IEG3821 N3:Daynamic Routing Protocol Laboratory Report

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Task 0: Construct the Dynagen Network File and Basic router configuration

a) Construct the Dynagen Network File

According to the network diagram, the Network File has modified as following:

```
# IEG3821 ?Lab3
autostart = false
ghostios = true
ghostsize = 64
mmap = true
sparsemem = true

[127.0.0.1]
workingdir = /Users/raptium/Documents/Study/IEG3821/N3/working/

[[ETHSW SW]]
1 = dot1q 123
2 = dot1q 123
3 = dot1q 123

[[3640]]
image = /Users/raptium/Documents/Study/IEG3821/N3/images/c3640-telco-mz.124-13.image
ram = 64

#### S1_PE ####
[[ROUTER S1_PE]]
console = 2001
model = 3640
F0/0 = SW 1

#### S2_PE ####
[[ROUTER S2_PE]]
console = 2002
model = 3640
F0/0 = SW 2

#### S3_PE ####
[[ROUTER S3_PE]]
```

```
console = 2003
model = 3640
F0/0 = SW 3

#### S1_CE ####
[[ROUTER S1_CE]]
console = 2004
model = 3640
F0/0 = S1_PE F1/0

#### S2_CE ####
[[ROUTER S2_CE]]
console = 2005
model = 3640
F0/0 = S2_PE F1/0

#### S3_CE ####
[[ROUTER S3_CE]]
console = 2006
model = 3640
F0/0 = S3_PE F1/0

#### S1_R ####
[[ROUTER S1_R]]
console = 2007
model = 3640
F0/0 = S1_CE F1/0

#### S2_R ####
[[ROUTER S2_R]]
console = 2008
model = 3640
F0/0 = S2_CE F1/0

#### S3_R ####
[[ROUTER S3_R]]
console = 2009
model = 3640
F0/0 = S3_CE F1/0
```

b) Basic Router Configurations

To configure the hostname of each router, just run `hostname` on the routers.

The missing IP address can be set as following:

- **S1_PE**

```
interface FastEthernet0/0
 no ip address
!
interface FastEthernet0/0.12
 encapsulation dot1Q 12
 ip address 1.51.12.1 255.255.255.0
!
interface FastEthernet0/0.13
 encapsulation dot1Q 13
```

```
 ip address 1.51.13.1 255.255.255.0
!
interface FastEthernet1/0
 ip address 1.51.1.254 255.255.255.0
!
```

- **S2_PE**

```
interface FastEthernet0/0
 no ip address
!
interface FastEthernet0/0.12
 encapsulation dot1Q 12
 ip address 1.51.12.2 255.255.255.0
!
interface FastEthernet0/0.23
 encapsulation dot1Q 23
 ip address 1.51.23.2 255.255.255.0
!
interface FastEthernet1/0
 ip address 1.51.2.254 255.255.255.0
!
```

- **S3_PE**

```
interface FastEthernet0/0
 no ip address
!
interface FastEthernet0/0.13
 encapsulation dot1Q 13
 ip address 1.51.13.3 255.255.255.0
!
interface FastEthernet0/0.23
 encapsulation dot1Q 23
 ip address 1.51.23.3 255.255.255.0
!
interface FastEthernet1/0
 ip address 1.51.3.254 255.255.255.0
!
```

- **S1_CE**

```
interface FastEthernet0/0
 ip address 1.51.1.1 255.255.255.0
!
```

- **S2_CE**

```
interface FastEthernet0/0
 ip address 1.51.2.1 255.255.255.0
!
```

- **S3_CE**

```
interface FastEthernet0/0
 ip address 1.51.3.1 255.255.255.0
!
```

To verify the configuration above,

```
S1_PE#ping 1.51.12.2

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 1.51.12.2, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 12/29/76 ms
S1_PE#ping 1.51.13.3

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 1.51.13.3, timeout is 2 seconds:
.!!!!
Success rate is 80 percent (4/5), round-trip min/avg/max = 20/52/96 ms
S1_PE#ping 1.51.1.1

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 1.51.1.1, timeout is 2 seconds:
.!!!!
Success rate is 80 percent (4/5), round-trip min/avg/max = 28/45/60 ms

S2_PE#ping 1.51.12.1

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 1.51.12.1, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 16/39/88 ms
S2_PE#ping 1.51.23.3

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 1.51.23.3, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 8/29/68 ms
S2_PE#ping 1.51.2.1

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 1.51.2.1, timeout is 2 seconds:
.!!!!
Success rate is 80 percent (4/5), round-trip min/avg/max = 16/32/40 ms

S3_PE#ping 1.51.13.1

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 1.51.13.1, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 12/25/52 ms
S3_PE#ping 1.51.23.2

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 1.51.23.2, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 8/44/112 ms
S3_PE#ping 1.51.3.1

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 1.51.3.1, timeout is 2 seconds:
```

```
.!!!!
Success rate is 80 percent (4/5), round-trip min/avg/max = 8/27/48 ms
```

