BGP Graceful Restart per Neighbor

The BGP graceful restart feature is already available on a global basis. The BGP Graceful Restart per Neighbor feature allows BGP graceful restart to be enabled or disabled for an individual neighbor, providing greater network flexibility and service.

- Finding Feature Information, on page 1
- Information About BGP Graceful Restart per Neighbor, on page 1
- How to Configure BGP Graceful Restart per Neighbor, on page 2
- Configuration Examples for BGP Graceful Restart per Neighbor, on page 12
- Additional References, on page 14
- Feature Information for BGP Graceful Restart per Neighbor, on page 15

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 Restart per Neighbor

BGP Graceful Restart per Neighbor

The ability to enable or disable BGP graceful restart for every individual BGP neighbor was introduced. Three new methods of configuring BGP graceful restart for BGP peers, in addition to the existing global BGP graceful restart configuration, are now available. Graceful restart can be enabled or disabled for a BGP peer or a BGP peer group using the neighbor ha-mode graceful-restart command, or a BGP peer can inherit a graceful restart configuration from a BGP peer-session template using the ha-mode graceful-restart command.

Although BGP graceful restart is disabled by default, the existing global command enables graceful restart for all BGP neighbors regardless of their capabilities. The ability to enable or disable BGP graceful restart for individual BGP neighbors provides a greater level of control for a network administrator.
When the BGP graceful restart capability is configured for an individual neighbor, each method of configuring graceful restart has the same priority, and the last configuration instance is applied to the neighbor. For example, if global graceful restart is enabled for all BGP neighbors but an individual neighbor is subsequently configured as a member of a peer group for which the graceful restart is disabled, graceful restart is disabled for that neighbor.

The configuration of the restart and stale-path timers is available only with the global `bgp graceful-restart` command, but the default values are set when the `neighbor ha-mode graceful-restart` or `ha-mode graceful-restart` commands are configured. The default values are optimal for most network deployments, and these values should be adjusted only by an experienced network operator.

**BGP Peer Session Templates**

Peer session templates are used to group and apply the configuration of general BGP session commands to groups of neighbors that share session configuration elements. General session commands that are common for neighbors that are configured in different address families can be configured within the same peer session template. Peer session templates are created and configured in peer session configuration mode. Only general session commands can be configured in a peer session template.

General session commands can be configured once in a peer session template and then applied to many neighbors through the direct application of a peer session template or through indirect inheritance from a peer session template. The configuration of peer session templates simplifies the configuration of general session commands that are commonly applied to all neighbors within an autonomous system.

Peer session templates support direct and indirect inheritance. A BGP neighbor can be configured with only one peer session template at a time, and that peer session template can contain only one indirectly inherited peer session template. A BGP neighbor can directly inherit only one session template and can indirectly inherit up to seven additional peer session templates.

Peer session templates support inheritance. A directly applied peer session template can directly or indirectly inherit configurations from up to seven peer session templates. So, a total of eight peer session templates can be applied to a neighbor or neighbor group.

Peer session templates support only general session commands. BGP policy configuration commands that are configured only for a specific address family or NLRI configuration mode are configured with peer policy templates.

To use a BGP peer session template to enable or disable BGP graceful restart, see the “Enabling and Disabling BGP Graceful Restart Using BGP Peer Session Templates” section.

**How to Configure BGP Graceful Restart per Neighbor**

**Enabling BGP Graceful Restart for an Individual BGP Neighbor**

Perform this task on Router B in the figure above to enable BGP graceful restart on the internal BGP peer at Router C in the figure above. Under the IPv4 address family, the neighbor at Router C is identified, and BGP graceful restart is enabled for the neighbor at Router C with the IP address 172.21.1.2. To verify that BGP graceful restart is enabled, the optional `show ip bgp neighbors` command is used.
### SUMMARY STEPS

1. `enable`
2. `configure terminal`
3. `router bgp autonomous-system-number`
4. `address-family ipv4 [unicast | multicast | vrf vrf-name]`
5. `neighbor ip-address remote-as autonomous-system-number`
6. `neighbor ip-address activate`
7. `neighbor ip-address ha-mode graceful-restart [disable]`
8. `end`
9. `show ip bgp neighbors [ip-address [received-routes | routes | advertised-routes | paths [regexp] | dampened-routes | flap-statistics | received prefix-filter | policy [detail]]]`

### DETAILED STEPS

<table>
<thead>
<tr>
<th>Command or Action</th>
<th>Purpose</th>
</tr>
</thead>
</table>
| **Step 1** enable | Enables privileged EXEC mode.  
  * Enter your password if prompted.  
  
