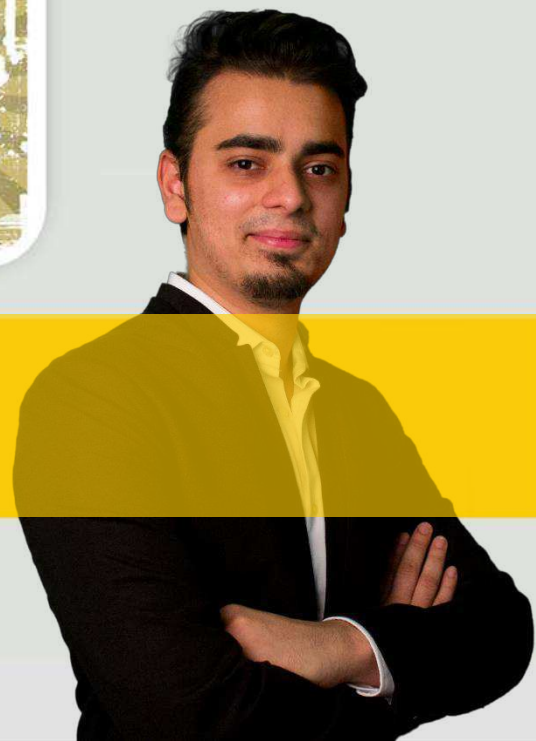


Routing
Switching
Tigers
Forum

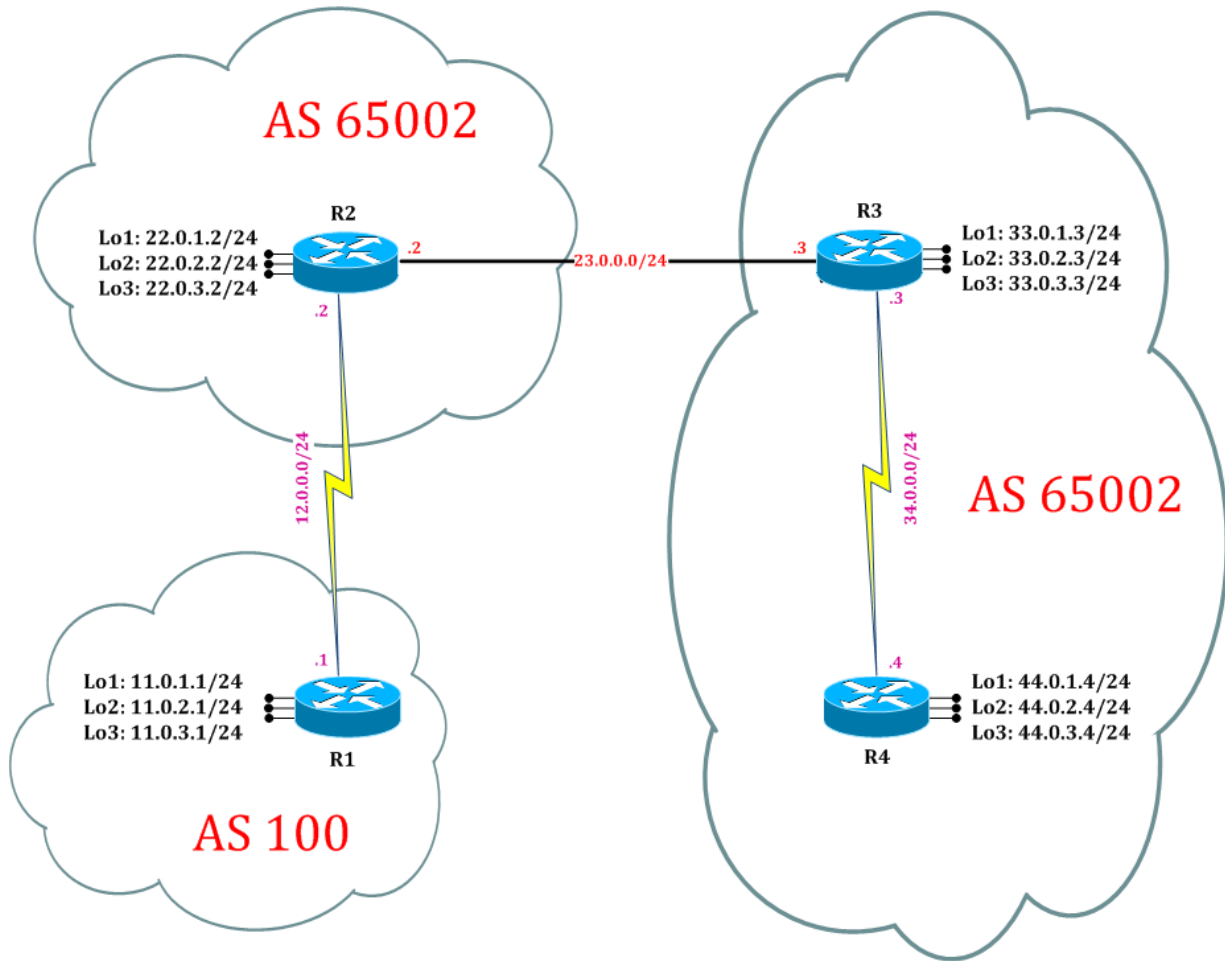


BGP



||| | www.rstforum.net

BGP Topology



WWW.

