Troubleshoot BGP Neighborship Connection Issues

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Introduction

This document describes issues that keep BGP neighborship from correctly being established.

Prerequisites

Requirements

There are no specific requirements for this document.

Components Used

This document is not restricted to specific software and hardware versions.

The information in this document was created from the devices in a specific lab environment. All of the devices used in this document started with a cleared (default) configuration. If your network is live, ensure that you understand the potential impact of any command.

Conventions

Refer to Cisco Technical Tips Conventions for more information on document conventions.

Background Information

BGP routers can exchange routing information only when they establish peer connection between them.

The BGP peer establishment begins with the creation of a TCP connection between the devices.

After TCP connection established, the BGP devices attempt to create a BGP session by the exchange of BGP Open messages, where they exchange BGP version, AS number, hold time and BGP identifier.

On the process of BGP peer establishment, several things can prevent a BGP neighborship from correctly being established. This document discusses some of these possible reasons for this issue:

- Neighbor statement is incorrect.
- No routes to the neighbor address exist , or the default route (0.0.0.0/0) is being used to reach the peer.
- The **update-source** command is missing under BGP.
- A typing error resulted in the wrong IP address in the neighbor statement or the wrong autonomous system number. Check your configurations.
- Unicast is broken, some of the reasons are:
  - Wrong virtual circuit (VC) mapping in an Asynchronous Transfer Mode (ATM) or Frame Relay environment in a highly redundant network.
  - Access list is blocking the unicast or TCP packet.
  - Network Address Translation (NAT) is running on the router and is translating the unicast packet.
  - Layer 2 is down.
- The lack of the **ebgp-multihop** command is a common mistake that keep peers from appearing. This issue is discussed in the second example.

Network Diagram

Use this network diagram as an example for the first three causes:



Network Diagram

Problem

Neighbor Statement Is Incorrect

The **show ip bgp summary** command on Router R1-AGS shows the session is active.

```
<#root>

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
10.10.10.2      4   400       0       0        0    0    0 never

Active
```

The configurations are:

R1-AGS	R6-2500
<#root> interface Loopback0 ip address 10.2.2.2 255.255.255.255 ! interface Serial1 ip address 10.10.10.1 255.255.255.0 ! router bgp 400 **neighbor 10.10.10.2 remote-as 400** **neighbor 10.10.10.2 update-source Loopback0** ! ip route 10.1.1.1 255.255.255.255 10.10.10.2	<#root> interface Loopback0 ip address 10.1.1.1 255.255.255.255 ! interface Serial0 ip address 10.10.10.2 255.255.255.0 ! router bgp 400 **neighbor 10.10.10.1 remote-as 400** **neighbor 10.10.10.1 update-source Loopback0** ! ip route 10.2.2.2 255.255.255.255 10.10.10.1

The **debug ip bgp** and **debug ip tcp transactions** commands show the TCP connection failing.

Debugs on Router R1-AGS:

```
<#root>

BGP: 10.10.10.2 open active, local address 10.2.2.2

TCB00135978 created
TCB00135978 setting property 0 16ABEA
TCB00135978 bound to 10.2.2.2.11039
TCP: sending SYN, seq 3797113156, ack 0
TCP0: Connection to 10.10.10.2:179, advertising MSS 1460
TCP0: state was CLOSED -> SYNSENT [11039 -> 10.10.10.2(179)]
TCP0: state was SYNSENT -> CLOSED [11039 -> 10.10.10.2(179)]
```

```
TCP0: bad seg from 10.10.10.2 -- closing connection: seq 0 ack 3797113157 rcvnxt 0 rcvwnd 0

TCP0: connection closed - remote sent RST
TCB00135978 destroyed

BGP: 10.10.10.2 open failed: Connection refused by remote host

TCP: sending RST, seq 0, ack 1965664223
TCP: sent RST to 10.1.1.1:11016 from 10.10.10.1:179
```

