

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

## Path Selection

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

**Algorithm** Path Selection

**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 neighborships formed between autonomous systems

**Internal BGP (iBGP)** · BGP between peers within a single autonomous system

**Synchronization requirement** · Asserts that 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

**Connect** · TCP session established

**Open Sent** · Open message sent

**Open Confirm** · Response received

**Established** · Neighborhood established

## Troubleshooting

show ip bgp

show ip bgp summary

show ip bgp neighbors

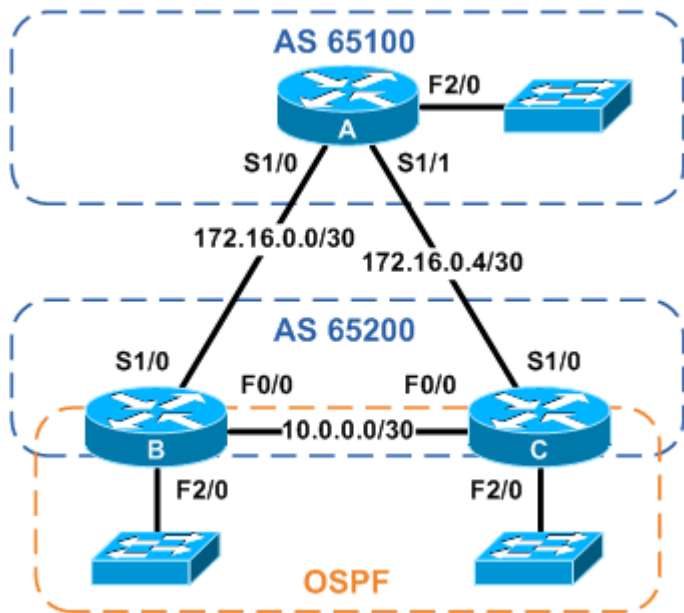
show ip route [bgp]

clear ip bgp \* [soft]

debug ip bgp events

debug ip bgp updates

## Configuration Example



### Router A

```
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
```

### Router B

```
interface FastEthernet0/0
  description Local 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 192.168.2.0 0.0.0.255 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
```

### Router C

```
interface FastEthernet0/0
  description Local 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 192.168.3.0 0.0.0.255 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
C    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
```