

NETWORK PROJECT

TEAM : PIZZA

팀장: 고준성

팀원: 박찬우, 김윤서, 이재호



목차

1. 물리적 구성도

2. IP 구성도

3. IGP 구성도

4. 설정

= Bridging and Switching

= IP . IGP Protocols

= IOS Features

= Security

5. 결과

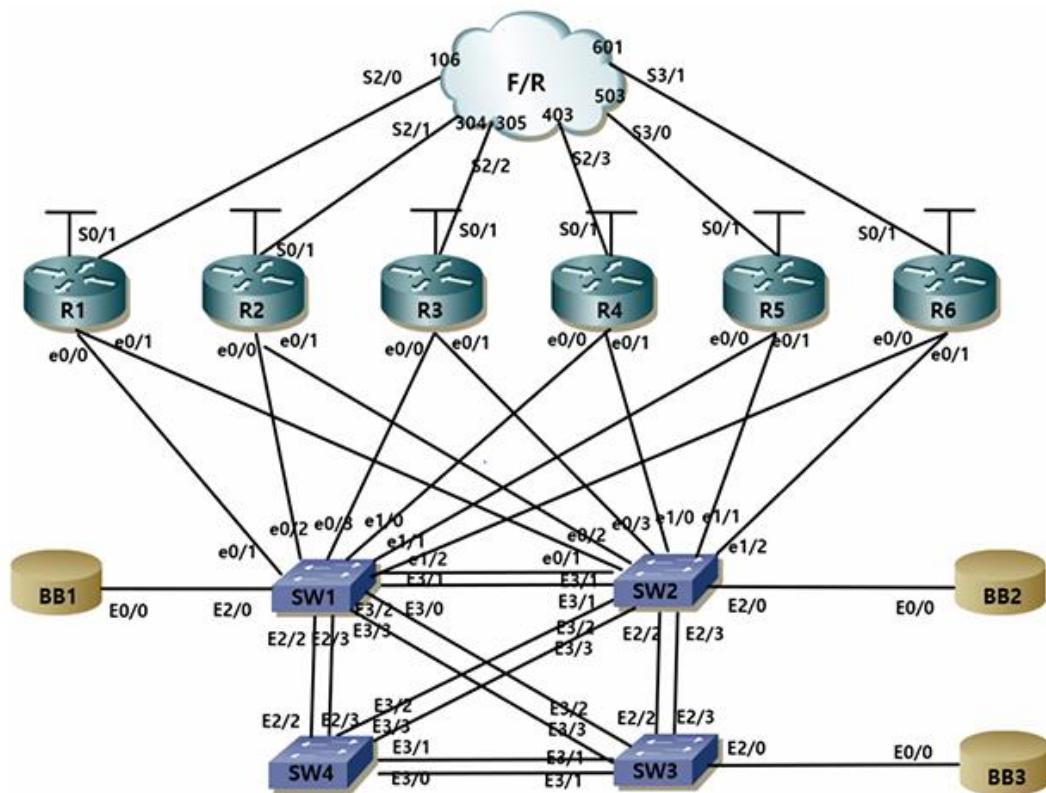
= 라우팅 테이블 확인

(Router . Switch 재분배 이전 결과 , 재분배 이후 결과)

