/a)
    Graceful Restart Capabilty: advertised and received
      Remote Restart timer is 120 seconds
      Address families by peer:
        none
  Graceful restart information:
    End-of-RIB send: IPv4 Unicast
    End-of-RIB received: IPv4 Unicast
  Message statistics:
    Inq depth is 0
    Outq depth is 0
                    Sent        Rcvd
    Opens:             6           5
    Notifications:    10           2
    Updates:           3           3
    Keepalives:        3           3
    Route Refresh:     0           0
    Capability:        0           0
    Total:            22          13

  Minimum time between advertisement runs is 0 seconds
 For address family: IPv4 Unicast
  Update group 4, subgroup 4
  Packet Queue length 0
  Community attribute sent to this neighbor(all)
  0 accepted prefixes
  Connections established 4; dropped 3
  Last reset 00:00:46,   No AFI/SAFI activated for peer
  Message received that caused BGP to send a NOTIFICATION:
    FFFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF
```

```
     004E0104 FDE900B4 04040404 31020601
     04000100 01020280 00020202 00020641
     040000FD E9020645 04000101 01020949
     0705736F 6E696300 02044002 0078
Local host: 10.3.0.3, Local port: 179
Foreign host: 10.3.0.2, Foreign port: 47570
Nexthop: 10.3.0.3
Nexthop global: fe80::3e2c:99ff:fe8b:41bc
Nexthop local: fe80::3e2c:99ff:fe8b:41bc
BGP connection: shared network
BGP Connect Retry Timer in Seconds: 120
Read thread: on  Write thread: on  FD used: 29


Switch#2
sonic# show bgp summary

IPv4 Unicast Summary:
BGP router identifier 4.4.4.4, local AS number 65001 vrf-id 0
BGP table version 0
RIB entries 0, using 0 bytes of memory
Peers 1, using 20 KiB of memory

Neighbor         V         AS MsgRcvd MsgSent   TblVer  InQ OutQ  Up/Down
State/PfxRcd
10.3.0.3         4      65000      37      25        0    0    0 00:00:48
0

Total number of neighbors 1

sonic# show bgp neighbors
BGP neighbor is 10.3.0.3, remote AS 65000, local AS 65001, external link
Hostname: sonic
  BGP version 4, remote router ID 3.3.3.3, local router ID 4.4.4.4
  BGP state = Established, up for 00:00:50
  Last read 00:00:49, Last write 00:00:49
  Hold time is 180, keepalive interval is 60 seconds
  Neighbor capabilities:
    4 Byte AS: advertised and received
    AddPath:
      IPv4 Unicast: RX advertised IPv4 Unicast and received
    Route refresh: advertised and received(old & new)
    Address Family IPv4 Unicast: advertised and received
    Hostname Capability: advertised (name: sonic,domain name: n/a) received
(name: sonic,domain name: n/a)
    Graceful Restart Capabilty: advertised and received
      Remote Restart timer is 120 seconds
      Address families by peer:
        none
  Graceful restart information:
    End-of-RIB send: IPv4 Unicast
    End-of-RIB received: IPv4 Unicast
  Message statistics:
    Inq depth is 0
    Outq depth is 0
                    Sent        Rcvd
    Opens:            12          12
    Notifications:     2          18
    Updates:           3           3
    Keepalives:        8           4
    Route Refresh:     0           0
    Capability:        0           0
    Total:            25          37
```

```
  Minimum time between advertisement runs is 0 seconds

 For address family: IPv4 Unicast
  Update group 4, subgroup 4
  Packet Queue length 0
  Community attribute sent to this neighbor(all)
  0 accepted prefixes

  Connections established 4; dropped 3
  Last reset 00:00:52,   User reset
Local host: 10.3.0.2, Local port: 47570
Foreign host: 10.3.0.3, Foreign port: 179
Nexthop: 10.3.0.2
Nexthop global: fe80::6f8:f8ff:fe8d:81e1
Nexthop local: fe80::6f8:f8ff:fe8d:81e1
BGP connection: shared network
BGP Connect Retry Timer in Seconds: 120
Read thread: on  Write thread: on  FD used: 27
 Step 7. Save the routing setting.

