

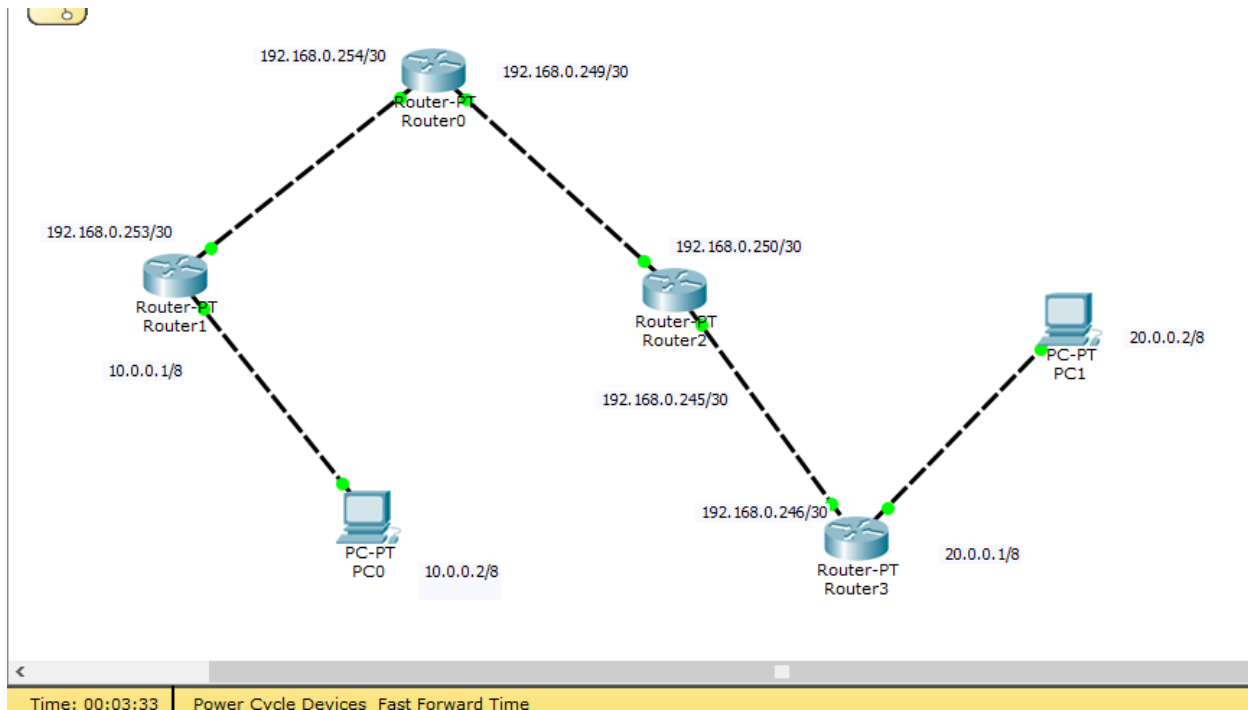


# Lab 03-Assignment 2

CO<sub>323</sub>

E/13/377 | S.S.E vanderputt | April 27, 2017

## 1. Configure the static routing in the network shown below



### Router 1

Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP

D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area

N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2

E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP

i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area

\* - candidate default, U - per-user static route, o - ODR

P - periodic downloaded static route

Gateway of last resort is not set

- C 10.0.0.0/8 is directly connected, FastEthernet0/0
- S 20.0.0.0/8 [1/0] via 192.168.0.254  
192.168.0.0/30 is subnetted, 1 subnets
- C 192.168.0.252 is directly connected, FastEthernet1/0

## Router 2

- S 10.0.0.0/8 [1/0] via 192.168.0.253
- S 20.0.0.0/8 [1/0] via 192.168.0.250  
192.168.0.0/30 is subnetted, 2 subnets
- C 192.168.0.248 is directly connected, FastEthernet0/0
- C 192.168.0.252 is directly connected, FastEthernet1/0