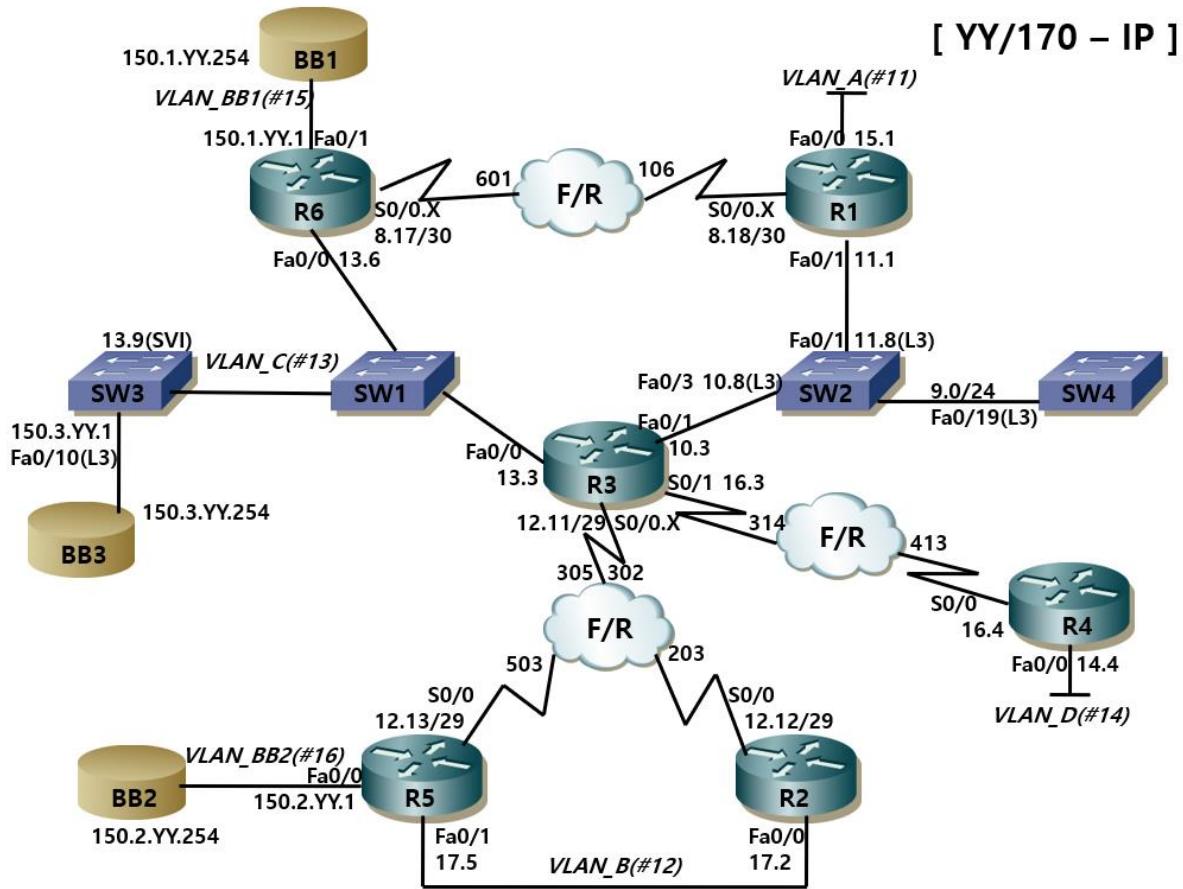
= VTP 정보 확인

= VLAN 정보 확인

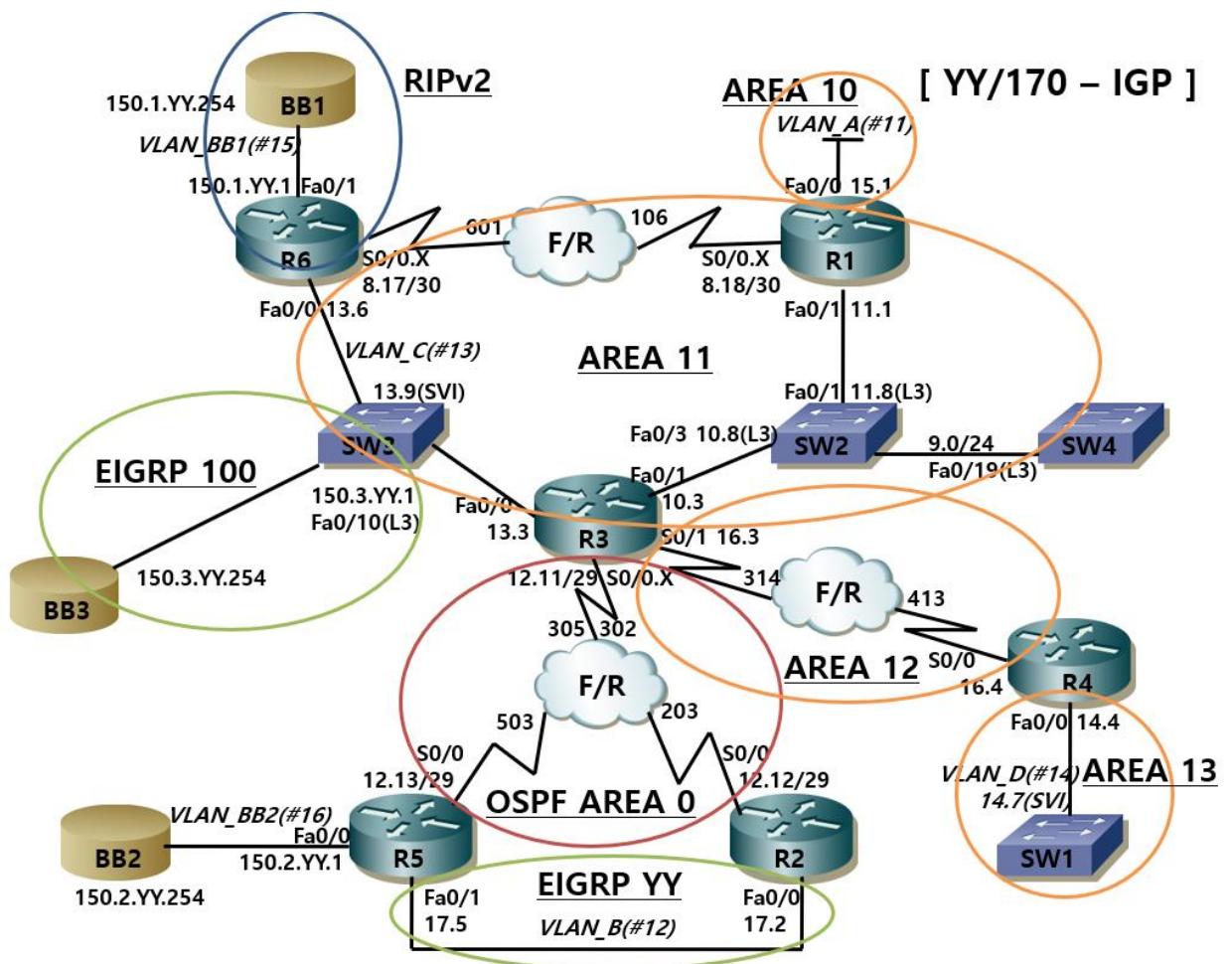
1. 물리적 구성도



2. IP 구성도



3. IGP 구성도



4. 설정

170-MAP

I. Bridging and Switching

- Configure IP across your frame relay network

[Frame-relay]

[a. R1,R3,R6 을 제외한 나머지 라우터에서는 Sub-interface 를 사용 할 수 없다.]

[b. R1 과 R6 에서는 Point-to-point sub-interface 를 사용하여 frame-relay 구간 설정.]

[c. R3 는 multipoint sub-interface 를 사용하여 frame-relay 구간 설정.] [d. Sub-interface 를 사용하는 모든 라우터에서는 Sub-interface name 을 Serial1/0.X 로 설정. X=장비번호]

R1 int lo0 ip add 15.15.1.1 255.255.255.255 int e0/1 no sh ip add 15.15.11.1 255.255.255.0 int e0/0 no sh ip add 15.15.15.1 255.255.255.0 int s1/0 encapsulation frame-relay no frame-relay inverse-arp no sh int s1/0.1 point ip add 15.15.8.18 255.255.255.252 frame inter 106 R2 int lo0 ip add 15.15.2.2 255.255.255.255	R4 int lo0 ip add 15.15.4.4 255.255.255.255 int e0/0 no sh ip add 15.15.14.4 255.255.255.0 int s1/0 en fram no fram inv no sh int s1/0.16 p ip add 15.15.16.4 255.255.255.0 fram int 403 R5 int lo0 ip add 15.15.5.5 255.255.255.255 int e0/0 no sh ip add 150.2.14.1 255.255.255.0 int e0/1 no sh
--	--

	ip add 15.15.17.5 255.255.255.0 int s1/0 encapsulation frame-relay
--	--

<pre> int e0/0 no sh ip add 15.15.17.2 255.255.255.0 int s1/0 enc frame no frame inver no sh ip add 15.15.12.2 255.255.255.248 frame map ip 15.15.12.3 203 br frame map ip 15.15.12.5 203 br R3 int lo0 ip add 15.15.3.3 255.255.255.255 int e0/1 no sh ip add 15.15.10.3 255.255.255.0 int e0/0 no sh ip add 15.15.13.3 255.255.255.0 int s1/0 encapsulation frame-relay no frame-relay inverse-arp no sh int s1/0.16 p ip add 15.15.16.3 255.255.255.0 fram int 304 int s1/0.3 m ip add 15.15.12.3 255.255.255.248 frame map ip 15.15.12.5 305 broad frame map ip 15.15.12.2 302 broad </pre>	<pre> no frame-relay inverse-arp no sh ip add 15.15.12.5 255.255.255.248 frame map ip 15.15.12.2 503 broad frame map ip 15.15.12.3 503 broad R6 int lo0 ip add 15.15.6.6 255.255.255.255 int e0/1 no sh ip add 150.1.14.1 255.255.255.0 int e0/0 no sh ip add 15.15.13.6 255.255.255.0 int s1/0 encapsulation frame-relay no frame-relay inverse-arp no sh int s1/0.6 point ip add 15.15.8.17 255.255.255.252 frame inter 601 </pre>
--	---

2. Cat3550 Switch Setup

2.1 Default Configuration

SW1	SW2
int range e2/2 – 3 shutdown	int range e2/2 – 3 shutdown
int e3/3 shutdown	int e3/3 shutdown
SW3	int e3/2 no sw
int range e3/0 – 1 shutdown	SW4
int range e2/2 – 3 shutdown	int range e3/0 – 1 shutdown
int e3/3 shutdown	int range e2/2 – 3 shutdown
	int e3/3 shutdown
	int e3/2 no sw

2.1 VTP Configuration

[모든 SW 에서 VTP 및 DTP broadcast 트래픽이 모든 포트에서 흘러 다니지 않도록 하라]

SW1 – SW4
vtp mode transparent
vtp domain Pizza.com
vtp password Pizza
vtp ver 2

2.2 Trunk Port

[SW1,SW2 사이에 ISL trunk 구성하라.]

