

네트워크 팀 프로젝트

5조 Steam

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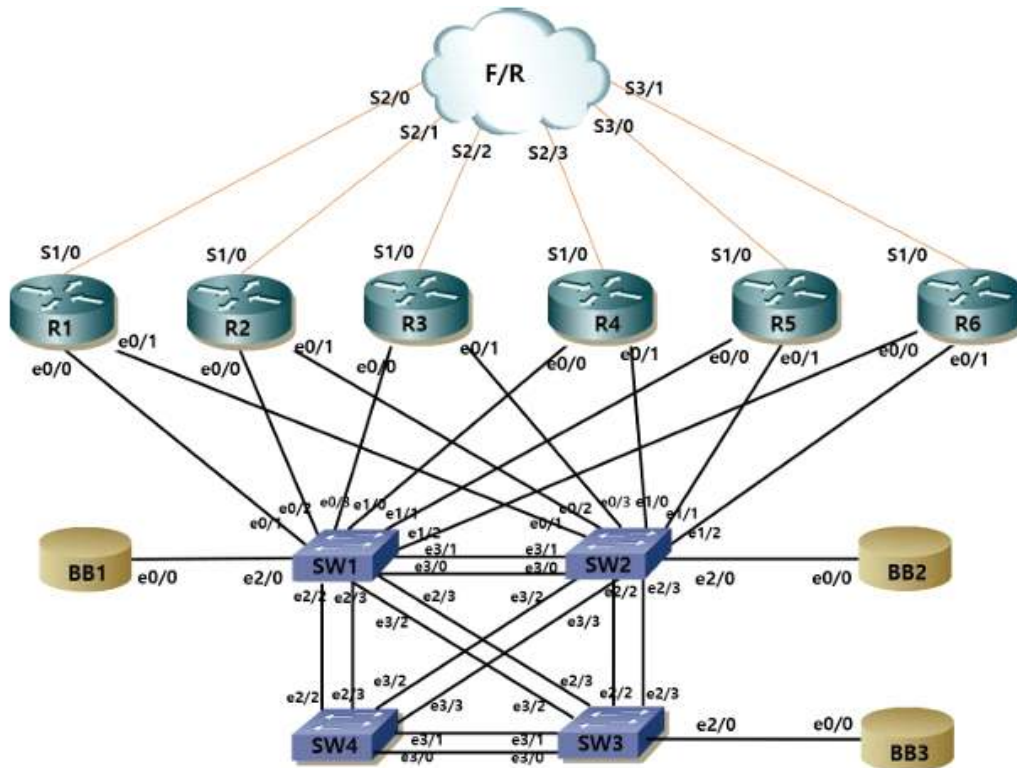
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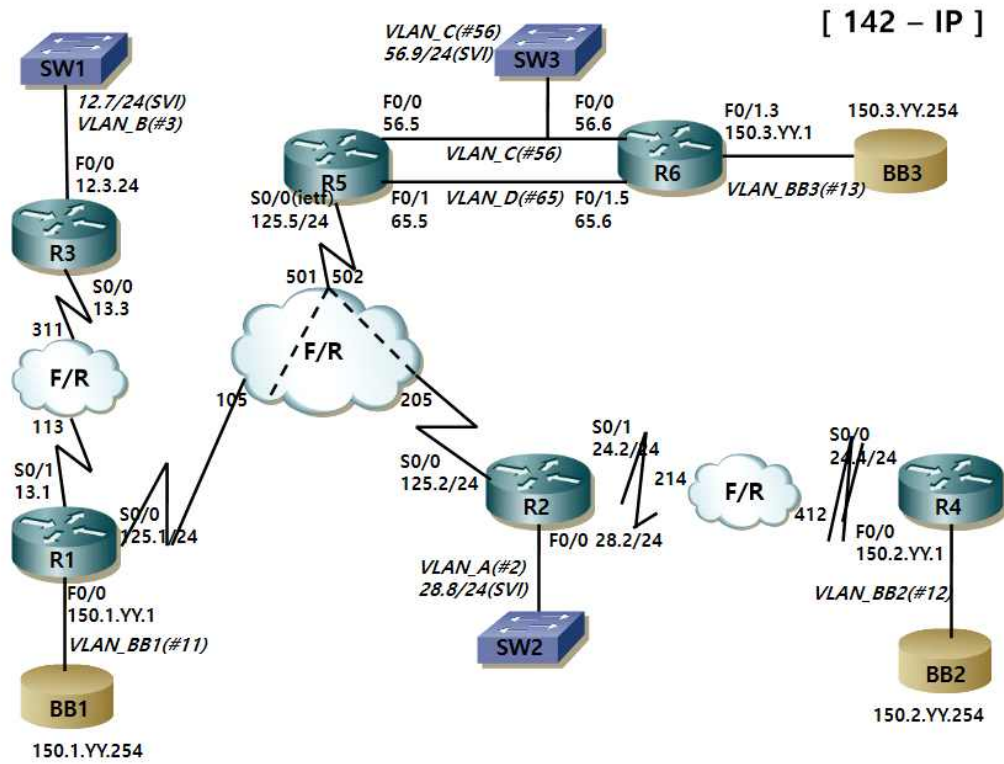
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1. 물리적 구성도