  **Example:**  
  Device> enable |
| **Step 2** configure terminal | Enters global configuration mode.  
  
  **Example:**  
  Device# configure terminal |
| **Step 3** router bgp autonomous-system-number | Enters router configuration mode and creates a BGP routing process.  
  
  **Example:**  
  Device(config)# router bgp 45000 |
| **Step 4** address-family ipv4 [unicast | multicast | vrf vrf-name] | Specifies the IPv4 address family and enters address family configuration mode.  
  * The `unicast` keyword specifies the IPv4 unicast address family. By default, the router is placed in address family configuration mode for the IPv4 unicast address family if the `unicast` keyword is not specified.  
  * The `multicast` keyword specifies IPv4 multicast address prefixes.  
  * The `vrf` keyword and `vrf-name` argument specify the name of the VRF instance to associate with subsequent IPv4 address family configuration mode commands.  
  
  **Example:**  
  Device(config-router)# address-family ipv4 unicast |
| **Step 5** neighbor ip-address remote-as autonomous-system-number | Configures peering with a BGP neighbor in the specified autonomous system.  
  * In this example, the BGP peer at 172.21.1.2 is an internal BGP peer because it has the same autonomous system.  
  
  **Example:** |
### Enabling BGP Graceful Restart for an Individual BGP Neighbor

<table>
<thead>
<tr>
<th>Command or Action</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Device(config-router-af)# neighbor 172.21.1.2 remote-as 45000</td>
<td>system number as the router where the BGP configuration is being entered (see Step 3).</td>
</tr>
<tr>
<td><strong>Step 6</strong> neighbor <strong>ip-address</strong> activate</td>
<td>Enables the neighbor to exchange prefixes for the IPv4 address family with the local router.</td>
</tr>
<tr>
<td><strong>Example:</strong></td>
<td>- In this example, the internal BGP peer at 172.21.1.2 is activated.</td>
</tr>
<tr>
<td>Device(config-router-af)# neighbor 172.21.1.2 activate</td>
<td></td>
</tr>
<tr>
<td><strong>Step 7</strong> neighbor <strong>ip-address</strong> ha-mode graceful-restart [disable]</td>
<td>Enables the BGP graceful restart capability for a BGP neighbor.</td>
</tr>
<tr>
<td><strong>Example:</strong></td>
<td>- Use the disable keyword to disable BGP graceful restart capability.</td>
</tr>
<tr>
<td>Device(config-router-af)# neighbor 172.21.1.2 ha-mode graceful-restart</td>
<td>- If you enter this command after the BGP session has been established, you must restart the session in order for the capability to be exchanged with the BGP neighbor.</td>
</tr>
<tr>
<td></td>
<td>- In this example, the BGP graceful restart capability is enabled for the neighbor at 172.21.1.2.</td>
</tr>
<tr>
<td><strong>Step 8</strong> end</td>
<td>Exits address family configuration mode and returns to privileged EXEC mode.</td>
</tr>
<tr>
<td><strong>Example:</strong></td>
<td></td>
</tr>
<tr>
<td>Device(config-router-af)# end</td>
<td></td>
</tr>
<tr>
<td><strong>Step 9</strong> show ip bgp neighbors [<strong>ip-address</strong> [received-routes</td>
<td>routes</td>
</tr>
<tr>
<td><strong>Example:</strong></td>
<td>- “Graceful Restart Capability: advertised” will be displayed for each neighbor that has exchanged graceful restart capabilities with this router.</td>
</tr>
<tr>
<td>Device# show ip bgp neighbors 172.21.1.2</td>
<td>- In this example, the output is filtered to display information about the BGP peer at 172.21.1.2.</td>
</tr>
</tbody>
</table>

