



네트워크 프로젝트

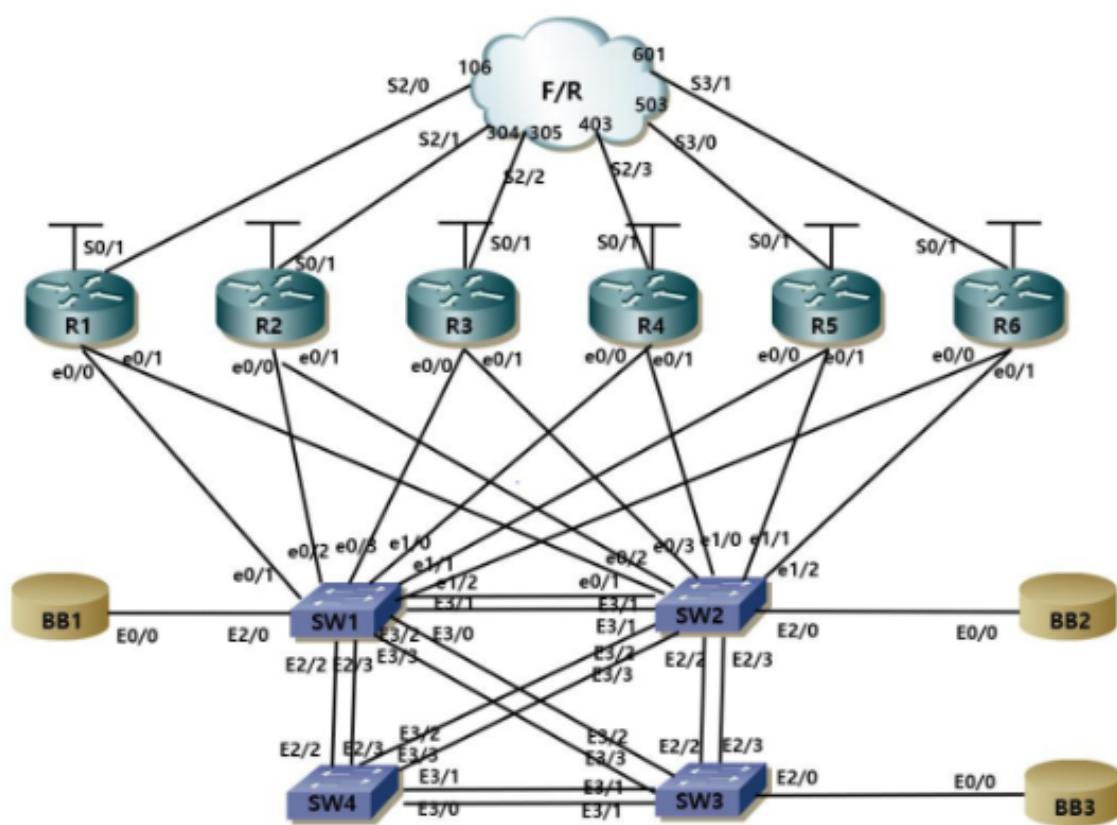
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목차