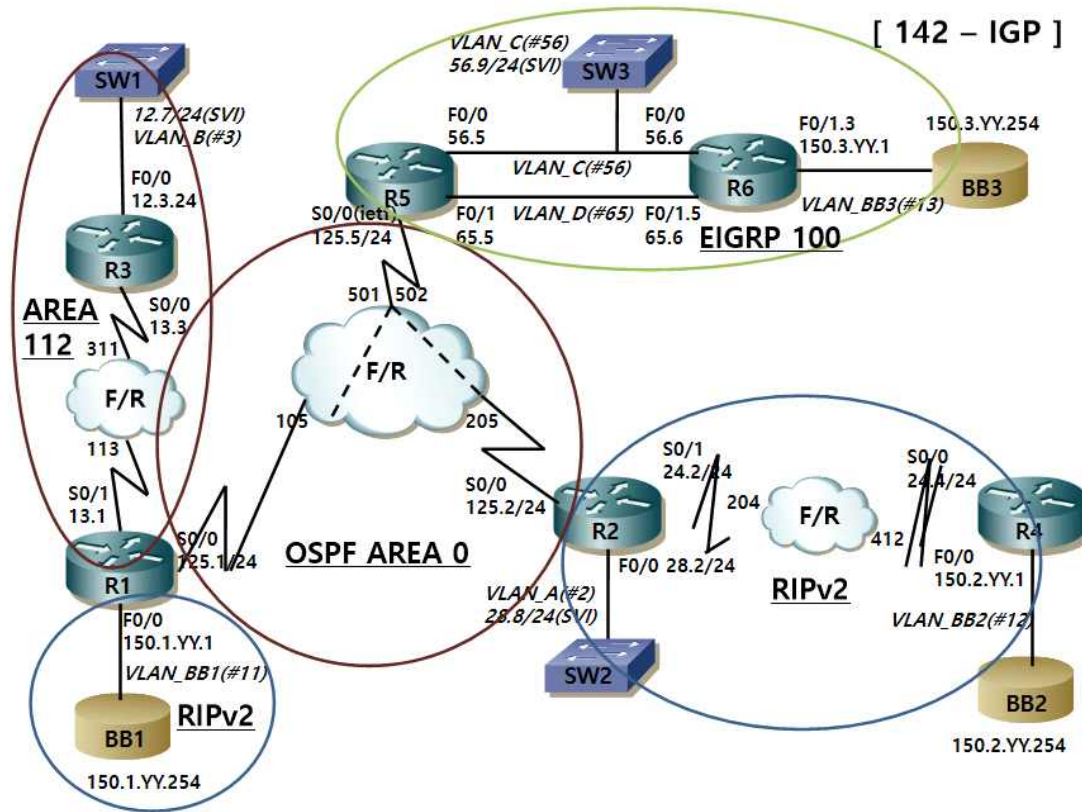


2. 논리적 구성도

2-1. IP



2-2. IGP



3. 설정

기본 설정

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

use class B address range 5.5.X.0/16. YY is your rack number

YY is your rack number, X is your router number

Ex (If your Rack number is 03, Lo0 is 3.3.3.3 and Rack number is 07, Lo0 is 7.7.7.7)

Note (## VLAN 이름과 넘버는 바뀔 수 있습니다)

- VLAN 2 name VLAN_A 5.5.28.0/24
- VLAN 3 name VLAN_B 5.5.13.0/24
- VLAN 56 name VLAN_C 5.5.56.0/24
- VLAN 65 name VLAN_D 5.5.65.0/24
- VLAN 11 name VLAN_BB1 150.1.5.0/24
- VLAN 12 name VLAN_BB2 150.2.5.0/24
- VLAN 13 name VLAN_BB3 150.3.5.0/24

- FrameRelay : 5.5.125.0/24 (R2-R3-R5)
5.5.24.0/24 (R2-R4)
5.5.13.0/24 (R1-R3)
- BB1 is 150.1.YY.254/24
- BB2 is 150.2.YY.254/24
- BB3 is 150.3.YY.254/24

- Loopback IP Address

Hostname	Loopback 0 interface IP Address	Hostname	Loopback 0 interface IP Address
RackYYR1	5.5.1.1/24	RackYYR6	5.5.6.6/24
RackYYR2	5.5.2.2/24	RackYYSW1	5.5.7.7/24
RackYYR3	5.5.3.3/24	RackYYSW2	5.5.8.8/24
RackYYR4	5.5.4.4/24	RackYYSW3	5.5.9.9/24
RackYYR5	5.5.5.5/24		

Unless specified above, all interface else must be 24 bit mask addressing

I. Bridging and Switching

1. Configure IP across your frame relay network

• The frame provided for you is fully meshed. However, you must only use PVC's indicated on Diagram user of any dynamic circuits is not permitted. Do not use sub-interface for the frame-relay links but use only on Hub and Spoke, Configure the frame-relay connections according to the Diagram. Use only DLCI numbers supplied, Ensure you can ping all frame relay interfaces. R2 and R4 are should be PPP over Frame-Relay and should sub-interface but Don't use IP unnumbered. (## 확인 : sh frame pvc , debug frame ppp , debug frame packet)

a. R2,R4,R5 를 제외한 나머지 Router 에서는 Sub-interface 를 사용할 수 없다. R5 에

서 multipoint sub-interface 로 구성하시오.

- b. R2와 R4 사이의 Frame-relay link 는 PPP over Frame-relay 를 구성하라. R2와 R4 는 PPP Over F/R 로 구성하되 먼저 Subinterface 를 생성하며 IP Unnumbered 를 사용할 수 없다. (또는 Subinterface 를 사용하지 않고 PPPover FR 을 설정하라고 출제되는 경우도 있음*

R1

```
int s1/0
encapsulation frame-relay
no frame-relay inverse-arp
no shut
int s1/0.125 m
ip add 5.5.125.1 255.255.255.0
frame-relay map ip 5.5.125.5 105 broadcast
frame-relay map ip 5.5.125.2 105 broadcast
no shut
```

```
int s1/0.13 p
ip add 5.5.13.1 255.255.255.0
frame-relay interface-dlci 103
ip os net point-to-p
no sh
```

```
int lo0
ip add 5.5.1.1 255.255.255.0
ip os net point-to-p
```

R2

```
en
conf t
int s1/0
enc frame
no frame inver
no shut
int s1/0.125 m
ip add 5.5.125.2 255.255.255.0
frame map ip 5.5.125.5 205 br
frame map ip 5.5.125.1 205 br
no sh
```

```
int s1/0.24 p
ip add 5.5.24.2 255.255.255.0
frame-relay interface-dlci 204
```

```
int lo0
ip add 5.5.2.2 255.255.255.0
```

```
R3
int s1/0
encapsulation frame-relay
no frame-relay inverse-arp
no shut
int s1/0.13 p
ip add 5.5.13.3 255.255.255.0
frame interface-dlci 301
```

```
int lo0
ip add 5.5.3.3 255.255.255.0
ip os net point-to-p
```

```
R4
int s1/0
encapsulation frame-relay
no frame-relay inverse-arp
no shut
int s1/0.24 p
ip add 5.5.24.4 255.255.255.0
fram int 402
```

```
int lo0
ip add 5.5.4.4 255.255.255.0
```

```
R5
int s1/0
enc frame
no frame inver
no shut
int s1/0.125 m
ip add 5.5.125.5 255.255.255.0
frame map ip 5.5.125.1 501 br
frame map ip 5.5.125.2 502 br
```


2. Cat3550/3560 Switch Setup

2.1 VTP Configuration

- Configure SW1 to be the VTP Server for domain VTP+YY. FOR Example, Rack07 would be VTP07
Rack15 would be VTP15 and so on.
SW2, SW3, SW4 is a VTP client in the VTP+YY Domain.

