



## BGP Support for Dual AS Configuration for Network AS Migrations

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The BGP Support for Dual AS Configuration for Network AS Migrations feature extended the functionality of the BGP Local-AS feature by providing additional autonomous system path customization configuration options. The configuration of this feature is transparent to customer peering sessions, allowing the provider to merge two autonomous systems without interrupting customer peering arrangements. Customer peering sessions can later be updated during a maintenance window or during other scheduled downtime.

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## Information About BGP Support for Dual AS Configuration for Network AS Migrations

### Autonomous System Migration for BGP Networks

Autonomous system migration can be necessary when a telecommunications or Internet service provider purchases another network. It is desirable for the provider to be able to integrate the second autonomous system without disrupting existing customer peering arrangements. The amount of configuration required in the customer networks can make this a cumbersome task that is difficult to complete without disrupting service.

### Dual Autonomous System Support for BGP Network Autonomous System Migration

In Cisco IOS Release 12.0(29)S, 12.3(14)T, 12.2(33)SXH, and later releases, support was added for dual BGP autonomous system configuration to allow a secondary autonomous system to merge under a primary autonomous system, without disrupting customer peering sessions. The configuration of this feature is transparent to customer networks. Dual BGP autonomous system configuration allows a router to appear, to

external peers, as a member of secondary autonomous system during the autonomous system migration. This feature allows the network operator to merge the autonomous systems and then later migrate customers to new configurations during normal service windows without disrupting existing peering arrangements.

The **neighbor local-as** command is used to customize the AS\_PATH attribute by adding and removing autonomous system numbers for routes received from eBGP neighbors. This feature allows a router to appear to external peers as a member of another autonomous system for the purpose of autonomous system number migration. This feature simplifies this process of changing the autonomous system number in a BGP network by allowing the network operator to merge a secondary autonomous system into a primary autonomous system and then later update the customer configurations during normal service windows without disrupting existing peering arrangements.

### BGP Autonomous System Migration Support for Confederations, Individual Peering Sessions, and Peer Groupings

This feature supports confederations, individual peering sessions, and configurations applied through peer groups and peer templates. If this feature is applied to group peers, the individual peers cannot be customized.

### Ingress Filtering During BGP Autonomous System Migration

Autonomous system path customization increases the possibility that routing loops can be created if such customization is misconfigured. The larger the number of customer peerings, the greater the risk. You can minimize this possibility by applying policies on the ingress interfaces to block the autonomous system number that is in transition or routes that have no **local-as** configuration.



#### Caution

BGP prepends the autonomous system number from each BGP network that a route traverses to maintain network reachability information and to prevent routing loops. This feature should be configured only for autonomous system migration and should be deconfigured after the transition has been completed. This procedure should be attempted only by an experienced network operator, as routing loops can be created with improper configuration.

## BGP Network Migration to 4-Byte Autonomous System Numbers

The BGP Support for 4-Byte ASN feature introduced support for 4-byte autonomous system numbers. Because of increased demand for autonomous system numbers, in January 2009 the IANA started to allocate 4-byte autonomous system numbers in the range from 65536 to 4294967295.

The Cisco implementation of 4-byte autonomous system numbers supports RFC 4893. RFC 4893 was developed to allow BGP to support a gradual transition from 2-byte autonomous system numbers to 4-byte autonomous system numbers. A new reserved (private) autonomous system number, 23456, was created by RFC 4893 and this number cannot be configured as an autonomous system number in the Cisco IOS CLI.

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

To ensure a smooth transition, we recommend that all BGP speakers within an autonomous system that is identified using a 4-byte autonomous system number be upgraded to support 4-byte autonomous system numbers.

For details about steps to perform to upgrade a BGP network to full 4-byte autonomous system support, see the [Migration Guide for Explaining 4-Byte Autonomous System](#) white paper.

# How to Configure BGP Support for Dual AS Configuration for Network AS Migrations

## Configuring Dual AS Peering for Network Migration

Perform this task to configure a BGP peer router to appear to external peers as a member of another autonomous system for the purpose of autonomous system number migration. When the BGP peer is configured with dual autonomous system numbers then the network operator can merge a secondary autonomous system into a primary autonomous system and update the customer configuration during a future service window without disrupting existing peering arrangements.

The **show ip bgp** and **show ip bgp neighbors** commands can be used to verify autonomous system number for entries in the routing table and the status of this feature.



