Configure BGP to Advertise a Default Route on Nexus Switches

Contents

Introduction

This document describes the configuration Border Gateway Protocol to advertise Default Route to BGP neighbors on Cisco Nexus NX-OS based Switches.

Prerequisites

Requirements

Cisco recommends prior knowledge of these topics:

- Nexus NX-OS Software.
- Routing Protocols, specifically Border Gateway Protocol (BGP).

Components Used

The information in this document is based on Cisco Nexus 7000 with NX-OS version 7.3(0)D1(1).

The information in this document was created from the devices in a specific lab environment. All of the devices used in this document started with a cleared (default) configuration. If your network is live, ensure that you understand the potential impact of any command.

Configure

Network Command

The network 0.0.0.0/0 command injects the default route in the BGP RIB (BGP Routing Information Base).

The prerequisite is to have the default route in the Routing Table via any other Routing Protocol or manually configured with a Static Route.

Once in the BGP RIB, the default route is advertised to all BGP neighbors unless specifically denied by an outbound filter configured per neighbor.

BGP configuration as seen in the show running-config output.

```
Nexus BGP Configuration

<#root>

Nexus# show running-config bgp

!Command: show running-config bgp
!Time: Tue Dec  4 01:27:43 2018

version 7.3(0)D1(1)
feature bgp

router bgp 64512
  address-family ipv4 unicast


network 0.0.0.0/0

  neighbor 10.1.3.3
    remote-as 64512
    address-family ipv4 unicast
```
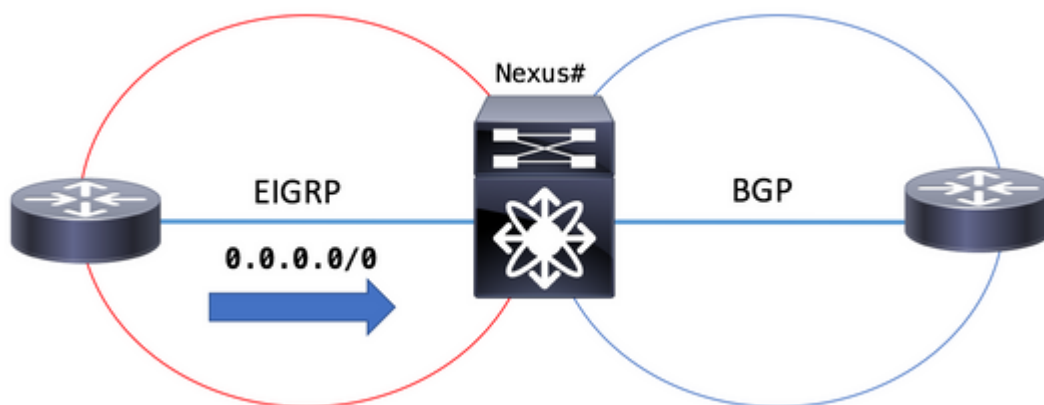
In this example, Nexus receives the default route from EIGRP protocol. Therefore, the Nexus Routing Table shows the default route is available via EIGRP.


```
Nexus Routing Table

<#root>

Nexus#

show ip route 0.0.0.0


IP Route Table for VRF "default"
'*' denotes best ucast next-hop
'**' denotes best mcast next-hop
'[x/y]' denotes [preference/metric]
```

```
'%<string>' in via output denotes VRF <string>


0.0.0.0/0, ubest/mbest: 1/0


    *via 10.1.2.2, Eth2/1, [170/2816], 00:00:50, eigrp-1, external
Nexus#
```

BGP RIB shows 0.0.0.0/0 as valid and best path since prerequisites are met. Default route is in the Routing Table, and the network 0.0.0.0/0 command is configured in BGP configuration section.

