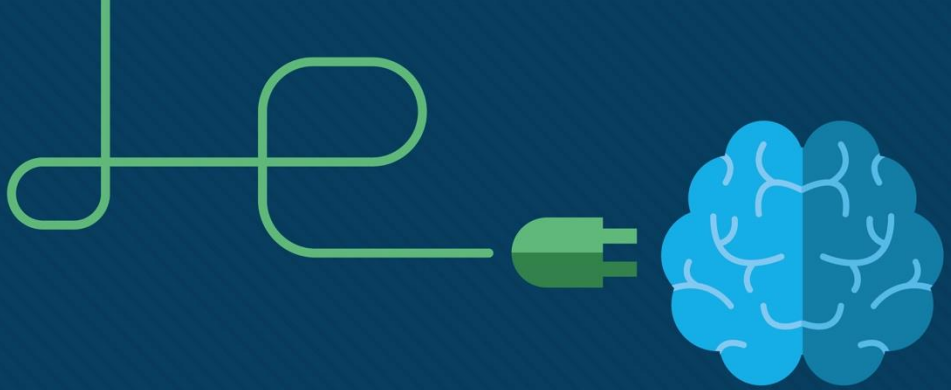


# Chapter 9: Branch Connections

Redes de Computadores II

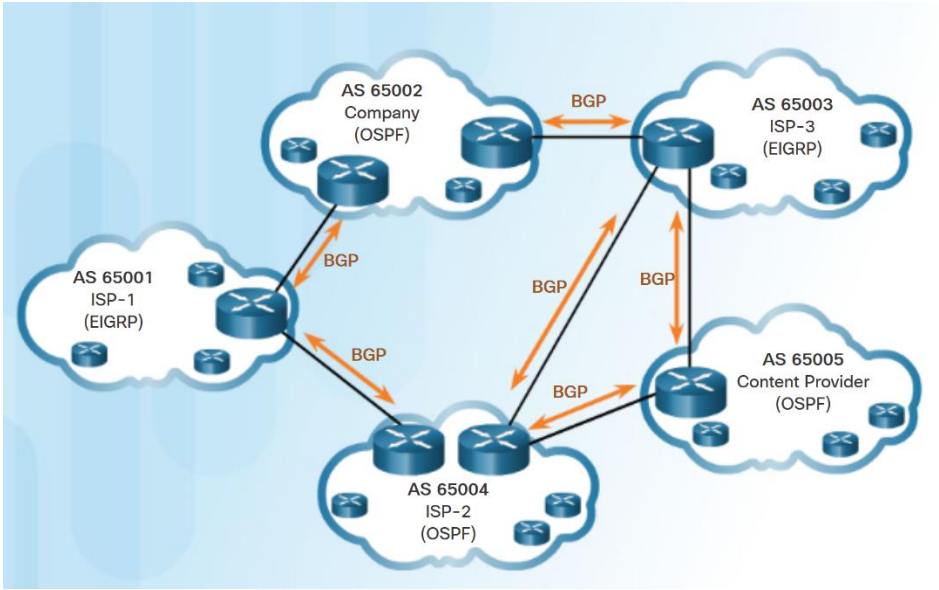
# Chapter 9 - Sections & Objectives

- 9. eBGP
  - Implement eBGP in a single-homed remote access network.
    - Describe basic BGP features.
    - Explain BGP design considerations.
    - Configure an eBGP branch connection.