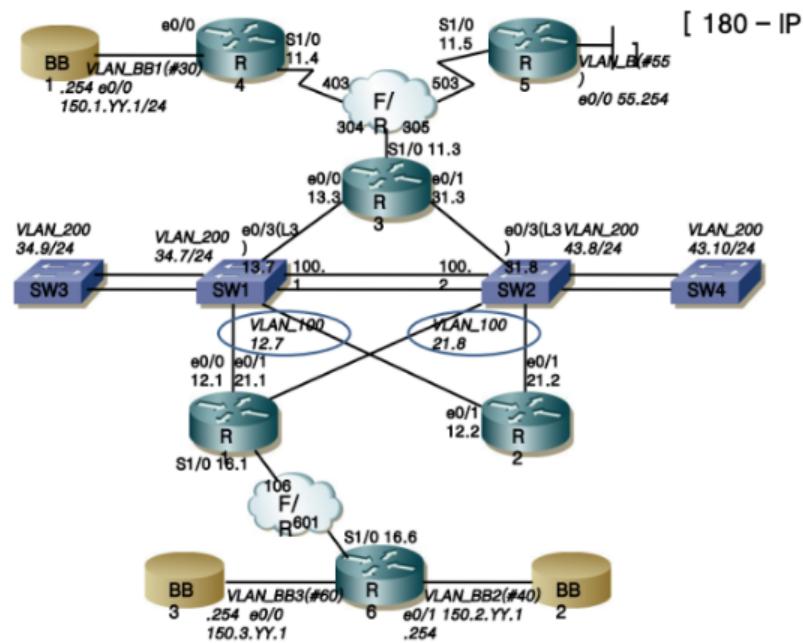


- 1. 물리적 구성도**
- 2. IP 구성도**
- 3. ICP 구성도**
- 4. 설정**
- 5. 결과**

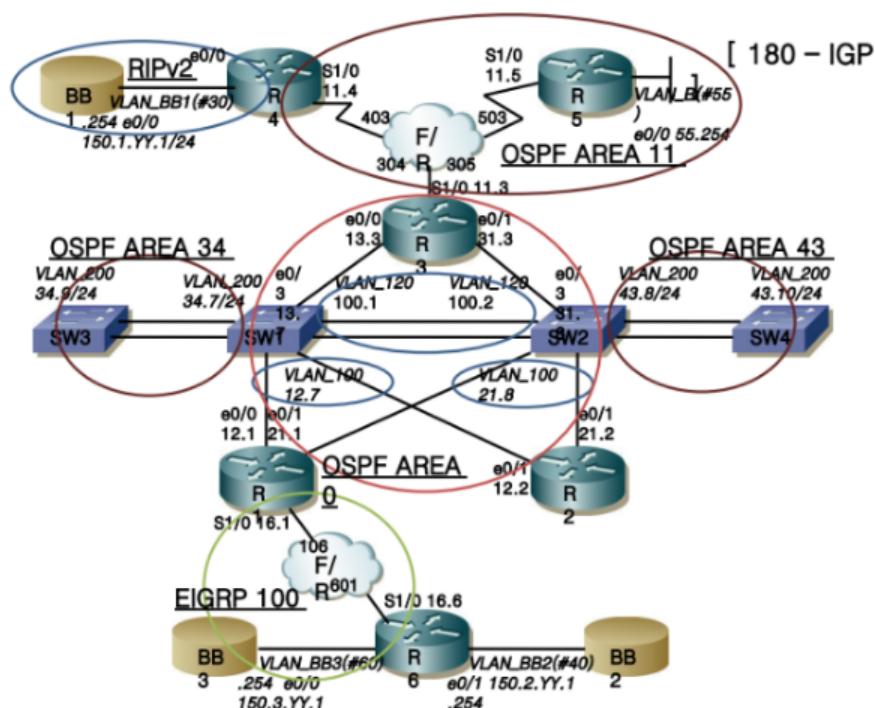
1. 물리적 구성도



2. IP 구성도



3. IGP 구성도



4. 설정

180

General Information

IOS 12.4

Doc CD : you have access to cisco.com/univercd

All configuration guides and master indexes are there

Tools : notepad and calculator are available

0. Address Allocation

모든 네트워크는 24bit 시리얼 구간 포함

Frame-relay : YY.YY.11.0/24(R3,R4,R5) , YY.YY.16.0(R1,R6)

SW1-SW2 L3 EtherChannel

SW1-SW3, SW2-SW4 L2 EtherChannel

Vlan_B(#55) 는 YY.YY.55.0/24

Vlan_100(#100) 는 YY.YY.12.0/24

Vlan_100(#100) 는 YY.YY.21.0/24

Vlan_200(#200) 는 YY.YY.34.0/24

Vlan_200(#200) 는 YY.YY.43.0/24

Vlan_BB1(#50) 는 150.1.YY.0/24

Vlan_BB2(#60) 는 150.2.YY.0/24

Vlan_BB3(#70) 는 150.3.YY.0/24

- Loopback IP Address

Hostname	Loopback 0 interface IP Address	Loopback 200 interface IP Address
RackYYR1	YY.YY.1.1/24	200.1YY.101.1/32
RackYYR2	YY.YY.2.2/24	200.1YY.102.1/32
RackYYR3	YY.YY.3.3/24	200.YY.3.1/32
RackYYR4	YY.YY.4.4/24	200.YY.4.1/32
RackYYR5	YY.YY.5.5/24	200.YY.5.1/32
RackYYR6	YY.YY.6.6/24	200.1YY.106.1/32
RackYYSW1	YY.YY.7.7/24	
RackYYSW2	YY.YY.8.8/24	
RackYYSW3	YY.YY.9.9/24	
RackYYSW4	YY.YY.10.10/24	
RackYYSW2	YY.YY.8.8/24	
RackYYSW3	YY.YY.9.9/24	
RackYYSW4	YY.YY.10.10/24	

1) BRIDGING AND SWITCHING

1-1) TRUNK

SW1

Ethernet2/2 - 3 shutdown

SW2

Ethernet2/2 - 3 shutdown

SW3

Ethernet2/2 - 3 shutdown

Ethernet3/0 - 1 shutdown

SW4

Ethernet2/2 - 3 shutdown

Ethernet3/0 - 1 shutdown

1-2) VTP

SW1, SW2, SW3, SW4 의 VTP Mode를 Transparent로 설정하라.