Task 1: Core IGP in NSP network

- **S1_PE**

```
interface Loopback0
 ip ospf network point-to-point
!
router ospf 1
 network 1.51.12.0 0.0.0.255 area 0
 network 1.51.13.0 0.0.0.255 area 0
 network 10.1.1.3 0.0.0.0 area 0
!
```

- **S2_PE**

```
interface Loopback0
 ip ospf network point-to-point
!
router ospf 1
 network 1.51.12.0 0.0.0.255 area 0
 network 1.51.23.0 0.0.0.255 area 0
 network 10.1.1.2 0.0.0.0 area 0
!
```

- **S3_PE**

```
interface Loopback0
 ip ospf network point-to-point
!
router ospf 1
 network 1.51.13.0 0.0.0.255 area 0
 network 1.51.23.0 0.0.0.255 area 0
 network 10.1.1.3 0.0.0.0 area 0
!
```

- **Verify**

```
S1_PE#ping 10.1.1.2 source lo0

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 10.1.1.2, timeout is 2 seconds:
Packet sent with a source address of 10.1.1.1
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 4/10/24 ms
S1_PE#ping 10.1.1.3 source lo0

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 10.1.1.3, timeout is 2 seconds:
Packet sent with a source address of 10.1.1.1
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 8/10/16 ms
```

```
S2_PE#ping 10.1.1.1 source lo0

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 10.1.1.1, timeout is 2 seconds:
Packet sent with a source address of 10.1.1.2
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 4/12/16 ms
S2_PE#ping 10.1.1.3 source lo0

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 10.1.1.3, timeout is 2 seconds:
Packet sent with a source address of 10.1.1.2
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 8/10/16 ms

S3_PE#ping 10.1.1.1 source lo0

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 10.1.1.1, timeout is 2 seconds:
Packet sent with a source address of 10.1.1.3
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 4/16/40 ms
S3_PE#ping 10.1.1.2 source lo0

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 10.1.1.2, timeout is 2 seconds:
Packet sent with a source address of 10.1.1.3
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 4/10/20 ms
```

Task 2: COnfiguration of IGP on networks in each site

a) Configure RIP on networks in Site 1

- **S1_CE**

```
router rip
 network 10.0.0.0
 default-information originate
!
```

- **S1_R**

```
router rip
 network 10.0.0.0
 network 200.11.1.0
 network 200.11.2.0
 network 200.11.3.0
 network 200.11.4.0
 network 200.11.5.0
 network 200.11.6.0
 network 200.11.7.0
 network 200.11.8.0
 network 200.11.9.0
 network 200.11.10.0
```

```
 network 200.11.11.0
 network 200.11.12.0
 network 200.11.13.0
 network 200.11.14.0
 network 200.11.15.0
!
```

- Verify & Capture

```
S1_CE#sh ip route
Codes: C - connected, S - static, 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
       i - IS-IS, su - IS-IS summary, 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

R    200.11.4.0/24 [120/1] via 10.0.11.1, 00:00:04, FastEthernet1/0
     1.0.0.0/24 is subnetted, 1 subnets
C       1.51.1.0 is directly connected, FastEthernet0/0
R    200.11.5.0/24 [120/1] via 10.0.11.1, 00:00:04, FastEthernet1/0
R    200.11.6.0/24 [120/1] via 10.0.11.1, 00:00:04, FastEthernet1/0
R    200.11.7.0/24 [120/1] via 10.0.11.1, 00:00:04, FastEthernet1/0
R    200.11.1.0/24 [120/1] via 10.0.11.1, 00:00:04, FastEthernet1/0
R    200.11.2.0/24 [120/1] via 10.0.11.1, 00:00:04, FastEthernet1/0
R    200.11.3.0/24 [120/1] via 10.0.11.1, 00:00:04, FastEthernet1/0
R    200.11.12.0/24 [120/1] via 10.0.11.1, 00:00:04, FastEthernet1/0
R    200.11.13.0/24 [120/1] via 10.0.11.1, 00:00:04, FastEthernet1/0
R    200.11.14.0/24 [120/1] via 10.0.11.1, 00:00:04, FastEthernet1/0
     10.0.0.0/24 is subnetted, 1 subnets
C       10.0.11.0 is directly connected, FastEthernet1/0
R    200.11.15.0/24 [120/1] via 10.0.11.1, 00:00:05, FastEthernet1/0
R    200.11.8.0/24 [120/1] via 10.0.11.1, 00:00:05, FastEthernet1/0
R    200.11.9.0/24 [120/1] via 10.0.11.1, 00:00:05, FastEthernet1/0
R    200.11.10.0/24 [120/1] via 10.0.11.1, 00:00:05, FastEthernet1/0
R    200.11.11.0/24 [120/1] via 10.0.11.1, 00:00:05, FastEthernet1/0
```

```
S1_R#sh ip route
Codes: C - connected, S - static, 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
       i - IS-IS, su - IS-IS summary, 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 10.0.11.254 to network 0.0.0.0

C    200.11.4.0/24 is directly connected, Loopback0
C    200.11.5.0/24 is directly connected, Loopback0
C    200.11.6.0/24 is directly connected, Loopback0
```

```
C    200.11.7.0/24 is directly connected, Loopback0
C    200.11.1.0/24 is directly connected, Loopback0
C    200.11.2.0/24 is directly connected, Loopback0
C    200.11.3.0/24 is directly connected, Loopback0
C    200.11.12.0/24 is directly connected, Loopback0
C    200.11.13.0/24 is directly connected, Loopback0
C    200.11.14.0/24 is directly connected, Loopback0
     10.0.0.0/24 is subnetted, 1 subnets
C       10.0.11.0 is directly connected, FastEthernet0/0
C    200.11.15.0/24 is directly connected, Loopback0
C    200.11.8.0/24 is directly connected, Loopback0
C    200.11.9.0/24 is directly connected, Loopback0
C    200.11.10.0/24 is directly connected, Loopback0
C    200.11.11.0/24 is directly connected, Loopback0
R*   0.0.0.0/0 [120/1] via 10.0.11.254, 00:00:12, FastEthernet0/0
```

