



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.

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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** [*regex*] | **dampened-routes** | **flap-statistics** | **received prefix-filter** | **policy** [**detail**]]]

DETAILED STEPS

| | Command or Action | Purpose |
|--------|---|--|
| Step 1 | enable Example: <pre>Device> enable</pre> | Enables privileged EXEC mode. <ul style="list-style-type: none"> • Enter your password if prompted. |
| Step 2 | configure terminal Example: <pre>Device# configure terminal</pre> | Enters global configuration mode. |
| Step 3 | router bgp <i>autonomous-system-number</i> Example: <pre>Device(config)# router bgp 45000</pre> | Enters router configuration mode and creates a BGP routing process. |
| Step 4 | address-family ipv4 [unicast multicast vrf <i>vrf-name</i>] Example: <pre>Device(config-router)# address-family ipv4 unicast</pre> | Specifies the IPv4 address family and enters address family configuration mode. <ul style="list-style-type: none"> • 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 <i>vrf-name</i> argument specify the name of the VRF instance to associate with subsequent IPv4 address family configuration mode commands. |
| Step 5 | neighbor <i>ip-address</i> remote-as <i>autonomous-system-number</i> Example: <pre>Device(config-router-af)# neighbor 172.21.1.2 remote-as 45000</pre> | Configures peering with a BGP neighbor in the specified autonomous system. <ul style="list-style-type: none"> • In this example, the BGP peer at 172.21.1.2 is an internal BGP peer because it has the same autonomous system number as the router where the BGP configuration is being entered (see Step 3). |
| Step 6 | neighbor <i>ip-address</i> activate Example: <pre>Device(config-router-af)# neighbor 172.21.1.2 activate</pre> | Enables the neighbor to exchange prefixes for the IPv4 address family with the local router. <ul style="list-style-type: none"> • In this example, the internal BGP peer at 172.21.1.2 is activated. |
| Step 7 | neighbor <i>ip-address</i> ha-mode graceful-restart [disable] Example: | Enables the BGP graceful restart capability for a BGP neighbor. <ul style="list-style-type: none"> • Use the disable keyword to disable BGP graceful restart capability. |

| | Command or Action | Purpose |
|---------------|--|--|
| | Device(config-router-af)# neighbor 172.21.1.2 ha-mode graceful-restart | <ul style="list-style-type: none"> 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 neighbor at 172.21.1.2. |
| Step 8 | end Example: Device(config-router-af)# end | Exits address family configuration mode and returns to privileged EXEC mode. |
| Step 9 | show ip bgp neighbors [<i>ip-address</i> [received-routes routes advertised-routes paths [<i>regexp</i>] dampened-routes flap-statistics received prefix-filter policy [detail]]] Example: Device# show ip bgp neighbors 172.21.1.2 | (Optional) Displays information about TCP and BGP connections to neighbors. <ul style="list-style-type: none"> “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 172.21.1.2. |