공통

vtp domain VTP13

vtp mode transparent

1-3) VLAN 설정

SW1

vlan 30

name VLAN_BB1

vlan 55

name VLAN_B

vlan 60

name VLAN_BB3

vlan100

name VLAN_100

vlan120

name VLAN_120

vlan200

name VLAN_200

interface e0/1

switch mode access

switch access vlan 100

interface e0/2

switch mode access

switch access vlan 100

interface e0/3

no switchport

ip addr 13.13.13.7

255.255.255.0

interface e1/0

switch mode access

switch access vlan 30

interface e1/1

switch mode access

switch access vlan 55

interface e1/2

switch mode access

switch access vlan 60

interface vlan 100

no shutdown

ip addr 13.13.12.7

255.255.255.0

interface vlan 200

no shutdown

ip addr 13.13.34.7

255.255.255.0

```
interface vlan 120
no shutdown
ip addr 13.13.100.1
255.255.255.0
```

```
interface loopback0
ip address 13.13.7.7
255.255.255.0
```

SW2

```
vlan 40
name VLAN_BB2
```

```
vlan100
name VLAN_100
```

```
vlan120
name VLAN_120
```

```
vlan200
name VLAN_200
```

```
interface e0/1
switch mode access
switch access vlan 100
```

```
interface e0/2
switch mode access
switch access vlan 100
```

```
interface e0/3
no switchport
ip address 13.13.31.8
255.255.255.0
```

```
interface e1/2
switch mode access
switch access vlan 40
```

```
interface vlan 100
no shutdown
ip address 13.13.21.8
255.255.255.0
```

```
interface vlan 120
no shutdown
ip address 13.13.100.2
255.255.255.0
```

```
interface vlan 200
no shutdown
ip address 13.13.43.8
255.255.255.0
```

```
interface loopback 0
ip address 13.13.8.8
255.255.255.0
```

SW3

```
vlan 200
name VLAN_200
```

```
interface vlan 200
no shutdown
ip address 13.13.34.9
255.255.255.0
```

```
interface loopback0
ip address 13.13.9.9
255.255.255.0
```

SW4

```
vlan 200
name VLAN_200
interface vlan 200
no shutdown
ip address 13.13.43.10
255.255.255.0
```

```
interface loopback0  
ip address 13.13.10.10  
255.255.255.0
```

1-4) F/R 및 라우터 IP 설정

- R3는 Multipoint Sub-Interface를 사용하라.
- R4, R5는 point-to-point Sub-Interface를 사용하라.
- R3 ~ R5 까지 Sub-Interface 번호는 Router의 번호로 사용하라.
- R3~R5를 제외한 라우터에서는 frame-relay subinterface 를 사용할 수 없다.
- DLCI는 지정되어 있는 DLCI를 사용하라.

R1

```
en  
conf t  
int lo0  
ip add 13.13.1.1 255.255.255.0
```

```
int e0/0  
no sh  
ip add 13.13.12.1 255.255.255.0
```

```
int e0/1  
no sh  
ip add 13.13.21.1 255.255.255.0
```

```
int s1/0  
en frame-relay  
no frame-relay inverse-arp  
no sh  
ip add 13.13.16.1 255.255.255.0  
frame-relay map ip 13.13.16.6 106  
broadcast
```

R2

```
int lo0  
ip add 13.13.2.2 255.255.255.0  
ip ospf network point-to-point
```

```
int e0/0
```

```
no sh  
ip add 13.13.12.2 255.255.255.0
```

```
int e0/1
```

```
no sh  
ip add 13.13.21.2 255.255.255.0
```

R3

```
int lo0  
ip add 13.13.3.3 255.255.255.0  
ip ospf network point-to-point
```

```
int e0/0
```

```
no sh  
ip add 13.13.13.3 255.255.255.0
```

```
int e0/1
```

```
no sh  
ip add 13.13.31.3 255.255.255.0
```

```
int s1/0
```

```
en fram  
no fram inv  
no sh  
int s1/0.3 m  
ip addr 13.13.11.3 255.255.255.0  
fram map ip 13.13.11.4 304 br  
fram map ip 13.13.11.5 305 br
```