b) Configure EIGRP on networks in Site 2

- **S2_CE**

```
router eigrp 1200
 redistribute static
 network 172.16.12.0 0.0.0.255
!
ip route 0.0.0.0 0.0.0.0 Null0
```

- **S2_R**

```
router eigrp 1200
 network 172.16.12.0 0.0.0.255
 network 200.12.0.0 0.0.15.255
!
```

- **Verify & Capture**

```
S2_CE#sh ip route
Codes: C - connected, S - static, 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
       i - IS-IS, su - IS-IS summary, 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 0.0.0.0 to network 0.0.0.0

D    200.12.4.0/24 [90/156160] via 172.16.12.1, 00:02:23, FastEthernet1/0
     1.0.0.0/24 is subnetted, 1 subnets
C       1.51.2.0 is directly connected, FastEthernet0/0
D    200.12.5.0/24 [90/156160] via 172.16.12.1, 00:02:23, FastEthernet1/0
D    200.12.6.0/24 [90/156160] via 172.16.12.1, 00:02:23, FastEthernet1/0
D    200.12.7.0/24 [90/156160] via 172.16.12.1, 00:02:23, FastEthernet1/0
D    200.12.1.0/24 [90/156160] via 172.16.12.1, 00:02:23, FastEthernet1/0
D    200.12.2.0/24 [90/156160] via 172.16.12.1, 00:02:23, FastEthernet1/0
     172.16.0.0/24 is subnetted, 1 subnets
C       172.16.12.0 is directly connected, FastEthernet1/0
```

```
D    200.12.3.0/24 [90/156160] via 172.16.12.1, 00:02:23, FastEthernet1/0
D    200.12.12.0/24 [90/156160] via 172.16.12.1, 00:02:23, FastEthernet1/0
D    200.12.13.0/24 [90/156160] via 172.16.12.1, 00:02:23, FastEthernet1/0
D    200.12.14.0/24 [90/156160] via 172.16.12.1, 00:02:24, FastEthernet1/0
D    200.12.15.0/24 [90/156160] via 172.16.12.1, 00:02:24, FastEthernet1/0
D    200.12.8.0/24 [90/156160] via 172.16.12.1, 00:02:24, FastEthernet1/0
D    200.12.9.0/24 [90/156160] via 172.16.12.1, 00:02:24, FastEthernet1/0
D    200.12.10.0/24 [90/156160] via 172.16.12.1, 00:02:24, FastEthernet1/0
D    200.12.11.0/24 [90/156160] via 172.16.12.1, 00:02:24, FastEthernet1/0
S*   0.0.0.0/0 is directly connected, Null0


S2_R#sh ip route
Codes: C - connected, S - static, 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
       i - IS-IS, su - IS-IS summary, 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 172.16.12.254 to network 0.0.0.0

C    200.12.4.0/24 is directly connected, Loopback0
C    200.12.5.0/24 is directly connected, Loopback0
C    200.12.6.0/24 is directly connected, Loopback0
C    200.12.7.0/24 is directly connected, Loopback0
C    200.12.1.0/24 is directly connected, Loopback0
C    200.12.2.0/24 is directly connected, Loopback0
     172.16.0.0/16 is variably subnetted, 2 subnets, 2 masks
C       172.16.12.0/24 is directly connected, FastEthernet0/0
D       172.16.0.0/16 is a summary, 00:02:39, Null0
C    200.12.3.0/24 is directly connected, Loopback0
C    200.12.12.0/24 is directly connected, Loopback0
C    200.12.13.0/24 is directly connected, Loopback0
C    200.12.14.0/24 is directly connected, Loopback0
C    200.12.15.0/24 is directly connected, Loopback0
C    200.12.8.0/24 is directly connected, Loopback0
C    200.12.9.0/24 is directly connected, Loopback0
C    200.12.10.0/24 is directly connected, Loopback0
C    200.12.11.0/24 is directly connected, Loopback0
D*EX 0.0.0.0/0 [170/28160] via 172.16.12.254, 00:00:35, FastEthernet0/0
```

c) Configure OSPF no networks in Site 3

- **S3_CE**

```
router ospf 1
 network 192.168.13.0 0.0.0.255 area 1300
 default-information originate
!
ip route 0.0.0.0 0.0.0.0 Null0
```

