



# PyNetLabs

Network Automation Specialists

<https://t.me/learningnets>

# BGP FEATURES

1

BGP can't be compared with IGPs like OSPF and EIGRP.

3

BGP can handle huge routing tables.

5

In BGP, neighbors are known as "Peers."

BGP is considered a "Path Vector" routing protocol.

2

Neighbor discovery in BGP is not automatic.

4

Designed for inter AS routing.

6

# BGP FEATURES

7

BGP is an application layer protocol uses TCP Port 179.

9

BGP is algorithm less as it uses Attributes for best path selection.

**AD Values**  
200 – iBGP  
20 – eBGP

8

BGP sends updates to configured neighbor as unicast.  
(Because of manual neighborhood)

10

# BGP TABLES

## NEIGHBOR TABLE

- A list of all manually configured BGP neighbors.  
`#show ip bgp summary`

## FORWARDING TABLE

- A list of all networks known in BGP along with their AS Paths & Attributes.  
`#show ip bgp`

## ROUTING TABLE

- List of best paths to particular destination  
`#show ip route`  
`#show ip route bgp`

# BGP FINITE-STATE MECHANISM

- As a BGP peer session is forming, it will pass through several states. This process is known as the BGP Finite-State Machine (FSM)
  1. **Idle** - Router is searching routing table to see whether a route exists to reach the neighbor.
  2. **Connect** - BGP waits for a TCP connection with the remote peer. If successful, an OPEN message is sent. If unsuccessful, the session is placed in an Active state.
  3. **Active** – BGP attempts to initiate a TCP connection with the remote neighbor. If unsuccessful, BGP will wait for a ConnectRetry timer to expire, and puts the session back in a Connect State.

# BGP FINITE-STATE MECHANISM

- 4. OpenSent** – BGP has established the TCP connection & exchanges the open messages and then the BGP peer will send a KEEPALIVE message.
- 5. OpenConfirm** – BGP listens for a reply KEEPALIVE message.
- 6. Established** - Peering is established and routing updates are being sync.

# BGP NEIGHBORS

| <b>iBGP</b>  | <b>eBGP</b>   |
|--|---|
| <ul style="list-style-type: none"><li>• BGP neighbors within the same autonomous system</li></ul>        | <ul style="list-style-type: none"><li>• BGP neighbors with different autonomous system.</li></ul> |
| <ul style="list-style-type: none"><li>• I-BGP neighbors doesn't need to be directly connected.</li></ul> | <ul style="list-style-type: none"><li>• E-BGP neighbors needs to be directly connected.</li></ul> |
| <ul style="list-style-type: none"><li>• AD-200</li></ul>   | <ul style="list-style-type: none"><li>• AD-20</li></ul>   |

# BGP ATTRIBUTES

## (Well-Known)

## (Optional)

### Mandatory

- AS Path
- Next HOP
- Origin
  - i
  - e
  - ?

### Discretionary

- Local Preference
- Atomic Aggregate

### Transitive

- Aggregator
- Community
  - no-export
  - no-advertise
  - internet
  - Local-as

### Non-Transitive

- MED
- Originator
- Cluster-id

# BGP Attributes

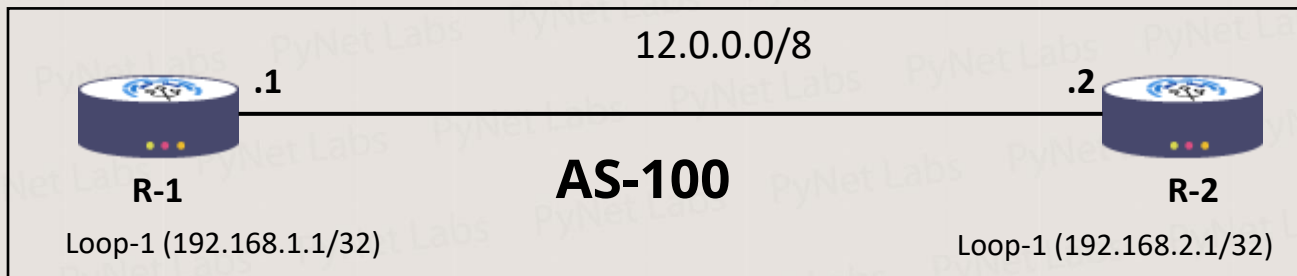
- **Well-Known Mandatory** - As the name represents itself that it's recognized by every BGP-Peer. This simply means every router configured with BGP will understand this attribute and also it's included in every BGP Update.
- **Well-Known Discretionary** - It's going to be recognized by all BGP routers but it may be present or may not be present in the BGP update.
- **Optional Transitive** - It's optional, which means it may be present in the BGP update or it may not be present & It must be forwarded by BGP router, either it support that attribute or not.
- **Optional Non-Transitive** - These attributes are allowed to be unrecognized by some BGP routers. If a BGP router does not recognize one of these attributes it is quietly ignored and not passed on to other BGP peers.

# BGP Attributes Continued...

- **AS Path (Well-known Mandatory)** - It identifies the path of traversed AS to reach a specific destination. AS-Path information is always carried by routing updates.
- **Next-Hop (Well-known Mandatory)** - It Identifies the next hop IP address to reach a particular destination.
- **Origin (Well-known Mandatory)** - It finds from where the route actually got introduced into your BGP Routing Table.
- **Local Preference (Well-known, Discretionary)** – Provides a preference to determine the best path.
- **Weight (Cisco Proprietary)** – Similar to Local Preference, provides a local weight to determine the best path

# BGP Attributes Continued...

- **Atomic Aggregate (Well-known, Discretionary)** – Identifies routes that have been summarized.
- **Aggregator (Optional Transitive)** - It identifies the router that performed the aggregation.
- **Community (Optional Transitive)** - Tags the routes that share common characteristics.



```
R1(config)#router bgp 100
R1(config-router)#neighbor 12.0.0.2 remote-as 100
R1(config-router)#network 192.168.1.1 mask 255.255.255.255
R1(config-router)#exit
```

```
R2(config)#router bgp 100
R2(config-router)#neighbor 12.0.0.1 remote-as 100
R2(config-router)#network 192.168.2.2 mask 255.255.255.255
R2(config-router)#end
```

**Now you can check if the routers have the iBGP routes in the routing table using the command 'show ip route' in the enable mode.**

# E-BGP LAB



```
R1(config)#router bgp 100
R1(config-router)#neighbor 12.0.0.2 remote-as 200
R1(config-router)#network 192.168.1.1 mask 255.255.255.255
R1(config-router)#exit
```

```
R2(config)#router bgp 200
R2(config-router)#neighbor 12.0.0.1 remote-as 100
R2(config-router)#network 192.168.2.2 mask 255.255.255.255
R2(config-router)#end
```

**Now you can check if the routers have the iBGP routes in the routing table using the command 'show ip route' in the enable mode.**



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## THANK YOU

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### Let's Connect.



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