

### Objective

This tech note outlines the main differences in Border Gateway Protocol support between Cisco® NX-OS Software and Cisco IOS® Software. Sample configurations are included for the Cisco NX-OS and Cisco IOS Software for some common features to demonstrate the similarities and differences. Please refer to the [NX-OS documentation on Cisco.com](#) for a complete list of supported features.

### BGP Overview

BGPv4 is a standard Exterior Routing Protocol defined in [RFC 4271](#), commonly used to exchange network reachability information between autonomous systems. This document covers the features required for basic connectivity.

### Important Cisco NX-OS and Cisco IOS Software Differences

In Cisco NX-OS:

- BGP CLI configuration and verification commands are not available until you enable the BGP feature with the **feature bgp** command.
- The BGP protocol requires an Enterprise Services license.
- Autonomous system numbers can be configured as 16 or 32 bit values.
- Address families need to be explicitly enabled (IE: IPv4 unicast, IPv6 unicast, etc?). All address families are disabled by default.
- By default, eBGP supports 8 Equal Cost Paths and iBGP supports 1. The Cisco NX-OS supports up to 16 Equal Cost Paths for both eBGP and iBGP.
- Automatic Route Summarization and Synchronization are disabled by default.
- BGP consists of a hierarchical configuration based on neighbors and address families.
- If a router ID is not manually configured, the loopback 0 IP address is always preferred. If loopback 0 does not exist, Cisco NX-OS selects the IP address for the first loopback interface in the configuration. If no loopback interfaces exist, Cisco NX-OS selects the IP address for the first physical interface in the configuration.
- Neighbor logging is not enabled by default under the BGP instance. Neighbor logging can be enabled with the **log-neighbor-changes** command.
- When neighbor authentication is configured, the BGP key is 3DES encrypted in the configuration. Cisco IOS Software requires the **service password** command to encrypt the password in the configuration.

### Things You Should Know

The following list provides some additional facts about Cisco NX-OS that should be helpful when designing, configuring, and maintaining a BGP network.

- One BGP instances can be configured per Virtual Device Context (VDC).
- Numerous Virtual Route Forwarding (VRF) instances can be associated to a BGP instance.
- If the **feature bgp** command is removed, all relevant BGP configuration information is also removed.
- Network statements must be configured under their respective address-family configuration mode when advertising them via BGP.

## Cisco\_NX-OS/IOS\_BGP\_(Basic)\_Comparison

- The **shutdown** command under the BGP instance can be used to disable BGP while retaining the configuration.
- The **show running-config bgp** command displays the current BGP configuration.
- A BGP instance can be restarted with the **restart bgp <instance #>** command.
- Graceful Restart ([RFC 3623](#)) is enabled by default.

### Configuration Comparison

The following sample configuration code similarities and differences between the Cisco NX-OS and Cisco IOS Software CLIs. There are three significant differences: The Cisco NX-OS allows BGP to be enabled and disabled globally. It utilizes a hierarchical configuration that makes it easier to read. The Cisco NX-OS does not enable any address families by default. Each address-family needs to be explicitly enabled. The following examples demonstrate this using the IPv4 unicast address family.

#### *Cisco IOS CLI*

#### *Cisco NX-OS CLI*

##### Enabling the BGP Feature

```
feature bgp
```

##### Configuring a BGP Instance and Router ID

```
router bgp 10
```

```
router-id 192.168.1.1
```

##### Configuring a BGP Neighbor (Internal)

```
router bgp 10
```

```
neighbor 192.168.2.1 remote-as 10
```

```
update-source loopback0
```

```
address-family ipv4 unicast
```

##### Configuring a BGP Neighbor (External)

```
router bgp 10
```

```
neighbor 192.168.10.2 remote-as 11
```

```
address-family ipv4 unicast
```

##### Advertising a Network in an Address Family (IPv4)

```
router bgp 10
```

```
address-family ipv4 unicast
```

```
network 159.142.1.0/24
```

```
network 159.142.254.0/24
```

```
neighbor 192.168.10.2 remote-as 11
```

address-family ipv4 unicast

### Configuring Neighbor Authentication (MD5)

**router bgp 10**

neighbor 192.168.10.2 remote-as 11

password 3 a667d47acc18ea6b

address-family ipv4 unicast

### Configuring an Aggregate Address (Summary-Only)

**router bgp 10**

address-family ipv4 unicast

network 159.142.1.0/24

network 159.142.254.0/24

aggregate-address 159.142.0.0/16 summary-only

neighbor 192.168.10.2 remote-as 11

address-family ipv4 unicast

### Generating a Default Route for a Neighbor

**router bgp 10**

neighbor 192.168.10.2 remote-as 11

address-family ipv4 unicast

default-originate

### Verification Command Comparison

The following table compares some useful **show** commands for verifying and troubleshooting a BGP network configuration.