# 9.5 eBGP

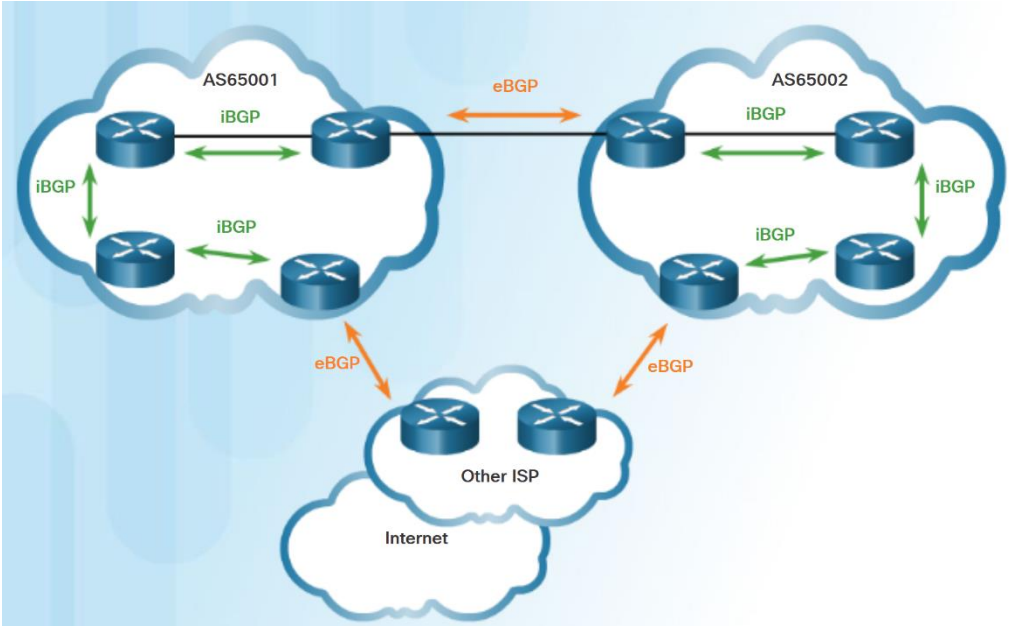
# IGP and EGP Routing Protocols

- IGPs are used to exchange routing information within a company network or an autonomous system (AS).
- An Exterior Gateway Protocol (EGP) is used for the exchange of routing information between autonomous systems, such as ISPs.
- Border Gateway Protocol (BGP) is an Exterior Gateway Protocol (EGP).
  - Every AS is assigned a unique 16-bit or 92-bit AS number which uniquely identifies it on the Internet.



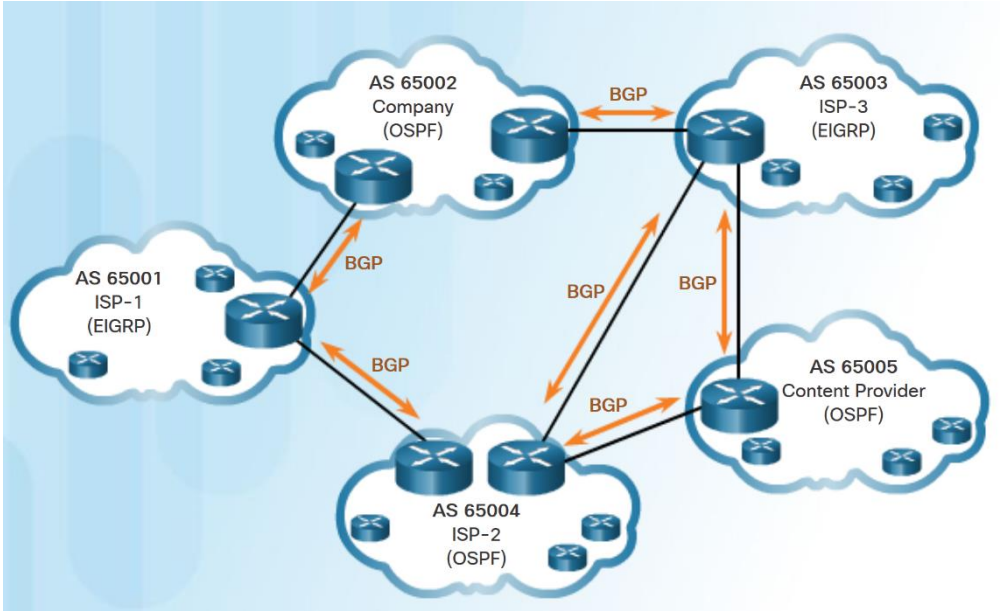
# eBGP and iBGP

- **External BGP (eBGP)** – External BGP is the routing protocol used between routers in different autonomous systems.
- **Internal BGP (iBGP)** - Internal BGP is the routing protocol used between routers in the same AS.
- Two routers exchanging BGP routing information are known as BGP peers