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

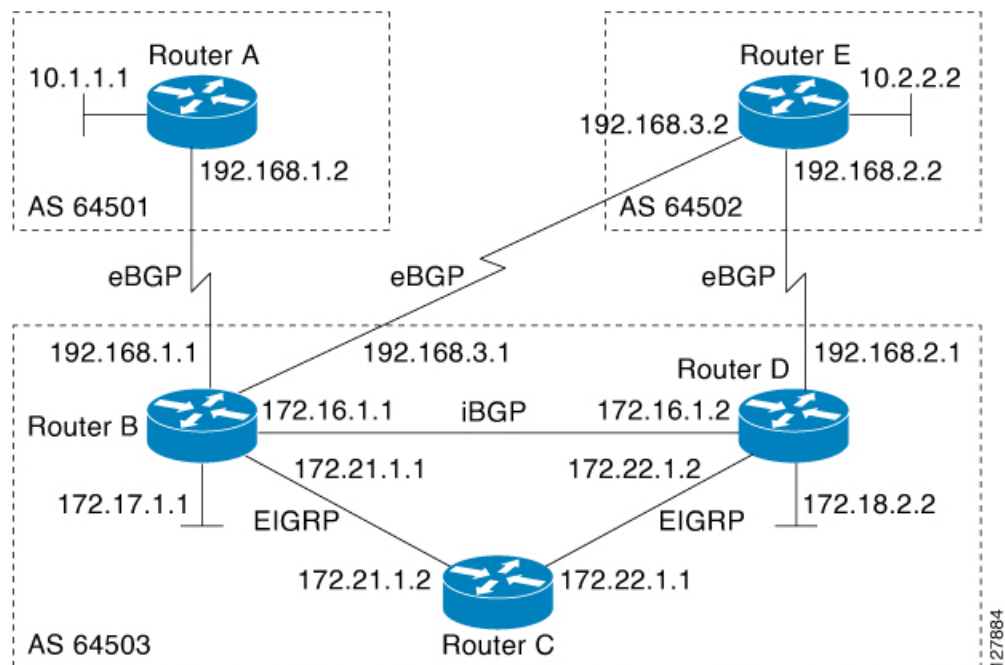
BGP neighbor is 172.21.1.2, remote AS 45000, internal link
  BGP version 4, remote router ID 172.22.1.1
  BGP state = Established, up for 00:01:01
  Last read 00:00:02, last write 00:00:07, hold time is 180, keepalive intervals
  Neighbor sessions:
    1 active, is multisession capable
  Neighbor capabilities:
    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.



Note A BGP peer cannot inherit from a peer policy or session template and be configured as a peer group member at the same. 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** [*regex*] | **dampened-routes** | **flap-statistics** | **received prefix-filter** | **policy** [**detail**]]]

DETAILED STEPS

| | Command or Action | Purpose |
|---------------|---|---|
| Step 1 | enable Example: Device> enable | Enables privileged EXEC mode. <ul style="list-style-type: none"> • Enter your password if prompted. |
| Step 2 | configure terminal Example: Device# configure terminal | Enters global configuration mode. |
| Step 3 | router bgp <i>autonomous-system-number</i> Example: Device(config)# router bgp 45000 | Enters router configuration mode and creates a BGP routing process. |
| Step 4 | template peer-session <i>session-template-name</i> Example: Device(config-router)# template peer-session S1 | Enters session-template configuration mode and creates a peer session template. <ul style="list-style-type: none"> • 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. <ul style="list-style-type: none"> • Use the disable keyword to disable BGP graceful restart capability. |

| | Command or Action | Purpose |
|----------------|--|--|
| | | <ul style="list-style-type: none"> 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: <pre>Device(config-router-stmp)# exit-peer-session</pre> | Exits session-template configuration mode and returns to router configuration mode. |
| Step 7 | template peer-session <i>session-template-name</i> Example: <pre>Device(config-router)# template peer-session S2</pre> | Enters session-template configuration mode and creates a peer session template. <ul style="list-style-type: none"> In this example, a peer session template named S2 is created. |
| Step 8 | ha-mode graceful-restart [disable] Example: <pre>Device(config-router-stmp)# ha-mode graceful-restart disable</pre> | Enables the BGP graceful restart capability and BGP NSF awareness. <ul style="list-style-type: none"> 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: <pre>Device(config-router-stmp)# exit-peer-session</pre> | Exits session-template configuration mode and returns to router configuration mode. |
| Step 10 | bgp log-neighbor-changes Example: <pre>Device(config-router)# bgp log-neighbor-changes</pre> | Enables logging of BGP neighbor status changes (up or down) and neighbor resets. <ul style="list-style-type: none"> Use this command 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. |
| Step 11 | neighbor <i>ip-address</i> remote-as <i>autonomous-system-number</i> Example: | Configures peering with a BGP neighbor in the specified autonomous system. |