- **S3_R**

```
router ospf 1
```

```
 network 192.168.13.0 0.0.0.255 area 1300
 network 200.13.0.0 0.0.15.255 area 1300
!
```

- **Verify & Capture**

```
S3_CE#sh ip route
Codes: C - connected, S - static, 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
       i - IS-IS, su - IS-IS summary, 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 0.0.0.0 to network 0.0.0.0

O    200.13.4.0/24 [110/2] via 192.168.13.1, 00:00:38, FastEthernet1/0
     1.0.0.0/24 is subnetted, 1 subnets
C       1.51.3.0 is directly connected, FastEthernet0/0
C    192.168.13.0/24 is directly connected, FastEthernet1/0
O    200.13.5.0/24 [110/2] via 192.168.13.1, 00:00:38, FastEthernet1/0
O    200.13.6.0/24 [110/2] via 192.168.13.1, 00:00:38, FastEthernet1/0
O    200.13.7.0/24 [110/2] via 192.168.13.1, 00:00:38, FastEthernet1/0
     200.13.1.0/32 is subnetted, 1 subnets
O       200.13.1.254 [110/2] via 192.168.13.1, 00:00:38, FastEthernet1/0
O    200.13.2.0/24 [110/2] via 192.168.13.1, 00:00:38, FastEthernet1/0
O    200.13.3.0/24 [110/2] via 192.168.13.1, 00:00:38, FastEthernet1/0
O    200.13.12.0/24 [110/2] via 192.168.13.1, 00:00:38, FastEthernet1/0
O    200.13.13.0/24 [110/2] via 192.168.13.1, 00:00:38, FastEthernet1/0
O    200.13.14.0/24 [110/2] via 192.168.13.1, 00:00:38, FastEthernet1/0
O    200.13.15.0/24 [110/2] via 192.168.13.1, 00:00:38, FastEthernet1/0
O    200.13.8.0/24 [110/2] via 192.168.13.1, 00:00:38, FastEthernet1/0
O    200.13.9.0/24 [110/2] via 192.168.13.1, 00:00:38, FastEthernet1/0
O    200.13.10.0/24 [110/2] via 192.168.13.1, 00:00:38, FastEthernet1/0
O    200.13.11.0/24 [110/2] via 192.168.13.1, 00:00:38, FastEthernet1/0
S*   0.0.0.0/0 is directly connected, Null0


S3_R#sh ip route
Codes: C - connected, S - static, 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
       i - IS-IS, su - IS-IS summary, 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 192.168.13.254 to network 0.0.0.0

C    200.13.4.0/24 is directly connected, Loopback0
C    192.168.13.0/24 is directly connected, FastEthernet0/0
C    200.13.5.0/24 is directly connected, Loopback0
C    200.13.6.0/24 is directly connected, Loopback0
C    200.13.7.0/24 is directly connected, Loopback0
C    200.13.1.0/24 is directly connected, Loopback0
```

```
C    200.13.2.0/24 is directly connected, Loopback0
C    200.13.3.0/24 is directly connected, Loopback0
C    200.13.12.0/24 is directly connected, Loopback0
C    200.13.13.0/24 is directly connected, Loopback0
C    200.13.14.0/24 is directly connected, Loopback0
C    200.13.15.0/24 is directly connected, Loopback0
C    200.13.8.0/24 is directly connected, Loopback0
C    200.13.9.0/24 is directly connected, Loopback0
C    200.13.10.0/24 is directly connected, Loopback0
C    200.13.11.0/24 is directly connected, Loopback0
O*E2 0.0.0.0/0 [110/1] via 192.168.13.254, 00:00:00, FastEthernet0/0
```

Task 3: Core BGP in each NSP network

- **S1_PE**

```
router bgp 1000
 bgp router-id 10.1.1.1
 neighbor 10.1.1.2 remote-as 1000
 neighbor 10.1.1.2 update-source Loopback0
 neighbor 10.1.1.3 remote-as 1000
 neighbor 10.1.1.3 update-source Loopback0
!
```

- **S2_PE**

```
router bgp 1000
 bgp router-id 10.1.1.2
 neighbor 10.1.1.1 remote-as 1000
 neighbor 10.1.1.1 update-source Loopback0
 neighbor 10.1.1.3 remote-as 1000
 neighbor 10.1.1.3 update-source Loopback0
!
```

