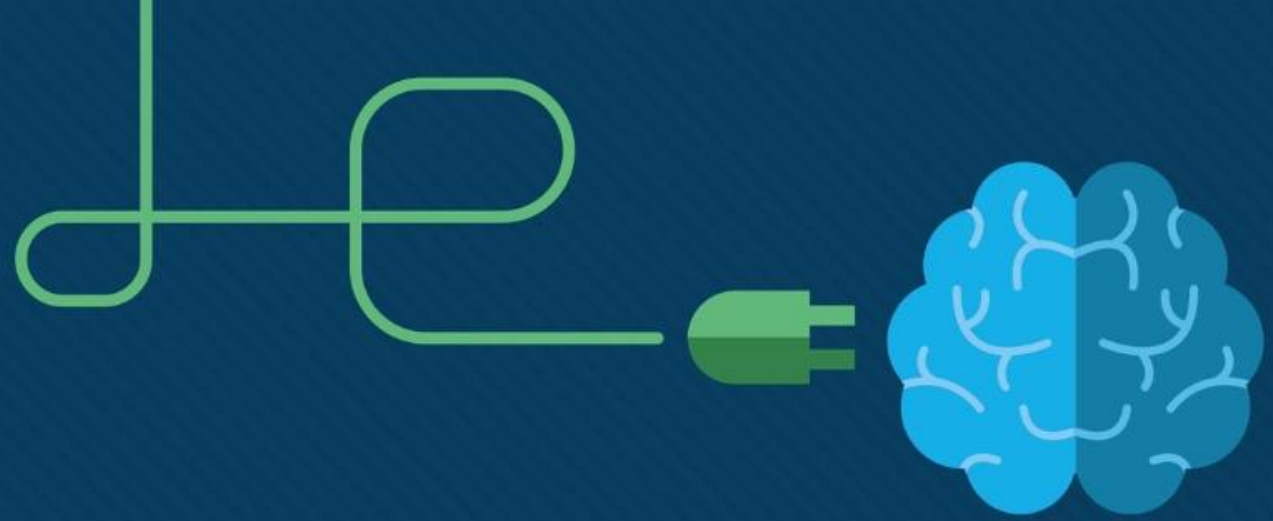

5조 팀 프로젝트

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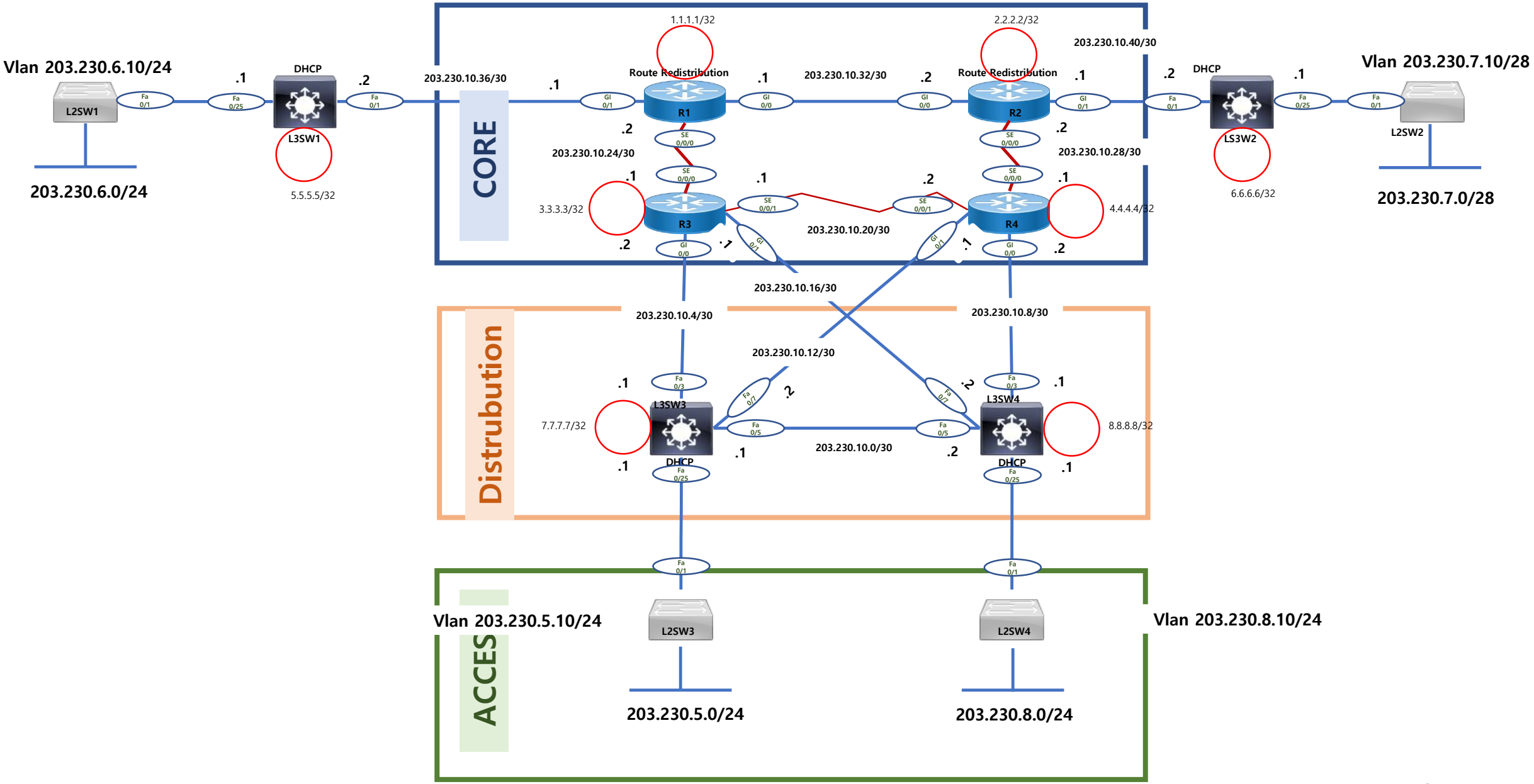
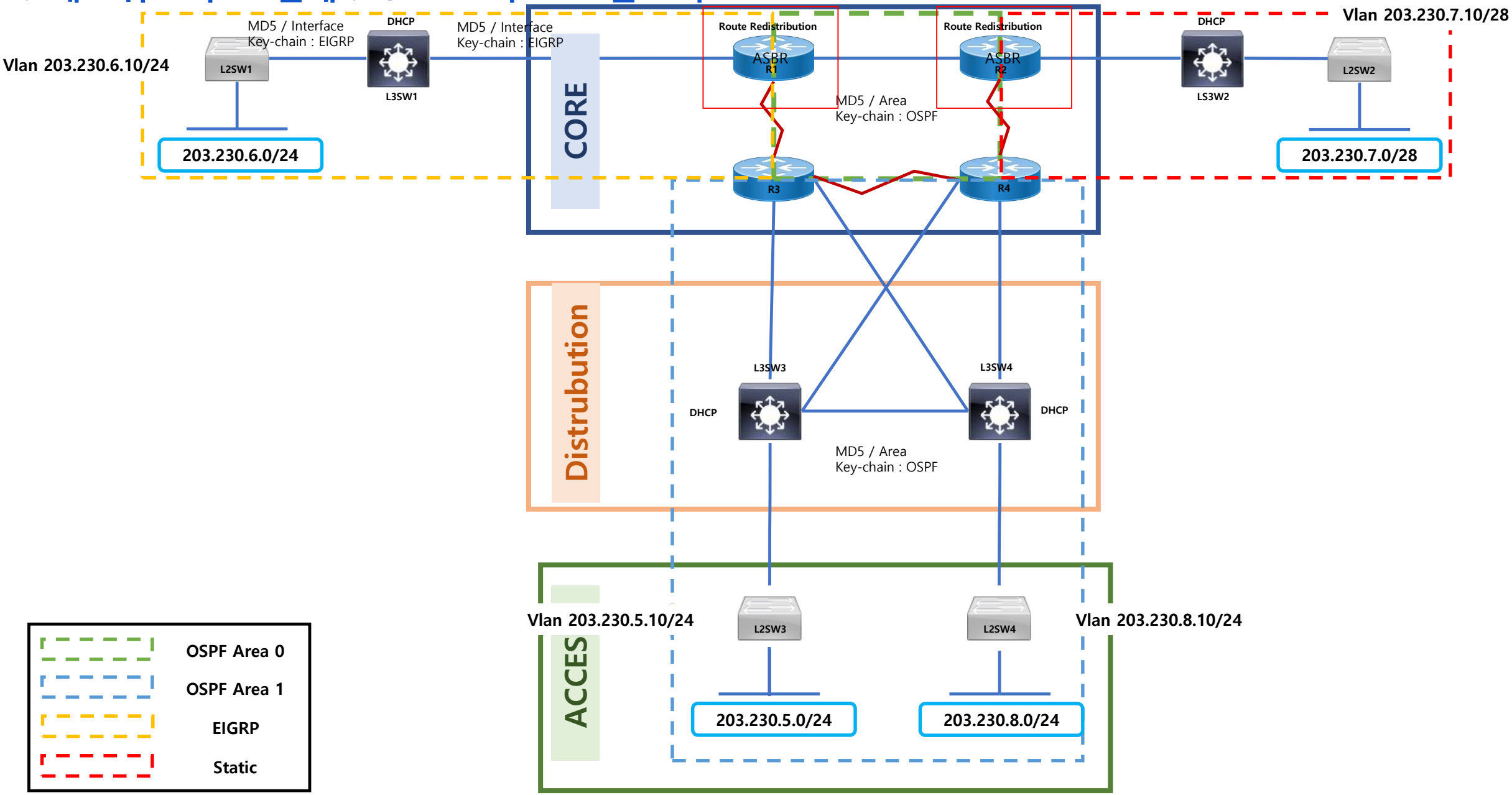
목차

1. 네트워크 구조 설계 : 3-TIER 구조 토폴로지



1. 네트워크 구조 설계 : 3-TIER 구조 토폴로지



1. 네트워크 구조 설계 : : 3-TIER 구조 토폴로지

Router : Catalyst 2800 Series
L3 SW : Catalyst 3560
L2 SW : Catalyst 2960

2. 주요 설정 코드 : 네트워크 장비 Confing : L3SW 인터페이스 IPv4 주소 설정 및 활성화 결과

L3SW1

```
L3SW1(config)#do show ip int br | in up
Vlan1                  unassigned      YES NVRAM  up                    down
FastEthernet0/1        203.230.10.38   YES manual up                    up
FastEthernet0/25       203.230.6.1     YES manual up                    up
Loopback0              5.5.5.5         YES manual up                    up
```

L3SW2

```
L3SW2#show ip int brief | in up
Vlan1                  unassigned      YES NVRAM  up                    down
FastEthernet0/1        203.230.10.42   YES manual up                    up
FastEthernet0/25       203.230.7.1     YES manual up                    up
Loopback0              6.6.6.6         YES manual up                    up
```

L3SW3

```
L3SW3(config)#do show ip int br | in up
Vlan1                  unassigned      YES NVRAM  up                    down
FastEthernet0/3        203.230.10.5    YES manual up                    up
FastEthernet0/5        203.230.10.1    YES manual up                    up
FastEthernet0/7        203.230.10.14   YES manual up                    up
FastEthernet0/25       203.230.5.1     YES manual up                    up
Loopback0              7.7.7.7         YES manual up                    up
```