R4
en
conf t

int lo0
ip add 13.13.4.4 255.255.255.0
ip ospf network point-to-point

int e0/0
no sh
ip add 150.1.13.1 255.255.255.0

int s1/0
en fram
no fram inv
no sh

int s1/0.4 p
ip addr 13.13.11.4 255.255.255.0
fram int 403

R5
en
conf t

interface Loopback0
ip address 13.13.5.5 255.255.255.0
ip ospf network point-to-point

interface Ethernet0/0
ip address 13.13.55.254
255.255.255.0

interface S1/0
no ip address
encapsulation frame-relay
serial restart-delay 0
no frame-relay inverse-arp
interface Serial1/0.5 point-to-point
address 13.13.11.5 255.255.255.0
frame-relay interface-dlci 503

R6
en
conf t

int lo0
no sh
ip add 13.13.6.6 255.255.255.0

int e0/0
no sh
ip add 150.3.13.1 255.255.255.0

int e0/1
no sh
ip add 150.2.13.1 255.255.255.0

int s1/0
en frame-relay
no frame-relay inverse-arp
no sh
ip add 13.13.16.6 255.255.255.0
frame-relay map ip 13.13.16.1 601
broadcast
end

BB1
en
conf t
int e0/0
no sh
ip add 150.1.13.254 255.255.255.0

BB2
en
conf t
int e0/0
no sh
ip add 150.2.13.254 255.255.255.0

BB3

```
en  
conf t
```

```
int e0/0  
no sh  
ip add 150.3.13.254  
255.255.255.0
```

1-5) ETHERCHANNEL 설정

L3

- SW1과 SW2의 e3/0,e3/1 인터페이스를 사용해 L3 Etherchannel 구성 Group 번호는 21만 사용.
- SW1의 IP YY.YY.100.1/24 Sw2의 IP YY.YY.100.2/24를 사용.
- Etherchannel Type이 PAgP또는 LAcP로 지정되지 않게 하라.

SW1

```
int range Ethernet 3/0 - 1  
no switchport  
channel-group 21 mode on  
int vlan 120  
no shutdown  
ip address 13.13.100.1 255.255.255.0
```

SW2

```
int range Ethernet 3/0 - 1  
no switchport  
channel-group 21 mode on  
int vlan 120  
no shutdown  
ip address 13.13.100.2 255.255.255.0
```

L2

- SW1과 SW3, SW2와 SW4의 e3/2,e3/3 인터페이스를 사용해 L2 EtherChannel을 구성해라 Group번호는 10만 사용 (SW1-SW3 구간은 트렁크 SW2-SW4 구간은 액세스 포트 구성)
- SW1,2,3,4에 Vlan 100,200 인터페이스를 구성
- Etherchannel Type은 항상 PAgP가 되도록 설정

SW1

```
int range Ethernet 3/2 - 3  
switchport trunk encapsulation dot1q  
switchport mode trunk  
channel-group 10 mode desirable
```

SW3

```
int range Ethernet 3/2 - 3  
switchport trunk encapsulation dot1q  
switchport mode trunk  
channel-group 10 mode desirable
```

SW2

```
int range Ethernet 3/2 - 3  
switchport mode access  
switchport access vlan 200  
channel-group 10 mode desirable
```

SW4

```
int range Ethernet 3/2 - 3  
switchport mode access  
switchport access vlan 200  
channel-group 10 mode desirable
```

2) IP IGP PROTOCOLS

1-6) STORM CONTROL

SW4의 s5/3인터페이스에서 65m pps가 넘는 unicast트래픽을 차단

SW4

```
int serial 5/3  
storm-control unicast level pps 65m
```

1-7) CDP HOLDDTIME

SW2는 모든 Neighbor Device에서 CDP 정보를 2분동안 저장

```
cdp holdtime 120
```

1-8) BLOCKING UNKNOWN FRAMES

알려지지 않은 Multicast와 Unicast트래픽에 대해 드랍되도록 SW4의 s5/3 설정

SW4

```
int serial 5/3  
switchport block unicast  
switchport block multicast
```

2-1) OSPF AREA 0 라우팅 설정

R1

```
router ospf 1  
network 13.13.12.1 0.0.0.0 area 0  
network 13.13.21.1 0.0.0.0 area 0  
auto-cost reference-bandwidth 1000
```

