BGP Commands

address-family ipv4 (BGP)

To enter address family or router scope address family configuration mode to configure a routing session using standard IP Version 4 (IPv4) address prefixes, use the **address-family ipv4** command in router configuration or router scope configuration mode. To exit address family configuration mode and remove the IPv4 address family configuration from the running configuration, use the **no** form of this command.

Syntax Available Under Router Configuration Mode

address-family ipv4 [**mdt** | **multicast** | **tunnel** | **unicast** [**vrf** *vrf-name*] | **vrf** *vrf-name*]

no address-family ipv4 [**mdt** | **multicast** | **tunnel** | **unicast** [**vrf** *vrf-name*] | **vrf** *vrf-name*]

Syntax Available Under Router Scope Configuration Mode

address-family ipv4 [**mdt** | **multicast** | **unicast**]

no address-family ipv4 [**mdt** | **multicast** | **unicast**]

Syntax Description

mdt	(Optional) Specifies an IPv4 multicast distribution tree (MDT) address family session.
multicast	(Optional) Specifies IPv4 multicast address prefixes.
tunnel	(Optional) Specifies an IPv4 routing session for multipoint tunneling.
unicast	(Optional) Specifies IPv4 unicast address prefixes. This is the default.
vrf *vrf-name*	(Optional) Specifies the name of the VPN routing and forwarding (VRF) instance to associate with subsequent IPv4 address family configuration mode commands.

Command Default

IPv4 address prefixes are not enabled.

Command Modes

Router configuration (config-router)
Router scope configuration (config-router-scope)

Command History

Release	Modification
12.0(5)T	This command was introduced. This command replaced the **match nlri** and **set nlri** commands.
12.0(28)S	This command was integrated into Cisco IOS Release 12.0(28)S, and the **tunnel** keyword was added.
12.0(29)S	The **mdt** keyword was added.
12.0(30)S	Support for the Cisco 12000 series Internet router was added.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2(31)SB2	This command was integrated into Cisco IOS Release 12.2(31)SB2.
12.2(33)SRB	Support for the router scope configuration mode was added.

Release	Modification
12.2(33)SXH	This command was integrated into Cisco IOS Release 12.2(33)SXH.
12.2(33)SB	This command was integrated into Cisco IOS Release 12.2(33)SB.
Cisco IOS XE Release 2.1	This command was introduced on Cisco ASR 1000 Series Routers.
12.4(20)T	The **mdt** keyword was added.

Usage Guidelines

The **address-family ipv4** command replaces the **match nlri** and **set nlri** commands. The **address-family ipv4** command places the router in address family configuration mode (prompt: `config-router-af)`, from which you can configure routing sessions that use standard IPv4 address prefixes. To leave address family configuration mode and return to router configuration mode, type **exit**.

Note Routing information for address family IPv4 is advertised by default for each BGP routing session configured with the **neighbor remote-as** command unless you enter the **no bgp default ipv4-unicast** command before configuring the **neighbor remote-as** command.

The **tunnel** keyword is used to enable the tunnel subaddress family identifier (SAFI) under the IPv4 address family identifier. This SAFI is used to advertise the tunnel endpoints and the SAFI-specific attributes (which contain the tunnel type and tunnel capabilities). Redistribution of tunnel endpoints into the BGP IPv4 tunnel SAFI table occurs automatically when the tunnel address family is configured. However, peers need to be activated under the tunnel address family before the sessions can exchange tunnel information.

The **mdt** keyword is used to enable the MDT SAFI under the IPv4 address family identifier. This SAFI is used to advertise tunnel endpoints for inter-AS multicast VPN peering sessions.

If you specify a**ddress-family ipv4 multicast**, you will then specify the **network** *network-number* [**mask** *network-mask*] command. The **network** command advertises (injects) the specified network number and mask into the multicast BGP database. This route must exist in the forwarding table installed by an IGP (that is, by eigrp, ospf, rip, igrp, static, or is-is), but not bgp.

In Cisco IOS Release 12.2(33)SRB and later releases, the ability to use address family configuration under the router scope configuration mode was introduced. The scope hierarchy can be defined for BGP routing sessions and is required to support Multi-Topology Routing (MTR). To enter the router scope configuration mode, use the **scope** command, which can apply globally or for a specific VRF. When using the scope for a specific VRF, only the **unicast** keyword is available.

Examples

The following example places the router in address family configuration mode for the IPv4 address family:

```
Router(config)# router bgp 50000
Router(config-router)# address-family ipv4
Router(config-router-af)#
```

Multicast Example

The following example places the router in address family configuration mode and specifies only multicast address prefixes for the IPv4 address family:

```
Router(config)# router bgp 50000
Router(config-router)# address-family ipv4 multicast
Router(config-router-af)#
```

Unicast Example

The following example places the router in address family configuration mode and specifies unicast address prefixes for the IPv4 address family:

```
Router(config)# router bgp 50000
Router(config-router)# address-family ipv4 unicast
Router(config-router-af)#
```

VRF Example

The following example places the router in address family configuration mode and specifies **cisco** as the name of the VRF instance to associate with subsequent IPv4 address family configuration mode commands:

```
Router(config)# router bgp 50000
Router(config-router)# address-family ipv4 vrf cisco
Router(config-router-af)#
```

Note Use this form of the command, which specifies a VRF, only to configure routing exchanges between provider edge (PE) and customer edge (CE) devices.

Tunnel Example

The following example places the router in tunnel address family configuration mode:

```
Router(config)# router bgp 100
Router(config-router)# address-family ipv4 tunnel
Router(config-router-af)#
```

MDT Example

The following example shows how to configure a router to support an IPv4 MDT address-family session:

```
Router(config)# router bgp 45000
Router(config-router)# address-family ipv4 mdt
Router(config-router-af)#
```

Router Scope Configuration Mode Example

The following example shows how to configure the IPv4 address family under router scope configuration mode. In this example, the scope hierarchy is enabled globally. The router enters router scope address family configuration mode, and only multicast address prefixes for the IPv4 address family are specified:

```
Router(config)# router bgp 50000
Router(config-router)# scope global
Router(config-router-scope)# address-family ipv4 multicast
Router(config-router-scope-af)#
```

Related Commands

Command	Description
address-family ipv6	Places the router in address family configuration mode for configuring routing sessions, such as BGP, that use standard IPv6 address prefixes.
address-family vpnv4	Places the router in address family configuration mode for configuring routing sessions such as BGP, RIP, or static routing sessions that use standard VPN Version 4 address prefixes.
bgp default ipv4-unicast	Enables the IPv4 unicast address family on all neighbors.
neighbor activate	Enables the exchange of information with a BGP neighboring router.

Command	Description
neighbor remote-as	Adds an entry to the BGP or multiprotocol BGP neighbor table.
scope	Defines the scope for a BGP routing session and enters router scope configuration mode.

address-family l2vpn

To enter address family configuration mode to configure a routing session using Layer 2 Virtual Private Network (L2VPN) endpoint provisioning address information, use the **address-family l2vpn** command in router configuration mode. To remove the L2VPN address family configuration from the running configuration, use the **no** form of this command.

address-family l2vpn [**vpls**]

no address-family l2vpn [**vpls**]

Syntax Description

vpls	(Optional) Specifies L2VPN Virtual Private LAN Service (VPLS) endpoint provisioning address information.

Command Default

No L2VPN endpoint provisioning support is enabled.

Command Modes

Router configuration (config-router)

Command History

Release	Modification
12.2(33)SRB	This command was introduced.
Cisco IOS XE 2.6	This command was integrated into Cisco IOS XE Release 2.6.
15.1(1)S	This command was integrated into Cisco IOS Release 15.1(1)S.

Usage Guidelines

The **address-family l2vpn** command places the router in address family configuration mode (prompt: `config-router-af`), from which you can configure routing sessions that support L2VPN endpoint provisioning.

BGP support for the L2VPN address family introduces a BGP-based autodiscovery mechanism to distribute L2VPN endpoint provisioning information. BGP uses a separate L2VPN routing information base (RIB) to store endpoint provisioning information, which is updated each time any Layer 2 (L2) virtual forwarding instance (VFI) is configured. Prefix and path information is stored in the L2VPN database, allowing BGP to make best-path decisions. When BGP distributes the endpoint provisioning information in an update message to all its BGP neighbors, the endpoint information is used to set up a pseudowire mesh to support L2VPN-based services.

The BGP autodiscovery mechanism facilitates the setting up of L2VPN services, which are an integral part of the Cisco IOS Virtual Private LAN Service (VPLS) feature. VPLS enables flexibility in deploying services by connecting geographically dispersed sites as a large LAN over high-speed Ethernet in a robust and scalable IP MPLS network.

Note Routing information for address family IPv4 is advertised by default for each BGP routing session configured with the **neighbor remote-as** command unless you configure the **no bgp default ipv4-unicast** command before configuring the **neighbor remote-as** command.

Examples

In this example, two provider edge (PE) routers are configured with VPLS endpoint provisioning information that includes L2 VFI, VPN, and VPLS IDs. BGP neighbors are configured and activated under L2VPN address family to ensure that the VPLS endpoint provisioning information is saved to a separate L2VPN RIB and then distributed to other BGP peers in BGP update messages. When the endpoint information is received by the BGP peers, a pseudowire mesh is set up to support L2VPN-based services.

Router A

```
enable
configure terminal
l2 vfi customerA autodiscovery
 vpn id 100
 vpls-id 45000:100
 exit
l2 vfi customerB autodiscovery
 vpn id 200
 vpls-id 45000:200
 exit
router bgp 45000
 no bgp default ipv4-unicast
 bgp log-neighbor-changes
 neighbor 172.16.1.2 remote-as 45000
 neighbor 172.21.1.2 remote-as 45000
 address-family l2vpn vpls
 neighbor 172.16.1.2 activate
 neighbor 172.16.1.2 send-community extended
 neighbor 172.21.1.2 activate
 neighbor 172.21.1.2 send-community extended
 end
```

Router B

```
enable
configure terminal
l2 vfi customerA autodiscovery
 vpn id 100
 vpls-id 45000:100
 exit
l2 vfi customerB autodiscovery
 vpn id 200
 vpls-id 45000:200
 exit
router bgp 45000
 no bgp default ipv4-unicast
 bgp log-neighbor-changes
 neighbor 172.16.1.1 remote-as 45000
 neighbor 172.22.1.1 remote-as 45000
 address-family l2vpn vpls
 neighbor 172.16.1.1 activate
 neighbor 172.16.1.1 send-community extended
 neighbor 172.22.1.1 activate
 neighbor 172.22.1.1 send-community extended
 end
```

Related Commands

Command	Description
neighbor activate	Enables the exchange of information with a BGP neighboring router.
show ip bgp l2vpn	Displays L2VPN address family information.

address-family nsap

To enter address family configuration mode to configure Connectionless Network Service (CLNS)-specific parameters for Border Gateway Protocol (BGP) routing sessions, use the **address-family nsap** command in router configuration mode. To exit address family configuration mode and remove the CLNS address family configuration from the running configuration, use the **no** form of this command.

address-family nsap [**unicast**]

no address-family nsap [**unicast**]

Syntax Description

unicast	(Optional) Specifies network service access point (NSAP) unicast address prefixes.

Command Default

NSAP prefix support is not enabled.

Note Routing information for address family IPv4 is advertised by default for each BGP routing session configured with the **neighbor remote-as** command unless you configure the **no bgp default ipv4-unicast** command before configuring the **neighbor remote-as** command.

Command Modes

Router configuration

Command History

Release	Modification
12.2(8)T	This command was introduced.
12.2(33)SRB	This command was integrated into Cisco IOS Release 12.2(33)SRB.
Cisco IOS XE 2.6	This command was integrated into Cisco IOS XE Release 2.6.

Usage Guidelines

The **address-family nsap** command enters address family configuration mode (prompt: `config-router-af`)#, from which you can configure routing sessions that use standard NSAP address prefixes; you must enter NSAP address family configuration mode to configure BGP for CLNS prefixes.

To leave address family configuration mode and return to router configuration mode without removing the existing configuration, enter the **exit-address-family** command.

Examples

The following example enters NSAP address family configuration mode under BGP:

```
Router(config)# router bgp 50000
Router(config-router)# address-family nsap
Router(config-router-af)#
```

Related Commands

Command	Description
address-family ipv4 (BGP)	Enters address family configuration mode for configuring routing sessions, such as BGP, that use standard IPv4 address prefixes.
address-family ipv6	Places the router in address family configuration mode for configuring routing sessions, such as BGP, that use standard IPv6 address prefixes.
address-family vpnv4	Places the router in address family configuration mode for configuring routing sessions such as BGP, RIP, or static routing sessions that use standard VPN Version 4 address prefixes.
bgp default ipv4-unicast	Enables the IPv4 unicast address family on all neighbors.
neighbor activate	Enables the exchange of information with a BGP neighboring router.

address-family rtfilter unicast

To enter address family configuration mode and to enable Automated Route Target Filtering with a BGP peer, use the **address-family rtfilter unicast** command in router configuration mode. To remove ARTF, use the **no** form of the command.

address-family rtfilter unicast

no address-family rtfilter unicast

Syntax Description

This command has no arguments or keywords.

Command Default

No RT Constraint support is enabled for BGP.

Command Modes

Router configuration (config-router)

Command History

Release	Modification
15.1(1)S	This command was introduced.
Cisco IOS XE Release 3.2S	This command was integrated into Cisco IOS XE Release 3.2S.

Usage Guidelines

Use this command when you are configuring the BGP: RT Constrained Route Distribution feature.

The **address-family rtfilter unicast** command is configured on the provider edge (PE) and route reflector (RR). The command enables the PE to send RT constraint (RTC) network layer reachability information (NLRI) to a route reflector (RR). As soon as you configure a peer as a RR client, the default filter and default route are sent out also.

Examples

In the following example, the local PE is configured to send RTC NLRI to the neighboring RR at 10.2.2.2:

```
router bgp 65000
 address-family rtfilter unicast
 neighbor 10.2.2.2 activate
 exit-address-family
```

In the following example, the local PE is configured with the RT Constraint default filter, which indicates that the PE wants all of the VPN routes (regardless of the RT values):

```
router bgp 65000
 address-family rtfilter unicast
 neighbor 10.2.2.2 activate
 neighbor 10.2.2.2 default-originate
 exit-address-family
```

In the following example, the RR is configured with the RT Constraint default filter, which indicates that the RR is requesting the PE to advertise all of its routes to the RR:

```
router bgp 65000
 address-family rtfilter unicast
 neighbor 10.1.1.1 activate
 neighbor 10.1.1.1 default-originate
 exit-address-family
```

Related Commands

Command	Description
neighbor default-originate	Allows a BGP speaker (the local router) to send the default route 0.0.0.0 to a neighbor for use as a default route.
router bgp	Configures the BGP routing process.
show ip bgp rtfilter	Displays information about BGP RT filtering.

address-family vpnv4

To enter address family configuration mode to configure a routing session using Virtual Private Network (VPN) Version 4 address prefixes, use the **address-family vpnv4** command in router configuration mode. To exit address family configuration mode and remove the VPNv4 address family configuration from the running configuration, use the **no** form of this command.

address-family vpnv4 [**unicast**]

no address-family vpnv4 [**unicast**]

Syntax Description

unicast	(Optional) Specifies VPN Version 4 unicast address prefixes.

Defaults

Unicast prefix support is enabled by default when this command is entered without any optional keywords.

Note Routing information for address family IPv4 is advertised by default for each BGP routing session configured with the **neighbor remote-as** command unless you configure the **no bgp default ipv4-unicast** command before configuring the **neighbor remote-as** command.

Command Modes

Router configuration

Command History

Release	Modification
12.0(5)T	This command was introduced.'
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.

Usage Guidelines

The **address-family vpnv4** command replaces the **match nlri** and **set nlri** commands.

The **address-family vpnv4** command places the router in address family configuration mode (prompt: `config-router-af`)#, from which you can configure routing sessions that use VPN Version 4 address prefixes.

To leave address family configuration mode and return to router configuration mode without removing the existing configuration, enter the **exit-address-family command**.

Examples

The following example places the router in address family configuration mode for the VPN Version 4 address family:

```
Router(config)# router bgp 50000
Router(config-router)# address-family vpnv4
Router(config-router-af)#
```

The following example places the router in address family configuration mode for the unicast VPN Version 4 address family:

```
Router(config)# router bgp 50000
Router(config-router)# address-family vpnv4 unicast
Router(config-router-af)#
```

Related Commands

Command	Description
address-family ipv4 (BGP)	Places the router in address family configuration mode for configuring routing sessions such as BGP, RIP, or static routing sessions that use standard IP Version 4 address prefixes.
address-family ipv6	Places the router in address family configuration mode for configuring routing sessions, such as BGP, that use standard IPv6 address prefixes.
address-family nsap	Places the router in address family configuration mode for configuring routing sessions, such as BGP, that use CLNS prefixes.
neighbor activate	Enables the exchange of information with a BGP neighboring router.

aggregate-address

To create an aggregate entry in a Border Gateway Protocol (BGP) database, use the **aggregate-address** command in address family or router configuration mode. To disable this function, use the **no** form of this command.

aggregate-address *address mask* [**as-set**] [**as-confed-set**] [**summary-only**] [**suppress-map** *map-name*] [**advertise-map** *map-name*] [**attribute-map** *map-name*]

no aggregate-address *address mask* [**as-set**] [**as-confed-set**] [**summary-only**] [**suppress-map** *map-name*] [**advertise-map** *map-name*] [**attribute-map** *map-name*]

Syntax Description

address	Aggregate address.
mask	Aggregate mask.
as-set	(Optional) Generates autonomous system set path information.
as-confed-set	(Optional) Generates autonomous confederation set path information.
summary-only	(Optional) Filters all more-specific routes from updates.
suppress-map *map-name*	(Optional) Specifies the name of the route map used to select the routes to be suppressed.
advertise-map *map-name*	(Optional) Specifies the name of the route map used to select the routes to create AS_SET origin communities.
attribute-map *map-name*	(Optional) Specifies the name of the route map used to set the attribute of the aggregate route.

Command Default

The atomic aggregate attribute is set automatically when an aggregate route is created with this command unless the **as-set** keyword is specified.

Command Modes

Address family configuration (config-router-af)
Router configuration (config-router)

Command History

Release	Modification
10.0	This command was introduced.
11.1(20)CC	The **nlri unicast**, **nlri multicast**, and **nlri unicast multicast** keywords were added.
12.0(2)S	The **nlri unicast**, **nlri multicast**, and **nlri unicast multicast** keywords were added.
12.0(7)T	The **nlri unicast**, **nlri multicast**, and **nlri unicast multicast** keywords were removed. Address family configuration mode support was added.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2(33)SRB	Support for IPv6 was added.

Release	Modification
12.2(33)SB	This command was integrated into Cisco IOS Release 12.2(33)SB.
12.2(33)SXI	This command was integrated into Cisco IOS Release 12.2(33)SXI.
12.2(33)SRE	The **as-confed-set** keyword was added.
Cisco IOS XE Release 3.1S	This command was introduced on Cisco ASR 1000 series routers.

Usage Guidelines

You can implement aggregate routing in BGP and Multiprotocol BGP (mBGP) either by redistributing an aggregate route into BGP or mBGP, or by using the conditional aggregate routing feature.

Using the **aggregate-address** command with no keywords will create an aggregate entry in the BGP or mBGP routing table if any more-specific BGP or mBGP routes are available that fall within the specified range. (A longer prefix that matches the aggregate must exist in the Routing Information Base (RIB).) The aggregate route will be advertised as coming from your autonomous system and will have the atomic aggregate attribute set to show that information might be missing. (By default, the atomic aggregate attribute is set unless you specify the **as-set** keyword.)

Using the **as-set** keyword creates an aggregate entry using the same rules that the command follows without this keyword, but the path advertised for this route will be an AS_SET consisting of all elements contained in all paths that are being summarized. Do not use this form of the **aggregate-address** command when aggregating many paths, because this route must be continually withdrawn and updated as autonomous system path reachability information for the summarized routes changes.

Using the **as-confed-set** keyword creates an aggregate entry using the same rules that the command follows without this keyword. This keyword performs the same function as the **as-set** keyword, except that it generates autonomous confed set path information.

Using the **summary-only** keyword not only creates the aggregate route (for example, 192.*.*.*) but also suppresses advertisements of more-specific routes to all neighbors. If you want to suppress only advertisements to certain neighbors, you may use the **neighbor distribute-list** command, with caution. If a more-specific route leaks out, all BGP or mBGP routers will prefer that route over the less-specific aggregate you are generating (using longest-match routing).