L3SW4

```
L3SW4(config-if)#do show ip int br | in up
Vlan1                  unassigned      YES NVRAM  up                    down
FastEthernet0/3        203.230.10.9    YES manual up                    up
FastEthernet0/5        203.230.10.2    YES manual up                    up
FastEthernet0/7        203.230.10.18   YES manual up                    up
FastEthernet0/25       203.230.8.1     YES manual up                    up
Loopback0              8.8.8.8         YES manual up                    up
```

2. 주요 설정 코드 : 네트워크 장비 Confing : L2SW 인터페이스 IPv4 주소 설정 및 활성화 결과

L2SW1

```
SW1(config)#do show ip int brief
Interface              IP-Address      OK? Method Status                Protocol
Vlan1                  203.230.6.10    YES manual up                    up
```

L2SW2

```
L2SW2#show ip int brief | in up
Vlan1                  203.230.7.10    YES manual up                    up
```

L2SW3

```
L2SW3#show ip int bri
Interface              IP-Address      OK? Method Status                Protocol
Vlan1                  203.230.5.10    YES manual up                    up
```

L2SW4

```
L2SW4(config)#do show ip int br | in up
Vlan1                  203.230.8.10    YES manual up                    up
```

2. 주요 설정 코드 : 네트워크 장비 Confing : 라우터 인터페이스 IPv4 주소 설정 및 활성화 결과

R1

```
R1(config)#do show ip int brief
Interface                  IP-Address      OK? Method Status                Prot
ocol
GigabitEthernet0/0         203.230.10.33   YES manual up                    up

GigabitEthernet0/1         203.230.10.37   YES manual up                    up

Serial0/0/0                203.230.10.26   YES SLARP  up                    up

Serial0/0/1                unassigned      YES unset  administratively down down

Loopback0                  1.1.1.1         YES manual up                    up
```

R2

```
R2#show ip int brief
Interface                  IP-Address      OK? Method Status                Protocol
GigabitEthernet0/0         203.230.10.34   YES manual up                    up
GigabitEthernet0/1         203.230.10.41   YES manual up                    up
Serial0/0/0                203.230.10.30   YES SLARP  up                    up
Serial0/0/1                unassigned      YES unset  administratively down down
Loopback0                  2.2.2.2         YES manual up                    up
```

R3

```
R3#show ip int bri
Interface                  IP-Address      OK? Method Status                Protocol
GigabitEthernet0/0         203.230.10.6    YES manual up                    up
GigabitEthernet0/1         203.230.10.17   YES manual up                    up
Serial0/0/0                203.230.10.25   YES manual up                    up
Serial0/0/1                203.230.20.21   YES SLARP  up                    up
Loopback0                  3.3.3.3         YES manual up                    up
```

R4

```
R4(config)#do show ip int br | in up
GigabitEthernet0/0         203.230.10.10   YES manual up                    up
GigabitEthernet0/1         203.230.10.13   YES manual up                    up
Serial0/0/0                203.230.10.29   YES manual up                    up
Serial0/0/1                203.230.10.22   YES manual up                    up
Loopback0                  4.4.4.4         YES manual up                    up
```

2. 주요 설정 코드 : 네트워크 장비 Confing : DHCP 설정 결과

L3SW1

```
L3SW1#show ip dhcp binding
Bindings from all pools not associated with VRF:
IP address          Client-ID/              Lease expiration        Type
                    Hardware address/
                    User name
203.230.6.2         0188.aedd.2980.bd       Mar 02 1993 12:46 AM    Automatic
203.230.6.3         012c.58b9.ef17.17       Mar 02 1993 12:59 AM    Automatic
```

L3SW2

DNS 서버는 고정 IP (203.230.7.2)로 (excluded- 설정)

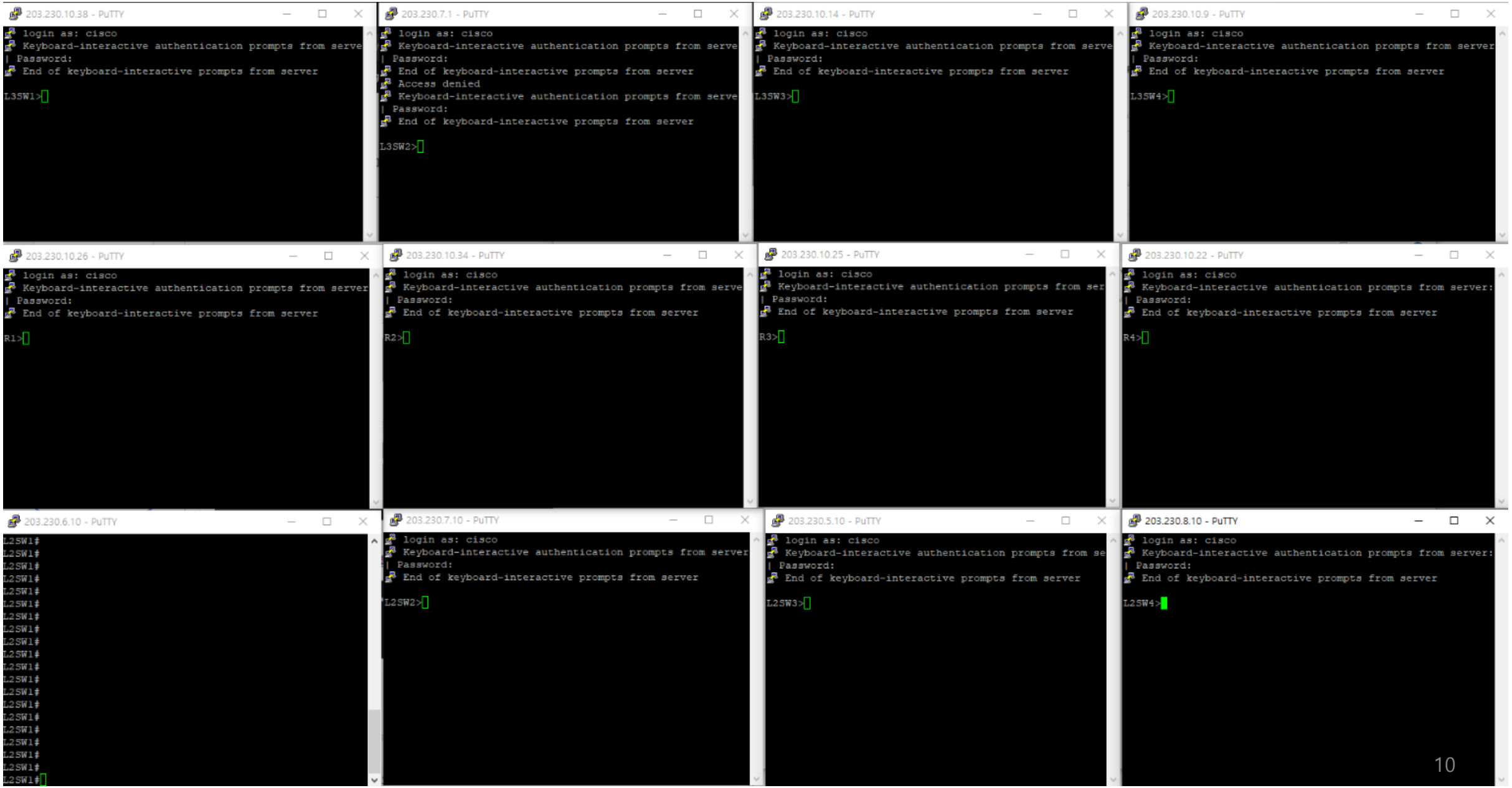
L3SW3

```
L3SW3(config)#do show ip dhcp binding
Bindings from all pools not associated with VRF:
IP address          Client-ID/              Lease expiration        Type
                    Hardware address/
                    User name
203.230.5.2         0188.aedd.2948.55       Mar 02 1993 12:52 AM    Automatic
203.230.5.3         012c.58b9.ef17.4d       Mar 02 1993 12:46 AM    Automatic
```

L3SW4

```
L3SW4(config)#do show ip dhcp bind
Bindings from all pools not associated with VRF:
IP address          Client-ID/              Lease expiration        Type
                    Hardware address/
                    User name
203.230.8.2         0188.aedd.294a.47       Mar 02 1993 12:49 AM    Automatic
```