R2

```
router ospf 1  
network 13.13.12.2 0.0.0.0 area 0  
network 13.13.21.2 0.0.0.0 area 0  
network 13.13.2.2 0.0.0.0 area 0  
auto-cost reference-bandwidth 1000
```

R3

```
router ospf 1  
network 13.13.3.3 0.0.0.0 area 0  
network 13.13.13.3 0.0.0.0 area 0  
network 13.13.31.3 0.0.0.0 area 0
```

SW1

```
router ospf 1  
network 13.13.7.7 0.0.0.0 area 0  
network 13.13.12.7 0.0.0.0 area 0  
network 13.13.13.7 0.0.0.0 area 0  
network 13.13.100.1 0.0.0.0 area 0  
auto-cost reference-bandwidth 1000
```

SW2

```
router ospf 1  
network 13.13.8.8 0.0.0.0 area 0  
network 13.13.21.8 0.0.0.0 area 0  
network 13.13.31.8 0.0.0.0 area 0  
network 13.13.100.2 0.0.0.0 area 0  
auto-cost reference-bandwidth 1000
```

2-2) OSPF AREA 11 라우팅 설정

R3

```
router ospf 1  
network 13.13.11.3 0.0.0.0 area 11
```

R3

```
int s1/0.3  
ip ospf network point-to-multipoint
```

R4

```
router ospf 1  
network 13.13.4.4 0.0.0.0 area 11  
network 13.13.11.4 0.0.0.0 area 11  
auto-cost reference-bandwidth 1000
```

R4

```
int s1/0.4  
ip ospf network point-to-multipoint
```

R5

```
router ospf 1  
network 13.13.5.5 0.0.0.0 area 11  
network 13.13.11.5 0.0.0.0 area 11  
network 13.13.55.254 0.0.0.0 area 11  
auto-cost reference-bandwidth 1000
```

R5

```
int s1/0.5  
ip ospf network point-to-multipoint
```

2-3) RIPV2

- R4는 BB1으로부터 RIP을 통해 네트워크 정보를 받음
- 이중 199.172.0.0/16 범위에 속하는 것만 받음
- BB1으로부터 받는 네트워크를 OSPF로 재분배

R4

```
router rip  
router ver 2  
no auto-summary  
network 150.1.0.0  
distribute-list RIP_NET in e0/0
```

```
ip access-list standard RIP_NET  
permit 199.172.0.0 0.0.255.255
```

router ospf 1

```
redistribute rip subnets
```

- BB1으로는 YY.YY.0.0/16의 상세정보를 전달하고 5Hop거리에 있어야 한다
- 그 외의 다른 External 경로 정보들이 추가 되어도 BB1에게 전달되지 말아야 한다

R4

```
router rip  
redistribute ospf 1 metric 5  
distribute-list prefix TO_BB1 out e0/0
```

```
ip prefix-list TO_BB1 permit 13.13.0.0/16  
le32
```

- BB1으로는 YY.YY.0.0/16만 보내고 이 경로의 metric은 5로 확인해야 함
- 향후에 YY.YY.0.0/16외에 다른 경로 정보들이 추가되어도 BB1에게는 전달X

R1

```
router rip
redistribute ospf 1 metric 4
distribute-list prefix TO_BB1 out
e0/0
```

```
int e0/0
ip summary-address rip
13.13.0.0 255.255.0.0
ip prefix-list TO_BB1 permit
13.13.0.0/16
```

2-4) NSSA

- Area 11은 다른 ASBR에서 수신되는 외부 경로 정보(O E1, O E2)들을 수신하지 않을 것이며, LSA Type 3(O IA)는 허용할 것이다.

R3

```
router ospf 1
area 11 nssa default-
information-originate
```

R4

```
rotuer ospf 1
area 11 nssa
```

R5

```
router ospf 1
area 11 nssa
```

2-5) ABR

- 최소한의 설정을 사용해서 (FewerCommands) 모든 Area에 Default Route를 전파하라. (Static은 사용할 수 없다.)