# When to use BGP

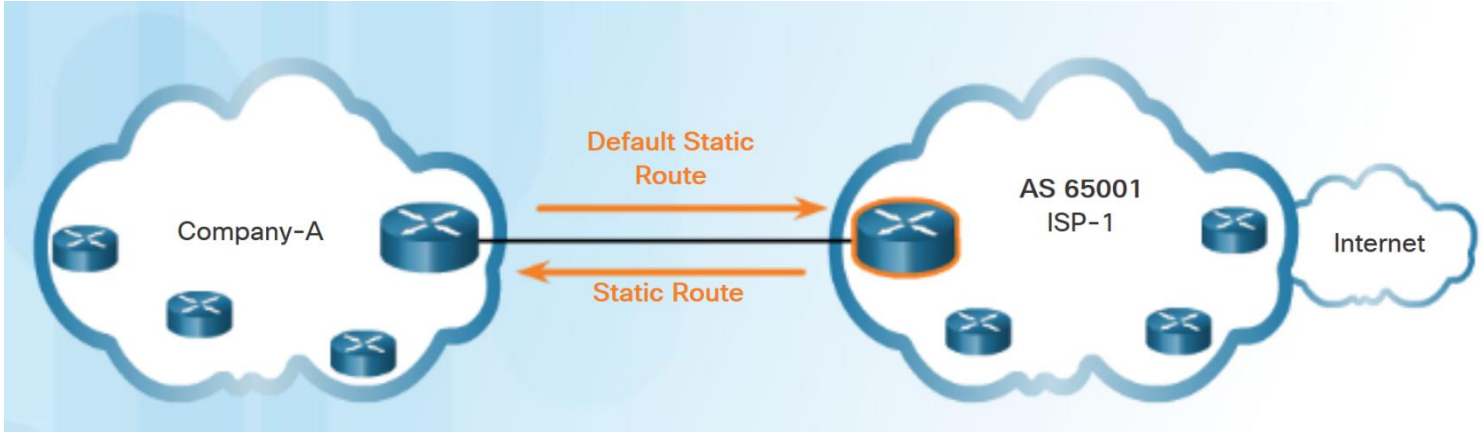
- BGP is used when an AS has connections to multiple autonomous systems. This is known as multi-homed.
- A misconfiguration of a BGP router could have negative effects throughout the Internet.



# When not to use BGP

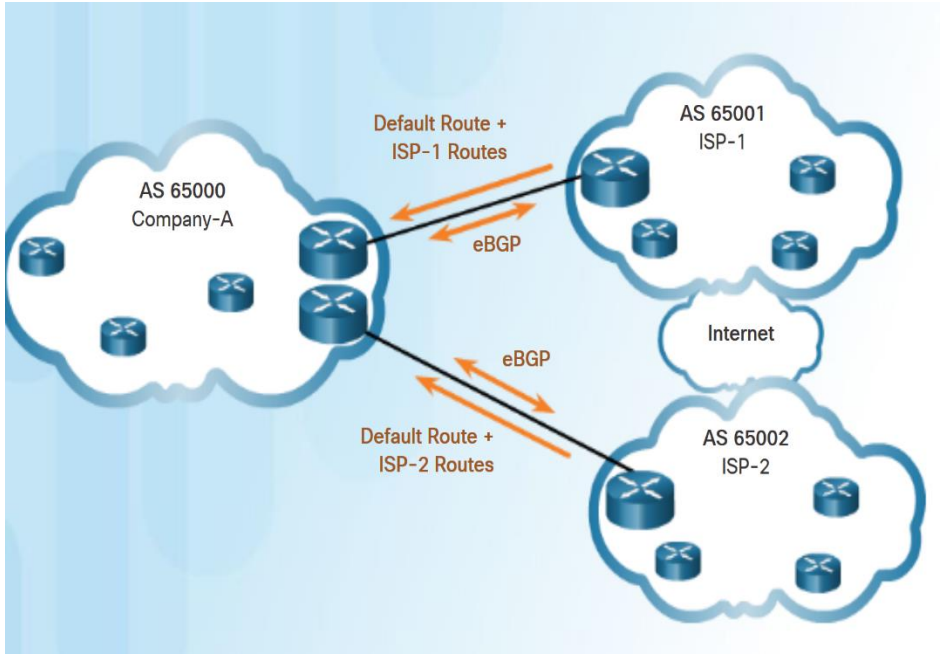
- BGP should not be used when one of the following conditions exist:
  - There is a single connection to the Internet or another AS. Known as single-homed.
  - When there is a limited understanding of BGP.

**Note:** Although it is recommended only in unusual situations, for the purposes of this course, you will configure single-homed BGP.



# BGP Options

- Three common ways an organization can implement BGP in a multi-homed environment:
  - Default Route Only
  - Default Route and ISP Routes
  - All Internet Routes (this would include routes to over 550,000 networks)