SW1

```
int range e3/0 – 1 switch trunk encap dot switch mode trunk
```

```
int e3/2 switch trunk encap dot switch mode trunk
```

SW2

```
int range e3/0 – 1 switch trunk encap dot switch mode trunk
```

SW3

```
int e3/2
```

```
switch trunk encap dot
```

```
switch mode trunk
```

2.3 VLAN Configuration

[다음에 보여지는 것과 같이 VLAN 을 assign 하시오. 모든 설정이 완료된 후, SW1,2,3 에서 모든 VLAN 이 보여야됨]

SW1, SW3	SW1
no vlan 10–100	int e0/1
vlan 11	sw mode acc
name VLAN_A	sw acc vlan 11
vlan 12	int e0/2
name VLAN_B	sw mod acc
vlan 13	sw acc vlan 11
name VLAN_C	sw mod acc
vlan 14	sw acc vlan 12

	name VLAN_D	int e0/3
	vlan 15	sw mod acc
	name VLAN_BB1	sw acc vlan 13
	vlan 16	int e1/0
	name VLAN_BB2	sw mod acc
SW2		sw acc vlan 14
no vlan 10-100		int e1/1
vlan 11		sw mod acc
name VLAN_A		sw acc vlan 16
vlan 12		int e1/2
name VLAN_B		sw mod acc
vlan 13		sw acc vlan 13
name VLAN_C		SW1
vlan 14		int lo0
name VLAN_D		ip add 15.15.7.7 255.255.255.255
vlan 15		SW2
name VLAN_BB1		int e0/1
vlan 16		no sw
name VLAN_BB		ip add 15.15.11.8 255.255.255.0
int e3/2 no sw		int e0/3
ip add 15.15.9.8 255.255.255.0		no sw

<pre> int lo0 ip add 15.15.8.8 255.255.255.255 SW3 int e2/0 no sw ip add 150.3.14.1 255.255.255.0 int vlan 13 no sh ip add 15.15.13.9 255.255.255.0 interface loopback0 ip add 15.15.9.9 255.255.255.255 SW4 int e3/2 no sw ip add 15.15.9.10 255.255.255.0 </pre>	<pre> ip add 15.15.10.8 255.255.255.0 int e1/1 sw mod acc sw acc vlan 12 int e1/2 sw mod acc sw acc vlan 15 int e2/0 sw mod acc sw acc vlan 16 int loopback0 ip add 15.15.10.10 255.255.255.255 </pre>
--	--

2.4 Load Balancing

(홀수 VLAN 은 e3/0 , 짝수 VLAN 은 e3/1) SW1,2 에 설정 [홀수 VLAN 은 e3/0 , 짝수 VLAN 은 e3/1 훌러 다니게 하라. 사용하는 VLAN 만 훌러다녀야 한다.

SW1, SW2 <pre> int e3/0 swit trunk allowed vlan 11,13,15 int e3/1 swit trunk allowed vlan 12,14,16 </pre>
--

2.5 Management Interface

(아래 단계에서는 up down 상태, 2.7 설정 후 up up 상태 됨) SW1 에서 OSPF 포함될 YY.YY.14.7/24 IP 를 설정하며 VLAN_D 에 대해서 SW1 이 root 가 되도록 설정하라.

SW1

```
int vlan 14  
no sh  
ip add 15.15.14.7 255.255.255.0  
spanning-tree vlan 14 priority 0
```

SW3

```
int vlan 13  
no sh  
ip add 15.15.13.9 255.255.255.0
```

2.6 Packet Monitor

SW3

```
monitor session 1 source interface f0/18  
monitor session 1 destination interface f0/17
```

2.7 BPDU Attack

```
SW1  
int e2/0  
spanning-tree bpdufilter enable  
SW2  
int e2/0  
spanning-tree bpdufilter enable
```

2.8 Spanning-tree Tuning

```
SW1  
spanning-tree vlan 14 root primary  
spanning-tree vlan 14 hello-time 2  
spanning-tree vlan 14 max-age 16  
spanning-tree vlan 14 forward-time 14
```

2.9 UDLD

(UTP 케이블은 aggressive에서 동작)

```
SW1
int e3/0
udld port aggressive
SW2
int e3/1
udld port aggressive
```

2.10 Errdisable

```
SW1
Errdisable recovery cause udld
Errdisable recovery interval 600
```

II. IP IGP Protocols

1. RIP

1.1 RIPv2 Configuration

[구성도-B 를 참조하여 R6 의 e0/1 port 만 포함하고 version 2 정보를 BB1 과 주고 받을 수 있도록 하라]

```
R6
router rip
ver 2
no au
net 150.1.0.0 passive-interface default
no passive-interface e0/1
```

1.2 Adjust Received Update

```
R6
ip access-list standard RIP_IN
permit 199.172.0.0 0.0.11.0
router rip
distribute-list RIP_IN in e0/1
```

1.3 Route Redistribution (OSPF 설정 후 적용 및 확인)

[R6 에서 RIP OSPF 상호 재분배 하라. BB1 으로는 YY.YY.0.0/16 만 보내라]

R6

```
router rip

redistribute ospf 1 metric 3

distribute-list prefix R6=>BB1 out e0/1

int e0/1

ip summary-address rip 15.15.0.0 255.255.0.0

ip prefix-list R6=>BB1 permit 15.15.0.0/16

router ospf 1 redistribute rip subnets
```

2. OSPF (OSPF Router-id X.X.X.X X: router number)

2.1 Basic OSPF Configuration

[a. 아래 조건을 참조하여 OSPF 를 구성하시오]

Area 10	R1 fa0/0
Area 11	R1 fa0/1 S0/0 , R3 fa0/0 fa0/1 , R6 fa0/0 S0/0 , SW2 , SW3 , SW4
Area 12	R3 S0/1 , R4 S0/0
Area 13	R4 fa0/0 , SW1

[b. 위 조건에 만족하여 OSPF 를 구성하되 area 10 과 area 13 에 대한 reachable 를 보장하시오.=virtual link]

[c. OSPF AREA 12 를 구성할 때 Hello interval 10 초 , Dead interval 40 초가 되도록 조정하고자 한다. (단 설정을 하는 동안 interval(time)과 직접 관련된 명령어는 사용할 수 없다.)]