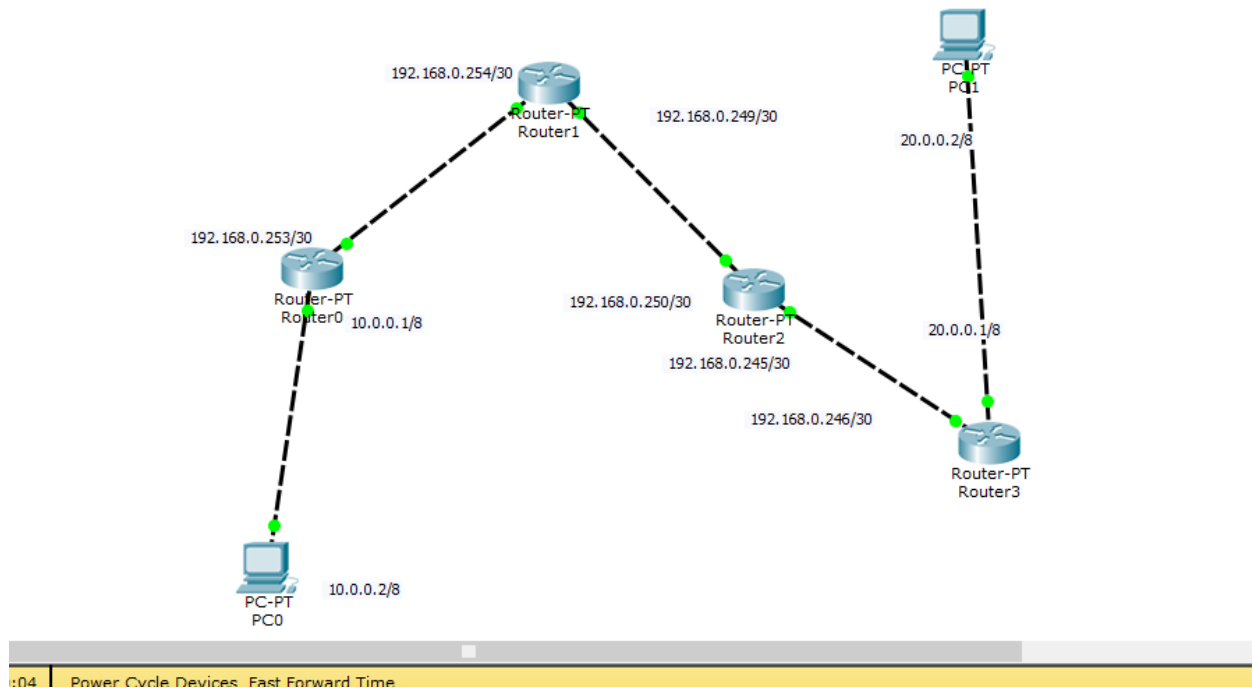
## Router 3

- S 10.0.0.0/8 [1/0] via 192.168.0.249
- S 20.0.0.0/8 [1/0] via 192.168.0.246  
192.168.0.0/30 is subnetted, 2 subnets
- C 192.168.0.244 is directly connected, FastEthernet1/0
- C 192.168.0.248 is directly connected, FastEthernet0/0

## Router 4

- S 10.0.0.0/8 [1/0] via 192.168.0.245
- C 20.0.0.0/8 is directly connected, FastEthernet0/0  
192.168.0.0/30 is subnetted, 1 subnets
- C 192.168.0.244 is directly connected, FastEthernet1/0

## 2. Configure the same network with Routing Information Protocol (RIP)



### Router 1

Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP

D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area

N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2

E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP

i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area

\* - candidate default, U - per-user static route, o - ODR

P - periodic downloaded static route

Gateway of last resort is not set

C 10.0.0.0/8 is directly connected, FastEthernet0/o

R 20.0.0.0/8 [120/3] via 192.168.0.254, 00:00:16, FastEthernet1/o

192.168.0.0/30 is subnetted, 3 subnets

R 192.168.0.244 [120/2] via 192.168.0.254, 00:00:16, FastEthernet1/o

R 192.168.0.248 [120/1] via 192.168.0.254, 00:00:16, FastEthernet1/o

C 192.168.0.252 is directly connected, FastEthernet1/o

## Router 2

R 10.0.0.0/8 [120/1] via 192.168.0.253, 00:00:26, FastEthernet1/o

R 20.0.0.0/8 [120/2] via 192.168.0.250, 00:00:27, FastEthernet0/o

192.168.0.0/30 is subnetted, 3 subnets

R 192.168.0.244 [120/1] via 192.168.0.250, 00:00:27, FastEthernet0/o

C 192.168.0.248 is directly connected, FastEthernet0/o

C 192.168.0.252 is directly connected, FastEthernet1/o

## Router 3

R 10.0.0.0/8 [120/2] via 192.168.0.249, 00:00:11, FastEthernet0/o

R 20.0.0.0/8 [120/1] via 192.168.0.246, 00:00:15, FastEthernet1/o

192.168.0.0/30 is subnetted, 3 subnets

C 192.168.0.244 is directly connected, FastEthernet1/o

C 192.168.0.248 is directly connected, FastEthernet0/o

R 192.168.0.252 [120/1] via 192.168.0.249, 00:00:11, FastEthernet0/o

## Router 4

R 10.0.0.0/8 [120/3] via 192.168.0.245, 00:00:09, FastEthernet1/0

C 20.0.0.0/8 is directly connected, FastEthernet0/0

192.168.0.0/30 is subnetted, 3 subnets

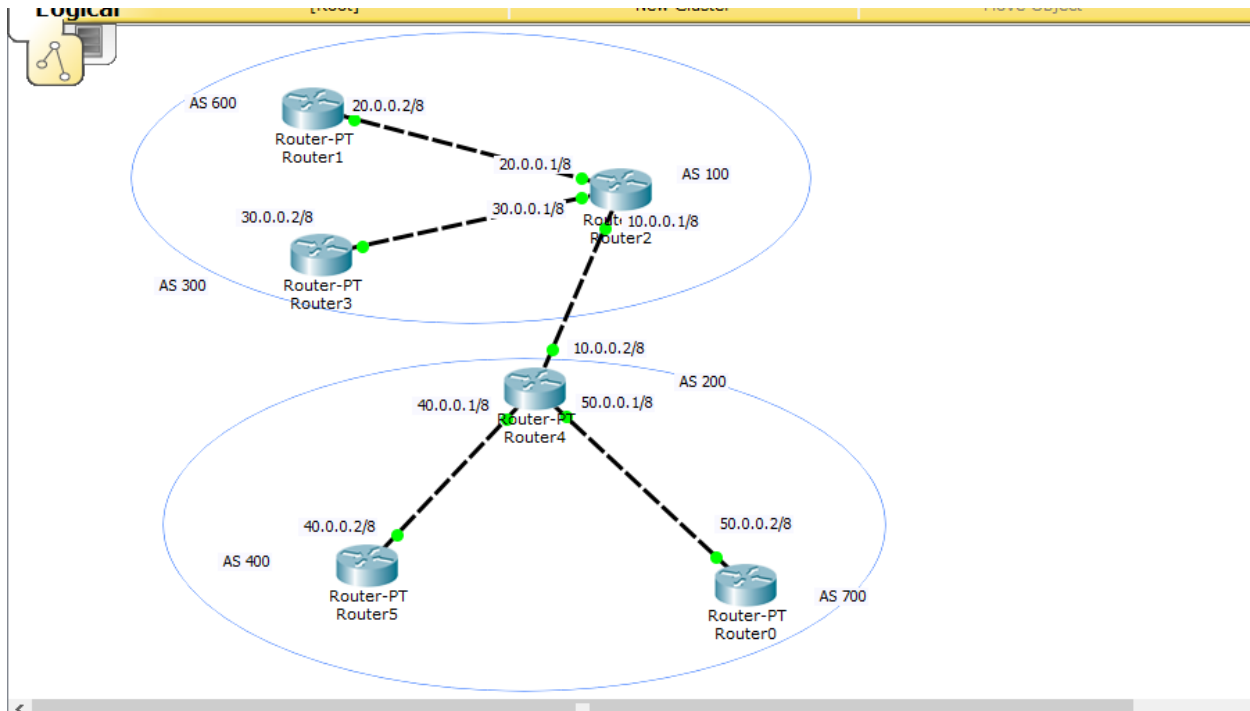
C 192.168.0.244 is directly connected, FastEthernet1/0

