



厦門大學信息学院(国家示范性软件学院)

School of Informatics Xiamen University (National Demonstrative Software School)

《计算机网络》实验报告

实验名称:	实验 4
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一、 实验目的

通过完成实验，理解网络层和路由的基本原理。掌握路由器配置网络和组网的方法；掌握 IP 协议、IP 地址配置和路由的概念；掌握 IP 协议和路由的基本原理；了解在模拟器下根据教程配置网络的方法。

二、 实验内容

使用 Router eSIM v1.1 模拟器来模拟路由器的配置环境；使用 CCNA Network Visualizer 6.0 配置静态路由、动态路由和交换机端口的 VLAN（虚拟局域网）。

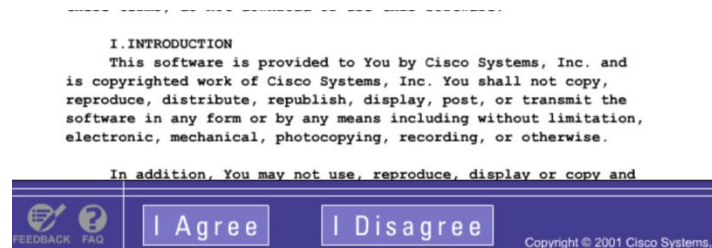
三、 核心功能实现

使用 Router eSIM v1.1 模拟器来模拟路由器的配置环境；使用 CCNA Network Visualizer 6.0 配置静态路由、动态路由和交换机端口的 VLAN（虚拟局域网）。思科模拟器 Packet Tracer 7.0 使用，配置静态路由，配置各种网络设备组网的综合实验。

四、 运行结果

一、 Cisco IOS 的基本操作和路由器的常规配置

启动 Router eSIM 软件



查看路由器完成操作

```
lab_A(config)#ip host lab_A 192.5.5.1 205.7.5.1 201.100.11.1
lab_A(config)#ip host lab_B 219.17.100.1 199.6.13.1 201.100.11.2
lab_A(config)#ip host lab_C 223.8.151.1 201.201.7.1 199.6.13.2
lab_A(config)#ip host lab_D 223.8.151.1 204.204.7.1 199.6.13.2
lab_A(config)#ip host lab_E 210.93.105.1 204.204.7.2
lab_A(config)#ip host lab_F 210.93.105.2
lab_A(config)#int eth 0
lab_A(config-if)#ip address 192.5.5.1 255.255.255.0
lab_A(config-if)#int eth 1
lab_A(config-if)#ip address 205.7.5.1 255.255.255.0
lab_A(config-if)#int eth 0
lab_A(config-if)#no shutdown
lab_A(config-if)#^
% Invalid input detected at '^' marker.
lab_A(config-if)#no shutdown
lab_A(config-if)#int eth 1
lab_A(config-if)#no shutdown
lab_A(config-if)#int serial 0
lab_A(config-if)#ip address 201.100.11.1 255.255.255.0
lab_A(config-if)#no shutdown
lab_A(config-if)#clock rate 56000
lab_A(config-if)#
```

```

Router#config t
Enter configuration commands, one per line. End with END.
Router(config)#hostname lab4
lab4(config)#

```

路由器配置接口描述

```

lab4(config)#interface ethernet 0
lab4(config-if)#description shiyan4
lab4(config-if)#exit

```

配置路由器交换机密码

```

lab4(config)#enable password cisco
lab4(config)#enable secret cisco1
lab4(config)#end
00:31:20: %SYS-5-CONFIG_I: Configured from console by console
lab4#