# Steps to Configure eBGP

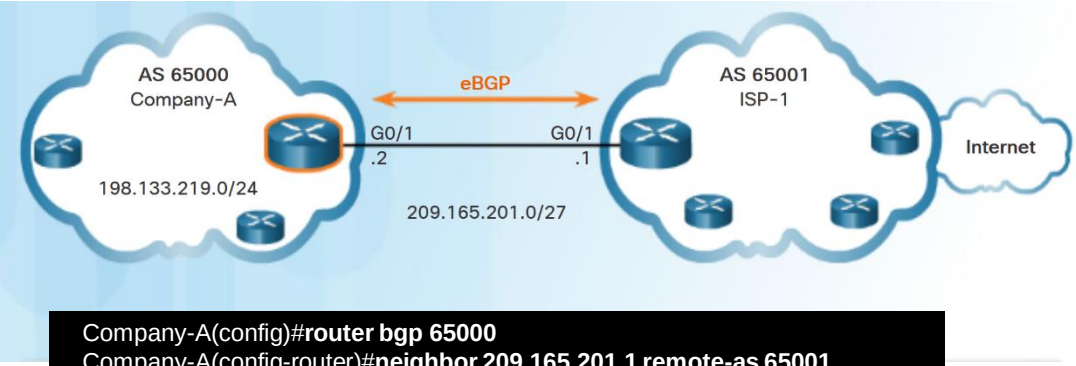
- To implement eBGP:
  - Enable BGP routing.
  - Configure BGP neighbor(s) (peering)
  - Advertise network(s) originating from this AS.

| Command | Description |
|---|---|
| `Router(config)# router bgp as-number` | Enables a BGP routing process, and places the router in router configuration mode. |
| `Router(config-router)# neighbor ip-address remote-as as-number` | Specifies a BGP neighbor. The as-number is the neighbor's AS number. |
| `Router(config-router)# network network-address [mask network-mask]` | Advertises a network address to an eBGP neighbor as being originated by this AS. The network-mask is the subnet mask of the network. |

# BGP Sample Configuration

- The **router bgp** *as-number* global configuration command enables BGP and identifies the AS number.
- The **neighbor** *ip-address* **remote-as** *as-number* router configuration command identifies the BGP peer and its AS number.
- The **network** *network-address* [**mask** *network-mask*] router configuration command enters the network-address into the local BGP table.

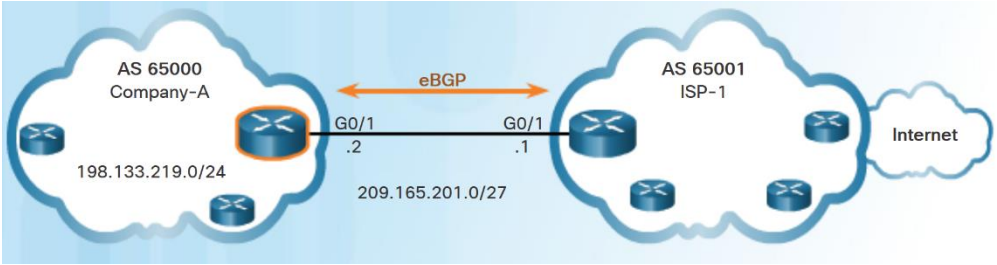
**Note:** The network-address used in the network command does not have to be a directly connected network.




```
Company-A(config)#router bgp 65000
Company-A(config-router)#neighbor 209.165.201.1 remote-as 65001
Company-A(config-router)#network 198.199.219.0 mask 255.255.255.0
```

```
ISP-1(config)#router bgp 65001
ISP-1(config-router)#neighbor 209.165.201.2 remote-as 65000
ISP-1(config-router)#network 0.0.0.0
```

# Verify eBGP




- Three commands to verify eBGP:
  - **show ip route**
  - **show ip bgp**
  - **show ip bgp summary**

```
Company-A# show ip route
Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP
<output omitted>

Gateway of last resort is 209.165.201.1 to network 0.0.0.0
B*    0.0.0.0/0 [20/0] via 209.165.201.1, 00:36:03
      10.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C        198.133.219.0/24 is directly connected, GigabitEthernet0/0
L        198.133.219.1/32 is directly connected, GigabitEthernet0/0
      209.165.201.0/24 is variably subnetted, 2 subnets, 2 masks
C        209.165.201.0/27 is directly connected, GigabitEthernet0/1
L        209.165.201.2/32 is directly connected, GigabitEthernet0/1
Company-A#
```

```
Company-A# show ip bgp
BGP table version is 3, local router ID is 209.165.201.2
Status codes: s suppressed, d damped, h history, * valid, > best, i - internal,
              r RIB-failure, S Stale, m multipath, b backup-path, f RT-Filter,
              x best-external, a additional-path, c RIB-compressed,
Origin codes: i - IGP, e - EGP, ? - incomplete
RPKI validation codes: V valid, I invalid, N Not found

     Network          Next Hop            Metric LocPrf Weight Path
*>   0.0.0.0          209.165.201.1            0             0 65001 i
*>   198.133.219.0/24 0.0.0.0                  0         32768 i
Company-A#
```