Nexus BGP RIB (BGP table)

```
<#root>

Nexus# show bgp ipv4 unicast
BGP routing table information for VRF default, address family IPv4 Unicast
BGP table version is 13, local router ID is 10.255.255.1
Status: s-suppressed, x-deleted, S-stale, d-dampened, h-history, *-valid, >-best
Path type: i-internal, e-external, c-confed, l-local, a-aggregate, r-redist, I-i
njected
Origin codes: i - IGP, e - EGP, ? - incomplete, | - multipath, & - backup

   Network          Next Hop          Metric     LocPrf     Weight Path
*>10.0.0.0/0        0.0.0.0                        100       32768 i
```

The advertised-routes parameter shows the default-route is advertised to BGP peer 10.1.3.3

Nexus BGP Routes Advertised to a Specific BGP Peer

```
<#root>

Nexus#

show bgp ipv4 unicast neighbors 10.1.3.3 advertised-routes


Peer 10.1.3.3 routes for address family IPv4 Unicast:
BGP table version is 13, local router ID is 10.255.255.1
Status: s-suppressed, x-deleted, S-stale, d-dampened, h-history, *-valid, >-best
Path type: i-internal, e-external, c-confed, l-local, a-aggregate, r-redist, I-i
njected
Origin codes: i - IGP, e - EGP, ? - incomplete, | - multipath, & - backup

   Network          Next Hop          Metric     LocPrf     Weight Path
*>10.0.0.0/0        0.0.0.0                        100       32768 i
```

Redistribute and Default-Information Originate Commands

The redistribute command configured under the BGP process injects all the routes that exist in the Routing Table by a specific source routing protocol (and permitted by a route-map) in the BGP RIB with the exception of the default route.

To additionally allow the default route to be installed from the source routing protocol in the BGP RIB, the command default-information originate is required.

Once in the BGP RIB, the default route is advertised to all BGP neighbors unless specifically denied by an outbound filter configured per neighbor.

BGP configuration section shows redistribute EIGRP and default-information originate in place.

Nexus BGP Configuration

```
<#root>

Nexus# show running-config bgp

!Command: show running-config bgp
!Time: Tue Dec  4 01:33:41 2018

version 7.3(0)D1(1)
feature bgp

router bgp 64512
  address-family ipv4 unicast

    redistribute eigrp 1 route-map PERMIT-ALL
    default-information originate

  neighbor 10.1.3.3
    remote-as 64512
    address-family ipv4 unicast

A route map with no match entry permits all routes.

route-map PERMIT-ALL permit 10
```

In this example, Nexus receives the default route from EIGRP protocol. Therefore, the Nexus Routing Table shows the default route is available via EIGRP.

Nexus Routing Table

```
<#root>

Nexus# show ip route eigrp
IP Route Table for VRF "default"
'*' denotes best ucast next-hop
```

```
'**' denotes best mcast next-hop
'[x/y]' denotes [preference/metric]
'%<string>' in via output denotes VRF <string>


0.0.0.0/0, ubest/mbest: 1/0

    *via 10.1.2.2, Eth2/1, [170/2816], 00:07:19, eigrp-1, external
192.168.2.0/24, ubest/mbest: 1/0
    *via 10.1.2.2, Eth2/1, [170/2816], 00:00:07, eigrp-1, external
```

BGP RIB shows 0.0.0.0/0 as valid and the best path since prerequisites are met. The default route has been redistributed from source routing protocol in BGP, and default-information originate command is configured in BGP configuration section.

Nexus BGP RIB (BGP table)

```
<#root>

Nexus# show bgp ipv4 unicast
BGP routing table information for VRF default, address family IPv4 Unicast
BGP table version is 17, local router ID is 10.255.255.1
Status: s-suppressed, x-deleted, S-stale, d-dampened, h-history, *-valid, >-best
Path type: i-internal, e-external, c-confed, l-local, a-aggregate, r-redist, I-i
njected
Origin codes: i - IGP, e - EGP, ? - incomplete, | - multipath, & - backup

   Network          Next Hop          Metric     LocPrf     Weight Path

*>r0.0.0.0/0         0.0.0.0             2816       100       32768 ?
*>r192.168.2.0/24    0.0.0.0             2816       100       32768 ?
```

The advertised-routes parameter shows the default-route is advertised to BGP peer 10.1.3.3