[d. OSPF AREA 0 구성 시 ip ospf network 관련 명령어 사용 금지. R2-R3-R5 사이에 구성]

R1

```
router ospf 1  
router-id 1.1.1.1  
network 15.15.1.1 0.0.0.0 area 11  
network 15.15.15.1 0.0.0.0 area 10  
network 15.15.11.1 0.0.0.0 area 11  
network 15.15.8.18 0.0.0.0 area 11
```

R2

```
router ospf 1  
router-id 2.2.2.2  
network 15.15.2.2 0.0.0.0 area 0  
network 15.15.12.2 0.0.0.0 area 0  
int s1/0 ip ospf priority 0
```

R3

```
router ospf 1  
router-id 3.3.3.3  
network 15.15.3.3 0.0.0.0 area 0  
network 15.15.13.3 0.0.0.0 area 11  
network 15.15.10.3 0.0.0.0 area 11  
network 15.15.16.3 0.0.0.0 area 12  
network 15.15.12.3 0.0.0.0 area 0  
neighbor 15.15.12.5 neighbor 15.15.12.2
```

```
int s1/0
ip ospf network point-to-point

R4
router ospf 1
router-id 4.4.4.4
network 15.15.4.4 0.0.0.0 area 13
network 15.15.16.4 0.0.0.0 area 12
network 15.15.14.4 0.0.0.0 area 13
int s1/0 ip ospf network point-to-point

R5
router ospf 1
router-id 5.5.5.5
network 15.15.5.5 0.0.0.0 area 0
network 15.15.12.5 0.0.0.0 area 0
int s1/0
ip ospf priority 0

R6
router ospf 1
router-id 6.6.6.6
network 15.15.6.6 0.0.0.0 area 11
network 15.15.13.6 0.0.0.0 area 11
network 15.15.8.17 0.0.0.0 area 11

SW1
```

```
router ospf 1
```

```
  router-id 7.7.7.7
```

```
  network 15.15.7.7 0.0.0.0 area 13
```

```
  network 15.15.14.7 0.0.0.0 area 13
```

SW2

```
router ospf 1
```

```
  router-id 8.8.8.8
```

```
  network 15.15.8.8 0.0.0.0 area 11
```

```
  network 15.15.11.8 0.0.0.0 area 11
```

```
  network 15.15.10.8 0.0.0.0 area 11
```

```
  network 15.15.9.8 0.0.0.0 area 11
```

SW3

```
router ospf 1
```

```
  router-id 9.9.9.9
```

```
  network 15.15.9.9 0.0.0.0 area 11
```

```
  network 15.15.13.9 0.0.0.0 area 11
```

SW4

```
router ospf 1
```

```
  router-id 10.10.10.10
```

```
  network 15.15.10.10 0.0.0.0 area 11
```

```
  network 15.15.9.10 0.0.0.0 area 11
```

2.1 - 1 virtual-link

R1

```
router ospf 1  
area 11 virtual-link 3.3.3.3
```

R3

```
router ospf 1  
area 11 virtual-link 1.1.1.1  
area 12 virtual-link 4.4.4.4
```

R4

```
router ospf 1  
area 12 virtual-link 3.3.3.3
```

2.2 OSPF Stub AREA

R4

```
router ospf 1  
area 13 stub no-summary  
area 13 default-cost 18  
SW1  
area 13 stub
```

2.3 OSPF Route Reduction (## 기존 area 11 => area 13 변경 축약)

OSPF AREA 13 에 포함되는 경로에 대해 summary 를 수행하여 다른 OSPF domain 에서 하나의 경로로 보이게 하라.

R4

```
router ospf 1  
area 13 range 15.15.0.0 255.255.240.0  
area 13 range 15.15.4.4 255.255.255.255  
area 13 range 15.15.7.7 255.255.255.255
```

3. EIGRP

[BB3에서 4.1.1.0/24, 128.28.2.0/24, 198.198.1.0/24 만 받아라. 이 정보는 모든 라우터에서 확인이 가능해야 하며 OSPF에서 metric 값이 누적되면서 전달되어야 한다.]

3.1 EIGRP 100 Configuration

SW3

```
router eigrp 100

eigrp router-id 9.9.9.9

no auto-summary

network 150.3.14.1 0.0.0.0

distribute-list prefix BB3=>SW3 in e2/0

redistribute ospf 1 metric 1544 2000 255 1 1500

ip prefix-list BB3=>SW3 permit 4.1.1.0/24

ip prefix-list BB3=>SW3 permit 128.28.2.0/24

ip prefix-list BB3=>SW3 permit 198.198.1.4/30

router ospf 1

redistribute eigrp 100 subnets route-map CH-TYPE

route-map CH-TYPE

(config-route-map)#match ip address prefix-list BB3=>SW3

(config-route-map)#set metric-type type-1

route-map CH-TYPE 20
```

3.2 EIGRP YY Configuration

R2

```
router eigrp 14  
eigrp router-id 2.2.2.2  
no auto-summary network 15.15.17.2 0.0.0.0
```

R5

```
router eigrp 14  
eigrp router-id 5.5.5.5  
no auto-summary  
network 15.15.17.5 0.0.0.0
```

3.3 EIGRP Contingency

[R2 와 R5 에서 eigrp 와 ospf 재분배를 수행하되 아래 조건에 만족하게끔 구성을 하라.
R2 는 Connected interface 를 제외한 모든 경로에 대해 VLAN_B 를 통하여 확인이 가능하도록 구성하라.]

R2

```
router eigrp 14  
redistribute ospf 1 metric 1544 2000 255 1 1500  
distance eigrp 90 95  
route-map TO OSPF deny 10  
(config-route-map)#match tag 100  
route-map TO OSPF permit 20  
router ospf 1  
redistribute eigrp 14 subnets route-map TO OSPF
```

R5

```
router eigrp 14
```

```
redistribute ospf 1 metric 1544 200 255 1 1500 route-map TO_EIGRP  
router ospf 1  
redistribute eigrp 14 subnets  
route-map TO_EIGRP  
set tag 100
```

III. IOS/IP Feature

1. NTP

```
R3  
ntp authentication-key 1 md5 cisco  
ntp authenticate  
ntp trusted-key 1  
ntp source Loopback0  
ntp master 2  
R4  
ntp server 15.15.3.3 key 1  
ntp authentication-key 1 md5 cisco  
ntp authenticate  
ntp trusted-key 1  
ntp source Loopback0
```

2. HSRP

```
R2  
interface Ethernet0/0  
standby 1 ip 15.15.17.1  
standby 1 preempt  
R5  
Interface Ethernet0/1  
standby 1 ip 15.15.17.1  
standby 1 priority 150  
standby 1 preempt  
standby 1 track Serial0/0 100
```

3. SYSLOG

```
R5
logging on
logging trap
critical logging
facility local6
logging source-interface Loopback0
logging host 150.2.14.250
```

IV. Security

1. Catalyst 3550 Switch Security

[R2 와 R5 가 연결된 SW 에 설정하여 두 라우터의 MAC 만이 허용되도록 한다.

traffic 은 Log 를 남기도록 하라. SW 가 재시작 되는 경우에도 이에 대한 설정은 남아 있도록 하라 HSRP 의 use-bia , mac-address 는 사용해서는 안된다.]

```
R2
int e0/0
standby 1 mac-address 0000.0000.2222
SW1
int e0/2
switchport port-security maximum 2
switchport port-security mac-address 0000.0000.2222
switchport port-security
R5 int e0/1
standby 1 mac-address 0000.0000.0005
SW2
int e1/1
switchport port-security maximum 2
switchport port-security mac-address 0000.0000.0005
switchport port-security
```

2. Telnet Feature

```
SW2
access-list 99 permit 150.1.0.0 0.0.255.255
access-list 99 permit 15.15.0.0 0.0.255.255
line vty 0 15
access-class 99 in
```

3. Dynamic Access-list

[텔넷 연결은 최대 10 분 이상 지속될 수 없고, telnet 의 idle 이 허용되는 시간은 최대 2분이다.]