Using the **suppress-map** keyword creates the aggregate route but suppresses advertisement of specified routes. You can use the **match** clauses of route maps to selectively suppress some more-specific routes of the aggregate and leave others unsuppressed. IP access lists and autonomous system path access lists match clauses are supported.

Using the **advertise-map** keyword selects specific routes that will be used to build different components of the aggregate route, such as AS_SET or community. This form of the **aggregate-address** command is useful when the components of an aggregate are in separate autonomous systems and you want to create an aggregate with AS_SET, and advertise it back to some of the same autonomous systems. You must remember to omit the specific autonomous system numbers from the AS_SET to prevent the aggregate from being dropped by the BGP loop detection mechanism at the receiving router. IP access lists and autonomous system path access lists **match** clauses are supported.

Using the **attribute-map** keyword allows attributes of the aggregate route to be changed. This form of the **aggregate-address** command is useful when one of the routes forming the AS_SET is configured with an attribute such as the community no-export attribute, which would prevent the aggregate route from being exported. An attribute map route map can be created to change the aggregate attributes.

Examples

AS-Set Example

In the following example, an aggregate BGP address is created in router configuration mode. The path advertised for this route will be an AS_SET consisting of all elements contained in all paths that are being summarized.

```
Router(config)# router bgp 50000
Router(config-router)# aggregate-address 10.0.0.0 255.0.0.0 as-set
```

Summary-Only Example

In the following example, an aggregate BGP address is created in address family configuration mode and applied to the multicast database under the IP Version 4 address family. Because the **summary-only** keyword is configured, more-specific routes are filtered from updates.

```
Router(config)# router bgp 50000
Router(config-router)# address-family ipv4 multicast
Router(config-router-af)# aggregate-address 10.0.0.0 255.0.0.0 summary-only
```

Conditional Aggregation Example

In the following example, a route map called MAP-ONE is created to match on an AS-path access list. The path advertised for this route will be an AS_SET consisting of elements contained in paths that are matched in the route map.

```
Router(config)# ip as-path access-list 1 deny ^1234_
Router(config)# ip as-path access-list 1 permit .*
Router(config)# !
Router(config)# route-map MAP-ONE
Router(config-route-map)# match ip as-path 1
Router(config-route-map)# exit
Router(config)# router bgp 50000
Router(config-router)# address-family ipv4
Router(config-router-af)# aggregate-address 10.0.0.0 255.0.0.0 as-set advertise-map
MAP-ONE
Router(config-router-af)# end
```

Related Commands

Command	Description
address-family ipv4 (BGP)	Places the router in address family configuration mode for configuring routing sessions such as BGP, RIP, or static routing sessions that use standard IPv4 address prefixes.
ip as-path access-list	Defines a BGP autonomous system path access list.
match ip address	Distributes any routes that have a destination network number address that is permitted by a standard or extended access list, and performs policy routing on packets.
neighbor distribute-list	Distributes BGP neighbor information in an access list.
route-map (IP)	Defines the conditions for redistributing routes from one routing protocol into another, or enables policy routing.

auto-summary (BGP)

To configure automatic summarization of subnet routes into network-level routes, use the **auto-summary** command in address family or router configuration mode. To disable automatic summarization and send subprefix routing information across classful network boundaries, use the **no** form of this command.

auto-summary

no auto-summary

Syntax Description

This command has no arguments or keywords.

Command Default

Automatic summarization is disabled by default (the software sends subprefix routing information across classful network boundaries).

Command Modes

Address family configuration
Router configuration

Command History

Release	Modification
10.0	This command was introduced.
12.0(7)T	Address family configuration mode support was added.
12.2(8)T	The command default behavior was changed to disabled.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2(33)SXH	This command was integrated into Cisco IOS Release 12.2(33)SXH.
15.0M, 12.2SRE	This command was modified. When an interface addressed with an address falling within the summarized range is shut down, that route no longer appears in the BGP routing table.

Usage Guidelines

BGP automatically summarizes routes to classful network boundaries when this command is enabled. Route summarization is used to reduce the amount of routing information in routing tables. Automatic summarization applies to connected, static, and redistributed routes.

Note The MPLS VPN Per VRF Label feature does not support auto-summary.

By default, automatic summarization is disabled and BGP accepts subnets redistributed from an Interior Gateway Protocol (IGP). To block subnets and create summary subprefixes to the classful network boundary when crossing classful network boundaries, use the **auto-summary** command.

To advertise and carry subnet routes in BGP when automatic summarization is enabled, use an explicit **network** command to advertise the subnet. The **auto-summary** command does not apply to routes injected into BGP via the **network** command or through iBGP or eBGP.

Why auto-summary for BGP Is Disabled By Default

When **auto-summary** is enabled, routes injected into BGP via redistribution are summarized on a classful boundary. Remember that a 32-bit IP address consists of a network address and a host address. The subnet mask determines the number of bits used for the network address and the number of bits used for the host address. The IP address classes have a natural or standard subnet mask, as shown in Table 1.

Table 1 IP Address Classes

Class	Address Range	Standard Mask
A	1.0.0.0 to 126.0.0.0	255.0.0.0 or /8
B	128.1.0.0 to 191.254.0.0	255.255.0.0 or /16
C	192.0.1.0 to 223.255.254.0	255.255.255.0 or /24

Reserved addresses include 128.0.0.0, 191.255.0.0, 192.0.0.0, and 223.255.255.0.

When using the standard subnet mask, Class A addresses have one octet for the network, Class B addresses have two octets for the network, and Class C addresses have three octets for the network.

Consider the Class B address 156.26.32.1 with a 24-bit subnet mask, for example. The 24-bit subnet mask selects three octets, 156.26.32, for the network. The last octet is the host address. If the network 156.26.32.1/24 is learned via an IGP and is then redistributed into BGP, if **auto-summary** were enabled, the network would be automatically summarized to the natural mask for a Class B network. The network that BGP would advertise is 156.26.0.0/16. BGP would be advertising that it can reach the entire Class B address space from 156.26.0.0 to 156.26.255.255. If the only network that can be reached via the BGP router is 156.26.32.0/24, BGP would be advertising 254 networks that cannot be reached via this router. This is why the **auto-summary (BGP)** command is disabled by default.

Examples

In the following example, automatic summarization is enabled for IPv4 address family prefixes:

```
Router(config)# router bgp 50000
Router(config-router)# address-family ipv4 unicast
Router(config-router-af)# auto-summary
Router(config-router-af)# network 7.7.7.7 255.255.255.255
```

In the example, there are different subnets, such as 7.7.7.6 and 7.7.7.7 on Loopback interface 6 and Loopback interface 7, respectively. Both **auto-summary** and a **network** command are configured.

```
Router# show ip interface brief

Interface              IP-Address      OK? Method Status                Protocol
Ethernet0/0            100.0.1.7       YES NVRAM  up                    up
Ethernet0/1            unassigned      YES NVRAM  administratively down down
Ethernet0/2            unassigned      YES NVRAM  administratively down down
Ethernet0/3            unassigned      YES NVRAM  administratively down down
Ethernet1/0            108.7.9.7       YES NVRAM  up                    up
Ethernet1/1            unassigned      YES NVRAM  administratively down down
Ethernet1/2            unassigned      YES NVRAM  administratively down down
Ethernet1/3            unassigned      YES NVRAM  administratively down down
Loopback6              7.7.7.6         YES NVRAM  up                    up
Loopback7              7.7.7.7         YES NVRAM  up                    up
```

Note that in the output below, because of the **auto-summary** command, the BGP routing table displays the summarized route 7.0.0.0 instead of 7.7.7.6. The 7.7.7.7/32 network is displayed because it was configured with the **network** command, which is not affected by the **auto-summary** command.

```
Router# show ip bgp

BGP table version is 10, local router ID is 7.7.7.7
Status codes: s suppressed, d damped, h history, * valid, > best, i - internal,
              r RIB-failure, S Stale, m multipath, b backup-path, x best-external
Origin codes: i - IGP, e - EGP, ? - incomplete

   Network          Next Hop            Metric LocPrf Weight Path
*> 6.6.6.6/32       100.0.1.6                0             0 6 i
*> 7.0.0.0          0.0.0.0                  0         32768 ?   <-- summarization
*> 7.7.7.7/32       0.0.0.0                  0         32768 i   <-- network command
r>i9.9.9.9/32       108.7.9.9                0    100      0 i
*> 100.0.0.0        0.0.0.0                  0         32768 ?
r> 100.0.1.0/24     100.0.1.6                0             0 6 ?
*> 108.0.0.0        0.0.0.0                  0         32768 ?
r>i108.7.9.0/24     108.7.9.9                0    100      0 ?
*>i200.0.1.0        108.7.9.9
```

Related Commands

Command	Description
address-family ipv4 (BGP)	Places the router in address family configuration mode for configuring routing sessions such as BGP, RIP, or static routing sessions that use standard IPv4 address prefixes.
address-family vpnv4	Places the router in address family configuration mode for configuring routing sessions such as BGP, RIP, or static routing sessions that use standard VPNv4 address prefixes.
network (BGP and multiprotocol BGP)	Specifies the networks to be advertised by BGP and multiprotocol BGP.

bgp additional-paths install

To enable BGP to calculate a backup path for a given address family and to install it into the Routing Information Base (RIB) and Cisco Express Forwarding, use the **bgp additional-paths install** command in address family configuration or router configuration mode. To remove the backup paths, use the **no** form of this command.

bgp additional-paths install

no bgp additional-paths install

Syntax Description

This command has no arguments or keywords.

Command Default

A backup path is not created.

Command Modes

Address family configuration (config-router-af)
Router configuration (config-router)

Command History

Release	Modification
12.2(33)SRE	This command was introduced.
12.2(33)XNE	This command was integrated into Cisco IOS Release 12.2(33)XNE.
Cisco IOS XE Release 2.5	This command was integrated into Cisco IOS XE Release 2.5.
15.0(1)S	This command was integrated into Cisco IOS Release 15.0(1)S.
Cisco IOS XE Release 3.3S	Support for IPv6 address family configuration mode was added.
15.1(2)S	Support for IPv6 address family configuration mode was added.

Usage Guidelines

You can issue the **bgp additional-paths install** command in different modes, each of which protects VRFs in its own way:

- VPNv4 address family configuration mode protects all VRFs.
- IPv4 address family configuration mode protects only IPv4 VRFs.
- IPv6 address family configuration mode protects only IPv6 VRFs.
- Router configuration mode protects VRFs in the global routing table.

Examples

The following example shows how to calculate a backup path and install it into the RIB and Cisco Express Forwarding:

```
Router(config-router-af)# bgp additional-paths install
```

Related Commands

Command	Description
address-family ipv6	Enters address family configuration mode for configuring routing sessions such as BGP that use standard IPv6 address prefixes.
bgp advertise-best-external	Enables BGP to use an external route as the backup path after a link or node failure.

bgp additional-paths select

To have the system calculate a second BGP bestpath, use the **bgp additional-paths select** command in address family configuration mode. To remove this mechanism for calculating a second bestpath, use the **no** form of the command.

bgp additional-paths select {**best-external** [**backup**] | **backup**}

no bgp additional-paths select

Syntax Description

best-external	(Optional) Calculates a second bestpath from among those received from external neighbors. Configure this keyword on a PE or RR. This keyword enables the BGP Best External feature on an RR.
backup	(Optional) Calculates a second bestpath as a backup path.

Command Default

This command is disabled by default.

Command Modes

Address family configuration (config-router-af)

Command History

Release	Modification
Cisco IOS XE Release 3.4S	This command was introduced.

Usage Guidelines

The BGP Diverse Path feature can be enabled on a route reflector to calculate a bestpath and an additional path per address family.

Computation of a diverse path per address family is triggered by any of the following commands:

- **bgp additional-paths install**
- **bgp additional-paths select**
- **maximum-paths ebgp**
- **maximum-paths ibgp**

The **bgp additional-paths install** command will install the type of path that is specified in the **bgp additional-paths select** command Either the **best-external** keyword or the **backup** keyword is required; both keywords can be specified. If both keywords (**best-external** and **backup**) are specified, the system will install a backup path.

Examples

In the following example, the system computes a second best path from among those received from external neighbors:

```
router bgp 1
 neighbor 10.1.1.1 remote-as 1
 address-family ipv4 unicast
```

```
neighbor 10.1.1.1 activate
maximum-paths ibgp 4
bgp bestpath igp-metric ignore
bgp additional-paths select best-external
bgp additional-paths install
neighbor 10.1.1.1 advertise diverse-path backup
```

Related Commands

Command	Description
bgp additional-paths install	Enables BGP to calculate a backup path for a given address and to install it into the RIB and CEF.
bgp bestpath igp-metric ignore	Specifies that the system ignore the IGP metric during best path selection.
maximum-paths ebgp	Configures multipath load sharing for eBGP and iBGP routes.
maximum-paths ibgp	Controls the maximum number of parallel iBGP routes that can be installed in a routing table.

bgp advertise-best-external

To enable BGP to calculate an external route as the best backup path for a given address family and to install it into the Routing Information base (RIB) and Cisco Express Forwarding, and to advertise the best external path to its neighbors, use the **bgp advertise-best-external** command in address family or router configuration mode. To remove the external backup path, use the **no** form of this command.

bgp advertise-best-external

no bgp advertise-best-external

Syntax Description

This command has no arguments or keywords.

Command Default

An external backup path is not created.

Command Modes

Router configuration (config-router)
Address family configuration (config-router-af)

Command History

Release	Modification
12.2(33)SRE	This command was introduced.
12.2(33)XNE	This command was integrated into Cisco IOS Release 12.2(33)XNE.
Cisco IOS XE Release 2.5	This command was integrated into Cisco IOS XE Release 2.5.
Cisco IOS XE Release 3.3S	Support for IPv6 address family configuration mode was added.
15.1(2)S	Support for IPv6 address family configuration mode was added.

Usage Guidelines

When you configure the Best External feature with the **bgp advertise-best-external** command, you need not enable the Prefix Independent Convergence (PIC) feature with the **bgp additional-paths install** command. The Best External feature automatically installs a backup path. If you try to configure the PIC feature after configuring the Best External feature, you receive an error. This behavior applies to both BGP and MPLS.

When you configure the MPLS VPN: Best External feature with the **bgp advertise-best-external** command, it will override the functionality of the MPLS VPN—BGP Local Convergence feature. You need not remove the **protection local-prefixes** command from the configuration.

You can issue the **bgp advertise-best-external** command in different modes, each of which protects VRFs in its own way:

- VPNv4 address-family configuration mode protects all VRFs.
- IPv4 address-family configuration mode protects only IPv4 VRFs.
- IPv6 address family configuration mode protects only IPv6 VRFs.
- Router configuration mode protects VRFs in the global routing table.

Examples

The following example calculates an external backup path and installs it into the RIB and Cisco Express Forwarding:

```
Router(config-router-af)# bgp advertise-best-external
```

Related Commands

Command	Description
address-family ipv6	Enters address family configuration mode for configuring routing sessions such as BGP that use standard IPv6 address prefixes.
bgp additional-paths install	Enables BGP to use an additional path as the backup path.
protection local-prefixes	Enables PE–CE link protection by preserving the local label.

bgp aggregate-timer

To set the interval at which BGP routes will be aggregated or to disable timer-based route aggregation, use the **bgp aggregate-timer** command in address-family or router configuration mode. To restore the default value, use the **no** form of this command.

bgp aggregate-timer *seconds*

no bgp aggregate-timer

Syntax Description

seconds	Interval (in seconds) at which the system will aggregate BGP routes. • The range is from 6 to 60 or else 0 (zero). The default is 30. • A value of 0 (zero) disables timer-based aggregation and starts aggregation immediately.

Command Default

30 seconds

Command Modes

Address family configuration (config-router-af)
Router configuration (config-router)

Command History

Release	Modification
12.2SX	This command was introduced.
12.2M	This command was integrated into Cisco IOS Release 12.2 Mainline.
12.2SR	This command was integrated into Cisco IOS Release 12.2 SR.
XE 2.0	This command was integrated into Cisco IOS XE Release 2.0.
12.2(33)SRD4	The zero (0) timer was added.

Usage Guidelines

Use this command to change the default interval at which BGP routes are aggregated.

In very large configurations, even if the **aggregate-address summary-only** command is configured, more specific routes are advertised and later withdrawn. To avoid this behavior, configure the **bgp aggregate-timer** to 0 (zero), and the system will immediately check for aggregate routes and suppress specific routes.

Examples

The following example configures BGP route aggregation at 20-second intervals:

```
Router(config)# router bgp 50
Router(config-router)# bgp aggregate-timer 20
```

The following example starts BGP route aggregation immediately:

```
Router(config)# router bgp 50
Router(config-router)# aggregate-address 10.0.0.0 255.0.0.0 summary-only
Router(config-router)# bgp aggregate-timer 0
```

Related Commands

Command	Description
aggregate-address	Creates an aggregate entry in a BGP database.

bgp always-compare-med

To enable the comparison of the Multi Exit Discriminator (MED) for paths from neighbors in different autonomous systems, use the **bgp always-compare-med** command in router configuration mode. To disallow the comparison, use the **no** form of this command.

bgp always-compare-med

no bgp always-compare-med

Syntax Description

This command has no arguments or keywords.

Command Default

Cisco IOS software does not compare the MED for paths from neighbors in different autonomous systems if this command is not enabled or if the **no** form of this command is entered. The MED is compared only if the autonomous system path for the compared routes is identical.

Command Modes

Router configuration

Command History

Release	Modification
11.0	This command was introduced.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.

Usage Guidelines

The MED, as stated in RFC 1771, is an optional nontransitive attribute that is a four octet non-negative integer. The value of this attribute may be used by the BGP best path selection process to discriminate among multiple exit points to a neighboring autonomous system.

The MED is one of the parameters that is considered when selecting the best path among many alternative paths. The path with a lower MED is preferred over a path with a higher MED. During the best-path selection process, MED comparison is done only among paths from the same autonomous system. The **bgp always-compare-med** command is used to change this behavior by enforcing MED comparison between all paths, regardless of the autonomous system from which the paths are received.

The **bgp deterministic-med** command can be configured to enforce deterministic comparison of the MED value between all paths received from within the same autonomous system.

Examples

In the following example, the local BGP routing process is configured to compare the MED from alternative paths, regardless of the autonomous system from which the paths are received:

```
Router(config)# router bgp 500000
Router(config-router)# bgp always-compare-med
```

Related Commands

Command	Description
bgp deterministic-med	Enforces deterministic comparison of the MED value between all paths received from within the same autonomous system

bgp asnotation dot

To change the default display and regular expression match format of Border Gateway Protocol (BGP) 4-byte autonomous system numbers from asplain (decimal values) to dot notation, use the **bgp asnotation dot** command in router configuration mode. To reset the default 4-byte autonomous system number display and regular expression match format to asplain, use the **no** form of this command.

bgp asnotation dot

no bgp asnotation dot

Syntax Description

This command has no arguments or keywords.

Command Default

BGP autonomous system numbers are displayed using asplain (decimal value) format in screen output, and the default format for matching 4-byte autonomous system numbers in regular expressions is asplain.

Command Modes

Router configuration (config-router)

Command History

Release	Modification
12.0(32)SY8	This command was introduced.
12.2(33)SXI1	This command was integrated into Cisco IOS Release 12.2(33)SXI1.
12.0(33)S3	This command was integrated into Cisco IOS Release 12.0(33)S3.
Cisco IOS XE Release 2.4	This command was integrated into Cisco IOS XE Release 2.4.
12.2(33)SRE	This command was integrated into Cisco IOS Release 12.2(33)SRE.
12.2(33)XNE	This command was integrated into Cisco IOS Release 12.2(33)XNE.

Usage Guidelines

Prior to January 2009, BGP autonomous system numbers that were allocated to companies were 2-octet numbers in the range from 1 to 65535 as described in RFC 4271, *A Border Gateway Protocol 4 (BGP-4)*. Due to increased demand for autonomous system numbers, the Internet Assigned Number Authority (IANA) will start in January 2009 to allocate four-octet autonomous system numbers in the range from 65536 to 4294967295. RFC 5396, *Textual Representation of Autonomous System (AS) Numbers*, documents three methods of representing autonomous system numbers. Cisco has implemented the following two methods:

- Asplain—Decimal value notation where both 2-byte and 4-byte autonomous system numbers are represented by their decimal value. For example, 65526 is a 2-byte autonomous system number and 234567 is a 4-byte autonomous system number.
- Asdot—Autonomous system dot notation where 2-byte autonomous system numbers are represented by their decimal value and 4-byte autonomous system numbers are represented by a dot notation. For example, 65526 is a 2-byte autonomous system number and 1.169031 is a 4-byte autonomous system number (this is dot notation for the 234567 decimal number).