R 192.168.0.248 [120/1] via 192.168.0.245, 00:00:09, FastEthernet1/0

R 192.168.0.252 [120/2] via 192.168.0.245, 00:00:09, FastEthernet1/0

Router#

### 3. For the following network, submit the outputs of the following commands



#### 1. Router 1 (AS 600)

1. Router#show ip bgp

BGP table version is 7, local router ID is 20.0.0.2

Status codes: s suppressed, d damped, h history, \* valid, > best, i - internal, r RIB-failure, S Stale

Origin codes: i - IGP, e - EGP, ? - incomplete

Network	Next Hop	Metric	LocPrf	Weight	Path
*> 10.0.0.0/8	20.0.0.1	0	0	0	100 i
*> 20.0.0.0/8	0.0.0.0	0	0	32768	i
*	20.0.0.1	0	0	0	100 i

```
*> 30.0.0.0/8      20.0.0.1      0  0  0  100 i
*> 40.0.0.0/8      20.0.0.1      0  0  0 100 200 i
*> 50.0.0.0/8      20.0.0.1      0  0  0 100 200 i
```

## 2. Router# show ip bgp summary

BGP router identifier 20.0.0.2, local AS number 600  
 BGP table version is 7, main routing table version 6  
 6 network entries using 792 bytes of memory  
 6 path entries using 312 bytes of memory  
 5/4 BGP path/bestpath attribute entries using 828 bytes of memory  
 3 BGP AS-PATH entries using 72 bytes of memory  
 0 BGP route-map cache entries using 0 bytes of memory  
 0 BGP filter-list cache entries using 0 bytes of memory  
 Bitfield cache entries: current 1 (at peak 1) using 32 bytes of memory  
 BGP using 2036 total bytes of memory  
 BGP activity 5/0 prefixes, 6/0 paths, scan interval 60 secs

Neighbor	V	AS	MsgRcvd	MsgSent	TblVer	InQ	OutQ	Up/Down	State/PfxRcd
20.0.0.1	4	100	21	11	7	0	0	00:09:09	4

## 3. Show ip bgp neighbors

BGP neighbor is 20.0.0.1, remote AS 100, external link  
 BGP version 4, remote router ID 30.0.0.1  
 BGP state = Established, up for 00:59:02  
 Last read 00:59:02, last write 00:59:02, hold time is 180, keepalive interval is 60 seconds  
 Neighbor capabilities:  
 Route refresh: advertised and received(new)  
 Address family IPv4 Unicast: advertised and received  
 Message statistics:  
 InQ depth is 0  
 OutQ depth is 0

	Sent	Rcvd
Opens:	1	1
Notifications:	0	0
Updates:	2	10
Keepalives:	60	60
Route Refresh:	0	5
Total:	63	76



Default minimum time between advertisements runs is 30 seconds

For address family: IPv4 Unicast

BGP table version 7, neighbor version 6/o

Output queue size : 0

Index 1, Offset 0, Mask 0x2

1 update-group member

	Sent	Rcvd
Prefix activity:	----	----
Prefixes Current:	2	5 (Consumes 161 bytes)
Prefixes total:	2	5
Implicit Withdraw:	0	0
Explicit Withdraw:	0	0
Used as bestpath:	n/a	1
Used as multipath:	n/a	0

	Outbound	Inbound
Local Policy Denied Prefixes:	-----	-----
Total:	0	0

Number of NLRIs in the update sent: max 3, min 1

Address tracking is enabled, the RIB does have a route to 20.0.0.1

Connections established 1; dropped 0

Last reset never

Transport(tcp) path-mtu-discovery is enabled

Connection state is ESTAB, I/O status: 1, unread input bytes: 0

Connection is ECN Disabled, Minimum incoming TTL 0, Outgoing TTL 1

Local host: 20.0.0.2, Local port: 1025

Foreign host: 20.0.0.1, Foreign port: 179

Connection tableid (VRF): 0

Enqueued packets for retransmit: 0, input: 0 mis-ordered: 0 (0 bytes)

Event Timers (current time is 0xC69F4):

Timer	Starts	Wakeups	Next
Retrans	0	0	0x0
TimeWait	0	0	0x0
AckHold	70	0	0x0
SendWnd	0	0	0x0
KeepAlive	60	0	0x0
GiveUp	0	0	0x0
PmtuAger	0	0	0x0
DeadWait	0	0	0x0

```
Linger      o      o      o
ProcessQ    o      o      o
```

```
iss: 2057115318  snduna: 2057115748  sndnxt: 2057115748  sndwnd: 15955
irs: 3480424370  rcvnxt: 3480424751  rcvwnd: 16004  delrcvwnd: 380
```

```
SRTT: 259 ms, RTTO: 579 ms, RTV: 320 ms, KRTT: 0 ms
minRTT: 16 ms, maxRTT: 300 ms, ACK hold: 200 ms
Status Flags: passive open, gen tcbs
Option Flags: nagle, path mtu capable
IP Precedence value : 6
```

```
Datagrams (max data segment is 1460 bytes):
Rcvd: 71 (out of order: 0), with data: 5, total data bytes: 120
Sent: 61 (retransmit: 0, fastretransmit: 0, partialack: 0, Second Congestion: 0), with data: 2,
total data bytes: 48
Packets received in fast path: 0, fast processed: 0, slow path: 0
fast lock acquisition failures: 0, slow path: 0
```