SW1

```
vtp mode server  
vtp domain STEAM.com  
vtp pass cisco
```

SW2~4

```
vtp mode client  
vtp domain STEAM.com  
vtp pass cisco
```

2.2 Trunk Port

- All the 4 Switch are connected to the 3 other switches. Configure an IEEE 802.1q protocol on all these inter-switch links so as to **pass all the vlans**. (토폴로지에서 사용하는 Vlan만 통과할 수 있도록 설정)
- 모든 trunk port 는 dot1.q 방식을 이용한다. 모든 스위치간의 연결을 trunk 로 구성하시오.

SW1~4

```
int ran e3/0 - 1  
sw tr en dot  
sw mo tr  
sw tr all vlan 2,3,11,12,13,31,56,65  
int ran e2/2 - 3  
sw tr en dot  
sw mo tr  
sw tr all vl 2,3,11,12,13,31,56,65
```

2.3 Trunk Port 2 (R6-SW2 필요한 VLAN만 흘러다니도록 설정하라)

- Configure R6 and SW2 as Trunk is only transmitted traffic of VLAN_D(#65) and VLAN_BB3(#13).

SW2

```
int e1/2
```

```
sw tr en dot
sw tr all vl 13,65
sw mo tr
```

```
R6
int e0/1
no sh
int e0/1.5
en dot 65
ip add 5.5.65.6 255.255.255.0
int e0/1.3
en dot 13
ip add 150.3.5.1 255.255.255.0
```

2.4 VLAN Configuration

- Enable all vlans and correct their names with the Diagram.
See the Pre-Configuration.

```
SW1
int e0/1
sw mo acc
sw acc vl 11
int e0/2
sw mo acc
sw acc vl 2
int e0/3
sw mo acc
sw acc vl 3
int e1/0
sw mo acc
sw acc vl 12
int e1/1
sw mo acc
sw acc vl 56
int e1/2
sw mo acc
sw acc vl 56
int e2/0
sw mo acc
sw acc vl 11
```

SW2

```
int e1/2
sw tr en dot
sw tr all vl 13,65
sw mo tr
int e1/1
sw mo acc
sw acc vl 65
int e2/0
sw mo acc
sw acc vl 12
```

SW3

```
int e2/0
sw mo acc
sw acc vl 13
```

2.5 STP Root Configuration → MSTP

STP에서 사용하는 VLAN 정보중에 아래 조건에 맞게 구성을 하시오.

- Topology 1 : VLAN_A(#2) , VLAN_C(#56) , VLAN_BB2(#12)
- Topology 2 : VLAN_B(#3) , VLAN_D(#65) , VLAN_BB1(#11) , VLAN_BB3(#13)
- Topology 1 에 대해서 SW1이 root 가 되도록 하고 Topology 2 에 대해서는 SW2 가 root가 되돌고 설정을 하는데 서로에 대한 backup 도 설정을 하라.

SW1~SW4

```
span mo mst
span mst con
name ccie
revi 1
inst 2 vl 3,11,13,65
inst 1 vl 2,12,56
```

SW1

```
span mst 1 root pri
span mst 2 root sec
```

SW2

```
span mst 2 root pri
span mst 1 root sec
```

[추가1] STP Load balancing

SW1과 SW2의 fa0/23 , fa0/24 의 trunk link 에 대해서 아래와 같은 조건을 만족하도록 구성하시오.

짝수 VLAN은 fa0/23 을 통해서, 홀수 VLAN은 fa0/24 에 대해서만 허용하는데 Load Balancing 이 가능하도록 하시오.

SW1~SW2

int e3/0

span mst 1 port-pri 16

[추가3] STP tuning

SW3에서 현재 fa0/20 이 blocking 상태인데 SW1에서 설정하여 SW3에서 fa0/20 이 forwarding 상태로 되게 설정.

int e3/3

span mst 1 port-p 64

2.7 Mac Table Aging Time (show mac-address aging-time vlan Z)

- Delete Mac address in MAC Table if not use for 30 min on VLAN_B(or VLAN_BB2)

SW1~SW4

mac-address-table aging-time 1800 vlan 3

SWX 에서 switch port는 모든 STP status를 거친다. Fa0/12 port에 대해서 이 시간을 16초 이하(미만)으로 구성하라

SW1~SW4

spanning-tree mst max-age 6

spanning-tree mst forward-time 4

2.8 Mac Address Table

- Mac Address Table on **SW2**, Configure your network to show the following when you issue the command.

* show mac-address-table dynamic vlan 56

Vlan	Mac Address	Type	Ports
56	0001.0001.0001	Dynamic	Fa0/23
56	0002.0002.0002	Dynamic	Fa0/23

R5

int e0/0

mac-address 0001.0001.0001

R6

int e0/0

mac-address 0002.0002.0002

II. IP IGP Protocols

After finishing each question below, ensure that all interfaces are visible on all routers.
And you can't not use the static route or default route if not specified in the question.
(Do not use "router-id" in IGP) * BGP는 router-id 사용

1. RIP

1.1 Configure RIPv2 between R1 and BB1

- BB1 is broadcasting routes of 199.172.x.0, where x is ranged from 1 to 16.
However you only need 199.172.8.0, 199.172.9.0, 199.172.10.0, 199.172.11.0 routes.
Do not use "auto-summary" command.

R1

```
router rip
ver 2
no au
net 150.1.0.0
distribute-list FROMBB1 in e0/0
```

[변형] • BB1에서 199.172.X.0(1~16) 정보가 들어 오고 있는데 그 중 199.172.8.0~11.0 , 150.1.YY.0 만 OSPF 재분배 하도록 하시오. 이 설정은 가장 간결한 설정으로 해결해야 한다. Auto-summary 를 사용해서는 안된다. Prefix-list 를 사용하시오.