sonic# write
Note: this version of vtysh never writes vtysh.conf
Building Configuration...
Integrated configuration saved to /etc/frr/frr.conf
[OK]
 Establish eBGP with peer group
Topology:
BGP_session3.png

Procedure:
Step 1. FRR config initialization (refer to this article)

Step 2. Configure IP address properly for BGP session (refer to this article)

Step 3. Enter Vty shell.

admin@sonic:~$ vtysh

Hello, this is FRRouting (version 7.2.1-sonic).
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sonic#
Note: vtysh provides a combined frontend to all FRR daemons in a single combined
session.

Step 4. Assign the Router ID

Switch#1
sonic# configure terminal
sonic(config)# router-id 1.1.1.1

Switch#2
sonic# configure terminal
sonic(config)# router-id 3.3.3.3

Switch#3
sonic# configure terminal
sonic(config)# router-id 4.4.4.4
Note:  Router ID is used to identify routers in AS(autonomous systems).
Caution: Router ID must be unique for each BGP router in the network.
Otherwise, it's failed to establish BGP session.

Step 5. Configuring BGP Neighbor Session
```

```
Switch#1
sonic# configure terminal
sonic(config)# router bgp 65000
sonic(config-router)# neighbor 10.2.0.3 remote-as 65001

Switch#2
sonic# configure terminal
sonic(config)# router bgp 65001
sonic(config-router)# neighbor LEAF peer-group
sonic(config-router)# neighbor LEAF remote-as external
sonic(config-router)# neighbor 10.2.0.2 peer-group LEAF
sonic(config-router)# neighbor 10.3.0.2 peer-group LEAF

Switch#3
sonic# configure terminal
sonic(config)# router bgp 65002
sonic(config-router)# neighbor 10.3.0.3 remote-as 65001
Step 6. Checking the neighbor status.
Switch#1

sonic# show bgp summary

IPv4 Unicast Summary:
BGP router identifier 1.1.1.1, local AS number 65000 vrf-id 0
BGP table version 0
RIB entries 0, using 0 bytes of memory
Peers 1, using 20 KiB of memory

Neighbor          V          AS MsgRcvd MsgSent   TblVer  InQ OutQ  Up/Down
State/PfxRcd
10.2.0.3          4       65001      13      17        0    0    0 00:00:31
0

Total number of neighbors 1
sonic# show bgp neighbors
BGP neighbor is 10.2.0.3, remote AS 65001, local AS 65000, external link
Hostname: sonic
  BGP version 4, remote router ID 3.3.3.3, local router ID 1.1.1.1
  BGP state = Established, up for 00:00:40
  Last read 00:00:39, Last write 00:00:38
  Hold time is 180, keepalive interval is 60 seconds
  Neighbor capabilities:
    4 Byte AS: advertised and received
    AddPath:
      IPv4 Unicast: RX advertised IPv4 Unicast and received
    Route refresh: advertised and received(old & new)
    Address Family IPv4 Unicast: advertised and received
    Hostname Capability: advertised (name: sonic,domain name: n/a) received
(name: sonic,domain name: n/a)
    Graceful Restart Capabilty: advertised and received
      Remote Restart timer is 120 seconds
      Address families by peer:
        none
  Graceful restart information:
    End-of-RIB send: IPv4 Unicast
    End-of-RIB received: IPv4 Unicast
  Message statistics:
    Inq depth is 0
    Outq depth is 0
                      Sent        Rcvd
    Opens:               6           4
    Notifications:       4           2
    Updates:             3           3
    Keepalives:          4           4
```

```
      Route Refresh:            0          0
      Capability:               0          0
      Total:                    17         13

   Minimum time between advertisement runs is 0 seconds

 For address family: IPv4 Unicast
  Update group 3, subgroup 3
  Packet Queue length 0
  Community attribute sent to this neighbor(all)