| | Command or Action | Purpose |
|----------------|---|--|
| | <pre>Device(config-router)# neighbor 192.168.1.2 remote-as 40000</pre> | <ul style="list-style-type: none"> 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). |
| Step 12 | <p>neighbor <i>ip-address</i> inherit peer-session <i>session-template-number</i></p> <p>Example:</p> <pre>Device(config-router)# neighbor 192.168.1.2 inherit peer-session S1</pre> | <p>Inherits a peer session template.</p> <ul style="list-style-type: none"> In this example, the peer session template named S1 is inherited, and the neighbor inherits the enabling of BGP graceful restart. |
| Step 13 | <p>neighbor <i>ip-address</i> remote-as <i>autonomous-system-number</i></p> <p>Example:</p> <pre>Device(config-router)# neighbor 192.168.3.2 remote-as 50000</pre> | <p>Configures peering with a BGP neighbor in the specified autonomous system.</p> <ul style="list-style-type: none"> 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). |
| Step 14 | <p>neighbor <i>ip-address</i> inherit peer-session <i>session-template-number</i></p> <p>Example:</p> <pre>Device(config-router)# neighbor 192.168.3.2 inherit peer-session S2</pre> | <p>Inherits a peer session-template.</p> <ul style="list-style-type: none"> In this example, the peer session template named S2 is inherited, and the neighbor inherits the disabling of BGP graceful restart. |
| Step 15 | <p>end</p> <p>Example:</p> <pre>Device(config-router)# end</pre> | <p>Exits router configuration mode and enters privileged EXEC mode.</p> |
| Step 16 | <p>show ip bgp template peer-session [<i>session-template-number</i>]</p> <p>Example:</p> <pre>Device# show ip bgp template peer-session</pre> | <p>(Optional) Displays locally configured peer session templates.</p> <ul style="list-style-type: none"> The output can be filtered to display a single peer policy template by using the <i>session-template-name</i> argument. This command also supports all standard output modifiers. |
| Step 17 | <p>show ip bgp neighbors [<i>ip-address</i> [received-routes routes advertised-routes paths [<i>regex</i>] dampened-routes flap-statistics received prefix-filter policy [detail]]]</p> <p>Example:</p> <pre>Device# show ip bgp neighbors 192.168.1.2</pre> | <p>(Optional) Displays information about TCP and BGP connections to neighbors.</p> <ul style="list-style-type: none"> “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 multiseession capable
Neighbor capabilities:
  Route refresh: advertised and received(new)
  Address family IPv4 Unicast: advertised and received
  Graceful Restart Capability: advertised
  Multiseession 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 multiseession 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
Graceful-Restart is disabled
Connection state is ESTAB, I/O status: 1, unread input bytes: 0
```

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

| | Command or Action | Purpose |
|---------------|--|---|
| 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 <i>autonomous-system-number</i> Example: Device(config)# router bgp 45000 | Enters router configuration mode and creates a BGP routing process. |
| Step 4 | address-family ipv4 [unicast multicast vrf <i>vrf-name</i>] Example: Device(config-router)# address-family ipv4 unicast | 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 <i>vrf-name</i> argument specify the name of the VRF instance to associate with |

| | Command or Action | Purpose |
|----------------|---|--|
| | | subsequent IPv4 address family configuration mode commands. |
| Step 5 | neighbor <i>peer-group-name</i> peer-group Example: <pre>Device(config-router-af)# neighbor PG1 peer-group</pre> | Creates a BGP peer group. <ul style="list-style-type: none"> In this example, the peer group named PG1 is created. |
| Step 6 | neighbor <i>peer-group-name</i> remote-as <i>autonomous-system-number</i> Example: <pre>Device(config-router-af)# neighbor PG1 remote-as 45000</pre> | Configures peering with a BGP peer group in the specified autonomous system. <ul style="list-style-type: none"> 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 <i>peer-group-name</i> ha-mode graceful-restart [disable] Example: <pre>Device(config-router-af)# neighbor PG1 ha-mode graceful-restart disable</pre> | Enables the BGP graceful restart capability for a BGP neighbor. <ul style="list-style-type: none"> 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 <i>ip-address</i> peer-group <i>peer-group-name</i> Example: <pre>Device(config-router-af)# neighbor 172.16.1.2 peer-group PG1</pre> | Assigns the IP address of a BGP neighbor to a peer group. <ul style="list-style-type: none"> 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: <pre>Device(config-router-af)# end</pre> | Exits address family configuration mode and returns to privileged EXEC mode. |
| Step 10 | show ip bgp neighbors [<i>ip-address</i> [received-routes routes advertised-routes paths [<i>regexp</i>] dampened-routes flap-statistics received prefix-filter policy [detail]]] Example: <pre>Device# show ip bgp neighbors 172.16.1.2</pre> | (Optional) Displays information about TCP and BGP connections to neighbors. <ul style="list-style-type: none"> 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 multiseession 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
```