R1

```
router rip
ver 2
no au
net 150.1.0.0
distribute-list DENY_ALL out e0/0
router ospf 1
redistribute rip subnets route-map NET_RIP
route-map NET_RIP
Match ip address prefix-list NET_RIP

ip prefix-list NET_RIP permit 150.1.5.0/24
ip prefix-list NET_RIP permit 199.172.8.0/22 ge 24 le 24

ip access standard DENY_ALL
Deny any
```

1.2 Configure RIPv2 between R2 and R4 , SW2

- Don't allowed advertisement on interface that don't show up on diagram.
• R2,R4 및 SW2에서 VLAN_A의 IP address 를 YY.YY.28.8/24 로 설정하고 RIP을 구성하시

오.

R2

```
router rip
ver 2
no au
net 5.0.0.0
```

R4

```
router rip
ver 2
no au
net 5.0.0.0
```

SW2

```
ip routing
int vlan 2
ip add 5.5.28.8 255.255.255.0
router rip
ver 2
no au
net 5.0.0.0
```

1.4 RIP Routing Table (즉, EIGRP>OSPF>RIP 재분배 하시오) – OSPF, EIGRP 설정 후

• On R4, configure your network to show the following

- 14.14.5.0 (120/4) - 14.14.6.0 (120/4) ## R4의 라우팅 테이블에 metric 값에 맞게 설정

R4

```
router rip
redistribute os 1 met 4
```

(변형) • R5,R6의 Loopback 0 가 R4에서 metric 3 으로 보이게 하라. 단, R4에서 설정하시 오.

R2

```
router rip
redi ospf 1 metric 1
router ospf 1
redi rip subnet
```

R4

```
router rip
```

offset-list 10 in 2

access-list 10 permit 5.5.5.0

access-list 10 permit 5.5.6.0

2. OSPF

2.1 Configuration OSPF AREA 0 (Loopback - /24 로 광고하자)

- Create OSPF area 0 with R1, R2, and R5. Use NBMA network type related commands. All router should be able to ping routers in OSPF domain after completing configuration.
- 구성도를 참조하여 R1,R2,R5 OSPF area 0 로 구성하라. NBMA network type 관련 명령어를 사용하라.

R1

router os 1

router-id 5.5.1.1

net 5.5.125.1 0.0.0.0 a 0

net 5.5.1.1 0.0.0.0 a 0

R2

router ospf 1

router-id 5.5.2.2

net 5.5.125.2 0.0.0.0 a 0

net 5.5.2.2 0.0.0.0 a 0

R5

router os 1

router-id 5.5.5.5

net 5.5.125.5 0.0.0.0 a 0

net 5.5.5.5 0.0.0.0 a 0

nei 5.5.125.1

nei 5.5.125.2

2.2 Configuration OSPF AREA 112 (Loopback /24로 광고되게하시오)

- Create area 112 with R1, R3, SW1 and make the OSPF network type point to point at R1 and make the OSPF network type point to multipoint at R3. Add VLAN_B(#3) to area 112.
- R1과 R3 사이에 Serial Link 를 AREA 112 로 구성하라. SW1의 VLAN_A 의 IP 주소를 Y.Y.12.7/24 로 설정하고 R3의 f0/0 과 함께 OSPF 설정하라. OSPF network type 은 R1에서 Point-to-point 를 사용하고 R3에서는 Point-to-Multipoint 사용.
- *SW1에서 VLAN_B 의 IP address 를 Y.Y.Y.12.7/24 를 설정하고 R3의 fa0/0 과 함께 OSPF 에 포함하라.*

• 또한 SW1에 Loopback1(YY.YY.15.7/24)도 OSPF에 포함하시오.

R1

```
router os 1
net 5.5.13.1 0.0.0.0 a 112
int s1/0.13 p
ip os net point-to-p
```

R3

```
router os 1
net 5.5.13.3 0.0.0.0 a 112
net 5.5.12.3 0.0.0.0 a 112
net 5.5.3.3 0.0.0.0 a 112
int s1/0.13 p
ip os net point-to-m
ip os hello-inter 10
```

SW1

```
int vl 3
no sh
ip add 5.5.12.7 255.255.255.0
int lo1
ip add 5.5.15.7 255.255.255.0
ip routing
router os 1
net 5.5.12.7 0.0.0.0 a 112
net 5.5.7.7 0.0.0.0 a 112
net 5.5.15.7 0.0.0.0 a 112
```

3. EIGRP

3.1 EIGRP 100 Configuration

• Limit the EIGRP on both FastEthernet interface on R5 and all attached interface on R6.(SW3 추가)

Do not use passive-interface.

• SW3에 VLAN_C(#56) ip address 를 YY.Yy.56.9/24 를 설정을 하고 eigrp 에 포함하여라.

R5

```
router ei 100
no au
net 5.5.56.5 0.0.0.0
net 5.5.65.5 0.0.0.0
```


R6

```
router ei 100
no au
net 5.5.56.6 0.0.0.0
net 5.5.65.6 0.0.0.0
net 5.5.6.6 0.0.0.0
net 150.3.5.1 0.0.0.0
```

SW3

```
int vlan 56
no sh
ip add 5.5.56.9 255.255.255.0
ip routing
router ei 100
no au
net 5.5.56.9 0.0.0.0
net 5.5.9.9 0.0.0.0
```

3.2 EIGRP 100 Advance Configuration

- Ensure all other routers ignore all routes but 198.198.z.0/24 and 4.1.1.0/24 from BB3.
(z=1~255)

And also, do not inform any topology change to over the BB3.

You also need to let other routers on your network see routes listed above.

R6

```
router ei 100
distribute-list pre FROMBB3 in e0/1.13
distribute-list pre TOBB3 out e0/1.13
ip prefix-list FROMBB3 permit 198.198.0.0/16 ge 24 le 24
ip prefix-list FROMBB3 permit 4.1.1.0/24
ip prefix-list TOBB3 deny 0.0.0.0/0 le 32
router os 1
redistribute ei 100 sub
```

3.4 EIGRP Authentication (Security 문제로 이동)

- Use MD5 authentication on VLAN_C

R5

```
int e0/0
ip authentication mode ei 100 md5
ip authentication key-chain ei 100 EIGRP
```

```
key chain EIGRP
key 1
key-string cisco
```

```
R6
int e0/0.13
ip authentication mode ei 100 md5
ip authentication key-chain ei 100 EIGRP
key chain EIGRP
key 1
key-string cisco
```

```
SW3
key chain EIGRP
key 1
key-string cisco
int vlan 56
ip authentication mode ei 100 md5
ip authentication key-chain ei 100 EIGRP
```

4. Redistribution

4.1 Redistribution (RIP <-> OSPF)

- Redistribute between RIP and OSPF.