- **S3_PE**

```
router bgp 1000
 bgp router-id 10.1.1.3
 neighbor 10.1.1.1 remote-as 1000
 neighbor 10.1.1.1 update-source Loopback0
 neighbor 10.1.1.2 remote-as 1000
 neighbor 10.1.1.2 update-source Loopback0
!
```

- **Verify & Capture**

```
S1_PE#sh ip bgp sum
BGP router identifier 10.1.1.1, local AS number 1000
BGP table version is 1, main routing table version 1

Neighbor        V    AS MsgRcvd MsgSent   TblVer  InQ OutQ Up/Down  State/PfxRcd
10.1.1.2        4  1000       4       5        1    0    0 00:01:14        0
10.1.1.3        4  1000       4       4        1    0    0 00:00:38        0
```

```
S2_PE#sh ip bgp sum
BGP router identifier 10.1.1.2, local AS number 1000
BGP table version is 1, main routing table version 1

Neighbor        V    AS MsgRcvd MsgSent   TblVer  InQ OutQ Up/Down  State/PfxRcd
10.1.1.1        4  1000       5       4        1    0    0 00:01:24        0
10.1.1.3        4  1000       4       4        1    0    0 00:00:24        0

S3_PE#sh ip bgp sum
BGP router identifier 10.1.1.3, local AS number 1000
BGP table version is 1, main routing table version 1

Neighbor        V    AS MsgRcvd MsgSent   TblVer  InQ OutQ Up/Down  State/PfxRcd
10.1.1.1        4  1000       4       4        1    0    0 00:00:53        0
10.1.1.2        4  1000       4       4        1    0    0 00:00:29        0
```

Task 4: Configuration of eBGP between PE and CE of each Site

- **S1_PE**

```
router bgp 1000
 bgp router-id 10.1.1.1
 neighbor 1.51.1.1 remote-as 1100
 neighbor 10.1.1.2 next-hop-self
 neighbor 10.1.1.3 next-hop-self
!
```

- **S1_CE**

```
router bgp 1100
 bgp router-id 1.51.1.1
 redistribute rip
 neighbor 1.51.1.254 remote-as 1000
 neighbor 1.51.1.254 update-source FastEthernet0/0
!
```

- **S2_PE**

```
router bgp 1000
 bgp router-id 10.1.1.2
 neighbor 1.51.2.1 remote-as 1200
 neighbor 10.1.1.1 next-hop-self
 neighbor 10.1.1.3 next-hop-self
!
```

- **S2_CE**

```
router bgp 1200
 bgp router-id 1.51.2.1
 redistribute eigrp 1200
 neighbor 1.51.2.254 remote-as 1000
 neighbor 1.51.2.254 update-source FastEthernet0/0
!
```

- **S3_PE**

```
router bgp 1000
 bgp router-id 10.1.1.3
 neighbor 1.51.3.1 remote-as 1300
 neighbor 10.1.1.1 next-hop-self
 neighbor 10.1.1.2 next-hop-self
!
```

- **S3_CE**

```
router bgp 1300
 bgp router-id 1.51.3.1
 redistribute ospf 1
 neighbor 1.51.3.254 remote-as 1000
 neighbor 1.51.3.254 update-source FastEthernet0/0
!
```

