



Configure BGP Graceful Shutdown

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Feature history for BGP graceful shutdown

This table provides release and related information for the features explained in this module.

These features are available in all the releases subsequent to the one they were introduced in, unless noted otherwise.

Release	Feature Name and Description	Supported Platform
Cisco IOS XE 26.2.1ea	BGP Graceful Shutdown: BGP Graceful Shutdown feature support has been introduced.	Cisco C9550 Series Smart Switches
Cisco IOS XE 17.18.1	BGP Graceful Shutdown: The BGP Graceful Shutdown feature reduces or eliminates the loss of inbound or outbound traffic flows that were initially forwarded along the peering link that is being shut down for maintenance.	Cisco C9350 Series Smart Switches Cisco C9610 Series Smart Switches

Use the Cisco Feature Navigator to find information about platform and software image support. To access Cisco Feature Navigator, go to <https://cfnnng.cisco.com/>.

Information about BGP graceful shutdown

This sections provide information about BGP graceful shutdown.

BGP graceful shutdown benefits

BGP graceful shutdown benefits are network advantages that

- reduce or eliminate the loss of inbound or outbound traffic flows during planned BGP session shutdowns
- minimize traffic loss during the planned shutdown and subsequent reestablishment of sessions, and
- provide fewer lost packets and less time spent reconfiguring devices.

Graceful shutdown operation

There are times when planned maintenance operations cause routing changes in BGP. After the shutdown of eBGP and iBGP peering sessions between autonomous system border routers (ASBRs), BGP devices are temporarily unreachable during BGP convergence. The goal of gracefully shutting down one or more BGP sessions is to minimize traffic loss during the planned shutdown and subsequent reestablishment of the sessions.

The BGP Graceful Shutdown feature reduces or eliminates the loss of inbound or outbound traffic flows that were initially forwarded along the peering link that is being shut down for maintenance. This feature is primarily for PE-CE, PE-RR and PE-PE links. Lowering the local preference for paths that are received over the session being shutdown renders the affected paths less preferred by the BGP decision process, but still allows the paths to be used during the convergence while alternative paths are propagated to the affected devices. Therefore, devices always have a valid route available during the convergence process.

The feature also allows vendors to provide a graceful shutdown mechanism that does not require any router reconfiguration at maintenance time.

GSHUT community

A GSHUT community is a well-known community attribute that

- is applied to a neighbor to gracefully shut down the link in an expected number of seconds
- is used in conjunction with the BGP Graceful Shutdown feature, and
- is always sent by the GSHUT initiator.

GSHUT community usage

The GSHUT community attribute is applied to a neighbor specified by the **neighbor shutdown graceful** command.

The GSHUT community is specified in a community list, which is referenced by a route map and then used to make policy routing decisions.

The GSHUT community can also be used in the **show ip BGP community** command to limit output to GSHUT routes.

Configure BGP GSHUT enhancement

Configure BGP GSHUT enhancement to enable graceful shutdown functionality for BGP sessions, allowing for controlled network maintenance operations.

Use this feature when you need to perform maintenance on BGP routers while minimizing traffic disruption. The BGP GSHUT enhancement provides a mechanism to gracefully shutdown BGP sessions with specific timing and community attributes.

Procedure

-
- Step 1** **enable**
- Example:**
- ```
Device>enable
```
- Enables privileged EXEC mode.
- Enter your password if prompted.
- Step 2**     **configure terminal**
- Example:**
- ```
Device#configure terminal
```
- Enters global configuration mode.
- Step 3** **router BGP** *autonomous-system-number*
- Example:**
- ```
Device(config)#router bgp 65000
```
- Enters router configuration mode to create or configure a BGP routing process.
- Step 4**     **BGP graceful-shutdown all** {**neighbors** | **vrf**s} *shutdown-time* {**community** *community-value* [**local-preference** *local-pref-value*] | **local-preference** *local-pref-value* [**community** *community-value*]}
- Example:**
- ```
Device(config-router)#bgp graceful-shutdown all neighbors 180 local-preference 20 community 10
```
- Enables the BGP GSHUT enhancement feature on the device.
- Step 5** **BGP graceful-shutdown all** {**neighbors** | **vrf**s} **activate**
- Example:**
- ```
Device(config-router)#bgp graceful-shutdown all neighbors activate
```
- Activates graceful shutdown across all neighbors or only across VRF neighbors for BGP sessions.
- Step 6**     **end**
- Example:**
- ```
Device(config-router)#end
```
- Returns to privileged EXEC mode.
- Step 7** **show ip BGP**