**Examples**

The following example shows partial output from the `show ip bgp neighbors` command for the BGP peer at 172.21.1.2. Graceful restart is shown as enabled. Note the default values for the restart and stale-path timers. These timers can be set using only the global `bgp graceful-restart` command.

```
Device# show ip bgp neighbors 172.21.1.2

BGP neighbor is 172.21.1.2, remote AS 45000, internal link
BGP version 4, remote router ID 172.22.1.1
BGP state = Established, up for 00:01:01
Last read 00:00:02, last write 00:00:07, hold time is 180, keepalive intervals
```
Neighbor sessions:
  1 active, is multisession capable
Neighbor capabilities:
  Route refresh: advertised and received(new)
  Address family IPv4 Unicast: advertised and received
  Graceful Restart Capability: advertised
  Multisession Capability: advertised and received

Address tracking is enabled, the RIB does have a route to 172.21.1.2
Connections established 1; dropped 0
Last reset never
Transport(tcp) path-mtu-discovery is enabled
Graceful-Restart is enabled, restart-time 120 seconds, stalepath-time 360 secs
Connection state is ESTAB, I/O status: 1, unread input bytes: 0

**Enabling and Disabling BGP Graceful Restart Using BGP Peer Session Templates**

Perform this task to enable and disable BGP graceful restart for BGP neighbors using peer session templates. In this task, a BGP peer session template is created, and BGP graceful restart is enabled. A second peer session template is created, and this template is configured to disable BGP graceful restart.

In this example, the configuration is performed at Router B in the figure below, and two external BGP neighbors—Router A and Router E—are identified. The first BGP peer at Router A is configured to inherit the first peer session template, which enables BGP graceful restart, whereas the second BGP peer at Router E inherits the second template, which disables BGP graceful restart. Using the optional `show ip bgp neighbors` command, the status of the BGP graceful restart capability is verified for each BGP neighbor configured in this task.

*Figure 1: Network Topology Showing BGP Neighbors*

The restart and stale-path timers can be modified only using the global `bgp graceful-restart` command. The restart and stale-path timers are set to the default values when BGP graceful restart is enabled for BGP neighbors using peer session templates.
A BGP peer cannot inherit from a peer policy or session template and be configured as a peer group member at the same time. BGP templates and BGP peer groups are mutually exclusive.

**SUMMARY STEPS**

1. `enable`
2. `configure terminal`
3. `router bgp autonomous-system-number`
4. `template peer-session session-template-name`
5. `ha-mode graceful-restart [disable]`
6. `exit-peer-session`
7. `template peer-session session-template-name`
8. `ha-mode graceful-restart [disable]`
9. `exit-peer-session`
10. `bgp log-neighbor-changes`
11. `neighbor ip-address remote-as autonomous-system-number`
12. `neighbor ip-address inherit peer-session session-template-number`
13. `neighbor ip-address remote-as autonomous-system-number`
14. `neighbor ip-address inherit peer-session session-template-number`
15. `end`
16. `show ip bgp template peer-session [session-template-number]`
17. `show ip bgp neighbors [ip-address [received-routes | routes | advertised-routes | paths [regexp] | dampened-routes | flap-statistics | received prefix-filter | policy [detail]]]`

**DETAILED STEPS**

<table>
<thead>
<tr>
<th>Step</th>
<th>Command or Action</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td><code>enable</code></td>
<td>Enables privileged EXEC mode.</td>
</tr>
<tr>
<td></td>
<td>Example:</td>
<td>• Enter your password if prompted.</td>
</tr>
<tr>
<td></td>
<td><code>Device&gt; enable</code></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td><code>configure terminal</code></td>
<td>Enters global configuration mode.</td>
</tr>
<tr>
<td></td>
<td>Example:</td>
<td></td>
</tr>
<tr>
<td></td>
<td><code>Device# configure terminal</code></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td><code>router bgp autonomous-system-number</code></td>
<td>Enters router configuration mode and creates a BGP routing process.</td>
</tr>
<tr>
<td></td>
<td>Example:</td>
<td></td>
</tr>
<tr>
<td></td>
<td><code>Device(config)# router bgp 45000</code></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td><code>template peer-session session-template-name</code></td>
<td>Enters session-template configuration mode and creates a peer session template.</td>
</tr>
<tr>
<td></td>
<td>Example:</td>
<td></td>
</tr>
</tbody>
</table>
Purpose

Command or Action

Device(config-router)# template peer-session S1

- In this example, a peer session template named S1 is created.