Debugs on Router R6-2500:

```
<#root>

TCP: sending RST, seq 0, ack 3797113157
TCP: sent RST to

10.2.2.2:11039 from 10.10.10.2:179
BGP: 10.10.10.1 open active, local address 10.1.1.1

TCB001E030C created
TCB001E030C setting property TCP_WINDOW_SIZE (0) 194F7A
TCB001E030C setting property TCP_TOS (11) 194F79
TCB001E030C bound to 10.10.1.1.11016
TCP: sending SYN, seq 1965664222, ack 0
TCP0: Connection to 10.10.10.1:179, advertising MSS 1460
TCP0: state was CLOSED -> SYNSENT [11016 -> 10.10.10.1(179)]
TCP0: state was SYNSENT -> CLOSED [11016 -> 10.10.10.1(179)]

TCP0: bad seg from 10.10.10.1 -- closing connection:

 seq 0 ack 1965664223 rcvnxt 0 rcvwnd 0
TCP0: connection closed - remote sent RST
TCB 0x1E030C destroyed

BGP: 10.10.10.1 open failed: Connection refused by remote host
```

Solution

In order to remedy this situation, either correct the loopback address in the neighbor statement, or remove the **update-source** command from the configuration.

In this example, the address is corrected.

R1-AGS	R6-2500
<#root> router bgp 400 **neighbor 10.1.1.1 remote-as 400** **neighbor 10.1.1.1 update-source Loopback0** ! ip route 10.1.1.1 255.255.255.255 10.10.10.2	<#root> router bgp 400 **neighbor 10.2.2.2 remote-as 400** **neighbor 10.2.2.2 update-source Loopback0** ! ip route 10.2.2.2 255.255.255.255 10.10.10.1

A look at the **show ip bgp summary** command shows Router R1-AGS is in the established state.

```
<#root>

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

10.1.1.1         4   400       3       3        1    0    0 00:00:26        0
```

Problem

No Routes to the Neighbor Address Exist or the Default Route Is Used to Reach the Peer

The **show ip bgp summary** command on Router R1-AGS shows the session is currently active.

```
<#root>

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
10.1.1.1         4   400       0       0        0    0    0

never    Active
```

The configurations are:

R1-AGS	R6-2500
interface Loopback0 ip address 10.2.2.2 255.255.255.255 ! interface Serial1 ip address 10.10.10.1 255.255.255.0 ! router bgp 300 neighbor 10.1.1.1 remote-as 400 neighbor 10.1.1.1 ebgp-multihop 2 neighbor 10.1.1.1 update-source Loopback0	interface Loopback0 ip address 10.1.1.1 255.255.255.255 ! interface Serial0 ip address 10.10.10.2 255.255.255.0 ! router bgp 400 neighbor 10.2.2.2 remote-as 300 neighbor 10.2.2.2 ebgp-multihop 2 neighbor 10.2.2.2 update-source Loopback0

If you run **debug** commands, it shows there is no route to the neighbor.

Debugs on Router R1-AGS:

```
<#root>

BGP: 10.1.1.1 open active, delay 9568ms
BGP: 10.1.1.1 multihop open delayed 19872ms

(no route)

BGP: 10.1.1.1 multihop open delayed 12784ms

(no route)
```