Example:

```
Device#show ip bgp neighbors 10.2.2.2 | include shutdown
```

Displays entries in the BGP routing table.

Step 8 show running-config**Example:**

```
Device#show running-config | session router bgp
```

Displays running configuration on the device.

BGP GSHUT enhancement is now configured and activated. The graceful shutdown functionality is enabled for BGP sessions with the specified timing and community attributes.

Configure BGP graceful shutdown

BGP graceful shutdown provides configurational capabilities for managing BGP session termination.

Summary

BGP graceful shutdown allows network administrators to manage BGP session termination in a controlled fashion, reducing disruption and ensuring seamless rerouting during maintenance or shutdown procedures.

The key components involved in the process are:

- Network administrator: Initiates and manages the BGP graceful shutdown configuration process.
- BGP router: Receives and applies the graceful shutdown configuration settings.

Workflow

The process involves the following stages:

1. The network administrator accesses the BGP router configuration interface.
2. The administrator applies the graceful shutdown settings on the router.
3. The BGP router recognizes the graceful shutdown configuration and signals its peers accordingly.

Result

The BGP session terminates in a controlled manner, allowing neighboring routers to reroute traffic and minimize service interruption during maintenance or shutdown.

Shut down a BGP link gracefully

This task allows you to gracefully shut down a BGP link, providing time for iBGP peers to converge and choose an alternate path before the connection is terminated.

Use this procedure when you need to shut down a BGP link in a controlled manner that minimizes network disruption by allowing proper route convergence.

Before you begin

Follow these steps to shut down a BGP link gracefully:

Procedure

Step 1 enable

Example:

```
Device>enable
```

Enables privileged EXEC mode.

Enter your password if prompted.

Step 2 configure terminal

Example:

```
Device#configure terminal
```

Enters global configuration mode.

Step 3 router BGP *autonomous-system-number*

Example:

```
Device(config)#router bgp 5000
```

Configures a BGP routing process.

Step 4 neighbor {*ipv4-address* | *ipv6-address*} remote-AS *number*

Example:

```
Device(config-router)#neighbor 2001:db8:3::1 remote-as 5500
```

Configures the autonomous system (AS) to which the neighbor belongs.

Step 5 neighbor {*ipv4-address* | *ipv6-address* | *peer-group-name*} SHUTDOWN graceful *seconds* {*community value* [*local-preference value*] | *local-preference value*}

Example:

```
Device(config-router)#neighbor 2001:db8:3::1 shutdown graceful 600 community 1200 local-preference 300
```

Configures the device to gracefully shut down the link to the specified peer in the specified number of seconds; advertises the route with the GSHUT (Graceful SHUTDOWN) community; and advertises the route with another community or specifies a local preference value for the route, or both.

- Make sure to specify an adequate amount of time for iBGP peers to converge and to choose an alternate path AS the best path.
- If the **graceful** keyword is used in the **neighbor SHUTDOWN** command, at least one of the two attributes (a community or local preference) must be configured. You may configure both attributes.
- If the **graceful** keyword is used in the **neighbor SHUTDOWN** command, the route is advertised with the GSHUT community by default. You may also set one other community for policy routing purposes.

- In this particular example, the route to the neighbor is configured to shut down in 600 seconds, is advertised with the GSHUT community and community 1200, and is configured with a local preference of 300.
- The device receiving the advertisement looks at the community value(s) of the route and optionally uses the community value to apply routing policy. Filtering routes based on a community is done with the **ip community-list** command and a route map.
- During the graceful SHUTDOWN, the **neighbor SHUTDOWN** command is not nvgened. After the timer expires, SHUTDOWN is nvgened.