LAB 10: Configure BGP Route Dampening

Task 1: Configure IPv4 BGP Process for Autonomous

Step 1. In the configuration mode of router configure IPv4 BGP Process by following command:

R1:

```
router bgp 100
neighbor 12.0.0.2 remote-as 65002
neighbor 12.0.0.2 soft-reconfiguration inbound
address-family ipv4
network 11.0.1.0 mask 255.255.255.0
network 11.0.2.0 mask 255.255.255.0
network 11.0.3.0 mask 255.255.255.0
exit
```

R2:

```
router bgp 65002
neighbor 23.0.0.3 remote-as 65001
neighbor 23.0.0.3 soft-reconfiguration inbound
neighbor 12.0.0.1 remote-as 100
neighbor 12.0.0.1 soft-reconfiguration inbound
address-family ipv4
network 22.0.1.0 mask 255.255.255.0
network 22.0.2.0 mask 255.255.255.0
network 22.0.3.0 mask 255.255.255.0
exit
```

R3:

```
router bgp 65001
neighbor 23.0.0.2 remote-as 65002
neighbor 23.0.0.2 soft-reconfiguration inbound
neighbor 34.0.0.4 remote-as 65001
neighbor 34.0.0.4 soft-reconfiguration inbound
address-family ipv4
network 33.0.1.0 mask 255.255.255.0
network 33.0.2.0 mask 255.255.255.0
network 33.0.3.0 mask 255.255.255.0
exit
```

```
R4:
router bgp 65001
neighbor 34.0.0.3 remote-as 65001
neighbor 34.0.0.3 soft-reconfiguration inbound
address-family ipv4
network 44.0.1.0 mask 255.255.255.0
network 44.0.2.0 mask 255.255.255.0
network 44.0.3.0 mask 255.255.255.0
exit
```

Step 2. In the configuration mode of router configure IPv4 OSPF Process by following command:

```
R1:
router ospf 1
network 0.0.0.0 0.0.0.0 area 0
exit
```

```
R2:
router ospf 1
network 0.0.0.0 0.0.0.0 area 0
exit
```

```
R3:
router ospf 1
network 0.0.0.0 0.0.0.0 area 0
exit
```

```
R4:
router ospf 1
network 0.0.0.0 0.0.0.0 area 0
exit
```

Step 3. Verify IPv4 BGP routes by following command:

```
R1#show ip bgp
BGP table version is 13, 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	12.0.0.2	0		0	65002 i
*> 22.0.2.0/24	12.0.0.2	0		0	65002 i
*> 22.0.3.0/24	12.0.0.2	0		0	65002 i
*> 33.0.1.0/24	12.0.0.2	0		0	65002 65001 i
*> 33.0.2.0/24	12.0.0.2	0		0	65002 65001 i
*> 33.0.3.0/24	12.0.0.2	0		0	65002 65001 i
*> 44.0.1.0/24	12.0.0.2	0		0	65002 65001 i
*> 44.0.2.0/24	12.0.0.2	0		0	65002 65001 i
*> 44.0.3.0/24	12.0.0.2	0		0	65002 65001 i

```
R2#show ip bgp
BGP table version is 13, local router ID is 22.0.3.2
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
*> 11.0.1.0/24	12.0.0.1	0		0	100 i
*> 11.0.2.0/24	12.0.0.1	0		0	100 i
*> 11.0.3.0/24	12.0.0.1	0		0	100 i
*> 22.0.1.0/24	0.0.0.0	0		32768	i
*> 22.0.2.0/24	0.0.0.0	0		32768	i
*> 22.0.3.0/24	0.0.0.0	0		32768	i
*> 33.0.1.0/24	23.0.0.3	0		0	65001 i
*> 33.0.2.0/24	23.0.0.3	0		0	65001 i
*> 33.0.3.0/24	23.0.0.3	0		0	65001 i
*> 44.0.1.0/24	23.0.0.3	0		0	65001 i
*> 44.0.2.0/24	23.0.0.3	0		0	65001 i
*> 44.0.3.0/24	23.0.0.3	0		0	65001 i

