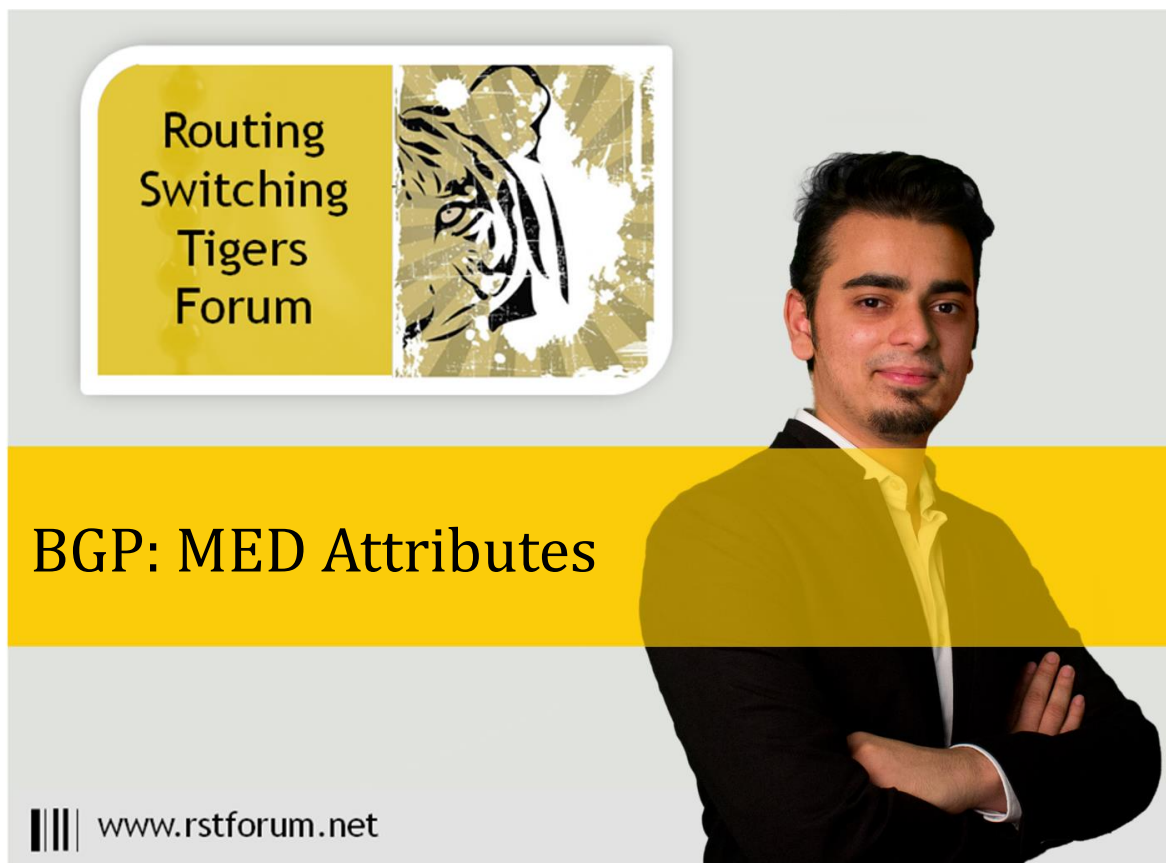


# LAB4: BGP – IPv4

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## *Disclaimer*

This Configuration Guide is designed to assist members to enhance their skills in respective technology area. While every effort has been made to ensure that all material is as complete and accurate as possible, the enclosed material is presented on an “as is” basis. Neither the authors nor Forum assume any liability or responsibility to any person or entity with respect to loss or damages incurred from the information contained in this guide. This Lab Guide was developed by RSTForum. Any similarities between material presented in this configuration guide and any other material is completely coincidental.