Step 6 **end****Example:**

```
Device(config-router)#end
```

Returns to EXEC mode.

Step 7 **show ip BGP community GSHUT****Example:**

```
Device#show ip bgp community gshut
```

(Optional) Displays information about the routes that are advertised with the well-known GSHUT community.

The BGP link is configured for graceful SHUTDOWN with the specified timer, community values, and local preference settings. The link will shut down gracefully after the configured time period, allowing iBGP peers to converge on alternate paths.

Filter BGP routes based on the GSHUT community

Filter BGP routes that have the GSHUT community to control route acceptance from peers during graceful shutdown scenarios.

Perform this task on a BGP peer to the device where you enabled the BGP Graceful Shutdown feature.

Before you begin

Follow these steps to filter BGP routes based on the GSHUT community:

Procedure**Step 1** **enable****Example:**

```
Device>enable
```

Enables privileged EXEC mode.

Enter your password if prompted.

Step 2 **configure terminal****Example:**

```
Device#configure terminal
```

Enters global configuration mode.

Step 3 **router BGP** *autonomous-system-number*

Example:

```
Device(config)#router bgp 2000
```

Configures a BGP routing process.

Step 4 **neighbor** {*ipv4-address* | *ipv6-address*} **remote-AS** *number*

Example:

```
Device(config-router)#neighbor 2001:db8:4::1 remote-as 1000
```

Configures the autonomous system (AS) to which the neighbor belongs.

Step 5 **neighbor** {*ipv4-address* | *ipv6-address*} **activate**

Example:

```
Device(config-router)#neighbor 2001:db8:4::1 activate
```

Activates the neighbor.

Step 6 **neighbor** {*ipv4-address* | *ipv6-address*} **send-community**

Example:

```
Device(config-router)#neighbor 2001:db8:4::1 send-community
```

Enables BGP community exchange with the neighbor.

Step 7 **exit**

Example:

```
Device(config-router)#exit
```

Exits router configuration mode.

Step 8 **route-map** *map-tag* [**permit** | **deny**] [*sequence-number*]

Example:

```
Device(config)#route-map RM_GSHUT deny 10
```

Configures a route map to permit or deny routes for policy routing.

Step 9 **match community** {*standard-list-number* | *expanded-list-number* | *community-list-name* [**exact**]}

Example:

```
Device(config-route-map)#match community GSHUT
```

Configures that the routes that match ip community-list GSHUT will be policy routed.

Step 10 **exit**

Example:

```
Device(config-route-map)#exit
```

Exits route-map configuration mode.

Step 11 **ip community-list** {*standard* | *standard list-name*} {**deny** | **permit**} **GSHUT**

Example:

```
Device(config)#ip community-list standard GSHUT permit gshut
```

Configures a community list AND permits or denies routes that have the GSHUT community to the community list.

If you specify other communities in the same statement, there is a logical AND operation AND all communities in the statement must match the communities for the route in order for the statement to be processed.

Step 12 **router BGP** *autonomous-system-number***Example:**

```
Device(config)#router bgp 2000
```

Configures a BGP routing process.

Step 13 **neighbor address route-map** *map-name in***Example:**

```
Device(config)#neighbor 2001:db8:4::1 route-map RM_GSHUT in
```

Applies the route map to incoming routes from the specified neighbor.

In this example, the route map that is named RM_GSHUT denies routes from the specified neighbor that have the GSHUT community.

The route map is configured to deny incoming BGP routes that have the GSHUT community from the specified neighbor, effectively filtering them from the routing table.

Configure BGP GSHUT enhancement

Configure BGP GSHUT enhancement to enable graceful shutdown functionality for BGP sessions, allowing for controlled network maintenance operations.

Use this feature when you need to perform maintenance on BGP routers while minimizing traffic disruption. The BGP GSHUT enhancement provides a mechanism to gracefully shutdown BGP sessions with specific timing and community attributes.

