

Attribute Types

- Well-known Mandatory** · Must be supported and propagated
- Well-known Discretionary** · Must be supported; propagation optional
- Optional Transitive** · Marked as partial if unsupported by neighbor
- Optional Nontransitive** · Deleted if unsupported by neighbor

Attributes

Name	Type	Description
Aggregator	OT	ID and AS of router which performed summarization
AS Path	WM	List of autonomous systems which the advertisement has traversed
Atomic Aggregate	WD	Includes ASes which have been dropped due to route aggregation
Cluster ID	ON	Originating cluster
Community	OT	Route tag
Local Preference	WD	Metric for internal neighbors to reach external destinations (default 100)
Multiple Exit Discriminator (MED)	ON	Metric for external neighbors to reach the AS (default 0)
Next Hop	WM	External peer in neighboring AS
Origin	WM	Origin type (IGP, EGP, or unknown)
Originator ID	ON	Identifies a route reflector
Weight	O	Cisco proprietary, not communicated to peers (default 0)

Path Selection

Order	Description	Preference
1 Weight	Administrative preference	Highest
2 Local Preference	Communicated between peers within an AS	Highest
3 Self-originated	Prefer paths originated locally	True
4 AS Path	Minimize AS hops	Shortest
5 Origin	Prefer IGP-learned routes over EGP, and EGP over unknown	IGP
6 MED	Used externally to enter an AS	Lowest
7 External	Prefer eBGP routes over iBGP	eBGP
8 IGP Cost	Consider IGP attributes	Lowest
9 eBGP Peering	Favor more stable routes	Oldest
10 Router ID	Tie breaker	Lowest

Influencing Path Selection

- Weight** neighbor 172.16.0.1 weight 200
- Local Preference** bgp default local-preference 100
- MED** default-metric 400
- Route Map** neighbor 172.16.0.1 route-map Foo

About BGP

Type	Path Vector
eBGP AD	20
iBGP AD	200
Standard	RFC 4271
Protocols	IP
Transport	TCP/179
Authentication	MD5

Terminology

Autonomous System (AS)

A logical domain under the control of a single entity

External BGP (eBGP)

BGP adjacencies which span autonomous system boundaries

Internal BGP (iBGP)

BGP adjacencies formed within a single autonomous system

Synchronization Requirement

A route must be known by an IGP before it may be advertised to BGP peers

Packet Types

Open	Update
Keepalive	Notification

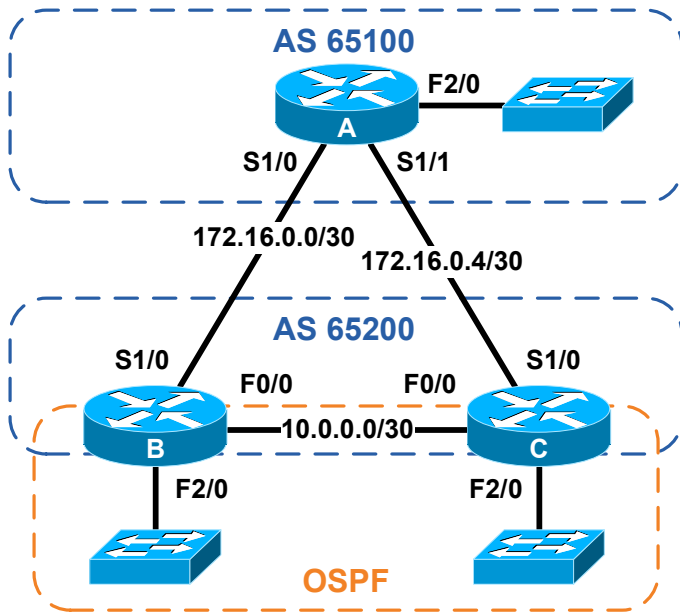
Neighbor States

- Idle** · Neighbor is not responding
- Active** · Attempting to connect
- Connect** · TCP session established
- Open Sent** · Open message sent
- Open Confirm** · Response received
- Established** · Established adjacency

Troubleshooting

- show ip bgp [summary]
- show ip bgp neighbors
- show ip route [bgp]
- clear ip bgp * [soft]
- debug ip bgp [...]

Configuration Example



```

interface Serial1/0
description Backbone to B
ip address 172.16.0.1 255.255.255.252
!
interface Serial1/1
description Backbone to C
ip address 172.16.0.5 255.255.255.252
!
interface FastEthernet2/0
description LAN
ip address 192.168.1.1 255.255.255.0
!
router bgp 65100
no synchronization
network 172.16.0.0 mask 255.255.255.252
network 172.16.0.4 mask 255.255.255.252
network 192.168.1.0
neighbor South peer-group
neighbor South remote-as 65200
neighbor 172.16.0.2 peer-group South
neighbor 172.16.0.6 peer-group South
no auto-summary
    
```

```

interface FastEthernet0/0
description Backbone to C
ip address 10.0.0.1 255.255.255.252
!
interface Serial1/0
description Backbone to A
ip address 172.16.0.2 255.255.255.252
!
interface FastEthernet2/0
description LAN
ip address 192.168.2.1 255.255.255.0
!
router ospf 100
network 10.0.0.1 0.0.0.0 area 0
network 192.168.2.1 0.0.0.0 area 1
!
router bgp 65200
no synchronization
redistribute ospf 100 route-map LAN_Subnets
neighbor 10.0.0.2 remote-as 65200
neighbor 172.16.0.1 remote-as 65100
no auto-summary
!
access-list 10 permit 192.168.0.0 0.0.255.255
!
route-map LAN_Subnets permit 10
match ip address 10
set metric 100
    
```

```

interface FastEthernet0/0
description Backbone to B
ip address 10.0.0.2 255.255.255.252
!
interface Serial1/0
description Backbone to A
ip address 172.16.0.6 255.255.255.252
!
interface FastEthernet2/0
description LAN
ip address 192.168.3.1 255.255.255.0
!
router ospf 100
network 10.0.0.2 0.0.0.0 area 0
network 192.168.3.1 0.0.0.0 area 2
!
router bgp 65200
no synchronization
redistribute ospf 100 route-map LAN_Subnets
neighbor 10.0.0.1 remote-as 65200
neighbor 172.16.0.5 remote-as 65100
no auto-summary
!
access-list 10 permit 192.168.0.0 0.0.255.255
!
route-map LAN_Subnets permit 10
match ip address 10
set metric 100
    
```

Router A Routing Table

```

172.16.0.0/30 is subnetted, 2 subnets
C       172.16.0.4 is directly connected, S1/1
C       172.16.0.0 is directly connected, S1/0
C       192.168.1.0/24 is directly connected, F2/0
B       192.168.2.0/24 [20/100] via 172.16.0.2
B       192.168.3.0/24 [20/100] via 172.16.0.2
    
```

Router B Routing Table

```

172.16.0.0/30 is subnetted, 2 subnets
B       172.16.0.4 [20/0] via 172.16.0.1
C       172.16.0.0 is directly connected, S1/0
10.0.0.0/30 is subnetted, 1 subnets
C       10.0.0.0 is directly connected, F0/0
B       192.168.1.0/24 [20/0] via 172.16.0.1
C       192.168.2.0/24 is directly connected, F2/0
O IA   192.168.3.0/24 [110/2] via 10.0.0.2, F0/0
    
```