## 2. Router 2 (AS 100)

### 1. Show ip bgp

BGP table version is 9, local router ID is 30.0.0.1

Status codes: s suppressed, d damped, h history, \* valid, > best, i - internal, r RIB-failure, S Stale

Origin codes: i - IGP, e - EGP, ? - incomplete

Network	Next Hop	Metric	LocPrf	Weight	Path
*> 10.0.0.0/8	0.0.0.0	0	0		32768 i
*	10.0.0.2	0	0	0	200 i
*> 20.0.0.0/8	0.0.0.0	0		0	32768 i
*	20.0.0.2	0	0	0	600 i
*> 30.0.0.0/8	0.0.0.0	0	0		32768 i
*	30.0.0.2	0	0	0	300 i
*> 40.0.0.0/8	10.0.0.2	0	0	0	200 i
*> 50.0.0.0/8	10.0.0.2	0	0	0	200 i

## 2. Show ip bgp summery

BGP router identifier 30.0.0.1, local AS number 100  
BGP table version is 9, main routing table version 6  
8 network entries using 1056 bytes of memory  
8 path entries using 416 bytes of memory  
5/2 BGP path/bestpath attribute entries using 644 bytes of memory  
4 BGP AS-PATH entries using 96 bytes of memory  
0 BGP route-map cache entries using 0 bytes of memory  
0 BGP filter-list cache entries using 0 bytes of memory  
Bitfield cache entries: current 1 (at peak 1) using 32 bytes of memory  
BGP using 2244 total bytes of memory  
BGP activity 5/0 prefixes, 8/0 paths, scan interval 60 secs

Neighbor	V	AS	MsgRcvd	MsgSent	TblVer	InQ	OutQ	Up/Down	State/PfxRcd
20.0.0.2	4	600	15	13	9	0	0	00:11:57	4
30.0.0.2	4	300	15	13	9	0	0	00:11:56	4
10.0.0.2	4	200	20	13	9	0	0	00:11:57	4

## 3. Show ip bgp neighbors

BGP neighbor is 20.0.0.2, remote AS 600, external link

BGP version 4, remote router ID 20.0.0.2  
BGP state = Established, up for 01:03:01  
Last read 01:03:01, last write 01:03:01, hold time is 180, keepalive interval is 60 seconds  
Neighbor capabilities:  
Route refresh: advertised and received(new)  
Address family IPv4 Unicast: advertised and received  
Message statistics:  
InQ depth is 0  
OutQ depth is 0

	Sent	Rcvd
Opens:	1	1
Notifications:	0	0
Updates:	12	2
Keepalives:	64	64
Route Refresh:	0	1
Total:	77	68

Default minimum time between advertisements runs is 30 seconds

For address family: IPv4 Unicast

BGP table version 11, neighbor version 6/0

Output queue size : 0

Index 1, Offset 0, Mask 0x2

1 update-group member

	Sent	Rcvd
Prefix activity:	----	----
Prefixes Current:	8	1 (Consumes 207 bytes)
Prefixes total:	8	1
Implicit Withdraw:	0	0
Explicit Withdraw:	0	0
Used as bestpath:	n/a	1
Used as multipath:	n/a	0

	Outbound	Inbound
Local Policy Denied Prefixes:	-----	-----
Total:	0	0

Number of NLRI's in the update sent: max 3, min 1

Address tracking is enabled, the RIB does have a route to 20.0.0.2

Connections established 1; dropped 0

Last reset never

Transport(tcp) path-mtu-discovery is enabled

Connection state is ESTAB, I/O status: 1, unread input bytes: 0

Connection is ECN Disabled, Minimum incoming TTL 0, Outgoing TTL 1

Local host: 20.0.0.1, Local port: 179

Foreign host: 20.0.0.2, Foreign port: 1025

Connection tableid (VRF): 0

Enqueued packets for retransmit: 0, input: 0 mis-ordered: 0 (0 bytes)

Event Timers (current time is 0xC69F4):

Timer	Starts	Wakeups	Next
Retrans	0	0	0x0
TimeWait	0	0	0x0
AckHold	66	0	0x0
SendWnd	0	0	0x0
KeepAlive	64	0	0x0
GiveUp	0	0	0x0
PmtuAger	0	0	0x0
DeadWait	0	0	0x0
Linger	0	0	0x0

ProcessQ        o        o        o x o

iss: 2057115318 snduna: 2057115748 sndnxt: 2057115748 sndwnd: 15955  
irs: 3480424370 rcvnxt: 3480424751 rcvwnd: 16004 delrcvwnd: 380

SRTT: 259 ms, RTTO: 579 ms, RTV: 320 ms, KRTT: 0 ms  
minRTT: 16 ms, maxRTT: 300 ms, ACK hold: 200 ms  
Status Flags: passive open, gen tcbs  
Option Flags: nagle, path mtu capable  
IP Precedence value : 6

Datagrams (max data segment is 1460 bytes):  
Rcvd: 67 (out of order: 0), with data: 1, total data bytes: 24  
Sent: 65 (retransmit: 0, fastretransmit: 0, partialack: 0, Second Congestion: 0), with data:  
16, total data bytes: 384  
Packets received in fast path: 0, fast processed: 0, slow path: 0  
fast lock acquisition failures: 0, slow path: 0

BGP neighbor is 30.0.0.2, remote AS 300, external link  
BGP version 4, remote router ID 30.0.0.2  
BGP state = Established, up for 00:00:00  
Last read 00:00:00, last write 00:00:00, hold time is 180, keepalive interval is 60 seconds  
Neighbor capabilities:  
Route refresh: advertised and received(new)  
Address family IPv4 Unicast: advertised and received  
Message statistics:  
InQ depth is 0  
OutQ depth is 0