For details about the third method of representing autonomous system numbers, see RFC 5396.

In Cisco IOS Release 12.0(32)SY8, 12.0(33)S3, 12.2(33)SRE, 12.2(33)XNE, 12.2(33)SXI1, Cisco IOS XE Release 2.4, and later releases, the Cisco implementation of 4-byte autonomous system numbers uses asplain as the default display format for autonomous system numbers, but you can configure 4-byte autonomous system numbers in both the asplain and asdot format. In addition, the default format for matching 4-byte autonomous system numbers in regular expressions is asplain, so you must ensure that any regular expressions to match 4-byte autonomous system numbers are written in the asplain format. If you want to change the default **show** command output to display 4-byte autonomous system numbers in the asdot format, use the **bgp asnotation dot** command under router configuration mode. When the asdot format is enabled as the default, any regular expressions to match 4-byte autonomous system numbers must be written using the asdot format, or the regular expression match will fail. Table 2 and Table 3 show that although you can configure 4-byte autonomous system numbers in either asplain or asdot format, only one format is used to display **show** command output and control 4-byte autonomous system number matching for regular expressions, and the default is asplain format. To display 4-byte autonomous system numbers in **show** command output and to control matching for regular expressions in the asdot format, you must configure the **bgp asnotation dot** command. After enabling the **bgp asnotation dot** command, a hard reset must be initiated for all BGP sessions by entering the **clear ip bgp *** command.

Note If you are upgrading to an image that supports 4-byte autonomous system numbers, you can still use 2-byte autonomous system numbers. The **show** command output and regular expression match are not changed and remain in asplain (decimal value) format for 2-byte autonomous system numbers regardless of the format configured for 4-byte autonomous system numbers.

Table 2 Default Asplain 4-Byte Autonomous System Number Format

Format	Configuration Format	Show Command Output and Regular Expression Match Format
asplain	2-byte: 1 to 65535 4-byte: 65536 to 4294967295	2-byte: 1 to 65535 4-byte: 65536 to 4294967295
asdot	2-byte: 1 to 65535 4-byte: 1.0 to 65535.65535	2-byte: 1 to 65535 4-byte: 65536 to 4294967295

Table 3 Asdot 4-Byte Autonomous System Number Format

Format	Configuration Format	Show Command Output and Regular Expression Match Format
asplain	2-byte: 1 to 65535 4-byte: 65536 to 4294967295	2-byte: 1 to 65535 4-byte: 1.0 to 65535.65535
asdot	2-byte: 1 to 65535 4-byte: 1.0 to 65535.65535	2-byte: 1 to 65535 4-byte: 1.0 to 65535.65535

Examples

The following output from the **show ip bgp summary** command shows the default asplain format of the 4-byte autonomous system numbers. Note the asplain format of the 4-byte autonomous system numbers, 65536 and 65550.

```
Router# show ip bgp summary

BGP router identifier 172.17.1.99, local AS number 65538
```

```
BGP table version is 1, main routing table version 1

Neighbor        V           AS MsgRcvd MsgSent   TblVer  InQ OutQ Up/Down  Statd
192.168.1.2     4        65536       7       7        1    0    0 00:03:04       0
192.168.3.2     4        65550       4       4        1    0    0 00:00:15       0
```

The following configuration is performed to change the default output format to the asdot notation format:

```
configure terminal
 router bgp 65538
  bgp asnotation dot
  end
clear ip bgp *
```

After the configuration is performed, the output is converted to asdot notation format as shown in the following output from the **show ip bgp summary** command. Note the asdot format of the 4-byte autonomous system numbers, 1.0 and 1.14 (these are the asdot conversions of the 65536 and 65550 autonomous system numbers).

```
Router# show ip bgp summary

BGP router identifier 172.17.1.99, local AS number 1.2
BGP table version is 1, main routing table version 1

Neighbor        V           AS MsgRcvd MsgSent   TblVer  InQ OutQ Up/Down  Statd
192.168.1.2     4          1.0       9       9        1    0    0 00:04:13       0
192.168.3.2     4         1.14       6       6        1    0    0 00:01:24       0
```

After the **bgp asnotation dot** command is configured, the regular expression match format for 4-byte autonomous system paths is changed to asdot notation format. Although a 4-byte autonomous system number can be configured in a regular expression using either asplain format or asdot format, only 4-byte autonomous system numbers configured using the current default format are matched. In the first example, the **show ip bgp regexp** command is configured with a 4-byte autonomous system number in asplain format. The match fails because the default format is currently asdot format and there is no output. In the second example using asdot format, the match passes and the information about the 4-byte autonomous system path is shown using the asdot notation.

Note The asdot notation uses a period, which is a special character in Cisco regular expressions. To remove the special meaning, use a backslash before the period.

```
Router# show ip bgp regexp ^65536$


Router# show ip bgp regexp ^1\.0$

BGP table version is 2, local router ID is 172.17.1.99
Status codes: s suppressed, d damped, h history, * valid, > best, i - internal,
              r RIB-failure, S Stale
Origin codes: i - IGP, e - EGP, ? - incomplete

   Network          Next Hop            Metric LocPrf Weight Path
*> 10.1.1.0/24      192.168.1.2              0             0 1.0 i
```

Related Commands

Command	Description
router bgp	Configures the BGP routing process.

show ip bgp regexp	Displays routes matching the autonomous system path regular expression.
show ip bgp summary	Displays the status of all BGP connections.

bgp bestpath as-path ignore

To configure Border Gateway Protocol (BGP) to not consider the autonomous system (AS) path during best path route selection, use the **bgp bestpath as-path ignore** command in router configuration mode. To restore default behavior and configure BGP to consider the AS-path during route selection, use the **no** form of this command.

bgp bestpath as-path ignore

no bgp bestpath as-path ignore

Syntax Description

This command has no arguments or keywords.

Command Default

The AS-path is considered during BGP best path selection.

Command Modes

Router configuration

Command History

Release	Modification
12.0	This command was introduced.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.

Examples

In the following example, the BGP routing process is configured to not consider the AS-path during best path selection:

```
Router(config)# router bgp 40000
Router(config-router)# bgp bestpath as-path ignore
```

Related Commands

Command	Description
show ip bgp ipv4	Displays information about the TCP and BGP connections to neighbors.

bgp bestpath compare-routerid

To configure a Border Gateway Protocol (BGP) routing process to compare identical routes received from different external peers during the best path selection process and to select the route with the lowest router ID as the best path, use the **bgp bestpath compare-routerid** command in router configuration mode. To return the BGP routing process to the default operation, use the **no** form of this command.

bgp bestpath compare-routerid

no bgp bestpath compare-routerid

The behavior of this command is disabled by default; BGP selects the route that was received first when two routes with identical attributes are received.

Command HistoryR

Release	Modification
12.1(3)	This command was introduced.
12.0(11)S	This command was integrated into Cisco IOS Release 12.0(11)S.
12.1(3a)E	This command was integrated into Cisco IOS Release 12.1(3a)E.
12.1(3)T	This command was integrated into Cisco IOS Release 12.1(3)T.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.

Usage Guidelines

The **bgp bestpath compare-routerid** command is used to configure a BGP routing process to use the router ID as the tie breaker for best path selection when two identical routes are received from two different peers (all the attributes are the same except for the router ID). When this command is enabled, the lowest router ID will be selected as the best path when all other attributes are equal.

In the following example, the BGP routing process is configured to compare and use the router ID as a tie breaker for best path selection when identical paths are received from different peers:

```
Router(config)# router bgp 50000
Router(config-router)# bgp bestpath compare-routerid
```

Related Commands

Command	Description
show ip bgp	Displays entries in the BGP routing table.

bgp bestpath cost-community ignore

To configure a router that is running the Border Gateway Protocol (BGP) to not evaluate the cost community attribute during the best path selection process, use the **bgp bestpath cost-community ignore** command in router configuration mode. To return the router to default operation, use the **no** form of this command.

bgp bestpath cost-community ignore

no bgp bestpath cost-community ignore

Syntax Description

This command has no keywords or arguments.

Command Default

The behavior of this command is enabled by default until the cost community attribute is manually configured.

Command Modes

Address family configuration
Router configuration

Command History

Release	Modification
12.0(24)S	This command was introduced.
12.3(2)T	This command was integrated into Cisco IOS Release 12.3(2)T.
12.2(18)S	This command was integrated into Cisco IOS Release 12.2(18)S.
12.2(27)SBC	This command was integrated into Cisco IOS Release 12.2(27)SBC.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.

Usage Guidelines

The **bgp bestpath cost-community ignore** command is used to disable the evaluation of the cost community attribute to help isolate problems and troubleshoot issues that relate to BGP path selection. This command can also be used to delay the activation of cost community attribute evaluation so that cost community filtering can be deployed in a large network at the same time.

Examples

The following example shows how to configure a router to not evaluate the cost community attribute during the best path selection process:

```
router bgp 50000
 address-family ipv4 unicast
 bgp bestpath cost-community ignore
```

Related Commands

Command	Description
set extcommunity cost	Creates a set clause to apply the cost community attribute to routes that pass through a route map.
show ip bgp	Displays entries in the BGP routing table.

bgp bestpath igp-metric ignore

To have the system ignore the Interior Gateway Protocol (IGP) metric during BGP best path selection, use the **bgp bestpath igp-metric ignore** command in address family configuration mode. To remove the instruction to ignore the IGP metric, use the **no** form of this command.

bgp bestpath igp-metric ignore

no bgp bestpath igp-metric ignore

Syntax Description

This command has no arguments or keywords.

Command Default

This command is disabled by default.

Command Modes

Address family configuration (config-router-af)

Command History

Release	Modification
Cisco IOS XE Release 3.4S	This command was introduced.

Usage Guidelines

The IGP metric is a configurable metric for EIGRP, IS-IS, or OSPF that is related to distance. The **bgp bestpath igp-metric ignore** command can be used independently, or in conjunction with the BGP Diverse Path feature. This command does not enable the BGP Diverse Path feature.

Similarly, enabling the BGP Diverse Path feature does not necessarily require that the IGP metric be ignored. If you enable the BGP Diverse Path feature and the RR and its shadow RR are not co-located, this command must be configured on the RR, shadow RR, and PE routers.

This command is supported in the following address families:

- ipv4 unicast
- vpnv4 unicast
- ipv6 unicast
- vpnv6 unicast
- ipv4+label
- ipv6+label

Note This command is not supported per VRF; if you use it per VRF, it is at your own risk.

This command applies per VRF as follows (which is consistent with the BGP PIC/Best External feature):

- When configured under address-family vpnv4 or vpnv6, it applies to all VRFs, but it will be nvgened only under vpnv4/vpnv6 global.

- When configured under a particular VRF, it applies only to that VRF and will be nvgened only for that VRF.
- When configured under vpnv4 or vpnv6 global, this command can be disabled for a particular VRF by specifying **no bgp bestpath igp-metric ignore**. The **no** form will be nvgened under that VRF, while under vpnv4 or vpnv6 **bgp bestpath igp-metric ignore** is nvgened and the command applies to all other VRFs.

Examples

In the following example, the IGP metric is ignored during calculation of the BGP best path:

```
router bgp 1
 neighbor 10.1.1.1 remote-as 1
 address-family ipv4 unicast
 neighbor 10.1.1.1 activate
 maximum-paths ibgp 4
 bgp bestpath igp-metric ignore
 bgp additional-paths select backup
 bgp additional-paths install
 neighbor 10.1.1.1 advertise diverse-path backup
```

Related Commands

Command	Description
bgp additional-paths select	Specifies that the system compute a second BGP bestpath.

bgp bestpath med confed

To configure a Border Gateway Protocol (BGP) routing process to compare the Multi Exit Discriminator (MED) between paths learned from confederation peers, use the **bgp bestpath med confed** command in router configuration mode. To disable MED comparison of paths received from confederation peers, use the **no** form of this command.

bgp bestpath med confed [**missing-as-worst**]

no bgp bestpath med confed [**missing-as-worst**]

Syntax Description

missing-as-worst	(Optional) Assigns the value of infinity to received routes that do not carry the MED attribute, making these routes the least desirable.

Defaults

Cisco IOS software does not consider the MED attribute when choosing among paths learned from confederation peers if this command is not enabled or if the **no** form of this command is entered.

Command Modes

Router configuration

Command History

Release	Modification
12.0	This command was introduced.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.

Usage Guidelines

The MED comparison between confederation peers occurs only if no external autonomous systems are in the path (an external autonomous system is an autonomous system that is not within the confederation). If an external autonomous system in the path, then the external MED is passed transparently through the confederation, and the comparison is does not occur.

For example, assume that autonomous system 65000, 65001, 65002, and 65004 are part of the confederation; autonomous system 1 is not; and we are comparing route A with four paths. If the **bgp bestpath med confed** command is enabled, path 1 would be chosen. The fourth path has a lower MED, but it is not involved in the MED comparison because there is an external autonomous system in this path. The following list displays the MED for each autonomous system.

path = 65000 65004, med = 2

path = 65001 65004, med = 3

path = 65002 65004, med = 4

path = 65003 1, med = 1

Examples

In the following example, the BGP routing process is configured to compare MED values for paths learned from confederation peers:

```
Router(config)# router bgp 50000
Router(config-router)# bgp bestpath med confed
```

Related Commands

Command	Description
show ip bgp	Displays entries in the BGP routing table.
show ip bgp ipv4	Displays information about the TCP and BGP connections to neighbors.

bgp bestpath med missing-as-worst

To configure a Border Gateway Protocol (BGP) routing process to assign a value of infinity to routes that are missing the Multi Exit Discriminator (MED) attribute (making the path without a MED value the least desirable path), use the **bgp bestpath med missing-as-worst** command in router configuration mode. To return the router to the default behavior (assign a value of 0 to the missing MED), use the **no** form of this command.

bgp bestpath med missing-as-worst

no bgp bestpath med missing-as-worst

Syntax Description

This command has no arguments or keywords.

Defaults

Cisco IOS software assigns a value of 0 to routes the are missing the MED attribute, causing the route with the missing MED attribute to be considered the best path.

Command Modes

Router configuration

Command History

Release	Modification
12.0	This command was introduced.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.

Examples

In the following example, the BGP router process is configured to consider a route with a missing MED attribute as having a value of infinity (4294967294), making this path the least desirable path:

```
Router(config)# router bgp 50000
Router(config-router)# bgp bestpath med missing-as-worst
```

Related Commands

Command	Description
show ip bgp	Displays entries in the BGP routing table.
show ip bgp ipv4	Displays information about the TCP and BGP connections to neighbors.

bgp client-to-client reflection

To enable or restore route reflection from a BGP route reflector to clients, use the **bgp client-to-client reflection** command in router configuration mode. To disable client-to-client route reflection, use the **no** form of this command.

bgp client-to-client reflection

no bgp client-to-client reflection

Syntax Description

This command has no arguments or keywords.

Defaults

Client-to-client route reflection is enabled by default; when a route reflector is configured, the route reflector reflects routes from a client to other clients.

Command Modes

Router configuration

Command History

Release	Modification
11.1	This command was introduced.
12.0(7)T	Address family configuration mode support was added.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.

Usage Guidelines

By default, the clients of a route reflector are not required to be fully meshed and the routes from a client are reflected to other clients. However, if the clients are fully meshed, route reflection is not required. In this case, use the **no bgp client-to-client reflection** command to disable client-to-client reflection.

Examples

In the following example, the local router is a route reflector, and the three neighbors are fully meshed. Because the neighbors are fully meshed, client-to-client reflection is disabled with the **no bgp client-to-client reflection** command.

```
Router(config)# router bgp 50000
Router(config-router)# neighbor 10.24.95.22 route-reflector-client
Router(config-router)# neighbor 10.24.95.23 route-reflector-client
Router(config-router)# neighbor 10.24.95.24 route-reflector-client
Router(config-router)# no bgp client-to-client reflection
Router(config-router)# end
```

Related Commands

Command	Description
address-family ipv4 (BGP)	Places the router in address family configuration mode for configuring routing sessions such as BGP, RIP, or static routing sessions that use standard IPv4 address prefixes.
address-family vpnv4	Places the router in address family configuration mode for configuring routing sessions such as BGP, RIP, or static routing sessions that use standard VPNv4 address prefixes.
bgp cluster-id	Configures the cluster ID if the BGP cluster has more than one route reflector.
neighbor route-reflector-client	Configures the router as a BGP route reflector and configures the specified neighbor as its client.
show ip bgp	Displays entries in the BGP routing table.

bgp cluster-id

To set the cluster ID on a route reflector in a route reflector cluster, use the **bgp cluster-id** command in router configuration mode. To remove the cluster ID, use the **no** form of this command.

bgp cluster-id *cluster-id*

no bgp cluster-id *cluster-id*

Syntax Description

cluster-id	Cluster ID of this router acting as a route reflector; maximum of 4 bytes. The ID can be specified in dotted or decimal format.

Defaults

The local router ID of the route reflector is used as the cluster ID when no ID is specified or when the **no** form of this command is entered.

Command Modes

Router configuration

Command History

Release	Modification
11.0	This command was introduced.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.

Usage Guidelines

Together, a route reflector and its clients form a *cluster*. When a single route reflector is deployed in a cluster, the cluster is identified by the router ID of the route reflector.

The **bgp cluster-id** command is used to assign a cluster ID to a route reflector when the cluster has one or more route reflectors. Multiple route reflectors are deployed in a cluster to increase redundancy and avoid a single point of failure. When multiple route reflectors are configured in a cluster, the same cluster ID is assigned to all route reflectors. This allows all route reflectors in the cluster to recognize updates from peers in the same cluster and reduces the number of updates that need to be stored in BGP routing tables.

Note All route reflectors must maintain stable sessions between all peers in the cluster. If stable sessions cannot be maintained, then overlay route reflector clusters should be used instead (route reflectors with different cluster IDs).

Examples

In the following example, the local router is one of the route reflectors serving the cluster. It is configured with the cluster ID to identify the cluster.

```
Router(config)# router bgp 50000
Router(config-router)# neighbor 192.168.70.24 route-reflector-client
Router(config-router)# bgp cluster-id 10.0.1.2
```

Related Commands

Command	Description
bgp client-to-client reflection	Enables or restores route reflection from a BGP route reflector to clients.
neighbor route-reflector-client	Configures the router as a BGP route reflector and configures the specified neighbor as its client.
show ip bgp	Displays entries in the BGP routing table.

bgp confederation identifier

To specify a BGP confederation identifier, use the **bgp confederation identifier** command in router configuration mode. To remove the confederation identifier, use the **no** form of this command.

bgp confederation identifier *autonomous-system-number*

no bgp confederation identifier *autonomous-system-number*

Syntax Description

autonomous-system-number	Number of an autonomous system number used to configure a single autonomous system number to identify a group of smaller autonomous systems as a single confederation. Number in the range from 1 to 65535. • In Cisco IOS Release 12.0(32)SY8, 12.0(33)S3, 12.2(33)SRE, 12.2(33)XNE, 12.2(33)SXI1, Cisco IOS XE Release 2.4, and later releases, 4-byte autonomous system numbers are supported in the range from 65536 to 4294967295 in asplain notation and in the range from 1.0 to 65535.65535 in asdot notation. • In Cisco IOS Release 12.0(32)S12, 12.4(24)T, and Cisco IOS XE Release 2.3, 4-byte autonomous system numbers are supported in the range from 1.0 to 65535.65535 in asdot notation only. For more details about autonomous system number formats, see the **router bgp** command.

Command Default

No BGP confederation identifier is identified.

Command Modes

Router configuration (config-router)

Command History

Release	Modification
10.3	This command was introduced.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2(14)SX	This command was integrated into Cisco IOS Release 12.2(14)SX.
12.0(32)S12	This command was modified. Support for 4-byte autonomous system numbers in asdot notation only was added.
12.0(32)SY8	This command was modified. Support for 4-byte autonomous system numbers in asplain and asdot notation was added.
12.4(24)T	This command was modified. Support for 4-byte autonomous system numbers in asdot notation only was added.
Cisco IOS XE Release 2.3	This command was modified. Support for 4-byte autonomous system numbers in asdot notation only was added.
12.2(33)SXI1	This command was modified. Support for 4-byte autonomous system numbers in asplain and asdot notation was added.