R3

```
router ospf 1
default-information originate
always
```

2-6) AREA 34, 43

SW1

```
network 13.13.34.7 0.0.0.0 area 34
```

SW2

```
network 13.13.43.8 0.0.0.0 area 43
```

SW3

```
router ospf 1
network 13.13.9.9 0.0.0.0 area 34
network 13.13.34.9 0.0.0.0 area 34
auto-cost reference-bandwidth 1000
```

SW4

```
router ospf 1
network 13.13.10.10 0.0.0.0 area 43
network 13.13.43.10 0.0.0.0 area 43
auto-cost reference-bandwidth 1000
```

2-6) SUMMARIZATION

- R2에 Loopback22,32,47을 설정하고 OSPF Area 0에 넣어라
- R2에서 포함시킨 Loopback22,32,47은 다른 Area에서 하나의 경로로 보여야 하고 최소한의 Prefix만을 사용

R2

```
int lo22
ip address 180.88.22.254
255.255.255.0
ip ospf network point-to-point

int lo32
ip address 180.88.32.254
255.255.255.0
ip ospf network point-to-point

int lo47
ip address 180.88.47.254
255.255.255.0
ip ospf network point-to-point

router ospf 1
network 180.88.22.254 0.0.0.0 area 0
network 180.88.32.254 0.0.0.0 area 0
network 180.88.47.254 0.0.0.0 area 0
```

R3

```
router ospf 1
area 0 range 180.88.0.0 255.255.192.0
```

SW1,2

```
router ospf 1
area 0 range 180.88.0.0 255.255.192.0
```

2-7) EIGRP 100

- R1-R6 EIGRP 100으로 설정
- R1에서는 VLAN_BB2의 경로 정보가 반드시 D EX로 보여야 한다
- R6에서는 YY.YY.0.0/16 정보가 보여야 한다
- R1의 Loopback0을 EIGRP 100에 포함
- EIGRP 100을 OSPF로 재분배

R1

```
router eigrp 100
network 14.14.1.1 0.0.0.0
network 14.14.16.1 0.0.0.0
no auto-summary
```

```
router eigrp 100
redistribute ospf 1 metric 1 1 1 1 1
```

int s1/0

```
ip summary-address eigrp 100 14.14.0.0
255.255.0.0
```

```
router ospf 1
redistribute eigrp 100 subnet
distribute-list prefix EIGRP_SUM out eigrp 100
```

```
ip prefix-list EIGRP_SUM deny 14.14.0.0/16
ip prefix-list EIGRP_SUM permit 0.0.0.0/0 le 32
```

R6

```
router eigrp 100
network 14.14.6.6 0.0.0.0
network 14.14.16.2 0.0.0.0
no auto-summary
redistribute connected route-map VLAN_BB2

route-map VLAN_BB2
match ip address R6_BB2
ip access-list standard R6_BB2
permit 150.2.14.0 0.0.0.255
```

3) IOS/FEATURE

2-8) EIGRP 100-2

- R6-BB3 EIGRP 100으로 설정
- BB3으로는 어떠한 라우팅 정보도 보내지 않음
- BB3로부터 Class A,B,C 네트워크를 받는데 198.0.0.0와 추가될수 있는 Class 만 받아라(반드시 Prefix-list 이용)

R6

```
router eigrp 100
network 150.3.14.1 0.0.0.0
distribute-list prefix TO_BB3 out e0/0
ip prefix-list TO_BB3 deny 0.0.0.0/0 le 32
```

```
router eigrp 100
distribute-list prefix FROM_BB3 in e0/0
ip prefix-list FROM_BB3 permit
192.0.0.0/3 le 32
```

3-1) DUMP

- a.FTP를 이용해 R4_DUMP파일을 보내라
 - 150.1.YY.254
 - Username: cisco
 - Password: ccie

R4

```
exception core-file R4_DUMP
exception dump 150.1.13.254
exception protocol ftp
!
ip ftp username cisco
ip ftp password ccie
```

3-2) SYSTEM LOG

- R5에서 System Error Message를 아래 조건을 참조하여 Local Buffer에 저장해라
- Buffer Size는 8192byte로 설정
- 각 Log Entry에는 시간이 명시되어야 한다
- 각 Entry 별로 발생한 횟수를 알 수 있게 하라

R5

```
service timestamps log datetime
logging on
logging buffered 8192 errors
logging count
```

3-3) DHCP SECURED

- R5에 설정한다
 - Domain:cisco.com
 - DNS:YY.YY.55.50 , YY.YY.55.51
 - Network : YY.YY.55.0 /24
 - Lease: 10(days)
 - Default-Route : YY.YY.55.254
 - 오직 Trusted Mac Address로부터의 ARP요청에 대해서만 응답
 - update arp : DHCP DB에 등록된 호스트들의 존재 유무를 확인위해 주기적으로 arp를 수행하여 응답있는지 확인