### Note

- The BGP Support for Dual AS Configuration for Network AS Migrations feature can be configured for only true eBGP peering sessions. This feature cannot be configured for two peers in different subautonomous systems of a confederation.
- The BGP Support for Dual AS Configuration for Network AS Migrations feature can be configured for individual peering sessions and configurations applied through peer groups and peer templates. If this command is applied to a peer group, the peers cannot be individually customized.

### SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **router bgp** *autonomous-system-number*
4. **neighbor** *ip-address* **remote-as** *autonomous-system-number*
5. **neighbor** *ip-address* **local-as** [*autonomous-system-number* [**no-prepend** [**replace-as** [**dual-as**]]]]
6. **neighbor** *ip-address* **remove-private-as**
7. **end**
8. **show ip bgp** [*network*] [*network-mask*] [**longer-prefixes**] [**prefix-list** *prefix-list-name* | **route-map** *route-map-name*] [**shorter-prefixes** *mask-length*]
9. **show ip bgp neighbors** [*neighbor-address*] [**received-routes** | **routes** | **advertised-routes** | **paths** *regex* | **dampened-routes** | **received** *prefix-filter*]

## DETAILED STEPS

## Procedure

|               | Command or Action                                                                                                                                                                                                                       | Purpose                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Step 1</b> | <b>enable</b><br><b>Example:</b><br><pre>Router&gt; enable</pre>                                                                                                                                                                        | Enables privileged EXEC mode. <ul style="list-style-type: none"> <li>• Enter your password if prompted.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Step 2</b> | <b>configure terminal</b><br><b>Example:</b><br><pre>Router# configure terminal</pre>                                                                                                                                                   | Enters global configuration mode.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Step 3</b> | <b>router bgp <i>autonomous-system-number</i></b><br><b>Example:</b><br><pre>Router(config)# router bgp 40000</pre>                                                                                                                     | Enters router configuration mode, and creates a BGP routing process.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Step 4</b> | <b>neighbor <i>ip-address</i> remote-as <i>autonomous-system-number</i></b><br><b>Example:</b><br><pre>Router(config-router)# neighbor 10.0.0.1 remote-as 45000</pre>                                                                   | Establishes a peering session with a BGP neighbor.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Step 5</b> | <b>neighbor <i>ip-address</i> local-as [<i>autonomous-system-number</i> [no-prepend [replace-as [dual-as]]]]</b><br><b>Example:</b><br><pre>Router(config-router)# neighbor 10.0.0.1 local-as 50000 no-prepend replace-as dual-as</pre> | Customizes the AS_PATH attribute for routes received from an eBGP neighbor. <ul style="list-style-type: none"> <li>• The <b>replace-as</b> keyword is used to prepend only the local autonomous system number (as configured with the <i>ip-address</i> argument) to the AS_PATH attribute. The autonomous system number from the local BGP routing process is not prepended.</li> <li>• The <b>dual-as</b> keyword is used to configure the eBGP neighbor to establish a peering session using the real autonomous-system number (from the local BGP routing process) or by using the autonomous system number configured with the <i>ip-address</i> argument (local-as).</li> <li>• The example configures the peering session with the 10.0.0.1 neighbor to accept the real autonomous system number and the local-as number.</li> </ul> |
| <b>Step 6</b> | <b>neighbor <i>ip-address</i> remove-private-as</b><br><b>Example:</b>                                                                                                                                                                  | (Optional) Removes private autonomous system numbers from outbound routing updates.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |

|        | Command or Action                                                                                                                                                                                                                                                                         | Purpose                                                                                                                                                                                                                                                                                                                                                                        |
|--------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|        | <pre>Router(config-router)# neighbor 10.0.0.1 remove-private-as</pre>                                                                                                                                                                                                                     | <ul style="list-style-type: none"> <li>This command can be used with the <b>replace-as</b> functionality to remove the private autonomous system number and replace it with an external autonomous system number.</li> <li>Private autonomous system numbers (64512 to 65535) are automatically removed from the AS_PATH attribute when this command is configured.</li> </ul> |
| Step 7 | <b>end</b><br><b>Example:</b><br><pre>Router(config-router)# end</pre>                                                                                                                                                                                                                    | Exits router configuration mode and enters privileged EXEC mode.                                                                                                                                                                                                                                                                                                               |
| Step 8 | <b>show ip bgp</b> [ <i>network</i> ] [ <i>network-mask</i> ] [ <b>longer-prefixes</b> ] [ <b>prefix-list</b> <i>prefix-list-name</i>   <b>route-map</b> <i>route-map-name</i> ] [ <b>shorter-prefixes</b> <i>mask-length</i> ]<br><b>Example:</b><br><pre>Router# show ip bgp</pre>      | Displays entries in the BGP routing table. <ul style="list-style-type: none"> <li>The output can be used to verify if the real autonomous system number or local-as number is configured.</li> </ul>                                                                                                                                                                           |
| Step 9 | <b>show ip bgp neighbors</b> [ <i>neighbor-address</i> ] [ <b>received-routes</b>   <b>routes</b>   <b>advertised-routes</b>   <b>paths</b> <i>regex</i>   <b>dampened-routes</b>   <b>received</b> <i>prefix-filter</i> ]<br><b>Example:</b><br><pre>Router# show ip bgp neighbors</pre> | Displays information about TCP and BGP connections to neighbors. <ul style="list-style-type: none"> <li>The output will display <b>local AS</b>, <b>no-prepend</b>, <b>replace-as</b>, and <b>dual-as</b> with the corresponding autonomous system number when these options are configured.</li> </ul>                                                                        |