Release	Modification
12.0(33)S3	This command was modified. Support for asplain notation was added and the default format for 4-byte autonomous system numbers is now asplain.
Cisco IOS XE Release 2.4	This command was modified. Support for asplain notation was added and the default format for 4-byte autonomous system numbers is now asplain.
12.2(33)SRE	This command was modified. Support for 4-byte autonomous system numbers in asplain and asdot notation was added.
12.2(33)XNE	This command was modified. Support for 4-byte autonomous system numbers in asplain and asdot notation was added.

Usage Guidelines

The **bgp confederation identifier** command is used to configure a single autonomous system number to identify a group of smaller autonomous systems as a single confederation.

A confederation can be used to reduce the internal BGP (iBGP) mesh by dividing a large single autonomous system into multiple subautonomous systems and then grouping them into a single confederation. The subautonomous systems within the confederation exchange routing information like iBGP peers. External peers interact with the confederation as if it were a single autonomous system.

Each subautonomous system is fully meshed within itself and has a few connections to other autonomous systems within the confederation. Next hop, Multi Exit Discriminator (MED), and local preference information is preserved throughout the confederation, allowing you to retain a single Interior Gateway Protocol (IGP) for all the autonomous systems.

In Cisco IOS Release 12.0(32)SY8, 12.0(33)S3, 12.2(33)SRE, 12.2(33)XNE, 12.2(33)SXI1, Cisco IOS XE Release 2.4, and later releases, the Cisco implementation of 4-byte autonomous system numbers uses asplain—65538 for example—as the default regular expression match and output display format for autonomous system numbers, but you can configure 4-byte autonomous system numbers in both the asplain format and the asdot format as described in RFC 5396. To change the default regular expression match and output display of 4-byte autonomous system numbers to asdot format, use the **bgp asnotation dot** command followed by the **clear ip bgp *** command to perform a hard reset of all current BGP sessions.

In Cisco IOS Release 12.0(32)S12, 12.4(24)T, and Cisco IOS XE Release 2.3, the Cisco implementation of 4-byte autonomous system numbers uses asdot—1.2 for example—as the only configuration format, regular expression match, and output display, with no asplain support.

If one member of a BGP confederation is identified using a 4-byte autonomous system number, all other members of a BGP confederation must be upgraded to support 4-byte autonomous system numbers.

Examples

In the following example, the routing domain is divided into autonomous systems 50001, 50002, 50003, 50004, 50005, and 50006 and is identified by the confederation identifier 50007. Neighbor 10.2.3.4 is a peer inside of the routing domain confederation. Neighbor 10.4.5.6 is a peer outside of the routing domain confederation. To external peers and routing domains, the confederation appears as a single autonomous system with the number 50007.

```
router bgp 50000
 bgp confederation identifier 50007
 bgp confederation peers 50001 50002 50003 50004 50005 50006
 neighbor 10.2.3.4 remote-as 50001
 neighbor 10.4.5.6 remote-as 40000
 end
```

In the following example, the routing domain is divided into autonomous systems using 4-byte autonomous system numbers 65538, 65536, and 65550 in asplain format and identified by the confederation identifier 65545. Neighbor 192.168.1.2 is a peer inside of the routing domain confederation. Neighbor 192.168.2.2 is a peer outside of the routing domain confederation. To external peers and routing domains, the confederation appears as a single autonomous system with the number 65545. This example requires Cisco IOS Release 12.0(32)SY8, 12.0(33)S3, 12.2(33)SRE, 12.2(33)XNE, 12.2(33)SXI1, Cisco IOS XE Release 2.4, or a later release.

```
router bgp 65550
 bgp confederation identifier 65545
 bgp confederation peers 65538 65536 65550
 neighbor 192.168.1.2 remote-as 65536
 neighbor 192.168.2.2 remote-as 65547
 end
```

In the following example, the routing domain is divided into autonomous systems using 4-byte autonomous system numbers 1.2 and 1.0 in asdot format and is identified by the confederation identifier 1.9. Neighbor 192.168.1.2 is a peer inside of the routing domain confederation. Neighbor 192.168.2.2 is a peer outside of the routing domain confederation. To external peers and routing domains, the confederation appears as a single autonomous system with the number 1.9. This example requires Cisco IOS Release 12.0(32)S12, 12.4(24)T, or Cisco IOS XE Release 2.3 where asdot notation is the only format for 4-byte autonomous system numbers. This configuration can also be performed using Cisco IOS Release 12.0(32)SY8, 12.0(33)S3, 12.2(33)SRE, 12.2(33)XNE, 12.2(33)SXI1, Cisco IOS XE Release 2.4, or later releases.

```
router bgp 1.14
 bgp confederation identifier 1.9
 bgp confederation peers 1.2 1.0
 neighbor 192.168.1.2 remote-as 1.0
 neighbor 192.168.2.2 remote-as 1.11
 end
```

Related Commands

Command	Description
bgp asnotation dot	Changes the default display and the regular expression match format of BGP 4-byte autonomous system numbers from asplain (decimal values) to dot notation.
bgp confederation peers	Configures subautonomous systems to belong to a single confederation.
router bgp	Configures the BGP routing process.

bgp confederation peers

To configure subautonomous systems to belong to a single confederation, use the **bgp confederation peers** command in router configuration mode. To remove an autonomous system from the confederation, use the **no** form of this command.

bgp confederation peers *autonomous-system-number* [*... autonomous-system-number*]

no bgp confederation peers *autonomous-system-number* [*... autonomous-system-number*]

Syntax Description

autonomous-system-number	Autonomous system numbers for BGP peers that will belong to the confederation. Number in the range from 1 to 65535. The autonomous system number of the local router is not allowed to be specified in this command. • In Cisco IOS Release 12.0(32)SY8, 12.0(33)S3, 12.2(33)SRE, 12.2(33)XNE, 12.2(33)SXI1, Cisco IOS XE Release 2.4, and later releases, 4-byte autonomous system numbers are supported in the range from 65536 to 4294967295 in asplain notation and in the range from 1.0 to 65535.65535 in asdot notation. • In Cisco IOS Release 12.0(32)S12, 12.4(24)T, and Cisco IOS XE Release 2.3, 4-byte autonomous system numbers are supported in the range from 1.0 to 65535.65535 in asdot notation only. For more details about autonomous system number formats, see the **router bgp** command.

Command Default

No BGP peers are configured to be members of a BGP confederation.

Command Modes

Router configuration (config-router)

Command History

Release	Modification
10.3	This command was introduced.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2(14)SX	This command was integrated into Cisco IOS Release 12.2(14)SX.
12.0(32)S12	This command was modified. Support for 4-byte autonomous system numbers in asdot notation only was added.
12.0(32)SY8	This command was modified. Support for 4-byte autonomous system numbers in asplain and asdot notation was added.
12.4(24)T	This command was modified. Support for 4-byte autonomous system numbers in asdot notation only was added.
Cisco IOS XE Release 2.3	This command was modified. Support for 4-byte autonomous system numbers in asdot notation only was added.
12.2(33)SXI1	This command was modified. Support for 4-byte autonomous system numbers in asplain and asdot notation was added.

Release	Modification
12.0(33)S3	This command was modified. Support for asplain notation was added and the default format for 4-byte autonomous system numbers is now asplain.
Cisco IOS XE Release 2.4	This command was modified. Support for asplain notation was added and the default format for 4-byte autonomous system numbers is now asplain.
12.2(33)SRE	This command was modified. Support for 4-byte autonomous system numbers in asplain and asdot notation was added.
12.2(33)XNE	This command was modified. Support for 4-byte autonomous system numbers in asplain and asdot notation was added.

Usage Guidelines

The **bgp confederation peers** command is used to configure multiple autonomous systems as a single confederation. The ellipsis (...) in the command syntax indicates that your command input can include multiple values for the *autonomous-system-number* argument.

The autonomous system number of the router on which this command is being specified is not allowed in this command (not allowed as a confederation peer). If you specify the local router's autonomous system number in the **bgp confederation peers** command, the error message "Local member-AS not allowed in confed peer list" will appear.

The autonomous systems specified in this command are visible internally to the confederation. Each autonomous system is fully meshed within itself. Use the **bgp confederation identifier** command to specify the confederation to which the autonomous systems belong.

In Cisco IOS Release 12.0(32)SY8, 12.0(33)S3, 12.2(33)SRE, 12.2(33)XNE, 12.2(33)SXI1, Cisco IOS XE Release 2.4, and later releases, the Cisco implementation of 4-byte autonomous system numbers uses asplain—65538 for example—as the default regular expression match and output display format for autonomous system numbers, but you can configure 4-byte autonomous system numbers in both the asplain format and the asdot format as described in RFC 5396. To change the default regular expression match and output display of 4-byte autonomous system numbers to asdot format, use the **bgp asnotation dot** command followed by the **clear ip bgp *** command to perform a hard reset of all current BGP sessions.

In Cisco IOS Release 12.0(32)S12, 12.4(24)T, and Cisco IOS XE Release 2.3, the Cisco implementation of 4-byte autonomous system numbers uses asdot—1.2 for example—as the only configuration format, regular expression match, and output display, with no asplain support.

If one member of a BGP confederation is identified using a 4-byte autonomous system number, all other members of a BGP confederation must be upgraded to support 4-byte autonomous system numbers.

Examples

In the following example, autonomous systems 50001, 50002, 50003, 50004, and 50005 are configured to belong to a single confederation under the identifier 50000:

```
router bgp 50000
 bgp confederation identifier 50000
 bgp confederation peers 50001 50002 50003 50004 50005
```

In the following example, the routing domain is divided into autonomous systems using 4-byte autonomous system numbers 65538 and 65536, and is identified by the confederation identifier 65545. Neighbor 192.168.1.2 is a peer inside of the routing domain confederation. Neighbor 192.168.2.2 is a peer outside of the routing domain confederation. To external peers and routing domains, the

confederation appears as a single autonomous system with the number 65545. This example requires Cisco IOS Release 12.0(32)SY8, 12.0(33)S3, 12.2(33)SRE, 12.2(33)XNE, 12.2(33)SXI1, Cisco IOS XE Release 2.4, or a later release.

```
router bgp 65550
 bgp confederation identifier 65545
 bgp confederation peers 65538 65536
 neighbor 192.168.1.2 remote-as 65536
 neighbor 192.168.2.2 remote-as 65547
 end
```

In the following example, the routing domain is divided into autonomous systems using 4-byte autonomous system numbers 1.2, 1.0, and 1.14 and is identified by the confederation identifier 1.9. Neighbor 192.168.1.2 is a peer inside of the routing domain confederation. Neighbor 192.168.2.2 is a peer outside of the routing domain confederation. To external peers and routing domains, the confederation appears as a single autonomous system with the number 1.9. This example requires Cisco IOS Release 12.0(32)S12, 12.4(24)T, or Cisco IOS XE Release 2.3 where asdot notation is the only format for 4-byte autonomous system numbers. This configuration can also be performed using Cisco IOS Release 12.0(32)SY8, 12.0(33)S3, 12.2(33)SRE, 12.2(33)XNE, 12.2(33)SXI1, Cisco IOS XE Release 2.4, or later releases.

```
router bgp 1.14
 bgp confederation identifier 1.9
 bgp confederation peers 1.2 1.0 1.14
 neighbor 192.168.1.2 remote-as 1.0
 neighbor 192.168.2.2 remote-as 1.11
 end
```

Related Commands

Command	Description
bgp asnotation dot	Changes the default display and the regular expression match format of BGP 4-byte autonomous system numbers from asplain (decimal values) to dot notation.
bgp confederation identifier	Specifies a BGP confederation identifier.
router bgp	Configures the BGP routing process.

bgp consistency-checker

To enable the BGP Consistency Checker feature, use the **bgp consistency-checker** command in router configuration mode. To disable the BGP Consistency Checker feature, use the **no** form of this command.

bgp consistency-checker {**error-message** | **auto-repair**} [**interval** *minutes*]

no bgp consistency-checker

Syntax Description

error-message	Specifies that when an inconsistency is found, the system will only generate a syslog message.
auto-repair	Specifies that when an inconsistency is found, the system will generate a syslog message and take action based on the type of inconsistency found.
interval *minutes*	(Optional) Specifies the interval at which the BGP consistency checker process occurs. • The range is 5 to 1440 minutes. The default is 1440 minutes (one day).

Command Default

No BGP consistency check is performed.

Command Modes

Router configuration (config-router)

Command History

Release	Modification
15.1(2)S	This command was introduced.
Cisco IOS XE 3.3S	This command was integrated into Cisco IOS XE 3.3S.

Usage Guidelines

A BGP route inconsistency with a peer occurs when an update or a withdraw is not sent to a peer, and black-hole routing can result. The BGP consistency checker feature is a low-priority process created to address this issue. This feature performs nexthop-label, RIB-out, and aggregation consistency checks. When BGP consistency checker is enabled, it is performed for all address families. Once the process identifies such an inconsistency:

- If the **error-message** keyword is specified, the system will report the inconsistency with a syslog message, and will also perform forceful aggregation reevaluation in the case of an aggregation inconsistency.
- If the **auto-repair** keyword is specified, the system will report the inconsistency with a syslog message and also take appropriate action, such as a route refresh request or an aggregation reevaluation, depending on the type of inconsistency.

Examples

In the following example, BGP consistency checker is enabled. If a BGP route inconsistency is found, the system will send a syslog message and take appropriate action.

```
Router(config)# router bgp 65000
Router(config-router)# bgp consistency-checker auto-repair
```

Related Commands

Command	Description
show ip bgp vpnv4 all inconsistency nexthop-label	Displays routes that have nexthop-label inconsistency found by BGP consistency checker.

bgp dampening

To enable BGP route dampening or change BGP route dampening parameters, use the **bgp dampening** command in address family or router configuration mode. To disable BGP dampening, use the **no** form of this command.

bgp dampening [*half-life reuse suppress max-suppress-time* | **route-map** *map-name*]

no **bgp dampening** [*half-life reuse suppress max-suppress-time* | **route-map** *map-name*]

Syntax Description

half-life	(Optional) Time (in minutes) after which a penalty is decreased. Once the route has been assigned a penalty, the penalty is decreased by half after the half-life period (which is 15 minutes by default). The process of reducing the penalty happens every 5 seconds. The range of the half-life period is 1 to 45 minutes. The default is 15 minutes.
reuse	(Optional) Reuse values based on accumulated penalties. If the penalty for a flapping route decreases enough to fall below this value, the route is unsuppressed. The process of unsuppressing routes occurs at 10-second increments. The range of the reuse value is from 1 to 20000; the default is 750.
suppress	(Optional) A route is suppressed when its penalty exceeds this limit. The range is from 1 to 20000; the default is 2000.
max-suppress-time	(Optional) Maximum time (in minutes) a route can be suppressed. The range is from 1 to 20000; the default is 4 times the *half-life*. If the *half-life* value is allowed to default, the maximum suppress time defaults to 60 minutes. When the *max-suppress-time* is configured, the maximum penalty will never be exceeded, regardless of the number of times that the prefix dampens. The maximum penalty is computed with the following formula: Maximum penalty = reuse-limit *2^(maximum suppress time/half time)
route-map *map-name*	(Optional) Specified the name of the route map that controls where BGP route dampening is enabled.

Defaults

BGP dampening is disabled by default. The following values are used when this command is enabled without configuring any optional arguments:

half-life: 15 minutes
reuse: 750
suppress: 2000
max-suppress-time: 4 times *half-life*

Command Modes

Address family configuration
Router configuration

Command History

Release	Modification
11.0	This command was introduced.
12.0(7)T	Address family configuration mode support was added.

Release	Modification
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.

Usage Guidelines

The **bgp dampening** command is used to enable BGP route dampening. This command can be entered without any arguments or keywords. The *half-life*, *reuse*, *suppress*, and *max-suppress-time* arguments are position-dependent; meaning that if any of these arguments are entered, then all optional arguments must be entered.

When BGP dampening is configured and a prefix is withdrawn, BGP considers the withdrawn prefix as a flap and increases the penalty by a 1000. If BGP receives an attribute change, BGP increases the penalty by 500. If then the prefix has been withdrawn, BGP keeps the prefix in the BGP table as a history entry. If the prefix has not been withdrawn by the neighbor and BGP is not using this prefix, the prefix is marked as dampened. Dampened prefixes are not used in the BGP decision process and not installed to the routing table.

Note This command is not supported in the address family configuration mode in Cisco IOS Release 12.2SX and later releases.

Examples

In the following example, the BGP dampening values are set to 30 minutes for the half life, 1500 for the reuse value, 10000 for the suppress value, and 120 minutes for the maximum suppress time:

```
Router(config)# router bgp 5
Router(config-router)# address-family ipv4 unicast
Router(config-router-af)# bgp dampening 30 1500 10000 120
Router(config-router-af)# end
```

In the following example, BGP dampening is applied to prefixes filtered through the route-map named BLUE:

```
Router(config)# ip prefix-list RED permit 10.0.0.0/8
Router(config)# !
Router(config)# route-map BLUE
Router(config-route-map)# match ip address ip prefix-list RED
Router(config-route-map)# exit
Router(config)# router bgp 50000
Router(config-router)# address-family ipv4
Router(config-router-af)# bgp dampening route-map BLUE
Router(config-router-af)# end
```

Related Commands

Command	Description
clear bgp nsap flap-statistics	Clears BGP flap statistics.
clear ip bgp dampening	Clears BGP route dampening information and unsuppresses the suppressed routes.
set dampening	Applies BGP dampening to prefixes filtered through a route map.
show ip bgp dampened-paths	Displays BGP dampened routes.
show ip bgp flap-statistics	Displays BGP flap statistics.

bgp default ipv4-unicast

To set the IP version 4 (IPv4) unicast address family as default for BGP peering session establishment, use the **bgp default ipv4-unicast** command in router configuration mode. To disable default IPv4 unicast address family for peering session establishment, use the **no** form of this command.

bgp default ipv4-unicast

no bgp default ipv4-unicast

Syntax Description

This command has no arguments or keywords.

Command Default

IPv4 address family routing information is advertised by default for each BGP routing session configured with the **neighbor remote-as** command, unless you first configure the **no bgp default ipv4-unicast** command before configuring the **neighbor remote-as** command.

Command Modes

Router configuration

Command History

Release	Modification
12.0(5)T	This command was introduced.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.

Usage Guidelines

The **bgp default ipv4-unicast** command is used to enable the automatic exchange of IPv4 address family prefixes. The **neighbor activate** address family configuration command must be entered in each IPv4 address family session before prefix exchange will occur.

Examples

In the following example, the automatic exchange of IP version 4 unicast address family routing information is disabled:

```
Router(config)# router bgp 50000
Router(config-router)# no bgp default ipv4-unicast
```

Related Commands

Command	Description
neighbor activate	Enables the exchange of information with a neighboring router.

bgp default local-preference

To change the default local preference value, use the **bgp default local-preference** command in router configuration mode. To return the local preference value to the default setting, use the **no** form of this command.

bgp default local-preference *number*

no bgp default local-preference *number*

Syntax Description

number	Local preference value from 0 to 4294967295.

Command Default

Cisco IOS software applies a local preference value of 100 if this command is not enabled or if the **no** form of this command is entered.

Command Modes

Router configuration

Command History

Release	Modification
10.0	This command was introduced.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.

Usage Guidelines

The local preference attribute is a discretionary attribute that is used to apply the degree of preference to a route during the BGP best path selection process. This attribute is exchanged only between iBGP peers and is used to determine local policy. The route with the highest local preference is preferred.

Examples

In the following example, the local preference value is set to 200:

```
Router(config)# router bgp 50000
Router(config-router)# bgp default local-preference 200
```

Related Commands

Command	Description
set local-preference	Specifies a preference value for the autonomous system path.

bgp deterministic-med

To enforce the deterministic comparison of the Multi Exit Discriminator (MED) value between all paths received from within the same autonomous system, use the **bgp deterministic-med** command in router configuration mode. To disable the required MED comparison, use the **no** form of this command.

bgp deterministic-med

no bgp deterministic-med

Syntax Description

This command has no arguments or keywords.

Command Default

Cisco IOS software does not enforce the deterministic comparison of the MED variable between all paths received from the same autonomous system.

