Sample IPv6 Configuration for BGP with Two Different Service Providers (Multihoming)

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Introduction

Border Gateway Protocol (BGP) is one of the key protocols to use to achieve Internet connection redundancy. When you connect your network to two different Internet service providers (ISPs), it is called multihoming. Multihoming provides redundancy and network optimization. It selects the ISP which offers the best path to a resource. When you run BGP with more than one service provider, you run the risk that your autonomous system (AS) will become a transit AS. This causes Internet traffic to pass through your AS and potentially consume all of the bandwidth and resources on the CPU of your router. This document addresses this issue and provides appropriate configuration examples.

Prerequisites

Requirements

Refer to this document before you proceed:

Sample Configuration for BGP with Two Different Service Providers (Multihoming)

Components Used

The information in this document is based on these software and hardware versions:

- Cisco 2800 Series Router with Cisco IOS® Software Release 12.4(13r)T
- Cisco 3800 Series Router with Cisco IOS Software Release 12.4(13r)T

Conventions

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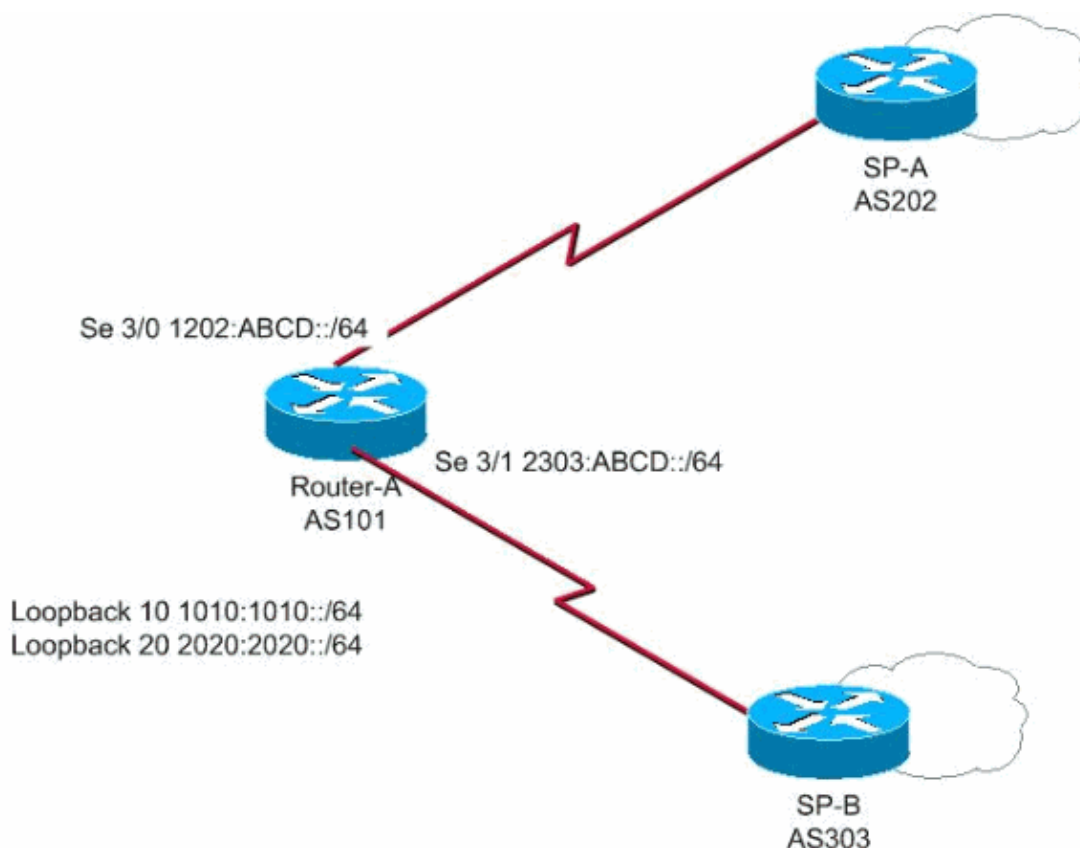
Configure

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

Note: Use the Command Lookup Tool (registered customers only) to find more information on the commands used in this document.

Network Diagram

This document uses this network setup:

In this network Router A connects to two different Service Providers SP−A and SP−B forming Multihoming where 1010:1010::/64 and 2020:2020::/64 is advertised by AS 101 to the outside and network 1212:1212::/64 is received from two different AS, AS 202 and AS 303.

Note: Here is a link to a video (available on Cisco Support Community) that provides overview of BGP Multihoming and gives advice on how to troubleshoot common BGP problems like peering and high CPU.

BGP Multi−homing: Design and Troubleshooting − Video from live Webcast

Configurations

This document uses these configurations:

- Router−A
- Service Provider A
- Service Provider B

Router–A

```
Router-A#
ipv6 unicast-routing

!---Enables the forwarding of IPv6 packets.

ipv6 cef
interface Serial3/0
 description CONNECTED TO SP-A
 ip address 192.168.10.1 255.255.255.0
 ipv6 address 1202:ABCD::/64 eui-64
 ipv6 enable
 no fair-queue
 clock rate 64000
!
interface Serial3/1
 description CONNECTED TO SP-B
 no ip address
 ipv6 address 2303:ABCD::/64 eui-64
 clock rate 64000
!
 router bgp 101
 bgp router-id 1.1.1.1
 no bgp default ipv4-unicast
 bgp log-neighbor-changes
 neighbor 1202:ABCD::21B:54FF:FEA9:24B0 remote-as 202

!--- Configures SP-A as neighbor.

 neighbor 1202:ABCD::21B:54FF:FEA9:24B0 ebgp-multihop 2
 neighbor 2303:ABCD::21B:54FF:FE54:FB10 remote-as 303

!--- Configures SP-B as neighbor.

 !
 address-family ipv6
  neighbor 1202:ABCD::21B:54FF:FEA9:24B0 activate
  neighbor 2303:ABCD::21B:54FF:FE54:FB10 activate
  network 1010:1010::/64
  network 2020:2020::/64
 exit-address-family
!
```