However ensure that you only able to see 150.1.0.0/16, 199.172.8.0/24, 199.172.9.0/24, 199.172.10.0/24, 199.172.11.0/24 routes from other routers.

Do not send out your network routes to BB1.

R1

```
router ospf 1
redistribute rip sub
summary-add 150.1.0.0 255.255.255.0
router rip
redistribute os 1 metric 3
distribute-list denyWHOLE out e0/0
ip access-list standard denyWHOLE
deny any
```

4.2 Redistribution (RIP<->OSPF)

R2

```
router os 1
redistribute rip sub
router rip
```

redistribute os 1 met 4

4.3 Redistribution (EIGRP<->OSPF)

R5

router ei 100

redistribute os 1 met 1 1 1 1 1

router os 1

redi ei 100 sub

V. IOS/IP Features

1. NAT

- Secondary IP address 1YY.0.0.1/24 is assigned on Loopback 0 of R1.

Configure dynamic IP address translation to 1YY.0.0.0/24 for IP address with YY.YY.0.0 and enable them to be able to PING networks on BB1 from all routers on your network.

Don't advertise Secondary IP address (1YY.0.0.1) to OSPF network.

- R1의 Loopback 0 에 1YY.0.0.1/24 로 secondary IP 가(직접 할당하라고함)있다. Dynamic NAT를 수행하여 YY.YY.0.0 이 1YY.0.0.0/24 로 변화되도록 당신의 관리하에 있는 모든 router 와 switch 에서 BB1과 통신이 가능하도록 하라. Secondary IP 로 지정한 네트워크 는 OSPF로 전달하지 않는다. (1YY.0.0.0/24 => 3.YY.0.0/24 변형 가능)

R1

int lo0

ip add 15.0.0.1 255.255.255.0 secondary

router rip

net 15.0.0.0

no au

int e0/0

ip nat outside

int s1/0.125

ip nat inside

int s1/0.13

ip nat inside

ip nat ins source list 30 pool NAT overload

access-lst 30 permit 5.5.0.0 0.0.255.255

ip nat pool NAT 15.0.0.2 15.0.0.254 netmask 255.255.255.0

router os 1

redi rip sub route-map FROM_RIP

route-map FROM_RIP deny 10

match ip add NET15

route-map FROM_RIP permit 20

2. Preferred Gateway

- Make R5 and R6 to be default gateway for hosts on VLAN_D(or VLAN_C)
Do use VRRP (YY.YY.65.100). Ensure R5 to become a primary gateway and R6 as a secondary.

And use VRRP authentication.

R5

int e0/1

vrrp 1 ip 5.5.65.100

vrrp 1 authentication md5 key-string cisco

vrrp 1 preempt

vrrp 1 pri 200

R6

int e0/1

vrrp 1 ip 5.5.65.100

vrrp 1 authentication md5 key-string cisco

vrrp 1 preempt

vrrp 1 pri 100

3. IP Fragment Attack

- Configure an appropriate ACL on R2 to prevent Fragment attacks from BB2 to WEB server (10.1.YY.5)
- R4는 Backbone2 로부터 IP Fragment 공격을 받고 있다. 이 packet 들의 공격 대상은 10.1.YY.5 의 web 서버이다. 모든 fragment packet 을 폐기 할 수 있도록 하여 이를 해결 하도록 하라.

R4

ip access-list extend Fragment

deny tcp any host 10.1.5.5 fragment

permit ip any any

int e0/0

ip access-group Fragnet in

4. 캡처

4-1) 재분배 전

R1

```
Router#show ip ro
+Dec 6 03:30:59.699: %SYS-5-CONFIG-I: Configured from console by console
Router#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, + - replicated route

Gateway of last resort is not set

  5.0.0.0/8 is variably subnetted, 9 subnets, 2 masks
C       5.5.1.0/24 is directly connected, Loopback0
L       5.5.1.1/32 is directly connected, Loopback0
O       5.5.3.0/24 [110/65] via 5.5.13.3, 00:02:24, Serial1/0.13
O       5.5.12.0/24 [110/74] via 5.5.13.3, 00:02:24, Serial1/0.13
C       5.5.13.0/24 is directly connected, Serial1/0.13
L       5.5.13.1/32 is directly connected, Serial1/0.13
O       5.5.13.3/32 [110/64] via 5.5.13.3, 00:02:24, Serial1/0.13
C       5.5.125.0/24 is directly connected, Serial1/0.125
L       5.5.125.1/32 is directly connected, Serial1/0.125
  15.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C       15.0.0.0/24 is directly connected, Loopback0
L       15.0.0.1/32 is directly connected, Loopback0
  150.1.0.0/16 is variably subnetted, 2 subnets, 2 masks
C       150.1.5.0/24 is directly connected, Ethernet0/0
L       150.1.5.1/32 is directly connected, Ethernet0/0
```

4-2) vlan 확인

SW1

```
SW1#sh vl br

VLAN Name                Status    Ports
-----
1    default                active    Et0/0, Et0/1, Et1/3, Et2/1
2    VLAN_A                 active    Et0/2
3    VLAN_B                 active    Et0/3
10   VLAN0010                active
11   VLAN_BB1               active    Et2/0
12   VLAN_BB2               active    Et1/0
13   VLAN_BB3               active
20   VLAN0020                active
30   VLAN0030                active
31   vlan_E                 active
40   VLAN_40                 active
50   VLAN_50                 active
56   VLAN_C                 active    Et1/1, Et1/2
60   VLAN_60                 active
65   VLAN_D                 active
70   VLAN0070                active
78   VLAN0078                active
89   VLAN0089                active
90   VLAN0090                active
1002 fddi-default            act/unsup

VLAN Name                Status    Ports
-----
1003 trcrf-default          act/unsup
1004 fddinet-default        act/unsup
1005 trbrf-default          act/unsup
```

