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Sample Configurations

# Sample Configuration for iBGP and eBGP With or Without a Loopback Address

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## Introduction

BGP is an exterior gateway protocol (EGP), used to perform interdomain routing in TCP/IP networks. A BGP router needs to establish a connection (on TCP port 179) to each of its BGP peers before BGP updates can be exchanged. The BGP session between two BGP peers is said to be an external BGP (eBGP) session if the BGP peers are in different autonomous systems (AS). A BGP session between two BGP peers is said to be an internal BGP (iBGP) session if the BGP peers are in the same autonomous systems.

By default, the peer relationship is established using the IP address of the interface closest to the peer router. However, using the [neighbor update-source](#) ([registered customers only](#)) command, any operational interface, including the loopback interface, can be specified to be used for establishing TCP connections. This method of peering using a loopback interface is useful since it will not bring down the BGP session when there are

multiple paths between the BGP peers, which would otherwise result in tearing down the BGP session if the physical interface used for establishing the session goes down. In addition to that, it also allows the routers running BGP with multiple links between them to load balance over the available paths.

The sample configurations in this document are for iBGP and eBGP, both with and without a loopback addresses.

**Note:** You can use these configurations for establishing neighbor relationship. Refer to [Using the Border Gateway Protocol for Interdomain Routing](#) for more complex configurations.

## Prerequisites

### Requirements

Before you attempt this configuration, ensure that you meet this requirement:

- Knowledge of BGP protocols

### Components Used

This document is not restricted to specific software and hardware versions. The command outputs shown in this document were taken from the 2500 Series Routers running IOS<sup>®</sup> version 12.2(24a).

### Conventions

For more information on document conventions, refer to [Cisco Technical Tips Conventions](#).

## Configure

This section contains the following configuration examples:

- [iBGP Configuration](#)
- [eBGP Configuration](#)
- [iBGP Configuration with a Loopback Address](#)
- [eBGP Configuration with a Loopback Address](#)

In this section, you are presented with the information to configure the features described in this document.

**Note:** To find additional information on the commands used in this document, use the [Command Lookup Tool](#) ([registered](#) customers only).

### Network Diagram

This document uses this network setup:



## iBGP Configuration

R1-AGS	R6-2500
<pre> Current configuration:  !-- Output suppressed.  interface Serial1  ip address 10.10.10.1 255.255.255.0 ! router bgp 400  !--- Enables BGP for the autonomous !--- system 400.   neighbor 10.10.10.2 remote-as 400  !--- Specifies a neighbor 10.10.10.2 !--- in the remote AS 400, making !--- this an iBGP connection. !-- Output suppressed.  end </pre>	<pre> Current configuration:  !-- Output suppressed.  interface Serial0  ip address 10.10.10.2 255.255.255.0 ! router bgp 400  neighbor 10.10.10.1 remote-as 400  !-- Output suppressed.  end </pre>

In the configuration above, both routers are in AS number 400.

## eBGP Configuration

R1-AGS	R6-2500
<pre> Current configuration:  !-- Output suppressed  interface Serial1  ip address 10.10.10.1 255.255.255.0 ! router bgp 300  !--- Enables BGP for the autonomous !--- system 300.   neighbor 10.10.10.2 remote-as 400 </pre>	<pre> Current configuration:  !-- Output suppressed.  interface Serial0  ip address 10.10.10.2 255.255.255.0 ! router bgp 400  neighbor 10.10.10.1 remote-as 300 </pre>

```

!--- Specifies a neighbor 10.10.10.2
!--- in the remote AS 400, making
!--- this an eBGP connection.
!
!--- Output suppressed.
end
!--- Output suppressed.
end

```

Peers must be directly connected when using eBGP. If they are not directly connected, the [neighbor ebgp-multihop](#) ([registered customers only](#)) command must be used and a path through an IGP or static route to reach the peer must exist in order for the routers to establish neighbor relationship. In the configuration above, R1-AGS router belongs to AS 300 while R6-2500 router belongs to AS 400.

## iBGP Configuration with a Loopback Address

You can configure iBGP using a loopback address (or any other operational interface) as shown in this section.