R5

```
ip dhcp pool DHCP
network 13.13.55.0 /24
domain-name cisco.com
dns-server 13.13.55.50 13.13.55.51
lease 10
default-router 13.13.55.254
update arp

ip dhcp excluded-address 13.13.55.254
ip dhcp excluded-address 13.13.55.50
13.13.55.51

int e0/0
arp authorized
```

3-4) IP SOURCE TRACKER (DOS ATTACK)

- 하루에 한 번 Syslog를 수행하라. 그리고 IP 정보만을 보내라.
- BB3의 150.3.YY.200에 DoS 공격으로 간주되는 공격이 있음을 감지했다. 이를 위해 어떤 Source에서 공격이 시작되는지를 Tracking하고, 150.3.YY.200으로 전달되는 Traffic에 대해 하루에 한 번 Syslog를 생성하라.
- 추적되는 Source는 1개 이상을 넘어서는 안 되고, ACL을 사용하지 않는다

R6

```
ip source-track 150.3.13.200
ip source-track address-limit 1
ip source-track syslog-interval 1440(분)
```

5. 결과

5-1) VLAN 설정

SW1

Interface	IP-Address	OK?	Method	Status	Protocol
Ethernet0/3	13.13.13.7	YES	manual	up	up
Loopback0	13.13.7.7	YES	manual	up	up
Vlan100	13.13.12.7	YES	manual	up	up
Vlan120	13.13.100.1	YES	manual	up	up
Vlan200	13.13.34.7	YES	manual	up	up

SW1#sh vl br			
VLAN Name	Status	Ports	
1 default	active	Et0/0, Et1/3, Et2/0, Et2/1 Et2/2, Et2/3	
30 VLAN_BB1	active	Et1/0	
40 VLAN_BB2	active		
55 VLAN_B	active	Et1/1	
60 VLAN_BB3	active	Et1/2	
100 VLAN_100	active	Et0/1, Et0/2	
120 VLAN0120	active		
200 VLAN_200	active		
1002 fddi-default	act/unsup		
1003 trcrf-default	act/unsup		
1004 fddinet-default	act/unsup		
1005 trbrf-default	act/unsup		

SW2

Interface	IP-Address	OK?	Method	Status	Protocol
Ethernet0/3	1.1.31.8	YES	manual	up	up
Loopback0	13.13.8.8	YES	manual	up	up
Vlan100	13.13.21.8	YES	manual	up	up
Vlan120	13.13.100.2	YES	manual	down	down
Vlan200	13.13.43.8	YES	manual	up	up

SW2#sh vl br			
VLAN Name	Status	Ports	
1 default	active	Et0/0, Et1/0, Et1/1, Et1/2 Et1/3, Et2/0, Et2/1, Et2/2 Et2/3	
40 VLAN_BB2	active		
100 VLAN_100	active	Et0/1, Et0/2	
120 VLAN_120	active		
200 VLAN_200	active	Et3/2, Et3/3	
1002 fddi-default	act/unsup		
1003 trcrf-default	act/unsup		
1004 fddinet-default	act/unsup		
1005 trbrf-default	act/unsup		

SW3

```
SW3#sh ip int br | e un
Interface          IP-Address      OK? Method Status      Protocol
Loopback0         13.13.9.9       YES manual up        up
Vlan200           13.13.34.9     YES manual up        up
```

```
SW3#sh vl br
```

VLAN Name	Status	Ports
1 default	active	Et0/0, Et0/1, Et0/2, Et0/3 Et1/0, Et1/1, Et1/2, Et1/3 Et2/0, Et2/1, Et2/2, Et2/3 Et3/0, Et3/1
200 VLAN_200	active	
1002 fddi-default	act/unsup	
1003 trcrf-default	act/unsup	
1004 fddinet-default	act/unsup	
1005 trbrf-default	act/unsup	

SW4

```
SW4#sh ip int br | e un
Interface          IP-Address      OK? Method Status      Protocol
Loopback0         13.13.10.10     YES manual up        up
Vlan200           13.13.43.10     YES manual up        up
```

```
SW4#sh vl br
```

VLAN Name	Status	Ports
1 default	active	Et0/0, Et0/1, Et0/2, Et0/3 Et1/0, Et1/1, Et1/2, Et1/3 Et2/0, Et2/1, Et2/2, Et2/3 Et3/0, Et3/1
200 VL_200	active	Et3/2, Et3/3
1002 fddi-default	act/unsup	
1003 trcrf-default	act/unsup	
1004 fddinet-default	act/unsup	
1005 trbrf-default	act/unsup	