- **Verify & Capture**

```
S1_CE#sh ip bgp
BGP table version is 17, local router ID is 1.51.1.1
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
*> 10.0.11.0/24     0.0.0.0                  0         32768 ?
*> 200.11.1.0       10.0.11.1                1         32768 ?
*> 200.11.2.0       10.0.11.1                1         32768 ?
*> 200.11.3.0       10.0.11.1                1         32768 ?
*> 200.11.4.0       10.0.11.1                1         32768 ?
*> 200.11.5.0       10.0.11.1                1         32768 ?
*> 200.11.6.0       10.0.11.1                1         32768 ?
*> 200.11.7.0       10.0.11.1                1         32768 ?
*> 200.11.8.0       10.0.11.1                1         32768 ?
*> 200.11.9.0       10.0.11.1                1         32768 ?
*> 200.11.10.0      10.0.11.1                1         32768 ?
*> 200.11.11.0      10.0.11.1                1         32768 ?
*> 200.11.12.0      10.0.11.1                1         32768 ?
*> 200.11.13.0      10.0.11.1                1         32768 ?
*> 200.11.14.0      10.0.11.1                1         32768 ?
*> 200.11.15.0      10.0.11.1                1         32768 ?


S2_CE#sh ip bgp
BGP table version is 47, local router ID is 1.51.2.1
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
*> 172.16.12.0/24   0.0.0.0                  0         32768 ?
*> 200.12.1.0       172.16.12.1         156160         32768 ?
*> 200.12.2.0       172.16.12.1         156160         32768 ?
*> 200.12.3.0       172.16.12.1         156160         32768 ?
*> 200.12.4.0       172.16.12.1         156160         32768 ?
*> 200.12.5.0       172.16.12.1         156160         32768 ?
```

```
*> 200.12.6.0       172.16.12.1         156160         32768 ?
*> 200.12.7.0       172.16.12.1         156160         32768 ?
*> 200.12.8.0       172.16.12.1         156160         32768 ?
*> 200.12.9.0       172.16.12.1         156160         32768 ?
*> 200.12.10.0      172.16.12.1         156160         32768 ?
*> 200.12.11.0      172.16.12.1         156160         32768 ?
*> 200.12.12.0      172.16.12.1         156160         32768 ?
*> 200.12.13.0      172.16.12.1         156160         32768 ?
*> 200.12.14.0      172.16.12.1         156160         32768 ?
*> 200.12.15.0      172.16.12.1         156160         32768 ?


S3_CE#sh ip bgp
BGP table version is 17, local router ID is 1.51.3.1
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
*> 192.168.13.0     0.0.0.0                  0         32768 ?
*> 200.13.1.254/32  192.168.13.1             2         32768 ?
*> 200.13.2.0       192.168.13.1             2         32768 ?
*> 200.13.3.0       192.168.13.1             2         32768 ?
*> 200.13.4.0       192.168.13.1             2         32768 ?
*> 200.13.5.0       192.168.13.1             2         32768 ?
*> 200.13.6.0       192.168.13.1             2         32768 ?
*> 200.13.7.0       192.168.13.1             2         32768 ?
*> 200.13.8.0       192.168.13.1             2         32768 ?
*> 200.13.9.0       192.168.13.1             2         32768 ?
*> 200.13.10.0      192.168.13.1             2         32768 ?
*> 200.13.11.0      192.168.13.1             2         32768 ?
*> 200.13.12.0      192.168.13.1             2         32768 ?
*> 200.13.13.0      192.168.13.1             2         32768 ?
*> 200.13.14.0      192.168.13.1             2         32768 ?
*> 200.13.15.0      192.168.13.1             2         32768 ?

S1_R#ping 200.12.1.254 source lo0

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 200.12.1.254, timeout is 2 seconds:
Packet sent with a source address of 200.11.1.254
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 44/99/144 ms
S1_R#ping 200.13.1.254 source lo0

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 200.13.1.254, timeout is 2 seconds:
Packet sent with a source address of 200.11.1.254
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 64/88/136 ms
```

Task 5: Implementation of RFC 1918 in PE Router

- **S1_PE**

```
ip prefix-list PL seq 5 deny 10.0.11.0/24
ip prefix-list PL seq 10 permit 0.0.0.0/0 le 32
router bgp 1000
 neighbor 1.51.1.1 prefix-list PL in
!
```

- **S2_PE**

```
ip prefix-list PL seq 5 deny 172.16.12.0/24
ip prefix-list PL seq 10 permit 0.0.0.0/0 le 32
router bgp 1000
 neighbor 1.51.2.1 prefix-list PL in
!
```

- **S3_PE**

```
ip prefix-list PL seq 5 deny 192.168.13.0/24
ip prefix-list PL seq 10 permit 0.0.0.0/0 le 32
router bgp 1000
 neighbor 1.51.3.1 prefix-list PL in
!
```