R1-AGS	R6-2500
<pre> Current configuration:  !--- Output suppressed.  interface Loopback0  ip address 1.1.1.1 255.255.255.255 ! interface Serial1  ip address 10.10.10.1 255.255.255.0 ! router bgp 300  neighbor 2.2.2.2 remote-as 300  neighbor 2.2.2.2 update-source Loopback0  !--- This command specifies that the TCP !--- connection with the specified external !--- peer should be established using the !--- address on the loopback interface. ! ip route 2.2.2.2 255.255.255.255 10.10.10.2  !--- This static route ensures that the !--- remote peer address used for peering !--- is reachable. !--- Output suppressed.  end </pre>	<pre> Current configuration:  !--- Output suppressed.  interface Loopback0  ip address 2.2.2.2 255.255.255.255 ! interface Serial0  ip address 10.10.10.2 255.255.255.0 ! router bgp 300  neighbor 1.1.1.1 remote-as 300  neighbor 1.1.1.1 update-source Loopback0 ! ip route 1.1.1.1 255.255.255.255 10.10.10.1  !--- Output suppressed.  end </pre>


## eBGP Configuration with a Loopback Address

You can also configure eBGP using a loopback address (or any other operational interface) as shown in this section. Loopback interfaces are used in this manner to guarantee reachability in networks with multiple paths as shown in the [Load Sharing Using the Loopback Address as a BGP Neighbor](#) section of [Load Sharing with](#)

[BGP in Single and Multihomed Environments: Sample Configurations.](#)

R1-AGS	R6-2500
<pre> Current configuration:  !-- Output suppressed.  interface Loopback0  ip address 1.1.1.1 255.255.255.255  ! interface Serial1  ip address 10.10.10.1 255.255.255.0  ! router bgp 300  neighbor 2.2.2.2 remote-as 400  neighbor 2.2.2.2 ebgp-multihop 2  !--- This command changes the ttl value in !--- order to allow the packet to reach the !--- external BGP peer which is not directly !--- connected or is using an interface other !--- than the directly connected interface.  neighbor 2.2.2.2 update-source Loopback0  !--- This command specifies that the TCP !--- connection with the external BGP !--- peer should be established using the !--- address on the loopback interface. !  ip route 2.2.2.2 255.255.255.255 10.10.10.2  !--- This static route ensures that the !--- remote peer address used for peering !--- is reachable.  !-- Output suppressed.  end </pre>	<pre> Current configuration:  !-- Output suppressed.  interface Loopback0  ip address 2.2.2.2 255.255.255.255  ! interface Serial0  ip address 10.10.10.2 255.255.255.0  ! router bgp 400  neighbor 1.1.1.1 remote-as 300  neighbor 1.1.1.1 ebgp-multihop 2  neighbor 1.1.1.1 update-source Loopback0  ! ip route 1.1.1.1 255.255.255.255 10.10.10.2  !-- Output suppressed.  end </pre>

## Verify

These sections provide information you can use to confirm your configurations are working properly. Certain show commands are supported by the [Output Interpreter Tool](#) , which allows you to view an analysis of show command output.

### Verify iBGP Configuration

Use the [show ip bgp neighbors](#) ([registered customers only](#)) command to display information about the TCP and Border Gateway Protocol (BGP) connections and verify if the BGP peer is established. The output of the **show**

**ip bgp neighbors** command below shows the BGP state as 'Established', which indicates that the BGP peer relationship has been established successfully.

```
R1-AGS# show ip bgp neighbors | include BGP
BGP neighbor is 10.10.10.2, remote AS 400, internal link
  BGP version 4, remote router ID 2.2.2.2
  BGP state = Established, up for 00:04:20
  BGP table version 1, neighbor version 1
R1-AGS#
```

The **show ip bgp neighbors** command has been used above with the modifier / *include BGP*. This makes the output more readable by filtering the the command output and displaying the relevant parts only.