5-2) EIGRP 재분배

```
R1#sh ip ro
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

      13.0.0.0/8 is variably subnetted, 24 subnets, 3 masks
D        13.13.0.0/16 is a summary, 00:02:58, Null0
C        13.13.1.0/24 is directly connected, Loopback0
L        13.13.1.1/32 is directly connected, Loopback0
O        13.13.2.0/24 [110/101] via 13.13.21.2, 00:45:21, Ethernet0/1
                  [110/101] via 13.13.12.2, 00:45:31, Ethernet0/0
O        13.13.3.0/24 [110/201] via 13.13.21.8, 00:42:40, Ethernet0/1
                  [110/201] via 13.13.12.7, 00:42:40, Ethernet0/0
O  IA      13.13.4.0/24 [110/848] via 13.13.21.8, 00:42:40, Ethernet0/1
                  [110/848] via 13.13.12.7, 00:42:40, Ethernet0/0
D        13.13.6.0/24 [90/2297856] via 13.13.16.6, 00:44:50, Serial1/0
O        13.13.7.0/24 [110/101] via 13.13.12.7, 00:45:59, Ethernet0/0
O        13.13.8.0/24 [110/101] via 13.13.21.8, 00:45:49, Ethernet0/1
O  IA      13.13.9.0/24 [110/102] via 13.13.12.7, 00:46:00, Ethernet0/0
O  IA      13.13.10.0/24 [110/102] via 13.13.21.8, 00:45:50, Ethernet0/1
O  IA      13.13.11.3/32 [110/200] via 13.13.21.8, 00:42:41, Ethernet0/1
                  [110/200] via 13.13.12.7, 00:42:41, Ethernet0/0
O  IA      13.13.11.4/32 [110/847] via 13.13.21.8, 00:42:41, Ethernet0/1
                  [110/847] via 13.13.12.7, 00:42:41, Ethernet0/0
C        13.13.12.0/24 is directly connected, Ethernet0/0
L        13.13.12.1/32 is directly connected, Ethernet0/0
O        13.13.13.0/24 [110/200] via 13.13.12.7, 00:44:04, Ethernet0/0
C        13.13.16.0/24 is directly connected, Serial1/0
L        13.13.16.1/32 is directly connected, Serial1/0
C        13.13.21.0/24 is directly connected, Ethernet0/1
L        13.13.21.1/32 is directly connected, Ethernet0/1
O        13.13.31.0/24 [110/200] via 13.13.21.8, 00:42:41, Ethernet0/1
O  IA      13.13.34.0/24 [110/101] via 13.13.12.7, 00:46:00, Ethernet0/0
O  IA      13.13.43.0/24 [110/101] via 13.13.21.8, 00:45:50, Ethernet0/1
O        13.13.100.0/24 [110/101] via 13.13.21.8, 00:45:50, Ethernet0/1
                  [110/101] via 13.13.12.7, 00:46:00, Ethernet0/0
      150.2.0.0/24 is subnetted, 1 subnets
D  EX      150.2.13.0 [170/2195456] via 13.13.16.6, 00:07:28, Serial1/0
      150.3.0.0/24 is subnetted, 1 subnets
D        150.3.13.0 [90/2195456] via 13.13.16.6, 00:44:51, Serial1/0
      180.88.0.0/24 is subnetted, 3 subnets
```

5-3) 시스템 로그 확인

```
R5(config)#service timestamps log datetime
R5(config)#logging on
R5(config)#logging buffered 8192 errors
R5(config)#logging count
R5(config)#do sh log
Syslog logging: enabled (0 messages dropped, 3 messages rate-limited,
                  0 flushes, 0 overruns, xml disabled, filtering disabled)

No Active Message Discriminator.

No Inactive Message Discriminator.

Console logging: level debugging, 44 messages logged, xml disabled,
                  filtering disabled
Monitor logging: level debugging, 0 messages logged, xml disabled,
                  filtering disabled
Buffer logging: level errors, 0 messages logged, xml disabled,
                  filtering disabled
Logging Exception size (4096 bytes)
Count and timestamp logging messages: enabled
Persistent logging: disabled

No active filter modules.

ESM: 0 messages dropped

Trap logging: level informational, 46 message lines logged

Log Buffer (8192 bytes):
```

5-4) FRAGMENT ATTACK

```
R4(config)#do sh access-list
Standard IP access list RIP_NET
  10 permit 199.172.0.0, wildcard bits 0.0.255.255
Extended IP access list BLOCK-FRAGMENT
  10 deny ip any host 10.1.5.14 fragments
  20 permit ip any any
```