R4

```
username ccie password 0 cisco
ip access-list extended LOCK
permit tcp 15.15.14.0 0.0.0.255 host 15.15.14.4 eq telnet
dynamic LK timeout 10 permit tcp 15.15.14.0 0.0.0.255 any eq telnet
deny tcp 15.15.14.0 0.0.0.255 any eq telnet
permit ip any any
line vty 0 4
password cisco
login local
autocommand access-enable host timeout 2
```

결과

라우팅 테이블 확인

ROUTER 2 재분배 이전 결과

```
R2(config)#sh 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, + - replicated route
```

Gateway of last resort is not set

```
15.0.0.0/8 is variably subnetted, 22 subnets, 5 masks
D EX  15.15.0.0/20 [95/1734656] via 15.15.17.5, 01:23:08, Ethernet0/0
D EX  15.15.1.1/32 [95/1734656] via 15.15.17.5, 01:55:52, Ethernet0/0
C    15.15.2.2/32 is directly connected, Loopback0
D EX  15.15.3.3/32 [95/1734656] via 15.15.17.5, 01:55:52, Ethernet0/0
D EX  15.15.4.4/32 [95/1734656] via 15.15.17.5, 01:55:52, Ethernet0/0
D EX  15.15.5.5/32 [95/1734656] via 15.15.17.5, 01:55:52, Ethernet0/0
D EX  15.15.6.6/32 [95/1734656] via 15.15.17.5, 01:55:52, Ethernet0/0
D EX  15.15.7.7/32 [95/1734656] via 15.15.17.5, 01:55:52, Ethernet0/0
D EX  15.15.8.8/32 [95/1734656] via 15.15.17.5, 00:35:53, Ethernet0/0
D EX  15.15.8.16/30 [95/1734656] via 15.15.17.5, 01:55:53, Ethernet0/0
D EX  15.15.9.0/24 [95/1734656] via 15.15.17.5, 00:35:43, Ethernet0/0
D EX  15.15.9.9/32 [95/1734656] via 15.15.17.5, 00:35:43, Ethernet0/0
D EX  15.15.10.0/24 [95/1734656] via 15.15.17.5, 00:35:43, Ethernet0/0
D EX  15.15.10.10/32 [95/1734656] via 15.15.17.5, 00:35:43, Ethernet0/0
D EX  15.15.11.0/24 [95/1734656] via 15.15.17.5, 01:55:52, Ethernet0/0
L    15.15.12.2/32 is directly connected, Serial1/0
D EX  15.15.13.0/24 [95/1734656] via 15.15.17.5, 01:55:53, Ethernet0/0
D EX  15.15.15.0/24 [95/1734656] via 15.15.17.5, 01:55:53, Ethernet0/0
D EX  15.15.16.0/24 [95/1734656] via 15.15.17.5, 01:55:53, Ethernet0/0
L    15.15.17.4/32 is directly connected, Ethernet0/0
L    15.15.17.7/32 is directly connected, Ethernet0/0
```

ROUTER 2 재분배 이후 결과

R2#sh 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, + - replicated route

Gateway of last resort is not set

15.0.0.0/8 is variably subnetted, 22 subnets, 5 masks

D EX 15.15.0.0/20 [95/1734656] via 15.15.17.5, 01:02:38, Ethernet0/0
D EX 15.15.1.1/32 [95/1734656] via 15.15.17.5, 01:35:22, Ethernet0/0
C 15.15.2.2/32 is directly connected, Loopback0
D EX 15.15.3.3/32 [95/1734656] via 15.15.17.5, 01:35:22, Ethernet0/0
D EX 15.15.4.4/32 [95/1734656] via 15.15.17.5, 01:02:38, Ethernet0/0
D EX 15.15.5.5/32 [95/1734656] via 15.15.17.5, 01:02:38, Ethernet0/0
D EX 15.15.6.6/32 [95/1734656] via 15.15.17.5, 01:35:22, Ethernet0/0
D EX 15.15.7.7/32 [95/1734656] via 15.15.17.5, 01:35:22, Ethernet0/0
D EX 15.15.8.8/32 [95/1734656] via 15.15.17.5, 01:35:22, Ethernet0/0
D EX 15.15.8.16/30 [95/1734656] via 15.15.17.5, 01:35:22, Ethernet0/0
D EX 15.15.9.0/24 [95/1734656] via 15.15.17.5, 01:35:22, Ethernet0/0
D EX 15.15.9.9/32 [95/1734656] via 15.15.17.5, 01:35:23, Ethernet0/0
D EX 15.15.10.0/24 [95/1734656] via 15.15.17.5, 01:35:23, Ethernet0/0
D EX 15.15.10.10/32 [95/1734656] via 15.15.17.5, 01:35:23, Ethernet0/0
D EX 15.15.11.0/24 [95/1734656] via 15.15.17.5, 01:35:23, Ethernet0/0
L 15.15.12.2/32 is directly connected, Serial1/0
D EX 15.15.13.0/24 [95/1734656] via 15.15.17.5, 01:35:23, Ethernet0/0
D EX 15.15.15.0/24 [95/1734656] via 15.15.17.5, 01:03:04, Ethernet0/0
D EX 15.15.16.0/24 [95/1734656] via 15.15.17.5, 01:03:04, Ethernet0/0
C 15.15.17.0/24 is directly connected, Ethernet0/0
L 15.15.17.2/32 is directly connected, Ethernet0/0

150.1.0.0/24 is subnetted, 1 subnets

D EX 150.1.14.0 [95/1734656] via 15.15.17.5, 01:35:23, Ethernet0/0

150.3.0.0/24 is subnetted, 1 subnets

D EX 150.3.14.0 [95/1734656] via 15.15.17.5, 01:35:23, Ethernet0/0



ROUTER 5 재분배 이전 결과

```
R5(config)#sh 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, + - replicated route

Gateway of last resort is not set

15.0.0.0/8 is variably subnetted, 22 subnets, 5 masks