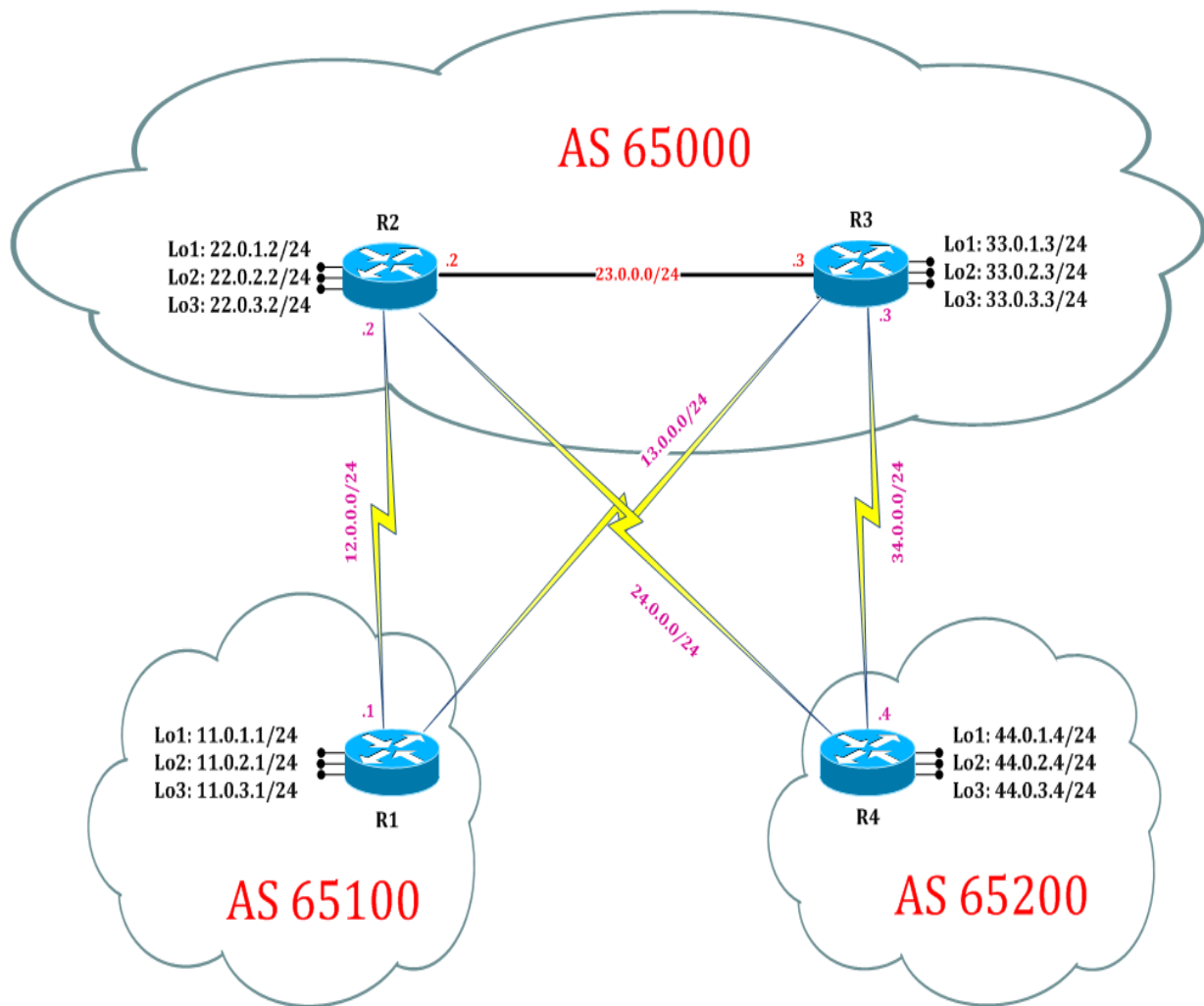
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**BGP: MED Attributes**

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# LAB 4: Diagram

Note: This Lab was developed on Cisco IOS Version 15.2(4) M1 ADVENTERPRISEK9-M.



# LAB 4: Configure BGP MED Attributes:

## Task 1: Configure BGP MED Attributes for Autonomous

Step 1 In the configuration mode of router configure BGP MED Attributes by following command:

```
R1:
interface s2/3
ip address 13.0.0.1 255.255.255.0
no shutdown
router bgp 65100
neighbor 13.0.0.3 remote-as 65000
address-family ipv4
neighbor 13.0.0.3 soft-reconfiguration inbound
exit
```

```
R2:
interface s2/3
ip address 24.0.0.2 255.255.255.0
no shutdown
router bgp 65000
neighbor 24.0.0.4 remote-as 65200
address-family ipv4
neighbor 24.0.0.4 soft-reconfiguration inbound
exit
```

```
R3:
interface s2/3
ip address 13.0.0.3 255.255.255.0
no shutdown
router bgp 65000
neighbor 13.0.0.1 remote-as 65100
address-family ipv4
neighbor 13.0.0.1 soft-reconfiguration inbound
exit
```

```
R4:
interface s2/3
ip address 24.0.0.4 255.255.255.0
no shutdown
router bgp 65200
neighbor 24.0.0.2 remote-as 65000
address-family ipv4
neighbor 24.0.0.2 soft-reconfiguration inbound
exit
```

Step 2 Verify IPv4 BGP routes by following command:

```
R1#show ip bgp
```

BGP table version is 21, local router ID is 11.0.3.1

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
*> 11.0.1.0/24	0.0.0.0	0		32768	i
*> 11.0.2.0/24	0.0.0.0	0		32768	i
*> 11.0.3.0/24	0.0.0.0	0		32768	i
*> 22.0.1.0/24	13.0.0.3			0	65000 i
*	22.0.1.2	0		0	65000 i
*> 22.0.2.0/24	13.0.0.3			0	65000 i
*	22.0.1.2	0		0	65000 i
*> 22.0.3.0/24	13.0.0.3			0	65000 i
*	22.0.1.2	0		0	65000 i
*> 33.0.1.0/24	13.0.0.3	0		0	65000 i
*	22.0.1.2			0	65000 i
*> 33.0.2.0/24	13.0.0.3	0		0	65000 i
*	22.0.1.2			0	65000 i
*> 33.0.3.0/24	13.0.0.3	0		0	65000 i
*	22.0.1.2	0			65000 i
* 44.0.1.0/24	22.0.1.2	0			65000 65200 i
*>	13.0.0.3	0			65000 65200 i
*> 44.0.2.0/24	13.0.0.3	0			65000 65200 i
*	22.0.1.2	0			65000 65200 i
*> 44.0.3.0/24	13.0.0.3	0			65000 65200 i
*	22.0.1.2	0			65000 65200 i

(MED is local to a router and it is use to change router's decision when it receives multiple path from same AS.