Procedure

Step 1 **enable****Example:**

```
Device>enable
```

Enables privileged EXEC mode.

Enter your password if prompted.

Step 2 **configure terminal****Example:**

```
Device#configure terminal
```


Enters global configuration mode.

Step 3 **router BGP** *autonomous-system-number*

Example:

```
Device(config)#router bgp 65000
```

Enters router configuration mode to create or configure a BGP routing process.

Step 4 **BGP graceful-shutdown all** {neighbors | vrfs} shutdown-time {community community-value [local-preference local-pref-value] | local-preference local-pref-value [community community-value]}

Example:

```
Device(config-router)#bgp graceful-shutdown all neighbors 180 local-preference 20 community 10
```

Enables the BGP GSHUT enhancement feature on the device.

Step 5 **BGP graceful-shutdown all** {neighbors | vrfs} activate

Example:

```
Device(config-router)#bgp graceful-shutdown all neighbors activate
```

Activates graceful shutdown across all neighbors or only across VRF neighbors for BGP sessions.

Step 6 **end**

Example:

```
Device(config-router)#end
```

Returns to privileged EXEC mode.

Step 7 **show ip BGP**

Example:

```
Device#show ip bgp neighbors 10.2.2.2 | include shutdown
```

Displays entries in the BGP routing table.

Step 8 **show running-config**

Example:

```
Device#show running-config | session router bgp
```

Displays running configuration on the device.

BGP GSHUT enhancement is now configured and activated. The graceful shutdown functionality is enabled for BGP sessions with the specified timing and community attributes.

Configuration examples for BGP graceful shutdown

These sections provide configuration examples for BGP graceful shutdown.

Example: shut down a BGP link gracefully

This reference provides examples for shutting down a BGP link gracefully.

Graceful shutdown while setting a local-preference

This example gracefully shuts down the link to the specified neighbor in 600 seconds, adds the GSHUT community to the route, and sets a local preference of 500 for the route.

```
router bgp 1000
neighbor 2001:db8:5::1 remote-as 2000
neighbor 2001:db8:5::1 shutdown graceful 600 local-preference 500
neighbor 2001:db8:5::1 send-community
exit
```

Graceful shutdown while setting an additional community

This example gracefully shuts down the link to the specified neighbor in 600 seconds, and adds the GSHUT community and numbered community to the route.

```
router bgp 1000
neighbor 2001:db8:5::1 remote-as 2000
neighbor 2001:db8:5::1 shutdown graceful 600 community 1400
neighbor 2001:db8:5::1 send-community
exit
```

Graceful shutdown while setting an additional community and local-preference

This example gracefully shuts down the link to the specified neighbor in 600 seconds, adds the GSHUT community and the numbered community to the route, and sets a local preference of 500 to the route.

```
router bgp 1000
neighbor 2001:db8:5::1 remote-as 2000
neighbor 2001:db8:5::1 shutdown graceful 600 community 1400 local-preference 500
neighbor 2001:db8:5::1 send-community
exit
```

Filter BGP routes based on the GSHUT community

Filter routes with the GSHUT community from getting into the BGP routing table using a community list and route map configuration.

In addition to being able to gracefully shut down a BGP route, another use of the GSHUT community is to configure a community list to filter routes with this community from getting into the BGP routing table.

This configuration uses a route map that denies routes based on a standard community list containing routes with the GSHUT community. The route map is then applied to incoming routes from a specific neighbor.

Procedure

Step 1 Configure the BGP router process and neighbor settings.

Example:

```
Device(config)#router bgp 2000
Device(config-router)#neighbor 2001:db8:4::1 remote-as 1000
Device(config-router)#neighbor 2001:db8:4::1 activate
Device(config-router)#neighbor 2001:db8:4::1 send-community
Device(config-router)#exit
```

Step 2 Create a route map that denies routes based on the community list.

Example:

```
Device(config)#route-map RM_GSHUT deny 10
Device(config-route-map)#match community GSHUT
Device(config-route-map)#exit
```

Step 3 Create a standard community list for the GSHUT community.