```

```

Router#show interfaces
Ethernet0 is administratively down, line protocol is down
  Hardware is Lance, address is 0010.7b81.4e2c(bia 0010.7b81.4e2c)
  MTU 1500 bytes, BW 10000 Kbit, DLY 1000 usec,
    reliability 252/255, txload 1/255, rxload 1/255
  Encapsulation ARPA, loopback not set
  Keepalive set (10 sec)
  ARP type: ARPA, ARP Timeout 04:00:00
  Last input never, output 00:00:20, output hang never
  Last clearing of "show interface" counters never
  Queueing strategy: fifo
  Output queue 0/40, 0 drops; input queue 0/75, 0 drops
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
    0 packets input, 0 bytes, 0 no buffer
      Received 0 broadcasts, 0 runts, 0 giants, 0 throttles
    0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored
    0 input packets with dribble condition detected
  6 packets output, 360 bytes, 0 underruns
  6 output errors, 0 collisions, 3 interface resets
  0 babbles, 0 late collision, 0 deferred
  6 lost carrier, 0 no carrier

```

Lab_A	Not Completed
Hostname	Done
Enable Secret	Not Done
Line Console Login	Not Done
Line Console Password	Not Done
Line vty Login	Not Done
Line vty Password	Not Done
E0 IP	Done
E0 Shutdown	Done
E1 IP	Done
E1 Shutdown	Done
S0 IP	Done
S0 Clock Rate	Done
S0 Shutdown	Done
Routing Protocol	Not Done
Network 1	Not Done
Network 2	Not Done
Network 3	Not Done
IP Host Lab_A	Done
IP Host Lab_B	Done
IP Host Lab_C	Done
IP Host Lab_D	Done
IP Host Lab_E	Done
Time elapsed	14:11

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```

lab_A#show ip route
Codes: C - connected, S - static, I - IGRP, 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, E - EGP
       i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, * - candidate default
       U - per-user static route, o - ODR

