Objective

This tech note outlines the main differences in advanced Border Gateway Protocol (BGP) support between Cisco® NX-OS Software and Cisco IOS® Software. Sample configurations are included for 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 discusses route reflectors, confederations, peer templates, route-map policies and the prefix-list (route-filtering) feature.

Important Cisco NX-OS and Cisco IOS Software Differences

In Cisco NX-OS:

- When configuring route reflectors, the **route-reflector-client** command is assigned per neighbor under the neighbor-specific address family.
- When configuring confederations, the confederation is configured under the autonomous system without the leading **bgp** keyword.
- Cisco NX-OS uses a peer template instead of a peer group to reuse common BGP policies.
- Multiple policy templates can be applied to a single neighbor. Cisco IOS Software allows only one policy template per neighbor.
- Cisco NX-OS does not require a manual reset for a neighbor when its routing policy is modified. Cisco IOS Software requires a hard or soft reset depending on the neighbor capabilities exchanged.

Things You Should Know

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

- Peer and session templates define neighbor attributes such as security passwords, timers, and transport options.
- Peer templates and session templates have identical configuration capabilities with one exception: peer templates can configure address families.
- Peer and session templates are inherited by a neighbor through the BGP neighbor configuration mode.
- Only one peer template and session template can be inherited by a single BGP neighbor.
- Peer templates can inherit session templates.
- Session templates can inherit other session templates.
- Policy templates define address-family policies for inbound or outbound polices, including default-route origination, filter lists, route-map polices, prefix lists, etc.
- Multiple policy templates can be assigned per neighbor. Policy templates are executed in order based on the configured sequence number.
- Policy templates are inherited by a neighbor through the neighbor and address-family configuration mode.

- Route-map polices can configure BGP attributes such as as-path, community lists, community attributes, dampening, local preference, metric type, origin, and weight.
- Route-map polices can be applied per neighbor for inbound and outbound routing policies.

Configuration Comparison

The following sample code shows the configuration similarities and differences between the Cisco NX-OS and Cisco IOS Software CLIs. The configurations are very similar with the exception of the hierarchy used in Cisco NX-OS.

Cisco IOS CLI	*Cisco NX-OS CLI*
Configuring a Route-Reflector	
	router bgp 10
	address-family ipv4 unicast
	network 192.168.11.1/32
	neighbor 192.168.2.1 remote-as 10
	update-source loopback0
	address-family ipv4 unicast
	route-reflector-client
Configuring Confederations	
	router bgp 65534
	confederation identifier 10
	confederation peers 65535
	address-family ipv4 unicast
	network 192.168.11.1/32
	neighbor 192.168.10.2 remote-as 65535
	address-family ipv4 unicast
Configuring a Peer Template	
	router bgp 10
	address-family ipv4 unicast
	network 192.168.11.1/32

```
template peer IBGP-Template
password 3 a667d47acc18ea6b
update-source loopback0
address-family ipv4 unicast
neighbor 192.168.2.1 remote-as 10
inherit peer IBGP-Template
```

Configuring a Policy Template

```
router bgp 10
address-family ipv4 unicast
network 192.168.11.1/32
template peer-policy EBGP-Policy
send-community
default-originate
neighbor 192.168.10.2 remote-as 20
address-family ipv4 unicast
inherit peer-policy EBGP-Policy 10
```

Configuring an Outbound Neighbor Route-Map Policy

```
route-map EBGP-Policy permit 10
set as-path prepend 10 10 10

router bgp 10
address-family ipv4 unicast
network 192.168.11.1/32
neighbor 192.168.10.2 remote-as 20
address-family ipv4 unicast
route-map EBGP-Policy out
```

Configuring an Outbound Prefix-List

ip prefix-list EBGP-Policy seq 5 permit 192.168.11.1/32

router bgp 10

neighbor 192.168.10.2 remote-as 20

address-family ipv4 unicast

prefix-list EBGP-Policy out

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**
show bgp convergence	-	Displays global convergence information
show bgp process	-	Displays global BGP process information
show bgp sessions	-	Displays information for all neighbors
show bgp statistics	-	Displays global BGP process statistics
show ip bgp <*option*>	show ip bgp	Displays BGP Process and BGP table entries
show ip bgp *x.x.x.x*	show ip bgp *x.x.x.x*	Displays a specific network in the BGP table
show ip bgp *x.x.x.x* **vrf**	-	Displays a network in a specified VRF BGP table
show ip bgp *x.x.x.x/len*	show ip bgp *x.x.x.x mask*	Displays a specific prefix in the BGP table
show ip bgp *x.x.x.x/len* **longer-prefix**	show ip bgp *x.x.x.x mask* longer-prefix	Displays a prefix in the table with longer prefixes
show ip bgp all	show ip bgp all	Displays the BGP table for all protocol families
show ip bgp community <*word*>	show ip bgp community <#>	Displays routes with a specific regular expression
show ip bgp community <*aa:nn*>	-	Displays routes with a specific community value
show ip bgp community internet	-	Displays BGP routes advertised to the Internet
show ip bgp community no-advertise	show ip bgp community no-advertise	Displays BGP routes not advertised to peers

show ip bgp community no-export	show ip bgp community no-export	Displays BGP routes not exported to next AS
show ip bgp community no-export-spoofed	-	Displays BGP routes not sent to outside local AS
show ip bgp community-list <*name*>	show ip bgp community-list <*name*>	Displays a specific BGP community list
show ip bgp dampening dampened-paths	show ip bgp dampening dampened-paths	Displays all Dampened paths
show ip bgp dampening flap-statistics	show ip bgp dampening flap-statistics	Displays flap statistics for BGP routes
show ip bgp dampening history-paths	-	Displays all history paths
show ip bgp dampening parameters	show ip bgp dampening parameters	Displays all of the Dampening parameters
show ip bgp extcommunity <*word*>	-	Displays routes with a specific regular expression for extended communities
show ip bgp extcommunity-list <*name*>	-	Displays a specific BGP extended community list
show ip bgp filter-list	show ip bgp filter-list	Displays all routes matching a specified filter list
show ip bgp flap-statistics	-	Displays all BGP route flap statistics
show ip bgp ipv4 multicast <option>	show ip bgp ipv4 multicast <option>	Displays BGP IPv4 multicast address families
show ip bgp ipv4 unicast <option>	show ip bgp ipv4 unicast <option>	Displays BGP IPv4 unicast address families
show ip bgp neighbors	show ip bgp neighbors	Displays detailed neighbor information
show ip bgp neighbors *x.x.x.x*	show ip bgp neighbors *x.x.x.x*	Displays detailed information for a neighbor
show ip bgp nexthop *x.x.x.x*	-	Displays all routes matching a specified next-hop
show ip bgp nexthop-database	-	Displays the next-hop database
show ip bgp paths	show ip bgp paths	Displays all BGP paths
show ip bgp peer-policy	-	Displays BGP peer policy by specified name
show ip bgp peer-session	-	Displays information about a peer session
show ip bgp peer-template	show ip bgp unicast ipv4 template	Displays information about a peer template
show ip bgp prefix-list	show ip bgp prefix-list	Displays routes matching a specified prefix-list
show ip bgp regexp	show ip bgp regexp	Displays routes matching a regular-expression
show ip bgp received-paths	-	Displays the paths stored for soft reconfiguration
show ip bgp route-map	show ip bgp route-map	Displays BGP routes matching a route-map
show ip bgp summary	show ip bgp summary	Displays a summary list of neighbors and statistics

show ip bgp vrf	show ip bgp vpnv4 vrf	Displays information for a specified BGP VRF