	Sent	Rcvd
Opens:	2	2
Notifications:	0	1
Updates:	7	3
Keepalives:	64	63
Route Refresh:	0	1
Total:	73	70

Default minimum time between advertisements runs is 30 seconds

For address family: IPv4 Unicast  
BGP table version 11, neighbor version 6/0  
Output queue size : 0  
Index 1, Offset 0, Mask 0x2  
1 update-group member

	Sent	Rcvd
--	------	------

Prefix activity:	----	----
Prefixes Current:	0	1 (Consumes 23 bytes)
Prefixes total:	0	1
Implicit Withdraw:	0	0
Explicit Withdraw:	0	0
Used as bestpath:	n/a	1
Used as multipath:	n/a	0

	Outbound	Inbound
Local Policy Denied Prefixes:	-----	-----
Total:	0	0

Number of NLRIs in the update sent: max 3, min 1

Address tracking is enabled, the RIB does have a route to 30.0.0.2  
Connections established 2; dropped 1  
Last reset never  
Transport(tcp) path-mtu-discovery is enabled  
Connection state is ESTAB, I/O status: 1, unread input bytes: 0  
Connection is ECN Disabled, Minimum incoming TTL 0, Outgoing TTL 1  
Local host: 30.0.0.1, Local port: 1028  
Foreign host: 30.0.0.2, Foreign port: 179  
Connection tableid (VRF): 0

Enqueued packets for retransmit: 0, input: 0 mis-ordered: 0 (0 bytes)

Event Timers (current time is 0xC69F4):

Timer	Starts	Wakeups	Next
Retrans	0	0	0x0
TimeWait	0	0	0x0
AckHold	66	0	0x0
SendWnd	0	0	0x0
KeepAlive	64	0	0x0
GiveUp	0	0	0x0
PmtuAger	0	0	0x0
DeadWait	0	0	0x0
Linger	0	0	0x0
ProcessQ	0	0	0x0

iss: 2057115318 snduna: 2057115748 sndnxt: 2057115748 sndwnd: 15955  
irs: 3480424370 rcvnxt: 3480424751 rcvwnd: 16004 delrcvwnd: 380

SRTT: 259 ms, RTTO: 579 ms, RTV: 320 ms, KRTT: 0 ms  
minRTT: 16 ms, maxRTT: 300 ms, ACK hold: 200 ms  
Status Flags: passive open, gen tcbs

Option Flags: nagle, path mtu capable  
IP Precedence value : 6

Datagrams (max data segment is 1460 bytes):

Rcvd: 69 (out of order: 0), with data: 1, total data bytes: 24

Sent: 66 (retransmit: 0, fastretransmit: 0, partialack: 0, Second Congestion: 0), with data: 8, total data bytes: 192

Packets received in fast path: 0, fast processed: 0, slow path: 0  
fast lock acquisition failures: 0, slow path: 0

BGP neighbor is 10.0.0.2, remote AS 200, external link

BGP version 4, remote router ID 50.0.0.1

BGP state = Established, up for 01:03:01

Last read 01:03:01, last write 01:03:01, hold time is 180, keepalive interval is 60 seconds

Neighbor capabilities:

Route refresh: advertised and received(new)

Address family IPv4 Unicast: advertised and received

Message statistics:

InQ depth is 0

OutQ depth is 0

	Sent	Rcvd
Opens:	1	1
Notifications:	0	0
Updates:	9	11
Keepalives:	64	64
Route Refresh:	0	4
Total:	74	80

Default minimum time between advertisements runs is 30 seconds

For address family: IPv4 Unicast

BGP table version 11, neighbor version 6/0

Output queue size : 0

Index 1, Offset 0, Mask 0x2

1 update-group member

	Sent	Rcvd
Prefix activity:	----	----
Prefixes Current:	6	3 (Consumes 207 bytes)
Prefixes total:	6	3
Implicit Withdraw:	0	0
Explicit Withdraw:	0	0
Used as bestpath:	n/a	1

Used as multipath: n/a 0

	Outbound	Inbound
Local Policy Denied Prefixes:	-----	-----
Total:	0	0
Number of NLRIs in the update sent: max 3, min 1		

Address tracking is enabled, the RIB does have a route to 10.0.0.2  
Connections established 1; dropped 0  
Last reset never  
Transport(tcp) path-mtu-discovery is enabled  
Connection state is ESTAB, I/O status: 1, unread input bytes: 0  
Connection is ECN Disabled, Minimum incoming TTL 0, Outgoing TTL 1  
Local host: 10.0.0.1, Local port: 179  
Foreign host: 10.0.0.2, Foreign port: 1026  
Connection tableid (VRF): 0

Enqueued packets for retransmit: 0, input: 0 mis-ordered: 0 (0 bytes)

Event Timers (current time is 0xC69F4):

Timer	Starts	Wakeups	Next
Retrans	0	0	0x0
TimeWait	0	0	0x0
AckHold	75	0	0x0
SendWnd	0	0	0x0
KeepAlive	64	0	0x0
GiveUp	0	0	0x0
PmtuAger	0	0	0x0
DeadWait	0	0	0x0
Linger	0	0	0x0
ProcessQ	0	0	0x0

iss: 2057115318 snduna: 2057115748 sndnxt: 2057115748 sndwnd: 15955  
irs: 3480424370 rcvnxt: 3480424751 rcvwnd: 16004 delrcvwnd: 380

SRTT: 259 ms, RTTO: 579 ms, RTV: 320 ms, KRTT: 0 ms  
minRTT: 16 ms, maxRTT: 300 ms, ACK hold: 200 ms  
Status Flags: passive open, gen tcbs  
Option Flags: nagle, path mtu capable  
IP Precedence value : 6

Datagrams (max data segment is 1460 bytes):  
Rcvd: 76 (out of order: 0), with data: 5, total data bytes: 120