R3#show ip bgp
 BGP table version is 13, local router ID is 33.0.3.3
 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	23.0.0.2			0	65002 100 i
*> 11.0.2.0/24	23.0.0.2			0	65002 100 i
*> 11.0.3.0/24	23.0.0.2			0	65002 100 i
*> 22.0.1.0/24	23.0.0.2	0		0	65002 i
*> 22.0.2.0/24	23.0.0.2	0		0	65002 i
*> 22.0.3.0/24	23.0.0.2	0		0	65002 i
*> 33.0.1.0/24	0.0.0.0	0		32768	i
*> 33.0.2.0/24	0.0.0.0	0		32768	i
*> 33.0.3.0/24	0.0.0.0	0		32768	i
*>i 44.0.1.0/24	34.0.0.4	0	100	0	i
*>i 44.0.2.0/24	34.0.0.4	0	100	0	i
*>i 44.0.3.0/24	34.0.0.4	0	100	0	i

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
*>i 11.0.1.0/24	23.0.0.2	0	100	0	65002 100 i
*>i 11.0.2.0/24	23.0.0.2	0	100	0	65002 100 i
*>i 11.0.3.0/24	23.0.0.2	0	100	0	65002 100 i
*>i 22.0.1.0/24	23.0.0.2	0	100	0	65002 i
*>i 22.0.2.0/24	23.0.0.2	0	100	0	65002 i
*>i 22.0.3.0/24	23.0.0.2	0	100	0	65002 i
*>i 33.0.1.0/24	34.0.0.3	0	100	0	i
*>i 33.0.2.0/24	34.0.0.3	0	100	0	i
*>i 33.0.3.0/24	34.0.0.3	0	100	0	i
*> 44.0.1.0/24	0.0.0.0	0		32768	i
*> 44.0.2.0/24	0.0.0.0	0		32768	i
*> 44.0.3.0/24	0.0.0.0	0		32768	i

Task 2: Verify BGP Route Dampening

Step 1. Enable and verify BGP Dampening

R2:

```
router bgp 65002
address-family ipv4
  bgp dampening
exit
```

R2#show ip bgp dampening parameters

dampening 15 750 2000 60 (DEFAULT)

Half-life time : 15 mins Decay Time : 2320 secs

Max suppress penalty : 12000 Max suppress time: 60 mins

Suppress penalty : 2000 Reuse penalty : 750

Step 2. Shutdown interface loopback 1 on router R1

R1:

```
interface loopback 1
shutdown
```

*Jun 30 09:37:19.550: %LINK-5-CHANGED: Interface Loopback1, changed state to administratively down

*Jun 30 09:37:20.550: %LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback1, changed state to down

Step 3. Verify output 3 mins after on router R2

R2#debug ip bgp dampening

BGP dampening debugging is on for all address families

R2#

*Jun 30 11:00:46.144: EvD: charge penalty 1000, new accum. penalty 1000, flap count 1

*Jun 30 11:00:46.144: EvD: unsuppress item left in reuse timer array with penalty 1000

*Jun 30 11:00:46.144: BGP(0): charge penalty for 11.0.1.0/24 path 100 with halflife-time 15 reuse/suppress 750/2000

*Jun 30 11:00:46.144: BGP(0): flapped 1 times since 00:00:00. New penalty is 1000

```

R2#show ip bgp
BGP table version is 22, local router ID is 22.0.3.2
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
h 11.0.1.0/24	12.0.0.1	0	0	100	i
*> 11.0.2.0/24	12.0.0.1	0	0	100	i
*> 11.0.3.0/24	12.0.0.1	0	0	100	i
*> 22.0.1.0/24	0.0.0.0	0	32768		i
*> 22.0.2.0/24	0.0.0.0	0	32768		i
*> 22.0.3.0/24	0.0.0.0	0	32768		i
*> 33.0.1.0/24	23.0.0.3	0	0	65001	i
*> 33.0.2.0/24	23.0.0.3	0	0	65001	i
*> 33.0.3.0/24	23.0.0.3	0	0	65001	i
*> 44.0.1.0/24	23.0.0.3	0	0	65001	i
*> 44.0.2.0/24	23.0.0.3	0	0	65001	i
*> 44.0.3.0/24	23.0.0.3	0	0	65001	i

```

R2#show ip bgp 11.0.1.0
BGP routing table entry for 11.0.1.0/24, version 22
Paths: (1 available, no best path)
Not advertised to any peer
Refresh Epoch 1
100 (history entry)
12.0.0.1 from 12.0.0.1 (11.0.3.1)
Origin IGP, metric 0, localpref 100, external
Dampinfo: penalty 1681, flapped 2 times in 00:04:29

```

Step 4. Flap the loopback interface 1 of router R1 4 times till the penalty limit reaches