## Configuration Examples for Dual-AS Peering for Network Migration

### Example: Dual AS Configuration

The following examples shows how this feature is used to merge two autonomous systems without interrupting peering arrangements with the customer network. The **neighbor local-as** command is configured to allow Router 1 to maintain peering sessions through autonomous system 40000 and autonomous system 45000. Router 2 is a customer router that runs a BGP routing process in autonomous system 50000 and is configured to peer with autonomous-system 45000.

#### Router 1 in Autonomous System 40000 (Provider Network)

```
interface Serial3/0
 ip address 10.3.3.11 255.255.255.0
!
```

**Example: Dual AS Confederation Configuration**

```
router bgp 40000
no synchronization
bgp router-id 10.0.0.11
neighbor 10.3.3.33 remote-as 50000
neighbor 10.3.3.33 local-as 45000 no-prepend replace-as dual-as
```

**Router 1 in Autonomous System 45000 (Provider Network)**

```
interface Serial3/0
ip address 10.3.3.11 255.255.255.0
!
router bgp 45000
bgp router-id 10.0.0.11
neighbor 10.3.3.33 remote-as 50000
```

**Router 2 in Autonomous System 50000 (Customer Network)**

```
interface Serial3/0
ip address 10.3.3.33 255.255.255.0
!
router bgp 50000
bgp router-id 10.0.0.3
neighbor 10.3.3.11 remote-as 45000
```

After the transition is complete, the configuration on router 50000 can be updated to peer with autonomous system 40000 during a normal maintenance window or during other scheduled downtime:

```
neighbor 10.3.3.11 remote-as 100
```

**Example: Dual AS Confederation Configuration**

The following example can be used in place of the Router 1 configuration in the "Example: Dual AS Configuration" example. The only difference between these configurations is that Router 1 is configured to be part of a confederation.

```
interface Serial3/0/0
ip address 10.3.3.11 255.255.255.0
!
router bgp 65534
no synchronization
bgp confederation identifier 100
bgp router-id 10.0.0.11
neighbor 10.3.3.33 remote-as 50000
neighbor 10.3.3.33 local-as 45000 no-prepend replace-as dual-as
```

**Example: Replace an AS with Another AS in Routing Updates**

The following example strips private autonomous system 64512 from outbound routing updates for the 10.3.3.33 neighbor and replaces it with autonomous system 50000:

```
router bgp 64512
neighbor 10.3.3.33 local-as 50000 no-prepend replace-as
```

## Additional References

### Related Documents

| Related Topic      | Document Title                                              |
|--------------------|-------------------------------------------------------------|
| Cisco IOS commands | <a href="#">Cisco IOS Master Command List, All Releases</a> |
| BGP commands       | <a href="#">Cisco IOS IP Routing: BGP Command Reference</a> |

### 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. | <a href="http://www.cisco.com/cisco/web/support/index.html">http://www.cisco.com/cisco/web/support/index.html</a> |

## Feature Information for BGP Support for Dual AS Configuration for Network AS Migrations

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 Support for Dual AS Configuration for Network AS Migrations*

| Feature Name                                                    | Releases | Feature Information                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|-----------------------------------------------------------------|----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| BGP Support for Dual AS Configuration for Network AS Migrations |          | <p>The BGP Support for Dual AS Configuration for Network AS Migrations feature extended the functionality of the BGP Local-AS feature by providing additional autonomous system path customization configuration options. The configuration of this feature is transparent to customer peering sessions, allowing the provider to merge two autonomous systems without interrupting customer peering arrangements. Customer peering sessions can later be updated during a maintenance window or during other scheduled downtime.</p> <p>The following command was modified by this feature: <b>neighbor local-as</b>.</p> |