Command Modes

Router configuration

Command History

Release	Modification
11.1	This command was introduced.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.

Usage Guidelines

The **bgp always-compare-med** command is used to enable the comparison of the Multi Exit Discriminator (MED) for paths from neighbors in different autonomous systems. After the **bgp always-compare-med** command is configured, all paths for the same prefix that are received from different neighbors, which are in the same autonomous system, will be grouped together and sorted by the ascending MED value (received-only paths are ignored and not grouped or sorted). The best path selection algorithm will then pick the best paths using the existing rules; the comparison is made on a per neighbor autonomous system basis and then global basis. The grouping and sorting of paths occurs immediately after this command is entered. For correct results, all routers in the local autonomous system must have this command enabled (or disabled).

Examples

In the following example, BGP is configured to compare the MED during path selection for routes advertised by the same subautonomous system within a confederation:

```
Router(config)# router bgp 50000
Router(config-router)# bgp deterministic-med
```

The following example **show ip bgp** command output shows how route selection is affected by the configuration of the **bgp deterministic-med** command. The order in which routes are received affects how routes are selected for best path selection when the **bgp deterministic-med** command is not enabled. The following sample output from the **show ip bgp** command shows three paths that are received for the same prefix (10.100.0.0), and the **bgp deterministic-med** command is not enabled:

```
Router# show ip bgp 10.100.0.0

BGP routing table entry for 10.100.0.0/16, version 40
Paths: (3 available, best #3, advertised over IBGP, EBGP)
  109
    192.168.43.10 from 192.168.43.10 (192.168.43.1)
      Origin IGP, metric 0, localpref 100, valid, internal
  2051
    192.168.43.22 from 192.168.43.22 (192.168.43.2)
      Origin IGP, metric 20, localpref 100, valid, internal
  2051
    192.168.43.3 from 192.168.43.3 (10.4.1.1)
      Origin IGP, metric 30, valid, external, best
```

If the bgp deterministic-med feature is not enabled on the router, the route selection can be affected by the order in which the routes are received. Consider the following scenario in which a router received three paths for the same prefix:

The **clear ip bgp *** command is entered to clear all routes in the local routing table.

```
Router# clear ip bgp *
```

The **show ip bgp** command is issued again after the routing table has been repopulated. Note that the order of the paths changed after clearing the BGP session. The results of the selection algorithm also changed because the order in which the paths were received was different for the second session.

```
Router# show ip bgp 10.100.0.0

BGP routing table entry for 10.100.0.0/16, version 2
Paths: (3 available, best #3, advertised over EBGP)
  109 192.168.43.10 from 192.168.43.10 (192.168.43.1)
      Origin IGP, metric 0, localpref 100, valid, internal
  2051
    192.168.43.3 from 192.168.43.3 (10.4.1.1)
      Origin IGP, metric 30, valid, external
  2051
    192.168.43.22 from 192.168.43.22 (192.168.43.2)
      Origin IGP, metric 20, localpref 100, valid, internal, best
```

If the **bgp deterministic-med** command is enabled, then the result of the selection algorithm will always be the same, regardless of the order in which the paths are received by the local router. The following output is always generated when the **bgp deterministic-med** command is entered on the local router in this scenario:

```
Router# show ip bgp 10.100.0.0

BGP routing table entry for 10.100.0.0/16, version 15
Paths: (3 available, best #1, advertised over EBGP)
  109
    192.168.43.10 from 192.168.43.10 (192.168.43.1)
      Origin IGP, metric 0, localpref 100, valid, internal, best 3
    192.168.43.22 from 192.168.43.22 (192.168.43.2)
      Origin IGP, metric 20, localpref 100, valid, internal 3
    192.168.43.3 from 192.168.43.3 (10.4.1.1)
      Origin IGP, metric 30, valid, external
```

Related Commands

Command	Description
bgp always-compare-med	Enables the comparison of the MED for paths from neighbors in different autonomous systems.
clear ip bgp	Resets a BGP connection or session.
show ip bgp	Displays entries in the BGP routing table.
show ip bgp neighbors	Displays information about the TCP and BGP connections to neighbors.

bgp dmzlink-bw

To configure BGP to distribute traffic proportionally over external links with unequal bandwidth when multipath load balancing is enabled, use the **bgp dmzlink-bw** command in address family configuration mode. To disable traffic distribution that is proportional to the link bandwidth, use the **no** form of this command.

bgp dmzlink-bw

no bgp dmzlink-bw

Syntax Description

This command has no arguments or keywords.

Command Default

BGP traffic is not distributed proportionally over external links with unequal bandwidth.

Command Modes

Address family configuration

Command History

Release	Modification
12.2(2)T	This command was introduced.
12.2(14)S	This command was integrated into Cisco IOS Release 12.2(14)S.
12.0(24)S	This command was integrated into Cisco IOS Release 12.0(24)S.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.

Usage Guidelines

The **bgp dmzlink-bw** command is used to configure BGP to distribute traffic proportionally to the bandwidth of external links. This command is configured for multipath load balancing between directly connected external BGP (eBGP) neighbors. This command is used with BGP multipath features to configure load balancing over links with unequal bandwidth. The **neighbor dmzlink-bw** command must also be configured for each external link through which multipath load balancing is configured to advertise the link bandwidth as an extended community. The **neighbor send-community** command must be configured to exchange the link bandwidth extended community with internal BGP (iBGP) peers.

Examples

The following example shows how to configure the **bgp dmzlink-bw** command to allow multipath load balancing to distribute link traffic proportionally to the bandwidth of each external link and to advertise the bandwidth of these links to iBGP peers as an extended community:

```
Router(config)# router bgp 45000
Router(config-router)# neighbor 10.10.10.1 remote-as 100
Router(config-router)# neighbor 10.10.10.1 update-source Loopback 0
Router(config-router)# neighbor 10.10.10.3 remote-as 100
Router(config-router)# neighbor 10.10.10.3 update-source Loopback 0
Router(config-router)# neighbor 172.16.1.1 remote-as 200
Router(config-router)# neighbor 172.16.1.1 ebgp-multihop 1
```

```
Router(config-router)# neighbor 172.16.2.2 remote-as 200
Router(config-router)# neighbor 172.16.2.2 ebgp-multihop 1
Router(config-router)# address-family ipv4
Router(config-router-af)# bgp dmzlink-bw
Router(config-router-af)# neighbor 10.10.10.1 activate
Router(config-router-af)# neighbor 10.10.10.1 next-hop-self
Router(config-router-af)# neighbor 10.10.10.1 send-community both
Router(config-router-af)# neighbor 10.10.10.3 activate
Router(config-router-af)# neighbor 10.10.10.3 next-hop-self
Router(config-router-af)# neighbor 10.10.10.3 send-community both
Router(config-router-af)# neighbor 172.16.1.1 activate
Router(config-router-af)# neighbor 172.16.1.1 dmzlink-bw
Router(config-router-af)# neighbor 172.16.2.2 activate
Router(config-router-af)# neighbor 172.16.2.2 dmzlink-bw
Router(config-router-af)# maximum-paths ibgp 6
Router(config-router-af)# maximum-paths 6
```

Related Commands

Command	Description
neighbor dmzlink-bw	Configures BGP to advertise the bandwidth of links that are used to exit an autonomous system.
neighbor send-community	Specifies that a communities attribute should be sent to a BGP neighbor.

bgp enforce-first-as

To configure a router to deny an update received from an external BGP (eBGP) peer that does not list its autonomous system number at the beginning of the AS_PATH in the incoming update, use the **bgp enforce-first-as** command in router configuration mode. To disable this behavior, use the **no** form of this command.

bgp enforce-first-as

no bgp enforce-first-as

Syntax Description

This command has no arguments or keywords.

Defaults

The behavior of this command is enabled by default.

Command Modes

Router configuration

Command History

Release	Modification
12.0(3)S	This command was introduced.
12.0(26)S	The default behavior for this command was changed to enabled in Cisco IOS Release 12.0(26)S.
12.2(18)S	This command was integrated into Cisco IOS Release 12.2(18)S.
12.3(2)	This command was integrated into Cisco IOS Release 12.3(2).
12.3(2)T	This command was integrated into Cisco IOS Release 12.3(2)T.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.

Usage Guidelines

The **bgp enforce-first-as** command is used to deny incoming updates received from eBGP peers that do not list their autonomous system number as the first segment in the AS_PATH attribute. Enabling this command prevents a misconfigured or unauthorized peer from misdirecting traffic (spoofing the local router) by advertising a route as if it was sourced from another autonomous system.

Examples

In the following example, all incoming updates from eBGP peers are examined to ensure that the first autonomous system number in the AS_PATH is the local AS number of the transmitting peer. In the follow example, updates from the 10.100.0.1 peer will be discarded if the first AS number is not 65001.

```
Router(config)# router bgp 50000
Router(config-router)# bgp enforce-first-as
Router(config-router)# address-family ipv4
Router(config-router-af)# neighbor 10.100.0.1 remote-as 65001
Router(config-router-af)# end
```

bgp fast-external-fallover

To configure a Border Gateway Protocol (BGP) routing process to immediately reset external BGP peering sessions if the link used to reach these peers goes down, use the **bgp fast-external-fallover c**ommand in router configuration mode. To disable BGP fast external fallover, use the **no** form of this command.

bgp fast-external-fallover

no bgp fast-external-fallover

Syntax Description

This command has no arguments or keywords.

Command Default

BGP fast external fallover is enabled by default in Cisco IOS software.

Command Modes

Router configuration

Command History

Release	Modification
10.0	This command was introduced.
12.0(7)T	Address family configuration mode support was added.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.

Usage Guidelines

The **bgp fast-external-fallover** command is used to disable or enable fast external fallover for BGP peering sessions with directly connected external peers. The session is immediately reset if link goes down. Only directly connected peering sessions are supported.

If BGP fast external fallover is disabled, the BGP routing process will wait until the default hold timer expires (3 keepalives) to reset the peering session. BGP fast external fallover can also be configured on a per-interface basis using the **ip bgp fast-external-fallover** interface configuration command.

Examples

In the following example, the BGP fast external fallover feature is disabled. If the link through which this session is carried flaps, the connection will not be reset.

```
Router(config)# router bgp 50000
Router(config-router)# no bgp fast-external-fallover
```

Related Commands

Command	Description
address-family ipv4 (BGP)	Places the router in address family configuration mode for configuring routing sessions such as BGP, RIP, or static routing sessions that use standard IPv4 address prefixes.
ip bgp fast-external-fallover	Configures per-interface BGP fast external fallover.

bgp graceful-restart

To enable the Border Gateway Protocol (BGP) graceful restart capability globally for all BGP neighbors, use the **bgp graceful-restart** command in address family or in router configuration mode. To disable the BGP graceful restart capability globally for all BGP neighbors, use the **no** form of this command.

bgp graceful-restart [**restart-time** *seconds* | **stalepath-time** *seconds*] [**all**]

no bgp graceful-restart

Syntax Description

restart-time *seconds*	(Optional) Sets the maximum time period that the local router will wait for a graceful-restart-capable neighbor to return to normal operation after a restart event occurs. The default value for this argument is 120 seconds. The configurable range of values is from 1 to 3600 seconds.
stalepath-time *seconds*	(Optional) Sets the maximum time period that the local router will hold stale paths for a restarting peer. All stale paths are deleted after this timer expires. The default value for this argument is 360 seconds. The configurable range of values is from 1 to 3600 seconds
all	(Optional) Enables BGP graceful restart capability for all address family modes.

Command Default

The following default values are used when this command is entered without any keywords or arguments:

restart-time: 120 seconds
stalepath-time: 360 seconds

Note Changing the restart and stalepath timer values is not required to enable the BGP graceful restart capability. The default values are optimal for most network deployments, and these values should be adjusted only by an experienced network operator.

Command Modes

Address-family configuration (config-router-af)
Router configuration (router-config)

Command History

Release	Modification
12.0(22)S	This command was introduced.
12.2(15)T	This command was integrated into Cisco IOS Release 12.2(15)T.
12.2(18)S	This command was integrated into Cisco IOS Release 12.2(18)S.
12.2(28)SB	Support for this command was added into Cisco IOS Release 12.2(28)SB.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.

Release	Modification
Cisco IOS XE Release 2.1	Support for IPv6 was added. The optional **all** keyword was added.
12.2(33)SRE	This command was modified. It was integrated into Cisco IOS Release 12.2(33)SRE.
12.2(33)XNE	This command was modified. It was integrated into Cisco IOS Release 12.2(33)XNE .

Usage Guidelines

The **bgp graceful-restart** command is used to enable or disable the graceful restart capability globally for all BGP neighbors in a BGP network. The graceful restart capability is negotiated between nonstop forwarding (NSF)-capable and NSF-aware peers in OPEN messages during session establishment. If the graceful restart capability is enabled after a BGP session has been established, the session will need to be restarted with a soft or hard reset.

The graceful restart capability is supported by NSF-capable and NSF-aware routers. A router that is NSF-capable can perform a stateful switchover (SSO) operation (graceful restart) and can assist restarting peers by holding routing table information during the SSO operation. A router that is NSF-aware functions like a router that is NSF-capable but cannot perform an SSO operation.

The BGP graceful restart capability is enabled by default when a supporting version of Cisco IOS software is installed. The default timer values for this feature are optimal for most network deployments. We recommend that they are adjusted only by experienced network operators. When adjusting the timer values, the restart timer should not be set to a value greater than the hold time that is carried in the OPEN message. If consecutive restart operations occur, routes (from a restarting router) that were previously marked as stale will be deleted.

Note Changing the restart and stalepath timer values is not required to enable the BGP graceful restart capability. The default values are optimal for most network deployments, and these values should be adjusted only by an experienced network operator.

Examples

In the following example, the BGP graceful restart capability is enabled:

```
Router# configure terminal
Router(config)# router bgp 65000
Router(config-router)# bgp graceful-restart
```

In the following example, the restart timer is set to 130 seconds:

```
Router# configure terminal
Router(config)# router bgp 65000
Router(config-router)# bgp graceful-restart restart-time 130
```

In the following example, the stalepath timer is set to 350 seconds:

```
Router# configure terminal
Router(config)# router bgp 65000
Router(config-router)# bgp graceful-restart stalepath-time 350
```

Related Commands

Command	Description
show ip bgp	Displays entries in the BGP routing table.
show ip bgp neighbors	Displays information about the TCP and BGP connections to neighbors.

bgp inject-map

To configure conditional route injection to inject more specific routes into a Border Gateway Protocol (BGP) routing table, use the **bgp inject-map** command in address family or router configuration mode. To disable a conditional route injection configuration, use the **no** form of this command.

bgp inject-map *inject-map* **exist-map** *exist-map* [**copy-attributes**]

no bgp inject-map *inject-map* **exist-map** *exist-map*

Syntax Description

inject-map	Name of the route map that specifies the prefixes to inject into the local BGP routing table.
exist-map *exist-map*	Specifies the name of the route map containing the prefixes that the BGP speaker will track.
copy-attributes	(Optional) Configures the injected route to inherit attributes of the aggregate route.

Command Default

No specific routes are injected into a BGP routing table.

Command Modes

Address family configuration
Router configuration

Command History

Release	Modification
12.0(14)ST	This command was introduced.
12.2(4)T	This command was integrated into Cisco IOS Release 12.2(4)T.
12.2(14)S	This command was integrated into Cisco IOS Release 12.2(14)S.
12.2(14)SX	This command was integrated into Cisco IOS Release 12.2(14)SX.

Usage Guidelines

The **bgp inject-map** command is used to configure conditional route injection. Conditional route injection allows you to originate a more specific prefix into a BGP routing table without a corresponding match. Two route maps (*exist-map* and *inject-map*) are configured in global configuration mode and then specified with the **bgp inject-map** command in address family or router configuration mode.

The *exist-map* argument specifies a route map that defines the prefix that the BGP speaker will track. This route map must contain a **match ip address prefix-list** command statement to specify the aggregate prefix and a **match ip route-source prefix-list** command statement to specify the route source.

The *inject-map* argument defines the prefixes that will be created and installed into the routing table. Injected prefixes are installed in the local BGP RIB. A valid parent route must exist; Only prefixes that are equal to or more specific than the aggregate route (existing prefix) can be injected.

The optional **copy-attributes** keyword is used to optionally configure the injected prefix to inherit the same attributes as the aggregate route. If this keyword is not entered, the injected prefix will use the default attributes for locally originated routes.

Examples

In the following example, conditional route injection is configured. Injected prefixes will inherit the attributes of the aggregate (parent) route.

```
Router(config)# ip prefix-list ROUTE permit 10.1.1.0/24
Router(config)# ip prefix-list ROUTE_SOURCE permit 10.2.1.1/32
Router(config)# ip prefix-list ORIGINATED_ROUTES permit 10.1.1.0/25
Router(config)# ip prefix-list ORIGINATED_ROUTES permit 10.1.1.128/25
Router(config)# route-map LEARNED_PATH permit 10
Router(config-route-map)# match ip address prefix-list ROUTE
Router(config-route-map)# match ip route-source prefix-list ROUTE_SOURCE
Router(config-route-map)# exit
Router(config)# route-map ORIGINATE permit 10
Router(config-route-map)# set ip address prefix-list ORIGINATED_ROUTES
Router(config-route-map)# set community 14616:555 additive
Router(config-route-map)# exit
Router(config)# router bgp 50000
Router(config-router)# address-family ipv4
Router(config-router-af)# bgp inject-map ORIGINATE exist-map LEARNED_PATH copy-attributes
Router(config-router-af)# end
```

Related Commands

Command	Description
ip prefix-list	Creates an entry in a prefix list.
match ip address	Distributes any routes that have a destination network number address permitted by a standard or extended access list, or performs policy routing on packets.
match ip route-source	Redistributes routes that have been advertised by routers and access servers at the address specified by the access lists.
set ip address prefix-list	Sets a route to criteria specified in the source prefix list.
set community	Sets the BGP communities attribute.
route-map (IP)	Defines the conditions for redistributing routes from one routing protocol into another, or enables policy routing.
show ip bgp	Displays entries in the BGP routing table.
show ip bgp injected-paths	Displays injected routes or prefixes in the BGP routing table.
show ip prefix-list	Displays information about a prefix list or prefix list entries.

bgp listen

To associate a subnet range with a Border Gateway Protocol (BGP) peer group and activate the BGP dynamic neighbors feature, use the **bgp listen** command in router configuration mode. To disable the BGP dynamic neighbors feature, use the **no** form of this command.

bgp listen [**limit** *max-number* | **range** *network/length* **peer-group** *peer-group-name*]

no bgp listen [**limit** | **range** *network/length* **peer-group** *peer-group-name*]

Syntax Description

limit	(Optional) Sets a maximum limit number of BGP dynamic subnet range neighbors.
max-number	(Optional) Number from 1 to 5000. Default is 100.
range	(Optional) Specifies a subnet range that is to be associated with a specified peer group.
network/length	(Optional) The IP prefix representing a subnet, and the length of the subnet mask in bits. The *network* argument can be any valid IP prefix. The *length* argument can be a number from 0 to 32.
peer-group	(Optional) Specifies a BGP peer group that is to be associated with the specified subnet range.
peer-group-name	(Optional) Name of a BGP peer group. This peer group is referred to as a listen range group.

Command Default

No subnets are associated with a BGP listen range group, and the BGP dynamic neighbor feature is not activated.

Command Modes

Router configuration (config-router)

Command History

Release	Modification
12.2(33)SXH	This command was introduced.
15.1(2)T	This command was intergrated into Cisco IOS Release 15.1(2)T.
15.0(1)S	This command was integrated into Release 15.0(1)S.
Cisco IOS XE Release 3.1S	This command was integrated into Cisco IOS Release 3.1S.

Usage Guidelines

Use the **limit** keyword and *max-number* argument to define the global maximum number of BGP dynamic neighbors that can be created.

BGP dynamic neighbors are configured using a range of IP addresses and BGP peer groups. Each range can be configured as a subnet IP address. After a subnet range is configured for a BGP peer group, and a TCP session is initiated for an IP address in the subnet range, a new BGP neighbor is dynamically created as a member of that group. The new BGP neighbor will inherit any configuration for the peer

group. Only IPv4 peering is supported. The output for three **show** commands has been updated to display information about dynamic neighbors. The commands are **show ip bgp neighbors**, **show ip bgp peer-group**, and the **show ip bgp summary** command.

