

# Configure BGP to Advertise a Default Route on Nexus Switches

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## 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.

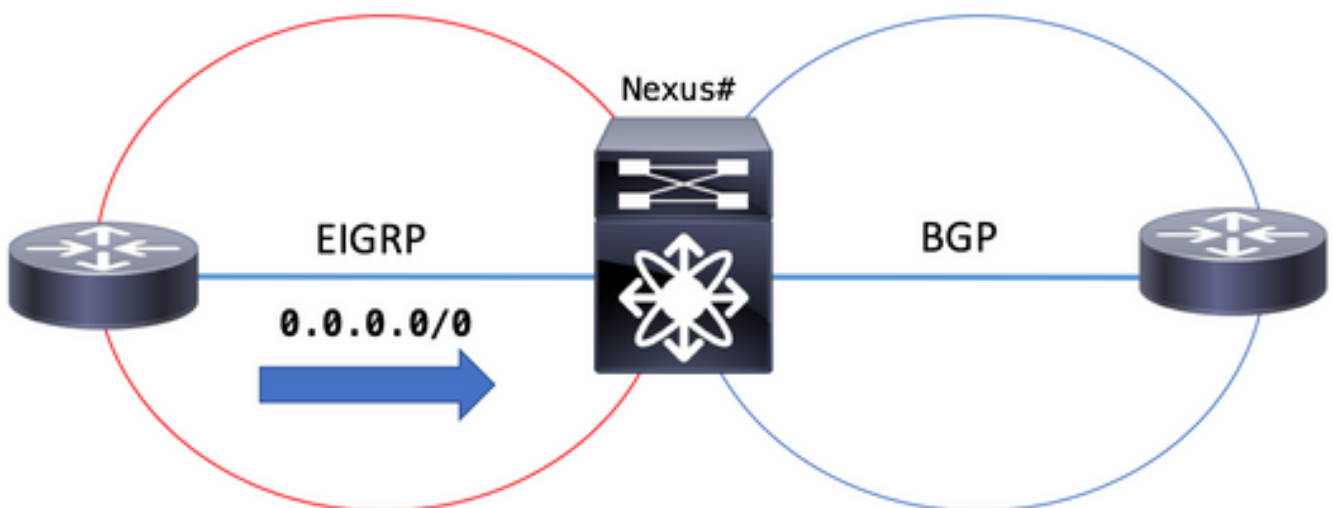
Once in the BGP RIB, the default route is advertised to all BGP neighbors unless specifically denied by an

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 Enhanced Interior Gateway Routing Protocol (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.

Additionally, to 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 also be 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
*>192.168.1.0/24	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
*>192.168.1.0/24	0.0.0.0		100	32768 i