Debugs on Router R6-2500:

```
<#root>

BGP: 10.2.2.2 open active, delay 6531ms
BGP: 10.2.2.2 multihop open delayed 14112ms

(no route)

BGP: 10.2.2.2 multihop open delayed 15408ms

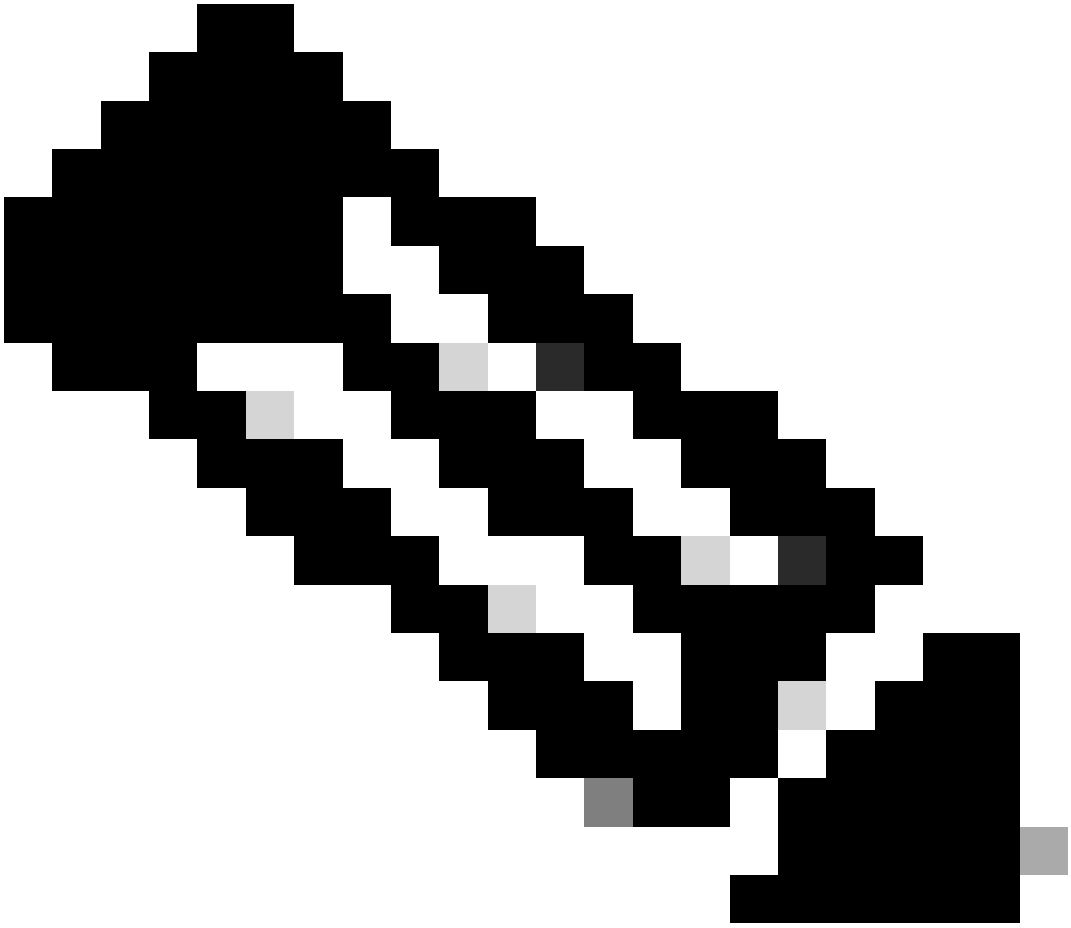
(no route)
```

Solution

The solution is to include a route to the next hop in the BGP neighbor statement. Use a static or dynamic route depending on the situation.

In an internal BGP (iBGP) environment where you have more control, you can propagate the route dynamically using a routing protocol.

In an external BGP (eBGP) situation, it is recommended to configure a static route to reach the next hop.