  0 accepted prefixes

  Connections established 3; dropped 2
  Last reset 00:00:42,   No AFI/SAFI activated for peer
  Message received that caused BGP to send a NOTIFICATION:
    FFFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF
    004E0104 FDE900B4 03030303 31020601
    04000100 01020280 00020202 00020641
    040000FD E9020645 04000101 01020949
    0705736F 6E696300 02044002 0078
Local host: 10.2.0.2, Local port: 179
Foreign host: 10.2.0.3, Foreign port: 59126
Nexthop: 10.2.0.2
Nexthop global: fe80::6f8:f8ff:fe6b:691
Nexthop local: fe80::6f8:f8ff:fe6b:691
BGP connection: shared network
BGP Connect Retry Timer in Seconds: 120
Read thread: on  Write thread: on  FD used: 29

Switch#2
sonic# show bgp summary

IPv4 Unicast Summary:
BGP router identifier 3.3.3.3, local AS number 65001 vrf-id 0
BGP table version 0
RIB entries 0, using 0 bytes of memory
Peers 2, using 41 KiB of memory
Peer groups 1, using 64 bytes of memory


Neighbor         V          AS MsgRcvd MsgSent   TblVer  InQ OutQ  Up/Down
State/PfxRcd
10.2.0.2         4       65000      12      12        0    0    0 00:00:30
0
10.3.0.2         4       65002      13      18        0    0    0 00:00:34
0

Total number of neighbors 2
sonic# show bgp neighbors
BGP neighbor is 10.2.0.2, remote AS 65000, local AS 65001, external link
Hostname: sonic
 Member of peer-group LEAF for session parameters
  BGP version 4, remote router ID 1.1.1.1, local router ID 3.3.3.3
  BGP state = Established, up for 00:00:39
  Last read 00:00:38, Last write 00:00:39
  Hold time is 180, keepalive interval is 60 seconds
  Neighbor capabilities:
    4 Byte AS: advertised and received
    AddPath:
      IPv4 Unicast: RX advertised IPv4 Unicast and received
    Route refresh: advertised and received(old & new)
    Address Family IPv4 Unicast: advertised and received
    Hostname Capability: advertised (name: sonic,domain name: n/a) received
```

```
(name: sonic,domain name: n/a)
    Graceful Restart Capabilty: advertised and received
      Remote Restart timer is 120 seconds
      Address families by peer:
        none
  Graceful restart information:
    End-of-RIB send: IPv4 Unicast
    End-of-RIB received: IPv4 Unicast
  Message statistics:
    Inq depth is 0
    Outq depth is 0
                      Sent         Rcvd
    Opens:               3            3
    Notifications:       2            2
    Updates:             3            3
    Keepalives:          4            4
    Route Refresh:       0            0
    Capability:          0            0
    Total:              12           12

  Minimum time between advertisement runs is 0 seconds


 For address family: IPv4 Unicast
  LEAF peer-group member
  Update group 2, subgroup 2
  Packet Queue length 0
  Community attribute sent to this neighbor(all)
  0 accepted prefixes


  Connections established 3; dropped 2
  Last reset 00:00:41,   Notification received (Cease/Administratively Reset)
Local host: 10.2.0.3, Local port: 59126
Foreign host: 10.2.0.2, Foreign port: 179
Nexthop: 10.2.0.3
Nexthop global: fe80::3e2c:99ff:fe8b:41bc
Nexthop local: fe80::3e2c:99ff:fe8b:41bc
BGP connection: shared network
BGP Connect Retry Timer in Seconds: 120
Read thread: on  Write thread: on  FD used: 28

BGP neighbor is 10.3.0.2, remote AS 65002, local AS 65001, external link
Hostname: sonic
 Member of peer-group LEAF for session parameters
  BGP version 4, remote router ID 4.4.4.4, local router ID 3.3.3.3
  BGP state = Established, up for 00:00:43
  Last read 00:00:42, Last write 00:00:43
  Hold time is 180, keepalive interval is 60 seconds
  Neighbor capabilities:
    4 Byte AS: advertised and received
    AddPath:
      IPv4 Unicast: RX advertised IPv4 Unicast and received
    Route refresh: advertised and received(old & new)
    Address Family IPv4 Unicast: advertised and received
    Hostname Capability: advertised (name: sonic,domain name: n/a) received
(name: sonic,domain name: n/a)
    Graceful Restart Capabilty: advertised and received
      Remote Restart timer is 120 seconds
      Address families by peer:
        none
  Graceful restart information:
    End-of-RIB send: IPv4 Unicast
    End-of-RIB received: IPv4 Unicast
```