2. 주요 설정 코드 : 네트워크 장비 Confing : 라우터 및 L2&L3 스위치 SSH 설정 결과



2. 주요 설정 코드 : 네트워크 장비 Confing : mannual summary 결과

```
R1#show ip route
Codes: L - local, 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, H - NHRP, l - LISP
       + - replicated route, % - next hop override

Gateway of last resort is not set

      1.0.0.0/32 is subnetted, 1 subnets
C        1.1.1.1 is directly connected, Loopback0
      2.0.0.0/32 is subnetted, 1 subnets
O        2.2.2.2 [110/2] via 203.230.10.34, 00:00:10, GigabitEthernet0/0
      3.0.0.0/32 is subnetted, 1 subnets
O        3.3.3.3 [110/65] via 203.230.10.25, 00:00:10, Serial0/0/0
      4.0.0.0/32 is subnetted, 1 subnets
O        4.4.4.4 [110/66] via 203.230.10.34, 00:00:10, GigabitEthernet0/0
      5.0.0.0/32 is subnetted, 5 subnets
D        5.5.5.5 [90/156160] via 203.230.10.38, 00:00:00, GigabitEthernet0/1
D        5.5.6.5 [90/156160] via 203.230.10.38, 00:00:00, GigabitEthernet0/1
D        5.5.7.5 [90/156160] via 203.230.10.38, 00:00:00, GigabitEthernet0/1
D        5.5.8.5 [90/156160] via 203.230.10.38, 00:00:00, GigabitEthernet0/1
D        5.5.9.5 [90/156160] via 203.230.10.38, 00:00:00, GigabitEthernet0/1
      6.0.0.0/32 is subnetted, 1 subnets
O E2     6.6.6.6 [110/20] via 203.230.10.34, 00:00:10, GigabitEthernet0/0
      7.0.0.0/32 is subnetted, 1 subnets
O IA     7.7.7.7 [110/66] via 203.230.10.25, 00:00:10, Serial0/0/0
      8.0.0.0/32 is subnetted, 1 subnets
O IA     8.8.8.8 [110/66] via 203.230.10.25, 00:00:10, Serial0/0/0
O IA  203.230.5.0/24 [110/66] via 203.230.10.25, 00:00:10, Serial0/0/0
D     203.230.6.0/24
         [90/30720] via 203.230.10.38, 00:00:00, GigabitEthernet0/1
O E2  203.230.7.0/24 [110/20] via 203.230.10.34, 00:00:10, GigabitEthernet0/0
O IA  203.230.8.0/24 [110/66] via 203.230.10.25, 00:00:10, Serial0/0/0
      203.230.10.0/24 is variably subnetted, 12 subnets, 2 masks
O IA     203.230.10.0/30 [110/66] via 203.230.10.25, 00:00:10, Serial0/0/0
O IA     203.230.10.4/30 [110/65] via 203.230.10.25, 00:00:10, Serial0/0/0
O IA     203.230.10.8/30
           [110/66] via 203.230.10.34, 00:00:10, GigabitEthernet0/0
           [110/66] via 203.230.10.25, 00:00:10, Serial0/0/0
O IA     203.230.10.16/30 [110/65] via 203.230.10.25, 00:00:10, Serial0/0/0
O        203.230.10.20/30 [110/128] via 203.230.10.25, 00:00:10, Serial0/0/0
C        203.230.10.24/30 is directly connected, Serial0/0/0
L        203.230.10.26/32 is directly connected, Serial0/0/0
O        203.230.10.28/30
           [110/65] via 203.230.10.34, 00:00:10, GigabitEthernet0/0
C        203.230.10.32/30 is directly connected, GigabitEthernet0/0
L        203.230.10.33/32 is directly connected, GigabitEthernet0/0
C        203.230.10.36/30 is directly connected, GigabitEthernet0/1
L        203.230.10.37/32 is directly connected, GigabitEthernet0/1
```

```
R1#show ip route
Codes: L - local, 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, H - NHRP, l - LISP
       + - replicated route, % - next hop override

Gateway of last resort is not set

      1.0.0.0/32 is subnetted, 1 subnets
C        1.1.1.1 is directly connected, Loopback0
      2.0.0.0/32 is subnetted, 1 subnets
O        2.2.2.2 [110/2] via 203.230.10.34, 00:00:02, GigabitEthernet0/0
      3.0.0.0/32 is subnetted, 1 subnets
O        3.3.3.3 [110/65] via 203.230.10.25, 00:00:02, Serial0/0/0
      4.0.0.0/32 is subnetted, 1 subnets
O        4.4.4.4 [110/66] via 203.230.10.34, 00:00:02, GigabitEthernet0/0
      5.0.0.0/16 is subnetted, 1 subnets
D        5.5.0.0 [90/156160] via 203.230.10.38, 00:00:02, GigabitEthernet0/1
      6.0.0.0/32 is subnetted, 1 subnets
O E2     6.6.6.6 [110/20] via 203.230.10.34, 00:00:02, GigabitEthernet0/0
      7.0.0.0/32 is subnetted, 1 subnets
O IA     7.7.7.7 [110/66] via 203.230.10.25, 00:00:02, Serial0/0/0
      8.0.0.0/32 is subnetted, 1 subnets
O IA     8.8.8.8 [110/66] via 203.230.10.25, 00:00:02, Serial0/0/0
O IA  203.230.5.0/24 [110/66] via 203.230.10.25, 00:00:02, Serial0/0/0
D     203.230.6.0/24
         [90/30720] via 203.230.10.38, 00:00:02, GigabitEthernet0/1
O E2  203.230.7.0/24 [110/20] via 203.230.10.34, 00:00:02, GigabitEthernet0/0
O IA  203.230.8.0/24 [110/66] via 203.230.10.25, 00:00:02, Serial0/0/0
      203.230.10.0/24 is variably subnetted, 12 subnets, 2 masks
O IA     203.230.10.0/30 [110/66] via 203.230.10.25, 00:00:02, Serial0/0/0
O IA     203.230.10.4/30 [110/65] via 203.230.10.25, 00:00:02, Serial0/0/0
O IA     203.230.10.8/30
           [110/66] via 203.230.10.34, 00:00:02, GigabitEthernet0/0
           [110/66] via 203.230.10.25, 00:00:02, Serial0/0/0
O IA     203.230.10.16/30 [110/65] via 203.230.10.25, 00:00:02, Serial0/0/0
O        203.230.10.20/30 [110/128] via 203.230.10.25, 00:00:02, Serial0/0/0
C        203.230.10.24/30 is directly connected, Serial0/0/0
L        203.230.10.26/32 is directly connected, Serial0/0/0
O        203.230.10.28/30
           [110/65] via 203.230.10.34, 00:00:02, GigabitEthernet0/0
C        203.230.10.32/30 is directly connected, GigabitEthernet0/0
L        203.230.10.33/32 is directly connected, GigabitEthernet0/0
C        203.230.10.36/30 is directly connected, GigabitEthernet0/1
L        203.230.10.37/32 is directly connected, GigabitEthernet0/1
```

2. 주요 설정 코드 : 네트워크 장비 Confing : 라우터 OSPF 설정 (Area 0) 결과

R1

```
      1.0.0.0/32 is subnetted, 1 subnets
C        1.1.1.1 is directly connected, Loopback0
      2.0.0.0/32 is subnetted, 1 subnets
O        2.2.2.2 [110/2] via 203.230.10.34, 00:03:00, GigabitEthernet0/0
      3.0.0.0/32 is subnetted, 1 subnets
O        3.3.3.3 [110/65] via 203.230.10.25, 00:08:13, Serial0/0/0
      4.0.0.0/32 is subnetted, 1 subnets
O        4.4.4.4 [110/66] via 203.230.10.34, 00:03:00, GigabitEthernet0/0
      5.0.0.0/32 is subnetted, 1 subnets
D        5.5.5.5 [90/156160] via 203.230.10.38, 00:09:01, GigabitEthernet0/1
      6.0.0.0/32 is subnetted, 1 subnets
O E2     6.6.6.6 [110/20] via 203.230.10.34, 00:03:00, GigabitEthernet0/0
      7.0.0.0/32 is subnetted, 1 subnets
O IA     7.7.7.7 [110/66] via 203.230.10.25, 00:08:13, Serial0/0/0
      8.0.0.0/32 is subnetted, 1 subnets
O IA     8.8.8.8 [110/66] via 203.230.10.25, 00:08:13, Serial0/0/0
O IA  203.230.5.0/24 [110/66] via 203.230.10.25, 00:08:13, Serial0/0/0
D     203.230.6.0/24
           [90/30720] via 203.230.10.38, 00:09:01, GigabitEthernet0/1
O E2  203.230.7.0/24 [110/20] via 203.230.10.34, 00:03:00, GigabitEthernet0/0
O IA  203.230.8.0/24 [110/66] via 203.230.10.25, 00:08:13, Serial0/0/0
      203.230.10.0/24 is variably subnetted, 13 subnets, 2 masks
O IA     203.230.10.0/30 [110/66] via 203.230.10.25, 00:08:13, Serial0/0/0
O IA     203.230.10.4/30 [110/65] via 203.230.10.25, 00:08:13, Serial0/0/0
O IA     203.230.10.8/30
           [110/66] via 203.230.10.34, 00:03:00, GigabitEthernet0/0
           [110/66] via 203.230.10.25, 00:08:13, Serial0/0/0
O IA     203.230.10.12/30
           [110/66] via 203.230.10.34, 00:03:00, GigabitEthernet0/0
           [110/66] via 203.230.10.25, 00:08:13, Serial0/0/0
O IA     203.230.10.16/30 [110/65] via 203.230.10.25, 00:08:13, Serial0/0/0
O        203.230.10.20/30 [110/128] via 203.230.10.25, 00:08:13, Serial0/0/0
C        203.230.10.24/30 is directly connected, Serial0/0/0
L        203.230.10.26/32 is directly connected, Serial0/0/0
O        203.230.10.28/30
           [110/65] via 203.230.10.34, 00:03:00, GigabitEthernet0/0
C        203.230.10.32/30 is directly connected, GigabitEthernet0/0
L        203.230.10.33/32 is directly connected, GigabitEthernet0/0
C        203.230.10.36/30 is directly connected, GigabitEthernet0/1
L        203.230.10.37/32 is directly connected, GigabitEthernet0/1
```

R2

```
R2#show ip route
Codes: L - local, 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, H - NHRP, l - LISP
       + - replicated route, % - next hop override

Gateway of last resort is not set

      1.0.0.0/32 is subnetted, 1 subnets
O        1.1.1.1 [110/193] via 203.230.10.29, 00:07:20, Serial0/0/0
      2.0.0.0/32 is subnetted, 1 subnets
C        2.2.2.2 is directly connected, Loopback0
      3.0.0.0/32 is subnetted, 1 subnets
O        3.3.3.3 [110/129] via 203.230.10.29, 00:07:20, Serial0/0/0
      4.0.0.0/32 is subnetted, 1 subnets
O        4.4.4.4 [110/65] via 203.230.10.29, 01:03:55, Serial0/0/0
      5.0.0.0/32 is subnetted, 1 subnets
O E2     5.5.5.5 [110/20] via 203.230.10.29, 00:07:20, Serial0/0/0
      6.0.0.0/32 is subnetted, 1 subnets
S        6.6.6.6 [1/0] via 203.230.10.42
      7.0.0.0/32 is subnetted, 1 subnets
O IA     7.7.7.7 [110/66] via 203.230.10.29, 00:41:46, Serial0/0/0
      8.0.0.0/32 is subnetted, 1 subnets
O IA     8.8.8.8 [110/66] via 203.230.10.29, 01:00:09, Serial0/0/0
O IA  203.230.5.0/24 [110/66] via 203.230.10.29, 00:41:46, Serial0/0/0
O E2  203.230.6.0/24 [110/20] via 203.230.10.29, 00:07:20, Serial0/0/0
S     203.230.7.0/24 [1/0] via 203.230.10.42
O IA  203.230.8.0/24 [110/66] via 203.230.10.29, 01:00:19, Serial0/0/0
      203.230.10.0/24 is variably subnetted, 14 subnets, 2 masks
O IA     203.230.10.0/30 [110/66] via 203.230.10.29, 01:01:20, Serial0/0/0
O IA     203.230.10.4/30 [110/66] via 203.230.10.29, 00:41:56, Serial0/0/0
O IA     203.230.10.8/30 [110/65] via 203.230.10.29, 01:03:06, Serial0/0/0
O IA     203.230.10.12/30 [110/65] via 203.230.10.29, 01:03:26, Serial0/0/0
O IA     203.230.10.16/30 [110/66] via 203.230.10.29, 01:00:24, Serial0/0/0
O        203.230.10.20/30 [110/128] via 203.230.10.29, 01:03:55, Serial0/0/0
O        203.230.10.24/30 [110/192] via 203.230.10.29, 00:07:20, Serial0/0/0
C        203.230.10.28/30 is directly connected, Serial0/0/0
L        203.230.10.30/32 is directly connected, Serial0/0/0
C        203.230.10.32/30 is directly connected, GigabitEthernet0/0
L        203.230.10.34/32 is directly connected, GigabitEthernet0/0
O E2     203.230.10.36/30 [110/20] via 203.230.10.29, 00:07:20, Serial0/0/0
C        203.230.10.40/30 is directly connected, GigabitEthernet0/1
L        203.230.10.41/32 is directly connected, GigabitEthernet0/1
```