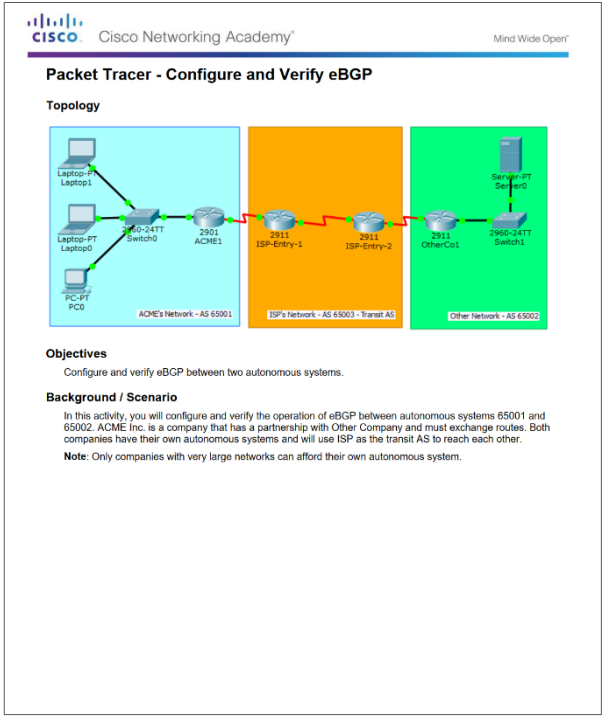
```
Company-A# show ip bgp summary
BGP router identifier 209.165.201.2, local AS number 65000
BGP table version is 3, main routing table version 3
2 network entries using 288 bytes of memory
2 path entries using 160 bytes of memory
2/2 BGP path/bestpath attribute entries using 320 bytes of memory
1 BGP AS-PATH entries using 24 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 792 total bytes of memory
BGP activity 2/0 prefixes, 2/0 paths, scan interval 60 secs

Neighbor        V    AS MsgRcvd MsgSent   TblVer  InQ OutQ Up/Down  State/PfxRcd
209.165.201.1   4 65001      66      66        3    0    0 00:56:11        1
Company-A#
```



# Packet Tracer - Configure and Verify eBGP



Cisco Networking Academy® Mind Wide Open™

**Packet Tracer - Configure and Verify eBGP**

**Topology**



**Objectives**

Configure and verify eBGP between two autonomous systems.

**Background / Scenario**

In this activity, you will configure and verify the operation of eBGP between autonomous systems 65001 and 65002. ACME Inc. is a company that has a partnership with Other Company and must exchange routes. Both companies have their own autonomous systems and will use ISP as the transit AS to reach each other.

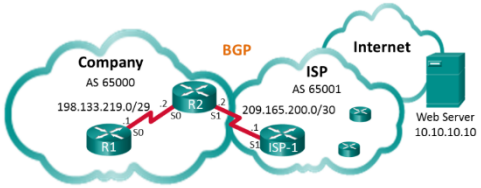
**Note**: Only companies with very large networks can afford their own autonomous system.

# Lab - Configure and Verify eBGP

Cisco Networking Academy® Mind Wide Open™

## Lab - Configure and Verify eBGP

### Topology




### Addressing Table

| Device | Interface | IP Address | Subnet Mask |
|---|---|---|---|
| R1 | S0/0/0 (DCE) | 198.133.219.1 | 255.255.255.248 |
| R2 | S0/0/0 | 198.133.219.2 | 255.255.255.248 |
| | S0/0/1 (DCE) | 209.165.200.2 | 255.255.255.252 |
| ISP-1 | S0/0/1 | 209.165.200.1 | 255.255.255.252 |
| Web Server | | 10.10.10.10 | 255.255.255.255 |

### Objectives

**Part 1: Build the Network and Configure Basic Device Settings**

**Part 2: Configure eBGP on R1**

**Part 3: Verify eBGP Configuration**

### Background / Scenario

In this lab you will configure eBGP for the Company. The ISP will provide the default route to the Internet. After the configuration is complete, you will use various **show** commands to verify that the eBGP configuration is working as expected.

### Required Resources

- 3 Routers (Cisco 1941 with Cisco IOS Release 15.2(4)M3 universal image or comparable)
- Console cables to configure the Cisco IOS devices via the console ports
- Serial cables as shown in the topology

# 9.6 Chapter Summary

# Chapter 9: Branch Connections

- Implement eBGP in a single-homed remote access network.


P.PORTO