Service ProviderA

```
SP-A#
ipv6 unicast-routing
ipv6 cef
interface Serial1/0
 no ip address
 ipv6 address 1202:ABCD::/64 eui-64
 ipv6 enable
 no fair-queue
!
router bgp 202
 bgp router-id 2.2.2.2
 no bgp default ipv4-unicast
 bgp log-neighbor-changes
 neighbor 1202:ABCD::21C:58FF:FEED:3E90 remote-as 101

!--- Configuers Router A as neighbor.

 !
 address-family ipv6
```

```
  neighbor 1202:ABCD::21C:58FF:FEED:3E90 activate
  network 1212:1212::/64
 exit-address-family
!
```

Service ProviderB

```
SP-B#
ipv6 unicast-routing
ipv6 cef
interface Serial1/0
 no ip address
 ipv6 address 2303:ABCD::/64 eui-64
 no fair-queue
!
router bgp 303
 no synchronization
 bgp router-id 3.3.3.3
 bgp log-neighbor-changes
 neighbor 2303:ABCD::21C:58FF:FEED:3E90 remote-as 101

!--- Configures as Router A as neighbor.

 neighbor 2303:ABCD::21C:58FF:FEED:3E90 ebgp-multihop 5
 no auto-summary
 !
 address-family ipv6
  neighbor 2303:ABCD::21C:58FF:FEED:3E90 activate
  network 1212:1212::/64
 exit-address-family
!
```

Verify

Use this section to confirm that your configuration works properly.

The Output Interpreter Tool (registered customers only) (OIT) supports certain **show** commands. Use the OIT to view an analysis of **show** command output.

- Router A peering with Two ISPs

```
Router-A#
show bgp ipv6 unicast summary

BGP router identifier 1.1.1.1, local AS number 101
BGP table version is 6, main routing table version 6
3 network entries using 447 bytes of memory
4 path entries using 304 bytes of memory
4/2 BGP path/bestpath attribute entries using 496 bytes of memory
2 BGP AS-PATH entries using 48 bytes of memory
0 BGP route-map cache entries using 0 bytes of memory
0 BGP filter-list cache entries using 0 bytes of memory
BGP using 1295 total bytes of memory
BGP activity 3/0 prefixes, 14/10 paths, scan interval 60 secs


Neighbor          V    AS MsgRcvd MsgSent   TblVer  InQ OutQ Up/Down  State/PfxRcd
1202:ABCD::21B:54FF:FEA9:24B0   4    202   108      119    6    0    0 00:31:41   1
2303:ABCD::21B:54FF:FE54:FB10   4    303   108      121    6    0    0 00:25:1    1


!--- Indicates that Router A is peering with both the ISP SP-A and SP-B
```

- Router-A learned Routes from SP-A and SP-B

```
Router-A#show bgp ipv6 unicast
BGP table version is 6, local router ID is 1.1.1.1
Status codes: s suppressed, d damped, h history, * valid, > best, i - internal,
              r RIB-failure, S Stale
Origin codes: i - IGP, e - EGP, ? - incomplete

   Network          Next Hop            Metric LocPrf Weight Path
*> 1010:1010::/64   ::                       0              32768 i
*  1212:1212::/64   2303:ABCD::21B:54FF:FE54:FB10 0  0 303 i
*>                          1202:ABCD::21B:54FF:FEA9:24B0 0  0 202 i
*> 2020:2020::/64   ::                       0              32768 i
```

- On SP–A:

```
SP-A#sh bgp ipv6 unicast
BGP table version is 4, local router ID is 2.2.2.2
Status codes: s suppressed, d damped, h history, * valid, > best, i - internal,
              r RIB-failure, S Stale
Origin codes: i - IGP, e - EGP, ? - incomplete

   Network          Next Hop            Metric LocPrf Weight Path
*> 1010:1010::/64   1202:ABCD::21C:58FF:FEED:3E90 0 0 101 i
*> 1212:1212::/64   ::                       0              32768          i
*> 2020:2020::/64   1202:ABCD::21C:58FF:FEED:3E90 0 0 101 i
```

- On SP–B:

```
SP-B#sh bgp ipv6 unicast
BGP table version is 4, local router ID is 3.3.3.3
Status codes: s suppressed, d damped, h history, * valid, > best, i - internal,
              r RIB-failure, S Stale
Origin codes: i - IGP, e - EGP, ? - incomplete

   Network          Next Hop            Metric LocPrf Weight Path
*> 1010:1010::/64   2303:ABCD::21C:58FF:FEED:3E90 0         0 101 i
*  1212:1212::/64   2303:ABCD::21C:58FF:FEED:3E90  0            101 202 i
*>                  ::                       0         32768 i
*> 2020:2020::/64   2303:ABCD::21C:58FF:FEED:3E90 0         0 101 i
```

Troubleshoot

Use the **debug bgp ipv6 update** command in order to display debugging information on the updates to help determine the state of the peering.

Related Information

- **Border Gateway Protocol (BGP)**
- **BGP Case studies**
- **BGP Command Reference**
- **BGP Configuration Guide**
- **Technical Support & Documentation – Cisco Systems**