```
O IA 15.15.0.0/20 [110/138] via 15.15.12.3, 01:24:23, Serial1/0
O IA 15.15.1.1/32 [110/85] via 15.15.12.3, 00:00:10, Serial1/0
O IA 15.15.2.2/32 [110/75] via 15.15.12.3, 02:03:07, Serial1/0
O IA 15.15.3.3/32 [110/65] via 15.15.12.3, 02:03:07, Serial1/0
O IA 15.15.4.4/32 [110/129] via 15.15.12.3, 01:24:23, Serial1/0
O IA 15.15.5.5/32 [110/75] via 15.15.12.3, 02:03:07, Serial1/0
C 15.15.6.6/32 is directly connected, Loopback0
O IA 15.15.7.7/32 [110/139] via 15.15.12.3, 00:37:38, Serial1/0
O IA 15.15.8.8/32 [110/75] via 15.15.12.3, 02:03:07, Serial1/0
O IA 15.15.8.16/30 [110/84] via 15.15.12.3, 02:03:07, Serial1/0
O IA 15.15.9.0/24 [110/75] via 15.15.12.3, 02:03:07, Serial1/0
O IA 15.15.9.9/32 [110/75] via 15.15.12.3, 00:36:59, Serial1/0
O IA 15.15.10.0/24 [110/85] via 15.15.12.3, 00:36:48, Serial1/0
O IA 15.15.10.10/32 [110/85] via 15.15.12.3, 00:36:48, Serial1/0
O IA 15.15.11.0/24 [110/75] via 15.15.12.3, 02:03:07, Serial1/0
C 15.15.12.0/29 is directly connected, Serial1/0
L 15.15.12.5/32 is directly connected, Serial1/0
O IA 15.15.13.0/24 [110/74] via 15.15.12.3, 02:03:07, Serial1/0
O IA 15.15.15.0/24 [110/94] via 15.15.12.3, 02:02:06, Serial1/0
O IA 15.15.16.0/24 [110/128] via 15.15.12.3, 01:24:48, Serial1/0
C 15.15.17.0/24 is directly connected, Ethernet0/1
L 15.15.17.5/32 is directly connected, Ethernet0/1
```

150.1.0.0/24 is subnetted, 1 subnets

```
O E2 150.1.1.0/24 [110/20] via 15.15.12.3, 00:01:29, Serial1/0
```

150.2.0.0/16 is variably subnetted, 2 subnets, 2 masks

```
C 150.2.0.0/24 is directly connected, Ethernet0/0
L 150.2.15.1/32 is directly connected, Ethernet0/0
```



ROUTER 5 재분배 이후 결과

```
R5(config)#sh 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, + - replicated route

Gateway of last resort is not set

15.0.0.0/8 is variably subnetted, 22 subnets, 5 masks

```
O IA 15.15.0.0/20 [110/138] via 15.15.12.3, 01:24:23, Serial1/0
O IA 15.15.1.1/32 [110/85] via 15.15.12.3, 00:00:10, Serial1/0
O IA 15.15.2.2/32 [110/75] via 15.15.12.3, 02:03:07, Serial1/0
O IA 15.15.3.3/32 [110/65] via 15.15.12.3, 02:03:07, Serial1/0
O IA 15.15.4.4/32 [110/129] via 15.15.12.3, 01:24:23, Serial1/0
O IA 15.15.5.5/32 [110/75] via 15.15.12.3, 02:03:07, Serial1/0
C 15.15.6.6/32 is directly connected, Loopback0
O IA 15.15.7.7/32 [110/139] via 15.15.12.3, 00:37:38, Serial1/0
O IA 15.15.8.8/32 [110/75] via 15.15.12.3, 02:03:07, Serial1/0
O IA 15.15.8.16/30 [110/84] via 15.15.12.3, 02:03:07, Serial1/0
O IA 15.15.9.0/24 [110/75] via 15.15.12.3, 02:03:07, Serial1/0
O IA 15.15.9.9/32 [110/75] via 15.15.12.3, 00:36:59, Serial1/0
O IA 15.15.10.0/24 [110/85] via 15.15.12.3, 00:36:48, Serial1/0
O IA 15.15.10.10/32 [110/85] via 15.15.12.3, 00:36:48, Serial1/0
O IA 15.15.11.0/24 [110/75] via 15.15.12.3, 02:03:07, Serial1/0
C 15.15.12.0/29 is directly connected, Serial1/0
L 15.15.12.5/32 is directly connected, Serial1/0
O IA 15.15.13.0/24 [110/74] via 15.15.12.3, 02:03:07, Serial1/0
O IA 15.15.15.0/24 [110/94] via 15.15.12.3, 02:02:06, Serial1/0
O IA 15.15.16.0/24 [110/128] via 15.15.12.3, 01:24:48, Serial1/0
C 15.15.17.0/24 is directly connected, Ethernet0/1
L 15.15.17.5/32 is directly connected, Ethernet0/1
```

150.1.0.0/24 is subnetted, 1 subnets

```
O E2 150.1.1.0/24 [110/20] via 15.15.12.3, 00:01:29, Serial1/0
```

150.2.0.0/16 is variably subnetted, 2 subnets, 2 masks

```
C 150.2.0.0/24 is directly connected, Ethernet0/0
L 150.2.15.1/32 is directly connected, Ethernet0/0
```

ROUTER 6 재분배 이전 결과

```
R6(config)#sh 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, + - replicated route

Gateway of last resort is not set

15.0.0.0/8 is variably subnetted, 21 subnets, 5 masks

```
O IA 15.15.0.0/20 [110/84] via 15.15.13.3, 01:27:11, Ethernet0/0
O 15.15.1.1/32 [110/31] via 15.15.13.3, 02:07:11, Ethernet0/0
O IA 15.15.2.2/32 [110/75] via 15.15.13.3, 02:05:50, Ethernet0/0
O IA 15.15.3.3/32 [110/11] via 15.15.13.3, 02:07:11, Ethernet0/0
O IA 15.15.4.4/32 [110/75] via 15.15.13.3, 01:27:11, Ethernet0/0
O IA 15.15.5.5/32 [110/75] via 15.15.13.3, 02:05:50, Ethernet0/0
C 15.15.6.6/32 is directly connected, Loopback0
O IA 15.15.7.7/32 [110/85] via 15.15.13.3, 00:40:21, Ethernet0/0
O IA 15.15.8.8/32 [110/21] via 15.15.13.3, 00:39:52, Ethernet0/0
C 15.15.8.16/30 is directly connected, Serial1/0.6
L 15.15.8.17/32 is directly connected, Serial1/0.6
O IA 15.15.9.0/24 [110/30] via 15.15.13.3, 02:07:01, Ethernet0/0
O IA 15.15.9.9/32 [110/11] via 15.15.13.9, 00:39:43, Ethernet0/0
O IA 15.15.10.0/24 [110/20] via 15.15.13.3, 02:07:12, Ethernet0/0
O IA 15.15.10.10/32 [110/31] via 15.15.13.3, 00:39:33, Ethernet0/0
O IA 15.15.11.0/24 [110/30] via 15.15.13.3, 02:07:12, Ethernet0/0
O IA 15.15.12.0/29 [110/74] via 15.15.13.3, 02:07:12, Ethernet0/0
C 15.15.13.0/24 is directly connected, Ethernet0/0
L 15.15.13.6/32 is directly connected, Ethernet0/0
O IA 15.15.15.0/24 [110/40] via 15.15.13.3, 02:05:36, Ethernet0/0
O IA 15.15.16.0/24 [110/74] via 15.15.13.3, 02:05:36, Ethernet0/0
```

150.1.0.0/16 is variably subnetted, 2 subnets, 2 masks