Sent: 65 (retransmit: 0, fastretransmit: 0, partialack: 0, Second Congestion: 0), with data: 12, total data bytes: 288  
Packets received in fast path: 0, fast processed: 0, slow path: 0  
fast lock acquisition failures: 0, slow path: 0

### 3.Router (AS 300)

#### 1. *Show ip bgp*

BGP table version is 7, local router ID is 30.0.0.2

Status codes: s suppressed, d damped, h history, \* valid, > best, i - internal, r RIB-failure, S Stale

Origin codes: i - IGP, e - EGP, ? - incomplete

Network	Next Hop	Metric	LocPrf	Weight	Path
*> 10.0.0.0/8	30.0.0.1	0	0	0	100 i
*> 20.0.0.0/8	30.0.0.1	0	0	0	100 i
*> 30.0.0.0/8	0.0.0.0	0	0		32768 i
*	30.0.0.1	0	0	0	100 i
*> 40.0.0.0/8	30.0.0.1	0	0	0	100 200 i
*> 50.0.0.0/8	30.0.0.1	0	0	0	100 200 i

#### 2. *Show ip bgp summery*

BGP router identifier 30.0.0.2, local AS number 300  
BGP table version is 7, main routing table version 6  
6 network entries using 792 bytes of memory  
6 path entries using 312 bytes of memory  
5/4 BGP path/bestpath attribute entries using 828 bytes of memory  
3 BGP AS-PATH entries using 72 bytes of memory  
0 BGP route-map cache entries using 0 bytes of memory  
0 BGP filter-list cache entries using 0 bytes of memory  
Bitfield cache entries: current 1 (at peak 1) using 32 bytes of memory  
BGP using 2036 total bytes of memory  
BGP activity 5/0 prefixes, 6/0 paths, scan interval 60 secs

Neighbor	V	AS	MsgRcvd	MsgSent	TblVer	InQ	OutQ	Up/Down	State/PfxRcd
30.0.0.1	4	100	21	14	7	0	0	00:12:39	4

### 3. Show ip bgp neighbors

BGP neighbor is 30.0.0.1, remote AS 100, external link  
 BGP version 4, remote router ID 30.0.0.1  
 BGP state = Established, up for 00:02:31  
 Last read 00:02:31, last write 00:02:31, hold time is 180, keepalive interval is 60 seconds  
 Neighbor capabilities:  
 Route refresh: advertised and received(new)  
 Address family IPv4 Unicast: advertised and received  
 Message statistics:  
 InQ depth is 0  
 OutQ depth is 0

	Sent	Rcvd
Opens:	2	2
Notifications:	1	0
Updates:	3	14
Keepalives:	65	63
Route Refresh:	0	4
Total:	71	83

Default minimum time between advertisements runs is 30 seconds

For address family: IPv4 Unicast  
 BGP table version 12, neighbor version 6/0  
 Output queue size : 0  
 Index 1, Offset 0, Mask 0x2  
 1 update-group member

	Sent	Rcvd
Prefix activity:	----	----
Prefixes Current:	1	5 (Consumes 138 bytes)
Prefixes total:	1	5
Implicit Withdraw:	0	0

Explicit Withdraw:	o	o
Used as bestpath:	n/a	1
Used as multipath:	n/a	o

	Outbound	Inbound
Local Policy Denied Prefixes:	-----	-----
Total:	o	o

Number of NLRIs in the update sent: max 3, min 1

Address tracking is enabled, the RIB does have a route to 30.0.0.1  
Connections established 2; dropped o  
Last reset never  
Transport(tcp) path-mtu-discovery is enabled  
Connection state is ESTAB, I/O status: 1, unread input bytes: o  
Connection is ECN Disabled, Minimum incoming TTL o, Outgoing TTL 1  
Local host: 30.0.0.2, Local port: 179  
Foreign host: 30.0.0.1, Foreign port: 1028  
Connection tableid (VRF): o

Enqueued packets for retransmit: o, input: o mis-ordered: o (o bytes)

Event Timers (current time is 0xC69F4):

Timer	Starts	Wakeup	Next
Retrans	o	o	0x0
TimeWait	o	o	0x0
AckHold	77	o	0x0
SendWnd	o	o	0x0
KeepAlive	65	o	0x0
GiveUp	o	o	0x0
PmtuAger	o	o	0x0
DeadWait	o	o	0x0
Linger	o	o	0x0
ProcessQ	o	o	0x0

iss: 2057115318 snduna: 2057115748 sndnxt: 2057115748 sndwnd: 15955  
irs: 3480424370 rcvnxt: 3480424751 rcvwnd: 16004 delrcvwnd: 380

SRTT: 259 ms, RTTO: 579 ms, RTV: 320 ms, KRTT: o ms  
minRTT: 16 ms, maxRTT: 300 ms, ACK hold: 200 ms  
Status Flags: passive open, gen tcbs  
Option Flags: nagle, path mtu capable  
IP Precedence value : 6

Datagrams (max data segment is 1460 bytes):

Rcvd: 79 (out of order: 0), with data: 4, total data bytes: 96  
 Sent: 68 (retransmit: 0, fastretransmit: 0, partialack: 0, Second Congestion: 0), with data: 3, total data bytes: 72  
 Packets received in fast path: 0, fast processed: 0, slow path: 0  
 fast lock acquisition failures: 0, slow path: 0

## 4.Router (AS 200)

### 1. *Show ip bgp*

BGP table version is 9, local router ID is 50.0.0.1

Status codes: s suppressed, d damped, h history, \* valid, > best, i - internal, r RIB-failure, S Stale

Origin codes: i - IGP, e - EGP, ? - incomplete

Network	Next Hop	Metric	LocPrf	Weight	Path
*> 10.0.0.0/8	0.0.0.0	0	0		32768 i
*	10.0.0.1	0	0	0	100 i
*> 20.0.0.0/8	10.0.0.1	0	0	0	100 i
*> 30.0.0.0/8	10.0.0.1	0	0	0	100 i
*> 40.0.0.0/8	0.0.0.0	0	0		32768 i
*	40.0.0.2	0	0	0	400 i
*> 50.0.0.0/8	0.0.0.0	0	0		32768 i
*	50.0.0.2	0	0	0	700 i