SW2

```
SW2#sho vl br
```

VLAN	Name	Status	Ports
1	default	active	Et0/0, Et0/1, Et0/2, Et0/3 Et1/0, Et1/3, Et2/1
2	VLAN_A	active	
3	VLAN_B	active	
10	VLAN0010	active	
11	VLAN_BB1	active	
12	VLAN_BB2	active	Et2/0
13	VLAN_BB3	active	
20	VLAN0020	active	
30	VLAN0030	active	
31	vlan_E	active	
40	VLAN_40	active	
50	VLAN_50	active	
56	VLAN_C	active	
60	VLAN_60	active	
65	VLAN_D	active	Et1/1
70	VLAN0070	active	
78	VLAN0078	active	
89	VLAN0089	active	
90	VLAN0090	active	

VLAN	Name	Status	Ports
1002	fddi-default	act/unsup	
1003	trcrf-default	act/unsup	
1004	fddinet-default	act/unsup	
1005	trbrf-default	act/unsup	

4-3) vtp 확인

SW1

```
SW1#show vtp stat
VTP Version capable      : 1 to 3
VTP version running      : 2
VTP Domain Name          : STEAM.com
VTP Pruning Mode         : Disabled
VTP Traps Generation     : Disabled
Device ID                : aabb.cc00.0700
Configuration last modified by 0.0.0.0 at 12-5-24 11:52:24
Local updater ID is 5.5.28.8 on interface Vl2 (lowest numbered VLAN interface found)

Feature VLAN:
-----
VTP Operating Mode       : Server
Maximum VLANs supported locally : 1005
Number of existing VLANs : 23
Configuration Revision   : 8
MD5 digest               : 0x47 0x8C 0x01 0xD8 0xAD 0x85 0x3F 0x2C
                        : 0x80 0x4C 0xAD 0xFB 0xEF 0x8A 0x5A 0xBB
```

SW2

```
SW2#show vtp stat
VTP Version capable      : 1 to 3
VTP version running      : 2
VTP Domain Name          : STEAM.com
VTP Pruning Mode         : Disabled
VTP Traps Generation     : Disabled
Device ID                : aabb.cc00.0800
Configuration last modified by 0.0.0.0 at 12-5-24 11:52:24

Feature VLAN:
-----
VTP Operating Mode       : Client
Maximum VLANs supported locally : 1005
Number of existing VLANs : 23
Configuration Revision    : 8
MD5 digest               : 0x47 0x8C 0x01 0xD8 0xAD 0x85 0x3F 0x2C
                        : 0x80 0x4C 0xAD 0xFB 0xEF 0x8A 0x5A 0xBB
```

4-4) 라우팅 테이블 확인

R1

```
5.0.0.0/8 is variably subnetted, 20 subnets, 2 masks
C    5.5.1.0/24 is directly connected, Loopback0
L    5.5.1.1/32 is directly connected, Loopback0
O    5.5.2.2/32 [110/65] via 5.5.125.2, 00:46:12, Serial1/0.125
O    5.5.3.0/24 [110/65] via 5.5.13.3, 00:59:11, Serial1/0.13
O E2  5.5.4.0/24 [110/20] via 5.5.125.2, 00:46:12, Serial1/0.125
O    5.5.5.5/32 [110/65] via 5.5.125.5, 00:46:12, Serial1/0.125
O E2  5.5.6.0/24 [110/20] via 5.5.125.5, 00:46:12, Serial1/0.125
O    5.5.7.0/24 [110/75] via 5.5.13.3, 00:59:11, Serial1/0.13
O E2  5.5.8.0/24 [110/20] via 5.5.125.2, 00:46:12, Serial1/0.125
O    5.5.12.0/24 [110/74] via 5.5.13.3, 00:59:11, Serial1/0.13
C    5.5.13.0/24 is directly connected, Serial1/0.13
L    5.5.13.1/32 is directly connected, Serial1/0.13
O    5.5.13.3/32 [110/64] via 5.5.13.3, 00:59:12, Serial1/0.13
O    5.5.15.7/32 [110/75] via 5.5.13.3, 00:59:12, Serial1/0.13
O E2  5.5.24.0/24 [110/20] via 5.5.125.2, 00:46:13, Serial1/0.125
O E2  5.5.28.0/24 [110/20] via 5.5.125.2, 00:46:13, Serial1/0.125
O E2  5.5.56.0/24 [110/20] via 5.5.125.5, 00:46:13, Serial1/0.125
O E2  5.5.65.0/24 [110/20] via 5.5.125.5, 00:46:13, Serial1/0.125
C    5.5.125.0/24 is directly connected, Serial1/0.125
L    5.5.125.1/32 is directly connected, Serial1/0.125
15.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C    15.0.0.0/24 is directly connected, Loopback0
L    15.0.0.1/32 is directly connected, Loopback0
150.1.0.0/16 is variably subnetted, 2 subnets, 2 masks
C    150.1.5.0/24 is directly connected, Ethernet0/0
L    150.1.5.1/32 is directly connected, Ethernet0/0
150.3.0.0/24 is subnetted, 1 subnets
O E2  150.3.5.0 [110/20] via 5.5.125.5, 00:46:13, Serial1/0.125
```


R2

```

5.0.0.0/8 is variably subnetted, 21 subnets, 2 masks
O   5.5.1.0/24 [110/65] via 5.5.125.1, 00:47:00, Serial1/0.125
C   5.5.2.0/24 is directly connected, Loopback0
L   5.5.2.2/32 is directly connected, Loopback0
O IA 5.5.3.0/24 [110/129] via 5.5.125.1, 00:47:00, Serial1/0.125
R   5.5.4.0/24 [120/1] via 5.5.24.4, 00:00:26, Serial1/0.24
O   5.5.5.5/32 [110/65] via 5.5.125.5, 00:47:00, Serial1/0.125
O E2 5.5.6.0/24 [110/20] via 5.5.125.5, 00:47:00, Serial1/0.125
O IA 5.5.7.0/24 [110/139] via 5.5.125.1, 00:47:00, Serial1/0.125
R   5.5.8.0/24 [120/1] via 5.5.28.8, 00:00:14, Ethernet0/0
O IA 5.5.12.0/24 [110/138] via 5.5.125.1, 00:47:00, Serial1/0.125
O IA 5.5.13.0/24 [110/128] via 5.5.125.1, 00:47:00, Serial1/0.125
O IA 5.5.13.3/32 [110/128] via 5.5.125.1, 00:47:00, Serial1/0.125
O IA 5.5.15.7/32 [110/139] via 5.5.125.1, 00:47:01, Serial1/0.125
C   5.5.24.0/24 is directly connected, Serial1/0.24
L   5.5.24.2/32 is directly connected, Serial1/0.24
C   5.5.28.0/24 is directly connected, Ethernet0/0
L   5.5.28.2/32 is directly connected, Ethernet0/0
O E2 5.5.56.0/24 [110/20] via 5.5.125.5, 00:47:01, Serial1/0.125
O E2 5.5.65.0/24 [110/20] via 5.5.125.5, 00:47:01, Serial1/0.125
C   5.5.125.0/24 is directly connected, Serial1/0.125
L   5.5.125.2/32 is directly connected, Serial1/0.125
150.3.0.0/24 is subnetted, 1 subnets
O E2 150.3.5.0 [110/20] via 5.5.125.5, 00:47:01, Serial1/0.125