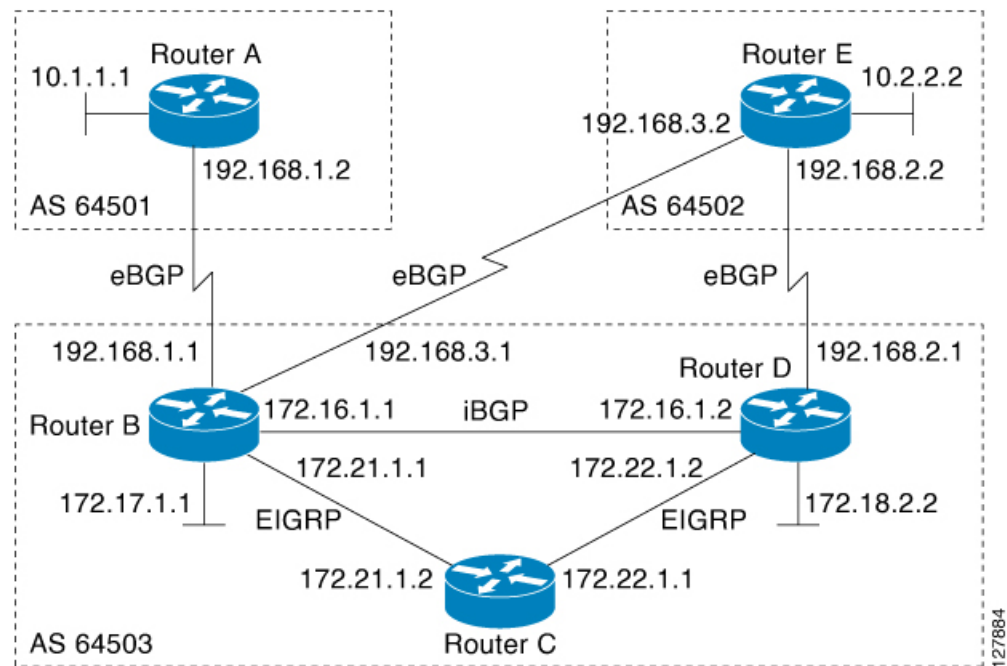
Configuration Examples for BGP Graceful Restart per Neighbor

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 2: 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.



Note A BGP peer cannot inherit from a peer policy or session template and be configured as a peer group member at the same. 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** [*regex*] | **dampened-routes** | **flap-statistics** | **received prefix-filter** | **policy** [*detail*]]

DETAILED STEPS

| | Command or Action | Purpose |
|---------------|---|---|
| Step 1 | enable Example: Device> enable | Enables privileged EXEC mode. <ul style="list-style-type: none"> • Enter your password if prompted. |
| Step 2 | configure terminal Example: Device# configure terminal | Enters global configuration mode. |
| Step 3 | router bgp <i>autonomous-system-number</i> Example: Device(config)# router bgp 45000 | Enters router configuration mode and creates a BGP routing process. |
| Step 4 | template peer-session <i>session-template-name</i> Example: Device(config-router)# template peer-session S1 | Enters session-template configuration mode and creates a peer session template. <ul style="list-style-type: none"> • 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. <ul style="list-style-type: none"> • 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 <i>session-template-name</i> Example: | Enters session-template configuration mode and creates a peer session template. |