Nexus BGP Routes Advertised to a Specific BGP Peer

```
<#root>

Nexus#

show bgp ipv4 unicast neighbors 10.1.3.3 advertised-routes



Peer 10.1.3.3 routes for address family IPv4 Unicast:
BGP table version is 17, local router ID is 10.255.255.1
Status: s-suppressed, x-deleted, S-stale, d-dampened, h-history, *-valid, >-best
Path type: i-internal, e-external, c-confed, l-local, a-aggregate, r-redist, I-i
njected
Origin codes: i - IGP, e - EGP, ? - incomplete, | - multipath, & - backup

   Network          Next Hop          Metric     LocPrf     Weight Path
```

```
*>r0.0.0.0/0            0.0.0.0               2816        100      32768 ?
*>r192.168.2.0/24       0.0.0.0               2816        100      32768 ?
```

In the absence of the default-information originate command from BGP configuration, the BGP RIB does not install the default route.

BGP configuration section next shows only redistribute EIGRP in place.

Nexus BGP Configuration

```
<#root>

Nexus# show run bgp

!Command: show running-config bgp
!Time: Tue Dec  4 01:39:30 2018

version 7.3(0)D1(1)
feature bgp

router bgp 64512
  address-family ipv4 unicast


  redistribute eigrp 1 route-map PERMIT-ALL

  neighbor 10.1.3.3
    remote-as 64512
    address-family ipv4 unicast

A route-map with no match entry permits all routes.

route-map PERMIT-ALL permit 10
```

Routing Table output shows the default route is available from EIGRP protocol.

Nexus Routing Table

```
Nexus# show ip route eigrp
IP Route Table for VRF "default"
'*' denotes best ucast next-hop
'**' denotes best mcast next-hop
'[x/y]' denotes [preference/metric]
'%<string>' in via output denotes VRF <string>

0.0.0.0/0, ubest/mbest: 1/0
    *via 10.1.2.2, Eth2/1, [170/2816], 00:07:19, eigrp-1, external
192.168.2.0/24, ubest/mbest: 1/0
    *via 10.1.2.2, Eth2/1, [170/2816], 00:00:07, eigrp-1, external
```

With no default-information originate command, BGP RIB does not install the 0.0.0.0/0 network prefix.

Nexus BGP RIB (BGP table)

```
Nexus# show bgp ipv4 unicast
BGP routing table information for VRF default, address family IPv4 Unicast
BGP table version is 18, local router ID is 10.255.255.1
Status: s-suppressed, x-deleted, S-stale, d-dampened, h-history, *-valid, >-best
Path type: i-internal, e-external, c-confed, l-local, a-aggregate, r-redist, I-i
njected
Origin codes: i - IGP, e - EGP, ? - incomplete, | - multipath, & - backup

   Network            Next Hop            Metric      LocPrf     Weight Path
*>r192.168.2.0/24     0.0.0.0               2816         100      32768 ?
```

Note: Before NX-OS version 6.2(2) for Nexus 7000 series and version 6.0(2)N3(1) for Nexus 5000 series, the command default-information originate was not required. Default route used to be also injected in BGP RIB only by the redistribute command.

Default-Originate Command

The default-originate command is configured on a per BGP neighbor basis. This command artificially generates and advertises a default route only to the specific BGP peer.

The default route does not need to exist in the Routing Table, and it is not created in the BGP RIB.

The default-originate command is configured on a per neighbor basis.

Nexus BGP Configuration

```
<#root>

Nexus# show running-config bgp

!Command: show running-config bgp
!Time: Tue Dec  4 02:22:43 2018

version 7.3(0)D1(1)
feature bgp

router bgp 64512
  address-family ipv4 unicast
    network 192.168.1.0/24
  neighbor 10.1.3.3
    remote-as 64512
```

```
   address-family ipv4 unicast

      default-originate
```

There is no need to have a default route in the Routing Table.