```

R3

```

5.0.0.0/8 is variably subnetted, 19 subnets, 2 masks
O IA 5.5.1.0/24 [110/65] via 5.5.13.1, 01:00:31, Serial1/0.13
O IA 5.5.2.2/32 [110/129] via 5.5.13.1, 00:47:32, Serial1/0.13
C   5.5.3.0/24 is directly connected, Loopback0
L   5.5.3.3/32 is directly connected, Loopback0
O E2 5.5.4.0/24 [110/20] via 5.5.13.1, 00:47:27, Serial1/0.13
O IA 5.5.5.5/32 [110/129] via 5.5.13.1, 00:47:32, Serial1/0.13
O E2 5.5.6.0/24 [110/20] via 5.5.13.1, 00:47:27, Serial1/0.13
O   5.5.7.0/24 [110/11] via 5.5.12.7, 01:02:31, Ethernet0/0
O E2 5.5.8.0/24 [110/20] via 5.5.13.1, 00:47:27, Serial1/0.13
C   5.5.12.0/24 is directly connected, Ethernet0/0
L   5.5.12.3/32 is directly connected, Ethernet0/0
C   5.5.13.0/24 is directly connected, Serial1/0.13
L   5.5.13.3/32 is directly connected, Serial1/0.13
O   5.5.15.7/32 [110/11] via 5.5.12.7, 01:02:32, Ethernet0/0
O E2 5.5.24.0/24 [110/20] via 5.5.13.1, 00:47:28, Serial1/0.13
O E2 5.5.28.0/24 [110/20] via 5.5.13.1, 00:47:28, Serial1/0.13
O E2 5.5.56.0/24 [110/20] via 5.5.13.1, 00:47:28, Serial1/0.13
O E2 5.5.65.0/24 [110/20] via 5.5.13.1, 00:47:28, Serial1/0.13
O IA 5.5.125.0/24 [110/128] via 5.5.13.1, 00:47:33, Serial1/0.13
150.3.0.0/24 is subnetted, 1 subnets
O E2 150.3.5.0 [110/20] via 5.5.13.1, 00:47:28, Serial1/0.13

```


R4

```

5.0.0.0/8 is variably subnetted, 19 subnets, 2 masks
R    5.5.1.0/24 [120/4] via 5.5.24.2, 00:00:00, Serial1/0.24
R    5.5.2.0/24 [120/1] via 5.5.24.2, 00:00:00, Serial1/0.24
R    5.5.3.0/24 [120/4] via 5.5.24.2, 00:00:00, Serial1/0.24
C    5.5.4.0/24 is directly connected, Loopback0
L    5.5.4.4/32 is directly connected, Loopback0
R    5.5.5.5/32 [120/4] via 5.5.24.2, 00:00:00, Serial1/0.24
R    5.5.6.0/24 [120/6] via 5.5.24.2, 00:00:00, Serial1/0.24
R    5.5.7.0/24 [120/4] via 5.5.24.2, 00:00:00, Serial1/0.24
R    5.5.8.0/24 [120/2] via 5.5.24.2, 00:00:00, Serial1/0.24
R    5.5.12.0/24 [120/4] via 5.5.24.2, 00:00:00, Serial1/0.24
R    5.5.13.0/24 [120/4] via 5.5.24.2, 00:00:00, Serial1/0.24
R    5.5.13.3/32 [120/4] via 5.5.24.2, 00:00:00, Serial1/0.24
R    5.5.15.7/32 [120/4] via 5.5.24.2, 00:00:01, Serial1/0.24
C    5.5.24.0/24 is directly connected, Serial1/0.24
L    5.5.24.4/32 is directly connected, Serial1/0.24
R    5.5.28.0/24 [120/1] via 5.5.24.2, 00:00:01, Serial1/0.24
R    5.5.56.0/24 [120/4] via 5.5.24.2, 00:00:01, Serial1/0.24
R    5.5.65.0/24 [120/4] via 5.5.24.2, 00:00:01, Serial1/0.24
R    5.5.125.0/24 [120/1] via 5.5.24.2, 00:00:01, Serial1/0.24
150.2.0.0/16 is variably subnetted, 2 subnets, 2 masks
C    150.2.5.0/24 is directly connected, Ethernet0/0
L    150.2.5.1/32 is directly connected, Ethernet0/0
150.3.0.0/24 is subnetted, 1 subnets
R    150.3.5.0 [120/4] via 5.5.24.2, 00:00:01, Serial1/0.24