Step 5

ha-mode graceful-restart [disable]

Example:
Device(config-router-stmp)# ha-mode graceful-restart

Enables the BGP graceful restart capability and BGP NSF awareness.

- Use the disable keyword to disable BGP graceful restart capability.
- If you enter this command after the BGP session has been established, you must restart the session in order for the capability to be exchanged with the BGP neighbor.
- In this example, the BGP graceful restart capability is enabled for the peer session template named S1.

Step 6

exit-peer-session

Example:
Device(config-router-stmp)# exit-peer-session

Exits session-template configuration mode and returns to router configuration mode.

Step 7

template peer-session session-template-name

Example:
Device(config-router)# template peer-session S2

Enters session-template configuration mode and creates a peer session template.

- In this example, a peer session template named S2 is created.

Step 8

ha-mode graceful-restart [disable]

Example:
Device(config-router-stmp)# ha-mode graceful-restart disable

Enables the BGP graceful restart capability and BGP NSF awareness.

- Use the disable keyword to disable BGP graceful restart capability.
- If you enter this command after the BGP session has been established, you must restart the session in order for the capability to be exchanged with the BGP neighbor.
- In this example, the BGP graceful restart capability is disabled for the peer session template named S2.

Step 9

exit-peer-session

Example:
Device(config-router-stmp)# exit-peer-session

Exits session-template configuration mode and returns to router configuration mode.

Step 10

bgp log-neighbor-changes

Example:
Device(config-router)# bgp log-neighbor-changes

Enables logging of BGP neighbor status changes (up or down) and neighbor resets.

- Use this command for troubleshooting network connectivity problems and measuring network.
### BGP Graceful Restart per Neighbor

<table>
<thead>
<tr>
<th>Step</th>
<th>Command or Action</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td><strong>neighbor ip-address remote-as autonomous-system-number</strong></td>
<td>Configures peering with a BGP neighbor in the specified autonomous system.</td>
</tr>
<tr>
<td></td>
<td>Example:</td>
<td>• In this example, the BGP peer at 192.168.1.2 is an external BGP peer because it has a different autonomous system number from the router where the BGP configuration is being entered (see Step 3).</td>
</tr>
<tr>
<td>12</td>
<td><strong>neighbor ip-address inherit peer-session</strong></td>
<td>Inherits a peer session template.</td>
</tr>
<tr>
<td></td>
<td>session-template-number</td>
<td>• In this example, the peer session template named S1 is inherited, and the neighbor inherits the enabling of BGP graceful restart.</td>
</tr>
<tr>
<td>13</td>
<td><strong>neighbor ip-address remote-as autonomous-system-number</strong></td>
<td>Configures peering with a BGP neighbor in the specified autonomous system.</td>
</tr>
<tr>
<td></td>
<td>Example:</td>
<td>• In this example, the BGP peer at 192.168.3.2 is an external BGP peer because it has a different autonomous system number from the router where the BGP configuration is being entered (see Step 3).</td>
</tr>
<tr>
<td>14</td>
<td><strong>neighbor ip-address inherit peer-session</strong></td>
<td>Inherits a peer session-template.</td>
</tr>
<tr>
<td></td>
<td>session-template-number</td>
<td>• In this example, the peer session template named S2 is inherited, and the neighbor inherits the disabling of BGP graceful restart.</td>
</tr>
<tr>
<td>15</td>
<td><strong>end</strong></td>
<td>Exits router configuration mode and enters privileged EXEC mode.</td>
</tr>
<tr>
<td>16</td>
<td><strong>show ip bgp template peer-session</strong></td>
<td>(Optional) Displays locally configured peer session templates.</td>
</tr>
<tr>
<td></td>
<td>[session-template-number]</td>
<td>• The output can be filtered to display a single peer policy template by using the <code>session-template-name</code> argument. This command also supports all standard output modifiers.</td>
</tr>
<tr>
<td>17</td>
<td><strong>show ip bgp neighbors</strong> [ip-address [received-routes</td>
<td>(Optional) Displays information about TCP and BGP connections to neighbors.</td>
</tr>
<tr>
<td></td>
<td>routes</td>
<td>advertised-routes</td>
</tr>
</tbody>
</table>
### Command or Action
- **dampened-routes**  
- **flap-statistics**  
- **received prefix-filter**  
- **policy [detail]]**

### Purpose
- “Graceful Restart Capability: advertised” will be displayed for each neighbor that has exchanged graceful restart capabilities with this router.
- In this example, the output is filtered to display information about the BGP peer at 192.168.1.2.