Examples

The following example configures a subnet range of 192.168.0.0/16 and associates this listen range with a BGP peer group. Note that the listen range peer group that is configured for the BGP dynamic neighbor feature can be activated in the IPv4 address family using the **neighbor activate** command. After the initial configuration on Router 1, when Router 2 starts a BGP router session and adds Router 1 to its BGP neighbor table, a TCP session is initiated and Router 1 creates a new BGP neighbor dynamically because the IP address of the new neighbor is within the listen range subnet.

Router 1

```
enable
configure terminal
router bgp 45000
 bgp log-neighbor-changes
 neighbor group192 peer-group
 bgp listen range 192.168.0.0/16 peer-group group192
 neighbor group192 ebgp-multihop 255
 neighbor group192 remote-as 40000 alternate-as 50000
 address-family ipv4 unicast
 neighbor group192 activate
 end
```

Router 2

```
enable
configure terminal
router bgp 50000
 neighbor 192.168.3.1 remote-as 45000
 exit
```

If the **show ip bgp summary** command is now entered on Router 1, the output shows the dynamically created BGP neighbor, 192.168.3.2.

```
Router1# show ip bgp summary

BGP router identifier 192.168.3.1, local AS number 45000
BGP table version is 1, main routing table version 1

Neighbor        V    AS MsgRcvd MsgSent   TblVer  InQ OutQ Up/Down  State/PfxRcd
*192.168.3.2    4 50000       2       2        0    0    0 00:00:37        0
* Dynamically created based on a listen range command
Dynamically created neighbors: 1/(100 max), Subnet ranges: 1

BGP peergroup group192 listen range group members:
  192.168.0.0/16
```

Related Commands

Command	Description
neighbor peer-group	Creates a BGP peer group.
neighbor remote-as	Adds an entry to the BGP or multiprotocol BGP neighbor table.
router bgp	Configures the BGP routing process.
show ip bgp summary	Displays the status of all BGP connections.

bgp log-neighbor-changes

To enable logging of BGP neighbor resets, use the **bgp log-neighbor-changes** command in router configuration mode. To disable the logging of changes in BGP neighbor adjacencies, use the **no** form of this command.

bgp log-neighbor-changes

no bgp log-neighbor-changes

Syntax Description

This command has no arguments or keywords.

Command Default

Logging of BGP neighbor resets is not enabled.

Command Modes

Router configuration

Command History

Release	Modification
11.1CC	This command was introduced.
12.0	This command was integrated into Cisco IOS release 12.0.
12.0(7)T	Address family configuration mode support was added.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2(33)SRB	Support for IPv6 was added.
12.2(33)SB	This command was integrated into Cisco IOS Release 12.2(33)SB.
12.2(33)SXI	This command was integrated into Cisco IOS Release 12.2(33)SXI.

Usage Guidelines

The **bgp log-neighbor-changes** command enables logging of BGP neighbor status changes (up or down) and resets for troubleshooting network connectivity problems and measuring network stability. Unexpected neighbor resets might indicate high error rates or high packet loss in the network and should be investigated.

Using the **bgp log-neighbor-changes** command to enable status change message logging does not cause a substantial performance impact, unlike, for example, enabling per BGP update debugging. If the UNIX syslog facility is enabled, messages are sent to the UNIX host running the syslog daemon so that the messages can be stored and archived. If the UNIX syslog facility is not enabled, the status change messages are retained in the internal buffer of the router, and are not stored to disk. You can set the size of this buffer, which is dependent upon the available RAM, using the **logging buffered** command.

The neighbor status change messages are not tracked if the **bgp log-neighbor-changes** command is not enabled, except for the reset reason, which is always available as output of the **show ip bgp neighbors** and **show bgp ipv6 neighbors** commands.

The **eigrp log-neighbor-changes** command enables logging of Enhanced Interior Gateway Routing Protocol (EIGRP) neighbor adjacencies, but messages for BGP neighbors are logged only if they are specifically enabled with the **bgp log-neighbor-changes** command.

Use the **show logging** command to display the log for the BGP neighbor changes.

Examples

The following example logs neighbor changes for BGP in router configuration mode:

```
Router(config)# bgp router 40000
Router(config-router)# bgp log-neighbor-changes
```

Related Commands

Command	Description
address-family ipv4 (BGP)	Places the router in address family configuration mode for configuring routing sessions such as BGP, RIP, or static routing sessions that use standard IPv4 address prefixes.
eigrp log-neighbor-changes	Enables the logging of neighbor adjacency changes to monitor the stability of the routing system and to help detect problems.
logging buffered	Logs messages to an internal buffer.
show ip bgp ipv4	Displays information about the TCP and BGP connections to neighbors.
show ip bgp neighbors	Displays information about BGP neighbors.
show logging	Displays the state of logging (syslog).

bgp maxas-limit

To configure Border Gateway Protocol (BGP) to discard routes that have a number of autonomous system numbers in AS-path that exceed the specified value, use the **bgp maxas-limit** command in router configuration mode. To return the router to default operation, use the **no** form of this command.

bgp maxas-limit *number*

no bgp maxas-limit

Syntax Description

number	Maximum number of autonomous system numbers in the AS-path attribute of the BGP Update message, ranging from 1 to 254. In addition to setting the limit on the number of autonomous system numbers within the AS-path segment, the command limits the number of AS-path segments to ten. The behavior to allow ten AS-path segments is built into the **bgp maxas-limit** command. **Note** In some earlier Cisco IOS software releases, values up to 2000 can be configured. Cisco does not recommend that a value higher than 254 be configured. These releases also have no limit on the number of autonomous system segments in the AS-path attribute.

Command Default

No routes are discarded.

Command Modes

Router configuration

Command History

Release	Modification
12.2	This command was introduced.
12.0(17)S	This command was integrated into Cisco IOS Release 12.0(17)S.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.

Usage Guidelines

The **bgp maxas-limit** command is used to limit the number of autonomous system numbers in the AS-path attribute that are permitted in inbound routes. If a route is received with an AS-path segment that exceeds the configured limit, the BGP routing process will discard the route.

Examples

This example sets a maximum number of autonomous systems numbers in the AS-path attribute to 30:

```
Router(config)# router bgp 40000
Router(config-router-af)# bgp maxas-limit 30
```

Related Commands

Command	Description
clear ip bgp	Resets a BGP connection or session.

bgp nexthop

To configure Border Gateway Protocol (BGP) next-hop address tracking, use the **bgp nexthop** command in address family or router configuration mode. To disable BGP next-hop address tracking, use the **no** form of this command.

bgp nexthop {**trigger** {**delay** *seconds* | **enable**} | **route-map** *map-name*}

no bgp nexthop {**trigger** {**delay** | **enable**} | **route-map** *map-name*}

Syntax Description

trigger	Specifies the use of BGP next-hop address tracking. Use this keyword with the **delay** keyword to change the next-hop tracking delay. Use this keyword with the **enable** keyword to enable next-hop address tracking.
delay	Changes the delay interval between checks on updated next-hop routes installed in the routing table.
seconds	Number of seconds specified for the delay. Range is from 0 to 100. Default is 5.
enable	Enables BGP next-hop address tracking.
route-map	Specifies the use of a route map that is applied to the route in the routing table that is assigned as the next-hop route for BGP prefixes.
map-name	Name of a route map.

Command Default

BGP next-hop address tracking is enabled by default for IPv4 and VPNv4 address families. It is also enabled by default for the VPNv6 address family as of Cisco IOS Release 12.2(33)SB6.

Command Modes

Address family configuration
Router configuration

Command History

Release	Modification
12.0(29)S	This command was introduced.
12.0(31)S	The default delay interval was changed from 1 to 5 seconds.
12.3(14)T	This command was integrated into Cisco IOS Release 12.3(14)T.
12.4(4)T	The **route-map** keyword and *map-name* argument were added to support the BGP Selective Address Tracking feature.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2(31)SB	This command was integrated into Cisco IOS Release 12.2(31)SB.
12.2(33)SRB	The **route-map** keyword and *map-name* argument were added to support the BGP Selective Address Tracking feature.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.

Release	Modification
12.2(33)SB	This command was integrated into Cisco IOS Release 12.2(33)SB.
12.2(33)SB6	This command was modified. Next-hop address tracking is enabled by default for VPNv6 prefixes.

Usage Guidelines

BGP next-hop address tracking is event driven. BGP prefixes are automatically tracked as peering sessions are established. Next-hop changes are rapidly reported to BGP as they are updated in the routing information base (RIB). This optimization improves overall BGP convergence by reducing the response time to next-hop changes for routes installed in the RIB. When a best-path calculation is run in between BGP scanner cycles, only the changes are processed and tracked.

Note BGP next-hop address tracking improves BGP response time significantly. However, unstable Interior Gateway Protocol (IGP) peers can introduce instability to BGP. We recommend that you aggressively dampen unstable IGP peering sessions to mitigate the possible impact to BGP.

Note BGP next-hop address tracking is not supported under the IPv6 address family.

Use the **trigger** keyword with the **delay** keyword and *seconds* argument to change the delay interval between routing table walks for BGP next-hop address tracking. You can increase the performance of BGP next-hop address tracking by tuning the delay interval between full routing table walks to match the tuning parameters for the IGP. The default delay interval is 5 seconds, which is an optimal value for a fast-tuned IGP. In the case of an IGP that converges more slowly, you can change the delay interval to 20 seconds or more, depending on the IGP convergence time.

Use the **trigger** keyword with the **enable** keyword to enable BGP next-hop address tracking. BGP next-hop address tracking is enabled by default.

Use the **route-map** keyword and *map-name* argument to allow a route map to be used. The route map is used during the BGP best-path calculation and is applied to the route in the routing table that covers the Next_Hop attribute for BGP prefixes. If the next-hop route fails the route-map evaluation, the next-hop route is marked as unreachable. This command is per address family, so different route maps can be applied for next-hop routes in different address families.

Note Only the **match ip address** and **match source-protocol** commands are supported in the route map. No **set** commands or other **match** commands are supported.

Examples

The following example shows how to change the delay interval between routing table walks for BGP next-hop address tracking to occur every 20 seconds under an IPv4 address family session:

```
router bgp 50000
 address-family ipv4 unicast
 bgp nexthop trigger delay 20
 end
```

The following example shows how to disable next-hop address tracking for the IPv4 address family:

```
router bgp 50000
 address-family ipv4 unicast
 no bgp nexthop trigger enable
```

```
 end
```

The following example shows how to configure a route map that permits a route to be considered as a next-hop route only if the address mask length is more than 25. This configuration will avoid any prefix aggregates being considered as a next-hop route.

```
router bgp 45000
 address-family ipv4 unicast
 bgp nexthop route-map CHECK-NEXTHOP
 exit-address-family
 exit
ip prefix-list FILTER25 seq 5 permit 0.0.0.0/0 ge 25
route-map CHECK-NEXTHOP permit 10
 match ip address prefix-list FILTER25
 end
```

Related Commands

Command	Description
match ip address	Matches IP addresses defined by a prefix list.
match source-protocol	Matches the route type based on the source protocol.

bgp nexthop trigger delay

The **trigger** and **delay** keywords for the **bgp nexthop** command are no longer documented as a separate command.

The information for using the **trigger** and **delay** keywords for the **bgp nexthop** command has been incorporated into the **bgp nexthop** command documentation. See the **bgp nexthop** command documentation for more information.

bgp nexthop trigger enable

The **trigger** and **enable** keywords for the **bgp nexthop** command are no longer documented as a separate command.

The information for using the **trigger** and **enable** keywords for the **bgp nexthop** command has been incorporated into the **bgp nexthop** command documentation. See the **bgp nexthop** command documentation for more information.

bgp nopeerup-delay

To configure the time duration that Border Gateway Protocol (BGP) waits for the first peer to come up before populating the routing information base (RIB), use the **bgp nopeerup-delay** command in router configuration mode. To remove the configured values, use the **no** form of this command.

bgp nopeerup-delay {**cold-boot** | **nsf-switchover** | **post-boot** | **user-initiated**} *seconds*

no bgp nopeerup-delay {**cold-boot** | **nsf-switchover** | **post-boot** | **user-initiated**} *seconds*

Syntax Description

cold-boot	Specifies the delay time for the first peer to come up after a cold boot.
nsf-switchover	Specifies the delay time for the first peer to come up post Non-Stop Forwarding (NSF) switchover.
post-boot	Specifies the delay time for the first peer to come up once the system is booted and all peers go down.
user-initiated	Specifies the delay time for the first peer to come up after a manual clear of BGP peers by the administrative user.
seconds	Delay in seconds. Valid values are from 1 to 3600.

Command Default

Delay time is not configured.

Command Modes

Router configuration (config-router)

Command History

Release	Modification
15.1(2)T	This command was introduced.

Usage Guidelines

In a Virtual Switching System (VSS), Open Shortest Path First (OSPF) NSF Engineering Task Force (IETF) operations and BGP are configured and peers are propagated through OSPF. In such a VSS, the OSPF restart interval should be shorter than the time BGP waits for the first peer to come up before populating the RIB; otherwise traffic will be dropped. To make the OSPF restart interval shorter than the time BGP waits for the first peer to come up, use the **nsf ietf restart-interval** command. To change the time duration that BGP waits for the first peer to come up, and make it longer than the OSPF restart interval, use the **bgp nopeerup-delay** command.

Examples

The following example shows how to configure the delay time to 234 seconds for the first peer to come up after NSF switchover.

```
Router(config)# router bgp 100
Router(config-router)# bgp nopeerup-delay nsf-switchover 234
```

Related Commands

Command	Description
clear ip bgp peer-group	Resets the BGP connections using hard or soft reconfiguration for all the members of a BGP peer group.
nsf ietf restart-interval	Enables IETF NSF operations on a router that is running OSPF.
router bgp	Configures the BGP routing process.

bgp recursion host

To enable the recursive-via-host flag for IP Version 4 (IPv4), Virtual Private Network (VPN) Version 4 (VPNv4), Virtual Routing and Forwarding (VRF) address families, and IPv6 address families, use the **bgp recursion host** command in address family configuration or router configuration mode. To disable the recursive-via-host flag, use the **no** form of this command.

bgp recursion host

no bgp recursion host

Syntax Description

This command has no arguments or keywords.

Command Default

For an internal Border Gateway Protocol (iBGP) IPv4 address family, irrespective of whether Prefix Independent Convergence (PIC) is enabled, the recursive-via-host flag in Cisco Express Forwarding is not set.

For the VPNv4 and IPv4 VRF address families, the recursive-via-host flag is set and the **bgp recursion host** command is automatically restored when PIC is enabled under the following conditions:

- The **bgp additional-paths install** command is enabled.
- The **bgp advertise-best-external** command is enabled.

Command Modes

Address family configuration (config-router-af)
Router configuration (config-router)

Command History

Release	Modification
12.2(33)SRE	This command was introduced.
12.2(33)XNE	This command was integrated into Cisco IOS Release 12.2(33)XNE.
Cisco IOS XE Release 2.5	This command was integrated into Cisco IOS XE Release 2.5.
15.0(1)S	This command was integrated into Cisco IOS Release 15.0(1)S.
Cisco IOS XE Release 3.3S	Support for IPv6 address family configuration mode was added.
15.1(2)S	Support for IPv6 address family configuration mode was added.

Usage Guidelines

The **bgp recursion host** command is used to help Cisco Express Forwarding during traffic blackholing when a node failure occurs.

For link protection, BGP automatically restricts the recursion for the next hop resolution of connected routes. These routes are provided by the route reflector, which receives the prefix from another provider edge (PE) router that needs the customer edge (CE) router to be protected.

For node protection, BGP automatically restricts the recursion for the next hop resolution of host routes. These routes are provided by the route reflector, which receives the prefix from the host PE router. If a PE router or Autonomous System Boundary Router (ASBR) fails, for the **bgp recursion host** command to work, the PE routers must satisfy the following options:

- The host prefix must be used on the PE loopback interfaces.
- The next-hop-self must be configured on iBGP sessions.
- The **recursive via host prefix** command must be configured.

To enable Cisco Express Forwarding to use strict recursion rules for an IPv4 address family, you must configure the **bgp recursion host** command that enables the **recursive-via-host** flag when PIC is enabled.

The recursive-via-connected flag is set for directly connected peers only. For example, if the **bgp additional-paths install** command is configured in IPv4 and IPv4 VRF address family configuration modes, the running configuration shows the following details:

```
address-family ipv4
bgp additional-paths-install
no bgp recursion host
!
address-family ipv4 vrf red
bgp additional-paths-install
bgp recursion host
```

In the case of an External Border Gateway Protocol (eBGP) directly connected peers route exchange, the recursion is disabled for the connected routes. The recursive-via-connected flag is automatically set in the RIB and Cisco Express Forwarding for the routes from the eBGP single-hop peers.

For all the VPNs, irrespective of whether PIC is enabled, when the **bgp recursion host** command is configured in VPNv4 and IPv4 address family configuration modes, the normal recursion rules are disabled and only recursion via host-specific routes are allowed for primary, backup, and multipaths under those address families. To enable the normal recursion rules, configure the **no bgp recursion host** command in VPNv4 and IPv4 address family configuration modes.

Examples

The following example shows the configuration of the **bgp advertise-best-external** and **bgp recursion host** commands:

```
Router> enable
Router# configure terminal
Router(config)# router ospf 10
Router(config-router)# log-adjacency-changes
Router(config-router)# redistribute connected subnets
Router(config-router)# network 192.168.0.0 0.0.255.255 area 0
Router(config-router)# router bgp 64500
Router(config-router)# no synchronization
Router(config-router)# bgp log-neighbor-changes
Router(config-router)# neighbor 10.5.5.5 remote-as 64500
Router(config-router)# neighbor 10.5.5.5 update-source Loopback0
Router(config-router)# neighbor 10.6.6.6 remote-as 64500
Router(config-router)# neighbor 10.6.6.6 update-source Loopback0
Router(config-router)# no auto-summary
Router(config-router)# address-family vpnv4
Router(config-router-af)# neighbor 10.5.5.5 activate
Router(config-router-af)# neighbor 10.5.5.5 send-community extended
Router(config-router-af)# neighbor 10.6.6.6 activate
Router(config-router-af)# neighbor 10.6.6.6 send-community extended
Router(config-router-af)# exit-address-family
Router(config-router)# address-family ipv4 vrf test1
```

```
Router(config-router-af)# no synchronization
Router(config-router-af)# bgp advertise-best-external
Router(config-router-af)# bgp recursion host
Router(config-router-af)# neighbor 192.168.9.2 remote-as 64511
Router(config-router-af)# neighbor 192.168.9.2 fall-over bfd
Router(config-router-af)# neighbor 192.168.9.2 activate
Router(config-router-af)# neighbor 192.168.9.2 as-override
Router(config-router-af)# neighbor 192.168.9.2 route-map LOCAL_PREF in
Router(config-router-af)# exit-address-family
```

The following example shows the configuration of the **bgp additional-paths install** and **bgp recursion host** commands:

```
Router> enable
Router# configure terminal
Router(config)# router ospf 10
Router(config-router)# log-adjacency-changes
Router(config-router)# redistribute connected subnets
Router(config-router)# network 192.168.0.0 0.0.255.255 area 0
Router(config-router)# router bgp 64500
Router(config-router)# no synchronization
Router(config-router)# bgp log-neighbor-changes
Router(config-router)# neighbor 10.5.5.5 remote-as 64500
Router(config-router)# neighbor 10.5.5.5 update-source Loopback0
Router(config-router)# neighbor 10.6.6.6 remote-as 64500
Router(config-router)# neighbor 10.6.6.6 update-source Loopback0
Router(config-router)# no auto-summary
Router(config-router)# address-family vpnv4
Router(config-router-af)# neighbor 10.5.5.5 activate
Router(config-router-af)# neighbor 10.5.5.5 send-community extended
Router(config-router-af)# neighbor 10.6.6.6 activate
Router(config-router-af)# neighbor 10.6.6.6 send-community extended
Router(config-router-af)# exit-address-family
Router(config-router)# address-family ipv4 vrf test1
Router(config-router-af)# no synchronization
Router(config-router-af)# bgp additional-paths install
Router(config-router-af)# bgp recursion host
Router(config-router-af)# neighbor 192.168.9.2 remote-as 64511
Router(config-router-af)# neighbor 192.168.9.2 fall-over bfd
Router(config-router-af)# neighbor 192.168.9.2 activate
Router(config-router-af)# neighbor 192.168.9.2 as-override
Router(config-router-af)# neighbor 192.168.9.2 route-map LOCAL_PREF in
Router(config-router-af)# exit-address-family
```

The following example shows the best external routes and the BGP recursion flags enabled:

```
Router# show ip bgp vpnv4 vrf test1 192.168.13.1

BGP routing table entry for 400:1:192.168.13.0/24, version 4
Paths: (2 available, best #2, table test1)
  Advertise-best-external
  Advertised to update-groups:
     1
  64511, imported path from 300:1:192.168.13.0/24
    10.7.7.7 (metric 20) from 10.5.5.5 (10.5.5.5)
      Origin IGP, metric 0, localpref 50, valid, internal, backup/repair
      Extended Community: RT:100:1 RT:200:1 RT:300:1 RT:400:1
      Originator: 10.7.7.7, Cluster list: 10.5.5.5 , recursive-via-host
      mpls labels in/out 25/17
  64511
    10.8.8.8 from 10.8.8.8 (192.168.13.1)
      Origin IGP, metric 0, localpref 100, valid, external, best
      Extended Community: RT:100:1 RT:200:1 RT:300:1 RT:400:1 , recursive-via-connected
```

```
      mpls labels in/out 25/nolabel
```

The following example shows the additional paths and the BGP recursion flags enabled:

```
Router# show ip bgp vpnv4 vrf test1 192.168.13.1

BGP routing table entry for 400:1:192.168.13.0/24, version 25
Paths: (2 available, best #2, table test1)
  Additional-path
  Advertised to update-groups:
     1
  64511, imported path from 300:1:192.168.13.0/24
    10.7.7.7 (metric 20) from 10.5.5.5 (10.5.5.5)
      Origin IGP, metric 0, localpref 50, valid, internal, backup/repair
      Extended Community: RT:100:1 RT:200:1 RT:300:1 RT:400:1
      Originator: 10.7.7.7, Cluster list: 10.5.5.5 , recursive-via-host
      mpls labels in/out 25/17
  64511
    10.8.8.8 from 10.8.8.8 (192.168.13.1)
      Origin IGP, metric 0, localpref 100, valid, external, best
      Extended Community: RT:100:1 RT:200:1 RT:300:1 RT:400:1 , recursive-via-connected
      mpls labels in/out 25/nolabel
```

Table 4 describes the significant fields shown in the display.