```
    Message statistics:
      Inq depth is 0
      Outq depth is 0
                        Sent        Rcvd
      Opens:               5           4
      Notifications:       6           2
      Updates:             3           3
      Keepalives:          4           4
      Route Refresh:       0           0
      Capability:          0           0
      Total:              18          13
    Minimum time between advertisement runs is 0 seconds

  For address family: IPv4 Unicast
   LEAF peer-group member
   Update group 2, subgroup 2
   Packet Queue length 0
   Community attribute sent to this neighbor(all)
   0 accepted prefixes

   Connections established 3; dropped 2
   Last reset 00:00:45,   No AFI/SAFI activated for peer
   Message received that caused BGP to send a NOTIFICATION:
     FFFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF
     004E0104 FDEA00B4 04040404 31020601
     04000100 01020280 00020202 00020641
     040000FD EA020645 04000101 01020949
     0705736F 6E696300 02044002 0078
Local host: 10.3.0.3, Local port: 179
Foreign host: 10.3.0.2, Foreign port: 52028
Nexthop: 10.3.0.3
Nexthop global: fe80::3e2c:99ff:fe8b:41bc
Nexthop local: fe80::3e2c:99ff:fe8b:41bc
BGP connection: shared network
BGP Connect Retry Timer in Seconds: 120
Read thread: on  Write thread: on  FD used: 30

Switch#3

sonic# show bgp summary

IPv4 Unicast Summary:
BGP router identifier 4.4.4.4, local AS number 65002 vrf-id 0
BGP table version 0
RIB entries 0, using 0 bytes of memory
Peers 1, using 20 KiB of memory

Neighbor        V        AS MsgRcvd MsgSent   TblVer  InQ OutQ  Up/Down
State/PfxRcd
10.3.0.3        4     65001      12      13        0    0    0 00:00:34
0

Total number of neighbors 1
sonic# show bgp neighbors
BGP neighbor is 10.3.0.3, remote AS 65001, local AS 65002, external link
Hostname: sonic
  BGP version 4, remote router ID 3.3.3.3, local router ID 4.4.4.4
  BGP state = Established, up for 00:00:43
  Last read 00:00:43, Last write 00:00:42
  Hold time is 180, keepalive interval is 60 seconds
  Neighbor capabilities:
    4 Byte AS: advertised and received
    AddPath:
      IPv4 Unicast: RX advertised IPv4 Unicast and received
```

```
      Route refresh: advertised and received(old & new)
      Address Family IPv4 Unicast: advertised and received
      Hostname Capability: advertised (name: sonic,domain name: n/a) received
(name: sonic,domain name: n/a)
      Graceful Restart Capabilty: advertised and received
        Remote Restart timer is 120 seconds
        Address families by peer:
          none
  Graceful restart information:
    End-of-RIB send: IPv4 Unicast
    End-of-RIB received: IPv4 Unicast
  Message statistics:
    Inq depth is 0
    Outq depth is 0
                        Sent       Rcvd
    Opens:                 4          3
    Notifications:         2          2
    Updates:               3          3
    Keepalives:            4          4
    Route Refresh:         0          0
    Capability:            0          0
    Total:                13         12

  Minimum time between advertisement runs is 0 seconds

 For address family: IPv4 Unicast
  Update group 3, subgroup 3
  Packet Queue length 0
  Community attribute sent to this neighbor(all)
  0 accepted prefixes


  Connections established 3; dropped 2
  Last reset 00:00:45,   Peer closed the session
Local host: 10.3.0.2, Local port: 52028
Foreign host: 10.3.0.3, Foreign port: 179
Nexthop: 10.3.0.2
Nexthop global: fe80::6f8:f8ff:fe8d:81e1
Nexthop local: fe80::6f8:f8ff:fe8d:81e1
BGP connection: shared network
BGP Connect Retry Timer in Seconds: 120
Read thread: on  Write thread: on  FD used: 28
 Step 7. Save the routing setting.

sonic# write
Note: this version of vtysh never writes vtysh.conf
Building Configuration...
Integrated configuration saved to /etc/frr/frr.conf
[OK]
```

Establish iBGP with peer group auto-discovery
Topology:
BGP_session4.png

Procedure:
Step 1. FRR config initialization (refer to this article)

Step 2. Configure IP address properly for BGP session (refer to this article)

Step 3. Enter Vty shell.