### Examples

The following example shows partial output from the `show ip bgp neighbors` command for the BGP peer at 192.168.1.2 (Router A in the figure above). Graceful restart is shown as enabled. Note the default values for the restart and stale-path timers. These timers can be set only by using the `bgp graceful-restart` command.

```
Device# show ip bgp neighbors 192.168.1.2
```

```
BGP neighbor is 192.168.1.2, remote AS 40000, external link
Inherits from template S1 for session parameters
BGP version 4, remote router ID 192.168.1.2
BGP state = Established, up for 00:02:11
Last read 00:00:23, last write 00:00:27, hold time is 180, keepalive intervals
Neighbor sessions:
  1 active, is multisession capable
Neighbor capabilities:
  Route refresh: advertised and received(new)
  Address family IPv4 Unicast: advertised and received
  Graceful Restart Capability: advertised
  Multisession Capability: advertised and received
!
Address tracking is enabled, the RIB does have a route to 192.168.1.2
Connections established 1; dropped 0
Last reset never
Transport(tcp) path-mtu-discovery is enabled
Graceful-Restart is enabled, restart-time 120 seconds, stalepath-time 360 secs
Connection state is ESTAB, I/O status: 1, unread input bytes: 0
```

The following example shows partial output from the `show ip bgp neighbors` command for the BGP peer at 192.168.3.2 (Router E in the figure above). Graceful restart is shown as disabled.

```
Device# show ip bgp neighbors 192.168.3.2
```

```
BGP neighbor is 192.168.3.2, remote AS 50000, external link
Inherits from template S2 for session parameters
BGP version 4, remote router ID 192.168.3.2
BGP state = Established, up for 00:01:41
Last read 00:00:45, last write 00:00:45, hold time is 180, keepalive intervals
Neighbor sessions:
  1 active, is multisession capable
Neighbor capabilities:
  Route refresh: advertised and received(new)
  Address family IPv4 Unicast: advertised and received
!
Address tracking is enabled, the RIB does have a route to 192.168.3.2
Connections established 1; dropped 0
Last reset never
Transport(tcp) path-mtu-discovery is enabled
```
Disabling BGP Graceful Restart for a BGP Peer Group

Perform this task to disable BGP graceful restart for a BGP peer group. In this task, a BGP peer group is created and graceful restart is disabled for the peer group. A BGP neighbor, Router D at 172.16.1.2 in the figure above, is then identified and added as a peer group member. It inherits the configuration associated with the peer group, which, in this example, disables BGP graceful restart.

SUMMARY STEPS

1. enable
2. configure terminal
3. router bgp autonomous-system-number
4. address-family ipv4 [unicast | multicast | vrf vrf-name]
5. neighbor peer-group-name peer-group
6. neighbor peer-group-name remote-as autonomous-system-number
7. neighbor peer-group-name ha-mode graceful-restart [disable]
8. neighbor ip-address peer-group peer-group-name
9. end
10. show ip bgp neighbors [ip-address [received-routes | routes | advertised-routes | paths [regexp] | dampened-routes | flap-statistics | received prefix-filter | policy [detail]]]