| | Command or Action | Purpose |
|----------------|--|---|
| | Device(config-router)# template peer-session S2 | <ul style="list-style-type: none"> In this example, a peer session template named S2 is created. |
| Step 8 | ha-mode graceful-restart [disable] Example: <pre>Device(config-router-stmp)# ha-mode graceful-restart disable</pre> | <p>Enables the BGP graceful restart capability and BGP NSF awareness.</p> <ul style="list-style-type: none"> 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: <pre>Device(config-router-stmp)# exit-peer-session</pre> | Exits session-template configuration mode and returns to router configuration mode. |
| Step 10 | bgp log-neighbor-changes Example: <pre>Device(config-router)# bgp log-neighbor-changes</pre> | <p>Enables logging of BGP neighbor status changes (up or down) and neighbor resets.</p> <ul style="list-style-type: none"> Use this command 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. |
| Step 11 | neighbor ip-address remote-as <i>autonomous-system-number</i> Example: <pre>Device(config-router)# neighbor 192.168.1.2 remote-as 40000</pre> | <p>Configures peering with a BGP neighbor in the specified autonomous system.</p> <ul style="list-style-type: none"> 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). |
| Step 12 | neighbor ip-address inherit peer-session <i>session-template-number</i> Example: <pre>Device(config-router)# neighbor 192.168.1.2 inherit peer-session S1</pre> | <p>Inherits a peer session template.</p> <ul style="list-style-type: none"> In this example, the peer session template named S1 is inherited, and the neighbor inherits the enabling of BGP graceful restart. |
| Step 13 | neighbor ip-address remote-as <i>autonomous-system-number</i> Example: | <p>Configures peering with a BGP neighbor in the specified autonomous system.</p> <ul style="list-style-type: none"> In this example, the BGP peer at 192.168.3.2 is an external BGP peer because it has a different |

| | Command or Action | Purpose |
|----------------|---|--|
| | Device(config-router)# neighbor 192.168.3.2 remote-as 50000 | autonomous system number from the router where the BGP configuration is being entered (see Step 3). |
| Step 14 | neighbor ip-address inherit peer-session session-template-number Example: Device(config-router)# neighbor 192.168.3.2 inherit peer-session S2 | Inherits a peer session-template. • In this example, the peer session template named S2 is inherited, and the neighbor inherits the disabling of BGP graceful restart. |
| Step 15 | end Example: Device(config-router)# end | Exits router configuration mode and enters privileged EXEC mode. |
| Step 16 | show ip bgp template peer-session [session-template-number] Example: Device# show ip bgp template peer-session | (Optional) Displays locally configured peer session templates. • The output can be filtered to display a single peer policy template by using the <i>session-template-name</i> argument. This command also supports all standard output modifiers. |
| Step 17 | show ip bgp neighbors [ip-address [received-routes routes advertised-routes paths [regex] dampened-routes flap-statistics received prefix-filter policy [detail]]] Example: Device# show ip bgp neighbors 192.168.1.2 | (Optional) Displays information about TCP and BGP connections to neighbors. • “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
Graceful-Restart is disabled
Connection state is ESTAB, I/O status: 1, unread input bytes: 0

```

Additional References

Related Documents

| Related Topic | Document Title |
|--------------------|---|
| Cisco IOS commands | Cisco IOS Master Command List, All Releases |
| BGP commands | Cisco IOS IP Routing: BGP Command Reference |

Standards and RFCs

| Standard/RFC | Title |
|--------------|---|
| RFC 4724 | <i>Graceful Restart Mechanism for BGP</i> |

Technical Assistance

| Description | Link |
|---|---|
| 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. | http://www.cisco.com/cisco/web/support/index.html |

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

| Feature Name | Releases | Feature Information |
|-----------------------------------|----------|---|
| BGP Graceful Restart per Neighbor | | <p>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.</p> <p>The following commands were introduced by this feature: ha-mode graceful-restart, and neighbor ha-mode graceful-restart.</p> <p>The following command was modified by this feature: show ip bgp neighbors.</p> |