Cisco NX-OS BGP	Cisco IOS Software BGP	Command Description
<b>show bgp convergence</b>	-	Displays global convergence information
<b>show bgp process</b>	-	Displays global BGP process information
<b>show bgp sessions</b>	-	Displays information for all neighbors
<b>show bgp statistics</b>	-	Displays global BGP process statistics
<b>show ip bgp &lt;option&gt;</b>	show ip bgp	Displays BGP Process and BGP table entries

## Cisco\_NX-OS/IOS\_BGP\_(Basic)\_Comparison

<b>show ip bgp</b> <i>x.x.x.x</i>	show ip bgp <i>x.x.x.x</i>	Displays a specific network in the BGP table
<b>show ip bgp</b> <i>x.x.x.x vrf</i>	-	Displays a network in a specified VRF BGP table
<b>show ip bgp</b> <i>x.x.x.x/len</i>	show ip bgp <i>x.x.x.x mask</i>	Displays a specific prefix in the BGP table
<b>show ip bgp</b> <i>x.x.x.x/len longer-prefix</i>	show ip bgp <i>x.x.x.x mask longer-prefix</i>	Displays a prefix in the table with longer prefixes
<b>show ip bgp all</b>	show ip bgp all	Displays the BGP table for all protocol families
<b>show ip bgp community</b> <i>&lt;word&gt;</i>	show ip bgp community <i>&lt;#&gt;</i>	Displays routes with a specific regular expression
<b>show ip bgp community</b> <i>&lt;aa.nn&gt;</i>	-	Displays routes with a specific community value
<b>show ip bgp community internet</b>	-	Displays BGP routes advertised to the Internet
<b>show ip bgp community no-advertise</b>	show ip bgp community no-advertise	Displays BGP routes not advertised to peers
<b>show ip bgp community no-export</b>	show ip bgp community no-export	Displays BGP routes not exported to next AS
<b>show ip bgp community no-export-spoofed</b>	-	Displays BGP routes not sent to outside local AS
<b>show ip bgp community-list</b> <i>&lt;name&gt;</i>	show ip bgp community-list <i>&lt;name&gt;</i>	Displays a specific BGP community list
<b>show ip bgp dampening dampened-paths</b>	show ip bgp dampening dampened-paths	Displays all Dampened paths
<b>show ip bgp dampening flap-statistics</b>	show ip bgp dampening flap-statistics	Displays flap statistics for BGP routes
<b>show ip bgp dampening history-paths</b>	-	Displays all history paths
<b>show ip bgp dampening parameters</b>	show ip bgp dampening parameters	Displays all of the Dampening parameters
<b>show ip bgp extcommunity</b> <i>&lt;word&gt;</i>	-	Displays routes with a specific regular expression for extended communities
<b>show ip bgp extcommunity-list</b> <i>&lt;name&gt;</i>	-	Displays a specific BGP extended community list
<b>show ip bgp filter-list</b>	show ip bgp filter-list	Displays all routes matching a specified filter list
<b>show ip bgp flap-statistics</b>	-	Displays all BGP route flap statistics
<b>show ip bgp ipv4 multicast</b> <i>&lt;option&gt;</i>	show ip bgp ipv4 multicast <i>&lt;option&gt;</i>	Displays BGP IPv4 multicast address families
<b>show ip bgp ipv4 unicast</b> <i>&lt;option&gt;</i>	show ip bgp ipv4 unicast <i>&lt;option&gt;</i>	Displays BGP IPv4 unicast address families
<b>show ip bgp neighbors</b>	show ip bgp neighbors	Displays detailed neighbor information
<b>show ip bgp neighbors</b> <i>x.x.x.x</i>	show ip bgp neighbors <i>x.x.x.x</i>	Displays detailed information for a neighbor
<b>show ip bgp nexthop</b> <i>x.x.x.x</i>	-	Displays all routes matching a specified next-hop

## Cisco\_NX-OS/IOS\_BGP\_(Basic)\_Comparison

<b>show ip bgp nexthop-database</b>	-	Displays the next-hop database
<b>show ip bgp paths</b>	show ip bgp paths	Displays all BGP paths
<b>show ip bgp peer-policy</b>	-	Displays BGP peer policy by specified name
<b>show ip bgp peer-session</b>	-	Displays information about a peer session
<b>show ip bgp peer-template</b>	show ip bgp unicast ipv4 template	Displays information about a peer template
<b>show ip bgp prefix-list</b>	show ip bgp prefix-list	Displays routes matching a specified prefix-list
<b>show ip bgp regexp</b>	show ip bgp regexp	Displays routes matching a regular-expression
<b>show ip bgp received-paths</b>	-	Displays the paths stored for soft reconfiguration
<b>show ip bgp route-map</b>	show ip bgp route-map	Displays BGP routes matching a route-map
<b>show ip bgp summary</b>	show ip bgp summary	Displays a summary list of neighbors and statistics
<b>show ip bgp vrf</b>	show ip bgp vpv4 vrf	Displays information for a specified BGP VRF