BGP Graceful Shutdown

The BGP Graceful Shutdown feature reduces or eliminates the loss of traffic along a link being shut down for maintenance. Routers always have a valid route available during the convergence process. This feature is used primarily for maintenance on a link between a Provider Edge (PE), PE-PE, PE-Route Reflector (RR), PE-Customer Edge (CE) and CE.

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• How to Configure BGP Graceful Shutdown, page 2
• Configuration Examples for BGP Graceful Shutdown, page 8
• Additional References, page 10
• Feature Information for BGP Graceful Shutdown, page 11

Finding Feature Information

Your software release may not support all the features documented in this module. For the latest caveats and feature information, see Bug Search Tool and the release notes for your platform and software release. To find information about the features documented in this module, and to see a list of the releases in which each feature is supported, see the feature information table at the end of this module.

Use Cisco Feature Navigator to find information about platform support and Cisco software image support. To access Cisco Feature Navigator, go to www.cisco.com/go/cfn. An account on Cisco.com is not required.

Information About BGP Graceful Shutdown

Purpose and Benefits of BGP Graceful Shutdown

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 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. The benefits of the BGP Graceful Shutdown feature are fewer lost packets
and less time spent reconfiguring devices.

GSHUT Community

The GSHUT community is a well-known community used in conjunction with the BGP Graceful Shutdown
feature. The GSHUT community attribute is applied to a neighbor specified by the `neighbor shutdown
general` command, thereby gracefully shutting down the link in an expected number of seconds. The GSHUT
community is always sent by the GSHUT initiator.

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.

BGP GSHUT Enhancement

The BGP Graceful Shutdown (GSHUT) Enhancement feature enables graceful shutdown of either all neighbors
or only virtual routing and forwarding (VRF) neighbors across BGP sessions. To enable the BGP GSHUT
enhancement feature on the device, you must configure either the `community` keyword or the `local-preference`
keyword in the `bgp graceful-shutdown all` command. Use the `activate` keyword to activate graceful shutdown
either across all neighbors or only across all VRF neighbors, across all BGP sessions.

How to Configure BGP Graceful Shutdown

Shutting Down a BGP Link Gracefully

**SUMMARY STEPS**

1. enable
2. configure terminal
3. router bgp autonomous-system-number
4. neighbor {ipv4-address | ipv6-address} remote-as number
5. neighbor {ipv4-address | ipv6-address | peer-group-name} shutdown graceful seconds {community
value [local-preference value] | local-preference value}
6. end
7. show ip bgp community gshut
## DETAILED STEPS

<table>
<thead>
<tr>
<th>Command or Action</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Step 1</strong> enable</td>
<td>Enables privileged EXEC mode.</td>
</tr>
<tr>
<td><strong>Example:</strong> Device&gt; enable</td>
<td></td>
</tr>
<tr>
<td>• Enter your password if prompted.</td>
<td></td>
</tr>
<tr>
<td><strong>Step 2</strong> configure terminal</td>
<td>Enters global configuration mode.</td>
</tr>
<tr>
<td><strong>Example:</strong> Device# configure terminal</td>
<td></td>
</tr>
<tr>
<td><strong>Step 3</strong> router bgp autonomous-system-number</td>
<td>Configures a BGP routing process.</td>
</tr>
<tr>
<td><strong>Example:</strong> Device(config)# router bgp 5000</td>
<td></td>
</tr>
<tr>
<td><strong>Step 4</strong> neighbor {ipv4-address</td>
<td>ipv6-address} remote-as number</td>
</tr>
<tr>
<td><strong>Example:</strong> Device(config-router)# neighbor 2001:db8:3::1 remote-as 5500</td>
<td></td>
</tr>
<tr>
<td><strong>Step 5</strong> neighbor {ipv4-address</td>
<td>ipv6-address</td>
</tr>
<tr>
<td><strong>Example:</strong> Device(config-router)# neighbor 2001:db8:3::1 shutdown graceful 600 community 1200 local-preference 300</td>
<td></td>
</tr>
</tbody>
</table>

- 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...
Filtering BGP Routes Based on the GSHUT Community

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

**SUMMARY STEPS**

1. enable
2. configure terminal
3. router bgp autonomous-system-number
4. neighbor {ipv4-address | ipv6-address} remote-as number
5. neighbor {ipv4-address | ipv6-address} activate
6. neighbor {ipv4-address | ipv6-address} send-community
7. exit
8. route-map map-tag [permit | deny] [sequence-number]
9. match community {standard-list-number | expanded-list-number | community-list-name [exact]}
10. exit
11. ip community-list {standard | standard list-name} {deny | permit} gshut
12. router bgp autonomous-system-number
13. neighbor address route-map map-name in
### DETAILED STEPS