In addition, the [show ip bgp summary \(registered customers only\)](#) command can also be used to display the status of all BGP connections, as shown below.

```
R1-AGS(9)# show ip bgp summary
BGP router identifier 10.1.1.2, local AS number 400
BGP table version is 1, main routing table version 1

Neighbor      V    AS MsgRcvd MsgSent   TblVer  InQ  OutQ  Up/Down  State/PfxRcd
10.10.10.2    4   400      3       3         1    0     0 00:00:26      0
```

## Verify eBGP Configuration

Use the [show ip bgp neighbors \(registered customers only\)](#) command to display information about the TCP and Border Gateway Protocol (BGP) connections and verify if the BGP peer is established. The output of the **show ip bgp neighbors** command below shows the BGP state as 'Established', which indicates that the BGP peer relationship has been established successfully.

```
R1-AGS# show ip bgp neighbors | include BGP
BGP neighbor is 10.10.10.2, remote AS 400, external link
  BGP version 4, remote router ID 2.2.2.2
  BGP state = Established, up for 00:00:17
  BGP table version 1, neighbor version 1
```

In addition, the [show ip bgp summary \(registered customers only\)](#) command can also be used to display the status of all BGP connections, as shown below.

```
R1-AGS(9)# show ip bgp summary
BGP router identifier 10.10.10.1, local AS number 300
BGP table version is 1, main routing table version 1

Neighbor      V    AS MsgRcvd MsgSent   TblVer  InQ  OutQ  Up/Down  State/PfxRcd
10.10.10.2    4   400      3       3         1    0     0 00:00:26      0
```

## Verify iBGP Configuration with a Loopback Address

Use the [show ip bgp neighbors \(registered customers only\)](#) command to display information about the TCP and Border Gateway Protocol (BGP) connections and verify if the BGP peer is established. The output of the **show ip bgp neighbors** command below shows the BGP state as 'Established', which indicates that the BGP peer relationship has been established successfully.

```
R1-AGS# show ip bgp neighbors | include BGP
BGP neighbor is 2.2.2.2, remote AS 300, internal link
  BGP version 4, remote router ID 2.2.2.2
  BGP state = Established, up for 00:00:28
  BGP table version 1, neighbor version 1
R1-AGS#
```

In addition, the [show ip bgp summary \(registered customers only\)](#) command can also be used to display the status of all BGP connections, as shown below.

```
R1-AGS(9)# show ip bgp summary
BGP table version is 1, main routing table version 1

Neighbor      V     AS MsgRcvd MsgSent   TblVer  InQ  OutQ Up/Down  State/PfxRcd
2.2.2.2       4     400     3       3         1    0    0 00:00:26      0
```

## Verify eBGP Configuration with a Loopback Address

Use the [show ip bgp neighbors \(registered customers only\)](#) command to display information about the TCP and Border Gateway Protocol (BGP) connections and verify if the BGP peer is established. The output of the **show ip bgp neighbors** command below shows the BGP state as 'Established', which indicates that the BGP peer relationship has been established successfully.

```
R1-AGS# show ip bgp neighbors | include BGP
BGP neighbor is 2.2.2.2, remote AS 400, external link
  BGP version 4, remote router ID 2.2.2.2
  BGP state = Established, up for 00:00:16
  BGP table version 1, neighbor version 1
  External BGP neighbor may be up to 2 hops away.
```

In addition, the [show ip bgp summary \(registered customers only\)](#) command can also be used to display the status of all BGP connections, as shown below.

```
R1-AGS(9)# show ip bgp summary
BGP router identifier 1.1.1.1, local AS number 300
BGP table version is 1, main routing table version 1

Neighbor      V     AS MsgRcvd MsgSent   TblVer  InQ  OutQ Up/Down  State/PfxRcd
2.2.2.2       4     400     3       3         1    0    0 00:00:26      0
```

## Troubleshoot

Refer to [Why Do BGP Neighbors Toggle Between Idle, Connect, and Active States?](#) and [Troubleshooting BGP](#) for troubleshooting information.

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## Related Information

- [EBGP Multihop and the update-source Command](#)
- [Load Sharing with BGP in Single and Multihomed Environments: Sample Configurations](#)
- [BGP Support Page](#)

- [Technical Support - Cisco Systems](#)
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