2. 주요 설정 코드 : 네트워크 장비 Confing : 라우터 OSPF 설정 (Area 0) 결과

R3

```
R3#show ip route
Codes: L - local, 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, H - NHRP, l - LISP
       + - replicated route, % - next hop override

Gateway of last resort is not set

      1.0.0.0/32 is subnetted, 1 subnets
O        1.1.1.1 [110/65] via 203.230.10.26, 00:53:25, Serial0/0/0
      2.0.0.0/32 is subnetted, 1 subnets
O        2.2.2.2 [110/66] via 203.230.10.26, 00:53:25, Serial0/0/0
      3.0.0.0/32 is subnetted, 1 subnets
C        3.3.3.3 is directly connected, Loopback0
      4.0.0.0/32 is subnetted, 1 subnets
O        4.4.4.4 [110/65] via 203.230.10.22, 00:53:25, Serial0/0/1
      5.0.0.0/32 is subnetted, 1 subnets
O E2     5.5.5.5 [110/20] via 203.230.10.26, 00:36:12, Serial0/0/0
      6.0.0.0/32 is subnetted, 1 subnets
O E2     6.6.6.6 [110/20] via 203.230.10.26, 00:35:20, Serial0/0/0
      7.0.0.0/32 is subnetted, 1 subnets
O        7.7.7.7 [110/2] via 203.230.10.5, 00:31:29, GigabitEthernet0/0
      8.0.0.0/32 is subnetted, 1 subnets
O        8.8.8.8 [110/2] via 203.230.10.18, 00:49:42, GigabitEthernet0/1
O     203.230.5.0/24 [110/2] via 203.230.10.5, 00:31:29, GigabitEthernet0/0
O E2  203.230.6.0/24 [110/20] via 203.230.10.26, 00:36:27, Serial0/0/0
O E2  203.230.7.0/24 [110/20] via 203.230.10.26, 00:35:20, Serial0/0/0
O     203.230.8.0/24 [110/2] via 203.230.10.18, 00:49:52, GigabitEthernet0/1
      203.230.10.0/24 is variably subnetted, 14 subnets, 2 masks
O        203.230.10.0/30
           [110/2] via 203.230.10.18, 00:49:29, GigabitEthernet0/1
           [110/2] via 203.230.10.5, 00:31:29, GigabitEthernet0/0
C        203.230.10.4/30 is directly connected, GigabitEthernet0/0
L        203.230.10.6/32 is directly connected, GigabitEthernet0/0
O        203.230.10.8/30
           [110/2] via 203.230.10.18, 00:49:57, GigabitEthernet0/1
O        203.230.10.12/30
           [110/2] via 203.230.10.5, 00:31:29, GigabitEthernet0/0
C        203.230.10.16/30 is directly connected, GigabitEthernet0/1
L        203.230.10.17/32 is directly connected, GigabitEthernet0/1
C        203.230.10.20/30 is directly connected, Serial0/0/1
L        203.230.10.21/32 is directly connected, Serial0/0/1
C        203.230.10.24/30 is directly connected, Serial0/0/0
L        203.230.10.25/32 is directly connected, Serial0/0/0
O        203.230.10.28/30 [110/128] via 203.230.10.22, 00:53:25, Serial0/0/1
O        203.230.10.32/30 [110/65] via 203.230.10.26, 00:53:25, Serial0/0/0
O E2     203.230.10.36/30 [110/20] via 203.230.10.26, 00:42:26, Serial0/0/0
```

R4

```
R4#show ip route
Codes: L - local, 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, H - NHRP, l - LISP
       + - replicated route, % - next hop override

Gateway of last resort is not set

      1.0.0.0/32 is subnetted, 1 subnets
O        1.1.1.1 [110/66] via 203.230.10.30, 00:39:27, Serial0/0/0
      2.0.0.0/32 is subnetted, 1 subnets
O        2.2.2.2 [110/65] via 203.230.10.30, 00:39:27, Serial0/0/0
      3.0.0.0/32 is subnetted, 1 subnets
O        3.3.3.3 [110/65] via 203.230.10.21, 00:39:27, Serial0/0/1
      4.0.0.0/32 is subnetted, 1 subnets
C        4.4.4.4 is directly connected, Loopback0
      5.0.0.0/32 is subnetted, 1 subnets
O E2     5.5.5.5 [110/20] via 203.230.10.30, 00:22:30, Serial0/0/0
      6.0.0.0/32 is subnetted, 1 subnets
O E2     6.6.6.6 [110/20] via 203.230.10.30, 00:21:39, Serial0/0/0
      7.0.0.0/32 is subnetted, 1 subnets
O        7.7.7.7 [110/2] via 203.230.10.14, 00:17:47, GigabitEthernet0/1
      8.0.0.0/32 is subnetted, 1 subnets
O        8.8.8.8 [110/2] via 203.230.10.9, 00:36:01, GigabitEthernet0/0
O     203.230.5.0/24 [110/2] via 203.230.10.14, 00:17:47, GigabitEthernet0/1
O E2  203.230.6.0/24 [110/20] via 203.230.10.30, 00:22:46, Serial0/0/0
O E2  203.230.7.0/24 [110/20] via 203.230.10.30, 00:21:39, Serial0/0/0
O     203.230.8.0/24 [110/2] via 203.230.10.9, 00:36:11, GigabitEthernet0/0
      203.230.10.0/24 is variably subnetted, 14 subnets, 2 masks
O        203.230.10.0/30
           [110/2] via 203.230.10.14, 00:17:47, GigabitEthernet0/1
           [110/2] via 203.230.10.9, 00:35:47, GigabitEthernet0/0
O        203.230.10.4/30
           [110/2] via 203.230.10.14, 00:17:47, GigabitEthernet0/1
C        203.230.10.8/30 is directly connected, GigabitEthernet0/0
L        203.230.10.10/32 is directly connected, GigabitEthernet0/0
C        203.230.10.12/30 is directly connected, GigabitEthernet0/1
L        203.230.10.13/32 is directly connected, GigabitEthernet0/1
O        203.230.10.16/30
           [110/2] via 203.230.10.9, 00:36:16, GigabitEthernet0/0
C        203.230.10.20/30 is directly connected, Serial0/0/1
L        203.230.10.22/32 is directly connected, Serial0/0/1
O        203.230.10.24/30 [110/128] via 203.230.10.21, 00:39:27, Serial0/0/1
C        203.230.10.28/30 is directly connected, Serial0/0/0
L        203.230.10.29/32 is directly connected, Serial0/0/0
O        203.230.10.32/30 [110/65] via 203.230.10.30, 00:39:27, Serial0/0/0
O E2     203.230.10.36/30 [110/20] via 203.230.10.30, 00:28:44, Serial0/0/0
```

2. 주요 설정 코드 : 네트워크 장비 Confing : 라우터 OSPF 설정 (Area 1) 결과

L3SW3

```
L3SW3#sho 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

O E2 203.230.7.0/24 [110/20] via 203.230.10.13, 00:30:22, FastEthernet0/7
     1.0.0.0/32 is subnetted, 1 subnets
O IA    1.1.1.1 [110/66] via 203.230.10.6, 00:30:22, FastEthernet0/3
O E2 203.230.6.0/24 [110/20] via 203.230.10.6, 00:30:22, FastEthernet0/3
C    203.230.5.0/24 is directly connected, FastEthernet0/25
     2.0.0.0/32 is subnetted, 1 subnets
O IA    2.2.2.2 [110/66] via 203.230.10.13, 00:30:22, FastEthernet0/7
     3.0.0.0/32 is subnetted, 1 subnets
O IA    3.3.3.3 [110/2] via 203.230.10.6, 00:30:22, FastEthernet0/3
     4.0.0.0/32 is subnetted, 1 subnets
O IA    4.4.4.4 [110/2] via 203.230.10.13, 00:30:23, FastEthernet0/7
     5.0.0.0/32 is subnetted, 1 subnets
O E2    5.5.5.5 [110/20] via 203.230.10.6, 00:30:23, FastEthernet0/3
     6.0.0.0/32 is subnetted, 1 subnets
O E2    6.6.6.6 [110/20] via 203.230.10.13, 00:30:24, FastEthernet0/7
     7.0.0.0/32 is subnetted, 1 subnets
C       7.7.7.7 is directly connected, Loopback0
     8.0.0.0/32 is subnetted, 1 subnets
O       8.8.8.8 [110/2] via 203.230.10.2, 00:30:24, FastEthernet0/5
     203.230.10.0/30 is subnetted, 10 subnets
O E2    203.230.10.36 [110/20] via 203.230.10.6, 00:30:24, FastEthernet0/3
O IA    203.230.10.32 [110/66] via 203.230.10.13, 00:30:24, FastEthernet0/7
                      [110/66] via 203.230.10.6, 00:30:24, FastEthernet0/3
C       203.230.10.4 is directly connected, FastEthernet0/3
C       203.230.10.0 is directly connected, FastEthernet0/5
C       203.230.10.12 is directly connected, FastEthernet0/7
O       203.230.10.8 [110/2] via 203.230.10.13, 00:30:24, FastEthernet0/7
                     [110/2] via 203.230.10.2, 00:30:24, FastEthernet0/5
O IA    203.230.10.20 [110/65] via 203.230.10.13, 00:30:24, FastEthernet0/7
                      [110/65] via 203.230.10.6, 00:30:24, FastEthernet0/3
O       203.230.10.16 [110/2] via 203.230.10.6, 00:30:25, FastEthernet0/3
                      [110/2] via 203.230.10.2, 00:30:25, FastEthernet0/5
O IA    203.230.10.28 [110/65] via 203.230.10.13, 00:30:25, FastEthernet0/7
O IA    203.230.10.24 [110/65] via 203.230.10.6, 00:30:25, FastEthernet0/3
O    203.230.8.0/24 [110/2] via 203.230.10.2, 00:30:25, FastEthernet0/5
```

L3SW4

```
L3SW4#show 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

O E2 203.230.7.0/24 [110/20] via 203.230.10.10, 00:28:28, FastEthernet0/3
     1.0.0.0/32 is subnetted, 1 subnets
O IA    1.1.1.1 [110/66] via 203.230.10.17, 00:28:28, FastEthernet0/7
O E2 203.230.6.0/24 [110/20] via 203.230.10.17, 00:28:28, FastEthernet0/7
O    203.230.5.0/24 [110/2] via 203.230.10.1, 00:28:28, FastEthernet0/5
     2.0.0.0/32 is subnetted, 1 subnets
O IA    2.2.2.2 [110/66] via 203.230.10.10, 00:28:28, FastEthernet0/3
     3.0.0.0/32 is subnetted, 1 subnets
O IA    3.3.3.3 [110/2] via 203.230.10.17, 00:28:28, FastEthernet0/7
     4.0.0.0/32 is subnetted, 1 subnets
O IA    4.4.4.4 [110/2] via 203.230.10.10, 00:28:28, FastEthernet0/3
     5.0.0.0/32 is subnetted, 1 subnets
O E2    5.5.5.5 [110/20] via 203.230.10.17, 00:28:28, FastEthernet0/7
     6.0.0.0/32 is subnetted, 1 subnets
O E2    6.6.6.6 [110/20] via 203.230.10.10, 00:28:29, FastEthernet0/3
     7.0.0.0/32 is subnetted, 1 subnets
O       7.7.7.7 [110/2] via 203.230.10.1, 00:28:29, FastEthernet0/5
     8.0.0.0/32 is subnetted, 1 subnets
C       8.8.8.8 is directly connected, Loopback0
     203.230.10.0/30 is subnetted, 10 subnets
O E2    203.230.10.36 [110/20] via 203.230.10.17, 00:28:29, FastEthernet0/7
O IA    203.230.10.32 [110/66] via 203.230.10.17, 00:28:29, FastEthernet0/7
                      [110/66] via 203.230.10.10, 00:28:29, FastEthernet0/3
O       203.230.10.4 [110/2] via 203.230.10.17, 00:28:29, FastEthernet0/7
                     [110/2] via 203.230.10.1, 00:28:29, FastEthernet0/5
C       203.230.10.0 is directly connected, FastEthernet0/5
O       203.230.10.12 [110/2] via 203.230.10.10, 00:28:29, FastEthernet0/3
                      [110/2] via 203.230.10.1, 00:28:29, FastEthernet0/5
C       203.230.10.8 is directly connected, FastEthernet0/3
O IA    203.230.10.20 [110/65] via 203.230.10.17, 00:28:30, FastEthernet0/7
                      [110/65] via 203.230.10.10, 00:28:30, FastEthernet0/3
C       203.230.10.16 is directly connected, FastEthernet0/7
O IA    203.230.10.28 [110/65] via 203.230.10.10, 00:28:30, FastEthernet0/3
O IA    203.230.10.24 [110/65] via 203.230.10.17, 00:28:30, FastEthernet0/7
C    203.230.8.0/24 is directly connected, FastEthernet0/25
```