Example:

```
Device(config)#ip community-list standard GSHUT permit gshut
```

Step 4 Apply the route map to incoming routes from the neighbor.

Example:

```
Device(config)#router bgp 2000
Device(config)#neighbor 2001:db8:4::1 route-map RM_GSHUT in
```

The route map RM_GSHUT filters incoming BGP routes from neighbor 2001:db8:4::1, denying routes that contain the GSHUT community from entering the BGP routing table.

Configure BGP GSHUT enhancement

Enable and activate the BGP GSHUT enhancement feature to configure neighbors for graceful shutdown within a specified time duration.

The BGP GSHUT enhancement allows you to gracefully shutdown BGP neighbors with specific parameters such as local preference and community values. This example demonstrates configuration for multiple neighbor types including IPv4 and VRF neighbors.

Procedure

Step 1 Enable privileged EXEC mode and enter global configuration mode.

Example:

```
Device>enable
Device#configure terminal
```

Step 2 Configure BGP router mode and enable graceful shutdown for all neighbors.

Example:

```
Device(config)#router bgp 65000
Device(config-router)#bgp graceful-shutdown all neighbors 180 local-preference 20 community 10
Device(config-router)#bgp graceful-shutdown all neighbors activate
Device(config-router)#end
```

In this configuration, neighbors are set to gracefully shutdown within 180 seconds with local-preference set to 20 and community value set to 10.

Step 3 Verify the graceful shutdown configuration for specific neighbors.

Example:

```
Device#show ip bgp neighbors 10.2.2.2 | include shutdown
```

```
Graceful Shutdown Timer running, schedule to reset the peer in 00:02:47 seconds
Graceful Shutdown Localpref set to 20
Graceful Shutdown Community set to 10
```

```
Device#show ip bgp neighbors 172.16.2.1 | include shutdown
```

```
Graceful Shutdown Timer running, schedule to reset the peer in 00:02:38 seconds
Graceful Shutdown Localpref set to 20
Graceful Shutdown Community set to 10
```

```
Device#show ip bgp vpnv4 vrf v1 neighbors 192.168.1.1 | include shutdown
```

```
Graceful Shutdown Timer running, schedule to reset the peer in 00:01:45 seconds
Graceful Shutdown Localpref set to 20
Graceful Shutdown Community set to 10
```

This example shows two IPv4 neighbors configured with IP addresses 10.2.2.2 and 172.16.2.1, and one VRF neighbor tagged v1 with IP address 192.168.1.1.

Step 4 Display the running configuration to verify BGP session information.

Example:

```
Device#show running-config | session router bgp
```

```
router bgp 65000
bgp log-neighbor-changes
bgp graceful-shutdown all neighbors 180 local-preference 20 community 10
network 10.1.1.0 mask 255.255.255.0
neighbor 10.2.2.2 remote-as 40
neighbor 10.2.2.2 shutdown
neighbor 172.16.2.1 remote-as 10
neighbor 172.16.2.1 shutdown
!
address-family vpnv4
```

```
neighbor 172.16.2.1 activate
neighbor 172.16.2.1 send-community both
exit-address-family
!
address-family ipv4 vrf v1
neighbor 192.168.1.1 remote-as 30
neighbor 192.168.1.1 shutdown
neighbor 192.168.1.1 activate
neighbor 192.168.1.1 send-community both
exit-address-family
```

The BGP GSHUT enhancement is successfully configured and activated. Neighbors will gracefully shutdown within the specified 180-second duration with the configured local preference and community values. The configuration can be verified using the show commands to display graceful shutdown timers and running configuration details.

Additional references

This reference provides additional documentation and standards related to BGP graceful shutdown implementation.

Related documents

Related Topic	Document Title
BGP commands	<i>Cisco IOS IP Routing: BGP Command Reference</i>

Standards and RFCs

Standard/RFC	Title
RFC 6198	<i>Requirements for the Graceful Shutdown of BGP Sessions</i>