Router R1 can reach 22.0.2.0 via 22.0.1.2 and via 13.0.0.3 through AS 65000 i.e. Router R1 has multiple path to reach AS 65000. But Router R1 will select path via 13.0.0.3 as best path because MED select directly connected path as best path when having multiple exit. Therefore MED selects 13.0.0.3 as best directly connected to reach R2 as best path as 13.0.0.3 is directly connected.)

```
R4#show ip bgp
```

BGP table version is 13, local router ID is 44.0.3.4

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
* 11.0.1.0/24	33.0.1.3			0	65000 65100 i
*>	24.0.0.2			0	65000 65100 i
* 11.0.2.0/24	33.0.1.3			0	65000 65100 i
*>	24.0.0.2			0	65000 65100 i
* 11.0.3.0/24	33.0.1.3			0	65000 65100 i
*>	24.0.0.2			0	65000 65100 i
* 22.0.1.0/24	33.0.1.3			0	65000 i
*>	24.0.0.2	0		0	65000 i
* 22.0.2.0/24	33.0.1.3			0	65000 i
*>	24.0.0.2	0		0	65000 i
* 22.0.3.0/24	33.0.1.3			0	65000 i
*>	24.0.0.2	0		0	65000 i
* 33.0.1.0/24	33.0.1.3	0		0	65000 i
*>	24.0.0.2			0	65000 i
* 33.0.2.0/24	33.0.1.3	0		0	65000 i
*>	24.0.0.2			0	65000 i
* 33.0.3.0/24	33.0.1.3	0		0	65000 i
*>	24.0.0.2			0	65000 i
*>	44.0.1.0/24	0		32768	i
*>	44.0.2.0/24	0		32768	i
*>	44.0.3.0/24	0		32768	i

(Router R4 can reach 11.0.1.0 via 33.0.1.3 and via 24.0.0.2 through AS 65000 65100 i.e. Router R4 has multiple path to reach AS 65000. But Router R1 will select path via 24.0.0.2 as best path because MED select directly connected path as best path when having multiple exit. Therefore MED selects 24.0.0.2 as best directly connected to reach R2 as best path as 24.0.0.2 is directly connected.)

## Task 2: Configure BGP Selective Manipulation using MED for Autonomous

Step 1 In the configuration mode of router configure BGP Selective Manipulation using MED by following command:

```
R1:
router bgp 65100
address-family ipv4
neighbor 13.0.0.3 route-map aaa in
exit
route-map aaa permit 10
match ip address 1
set metric 5000
exit
route-map aaa permit 20
exit
access-list 1 permit 22.0.2.0 0.0.0.255
exit
```

Step 2 Verify IPv4 BGP routes by following command:

```
R1#show ip bgp
```

```
BGP table version is 38, local router ID is 11.0.3.1
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
*> 11.0.1.0/24	0.0.0.0	0		32768	i
*> 11.0.2.0/24	0.0.0.0	0		32768	i
*> 11.0.3.0/24	0.0.0.0	0		32768	i
*> 22.0.1.0/24	13.0.0.3			0	65000 i
*	22.0.1.2	0		0	65000 i
* 22.0.2.0/24	13.0.0.3	5000	0	65000	i
*>	22.0.1.2	0		0	65000 i
*> 22.0.3.0/24	13.0.0.3			0	65000 i
*	22.0.1.2	0		0	65000 i
*> 33.0.1.0/24	13.0.0.3	0		0	65000 i
*	22.0.1.2			0	65000 i
*> 33.0.2.0/24	13.0.0.3	0		0	65000 i

```

*          22.0.1.2          0  65000 i
*> 33.0.3.0/24 13.0.0.3      0  65000 i
*          22.0.1.2          0  65000 i
* 44.0.1.0/24 22.0.1.2      0  65000 65200 i
*>          13.0.0.3          0  65000 65200 i
*> 44.0.2.0/24 13.0.0.3      0  65000 65200 i
*          22.0.1.2          0  65000 65200 i
*> 44.0.3.0/24 13.0.0.3      0  65000 65200 i
*          22.0.1.2          0  65000 65200 i

```

(Router R1 can now reach 22.0.2.0 via 22.0.1.2. This is done by calling route map policy in which selective route 22.0.2.0 only will set 13.0.0.3 metric 5000 and rest all routes will select their best path via 13.0.0.3. Hence Selective Route Manipulation is done.)