DETAILED STEPS

<table>
<thead>
<tr>
<th>Step</th>
<th>Command or Action</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1</td>
<td>enable</td>
<td>Enables privileged EXEC mode.</td>
</tr>
<tr>
<td></td>
<td>Example:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Device&gt; enable</td>
<td></td>
</tr>
<tr>
<td>Step 2</td>
<td>configure terminal</td>
<td>Enters global configuration mode.</td>
</tr>
<tr>
<td></td>
<td>Example:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Device# configure terminal</td>
<td></td>
</tr>
<tr>
<td>Step 3</td>
<td>router bgp autonomous-system-number</td>
<td>Enters router configuration mode and creates a BGP routing process.</td>
</tr>
<tr>
<td></td>
<td>Example:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Device(config)# router bgp 45000</td>
<td></td>
</tr>
<tr>
<td>Step 4</td>
<td>address-family ipv4 [unicast</td>
<td>multicast</td>
</tr>
<tr>
<td></td>
<td>Example:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Device(config-router)# address-family ipv4 unicast</td>
<td></td>
</tr>
<tr>
<td>Command or Action</td>
<td>Purpose</td>
<td></td>
</tr>
<tr>
<td>-------------------</td>
<td>---------</td>
<td></td>
</tr>
<tr>
<td></td>
<td>unicast address family if the <strong>unicast</strong> keyword is not specified.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• The <strong>multicast</strong> keyword specifies IPv4 multicast address prefixes.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• The <strong>vrf</strong> keyword and <strong>vrf-name</strong> argument specify the name of the VRF instance to associate with subsequent IPv4 address family configuration mode commands.</td>
<td></td>
</tr>
</tbody>
</table>

**Step 5**

`neighbor peer-group-name peer-group`

**Example:**

```
Device(config-router-af)# neighbor PG1 peer-group
```

Creates a BGP peer group.

• In this example, the peer group named PG1 is created.

**Step 6**

`neighbor peer-group-name remote-as autonomous-system-number`

**Example:**

```
Device(config-router-af)# neighbor PG1 remote-as 45000
```

Configures peering with a BGP peer group in the specified autonomous system.

• In this example, the BGP peer group named PG1 is added to the IPv4 multiprotocol BGP neighbor table of the local router.

**Step 7**

`neighbor peer-group-name ha-mode graceful-restart [disable]`

**Example:**

```
Device(config-router-af)# neighbor PG1 ha-mode graceful-restart disable
```

Enables the BGP graceful restart capability for a BGP neighbor.

• Use the **disable** keyword to disable BGP graceful restart capability.

• If you enter this command after the BGP session has been established, you must restart the session for the capability to be exchanged with the BGP neighbor.

• In this example, the BGP graceful restart capability is disabled for the BGP peer group named PG1.

**Step 8**

`neighbor ip-address peer-group peer-group-name`

**Example:**

```
Device(config-router-af)# neighbor 172.16.1.2 peer-group PG1
```

Assigns the IP address of a BGP neighbor to a peer group.

• In this example, the BGP neighbor peer at 172.16.1.2 is configured as a member of the peer group named PG1.

**Step 9**

`end`

**Example:**

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

Exits address family configuration mode and returns to privileged EXEC mode.

**Step 10**

`show ip bgp neighbors [ip-address [received-routes | routes | advertised-routes | paths [regexp] | dampened-routes | flap-statistics | received prefix-filter | policy [ detail]]]`

(Optional) Displays information about TCP and BGP connections to neighbors.
Purpose

Example:

Device# show ip bgp neighbors 172.16.1.2

- In this example, the output is filtered to display information about the BGP peer at 172.16.1.2 and the “Graceful-Restart is disabled” line shows that the graceful restart capability is disabled for this neighbor.

Examples

The following example shows partial output from the `show ip bgp neighbors` command for the BGP peer at 172.16.1.2. Graceful restart is shown as disabled. Note the default values for the restart and stale-path timers. These timers can be set using only the global `bgp graceful-restart` command.

Device# show ip bgp neighbors 172.16.1.2

BGP neighbor is 172.16.1.2, remote AS 45000, internal link
Member of peer-group PG1 for session parameters
  BGP version 4, remote router ID 0.0.0.0
  BGP state = Idle
  Neighbor sessions:
    0 active, is multisession capable
  !
  Address tracking is enabled, the RIB does have a route to 172.16.1.2
    Connections established 0; dropped 0
    Last reset never
    Transport(tcp) path-mtu-discovery is enabled
    Graceful-Restart is disabled