- **Capture & Verify**

```
S1_CE#sh bgp
BGP table version is 47, local router ID is 1.51.1.1
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
*> 10.0.11.0/24     0.0.0.0                  0         32768 ?
*> 200.11.1.0       10.0.11.1                1         32768 ?
*> 200.11.2.0       10.0.11.1                1         32768 ?
*> 200.11.3.0       10.0.11.1                1         32768 ?
*> 200.11.4.0       10.0.11.1                1         32768 ?
*> 200.11.5.0       10.0.11.1                1         32768 ?
*> 200.11.6.0       10.0.11.1                1         32768 ?
*> 200.11.7.0       10.0.11.1                1         32768 ?
*> 200.11.8.0       10.0.11.1                1         32768 ?
*> 200.11.9.0       10.0.11.1                1         32768 ?
*> 200.11.10.0      10.0.11.1                1         32768 ?
*> 200.11.11.0      10.0.11.1                1         32768 ?
*> 200.11.12.0      10.0.11.1                1         32768 ?
*> 200.11.13.0      10.0.11.1                1         32768 ?
*> 200.11.14.0      10.0.11.1                1         32768 ?
*> 200.11.15.0      10.0.11.1                1         32768 ?
*> 200.12.1.0       1.51.1.254                             0 1000 1200 ?
   Network          Next Hop            Metric LocPrf Weight Path
*> 200.12.2.0       1.51.1.254                             0 1000 1200 ?
*> 200.12.3.0       1.51.1.254                             0 1000 1200 ?
*> 200.12.4.0       1.51.1.254                             0 1000 1200 ?
*> 200.12.5.0       1.51.1.254                             0 1000 1200 ?
*> 200.12.6.0       1.51.1.254                             0 1000 1200 ?
*> 200.12.7.0       1.51.1.254                             0 1000 1200 ?
*> 200.12.8.0       1.51.1.254                             0 1000 1200 ?
```

```
*> 200.12.9.0       1.51.1.254                             0 1000 1200 ?
*> 200.12.10.0      1.51.1.254                             0 1000 1200 ?
*> 200.12.11.0      1.51.1.254                             0 1000 1200 ?
*> 200.12.12.0      1.51.1.254                             0 1000 1200 ?
*> 200.12.13.0      1.51.1.254                             0 1000 1200 ?
*> 200.12.14.0      1.51.1.254                             0 1000 1200 ?
*> 200.12.15.0      1.51.1.254                             0 1000 1200 ?
*> 200.13.1.254/32  1.51.1.254                             0 1000 1300 ?
*> 200.13.2.0       1.51.1.254                             0 1000 1300 ?
*> 200.13.3.0       1.51.1.254                             0 1000 1300 ?
*> 200.13.4.0       1.51.1.254                             0 1000 1300 ?
*> 200.13.5.0       1.51.1.254                             0 1000 1300 ?
*> 200.13.6.0       1.51.1.254                             0 1000 1300 ?
*> 200.13.7.0       1.51.1.254                             0 1000 1300 ?
*> 200.13.8.0       1.51.1.254                             0 1000 1300 ?
   Network          Next Hop            Metric LocPrf Weight Path
*> 200.13.9.0       1.51.1.254                             0 1000 1300 ?
*> 200.13.10.0      1.51.1.254                             0 1000 1300 ?
*> 200.13.11.0      1.51.1.254                             0 1000 1300 ?
*> 200.13.12.0      1.51.1.254                             0 1000 1300 ?
*> 200.13.13.0      1.51.1.254                             0 1000 1300 ?
*> 200.13.14.0      1.51.1.254                             0 1000 1300 ?
*> 200.13.15.0      1.51.1.254                             0 1000 1300 ?


S2_CE#sh bgp
BGP table version is 47, local router ID is 1.51.2.1
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
*> 172.16.12.0/24   0.0.0.0                  0         32768 ?
*> 200.11.1.0       1.51.2.254                             0 1000 1100 ?
*> 200.11.2.0       1.51.2.254                             0 1000 1100 ?
*> 200.11.3.0       1.51.2.254                             0 1000 1100 ?
*> 200.11.4.0       1.51.2.254                             0 1000 1100 ?
*> 200.11.5.0       1.51.2.254                             0 1000 1100 ?
*> 200.11.6.0       1.51.2.254                             0 1000 1100 ?
*> 200.11.7.0       1.51.2.254                             0 1000 1100 ?
*> 200.11.8.0       1.51.2.254                             0 1000 1100 ?
*> 200.11.9.0       1.51.2.254                             0 1000 1100 ?
*> 200.11.10.0      1.51.2.254                             0 1000 1100 ?
*> 200.11.11.0      1.51.2.254                             0 1000 1100 ?
*> 200.11.12.0      1.51.2.254                             0 1000 1100 ?
*> 200.11.13.0      1.51.2.254                             0 1000 1100 ?
*> 200.11.14.0      1.51.2.254                             0 1000 1100 ?
*> 200.11.15.0      1.51.2.254                             0 1000 1100 ?
*> 200.12.1.0       172.16.12.1         156160             32768 ?
   Network          Next Hop            Metric LocPrf Weight Path
*> 200.12.2.0       172.16.12.1         156160             32768 ?
*> 200.12.3.0       172.16.12.1         156160             32768 ?
*> 200.12.4.0       172.16.12.1         156160             32768 ?
*> 200.12.5.0       172.16.12.1         156160             32768 ?
*> 200.12.6.0       172.16.12.1         156160             32768 ?
*> 200.12.7.0       172.16.12.1         156160             32768 ?
```

```
*> 200.12.8.0       172.16.12.1         156160         32768 ?
*> 200.12.9.0       172.16.12.1         156160         32768 ?
*> 200.12.10.0      172.16.12.1         156160         32768 ?
*> 200.12.11.0      172.16.12.1         156160         32768 ?