```
admin@sonic:~$ vtysh

Hello, this is FRRouting (version 7.2.1-sonic).
Copyright 1996-2005 Kunihiro Ishiguro, et al.
```

```
sonic#
Note: vtysh provides a combined frontend to all FRR daemons in a single combined
session.


Step 4. Assign the Router ID


Switch#1
sonic# configure terminal
sonic(config)# router-id 1.1.1.1


Switch#2
sonic# configure terminal
sonic(config)# router-id 3.3.3.3


Switch#3
sonic# configure terminal
sonic(config)# router-id 4.4.4.4
Note: Router ID is used to identify routers in AS(autonomous systems).
Caution: Router ID must be unique for each BGP router in the network.
Otherwise, it's failed to establish BGP session.


Step 5. Configuring BGP Neighbor Session


Switch#1
sonic# configure terminal
sonic(config)# router bgp 65001
sonic(config-router)# neighbor 10.2.0.3 remote-as 65001


Switch#2
sonic# configure terminal
sonic(config)# router bgp 65001
sonic(config-router)# neighbor LEAF peer-group
sonic(config-router)# neighbor LEAF remote-as 65001
sonic(config-router)# bgp listen range 10.0.0.0/8 peer-group LEAF


Switch#3
sonic# configure terminal
sonic(config)# router bgp 65001
sonic(config-router)# neighbor 10.3.0.3 remote-as 65001
Step 6. Checking the neighbor status.


Switch#1


sonic# show bgp summary
IPv4 Unicast Summary:
BGP router identifier 1.1.1.1, local AS number 65001 vrf-id 0
BGP table version 0
RIB entries 0, using 0 bytes of memory
Peers 1, using 20 KiB of memory


Neighbor        V        AS MsgRcvd MsgSent   TblVer  InQ OutQ  Up/Down
State/PfxRcd
10.2.0.3        4     65001       3       4        0    0     0 00:00:55
0


Total number of neighbors 1

sonic# show bgp neighbors
BGP neighbor is 10.2.0.3, remote AS 65001, local AS 65001, internal link
Hostname: sonic
  BGP version 4, remote router ID 3.3.3.3, local router ID 1.1.1.1
  BGP state = Established, up for 00:00:58
```

```
  Last read 00:00:57, Last write 00:00:57
  Hold time is 180, keepalive interval is 60 seconds
  Neighbor capabilities:
    4 Byte AS: advertised and received
    AddPath:
      IPv4 Unicast: RX advertised IPv4 Unicast and received
    Route refresh: advertised and received(old & new)
    Address Family IPv4 Unicast: advertised and received
    Hostname Capability: advertised (name: sonic,domain name: n/a) received
(name: sonic,domain name: n/a)
    Graceful Restart Capabilty: advertised and received
      Remote Restart timer is 120 seconds
      Address families by peer:
        none
  Graceful restart information:
    End-of-RIB send: IPv4 Unicast
    End-of-RIB received: IPv4 Unicast
  Message statistics:
    Inq depth is 0
    Outq depth is 0
                      Sent       Rcvd
    Opens:              2          1
    Notifications:      0          0
    Updates:            1          1
    Keepalives:         1          1
    Route Refresh:      0          0
    Capability:         0          0
    Total:              4          3
  Minimum time between advertisement runs is 0 seconds

 For address family: IPv4 Unicast
  Update group 1, subgroup 1
  Packet Queue length 0
  Community attribute sent to this neighbor(all)
  0 accepted prefixes