<table>
<thead>
<tr>
<th>Command or Action</th>
<th>Purpose</th>
</tr>
</thead>
</table>
| **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 RK_GSHUT deny 10 | Configures a route map to permit or deny routes for policy routing. |
<table>
<thead>
<tr>
<th>Command or Action</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Step 9</strong></td>
<td><strong>match community</strong> `{standard-list-number</td>
</tr>
<tr>
<td><strong>Example:</strong></td>
<td>Device(config-route-map)# match community GSHUT</td>
</tr>
<tr>
<td><strong>Step 10</strong></td>
<td><strong>exit</strong></td>
</tr>
<tr>
<td><strong>Example:</strong></td>
<td>Device(config-route-map)# exit</td>
</tr>
<tr>
<td><strong>Step 11</strong></td>
<td><strong>ip community-list</strong> `{standard</td>
</tr>
<tr>
<td><strong>Example:</strong></td>
<td>Device(config)# ip community-list standard GSHUT permit gshut</td>
</tr>
<tr>
<td><strong>Step 12</strong></td>
<td><strong>router bgp</strong> <code>autonomous-system-number</code></td>
</tr>
<tr>
<td><strong>Example:</strong></td>
<td>Device(config)# router bgp 2000</td>
</tr>
<tr>
<td><strong>Step 13</strong></td>
<td><strong>neighbor</strong> <code>address route-map map-name in</code></td>
</tr>
<tr>
<td><strong>Example:</strong></td>
<td>Device(config)# neighbor 2001:db8:4::1 route-map RM_GSHUT in</td>
</tr>
<tr>
<td><strong>•</strong></td>
<td>In this example, the route map named RM_GSHUT denies routes from the specified neighbor that have the GSHUT community.</td>
</tr>
</tbody>
</table>
# Configuring BGP GSHUT Enhancement

## SUMMARY STEPS

1. `enable`
2. `configure terminal`
3. `router bgp autonomous-system-number`
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]}`
5. `bgp graceful-shutdown all {neighbors | vrfs} activate`
6. `end`
7. `show ip bgp`
8. `show running-config`

## DETAILED STEPS

<table>
<thead>
<tr>
<th>Command or Action</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Step 1</strong></td>
<td>Enables privileged EXEC mode.</td>
</tr>
<tr>
<td><code>enable</code></td>
<td>- Enter your password if prompted.</td>
</tr>
<tr>
<td><strong>Example:</strong></td>
<td>Device&gt; enable</td>
</tr>
<tr>
<td><strong>Step 2</strong></td>
<td>Enters global configuration mode.</td>
</tr>
<tr>
<td><code>configure terminal</code></td>
<td></td>
</tr>
<tr>
<td><strong>Example:</strong></td>
<td>Device# configure terminal</td>
</tr>
<tr>
<td><strong>Step 3</strong></td>
<td>Enters router configuration mode to create or configure a BGP routing process.</td>
</tr>
<tr>
<td><code>router bgp autonomous-system-number</code></td>
<td></td>
</tr>
<tr>
<td><strong>Example:</strong></td>
<td>Device(config)# router bgp 65000</td>
</tr>
<tr>
<td><strong>Step 4</strong></td>
<td>Enables the BGP GSHUT enhancement feature on the device.</td>
</tr>
<tr>
<td>`bgp graceful-shutdown all {neighbors</td>
<td>vrfs} shutdown-time {community community-value [local-preference local-pref-value]</td>
</tr>
<tr>
<td><strong>Example:</strong></td>
<td>Device(config-router)# bgp graceful-shutdown all neighbors 180 local-preference 20 community 10</td>
</tr>
<tr>
<td>Command or Action</td>
<td>Purpose</td>
</tr>
<tr>
<td>-------------------</td>
<td>---------</td>
</tr>
<tr>
<td>Step 5</td>
<td>bgp graceful-shutdown all {neighbors</td>
</tr>
<tr>
<td>Example:</td>
<td>Device(config-router)# bgp graceful-shutdown all neighbors activate</td>
</tr>
<tr>
<td>Step 6</td>
<td>end</td>
</tr>
<tr>
<td>Example:</td>
<td>Device(config-router)# end</td>
</tr>
<tr>
<td>Step 7</td>
<td>show ip bgp</td>
</tr>
<tr>
<td>Example:</td>
<td>Device# show ip bgp neighbors 10.2.2.2</td>
</tr>
<tr>
<td>Step 8</td>
<td>show running-config</td>
</tr>
<tr>
<td>Example:</td>
<td>Device# show running-config</td>
</tr>
</tbody>
</table>