```
C 150.1.14.0/24 is directly connected, Ethernet0/1
L 150.1.14.1/32 is directly connected, Ethernet0/1
```



ROUTER 6 재분배 이후 결과

```
R6#sh 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, + - replicated route

Gateway of last resort is not set

15.0.0.0/8 is variably subnetted, 22 subnets, 5 masks
O IA 15.15.0.0/20 [110/84] via 15.15.13.3, 01:05:08, Ethernet0/0
O IA 15.15.1.1/32 [110/31] via 15.15.13.3, 01:45:08, Ethernet0/0
O IA 15.15.2.2/32 [110/75] via 15.15.13.3, 01:43:47, Ethernet0/0
O IA 15.15.3.3/32 [110/11] via 15.15.13.3, 01:45:08, Ethernet0/0
O IA 15.15.4.4/32 [110/75] via 15.15.13.3, 01:05:08, Ethernet0/0
O IA 15.15.5.5/32 [110/75] via 15.15.13.3, 01:43:47, Ethernet0/0
C 15.15.6.6/32 is directly connected, Loopback0
O IA 15.15.7.7/32 [110/85] via 15.15.13.3, 00:18:18, Ethernet0/0
O IA 15.15.8.8/32 [110/21] via 15.15.13.3, 00:17:49, Ethernet0/0
C 15.15.8.16/30 is directly connected, Serial1/0.6
L 15.15.8.17/32 is directly connected, Serial1/0.6
O IA 15.15.9.0/24 [110/30] via 15.15.13.3, 01:44:58, Ethernet0/0
O IA 15.15.9.9/32 [110/11] via 15.15.13.9, 00:17:40, Ethernet0/0
O IA 15.15.10.0/24 [110/20] via 15.15.13.3, 01:45:09, Ethernet0/0
O IA 15.15.10.10/32 [110/31] via 15.15.13.3, 00:17:30, Ethernet0/0
O IA 15.15.11.0/24 [110/30] via 15.15.13.3, 01:45:09, Ethernet0/0
O IA 15.15.12.0/29 [110/74] via 15.15.13.3, 01:45:09, Ethernet0/0
C 15.15.13.0/24 is directly connected, Ethernet0/0
L 15.15.13.6/32 is directly connected, Ethernet0/0
O IA 15.15.15.0/24 [110/40] via 15.15.13.3, 01:43:33, Ethernet0/0
O IA 15.15.16.0/24 [110/74] via 15.15.13.3, 01:05:29, Ethernet0/0
O E2 15.15.17.0/24 [110/20] via 15.15.13.3, 01:17:30, Ethernet0/0

150.1.0.0/16 is variably subnetted, 2 subnets, 2 masks

C 150.1.14.0/24 is directly connected, Ethernet0/1
L 150.1.14.1/32 is directly connected, Ethernet0/1

150.3.0.0/24 is subnetted, 1 subnets

O E1 150.3.14.0 [110/30] via 15.15.13.9, 01:39:56, Ethernet0/0



SWITCH 3 재분배 이전 결과

```
SW3(config)#sh 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, I - LISP
      + - replicated route, % - next hop override
```

Gateway of last resort is not set

```
15.0.0.0/8 is variably subnetted, 20 subnets, 5 masks
O IA  15.15.0.0/20 [110/75] via 15.15.13.3, 01:28:34, Vlan13
O     15.15.1.1/32 [110/22] via 15.15.13.3, 02:07:58, Vlan13
O IA  15.15.2.2/32 [110/66] via 15.15.13.3, 02:07:12, Vlan13
O IA  15.15.3.3/32 [110/21] via 15.15.13.3, 02:07:58, Vlan13
O IA  15.15.4.4/32 [110/66] via 15.15.13.3, 01:28:34, Vlan13
O IA  15.15.5.5/32 [110/66] via 15.15.13.3, 02:07:12, Vlan13
O IA  15.15.6.6/32 [110/21] via 15.15.13.6, 02:07:58, Vlan13
O IA  15.15.7.7/32 [110/76] via 15.15.13.3, 00:41:43, Vlan13
O IA  15.15.8.8/32 [110/12] via 15.15.13.3, 00:41:14, Vlan13
O IA  15.15.8.16/30 [110/65] via 15.15.13.6, 02:07:58, Vlan13
O IA  15.15.9.0/24 [110/21] via 15.15.13.3, 02:07:58, Vlan13
O     15.15.9.9/32 is directly connected, Loopback0
O IA  15.15.10.0/24 [110/11] via 15.15.13.3, 02:07:58, Vlan13
O IA  15.15.10.10/32 [110/22] via 15.15.13.3, 00:40:51, Vlan13
O IA  15.15.11.0/24 [110/21] via 15.15.13.3, 02:07:58, Vlan13
O IA  15.15.12.0/29 [110/65] via 15.15.13.3, 02:07:58, Vlan13
C     15.15.13.0/24 is directly connected, Vlan13
L     15.15.13.9/32 is directly connected, Vlan13
O IA  15.15.15.0/24 [110/31] via 15.15.13.3, 02:06:59, Vlan13
O IA  15.15.16.0/24 [110/65] via 15.15.13.3, 01:28:54, Vlan13
```

```
150.3.0.0/16 is variably subnetted, 2 subnets, 2 masks
```

```
C     150.3.14.0/24 is directly connected, Ethernet2/0
L     150.3.14.1/32 is directly connected, Ethernet2/0
```



SWITCH 3 재분배 이후 결과

```
SW3#sh 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, + - replicated route

Gateway of last resort is not set

15.0.0.0/8 is variably subnetted, 21 subnets, 5 masks
O IA 15.15.0.0/20 [110/75] via 15.15.13.3, 01:15:36, Vlan13
O IA 15.15.1.1/32 [110/21] via 15.15.13.3, 01:55:00, Vlan13
O IA 15.15.2.2/32 [110/66] via 15.15.13.3, 01:54:14, Vlan13
O IA 15.15.3.3/32 [110/66] via 15.15.13.3, 01:55:00, Vlan13
O IA 15.15.4.4/32 [110/21] via 15.15.13.3, 01:15:36, Vlan13
O IA 15.15.5.5/32 [110/66] via 15.15.13.3, 01:54:14, Vlan13
O IA 15.15.6.6/32 [110/21] via 15.15.13.3, 01:15:36, Vlan13
O IA 15.15.7.7/32 [110/66] via 15.15.13.3, 01:54:14, Vlan13
O IA 15.15.8.8/32 [110/21] via 15.15.13.3, 01:28:45, Vlan13
O IA 15.15.8.16/30 [110/65] via 15.15.13.3, 01:28:16, Vlan13
O IA 15.15.9.0/24 [110/21] via 15.15.13.3, 01:55:00, Vlan13
C 15.15.9.9/32 is directly connected, Loopback0
O IA 15.15.10.0/24 [110/11] via 15.15.13.0, 01:55:00, Vlan13
O IA 15.15.10.10/32 [110/22] via 15.15.13.0, 00:27:53, Vlan13
O IA 15.15.11.0/24 [110/21] via 15.15.13.3, 01:55:00, Vlan13
O IA 15.15.12.0/29 [110/66] via 15.15.13.3, 01:55:00, Vlan13
C 15.15.13.0/24 is directly connected, Vlan13
L 15.15.13.9/32 is directly connected, Vlan13
O IA 15.15.15.0/24 [110/31] via 15.15.13.3, 01:54:01, Vlan13
O IA 15.15.16.0/24 [110/74] via 15.15.13.3, 01:55:56, Vlan13
O E2 15.15.17.0/24 [110/20] via 15.15.13.3, 01:48:05, Vlan13

150.1.0.0/24 is subnetted, 1 subnets

O E2 150.1.14.0 [110/20] via 15.15.13.6, 01:55:00, Vlan13

150.3.0.0/16 is variably subnetted, 2 subnets, 2 masks

C 150.3.14.0/24 is directly connected, Ethernet2/0

L 150.3.14.1/32 is directly connected, Ethernet2/0



5. 결과. VTP 정보 확인

SWITCH 1