*> 200.12.12.0      172.16.12.1         156160         32768 ?
*> 200.12.13.0      172.16.12.1         156160         32768 ?
*> 200.12.14.0      172.16.12.1         156160         32768 ?
*> 200.12.15.0      172.16.12.1         156160         32768 ?
*> 200.13.1.254/32  1.51.2.254                              0 1000 1300 ?
*> 200.13.2.0       1.51.2.254                              0 1000 1300 ?
*> 200.13.3.0       1.51.2.254                              0 1000 1300 ?
*> 200.13.4.0       1.51.2.254                              0 1000 1300 ?
*> 200.13.5.0       1.51.2.254                              0 1000 1300 ?
*> 200.13.6.0       1.51.2.254                              0 1000 1300 ?
*> 200.13.7.0       1.51.2.254                              0 1000 1300 ?
*> 200.13.8.0       1.51.2.254                              0 1000 1300 ?
   Network          Next Hop            Metric LocPrf Weight Path
*> 200.13.9.0       1.51.2.254                              0 1000 1300 ?
*> 200.13.10.0      1.51.2.254                              0 1000 1300 ?
*> 200.13.11.0      1.51.2.254                              0 1000 1300 ?
*> 200.13.12.0      1.51.2.254                              0 1000 1300 ?
*> 200.13.13.0      1.51.2.254                              0 1000 1300 ?
*> 200.13.14.0      1.51.2.254                              0 1000 1300 ?
*> 200.13.15.0      1.51.2.254                              0 1000 1300 ?
```

```
S3_CE#sh bgp
BGP table version is 47, local router ID is 1.51.3.1
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
*> 192.168.13.0     0.0.0.0                  0         32768 ?
*> 200.11.1.0       1.51.3.254                              0 1000 1100 ?
*> 200.11.2.0       1.51.3.254                              0 1000 1100 ?
*> 200.11.3.0       1.51.3.254                              0 1000 1100 ?
*> 200.11.4.0       1.51.3.254                              0 1000 1100 ?
*> 200.11.5.0       1.51.3.254                              0 1000 1100 ?
*> 200.11.6.0       1.51.3.254                              0 1000 1100 ?
*> 200.11.7.0       1.51.3.254                              0 1000 1100 ?
*> 200.11.8.0       1.51.3.254                              0 1000 1100 ?
*> 200.11.9.0       1.51.3.254                              0 1000 1100 ?
*> 200.11.10.0      1.51.3.254                              0 1000 1100 ?
*> 200.11.11.0      1.51.3.254                              0 1000 1100 ?
*> 200.11.12.0      1.51.3.254                              0 1000 1100 ?
*> 200.11.13.0      1.51.3.254                              0 1000 1100 ?
*> 200.11.14.0      1.51.3.254                              0 1000 1100 ?
*> 200.11.15.0      1.51.3.254                              0 1000 1100 ?
*> 200.12.1.0       1.51.3.254                              0 1000 1200 ?
   Network          Next Hop            Metric LocPrf Weight Path
*> 200.12.2.0       1.51.3.254                              0 1000 1200 ?
*> 200.12.3.0       1.51.3.254                              0 1000 1200 ?
*> 200.12.4.0       1.51.3.254                              0 1000 1200 ?
*> 200.12.5.0       1.51.3.254                              0 1000 1200 ?
```

```
*> 200.12.6.0       1.51.3.254                             0 1000 1200 ?
*> 200.12.7.0       1.51.3.254                             0 1000 1200 ?
*> 200.12.8.0       1.51.3.254                             0 1000 1200 ?
*> 200.12.9.0       1.51.3.254                             0 1000 1200 ?
*> 200.12.10.0      1.51.3.254                             0 1000 1200 ?
*> 200.12.11.0      1.51.3.254                             0 1000 1200 ?
*> 200.12.12.0      1.51.3.254                             0 1000 1200 ?
*> 200.12.13.0      1.51.3.254                             0 1000 1200 ?
*> 200.12.14.0      1.51.3.254                             0 1000 1200 ?
*> 200.12.15.0      1.51.3.254                             0 1000 1200 ?
*> 200.13.1.254/32  192.168.13.1            2         32768 ?
*> 200.13.2.0       192.168.13.1            2         32768 ?
*> 200.13.3.0       192.168.13.1            2         32768 ?
*> 200.13.4.0       192.168.13.1            2         32768 ?
*> 200.13.5.0       192.168.13.1            2         32768 ?
*> 200.13.6.0       192.168.13.1            2         32768 ?
*> 200.13.7.0       192.168.13.1            2         32768 ?
*> 200.13.8.0       192.168.13.1            2         32768 ?
   Network          Next Hop            Metric LocPrf Weight Path
*> 200.13.9.0       192.168.13.1            2         32768 ?
*> 200.13.10.0      192.168.13.1            2         32768 ?
*> 200.13.11.0      192.168.13.1            2         32768 ?
*> 200.13.12.0      192.168.13.1            2         32768 ?
*> 200.13.13.0      192.168.13.1            2         32768 ?
*> 200.13.14.0      192.168.13.1            2         32768 ?
*> 200.13.15.0      192.168.13.1            2         32768 ?
```

As you can see above, there are no private addresses from other CE networks advertised any more.

A Declaration

I declare that the assignment here submitted is original except for source material explicitly acknowledged, and that the same or related material has not been previously submitted for another course. I also acknowledge that I am aware of University policy and regulations on honesty in academic work, and of the disciplinary guidelines and procedures applicable to breaches of such policy and regulations, as contained in the website `http://www.cuhk.edu.hk/policy/academichonesty/`