Configuration Examples for BGP Graceful Restart per Neighbor

Examples: Enabling and Disabling BGP Graceful Restart per Neighbor

The ability to enable or disable the BGP graceful restart capability for an individual BGP neighbor, peer group, or peer session template was introduced. The following example is configured on Router B in the figure below and enables the BGP graceful restart capability for the BGP peer session template named S1 and disables the BGP graceful restart capability for the BGP peer session template named S2. The external BGP neighbor at Router A (192.168.1.2) inherits peer session template S1, and the BGP graceful restart capability is enabled for this neighbor. Another external BGP neighbor at Router E (192.168.3.2) is configured with the BGP graceful restart capability disabled after inheriting peer session template S2.
The BGP graceful restart capability is enabled for an individual internal BGP neighbor, Router C at 172.21.1.2, whereas the BGP graceful restart is disabled for the BGP neighbor at Router D, 172.16.1.2, because it is a member of the peer group PG1. The disabling of BGP graceful restart is configured for all members of the peer group, PG1. The restart and stale-path timers are modified, and the BGP sessions are reset.

```
router bgp 45000
    template peer-session S1
        remote-as 40000
        ha-mode graceful-restart
    exit-peer-session
    template peer-session S2
        remote-as 50000
        ha-mode graceful-restart disable
    exit-peer-session
    bgp log-neighbor-changes
    bgp graceful-restart restart-time 150
    bgp graceful-restart stalepath-time 400
    address-family ipv4 unicast
    neighbor PG1 peer-group
    neighbor PG1 remote-as 45000
    neighbor PG1 ha-mode graceful-restart disable
    neighbor 172.16.1.2 peer-group PG1
    neighbor 172.21.1.2 remote-as 45000
    neighbor 172.21.1.2 activate
    neighbor 172.21.1.2 ha-mode graceful-restart
    neighbor 192.168.1.2 remote-as 40000
    neighbor 192.168.1.2 inherit peer-session S1
    neighbor 192.168.3.2 remote-as 50000
    neighbor 192.168.3.2 inherit peer-session S2
end

clear ip bgp *
```

To demonstrate how the last configuration instance of the BGP graceful restart capability is applied, the following example initially enables the BGP graceful restart capability globally for all BGP neighbors. A BGP peer group, PG2, is configured with the BGP graceful restart capability disabled. An individual external BGP neighbor, Router A at 192.168.1.2 in the figure above, is then configured to be a member of the peer
group, PG2. The last graceful restart configuration instance is applied, and, in this case, the neighbor, 192.168.1.2, inherits the configuration instance from the peer group PG2, and the BGP graceful restart capability is disabled for this neighbor.

router bgp 45000
  bgp log-neighbor-changes
  bgp graceful-restart
  address-family ipv4 unicast
  neighbor PG2 peer-group
  neighbor PG2 remote-as 40000
  neighbor PG2 ha-mode graceful-restart disable
  neighbor 192.168.1.2 peer-group PG2
end
clear ip bgp *

Additional References

Related Documents

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

Standards and RFCs

<table>
<thead>
<tr>
<th>Standard/RFC</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>RFC 4724</td>
<td>Graceful Restart Mechanism for BGP</td>
</tr>
</tbody>
</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</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>
<tr>
<td>download documentation, software, and tools. Use these resources to install</td>
<td></td>
</tr>
<tr>
<td>and configure the software and to troubleshoot and resolve technical</td>
<td></td>
</tr>
<tr>
<td>issues with Cisco products and technologies. Access to most tools on the</td>
<td></td>
</tr>
<tr>
<td>Cisco Support and Documentation website requires a Cisco.com user ID and</td>
<td></td>
</tr>
<tr>
<td>password.</td>
<td></td>
</tr>
</tbody>
</table>
Feature Information for BGP Graceful Restart per Neighbor

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 http://www.cisco.com/go/cfn. An account on Cisco.com is not required.

Table 1: Feature Information for BGP Graceful Restart per Neighbor

<table>
<thead>
<tr>
<th>Feature Name</th>
<th>Releases</th>
<th>Feature Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>BGP Graceful Restart per Neighbor</td>
<td>12.2(33)SRC</td>
<td>The BGP Graceful Restart per Neighbor feature enables or disables the BGP graceful restart capability for an individual BGP neighbor, including using peer session templates and BGP peer groups.</td>
</tr>
<tr>
<td></td>
<td>12.2(33)SB</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cisco IOS XE 3.8S</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>In Cisco IOS Release 12.2(33)SB, platform support includes the Cisco 10000 series routers.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The following commands were introduced by this feature: <strong>ha-mode graceful-restart</strong>, and <strong>neighbor ha-mode graceful-restart</strong>.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The following command was modified by this feature: <strong>show ip bgp neighbors</strong>.</td>
</tr>
</tbody>
</table>