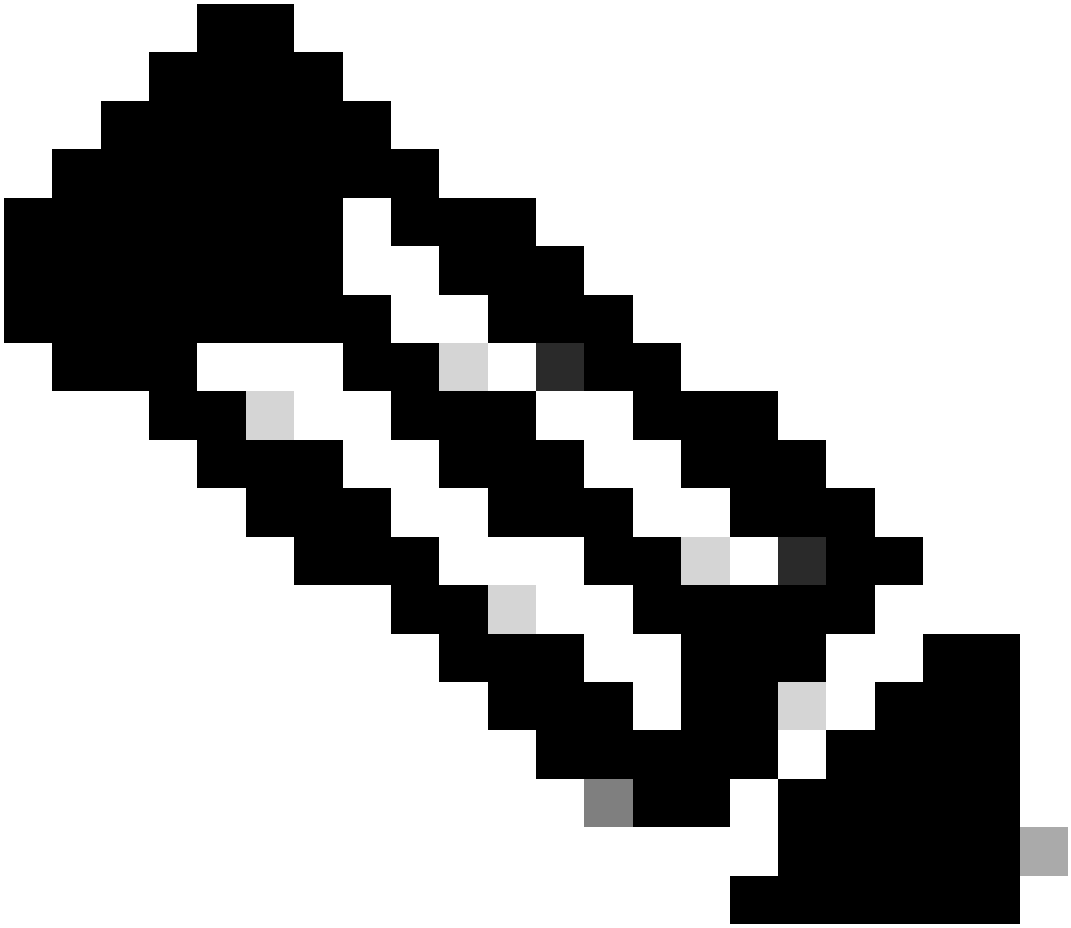
Note: Use the **neighbor ebgp-multihop** command only when the IP address you are peering to on your eBGP peer is not directly connected.

In this example, a static route is used.

R1-AGS	R6-2500
<#root> router bgp 300 neighbor 10.1.1.1 remote-as 400 neighbor 10.1.1.1 **ebgp-multihop 2** neighbor 10.1.1.1 update-source Loopback0 ! **ip route 10.1.1.1 255.255.255.255 10.10.10.2**	<#root> router bgp 400 neighbor 10.2.2.2 remote-as 300 neighbor 10.2.2.2 **ebgp-multihop 2** neighbor 10.2.2.2 update-source Loopback0 ! **ip route 10.2.2.2 255.255.255.255 10.10.10.1**

The **show ip bgp summary** command shows Router R1-AGS is in the established state.

```
<#root>
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
10.1.1.1         4   400       3       3        1    0    0 00:00:26        0
```



Note: A default route is never going to be used to establish a BGP session (iBGP/eBGP), and you see the same (no route) output in the debugs, although you are able to ping the BGP neighbor. The solution is again to add a route to the BGP neighbor.

Problem

Update-source Command Is Missing Under BGP

The **show ip bgp summary** command on Router R1-AGS shows the session is active.

```
<#root>

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
10.1.1.1         4   400       0       0        0    0    0

never    Active
```

The configurations are:

R1-AGS	R6-2500
<#root> interface Loopback0 ip address 10.2.2.2 255.255.255.255 ! interface Serial1 ip address 10.10.10.1 255.255.255.0 ! router bgp 400 **neighbor 10.1.1.1 remote-as 400** ! ip route 10.1.1.1 255.255.255.255 10.10.10.2	<#root> interface Loopback0 ip address 10.1.1.1 255.255.255.255 ! interface Serial0 ip address 10.10.10.2 255.255.255.0 ! router bgp 400 **neighbor 10.2.2.2 remote-as 400** ! ip route 10.2.2.2 255.255.255.255 10.10.10.1

If you run **debug** commands, it shows the TCP connection fails.