Nexus Routing Table

```
Nexus# show ip route 0.0.0.0
IP Route Table for VRF "default"
'*' denotes best ucast next-hop
'**' denotes best mcast next-hop
'[x/y]' denotes [preference/metric]
'%<string>' in via output denotes VRF <string>

Nexus#
```

No 0.0.0.0/0 entry is created in the BGP table.

Nexus BGP RIB (BGP table)

```
Nexus# show bgp ipv4 unicast
BGP routing table information for VRF default, address family IPv4 Unicast
BGP table version is 20, local router ID is 10.255.255.1
Status: s-suppressed, x-deleted, S-stale, d-dampened, h-history, *-valid, >-best
Path type: i-internal, e-external, c-confed, l-local, a-aggregate, r-redist, I-i
njected
Origin codes: i - IGP, e - EGP, ? - incomplete, | - multipath, & - backup

   Network          Next Hop          Metric      LocPrf     Weight Path
*>l192.168.1.0/24   0.0.0.0                          100      32768 i
```

The entry Originating default network 0.0.0.0/0 can be found in the routes advertised to BGP peer 10.1.3.3

Nexus BGP Routes Advertised to a Specific BGP Peer

```
<#root>

Nexus# show bgp ipv4 unicast neighbors 10.1.3.3 advertised-routes

Peer 10.1.3.3 routes for address family IPv4 Unicast:
BGP table version is 20, local router ID is 10.255.255.1
Status: s-suppressed, x-deleted, S-stale, d-dampened, h-history, *-valid, >-best
Path type: i-internal, e-external, c-confed, l-local, a-aggregate, r-redist, I-i
```

```
njected
Origin codes: i - IGP, e - EGP, ? - incomplete, | - multipath, & - backup


Originating default network 0.0.0.0/0


   Network            Next Hop             Metric      LocPrf      Weight Path
*>l192.168.1.0/24     0.0.0.0                           100        32768 i
```

Optionally, the default-originate command can use a route-map as a parameter to conditionally advertise the default-route.

Optional default-originate route-map

```
<#root>

Nexus(config-router-neighbor-af)# default-originate ?
  <CR>


route-map  Route-map to specify criteria for originating default
```

The route-map needs to match a route installed in the Routing Table in order to make default-originate advertise the default-route to the BGP peer.

Nexus Routing Table

```
<#root>

Nexus# show ip route 192.168.3.0
IP Route Table for VRF "default"
'*' denotes best ucast next-hop
'**' denotes best mcast next-hop
'[x/y]' denotes [preference/metric]
'%<string>' in via output denotes VRF <string>


Route not found
```

In this case, the route-map named ADVERTISE-DEFAULT-IF references a prefix-list named NETWORKS and the latter 192.168.3.0/24 network prefix, which must exist in the Routing Table in order to advertise the default-route.

Nexus BGP Configuration

```
<#root>
```

```
ip prefix-list

NETWORKS

  seq 5 permit

192.168.3.0/24


!
route-map

ADVERTISE-DEFAULT-IF

 permit 10
  match ip address prefix-list

NETWORKS


!
router bgp 64512
  address-family ipv4 unicast
    network 192.168.1.0/24
  neighbor 10.1.3.3
    remote-as 64512
    address-family ipv4 unicast


default-originate route-map ADVERTISE-DEFAULT-IF
```

Since 192.168.3.0/24 is not in the Routing Table, the default-route is not advertised.

Nexus BGP Routes Advertised to a Specific BGP Peer

```
Nexus# show bgp ipv4 unicast neighbors 10.1.3.3 advertised-routes

Peer 10.1.3.3 routes for address family IPv4 Unicast:
BGP table version is 20, local router ID is 10.255.255.1
Status: s-suppressed, x-deleted, S-stale, d-dampened, h-history, *-valid, >-best
Path type: i-internal, e-external, c-confed, l-local, a-aggregate, r-redist, I-i
njected
Origin codes: i - IGP, e - EGP, ? - incomplete, | - multipath, & - backup

   Network          Next Hop          Metric       LocPrf      Weight Path
*>l192.168.1.0/24    0.0.0.0                           100        32768 i
```