Table 4 show ip bgp vpnv4 vrf network-address Field Descriptions

Field	Description
BGP routing table entry for ... version	Internal version number of the table. This number is incremented whenever the table changes.
Paths	Number of autonomous system paths to the specified network. If multiple paths exist, one of the multipaths is designated the best path.
Advertised to update-groups	IP address of the BGP peers to which the specified route is advertised.
10.7.7.7 (metric 20) from 10.5.5.5 (10.5.5.5)	Indicates the next hop address and the address of the gateway that sent the update.
Origin	Indicates the origin of the entry. It can be one of the following values: • IGP—Entry originated from Interior Gateway Protocol (IGP) and was advertised with a **network** router configuration command. • incomplete—Entry originated from other than an IGP or Exterior Gateway Protocol (EGP) and was advertised with the **redistribute** router configuration command. • EGP—Entry originated from an EGP.
metric	The value of the interautonomous system metric.
localpref	Local preference value as set with the **set local-preference route-map** configuration command. The default value is 50.
valid	Indicates that the route is usable and has a valid set of attributes.
internal/external	The field is *internal* if the path is learned via iBGP. The field is *external* if the path is learned via eBGP.
best	If multiple paths exist, one of the multipaths is designated the best path and this path is advertised to neighbors.

Table 4 show ip bgp vpnv4 vrf network-address Field Descriptions (continued)

Field	Description
Extended Community	Route Target value associated with the specified route.
Originator	The router ID of the router from which the route originated when route reflector is used.
Cluster list	The router ID of all the route reflectors that the specified route has passed through.

Related Commands

Command	Description
address-family ipv6	Enters address family configuration mode for configuring routing sessions such as BGP that use standard IPv6 address prefixes.
bgp advertise-best-external	Enables BGP to use an external route as the backup path after a link or node failure.
bgp additional-paths install	Enables BGP to use an additional path as the backup path.

bgp redistribute-internal

To configure iBGP redistribution into an interior gateway protocol (IGP), such as IS-IS or OSPF, use the **bgp redistribute-internal** command in address family or router configuration mode. To return the router to default behavior and stop iBGP redistribution into IGPs, use the **no** form of this command.

bgp redistribute-internal

no bgp redistribute-internal

Syntax Description

This command has no arguments or keywords.

Defaults

In releases prior to Cisco IOS Release 15.1(2)S, 15.2(1)T, and Cisco IOS XE 3.3S, in the IPv4 VRF and IPv6 VRF address families, IBGP routes are not redistributed into IGPs

Beginning with Cisco IOS Release 15.1(2)S, 15.2(1)T, and Cisco IOS XE 3.3S, in the IPv4 VRF and IPv6 VRF address families, IBGP routes are redistributed into IGPs.

For all other address families, IBGP routes are not redistributed into IGPs.

Command Modes

Address family configuration
Router configuration

Command History

Release	Modification
12.1	This command was introduced.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.
15.1(2)S	This command was modified. In the IPv4 VRF and IPv6 VRF address families, **bgp redistribute-internal** is the default.
15.2(1)T	This command was modified. In the IPv4 VRF and IPv6 VRF address families, **bgp redistribute-internal** is the default.
Cisco IOS XE Release 3.3S	This command was modified. In the IPv4 VRF and IPv6 VRF address families, **bgp redistribute-internal** is the default.

Usage Guidelines

The **bgp redistribute-internal** command is used to configure iBGP redistribution into an IGP. The **clear ip bgp** command must be entered to reset BGP connections after this command is configured.

When redistributing BGP into any IGP, be sure to use IP prefix-list and route-map statements to limit the number of prefixes that are redistributed.

Caution Caution should be exercised when redistributing iBGP into an IGP. Use IP prefix-list and route-map statements to limit the number of prefixes that are redistributed. Redistributing an unfiltered BGP routing table into an IGP can have a detrimental effect on normal IGP network operation.

Examples

In the following example, BGP to OSPF route redistribution is enabled:

```
Router(config)# router ospf 300
Router(config-router)# redistribute bgp 200
Router(config-router)# exit
Router(config)# router bgp 200
Router(config-router)# address-family ipv4
Router(config-router-af)# bgp redistribute-internal
Router(config-router-af)# end
Router# clear ip bgp *
```

Related Commands

Command	Description
clear ip bgp	Resets a BGP connection or session.

bgp regexp deterministic

To configure system to use the regular expression engine that internally uses the DFA-based algorithm, use the **bgp regexp deterministic** command in router configuration mode. To configure Cisco IOS software to use the regular expression engine that internally uses the NFA-based algorithm, use the **no** form of this command.

bgp regexp deterministic

no bgp regexp deterministic

Syntax Description

This command has no arguments or keywords.

Command Default

The regular expression engine that internally uses the DFA-based algorithm is enabled.

Command Modes

Router configuration (config-router)

Command History

Release	Modification
12.0(26)S	This command was introduced.
12.3(4)T	This command was integrated into Cisco IOS Release 12.3(4)T.
12.2(22)S	This command was integrated into Cisco IOS Release 12.2(22)S.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2(33)SXH	This command was integrated into Cisco IOS Release 12.2(33)SXH.
15.0(1)M and 12.2(33)XNE	This command was modified. The default changed from the regular expression engine that internally uses the Nondeterministic Finite Automaton-based (NFA-based) algorithm to the regular expression engine that internally uses the Deterministic Finite Automaton-based (DFA-based) algorithm.

Usage Guidelines

This command controls a choice between the use of two different algorithms to evaluate regular expressions.

- The regular expression engine that internally uses the NFA-based algorithm uses a recursive algorithm. This engine is effective, but uses more system resources as the complexity of regular expressions increases. The recursive algorithm works well for simple regular expressions, but is less efficient when processing very complex regular expressions because of the backtracking that is required to process partial matches. In some cases, CPU watchdog timeouts and stack overflow traces have occurred because of the length of time that this engine requires to process very complex regular expressions.
- The regular expression engine that internally uses the DFA-based algorithm is the default engine used. This engine employs an improved algorithm that eliminates excessive backtracking and greatly improves performance when processing complex regular expressions. When this engine is

enabled, complex regular expressions are evaluated more quickly, and CPU watchdog timeouts and stack overflow traces will not occur. However, this engine takes longer to process simple regular expressions than the regular expression engine that internally uses the NFA-based algorithm.

Recommendations

- We recommend that you use the regular expression engine that internally uses the DFA-based algorithm if you need to evaluate complex regular expressions or if you have observed problems related to evaluating regular expressions. This engine is enabled by default or re-enabled by entering the **bgp regexp deterministic** command under a Border Gateway Protocol (BGP) routing process.
- We recommend that you use the regular expression engine that internally uses the NFA-based algorithm if you use only simple regular expressions. This engine can be enabled by entering the **no bgp regexp deterministic** command.

Note Only the negative version of the command (**no bgp regexp deterministic)** will appear in a configuration file (nvgened), if configured.

Examples

The following example shows how to configure the software to use the regular expression engine that internally uses the DFA-based algorithm, which is also the default behavior:

```
Router(config)# router bgp 50000
Router(config-router)# bgp regexp deterministic
```

The following examples shows how to configure the software to use the regular expression engine that internally uses the NFA-based algorithm:

```
Router(config)# router bgp 50000
Router(config-router)# no bgp regexp deterministic
```

Related Commands

Command	Description
router bgp	Configures the BGP routing process.
show ip bgp regexp	Displays routes matching the autonomous system path regular expression.

bgp router-id

To configure a fixed router ID for the local Border Gateway Protocol (BGP) routing process, use the **bgp router-id** command in router or address family configuration mode. To remove the fixed router ID from the running configuration file and restore the default router ID selection, use the **no** form of this command.

Router Configuration

bgp router-id {*ip-address* | **vrf auto-assign**}

no bgp router-id [**vrf auto-assign**]

Address Family Configuration

bgp router-id {*ip-address* | **auto-assign**}

no bgp router-id

Syntax Description

ip-address	Router identifier in the form of an IP address.
vrf	Configures a router identifier for a Virtual Routing and Forwarding (VRF) instance.
auto-assign	Automatically assigns a router identifier for each VRF.

Command Default

The following behavior determines local router ID selection when this command is not enabled:

- If a loopback interface is configured, the router ID is set to the IP address of the loopback interface. If multiple loopback interfaces are configured, the router ID is set to the IP address of the loopback interface with the highest IP address.
- If no loopback interface is configured, the router ID is set to the highest IP address on a physical interface.

Command Modes

Router configuration (config-router)
Address family configuration (config-router-af)

Command History

Release	Modification
10.0	This command was introduced.
12.2(33)SRA	The **vrf** and **auto-assign** keywords were added, and this command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2(31)SB2	This command, including the **vrf** and **auto-assign** keywords, was integrated into Cisco IOS Release 12.2(31)SB2.
12.2(33)SXH	This command, including the **vrf** and **auto-assign** keywords, was integrated into Cisco IOS Release 12.2(33)SXH.
12.4(20)T	The **vrf** and **auto-assign** keywords were added.

Usage Guidelines

The **bgp router-id** command is used to configure a fixed router ID for the local BGP routing process. The router ID is entered in IP address format. Any valid IP address can be used, even an address that is not locally configured on the router. If you use an IP address from a local interface, we recommend that you use the address of a loopback interface rather than the address of a physical interface. (A loopback interface is more effective than a fixed interface as an identifier because there is no physical link to go down.) Peering sessions are automatically reset when the router ID is changed.

In Cisco IOS Release 12.2(33)SRA, 12.2(31)SB2, 12.2(33)SXH, 12.4(20)T, and later releases, the Per-VRF Assignment of BGP Router ID feature introduced VRF-to-VRF peering in BGP on the same router. BGP is designed to refuse a session with itself because of the router ID check. The per-VRF assignment feature allows a separate router ID per VRF. The router ID can be manually configured for each VRF or automatically assigned either for each VRF or globally under address family configuration mode.

Examples

The following example shows how to configure the local router with a fixed BGP router ID of 192.168.254.254:

```
router bgp 50000
 bgp router-id 192.168.254.254
```

The following example shows how to configure a BGP router ID for the VRF named VRF1. This configuration is done under address family IPv4 VRF configuration mode.

```
router bgp 45000
 address-family ipv4 vrf VRF1
  bgp router-id 10.1.1.99
```

The following example shows how to configure an automatically assigned VRF BGP router ID for all VRFs. This configuration is done under BGP router configuration mode.

```
router bgp 45000
 bgp router-id vrf auto-assign
```

The following example shows how to configure an automatically assigned VRF BGP router ID for a single VRF. This configuration is done under address family IPv4 VRF configuration mode.

```
router bgp 45000
 address-family ipv4 vrf VRF2
  bgp router-id auto-assign
```

Related Commands

Command	Description
show ip bgp	Displays entries in the BGP routing table.
show ip bgp vpnv4	Displays VPNv4 address information from the BGP routing table.

bgp rr-group

To create a route-reflector group and enable automatic inbound filtering for VPN version 4 (VPNv4) updates based on the allowed route target (RT) extended communities, use the **bgp rr-group** command in address family configuration mode. To disable a route-reflector group, use the **no** form of this command.

bgp rr-group *extcom-list-number*

no bgp rr-group *extcom-list-number*

Syntax Description

extcom-list-number	Extended community-list that defines the route targets that will be permitted by the route-reflector group. The range of t numbers that can be entered is from 1 to 500. Only one extended community-list is specified for each route-reflector group.

Defaults

No default behavior or values

Command Modes

VPNv4 address family configuration

Command History

Release	Modification
12.1	This command was introduced.
12.0(22)S	This command was integrated into Cisco IOS Release 12.0(22)S.
12.0(22)S	The maximum number of extended community-lists that can supported by a route-reflector group was changed from 199 to 500 in Cisco IOS Release 12.0(22)S.
12.2(15)T	The maximum number of extended community-lists that can supported by a route-reflector group was changed from 199 to 500 in Cisco IOS Release 12.2(15)T.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.

Usage Guidelines

The **bgp rr-group** command is used to partition large VPNv4 Border Gateway Protocol (BGP) networks into smaller route-reflector groups. Each route-reflector group permits only routes from route targets defined in an extended community list. Only one extended community list can be configured for each route-reflector group.

Examples

In the following example, a route-reflector group is created. The route target is associated with the VRF and then defined in an extended community list. This route reflector will accept routes from only route target 50000:1024.

```
Router(config)# ip vrf RED
Router(config-vrf)# rd 50000:10000
Router(config-vrf)# route-target both 50000:10000
Router(config-vrf)# route-target export 50000:1024
Router(config-vrf)# exit
Router(config)# ip extcommunity-list 1 permit rt 50000:1024
Router(config)# router bgp 50000
Router(config-router)# address family vpnv4
Router(config-router-af)# bgp rr-group 1
Router(config-router-af)# neighbor 192.168.0.1 activate
Router(config-router-af)# neighbor 192.168.0.1 route-reflector-client
Router(config-router-af)# neighbor 192.168.0.1 send-community extended
Router(config-router-af)# end
```

Related Commands

Command	Description
ip extcommunity-list	Creates an extended community access list.

bgp scan-time

To configure scanning intervals of Border Gateway Protocol (BGP) routers for next hop validation or to decrease import processing time of Virtual Private Network version 4 (VPNv4) routing information, use the **bgp scan-time** command in address family or router configuration mode. To return the scanning interval of a router to its default scanning interval of 60 seconds, use the **no** form of this command.

bgp scan-time [**import**] *scanner-interval*

no bgp scan-time [**import**] *scanner-interval*

Syntax Description

import	(Optional) Configures import processing of VPNv4 unicast routing information from BGP routers into routing tables.
scanner-interval	The scanning interval of BGP routing information. • Valid values are from 15 to 60 seconds. The default is 60 seconds.

Command Default

The default scanning interval is 60 seconds.

Command Modes

Address family configuration (config-router-af)
Router configuration (config-router)

Command History

Release	Modification
12.0(7)T	This command was introduced.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.
15.0(1)M	This command was modified. The **import** keyword was removed. It is not available in Cisco IOS Release 15.0(1)M and later Cisco IOS Release 15.0M releases.
12.2(33)SRE	This command was modified. The **import** keyword was removed. It is not available in Cisco IOS Release 12.2(33)SRE and later Cisco IOS Release 12.2SR releases.
Cisco IOS XE 2.6	This command was integrated into Cisco IOS XE Release 2.6.
15.1(2)T	This command was modified. The minimum scan time is increased from 5 seconds to 15 seconds.
15.0(1)S	This command was modified. The minimum scan time is increased from 5 seconds to 15 seconds.
Cisco IOS XE 3.1S	This command was modified. The minimum scan time is increased from 5 seconds to 15 seconds.

Usage Guidelines

Entering the **no** form of this command does not disable scanning, but removes it from the output of the **show running-config** command.

The **import** keyword is supported in address family VPNv4 unicast mode only.

The BGP Event Based VPN Import feature introduced a modification to the existing BGP path import process using new commands and the **import** keyword was removed from the **bgp scan-time** command in Cisco IOS Release 15.0(1)M, 12.2(33)SRE, and later releases.

While **bgp nexthop** address tracking (NHT) is enabled for an address family, the **bgp scan-time** command will not be accepted in that address family and will remain at the default value of 60 seconds. NHT must be disabled before the **bgp scan-time** command will be accepted in either router mode or address family mode.

Examples

In the following router configuration example, the scanning interval for next hop validation of IPv4 unicast routes for BGP routing tables is set to 20 seconds:

```
router bgp 100
 no synchronization
 bgp scan-time 20
```

In the following address family configuration example, the scanning interval for next hop validation of address family VPNv4 unicast routes for BGP routing tables is set to 45 seconds:

```
router bgp 150
 address-family vpn4 unicast
  bgp scan-time 45
```

In the following address family configuration example, the scanning interval for importing address family VPNv4 routes into IP routing tables is set to 30 seconds:

```
router bgp 150
 address-family vpnv4 unicast
  bgp scan-time import 30
```

Related Commands

Command	Description
address-family vpnv4	Places the router in address family configuration mode for configuring routing sessions such as BGP, RIP, or static routing sessions that use standard VPNv4 address prefixes.
bgp nexthop	Configures BGP next-hop address tracking.

bgp slow-peer detection

To specify a threshold time that dynamically determines a slow peer, use the **bgp slow-peer detection** command in address-family configuration mode. To restore the default value, use the **no** form of this command.

bgp slow-peer detection [**threshold** *seconds*]

no bgp slow-peer detection

Syntax Description

seconds	(Optional) Threshold time in seconds that the timestamp of the oldest message in a peers queue can be lagging behind the current time before the peer is determined to be a slow peer. The range is from 120 to 3600; the default is 300.

Command Default

300 seconds

Command Modes

Address-family configuration (config-router-af)

Command History

Release	Modification
15.0(1)S	This command was introduced.
Cisco IOS XE 3.1S	This command was introduced.

Usage Guidelines

Update messages are timestamped when they are formatted. The timestamp of the oldest update message in a peers queue is compared to the current time to determine if the peer is lagging more than the configured number of seconds. When a peer is dynamically detected to be a slow peer, the system will send a syslog message. The peer will be marked as recovered and another syslog message will be generated only after the peer's update group converges.

Note If you want detection for only some peers, use the **neighbor slow-peer detection** command. The **neighbor slow-peer detection** command overrides the **bgp slow-peer detection** command. If the **neighbor slow-peer detection** command is unconfigured or if **no neighbor slow-peer detection** is configured, the system will inherit the global, address-family level configuration.

Note The **slow-peer detection** command performs the same function as the **bgp slow-peer detection** command, except through a peer policy template.

Examples

The following example specifies that if the timestamp on a peer's update message is more than 360 seconds before the current time, the peer that sent the update message is marked as a slow peer.

```
Router(config-router-af)# bgp slow-peer detection threshold 360
```

Related Commands

Command	Description
bgp slow-peer split-update-group dynamic	Moves a dynamically detected slow peer to a slow update group.
clear ip bgp slow	Moves dynamically configured slow peers back to their original update groups.

bgp slow-peer split-update-group dynamic

To move a dynamically detected slow peer to a slow update group, use the **bgp slow-peer split-update-group dynamic** command in address-family configuration mode. To cancel this method of moving dynamically detected slow peers to a slow update group, use the **no** form of this command.

bgp slow-peer split-update-group dynamic [**permanent**]

no bgp slow-peer split-update-group dynamic

Syntax Description

permanent	(Optional) Specifies that after the slow peer becomes a regular peer (converges), it is not moved back to its original update group automatically. After resolving the root cause of the slow peer, (network congestion, and so forth), the network administrator can use one of the **clear** commands to move the peer to its original update group.