```

R5

```

5.0.0.0/8 is variably subnetted, 21 subnets, 2 masks
O    5.5.1.0/24 [110/65] via 5.5.125.1, 00:48:25, Serial1/0.125
O    5.5.2.2/32 [110/65] via 5.5.125.2, 00:48:25, Serial1/0.125
O IA  5.5.3.0/24 [110/129] via 5.5.125.1, 00:48:25, Serial1/0.125
O E2  5.5.4.0/24 [110/20] via 5.5.125.2, 00:48:25, Serial1/0.125
C    5.5.5.0/24 is directly connected, Loopback0
L    5.5.5.5/32 is directly connected, Loopback0
D    5.5.6.0/24 [90/409600] via 5.5.65.6, 00:51:07, Ethernet0/1
O IA  5.5.7.0/24 [110/139] via 5.5.125.1, 00:48:25, Serial1/0.125
O E2  5.5.8.0/24 [110/20] via 5.5.125.2, 00:48:25, Serial1/0.125
O IA  5.5.12.0/24 [110/138] via 5.5.125.1, 00:48:25, Serial1/0.125
O IA  5.5.13.0/24 [110/128] via 5.5.125.1, 00:48:25, Serial1/0.125
O IA  5.5.13.3/32 [110/128] via 5.5.125.1, 00:48:25, Serial1/0.125
O IA  5.5.15.7/32 [110/139] via 5.5.125.1, 00:48:26, Serial1/0.125
O E2  5.5.24.0/24 [110/20] via 5.5.125.2, 00:48:26, Serial1/0.125
O E2  5.5.28.0/24 [110/20] via 5.5.125.2, 00:48:26, Serial1/0.125
C    5.5.56.0/24 is directly connected, Ethernet0/0
L    5.5.56.5/32 is directly connected, Ethernet0/0
C    5.5.65.0/24 is directly connected, Ethernet0/1
L    5.5.65.5/32 is directly connected, Ethernet0/1
C    5.5.125.0/24 is directly connected, Serial1/0.125
L    5.5.125.5/32 is directly connected, Serial1/0.125
150.3.0.0/24 is subnetted, 1 subnets
D    150.3.5.0 [90/307200] via 5.5.65.6, 00:51:08, Ethernet0/1

```

R6

```

5.0.0.0/8 is variably subnetted, 20 subnets, 2 masks
D EX 5.5.1.0/24 [170/2560025856] via 5.5.65.5, 00:48:50, Ethernet0/1.5
D EX 5.5.2.2/32 [170/2560025856] via 5.5.65.5, 00:48:50, Ethernet0/1.5
D EX 5.5.3.0/24 [170/2560025856] via 5.5.65.5, 00:48:50, Ethernet0/1.5
D EX 5.5.4.0/24 [170/2560025856] via 5.5.65.5, 00:48:50, Ethernet0/1.5
D EX 5.5.5.0/24 [170/2560025856] via 5.5.65.5, 00:51:32, Ethernet0/1.5
C 5.5.6.0/24 is directly connected, Loopback0
L 5.5.6.6/32 is directly connected, Loopback0
D EX 5.5.7.0/24 [170/2560025856] via 5.5.65.5, 00:48:50, Ethernet0/1.5
D EX 5.5.8.0/24 [170/2560025856] via 5.5.65.5, 00:48:50, Ethernet0/1.5
D EX 5.5.12.0/24 [170/2560025856] via 5.5.65.5, 00:48:50, Ethernet0/1.5
D EX 5.5.13.0/24 [170/2560025856] via 5.5.65.5, 00:48:50, Ethernet0/1.5
D EX 5.5.13.3/32 [170/2560025856] via 5.5.65.5, 00:48:50, Ethernet0/1.5
D EX 5.5.15.7/32 [170/2560025856] via 5.5.65.5, 00:48:51, Ethernet0/1.5
D EX 5.5.24.0/24 [170/2560025856] via 5.5.65.5, 00:48:51, Ethernet0/1.5
D EX 5.5.28.0/24 [170/2560025856] via 5.5.65.5, 00:48:51, Ethernet0/1.5
C 5.5.56.0/24 is directly connected, Ethernet0/0
L 5.5.56.6/32 is directly connected, Ethernet0/0
C 5.5.65.0/24 is directly connected, Ethernet0/1.5
L 5.5.65.6/32 is directly connected, Ethernet0/1.5
D EX 5.5.125.0/24 [170/2560025856] via 5.5.65.5, 00:51:26, Ethernet0/1.5
150.3.0.0/16 is variably subnetted, 2 subnets, 2 masks
C 150.3.5.0/24 is directly connected, Ethernet0/1.3
L 150.3.5.1/32 is directly connected, Ethernet0/1.3

```

SW1

```

5.0.0.0/8 is variably subnetted, 21 subnets, 2 masks
O IA 5.5.1.0/24 [110/66] via 5.5.12.3, 01:02:19, Vlan3
O IA 5.5.2.2/32 [110/130] via 5.5.12.3, 00:49:20, Vlan3
O 5.5.3.0/24 [110/2] via 5.5.12.3, 01:27:02, Vlan3
O E2 5.5.4.0/24 [110/20] via 5.5.12.3, 00:49:15, Vlan3
O IA 5.5.5.5/32 [110/130] via 5.5.12.3, 00:49:20, Vlan3
O E2 5.5.6.0/24 [110/20] via 5.5.12.3, 00:49:15, Vlan3
C 5.5.7.0/24 is directly connected, Loopback0
L 5.5.7.7/32 is directly connected, Loopback0
O E2 5.5.8.0/24 [110/20] via 5.5.12.3, 00:49:15, Vlan3
C 5.5.12.0/24 is directly connected, Vlan3
--More--
*Dec 6 02:33:21.710: %SYS-5-CONFIG_I: Configured from console by console
L 5.5.12.7/32 is directly connected, Vlan3
O 5.5.13.0/24 [110/129] via 5.5.12.3, 01:02:19, Vlan3
O 5.5.13.3/32 [110/1] via 5.5.12.3, 01:02:29, Vlan3
C 5.5.15.0/24 is directly connected, Loopback1
L 5.5.15.7/32 is directly connected, Loopback1
O E2 5.5.24.0/24 [110/20] via 5.5.12.3, 00:49:15, Vlan3
C 5.5.28.0/24 is directly connected, Vlan2
L 5.5.28.8/32 is directly connected, Vlan2
O E2 5.5.56.0/24 [110/20] via 5.5.12.3, 00:49:15, Vlan3
O E2 5.5.65.0/24 [110/20] via 5.5.12.3, 00:49:15, Vlan3
O IA 5.5.125.0/24 [110/129] via 5.5.12.3, 00:49:20, Vlan3
150.1.0.0/16 is variably subnetted, 2 subnets, 2 masks
C 150.1.5.0/24 is directly connected, Vlan11
L 150.1.5.7/32 is directly connected, Vlan11
150.3.0.0/24 is subnetted, 1 subnets
O E2 150.3.5.0 [110/20] via 5.5.12.3, 00:49:15, Vlan3

```


감사합니다.



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