2. 주요 설정 코드 : 네트워크 장비 Confing : 라우터 OSPF/EIGRP neighbor table

R1 - OSPF/EIGRP

```
R1#show ip ospf neighbor

Neighbor ID     Pri   State           Dead Time   Address         Interface
3.3.3.3           0   FULL/  -        00:00:34    203.230.10.25   Serial0/0/0
2.2.2.2           0   FULL/  -        00:00:36    203.230.10.34   GigabitEtherne
```

```
R1#show ip eigrp ne
EIGRP-IPv4 Neighbors for AS(7)
H   Address                 Interface       Hold Uptime   SRTT   RTO  Q  Seq
                                            (sec)         (ms)       Cnt Num
0   203.230.10.38           Gi0/1             12 00:13:31    9   200  0  126
```

L3SW1- EIGRP

```
R1#SHOW IP EIgrp NEighbors
EIGRP-IPv4 Neighbors for AS(7)
H   Address                 Interface       Hold Uptime   SRTT   RTO  Q  Seq
                                            (sec)         (ms)       Cnt Num
0   203.230.10.38           Gi0/1             10 00:12:03    5   200  0  26
```

R2 - OSPF

```
Neighbor ID     Pri   State           Dead Time   Address         Interface
4.4.4.4           0   FULL/  -        00:00:37    203.230.10.29   Serial0/0/0
1.1.1.1           0   FULL/  -        00:00:39    203.230.10.33   GigabitEthernet0/0
```

L3SW2

Static 설정 Router 라 neighbor table 생략

R3 - OSPF

```
R3#show ip os ne

Neighbor ID     Pri   State           Dead Time   Address         Interface
4.4.4.4           0   FULL/  -        00:00:35    203.230.10.22   Serial0/0/1
1.1.1.1           0   FULL/  -        00:00:37    203.230.10.26   Serial0/0/0
7.7.7.7           1   FULL/DR         00:00:38    203.230.10.5    GigabitEthernet0/0
8.8.8.8           1   FULL/DR         00:00:33    203.230.10.18   GigabitEthernet0/1
```

L3SW3 - OSPF

```
L3SW3#show  ip ospf ne

Neighbor ID     Pri   State           Dead Time   Address         Interface
4.4.4.4           1   FULL/DR         00:00:30    203.230.10.13   FastEthernet0/7
8.8.8.8           1   FULL/DR         00:00:34    203.230.10.2    FastEthernet0/5
3.3.3.3           1   FULL/DR         00:00:38    203.230.10.6    FastEthernet0/3
```

R4 - OSPF

```
R4(config)#do show ip ospf nei

Neighbor ID     Pri   State           Dead Time   Address         Interface
2.2.2.2           0   FULL/  -        00:00:34    203.230.10.30   Serial0/0/0
3.3.3.3           0   FULL/  -        00:00:32    203.230.10.21   Serial0/0/1
8.8.8.8           1   FULL/BDR        00:00:34    203.230.10.9    GigabitEthernet0/0
7.7.7.7           1   FULL/BDR        00:00:37    203.230.10.14   GigabitEthernet0/1
```

L3SW4 - OSPF

```
L3SW4(config)#do show ip os nei

Neighbor ID     Pri   State           Dead Time   Address         Interface
3.3.3.3           1   FULL/BDR        00:00:35    203.230.10.17   FastEthernet0/7
7.7.7.7           1   FULL/BDR        00:00:34    203.230.10.1    FastEthernet0/5
4.4.4.4           1   FULL/DR         00:00:36    203.230.10.10   FastEthernet0/3
```

2. 주요 설정 코드 : 네트워크 장비 Confing : 라우터 이더넷 구간 DR/BDR 확인 결과

설정 전

```
R2#show ip ospf neighbor

Neighbor ID     Pri   State           Dead Time   Address         Interface
4.4.4.4           0   FULL/  -        00:00:30    203.230.10.29   Serial0/0/0
1.1.1.1           1   FULL/BDR        00:00:34    203.230.10.33   GigabitEthernet0/0
```

설정 후

```
Neighbor ID     Pri   State           Dead Time   Address         Interface
4.4.4.4           0   FULL/  -        00:00:37    203.230.10.29   Serial0/0/0
1.1.1.1           0   FULL/  -        00:00:39    203.230.10.33   GigabitEthernet0/0
```

2. 주요 설정 코드 : 네트워크 장비 Confing : 라우터 EIGRP 설정 (MD5 설정) 결과

R1

```
R1#show ip eigrp int de
EIGRP-IPv4 Interfaces for AS(7)
                        Xmit Queue   Mean   Pacing Time   Multicast    Pending
Interface        Peers  Un/Reliable  SRTT   Un/Reliable  Flow Timer   Routes
Gi0/1              1        0/0        1       0/1           50           0
  Hello-interval is 5, Hold-time is 15
  Split-horizon is enabled
  Next xmit serial <none>
  Un/reliable mcasts: 0/118  Un/reliable ucasts: 128/107
  Mcast exceptions: 5  CR packets: 5  ACKs suppressed: 1
  Retransmissions sent: 73  Out-of-sequence rcvd: 1
  Topology-ids on interface - 0
  Authentication mode is md5,  key-chain is "security"
```

L3SW 1

```
L3SW1#show ip eigrp int de
EIGRP-IPv4 Interfaces for AS(7)
                        Xmit Queue   Mean   Pacing Time   Multicast    Pending
Interface        Peers  Un/Reliable  SRTT   Un/Reliable  Flow Timer   Routes
Fa0/1              1        0/0       16       0/1           80           0
  Hello-interval is 5, Hold-time is 15
  Split-horizon is enabled
  Next xmit serial <none>
  Un/reliable mcasts: 0/71  Un/reliable ucasts: 128/62
  Mcast exceptions: 1  CR packets: 1  ACKs suppressed: 6
  Retransmissions sent: 2  Out-of-sequence rcvd: 10
  Topology-ids on interface - 0
  Authentication mode is md5,  key-chain is "security"
```

2. 주요 설정 코드 : 네트워크 장비 Confing : 라우터 OSPF 설정 (MD5 설정) 결과

R1

```
GigabitEthernet0/0 is up, line protocol is up
  Internet Address 203.230.10.33/30, Area 0, Attached via Network Statement
  Process ID 7, Router ID 1.1.1.1, Network Type POINT_TO_POINT, Cost: 1
  Topology-MTID    Cost    Disabled    Shutdown      Topology Name
        0          1         no          no            Base
  Transmit Delay is 1 sec, State POINT_TO_POINT
  Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit 5
    oob-resync timeout 40
    Hello due in 00:00:05
  Supports Link-local Signaling (LLS)
  Cisco NSF helper support enabled
  IETF NSF helper support enabled
  Index 2/2, flood queue length 0
  Next 0x0(0)/0x0(0)
  Last flood scan length is 6, maximum is 9
  Last flood scan time is 0 msec, maximum is 0 msec
  Neighbor Count is 1, Adjacent neighbor count is 1
    Adjacent with neighbor 2.2.2.2
  Suppress hello for 0 neighbor(s)
  Message digest authentication enabled
    Youngest key id is 1
```

```
Serial0/0/0 is up, line protocol is up
  Internet Address 203.230.10.26/30, Area 0, Attached via Network Statement
  Process ID 7, Router ID 1.1.1.1, Network Type POINT_TO_POINT, Cost: 64
  Topology-MTID    Cost    Disabled    Shutdown      Topology Name
        0          64        no          no            Base
  Transmit Delay is 1 sec, State POINT_TO_POINT
  Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit 5
    oob-resync timeout 40
    Hello due in 00:00:08
  Supports Link-local Signaling (LLS)
  Cisco NSF helper support enabled
  IETF NSF helper support enabled
  Index 3/3, flood queue length 0
  Next 0x0(0)/0x0(0)
  Last flood scan length is 1, maximum is 5
  Last flood scan time is 0 msec, maximum is 4 msec
  Neighbor Count is 1, Adjacent neighbor count is 1
    Adjacent with neighbor 3.3.3.3
  Suppress hello for 0 neighbor(s)
  Message digest authentication enabled
    Youngest key id is 1
```

R2

```
Serial0/0/0 is up, line protocol is up
  Internet Address 203.230.10.30/30, Area 0, Attached via Network Statement
  Process ID 7, Router ID 2.2.2.2, Network Type POINT_TO_POINT, Cost: 64
  Topology-MTID    Cost    Disabled    Shutdown      Topology Name
        0          64        no          no            Base
  Transmit Delay is 1 sec, State POINT_TO_POINT
  Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit 5
    oob-resync timeout 40
    Hello due in 00:00:07
  Supports Link-local Signaling (LLS)
  Cisco NSF helper support enabled
  IETF NSF helper support enabled
  Index 4/4, flood queue length 0
  Next 0x0(0)/0x0(0)
  Last flood scan length is 1, maximum is 23
  Last flood scan time is 0 msec, maximum is 4 msec
  Neighbor Count is 1, Adjacent neighbor count is 1
    Adjacent with neighbor 4.4.4.4
  Message digest authentication enabled
    Youngest key id is 1
  Internet Address 203.230.10.34/30, Area 0, Attached via Network Statement
  Process ID 7, Router ID 2.2.2.2, Network Type POINT_TO_POINT, Cost: 1
  Topology-MTID    Cost    Disabled    Shutdown      Topology Name
        0          1         no          no            Base
  Transmit Delay is 1 sec, State POINT_TO_POINT
  Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit 5
    oob-resync timeout 40
    Hello due in 00:00:04
  Supports Link-local Signaling (LLS)
  Cisco NSF helper support enabled
  IETF NSF helper support enabled
  Index 2/2, flood queue length 0
  Next 0x0(0)/0x0(0)
  Last flood scan length is 7, maximum is 9
  Last flood scan time is 0 msec, maximum is 0 msec
  Neighbor Count is 1, Adjacent neighbor count is 1
    Adjacent with neighbor 1.1.1.1
  Message digest authentication enabled
    Youngest key id is 1
```