Gateway of last resort is not set

C 201.100.11.0 /24 is directly connected, Serial0
R 219.17.100.0 /24 [120/1] via 201.100.11.2, 00:00:04, Serial0
C 192.5.5.0 /24 is directly connected, Ethernet0
R 199.6.13.0 /24 [120/1] via 201.100.11.2, 00:00:04, Serial0
C 205.7.5.0 /24 is directly connected, Ethernet1
lab_A#conf t
Enter configuration commands, one per line. End with END.
lab_A(config)#router rip
lab_A(config-router)#version v2
lab_A(config-router)#version 2
lab_A(config-router)#network 205.7.5.0
lab_A(config-router)#network 201.100.11.0
lab_A(config-router)#network 192.5.5.0
lab_A(config-router)#

```

Checking Your Configuration

This activity is not completed.

Please click on one of the buttons below to **check** that Router's Configuration:

A
B
C
D
E

Please click on one of the buttons below to **set** that Router's Configuration:

A
B
C
D
E

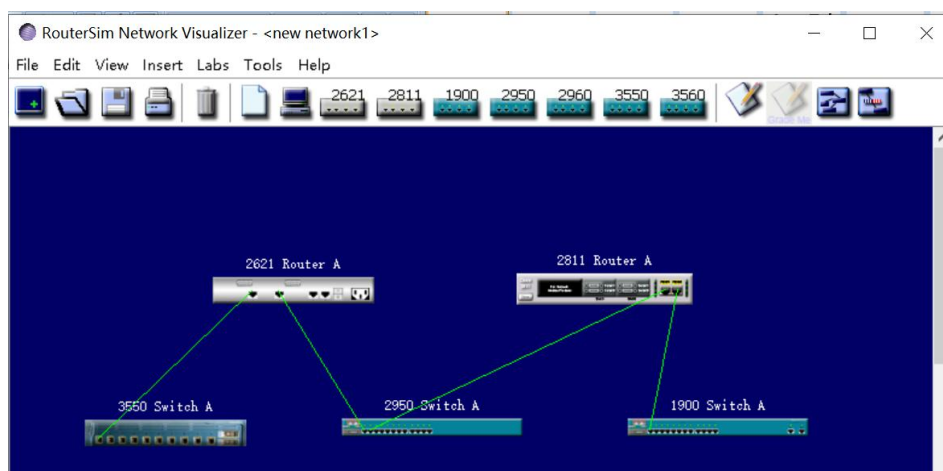
Loads all router variables for this eSIMTM scenario except the IP host table, which means, for example, that you will not be able to use the router name as part of ping or telnet commands.

Lab_A	Completed
Hostname	Done
Enable Secret	Done
Line Console Login	Done
Line Console Password	Done
Line vty Login	Done
Line vty Password	Done
E0 IP	Done
E0 Shutdown	Done
E1 IP	Done
E1 Shutdown	Done
S0 IP	Done
S0 Clock Rate	Done
S0 Shutdown	Done
Routing Protocol	Done
Network 1	Done
Network 2	Done
Network 3	Done
IP Host Lab_A	Done
IP Host Lab_B	Done
IP Host Lab_C	Done
IP Host Lab_D	Done
IP Host Lab_E	Done
Time elapsed	44:12

同理配置 BCDE 路由器。

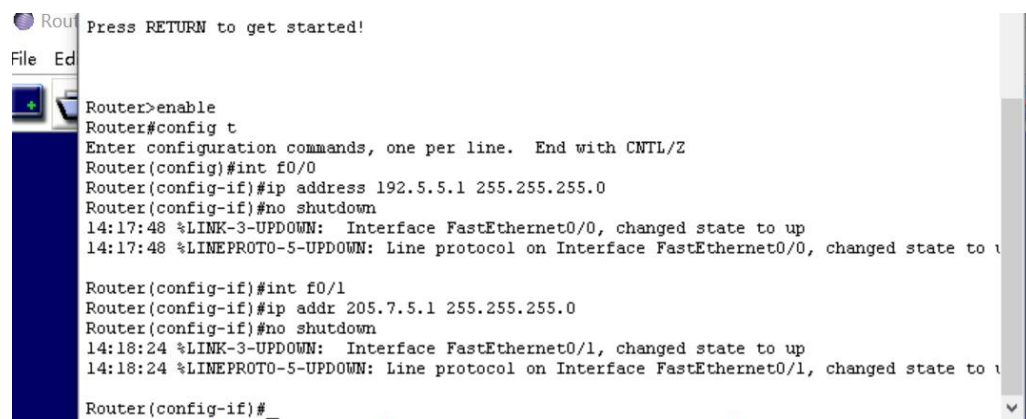
二、静态路由设置(使用软件：CCNA Network Visualizer 6.0)

1. 打开模拟器模拟的 Cisco 设备



2.在配置静态路由之前,要配置路由器各个端口的 IP 地址,还要用命令 `no shutdown` 激活端口。串口如果充当 DCE 端,还需要配置时钟频率,在准备工作做完之后,如果查看路

由表(show ip route), 会看到路由器直连网络的情况。



```
Router>enable
Router#config t
Enter configuration commands, one per line. End with CNTL/Z
Router(config)#int f0/0
Router(config-if)#ip address 192.5.5.1 255.255.255.0
Router(config-if)#no shutdown
14:17:48 %LINK-3-UPDOWN: Interface FastEthernet0/0, changed state to up
14:17:48 %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up
Router(config-if)#int f0/1
Router(config-if)#ip addr 205.7.5.1 255.255.255.0
Router(config-if)#no shutdown
14:18:24 %LINK-3-UPDOWN: Interface FastEthernet0/1, changed state to up
14:18:24 %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to up
Router(config-if)#
```

3.查看路由表:

```
Router#show ip route
Codes: C - connected, S - static, I - IGRP, 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, E - EGP
       i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, * - candidate default
       U - per-user static route, o - ODR, P - periodic downloaded static
       T - traffic engineered route

Gateway of last resort is not set
C    192.5.5.0/24 is directly connected, FastEthernet0/0
C    205.7.5.0/24 is directly connected, FastEthernet0/1
C    201.100.11.0/24 is directly connected, Serial0/0
Router#
```

查看 ping 是否连通

```
Router#ping 199.6.13.1

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 199.6.13.1, timeout is 2 seconds:
.....
Success rate is 0 percent (0/5), round-trip min/avg/max = 0/0/0 ms
```

继续配置静态路由