Command Default

No dynamically detected slow peer is moved to a slow peer update group.

Command Modes

Address-family configuration (config-router-af)

Command History

Release	Modification
15.0(1)S	This command was introduced.
Cisco IOS XE 3.1S	This command was introduced.

Usage Guidelines

When a peer is dynamically detected to be a slow peer (based on the threshold of the **bgp slow-peer detection** command), the slow peer is moved to a slow update group. If a *static* slow peer update group exists, (based on the **neighbor slow-peer split-update-group static** command, the dynamic slow peer is moved to the static slow peer update group; otherwise, a new slow peer update group is created and the peer is moved to that group. Furthermore:

- If the **permanent** keyword is configured, the peer is not automatically moved to its original update group. This is the recommended option. You can the **clear ip bgp slow** command to move the peer back to its original update group.
- If the **permanent** keyword is not configured, the slow peer will be moved back to its regular original update group after it becomes a regular peer (converges).

Note The **neighbor slow-peer split-update-group dynamic** command performs the same function as the **bgp slow-peer split-update-group dynamic** command (at the address-family level), except that the **neighbor slow-peer split-update-group dynamic** command overrides the address-family level command. When the **neighbor slow-peer split-update-group dynamic** command is unconfigured, the system will function according to the address-family level configuration. The **slow-peer split-update-group dynamic** command performs the same function through a peer policy template.

If **bgp slow-peer split-update-group dynamic** is configured, but no slow peer detection is configured, the detection will be done at the default threshold of 300 seconds.

Examples

In the following example, the timestamp of the oldest message in a peers queue is compared to the current time to determine if the peer is lagging more than 360 seconds. If it is lagging, the peer is marked as a slow peer and is put in the slow peer update group. Because the **permanent** keyword is not configured, the slow peer will be moved back to its regular original update group after it becomes a regular peer (converges).

```
Router(config-router-af)# bgp slow-peer detection threshold 360
Router(config-router-af)# bgp slow-peer split-update-group dynamic
```

Related Commands

Command	Description
bgp slow-peer detection	Specifies a threshold time that dynamically determines a slow peer.
clear ip bgp slow	Moves dynamically configured slow peers back to their original update groups.

bgp soft-reconfig-backup

To configure a Border Gateway Protocol (BGP) speaker to perform inbound soft reconfiguration for peers that do not support the route refresh capability, use the **bgp soft-reconfig-backup** command in address-family or r outer configuration mode. To disable this function, use the **no** form of this command.

bgp soft-reconfig-backup

no bgp soft-reconfig-backup

Syntax Description

This command has no arguments or keywords.

Command Default

Inbound soft reconfiguration for peers that do not support the route refresh capability is not performed.

Command Modes

Address-family configuration
Router configuration

Command History

Release	Modification
12.3(14)T	This command was introduced.

Usage Guidelines

The **bgp soft-reconfig-backup** command is used to configure BGP to perform inbound soft reconfiguration for peers that do not support the route refresh capability. The configuration of this command allows you to configure BGP to store updates (soft reconfiguration) only as necessary. Peers that support the route refresh capability are unaffected by the configuration of this command.

Use the **show ip bgp neighbors** command to determine if a peer supports the route refresh capability. If supported, the following will be displayed in the output:

```
Route refresh: advertised and received(new)
```

Use the **show ip bgp** command to determine if the BGP speaker is storing inbound updates for peer that does not support the route refresh capability. If updates are stored, the following will be displayed in the output:

```
(received-only)
```

Examples

The following example, starting in Global configuration mode, configures the router perform inbound soft reconfiguration only if the peer does not support the route refresh capability:

```
Router(config)# router bgp 50000
Router(config-router)# bgp soft-reconfig-backup
Router(config-router)# neighbor 10.1.1.1 remote-as 40000
Router(config-router)# neighbor 192.168.1.1 remote-as 60000
```

Related Commands

Command	Description
show ip bgp	Displays entries in the Border Gateway Protocol (BGP) routing table.
show ip bgp neighbors	Displays information about the TCP and Border Gateway Protocol (BGP) connections to neighbors.

bgp suppress-inactive

To suppress the advertisement of routes that are not installed in the routing information base (RIB), use the **bgp suppress-inactive** command in address family or router configuration mode.

bgp suppress-inactive

no bgp suppress inactive

Syntax Description

This command has no arguments or keywords.

Command Default

No routes are suppressed.

Command Modes

Address family configuration
Router configuration

Command History

Release	Modification
12.2(11)T	This command was introduced.
12.0(26)S	This command was integrated into Cisco IOS Release 12.0(26)S.
12.2(25)S	This command was integrated into Cisco IOS Release 12.2(25)S.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.
15.0(1)M	This command was integrated into Cisco IOS Release 15.0(1)M.

Usage Guidelines

The **bgp suppress-inactive** command is used to prevent routes that are not installed in the RIB (inactive routes) from being advertised to peers. If this feature is not enabled or if the **no** form of this command is used, Border Gateway Protocol (BGP) will advertise inactive routes.

Note BGP marks routes that are not installed into the RIB with a RIB-failure flag. This flag will also appear in the output of the **show ip bgp** command; for example, Rib-Failure (17). This flag does not indicate an error or problem with the route or the RIB, and the route may still be advertised depending on the configuration of this command. Enter the **show ip bgp rib-failure** command to see more information about the inactive route.

Examples

In the following example, the BGP routing process is configured to not advertise routes that are not installed in the RIB:

```
Router(config)# router bgp 500000
Router(config-router)# address-family ipv4
Router(config-router)# bgp suppress-inactive
```

Related Commands

Command	Description
clear ip bgp	Resets a BGP connection using BGP soft reconfiguration.
show ip bgp rib-failure	Display BGP routes were not installed in the RIB.

bgp transport

To enable TCP transport session parameters globally for all Border Gateway Protocol (BGP) sessions, use the **bgp transport** command in router configuration mode. To disable TCP transport session parameters globally for all BGP sessions, use the **no** form of this command.

bgp transport path-mtu-discovery

no bgp transport path-mtu-discovery

Syntax Description

path-mtu-discovery	Enables transport path maximum transmission unit (MTU) discovery.

Command Default

TCP path MTU discovery is enabled by default for all BGP sessions.

Command Modes

Router configuration (config-router)

Command History

Release	Modification
12.2(33)SRA	This command was introduced.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.
12.4(20)T	This command was integrated into Cisco IOS Release 12.4(20)T.

Usage Guidelines

This command is enabled by default because it is used to allow BGP sessions to take advantage of larger MTU links, which can be very important for internal BGP (iBGP) sessions. Use the **show ip bgp neighbors** command to ensure that TCP path MTU discovery is enabled.

Examples

The following example shows how to disable TCP path MTU discovery for all BGP sessions:

```
router bgp 45000
 no bgp transport path-mtu-discovery
```

The following example shows how to enable TCP path MTU discovery for all BGP sessions:

```
router bgp 45000
 bgp transport path-mtu-discovery
```

Related Commands

Command	Description
neighbor transport	Enables transport session parameters for a BGP neighbor session.
show ip bgp neighbors	Displays information about BGP and TCP connections to neighbors.

bgp update-delay

To set the maximum initial delay period before a Border Gateway Protocol (BGP)-speaking networking device sends its first updates, use the **bgp update-delay** command in router configuration mode. To remove the **bgp update-delay** command from the configuration file and restore the initial delay to its default value, use the **no** form of this command.

bgp update-delay *seconds*

no bgp update-delay

Syntax Description

seconds	The maximum delay, in seconds, before a BGP-speaking networking device sends its updates. The range is from 0 to 3600. The default is 120 seconds.

Command Default

If this command is not configured, the default initial delay value is 120 seconds.

Command Modes

Router configuration

Command History

Release	Modification
12.2	This command was introduced.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.

Usage Guidelines

When BGP is started, it waits a specified period of time for its neighbors to be established themselves and to begin sending their initial updates. Once that period is complete, or when the time expires, the best path is calculated for each route, and the software starts sending advertisements out to its peers. This behavior improves convergence time because, if the software were to start sending advertisements out immediately, it would have to send extra advertisements if it later received a better path for the prefix from another peer.

The **bgp update-delay** command is used to tune the maximum time the software will wait after the first neighbor is established until it starts calculating best paths and sending out advertisements. This command can be used when configuring the **bgp graceful-restart** command as part of the Nonstop Forwarding (NSF) capability.

Examples

The following example sets the maximum initial delay to 240 seconds:

```
router bgp 65000
 bgp update-delay 240
```

Related Commands

Command	Description
bgp graceful-restart	Enables the BGP graceful restart capability.

bgp update-group split as-override

To keep peers that are configured with **neighbor as-override** in separate, single-member update groups, use the **bgp update-group split as-override** command in VPNv4 address-family configuration mode. To restore the peers back to the original state of uniting with other peers under the same VRF configured with the same policies, use the **no** form of this command.

bgp update-group split as-override

no bgp update-group split as-override

Syntax Description

This command has no arguments or keywords.

Command Default

BGP update groups are not split based on a policy of AS-override.

Command Modes

VPNv4 address-family

Command History

Release	Modification
12.2(33)SRD4	This command was introduced.

Usage Guidelines

When the **neighbor as-override** command is specified to configure that a PE router overrides the autonomous system number (ASN) of a site with the ASN of a provider, it is standard practice to also configure Site of Origin (SoO). SoO prevents the route originated by a CE towards a PE from being sent back to the same CE by the PE.

An alternative to the SoO feature is using the **bgp update-group split as-override** command. The **bgp update-group split as-override** command causes the peers configured with the **neighbor as-override** command under the same IPv4 VRF, which were previously under one update group, to be removed (split) from that update group and each placed in their own update group (each becoming the only member in an update group).

Note The **bgp update-group split as-override** command cancels the resource optimization during update generation that was achieved by having the peers under the same VRF with common outbound policies belong to the same update group.

Examples

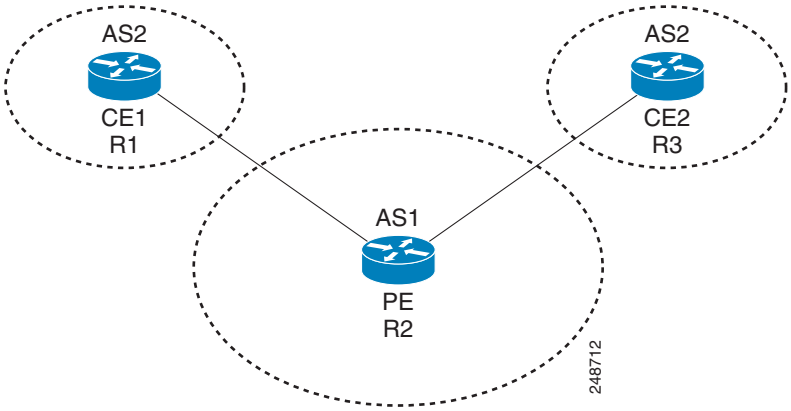
In the following example, the **neighbor as-override** command is configured on a PE for neighbors CE1 and CE2. When CE1 advertises a route to the PE, this command replaces the peer AS number (2) in the AS path with its own AS number (1) before advertising the route to its peers, in this case, CE2. Enabling the AS override feature allows routes originating from an AS to be accepted by another router (CE2) residing in the same AS. Without AS override enabled, CE2 would refuse the route advertisement once the AS path shows that the route originated from its own AS (2). This behavior occurs by default to prevent route loops. The **neighbor as-override** command overrides this default behavior.

If these PE peers, CE1 and CE2, under the **address-family ipv4 vrf** *name* command have the **neighbor as-override** configured on the PE, by default they are placed in the same update group. This causes the source router, CE1, to receive back its own prefix, since it's part of an update group [with CE1 and CE2] to which the prefix is advertised. This situation might result in route loops if not properly configured or if **neighbor as-override** is not accompanied by a feature such as SoO.

An alternative to SoO is to use the **bgp update-group split as-override** command. This command configured under **address-family vpnv4** causes peers with **neighbor as-override** configured under **address-family ipv4 vrf** *name* to be put in separate update groups. As as result of this update-group segregation, the prefixes sent out by a router, say CE1, do not get returned to itself by the PE.

The **bgp update-group split as-override** command, although configured under address family VPNv4, splits only the peers configured under address family IPv4 VRF B and no peers configured under any other address family. Figure 1 illustrates the PE in AS1 and the two CEs in AS2.

Figure 1 Example of bgp update-group split as-override Scenario



The configuration for the PE (Router 2) follows:

```
Router2(config)# router bgp 1
Router2(config-router)# address-family ipv4 vrf B
Router2(config-router-af)# neighbor 192.168.11.2 as-override
Router2(config-router-af)# neighbor 192.168.14.3 as-override
Router2(config-router-af)# exit
Router2(config-router)# address-family vpnv4
Router2(config-router-af)# bgp update-group split as-override
Router2(config-router-af)# exit-address-family
```

Related Commands

Command	Description
neighbor as-override	Configures a provider edge (PE) router to override the autonomous system number (ASN) of a site with the ASN of a provider.
neighbor soo	Sets the site-of-origin (SoO) value for a BGP neighbor or peer group.

bgp upgrade-cli

To upgrade a Network Layer Reachability Information (NLRI) formatted router configuration file to the address-family identifier (AFI) format and set the router command-line interface (CLI) to use only AFI commands, use the **bgp upgrade-cli** command in router configuration mode.

bgp upgrade-cli

Syntax Description

This command has no keywords or arguments.

Command Default

NLRI commands are not upgraded to the AFI format.

Command Modes

Router configuration

Command History

Release	Modification
12.0(14)ST	This command was introduced.
12.0(22)S	This command was integrated into Cisco IOS Release 12.0(22)S.
12.2(14)S	This command was integrated into Cisco IOS Release 12.2(14)S.
12.2(15)T	This command was integrated into Cisco IOS Release 12.2(15)T.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.

Usage Guidelines

The **bgp upgrade-cli** command is used to upgrade a router that is running in the NLRI formatted CLI to the AFI CLI format. The upgrade is automatic and does not require any further configuration by the network operator, and no configuration information is lost but you cannot return to the NLRI configuration because a **no** form does not exist for this command. Several NLRI-based commands do not exist under the AFI format but have equivalent commands under the AFI format. See Table 1 for NLRI to AFI command mapping.

Table 5 Mapping NLRI Commands with Address Family Commands

NLRI Commands	Address Family Command
distance mbgp	**distance bgp**
match nlri	**address-family ipv4**
set nlri	**address-family ipv4**
show ip mbgp	**show ip bgp ipv4 multicast**
show ip mbgp summary	**show ip bgp ipv4 multicast summary**

Examples

In the following example, the existing NLRI router configuration file is converted to the AFI format and the router is configured to use only AFI format commands:

```
Router(config)# router bgp 5
Router(config-router)# bgp upgrade-cli
```

bgp-policy

To enable Border Gateway Protocol (BGP) policy accounting or policy propagation on an interface, use the **bgp-policy** command in interface configuration mode. To disable BGP policy accounting or policy propagation, use the **no** form of this command.

bgp-policy {**accounting** [{**input** | **output**} [**source**]] | **destination** {**ip-prec-map** | **ip-qos-map**} | **source** {**ip-prec-map** | **ip-qos-map**}}

no bgp-policy {**accounting** [**input** | **output**] | **destination** {**ip-prec-map** | **ip-qos-map**} | **source** {**ip-prec-map** | **ip-qos-map**}}

Syntax Description

accounting	Enables accounting policy on the basis of community lists, autonomous system numbers, or autonomous system paths.
input	(Optional) Enables accounting policy on the basis of traffic that is traveling through an input interface.
output	(Optional) Enables accounting policy on the basis of traffic that is traveling through an output interface.
source	Enables accounting policy on the basis of the source address. This keyword is optional when used with the **accounting** keyword.
destination	Enables accounting policy on the basis of the destination address.
ip-prec-map	(Optional) Enables quality of service (QoS) policy on the basis of the IP precedence.
ip-qos-map	(Optional) Enables packet classification on the basis of the specified QoS group.

Command Default

BGP policy accounting and policy propagation are not enabled on an interface.

Command Modes

Interface configuration (config-if)

Command History

Release	Modification
11.1CC	This command was introduced.
12.0(9)S	This command was integrated into Cisco IOS Release 12.0(9)S and the **accounting** keyword was added.
12.0(17)ST	This command was integrated into Cisco IOS Release 12.0(17)ST.
12.0(22)S	The **input**, **output**, and **source** keywords were added for the Cisco 7200 series and Cisco 7500 series platforms.
12.2(13)T	This command was integrated into Cisco IOS Release 12.2(13)T.
12.2(14)S	This command was integrated into Cisco IOS Release 12.2(14)S.
12.3(4)T	The **input**, **output**, and **source** keywords were integrated into Cisco IOS Release 12.3(4)T.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.

Release	Modification
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.
12.2(50)SY	This command was integrated into Cisco IOS Release 12.2(50)SY.

Usage Guidelines

For BGP policy propagation to function, you must enable BGP and either Cisco Express Forwarding (CEF) or distributed CEF (dCEF).

To specify the QoS policy based on the IP precedence or a QoS group, the proper route-map configuration must be in place (for example, the **set ip precedence or set qos-group** route-map configuration command). To display QoS policy information for the interface, use the **show ip interface** command.

Note If you specify both the source and destination addresses when configuring policy propagation based on an access control list (ACL), the software looks up the source address in the routing table and classifies the packet based on the source address first; then the software looks up the destination address in the routing table and reclassifies the packet based on the destination address.

To specify the accounting policy, the proper route-map configuration must be in place matching specific BGP attributes using the **set traffic-index** command. In BGP router configuration mode, use the **table-map** command to modify the accounting buckets when the IP routing table is updated with routes learned from BGP. To display accounting policy information, use the **show cef interface policy-statistics**, **show ip bgp**, and **show ip cef detail** EXEC commands.

Cisco IOS Release 12.2SX and Cisco IOS Release 12.2SY Restrictions

Note the following release-specific restrictions for this command:

- For Cisco IOS Release 12.2SX, only the **bgp-policy accounting input** keyword combination is supported.
- For Cisco IOS Release 12.2SY, only the **bgp-policy accounting input** and **bgp-policy accounting input source** keyword combinations are supported. If the **source** keyword is not specified, policy accounting on the basis of the destination address is enabled.

Examples

In the following example, the BGP policy propagation feature is enabled on an interface based on the source address and the IP precedence setting:

```
Router(config)# interface ethernet 4/0/0
Router(config-int)# bgp-policy source ip-prec-map
Router(config-int)# end
```

In the following example, the BGP policy accounting feature is configured using a source address on input traffic being enabled on GE-WAN interface 9/1. The policy is classified by autonomous system paths.

```
Router(config)# router bgp 50000
Router(config-router)# no synchronization
Router(config-router)# table-map buckets
Router(config-router)# exit
Router(config)# ip as-path access-list 1 permit _10_
Router(config)# ip as-path access-list 2 permit _11_
```

```
Router(config)# route-map buckets permit 10
Router(config-route-map)# match as-path 1
Router(config-route-map)# set traffic-index 1
Router(config-route-map)# exit
Router(config)# route-map buckets permit 20
Router(config-route-map)# match as-path 2
Router(config-route-map)# set traffic-index 2
Router(config-route-map)# exit
Router(config)# route-map buckets permit 80
Router(config-route-map)# set traffic-index 7
Router(config-route-map)# exit
Router(config)# interface GE-WAN9/1
Router(config-int)# ip address 10.0.2.2 255.255.255.0
Router(config-int)# bgp-policy accounting input source
Router(config-int)# no negotiation auto
Router(config-int)# end
```

Related Commands

Command	Description
set ip precedence	Sets the precedence values in the IP header.
set qos-group	Sets a QoS group ID to classify packets.
set traffic-index	Defines where to output packets that pass a match clause of a route map for BGP policy accounting.
show cef interface policy-statistics	Displays detailed CEF policy statistical information for all interfaces.
show ip bgp	Displays entries in the BGP routing table.
show ip cef	Displays entries in the FIB or FIB summary information.
show ip interface	Displays the usability status of interfaces.
table-map	Classifies routes according to a route map.