2. 주요 설정 코드 : 네트워크 장비 Confing : 라우터 OSPF 설정 (MD5 설정) 결과

R3

```
Serial0/0/1 is up, line protocol is up
  Internet Address 203.230.10.21/30, Area 0, Attached via Network Statement
  Process ID 7, Router ID 3.3.3.3, Network Type POINT_TO_POINT, Cost: 64
  Topology-MTID    Cost    Disabled    Shutdown      Topology Name
        0           64        no          no            Base
  Transmit Delay is 1 sec, State POINT_TO_POINT
  Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit 5
    oob-resync timeout 40
    Hello due in 00:00:00
  Supports Link-local Signaling (LLS)
  Cisco NSF helper support enabled
  IETF NSF helper support enabled
  Index 5/5, flood queue length 0
  Next 0x0(0)/0x0(0)
  Last flood scan length is 1, maximum is 9
  Last flood scan time is 0 msec, maximum is 4 msec
  Neighbor Count is 1, Adjacent neighbor count is 1
    Adjacent with neighbor 4.4.4.4
  Suppress hello for 0 neighbor(s)
  Message digest authentication enabled
    Youngest key id is 1
```

L3SW3

```
FastEthernet0/3 is up, line protocol is up (connected)
  Internet Address 203.230.10.5/30, Area 1
  Process ID 7, Router ID 7.7.7.7, Network Type BROADCAST, Cost: 1
  Transmit Delay is 1 sec, State DR, Priority 1
  Designated Router (ID) 7.7.7.7, Interface address 203.230.10.5
  Backup Designated router (ID) 3.3.3.3, Interface address 203.230.10.6
  Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit 5
    oob-resync timeout 40
    Hello due in 00:00:07
  Supports Link-local Signaling (LLS)
  Cisco NSF helper support enabled
  IETF NSF helper support enabled
  Index 2/2, flood queue length 0
  Next 0x0(0)/0x0(0)
  Last flood scan length is 5, maximum is 11
  Last flood scan time is 0 msec, maximum is 9 msec
  Neighbor Count is 1, Adjacent neighbor count is 1
    Adjacent with neighbor 3.3.3.3  (Backup Designated Router)
  Suppress hello for 0 neighbor(s)
  Message digest authentication enabled
    Youngest key id is 1
L3SW3#
```

2. 주요 설정 코드 : 네트워크 장비 Confing : 라우터 OSPF 설정 (MD5 설정) 결과

R4

```
Serial0/0/1 is up, line protocol is up
  Internet Address 203.230.10.22/30, Area 0, Attached via Network Statement
  Process ID 7, Router ID 4.4.4.4, Network Type POINT_TO_POINT, Cost: 64
  Topology-MTID    Cost    Disabled    Shutdown      Topology Name
        0           64        no          no            Base
  Transmit Delay is 1 sec, State POINT_TO_POINT
  Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit 5
    oob-resync timeout 40
    Hello due in 00:00:08
  Supports Link-local Signaling (LLS)
  Cisco NSF helper support enabled
  IETF NSF helper support enabled
  Index 2/2, flood queue length 0
  Next 0x0(0)/0x0(0)
  Last flood scan length is 7, maximum is 7
  Last flood scan time is 0 msec, maximum is 4 msec
  Neighbor Count is 1, Adjacent neighbor count is 1
    Adjacent with neighbor 3.3.3.3
  Message digest authentication enabled
    Youngest key id is 1
```

L3SW4

```
FastEthernet0/3 is up, line protocol is up (connected)
  Internet Address 203.230.10.9/30, Area 1
  Process ID 7, Router ID 8.8.8.8, Network Type BROADCAST, Cost: 1
  Transmit Delay is 1 sec, State DR, Priority 1
  Designated Router (ID) 8.8.8.8, Interface address 203.230.10.9
  Backup Designated router (ID) 4.4.4.4, Interface address 203.230.10.10
  Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit 5
    oob-resync timeout 40
    Hello due in 00:00:00
  Supports Link-local Signaling (LLS)
  Cisco NSF helper support enabled
  IETF NSF helper support enabled
  Index 1/1, flood queue length 0
  Next 0x0(0)/0x0(0)
  Last flood scan length is 1, maximum is 12
  Last flood scan time is 0 msec, maximum is 9 msec
  Neighbor Count is 1, Adjacent neighbor count is 1
    Adjacent with neighbor 4.4.4.4  (Backup Designated Router)
  Message digest authentication enabled
    Youngest key id is 1
```

2. 주요 설정 코드 : 네트워크 장비 Confing : 라우터 OSPF 설정 (Redistribution OSPF <-> Static) 결과

R2 (ASBR) Config

```
router ospf 7
 router-id 2.2.2.2
 redistribute static subnets
 network 2.2.2.2 0.0.0.0 area 0
 network 203.230.10.30 0.0.0.0 area 0
 network 203.230.10.34 0.0.0.0 area 0
```

```
S        6.6.6.6 [1/0] via 203.230.10.42
      7.0.0.0/32 is subnetted, 1 subnets
O IA     7.7.7.7 [110/66] via 203.230.10.29, 00:21:29, Serial0/0/0
      8.0.0.0/32 is subnetted, 1 subnets
O IA     8.8.8.8 [110/66] via 203.230.10.29, 00:39:52, Serial0/0/0
O IA  203.230.5.0/24 [110/66] via 203.230.10.29, 00:21:29, Serial0/0/0
O E2  203.230.6.0/24 [110/20] via 203.230.10.33, 00:26:37, GigabitEthernet0/0
S     203.230.7.0/24 [1/0] via 203.230.10.42
O IA  203.230.8.0/24 [110/66] via 203.230.10.29, 00:40:02, Serial0/0/0
      203.230.10.0/24 is variably subnetted, 14 subnets, 2 masks
O IA     203.230.10.0/30 [110/66] via 203.230.10.29, 00:41:03, Serial0/0/0
O IA     203.230.10.4/30
           [110/66] via 203.230.10.33, 00:43:25, GigabitEthernet0/0
           [110/66] via 203.230.10.29, 00:21:39, Serial0/0/0
O IA     203.230.10.8/30 [110/65] via 203.230.10.29, 00:42:49, Serial0/0/0
O IA     203.230.10.12/30 [110/65] via 203.230.10.29, 00:43:09, Serial0/0/0
O IA     203.230.10.16/30
           [110/66] via 203.230.10.33, 00:43:25, GigabitEthernet0/0
```

R3 (Inner Router) Config

```
      5.0.0.0/32 is subnetted, 1 subnets
O E2     5.5.5.5 [110/20] via 203.230.10.26, 00:35:29, Serial0/0/0
      6.0.0.0/32 is subnetted, 1 subnets
O E2     6.6.6.6 [110/20] via 203.230.10.26, 00:34:37, Serial0/0/0
      7.0.0.0/32 is subnetted, 1 subnets
O        7.7.7.7 [110/2] via 203.230.10.5, 00:30:46, GigabitEthernet0/0
      8.0.0.0/32 is subnetted, 1 subnets
O        8.8.8.8 [110/2] via 203.230.10.18, 00:48:59, GigabitEthernet0/1
O     203.230.5.0/24 [110/2] via 203.230.10.5, 00:30:46, GigabitEthernet0/0
O E2  203.230.6.0/24 [110/20] via 203.230.10.26, 00:35:44, Serial0/0/0
O E2  203.230.7.0/24 [110/20] via 203.230.10.26, 00:34:37, Serial0/0/0
O     203.230.8.0/24 [110/2] via 203.230.10.18, 00:49:09, GigabitEthernet0/1
      203.230.10.0/24 is variably subnetted, 14 subnets, 2 masks
O        203.230.10.0/30
           [110/2] via 203.230.10.18, 00:48:46, GigabitEthernet0/1
           [110/2] via 203.230.10.5, 00:30:46, GigabitEthernet0/0
C        203.230.10.4/30 is directly connected, GigabitEthernet0/0
L        203.230.10.6/32 is directly connected, GigabitEthernet0/0
O        203.230.10.8/30
           [110/2] via 203.230.10.18, 00:49:14, GigabitEthernet0/1
O        203.230.10.12/30
           [110/2] via 203.230.10.5, 00:30:46, GigabitEthernet0/0
C        203.230.10.16/30 is directly connected, GigabitEthernet0/1
L        203.230.10.17/32 is directly connected, GigabitEthernet0/1
C        203.230.10.20/30 is directly connected, Serial0/0/1
L        203.230.10.21/32 is directly connected, Serial0/0/1
C        203.230.10.24/30 is directly connected, Serial0/0/0
L        203.230.10.25/32 is directly connected, Serial0/0/0
O        203.230.10.28/30 [110/128] via 203.230.10.22, 00:52:42, Serial0/0/1
O        203.230.10.32/30 [110/65] via 203.230.10.26, 00:52:42, Serial0/0/0
O E2     203.230.10.36/30 [110/20] via 203.230.10.26, 00:41:43, Serial0/0/0
```

2. 주요 설정 코드 : 네트워크 장비 Confing : 라우터 OSPF 설정 (Redistribution OSPF <-> EIGRP) 결과

R1 (ASBR) Config

```
router eigrp 7
 network 203.230.10.37 0.0.0.0
 redistribute ospf 7 metric 1 1 1 1 1
 passive-interface GigabitEthernet0/0
 passive-interface Serial0/0/0
 eigrp router-id 1.1.1.1
!
router ospf 7
 router-id 1.1.1.1
 redistribute eigrp 7 subnets
 passive-interface GigabitEthernet0/1
 network 1.1.1.1 0.0.0.0 area 0
 network 203.230.10.26 0.0.0.0 area 0
 network 203.230.10.33 0.0.0.0 area 0
```

L3SW1 EIGRP프로토콜 라우팅 테이블

```
L3SW1#show ip route eigrp
D EX 203.230.7.0/24
          [170/2560002816] via 203.230.10.37, 00:07:28, FastEthernet0/1
     1.0.0.0/32 is subnetted, 1 subnets
D EX    1.1.1.1 [170/2560002816] via 203.230.10.37, 00:07:28, FastEthernet0/1
D EX 203.230.5.0/24
          [170/2560002816] via 203.230.10.37, 00:07:28, FastEthernet0/1
     2.0.0.0/32 is subnetted, 1 subnets
D EX    2.2.2.2 [170/2560002816] via 203.230.10.37, 00:07:28, FastEthernet0/1
     3.0.0.0/32 is subnetted, 1 subnets
D EX    3.3.3.3 [170/2560002816] via 203.230.10.37, 00:07:28, FastEthernet0/1
     4.0.0.0/32 is subnetted, 1 subnets
D EX    4.4.4.4 [170/2560002816] via 203.230.10.37, 00:07:29, FastEthernet0/1
     6.0.0.0/32 is subnetted, 1 subnets
D EX    6.6.6.6 [170/2560002816] via 203.230.10.37, 00:07:29, FastEthernet0/1
     7.0.0.0/32 is subnetted, 1 subnets
D EX    7.7.7.7 [170/2560002816] via 203.230.10.37, 00:07:29, FastEthernet0/1
     8.0.0.0/32 is subnetted, 1 subnets
D EX    8.8.8.8 [170/2560002816] via 203.230.10.37, 00:07:29, FastEthernet0/1
     203.230.10.0/30 is subnetted, 10 subnets
D EX    203.230.10.32
          [170/2560002816] via 203.230.10.37, 00:07:30, FastEthernet0/1
D EX    203.230.10.4
          [170/2560002816] via 203.230.10.37, 00:07:30, FastEthernet0/1
D EX    203.230.10.0
          [170/2560002816] via 203.230.10.37, 00:07:31, FastEthernet0/1
D EX    203.230.10.12
          [170/2560002816] via 203.230.10.37, 00:07:31, FastEthernet0/1
D EX    203.230.10.8
          [170/2560002816] via 203.230.10.37, 00:07:31, FastEthernet0/1
D EX    203.230.10.20
          [170/2560002816] via 203.230.10.37, 00:07:31, FastEthernet0/1
D EX    203.230.10.16
          [170/2560002816] via 203.230.10.37, 00:07:31, FastEthernet0/1
D EX    203.230.10.28
          [170/2560002816] via 203.230.10.37, 00:07:32, FastEthernet0/1
D EX    203.230.10.24
          [170/2560002816] via 203.230.10.37, 00:07:32, FastEthernet0/1
D EX 203.230.8.0/24
          [170/2560002816] via 203.230.10.37, 00:07:32, FastEthernet0/1
L3SW1#
```