```

R1:
interface loopback 1
shutdown
*Jun 30 09:37:19.550: %LINK-5-CHANGED: Interface Loopback1, changed state to
administratively down
*Jun 30 09:37:20.550: %LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback1,
changed state to down

no shutdown
*Jun 30 11:01:35.817: %LINK-3-UPDOWN: Interface Loopback1, changed state to up
*Jun 30 11:01:36.817: %LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback1,
changed state to up

```


shutdown

*Jun 30 09:37:19.550: %LINK-5-CHANGED: Interface Loopback1, changed state to administratively down

*Jun 30 09:37:20.550: %LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback1, changed state to down

no shutdown

*Jun 30 11:01:35.817: %LINK-3-UPDOWN: Interface Loopback1, changed state to up

*Jun 30 11:01:36.817: %LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback1, changed state to up

shutdown

*Jun 30 09:37:19.550: %LINK-5-CHANGED: Interface Loopback1, changed state to administratively down

*Jun 30 09:37:20.550: %LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback1, changed state to down

no shutdown

*Jun 30 11:01:35.817: %LINK-3-UPDOWN: Interface Loopback1, changed state to up

*Jun 30 11:01:36.817: %LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback1, changed state to up

Step 5. Verify output 3 mins after on router R2

R2#debug ip bgp dampening

BGP dampening debugging is on for all address families

R2#

*Jun 30 11:00:46.144: EvD: charge penalty 1000, new accum. penalty 1000, flap count 1

*Jun 30 11:00:46.144: EvD: unsuppress item left in reuse timer array with penalty 1000

*Jun 30 11:00:46.144: BGP(0): charge penalty for 11.0.1.0/24 path 100 with half-life-time 15 reuse/suppress 750/2000

*Jun 30 11:00:46.144: BGP(0): flapped 1 times since 00:00:00. New penalty is 1000

*Jun 30 11:34:18.947: BGP(0): suppress 11.0.1.0/24 path 100 for 00:24:00 (penalty 2284)

*Jun 30 11:34:18.947: half-life-time 15, reuse/suppress 750/2000

*Jun 30 11:34:18.947: EvD: accum. penalty 2284, now suppressed with a reuse interval of 144

R2#show ip bgp 11.0.1.0

BGP routing table entry for 11.0.1.0/24, version 26

Paths: (1 available, no best path)

Not advertised to any peer

Refresh Epoch 1

100, (suppressed due to dampening), (received & used)

12.0.0.1 from 12.0.0.1 (11.0.3.1)

Origin IGP, metric 0, localpref 100, valid, external

Dampinfo: penalty 2266, flapped 4 times in 00:33:43, reuse in 00:01:59

R2#show ip bgp

BGP table version is 26, local router ID is 22.0.3.2

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
*d 11.0.1.0/24	12.0.0.1	0	0	100	i
*> 11.0.2.0/24	12.0.0.1	0	0	100	i
*> 11.0.3.0/24	12.0.0.1	0	0	100	i
*> 22.0.1.0/24	0.0.0.0	0	32768	i	
*> 22.0.2.0/24	0.0.0.0	0	32768	i	
*> 22.0.3.0/24	0.0.0.0	0	32768	i	
*> 33.0.1.0/24	23.0.0.3	0	0	65001	i
*> 33.0.2.0/24	23.0.0.3	0	0	65001	i
*> 33.0.3.0/24	23.0.0.3	0	0	65001	i
*> 44.0.1.0/24	23.0.0.3	0	0	65001	i
*> 44.0.2.0/24	23.0.0.3	0	0	65001	i
*> 44.0.3.0/24	23.0.0.3	0	0	65001	i

R2#show ip bgp dampening flap-statistics

BGP table version is 26, local router ID is 22.0.3.2

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	From	Flaps	Duration	Reuse	Path
*d 11.0.1.0/24	12.0.0.1	4	00:39:09	00:07:34	100

Task 2: Configure and define BGP Dampening Parameters

Step 1. Set BGP Dampening parameters using route-map

```
R2:
access-list 1 permit 11.0.1.0
route-map selective_dampening permit 10
set dampening 5 1900 2000 10 // 5=half-life, 1900=reuse limit, 2000=suppress
exit // limit, 10=max-suppress-limit
router bgp 65002
address-family ipv4
bgp dampening route-map selective_dampening
exit
*Jun 30 11:51:20.469: BGP(0): Created dampening structures with halflife time 5,
reuse/suppress 1900/2000
```

Step 2. Verify BGP Dampening parameters

```
R2#show ip bgp dampening parameters
dampening 5 1900 2000 10 (route-map selective_dampening 10)
Half-life time : 5 mins Decay Time : 575 secs
Max suppress penalty: 7600 Max suppress time: 10 mins
Suppress penalty : 2000 Reuse penalty : 1900
```