  Connections established 1; dropped 0
  Last reset 00:02:10,   Waiting for NHT
Local host: 10.2.0.2, Local port: 35220
Foreign host: 10.2.0.3, Foreign port: 179
Nexthop: 10.2.0.2
Nexthop global: fe80::6f8:f8ff:fe6b:691
Nexthop local: fe80::6f8:f8ff:fe6b:691
BGP connection: shared network
BGP Connect Retry Timer in Seconds: 120
Read thread: on  Write thread: on  FD used: 28

Switch#2

sonic# show bgp summary

IPv4 Unicast Summary:
BGP router identifier 3.3.3.3, local AS number 65001 vrf-id 0
BGP table version 0
RIB entries 0, using 0 bytes of memory
Peers 2, using 41 KiB of memory
Peer groups 1, using 64 bytes of memory
```

Neighbor	V	AS	MsgRcvd	MsgSent	TblVer	InQ	OutQ	Up/Down	State/PfxRcd
*10.2.0.2	4	65001	12	12	0	0	0	00:09:50	0
*10.3.0.2	4	65001	12	12	0	0	0	00:09:50	0

```
Total number of neighbors 2
* - dynamic neighbor
2 dynamic neighbor(s), limit 100

sonic# show bgp neighbors
BGP neighbor is *10.2.0.2, remote AS 65001, local AS 65001, internal link
Hostname: sonic
 Member of peer-group LEAF for session parameters
 Belongs to the subnet range group: 10.0.0.0/8
  BGP version 4, remote router ID 1.1.1.1, local router ID 3.3.3.3
  BGP state = Established, up for 00:09:54
  Last read 00:00:54, Last write 00:00:54
  Hold time is 180, keepalive interval is 60 seconds
  Neighbor capabilities:
    4 Byte AS: advertised and received
    AddPath:
      IPv4 Unicast: RX advertised IPv4 Unicast and received
    Route refresh: advertised and received(old & new)
    Address Family IPv4 Unicast: advertised and received
    Hostname Capability: advertised (name: sonic,domain name: n/a) received
(name: sonic,domain name: n/a)
    Graceful Restart Capabilty: advertised and received
      Remote Restart timer is 120 seconds
      Address families by peer:
        none
  Graceful restart information:
    End-of-RIB send: IPv4 Unicast
    End-of-RIB received: IPv4 Unicast
  Message statistics:
    Inq depth is 0
    Outq depth is 0
                      Sent       Rcvd
    Opens:              1          1
    Notifications:      0          0
    Updates:            1          1
    Keepalives:        10         10
    Route Refresh:      0          0
    Capability:         0          0
    Total:             12         12
  Minimum time between advertisement runs is 0 seconds

 For address family: IPv4 Unicast
  LEAF peer-group member
  Update group 1, subgroup 1
  Packet Queue length 0
  Community attribute sent to this neighbor(all)
  0 accepted prefixes
  Connections established 1; dropped 0
  Last reset 00:09:54,   No AFI/SAFI activated for peer
Local host: 10.2.0.3, Local port: 179
Foreign host: 10.2.0.2, Foreign port: 35220
Nexthop: 10.2.0.3
Nexthop global: fe80::3e2c:99ff:fe8b:41bc
Nexthop local: fe80::3e2c:99ff:fe8b:41bc
BGP connection: shared network
BGP Connect Retry Timer in Seconds: 120
Read thread: on  Write thread: on  FD used: 29

BGP neighbor is *10.3.0.2, remote AS 65001, local AS 65001, internal link
Hostname: sonic
 Member of peer-group LEAF for session parameters
 Belongs to the subnet range group: 10.0.0.0/8
  BGP version 4, remote router ID 4.4.4.4, local router ID 3.3.3.3
```