2. 주요 설정 코드 : 네트워크 장비 Confing
passive-interface 설정 후 No Hellos 확인

L3SW1

```
*Mar  1 03:22:24.221: EIGRP: Sending HELLO on FastEthernet0/1
*Mar  1 03:22:24.221:   AS 7, Flags 0x0:(NULL), Seq 0/0 interfaceQ 0/0 iidbQ un/rely 0/0
*Mar  1 03:22:26.351: EIGRP: Sending HELLO on Loopback0
*Mar  1 03:22:26.351:   AS 7, Flags 0x0:(NULL), Seq 0/0 interfaceQ 0/0 iidbQ un/rely 0/0
*Mar  1 03:22:26.351: EIGRP: Received HELLO on Loopback0 nbr 5.5.5.5
*Mar  1 03:22:26.351:   AS 7, Flags 0x0:(NULL), Seq 0/0 interfaceQ 0/0
*Mar  1 03:22:28.356: EIGRP: Received HELLO on FastEthernet0/1 nbr 203.230.10.37
*Mar  1 03:22:28.356:   AS 7, Flags 0x0:(NULL), Seq 0/0 interfaceQ 0/0 iidbQ un/rely 0/0 peerQ un
/rely 0/0
```

Debug에서 Hello 패킷 보내지 않는 것 확인

L3SW2

외부 Static 네트워크 구간으로
passive-interface 생략

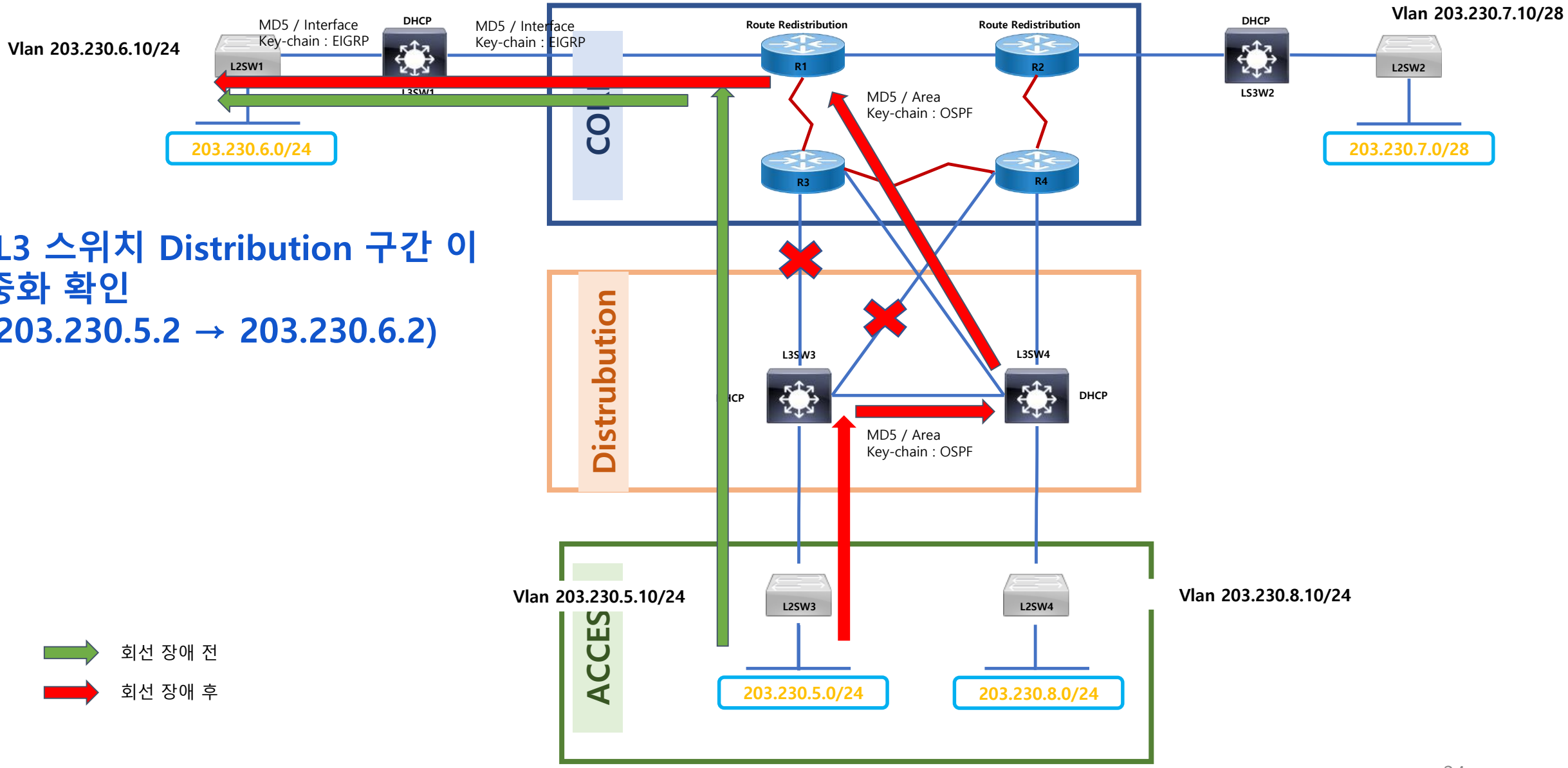
L3SW3

```
L3SW3#show ip ospf int
Loopback0 is up, line protocol is up
  Internet Address 7.7.7.7/32, Area 1
  Process ID 7, Router ID 7.7.7.7, Network Type LOOPBACK, Cost: 1
  Loopback interface is treated as a stub Host
FastEthernet0/25 is up, line protocol is up (connected)
  Internet Address 203.230.5.1/24, Area 1
  Process ID 7, Router ID 7.7.7.7, Network Type BROADCAST, Cost: 1
  Transmit Delay is 1 sec, State DR, Priority 1
  Designated Router (ID) 7.7.7.7, Interface address 203.230.5.1
  No backup designated router on this network
  Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit 5
    oob-resync timeout 40
    No Hellos (Passive interface)
```

L3SW4

```
L3SW4(config)#do show ip ospf interface
Loopback0 is up, line protocol is up
  Internet Address 8.8.8.8/32, Area 1
  Process ID 7, Router ID 8.8.8.8, Network Type LOOPBACK, Cost: 1
  Loopback interface is treated as a stub Host
FastEthernet0/25 is up, line protocol is up (connected)
  Internet Address 203.230.8.1/24, Area 1
  Process ID 7, Router ID 8.8.8.8, Network Type BROADCAST, Cost: 1
  Transmit Delay is 1 sec, State DR, Priority 1
  Designated Router (ID) 8.8.8.8, Interface address 203.230.8.1
  No backup designated router on this network
  Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit 5
    oob-resync timeout 40
    No Hellos (Passive interface)
```

3. Trouble Shooting 시나리오 : 회선 장애 상황



L3 스위치 Distribution 구간 이중화 확인 (203.230.5.2 → 203.230.6.2)

회선 장애 전

회선 장애 후

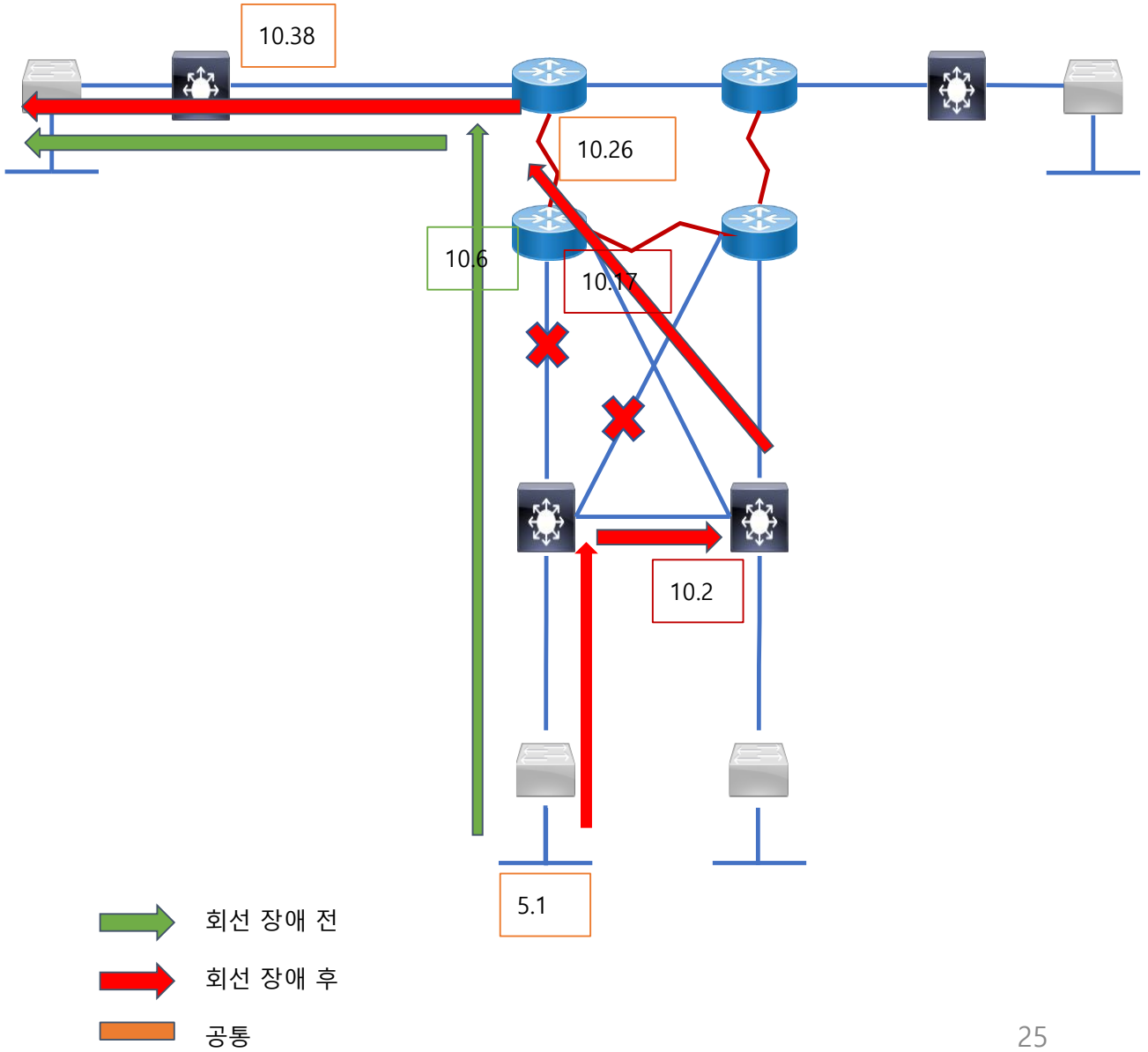
3. Trouble Shooting 시나리오 : 회선 장애 상황
L3 스위치 Distribution 구간 이중화 확인 (203.230.5.2 → 203.230.6.2)