```
Router(config)#ip route 199.6.13.0 255.255.255.0 201.100.11.2
Router(config)#exit
Router#show ip route
Codes: C - connected, S - static, I - IGRP, 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
```

ping 测试联通

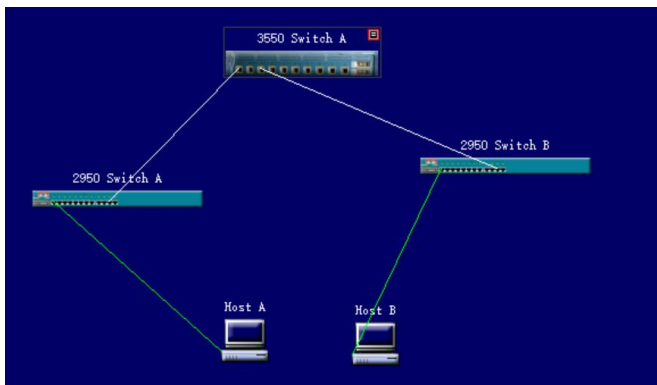
```

Router(config)#ip route 0.0.0.0 0.0.0.0 201.100.11.2
Router(config)#exit
Router#show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - m
D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF
N1 - OSPF NSSA external type 1, N2 - OSPF NSSA exte
E1 - OSPF external type 1, E2 - OSPF external type 2
i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, '
U - per-user static route, o - ODR, P - periodic dow
T - traffic engineered route

Gateway of last resort is 201.100.11.2 to network 0.0.0.0
C    205.7.5.0/24 is directly connected, FastEthernet0/1
C    192.5.5.0/24 is directly connected, FastEthernet0/0
S    199.6.13.1 [1/0] via 201.100.11.2
S    199.6.13.0 [1/0] via 201.100.11.2
C    201.100.11.0/24 is directly connected, Serial0/0
S*   0.0.0.0 [1/0] via 201.100.11.2

```

动态路由及 VLAN 配置



```

switch>en
switch#conf t
Enter configuration commands, one per line. End with CNTL/Z
switch(config)#vtp domain Cisco
Changing VTP domain name from NULL to Cisco
switch(config)#hostname switch_A
switch_A(config)#exit
switch_A#show vtp status
VTP Version                : 2
Configuration Revision     : 1
Maximum VLANs supported locally : 64
Number of existing VLANs    : 5
VTP Operating Mode         : Server
VTP Domain Name            : Cisco
VTP Pruning Mode           : Disabled

```

设置为客户模式

```

switch_B(config)#vtp mode client
Setting device to VTP CLIENT mode.

```

```

switch(config)#interface fa0/11
switch(config-if)#switchport mode trunk

```

客户端 trunk 处理

创建 VLAN

创建两个 VLAN:， VLAN 10 和 VLAN 20，并用 show vlan 命令验证


```

3550A(config)#vlan 10
3550A(config-vlan)#vlan 20
3550A(config-vlan)#exit
3550A(config)#exit
3550A#sh vlan

```

VLAN Name	Status	Ports
1 default	active	Fa0/2, Fa0/4, Fa0/5, Fa0/6 Fa0/7, Fa0/8, Fa0/9, Fa0/10
10 VLAN0010	active	
20 VLAN0020	active	
1002 fddi-default	active	
1003 token-ring-default	active	
1004 fddinet-default	active	
1005 trnet-default	active	

客户端配置:

```

switch(config)#interface fa0/2
switch(config-if)#switchport access vlan 20

```

配置各交换机的管理地址

```

3550A(config)#int vlan 1
3550A(config-if)#ip address 192.168.10.1 255.255.255.0
3550A(config-if)#no shut

```

客户端:

```

switch(config)#int vlan 1
switch(config-if)#ip address 192.168.10.3 255.255.255.0
switch(config-if)#no shutdown

```

启动验证

```

3550A#ping 192.168.10.2

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.10.2, timeout is 2 seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 4/4/4 ms
3550A#

```

实验总结

深刻认识到路由器实现网络互连，支持各种局域网和广域网接口等特征，以及大致配置的流程和口令