Debugs on Router R1-AGS:

```
<#root>

TCP: sending RST, seq 0, ack 2248020754
TCP: sent RST to

10.10.10.2:11018 from 10.2.2.2:179
BGP: 10.1.1.1 open active, local address 10.10.10.1

TCB0016B06C created
TCB0016B06C setting property 0 16ADEA
TCB0016B06C bound to 10.10.10.1.11042
TCP: sending SYN, seq 4099938541, ack 0
TCP0: Connection to 10.1.1.1:179, advertising MSS 536
```

```
TCP0: state was CLOSED -> SYNSENT [11042 -> 10.1.1.1(179)]
TCP0: state was SYNSENT -> CLOSED [11042 -> 10.1.1.1(179)]

TCP0: bad seg from 10.1.1.1 -- closing connection:

 seq 0 ack 4099938542 rcvnxt 0 rcvwnd 0
TCP0: connection closed - remote sent RST
TCB0016B06C destroyed

BGP: 10.1.1.1 open failed: Connection refused by remote host
```

Debugs on Router R6-2500:

```
<#root>

BGP: 10.2.2.2 open active, local address 10.10.10.2

TCB00194800 created
TCB00194800 setting property TCP_WINDOW_SIZE (0) E6572
TCB00194800 setting property TCP_TOS (11) E6571
TCB00194800 bound to 10.10.10.2.11018
TCP: sending SYN, seq 2248020753, ack 0
TCP0: Connection to 10.2.2.2:179, advertising MSS 556
TCP0: state was CLOSED -> SYNSENT [11018 -> 10.2.2.2(179)]
TCP0: state was SYNSENT -> CLOSED [11018 -> 10.2.2.2(179)]

TCP0: bad seg from 10.2.2.2 -- closing connection:

 seq 0 ack 2248020754 rcvnxt 0 rcvwnd 0
TCP0: connection closed - remote sent RST
TCB 0x194800 destroyed

BGP: 10.2.2.2 open failed: Connection refused by remote host

TCP: sending RST, seq 0, ack 4099938542
TCP: sent RST to

10.10.10.1:11042 from 10.1.1.1:179
```

Solution

In order to solve this problem, either configure the **update-source** command on both routers, or remove the **update-source** command and change the neighbor statement on both routers.

These are examples of both solutions.

The **update-source** command is configured on both routers:

R1-AGS	R6-2500
<#root> interface Loopback0 ip address 10.2.2.2 255.255.255.255 ! interface Serial1 ip address 10.10.10.1 255.255.255.0	<#root> interface Loopback0 ip address 10.1.1.1 255.255.255.255 ! interface Serial0 ip address 10.10.10.2 255.255.255.0

! router bgp 400 neighbor 10.1.1.1 remote-as 400 **neighbor 10.1.1.1 update-source Loopback0** ! ip route 10.1.1.1 255.255.255.255 10.10.10.2	! router bgp 400 neighbor 10.2.2.2 remote-as 400 **neighbor 10.2.2.2 update-source Loopback0** ! ip route 10.2.2.2 255.255.255.255 10.10.10.1

The **show ip bgp summary** command shows Router R1-AGS is in the established state.

```
<#root>

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
10.2.2.2         4   400       3       3        1    0    0 00:00:26        0
```

You only have to use the **update-source** command when someone is peering to your loopback address. This is true for an iBGP peer and an eBGP peer.

Here, the **update-source** command is removed and the neighbor statement is changed on both routers.

R1-AGS	R6-2500
<#root> interface Loopback0 ip address 10.2.2.2 255.255.255.255 ! interface Serial1 ip address 10.10.10.1 255.255.255.0 ! router bgp 400 **neighbor 10.10.10.2 remote-as 400**	<#root> interface Loopback0 ip address 10.1.1.1 255.255.255.255 ! interface Serial0 ip address 10.10.10.2 255.255.255.0 ! router bgp 400 **neighbor 10.10.10.1 remote-as 400**

The **show ip bgp summary** command shows Router R1-AGS is in the established state.

```
<#root>

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
```

```
10.10.10.2      4   400       3       3        1    0    0 00:00:26        0
```

Related Information

- **BGP Support Page**
- **Cisco Technical Support & Downloads**