```
SW1#show vtp status
VTP Version capable      : 1 to 3
VTP version running      : 2
VTP Domain Name          : Pizza.com
VTP Pruning Mode         : Disabled
VTP Traps Generation     : Disabled
Device ID                 : aabb.cc00.0700
Configuration last modified by 0.0.0.0 at 7-2-25 05:49:46

Feature VLAN:
-----
VTP Operating Mode        : Transparent
Maximum VLANs supported locally : 1005
Number of existing VLANs   : 11
Configuration Revision    : 0
MD5 digest                : 0xEC 0xE4 0xF1 0xCC 0x1F 0x51 0x6A 0xE9
                           0x0D 0x8F 0x3E 0x86 0xED 0xD3 0x84 0x08
```

SWITCH 2

```
SW2#show vtp status
VTP Version capable      : 1 to 3
VTP version running      : 2
VTP Domain Name          : Pizza.com
VTP Pruning Mode         : Disabled
VTP Traps Generation     : Disabled
Device ID                 : aabb.cc00.0800
Configuration last modified by 0.0.0.0 at 7-2-25 05:49:46

Feature VLAN:
-----
VTP Operating Mode        : Transparent
Maximum VLANs supported locally : 1005
Number of existing VLANs   : 11
Configuration Revision    : 0
MD5 digest                : 0xEC 0xE4 0xF1 0xCC 0x1F 0x51 0x6A 0xE9
                           0x0D 0x8F 0x3E 0x86 0xED 0xD3 0x84 0x08
```

5. 결과. VTP 정보 확인

SWITCH 3

```
SW3#show vtp status
VTP Version capable      : 1 to 3
VTP version running      : 2
VTP Domain Name          : Pizza.com
VTP Pruning Mode         : Disabled
VTP Traps Generation     : Disabled
Device ID                : aabb.cc00.0900
Configuration last modified by 0.0.0.0 at 7-2-25 05:49:46
```

Feature VLAN:

```
-----
VTP Operating Mode        : Transparent
Maximum VLANs supported locally : 1005
Number of existing VLANs   : 11
Configuration Revision    : 0
MD5 digest               : 0xEC 0xE4 0xF1 0xCC 0x1F 0x51 0x6A 0xE9
                           0x0D 0x8F 0x3E 0x86 0xED 0xD3 0x84 0x08
```

SWITCH 4

```
SW4#show vtp status
VTP Version capable      : 1 to 3
VTP version running      : 2
VTP Domain Name          : Pizza.com
VTP Pruning Mode         : Disabled
VTP Traps Generation     : Disabled
Device ID                : aabb.cc00.0a00
Configuration last modified by 0.0.0.0 at 7-2-25 05:49:46
```

Feature VLAN:

```
-----
VTP Operating Mode        : Transparent
Maximum VLANs supported locally : 1005
Number of existing VLANs   : 11
Configuration Revision    : 0
MD5 digest               : 0xEC 0xE4 0xF1 0xCC 0x1F 0x51 0x6A 0xE9
                           0x0D 0x8F 0x3E 0x86 0xED 0xD3 0x84 0x08
```



5. 결과. VLAN 정보 확인

SWITCH 1

```
SW1#show vlan brief
```

VLAN Name	Status	Ports
1 default	active	Et0/0, Et1/3, Et2/1, Et2/2 Et2/3, Et3/3
11 VLAN_A	active	Et0/1
12 VLAN_B	active	Et0/2
13 VLAN_C	active	Et0/3, Et1/2
14 VLAN_D	active	Et1/0
15 VLAN_BB1	active	Et2/0
16 VLAN_BB2	active	Et1/1
1002 fddi-default	act/unsup	
1003 trcrf-default	act/unsup	
1004 fddinet-default	act/unsup	
1005 trbrf-default	act/unsup	

SWITCH 2

```
SW2#show vlan brief
```

VLAN Name	Status	Ports
1 default	active	Et0/0, Et0/2, Et1/0, Et1/3 Et2/1, Et2/2, Et2/3, Et3/3
11 VLAN_A	active	
12 VLAN_B	active	Et1/1
13 VLAN_C	active	
14 VLAN_D	active	
15 VLAN_BB1	active	Et1/2
16 VLAN_BB2	active	Et2/0
1002 fddi-default	act/unsup	
1003 trcrf-default	act/unsup	
1004 fddinet-default	act/unsup	
1005 trbrf-default	act/unsup	



5. 결과. VLAN 정보 확인

SWITCH 3

```
SW3#show vlan brief
```

VLAN Name	Status	Ports
1 default	active	Et0/0, Et0/1, Et0/2, Et0/3 Et1/0, Et1/1, Et1/2, Et1/3 Et2/1, Et2/2, Et2/3, Et3/0 Et3/1, Et3/3
11 VLAN_A	active	
12 VLAN_B	active	
13 VLAN_C	active	
14 VLAN_D	active	
15 VLAN_BB1	active	
16 VLAN_BB2	active	
1002 fddi-default	act/unsup	
1003 trcrf-default	act/unsup	
1004 fddinet-default	act/unsup	
1005 trbrf-default	act/unsup	

SWITCH 4

```
SW4#show vlan brief
```

VLAN Name	Status	Ports
1 default	active	Et0/0, Et1/3, Et2/1, Et2/2 Et2/3, Et3/0, Et3/1, Et3/3
11 VLAN_A	active	Et0/1
12 VLAN_B	active	Et0/2
13 VLAN_C	active	Et0/3, Et1/2
14 VLAN_D	active	Et1/0
15 VLAN_BB1	active	Et2/0
16 VLAN_BB2	active	Et1/1
1002 fddi-default	act/unsup	
1003 trcrf-default	act/unsup	
1004 fddinet-default	act/unsup	
1005 trbrf-default	act/unsup	



NETWORK TEAM PROJECT

END