### Configuration Examples for BGP Graceful Shutdown

#### Example: 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
```
Gracious 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.

Example: Filtering BGP Routes Based on the GSHUT Community

In additional 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 example illustrates how to use a community list to filter incoming BGP routes based on the GSHUT community. In this example, a route map named RM_GSHUT denies routes based on a standard community list named GSHUT. The community list contains routes with the GSHUT community. The route map is then applied to incoming routes from the neighbor at 2001:db8:4::1.

Example: BGP GSHUT Enhancement

The following example shows how to enable and activate the BGP GSHUT enhancement feature across all neighbors. In this example, the neighbors are configured to gracefully shutdown within the specified duration of 180 seconds.

Following is sample output from the show ip bgp command, which displays the graceful shutdown time for each neighbor. In this example, there are two IPv4 neighbors configured with IP address 10.2.2.2 and 172.16.2.1 and one VRF neighbor, tagged v1, is configured with IP address 192.168.1.1.
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

Following is sample output from the **show running-config** command, which displays information associated with the BGP session in router configuration mode:

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

---

**Additional References**

**Related Documents**

<table>
<thead>
<tr>
<th>Related Topic</th>
<th>Document Title</th>
</tr>
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<tbody>
<tr>
<td>Cisco IOS commands</td>
<td>Cisco IOS Master Commands List, All Releases</td>
</tr>
<tr>
<td>BGP commands</td>
<td>Cisco IOS IP Routing: BGP Command Reference</td>
</tr>
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</table>

**Standards and RFCs**

<table>
<thead>
<tr>
<th>Standard/RFC</th>
<th>Title</th>
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</thead>
<tbody>
<tr>
<td>RFC 6198</td>
<td>Requirements for the Graceful Shutdown of BGP Sessions</td>
</tr>
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</table>
Technical Assistance

<table>
<thead>
<tr>
<th>Description</th>
<th>Link</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Cisco Support and Documentation website provides online resources to download documentation, software, and tools. Use these resources to install and configure the software and to troubleshoot and resolve technical issues with Cisco products and technologies. Access to most tools on the Cisco Support and Documentation website requires a Cisco.com user ID and password.</td>
<td><a href="http://www.cisco.com/cisco/web/support/index.html">http://www.cisco.com/cisco/web/support/index.html</a></td>
</tr>
</tbody>
</table>

Feature Information for BGP Graceful Shutdown

The following table provides release information about the feature or features described in this module. This table lists only the software release that introduced support for a given feature in a given software release train. Unless noted otherwise, subsequent releases of that software release train also support that feature.

Use Cisco Feature Navigator to find information about platform support and Cisco software image support. To access Cisco Feature Navigator, go to www.cisco.com/go/cfn. An account on Cisco.com is not required.

Table 1: Feature Information for BGP Graceful Shutdown

<table>
<thead>
<tr>
<th>Feature Name</th>
<th>Releases</th>
<th>Feature Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>BGP Graceful Shutdown</td>
<td>Cisco IOS XE Release 3.6S</td>
<td>The BGP Graceful Shutdown feature reduces or eliminates the loss of traffic along a link being shut down for maintenance. Routers always have a valid route available during the convergence process. In Cisco IOS XE Release 3.7S, support was added for the Cisco ASR 903 router. The following commands were modified: ip community-list, neighbor shutdown, show ip bgp community, and show ip bgp vpnv4.</td>
</tr>
<tr>
<td></td>
<td>Cisco IOS XE Release 3.7S</td>
<td></td>
</tr>
</tbody>
</table>
## Feature Information for BGP Graceful Shutdown

<table>
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<tr>
<th>Feature Name</th>
<th>Releases</th>
<th>Feature Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>BGP GSHUT Enhancement</td>
<td>Cisco IOS XE Release 3.11S</td>
<td>The BGP Graceful Shutdown (GSHUT) Enhancement feature enables graceful shutdown of either all neighbors or only virtual routing and forwarding (VRF) neighbors across BGP sessions. The following command was introduced: <code>bgp graceful-shutdown all</code>.</td>
</tr>
</tbody>
</table>