### 2. *Show ip bgp summery*

BGP router identifier 50.0.0.1, local AS number 200

BGP table version is 9, main routing table version 6

8 network entries using 1056 bytes of memory

8 path entries using 416 bytes of memory

5/2 BGP path/bestpath attribute entries using 644 bytes of memory

4 BGP AS-PATH entries using 96 bytes of memory

0 BGP route-map cache entries using 0 bytes of memory

0 BGP filter-list cache entries using 0 bytes of memory

Bitfield cache entries: current 1 (at peak 1) using 32 bytes of memory

BGP using 2244 total bytes of memory

BGP activity 5/0 prefixes, 8/0 paths, scan interval 60 secs

Neighbor	V	AS	MsgRcvd	MsgSent	TblVer	InQ	OutQ	Up/Down	State/PfxRcd
40.0.0.2	4	400	17	15	9	0	0	00:13:20	4
10.0.0.1	4	100	23	15	9	0	0	00:13:20	4
50.0.0.2	4	700	17	15	9	0	0	00:13:19	4

### 3. Show ip bgp neighbors

BGP neighbor is 40.0.0.2, remote AS 400, external link

BGP version 4, remote router ID 40.0.0.2

BGP state = Established, up for 01:06:05

Last read 01:06:05, last write 01:06:05, hold time is 180, keepalive interval is 60 seconds

Neighbor capabilities:

Route refresh: advertised and received(new)

Address family IPv4 Unicast: advertised and received

Message statistics:

InQ depth is 0

OutQ depth is 0

	Sent	Rcvd
Opens:	1	1
Notifications:	0	0
Updates:	12	2
Keepalives:	67	67
Route Refresh:	0	1
Total:	80	71

Default minimum time between advertisements runs is 30 seconds

For address family: IPv4 Unicast

BGP table version 12, neighbor version 6/0

Output queue size : 0

Index 1, Offset 0, Mask 0x2

1 update-group member

	Sent	Rcvd
Prefix activity:	----	----
Prefixes Current:	8	1 (Consumes 207 bytes)
Prefixes total:	8	1
Implicit Withdraw:	0	0
Explicit Withdraw:	0	0
Used as bestpath:	n/a	1
Used as multipath:	n/a	0

	Outbound	Inbound
Local Policy Denied Prefixes:	-----	-----

--More--

### 3. Show ip bgp neighbors

BGP neighbor is 40.0.0.1, remote AS 200, external link  
BGP version 4, remote router ID 50.0.0.1  
BGP state = Established, up for 01:08:12  
Last read 01:08:12, last write 01:08:12, hold time is 180, keepalive interval is 60 seconds  
Neighbor capabilities:  
Route refresh: advertised and received(new)  
Address family IPv4 Unicast: advertised and received  
Message statistics:  
InQ depth is 0  
OutQ depth is 0

	Sent	Rcvd
Opens:	1	1
Notifications:	0	0
Updates:	2	16
Keepalives:	69	69
Route Refresh:	0	5
Total:	72	91

Default minimum time between advertisements runs is 30 seconds

For address family: IPv4 Unicast  
BGP table version 9, neighbor version 6/0  
Output queue size : 0  
Index 1, Offset 0, Mask 0x2  
1 update-group member

	Sent	Rcvd
Prefix activity:	----	----
Prefixes Current:	2	5 (Consumes 161 bytes)
Prefixes total:	2	5
Implicit Withdraw:	0	0
Explicit Withdraw:	0	0
Used as bestpath:	n/a	1
Used as multipath:	n/a	0

	Outbound	Inbound
Local Policy Denied Prefixes:	-----	-----
Total:	0	0

Number of NLRIs in the update sent: max 3, min 1

Address tracking is enabled, the RIB does have a route to 40.0.0.1  
 Connections established 1; dropped 0  
 Last reset never  
 Transport(tcp) path-mtu-discovery is enabled  
 Connection state is ESTAB, I/O status: 1, unread input bytes: 0  
 Connection is ECN Disabled, Minimum incoming TTL 0, Outgoing TTL 1  
 Local host: 40.0.0.2, Local port: 1025  
 Foreign host: 40.0.0.1, Foreign port: 179  
 Connection tableid (VRF): 0

Enqueued packets for retransmit: 0, input: 0 mis-ordered: 0 (0 bytes)

Event Timers (current time is 0xC69F4):

Timer	Starts	Wakeup	Next
Retrans	0	0	0x0
TimeWait	0	0	0x0
AckHold	85	0	0x0
SendWnd	0	0	0x0
KeepAlive	69	0	0x0
GiveUp	0	0	0x0
PmtuAger	0	0	0x0
DeadWait	0	0	0x0
Linger	0	0	0x0
ProcessQ	0	0	0x0

iss: 2057115318 snduna: 2057115748 sndnxt: 2057115748 sndwnd: 15955  
 irs: 3480424370 rcvnxt: 3480424751 rcvwnd: 16004 delrcvwnd: 380

SRTT: 259 ms, RTTO: 579 ms, RTV: 320 ms, KRTT: 0 ms

minRTT: 16 ms, maxRTT: 300 ms, ACK hold: 200 ms

Status Flags: passive open, gen tcbs

Option Flags: nagle, path mtu capable

IP Precedence value : 6

Datagrams (max data segment is 1460 bytes):

Rcvd: 86 (out of order: 0), with data: 7, total data bytes: 168

Sent: 70 (retransmit: 0, fastretransmit: 0, partialack: 0, Second Congestion: 0), with data: 2,  
 total data bytes: 48