회선 장애 전

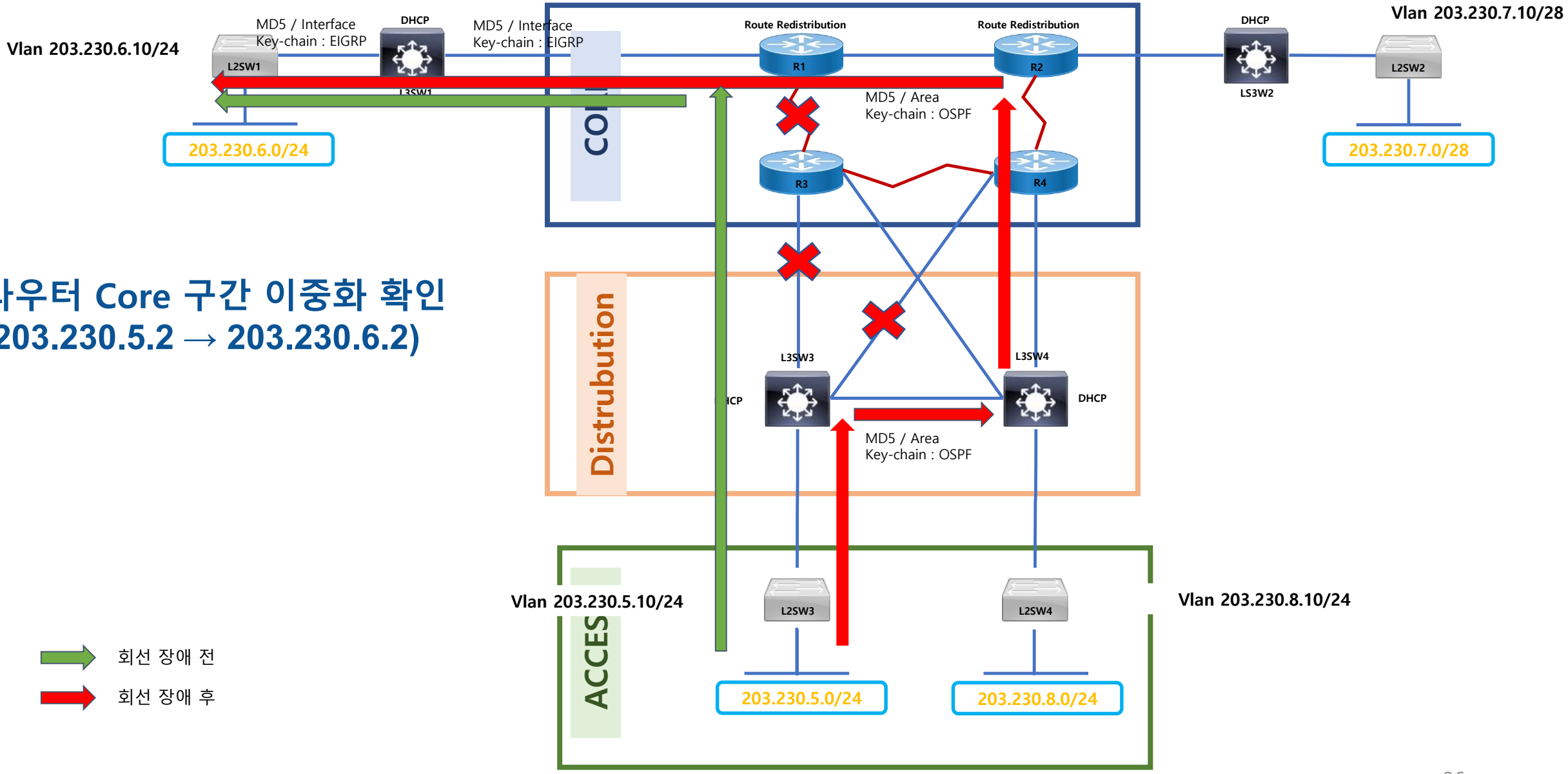
```
C:₩Users₩한국전파진흥협회>tracert -d 203.230.6.2

최대 30홉 이상의 203.230.6.2(으)로 가는 경로 추적

  1     2 ms     3 ms     3 ms  203.230.5.1
  2     2 ms     1 ms     1 ms  203.230.10.6
  3     1 ms     1 ms     1 ms  203.230.10.26
  4     8 ms     1 ms     2 ms  203.230.10.38
  5     1 ms     2 ms     2 ms  203.230.6.2
```

회선 장애 후

```
C:₩Users₩한국전파진흥협회>tracert -d 203.230.6.2

최대 30홉 이상의 203.230.6.2(으)로 가는 경로 추적

  1     5 ms     3 ms     2 ms  203.230.5.1
  2     2 ms     2 ms     4 ms  203.230.10.2
  3     1 ms    <1 ms    <1 ms  203.230.10.17
  4     1 ms     1 ms     1 ms  203.230.10.26
  5     2 ms     1 ms     1 ms  203.230.10.38
  6     2 ms     2 ms     2 ms  203.230.6.2

추적을 완료했습니다.
```



3. Trouble Shooting 시나리오 : 회선 장애 상황



라우터 Core 구간 이중화 확인 (203.230.5.2 → 203.230.6.2)

회선 장애 전

회선 장애 후

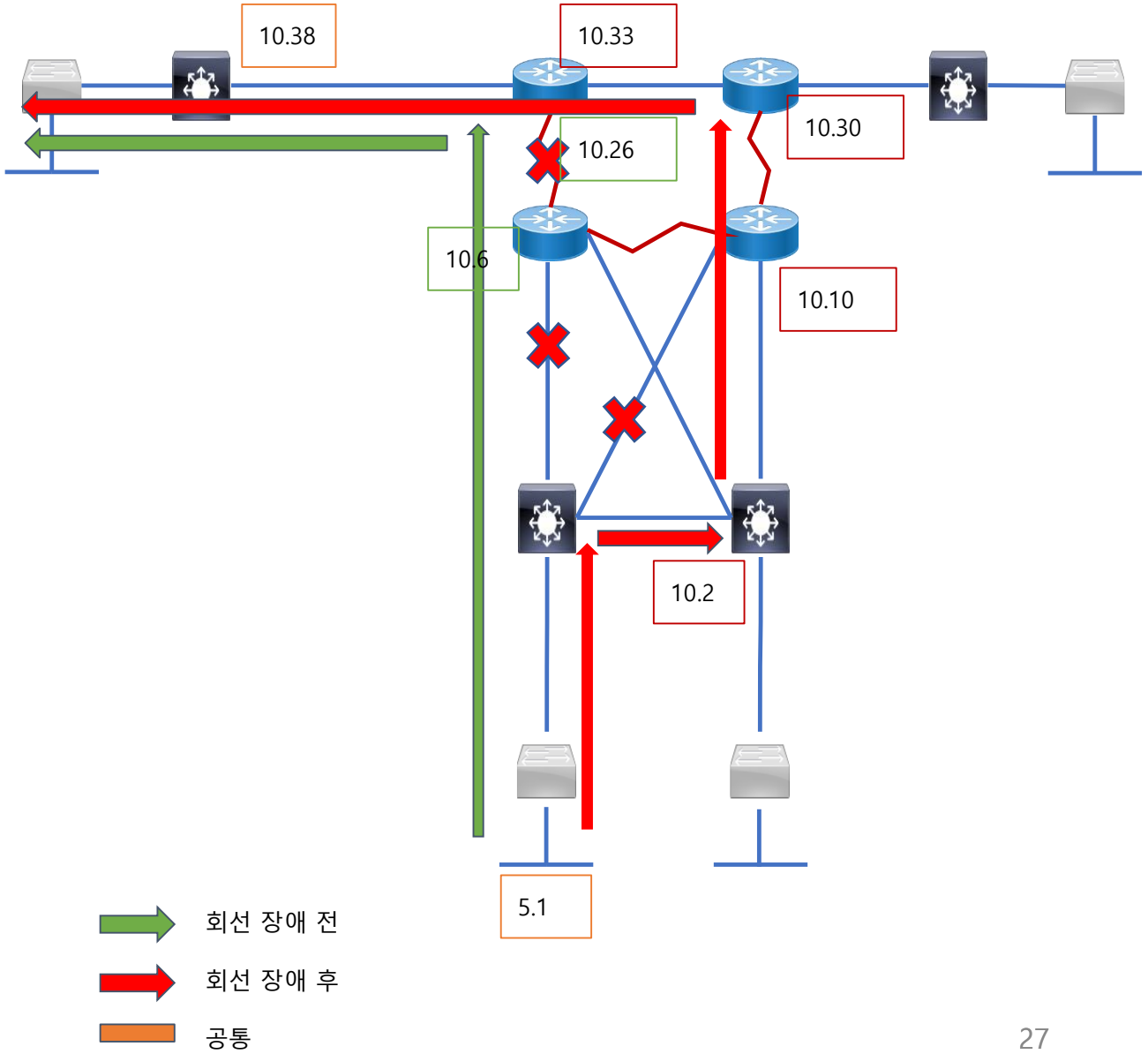
3. Trouble Shooting 시나리오 : 회선 장애 상황
라우터 Core 구간 이중화 확인 (203.230.5.2 → 203.230.6.2)

회선 장애 전

```
C:₩Users₩한국전파진흥협회>tracert -d 203.230.6.2

최대 30홉 이상의 203.230.6.2(으)로 가는 경로 추적

  1     2 ms     3 ms     3 ms  203.230.5.1
  2     2 ms     1 ms     1 ms  203.230.10.6
  3     1 ms     1 ms     1 ms  203.230.10.26
  4     8 ms     1 ms     2 ms  203.230.10.38
  5     1 ms     2 ms     2 ms  203.230.6.2
```

회선 장애 후

```
C:₩Users₩한국전파진흥협회>tracert -d 203.230.6.2

최대 30홉 이상의 203.230.6.2(으)로 가는 경로 추적

  1     3 ms    32 ms     2 ms  203.230.5.1
  2     3 ms     3 ms     6 ms  203.230.10.2
  3     1 ms    <1 ms    <1 ms  203.230.10.10
  4     1 ms     1 ms     1 ms  203.230.10.30
  5     1 ms     1 ms     1 ms  203.230.10.33
  6     3 ms     3 ms     3 ms  203.230.10.38
  7     2 ms     2 ms     2 ms  203.230.6.2

추적을 완료했습니다.
```




CISCO