```
  BGP state = Established, up for 00:09:54
  Last read 00:00:54, Last write 00:00:54
  Hold time is 180, keepalive interval is 60 seconds
  Neighbor capabilities:
    4 Byte AS: advertised and received
    AddPath:
      IPv4 Unicast: RX advertised IPv4 Unicast and received
    Route refresh: advertised and received(old & new)
    Address Family IPv4 Unicast: advertised and received
    Hostname Capability: advertised (name: sonic,domain name: n/a) received
(name: sonic,domain name: n/a)
    Graceful Restart Capabilty: advertised and received
      Remote Restart timer is 120 seconds
      Address families by peer:
        none
  Graceful restart information:
    End-of-RIB send: IPv4 Unicast
    End-of-RIB received: IPv4 Unicast
  Message statistics:
    Inq depth is 0
    Outq depth is 0
                      Sent        Rcvd
    Opens:               1           1
    Notifications:       0           0
    Updates:             1           1
    Keepalives:         10          10
    Route Refresh:       0           0
    Capability:          0           0
    Total:              12          12
  Minimum time between advertisement runs is 0 seconds

 For address family: IPv4 Unicast
  LEAF peer-group member
  Update group 1, subgroup 1
  Packet Queue length 0
  Community attribute sent to this neighbor(all)
  0 accepted prefixes


  Connections established 1; dropped 0
  Last reset 00:09:54,   No AFI/SAFI activated for peer
Local host: 10.3.0.3, Local port: 179
Foreign host: 10.3.0.2, Foreign port: 53426
Nexthop: 10.3.0.3
Nexthop global: fe80::3e2c:99ff:fe8b:41bc
Nexthop local: fe80::3e2c:99ff:fe8b:41bc
BGP connection: shared network
BGP Connect Retry Timer in Seconds: 120
Read thread: on  Write thread: on  FD used: 28

Switch#3

sonic# show bgp summary

IPv4 Unicast Summary:
BGP router identifier 4.4.4.4, local AS number 65001 vrf-id 0
BGP table version 0
RIB entries 0, using 0 bytes of memory
Peers 1, using 20 KiB of memory

Neighbor        V        AS MsgRcvd MsgSent   TblVer  InQ OutQ  Up/Down
State/PfxRcd
10.3.0.3        4      65001      3        4        0    0     0 00:00:56
0
```

```
Total number of neighbors 1
sonic# show bgp neighbors
BGP neighbor is 10.3.0.3, remote AS 65001, local AS 65001, internal link
Hostname: sonic
  BGP version 4, remote router ID 3.3.3.3, local router ID 4.4.4.4
  BGP state = Established, up for 00:00:59
  Last read 00:00:57, Last write 00:00:57
  Hold time is 180, keepalive interval is 60 seconds
  Neighbor capabilities:
    4 Byte AS: advertised and received
    AddPath:
      IPv4 Unicast: RX advertised IPv4 Unicast and received
    Route refresh: advertised and received(old & new)
    Address Family IPv4 Unicast: advertised and received
    Hostname Capability: advertised (name: sonic,domain name: n/a) received
(name: sonic,domain name: n/a)
    Graceful Restart Capabilty: advertised and received
      Remote Restart timer is 120 seconds
      Address families by peer:
        none
  Graceful restart information:
    End-of-RIB send: IPv4 Unicast
    End-of-RIB received: IPv4 Unicast
  Message statistics:
    Inq depth is 0
    Outq depth is 0
                        Sent        Rcvd
    Opens:                2           1
    Notifications:        0           0
    Updates:              1           1
    Keepalives:           1           1
    Route Refresh:        0           0
    Capability:           0           0
    Total:                4           3

  Minimum time between advertisement runs is 0 seconds

 For address family: IPv4 Unicast
  Update group 1, subgroup 1
  Packet Queue length 0
  Community attribute sent to this neighbor(all)
  0 accepted prefixes

  Connections established 1; dropped 0
  Last reset 00:02:22,   Waiting for NHT
Local host: 10.3.0.2, Local port: 53426
Foreign host: 10.3.0.3, Foreign port: 179
Nexthop: 10.3.0.2
Nexthop global: fe80::6f8:f8ff:fe8d:81e1
Nexthop local: fe80::6f8:f8ff:fe8d:81e1
BGP connection: shared network
BGP Connect Retry Timer in Seconds: 120
Read thread: on  Write thread: on  FD used: 28
 Step 7. Save the routing setting.

sonic# write
Note: this version of vtysh never writes vtysh.conf
Building Configuration...
Integrated configuration saved to /etc/frr/frr.conf
[OK]
```