Packets received in fast path: 0, fast processed: 0, slow path: 0

fast lock acquisition failures: 0, slow path: 0



## 6. Router 6 (AS 700)

### 1. Show ip bgp

1. BGP table version is 7, local router ID is 50.0.0.2

Status codes: s suppressed, d damped, h history, \* valid, > best, i - internal,  
r RIB-failure, S Stale

Origin codes: i - IGP, e - EGP, ? - incomplete

Network	Next Hop	Metric	LocPrf	Weight	Path
*> 10.0.0.0/8	50.0.0.1	0	0	0	200 i
*> 20.0.0.0/8	50.0.0.1	0	0	0	200 100 i
*> 30.0.0.0/8	50.0.0.1	0	0	0	200 100 i
*> 40.0.0.0/8	50.0.0.1	0	0	0	200 i
*> 50.0.0.0/8	0.0.0.0	0	0		32768 i
*	50.0.0.1	0	0	0	200 i

### 2. Show ip bgp summery

BGP router identifier 50.0.0.2, local AS number 700  
BGP table version is 7, main routing table version 6  
6 network entries using 792 bytes of memory  
6 path entries using 312 bytes of memory  
5/4 BGP path/bestpath attribute entries using 828 bytes of memory  
3 BGP AS-PATH entries using 72 bytes of memory  
0 BGP route-map cache entries using 0 bytes of memory  
0 BGP filter-list cache entries using 0 bytes of memory  
Bitfield cache entries: current 1 (at peak 1) using 32 bytes of memory  
BGP using 2036 total bytes of memory  
BGP activity 5/0 prefixes, 6/0 paths, scan interval 60 secs

Neighbor	V	A	S	MsgRcvd	MsgSent	TblVer	InQ	OutQ	Up/Down	State/PfxRcd
50.0.0.1	4	200	23	16	7	0	0	00:14:45	4	

### 3. Show ip bgp neighbors

BGP neighbor is 50.0.0.1, remote AS 200, external link  
BGP version 4, remote router ID 50.0.0.1

BGP state = Established, up for 00:04:13  
 Last read 00:04:13, last write 00:04:13, hold time is 180, keepalive interval is 60 seconds  
 Neighbor capabilities:  
 Route refresh: advertised and received(new)  
 Address family IPv4 Unicast: advertised and received  
 Message statistics:  
 InQ depth is 0  
 OutQ depth is 0

	Sent	Rcvd
Opens:	2	2
Notifications:	1	0
Updates:	3	14
Keepalives:	67	65
Route Refresh:	0	4
Total:	73	85

Default minimum time between advertisements runs is 30 seconds

For address family: IPv4 Unicast  
 BGP table version 12, neighbor version 6/0  
 Output queue size : 0  
 Index 1, Offset 0, Mask 0x2  
 1 update-group member

	Sent	Rcvd
Prefix activity:	----	----
Prefixes Current:	1	5 (Consumes 138 bytes)
Prefixes total:	1	5
Implicit Withdraw:	0	0
Explicit Withdraw:	0	0
Used as bestpath:	n/a	1
Used as multipath:	n/a	0

	Outbound	Inbound
Local Policy Denied Prefixes:	-----	-----
Total:	0	0

Number of NLRI in the update sent: max 3, min 1

Address tracking is enabled, the RIB does have a route to 50.0.0.1  
 Connections established 2; dropped 0  
 Last reset never  
 Transport(tcp) path-mtu-discovery is enabled  
 Connection state is ESTAB, I/O status: 1, unread input bytes: 0

Connection is ECN Disabled, Minimum incoming TTL 0, Outgoing TTL 1  
Local host: 50.0.0.2, Local port: 179  
Foreign host: 50.0.0.1, Foreign port: 1028  
Connection tableid (VRF): 0

Enqueued packets for retransmit: 0, input: 0 mis-ordered: 0 (0 bytes)

Event Timers (current time is 0xC69F4):

Timer	Starts	Wakeup	Next
Retrans	0	0	0x0
TimeWait	0	0	0x0
AckHold	79	0	0x0
SendWnd	0	0	0x0
KeepAlive	67	0	0x0
GiveUp	0	0	0x0
PmtuAger	0	0	0x0
DeadWait	0	0	0x0
Linger	0	0	0x0
ProcessQ	0	0	0x0

iss: 2057115318 snduna: 2057115748 sndnxt: 2057115748 sndwnd: 15955  
irs: 3480424370 rcvnxt: 3480424751 rcvwnd: 16004 delrcvwnd: 380

SRTT: 259 ms, RTTO: 579 ms, RTV: 320 ms, KRTT: 0 ms

minRTT: 16 ms, maxRTT: 300 ms, ACK hold: 200 ms

Status Flags: passive open, gen tcbs

Option Flags: nagle, path mtu capable

IP Precedence value : 6

Datagrams (max data segment is 1460 bytes):

Rcvd: 81 (out of order: 0), with data: 4, total data bytes: 96

Sent: 70 (retransmit: 0, fastretransmit: 0, partialack: 0, Second Congestion: 0), with data: 3,  
total data bytes: 72

Packets received in fast path: 0, fast processed: 0, slow path: 0

fast lock acquisition failures: 0, slow path: 0

## Commands

### For 1<sup>nd</sup> Question

1. enable
2. configure terminal
3. ip address 192.168.0.254 255.255.255.252
4. ip route 20.0.0.0 255.0.0.0 192.168.0.254
5. exit

### For 2<sup>st</sup> question

1. enable
2. configure terminal
3. ip address 192.168.0.254 255.255.255.252
4. router rip
5. network 192.168.0.0
6. exit

### For 3<sup>rd</sup> question

1. enable
2. configure terminal
3. router bgp 100
4. network 10.0.0.0
5. neighbor 10.0.0.2 remote-as 200 (Router#%BGP-5-ADJCHANGE: neighbor 10.0.0.2 Up)
6. exit