《计算机网络》实验报告

实验名称:	实验 4
实验日期:	2021 年 4 月 13 日星期二
实验地点:	
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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）。

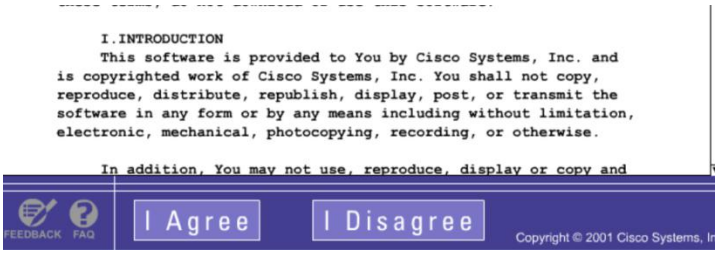
三、 核心功能实现

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。

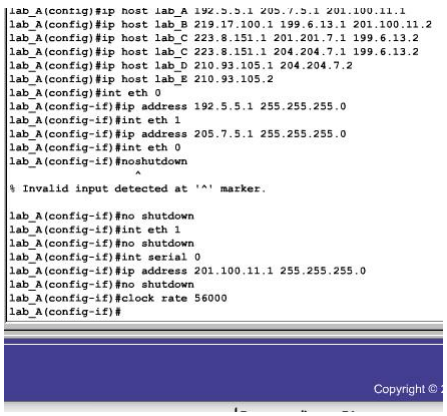
四、 运行结果

一、 Cisco IOS 的基本操作和路由器的常规配置

启动 RoutereSIM 软件



查看路由器完成操作



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

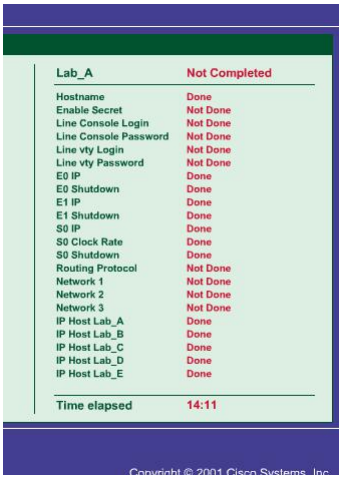
路由器配置接口描述

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

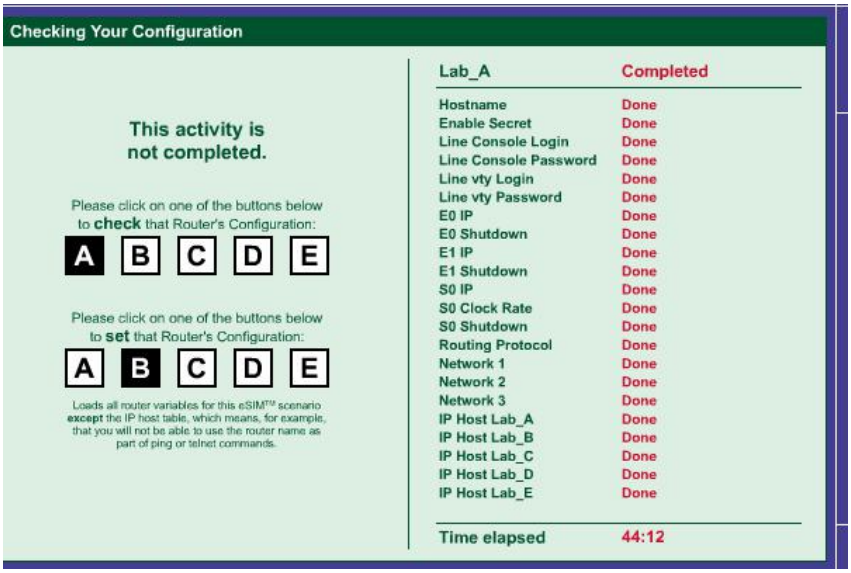
配置路由器交换机密码

```
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
```



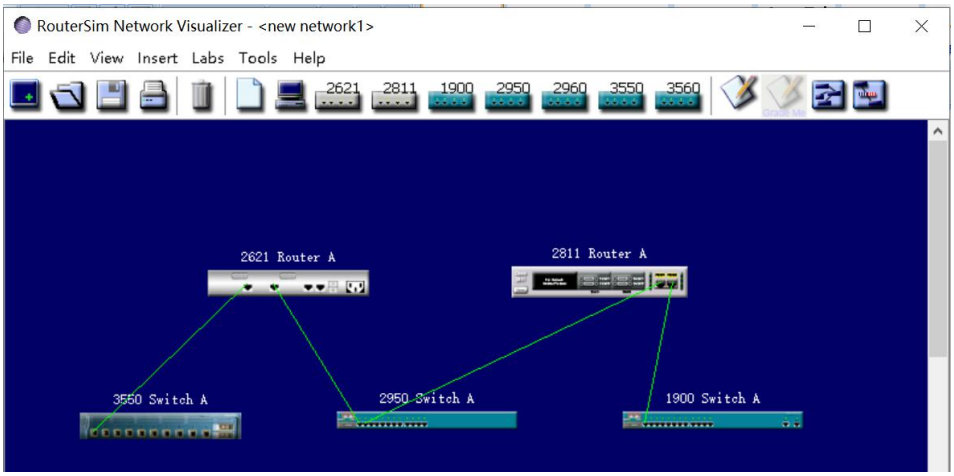
```
lab_A#show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2, E - 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)#
```



同理配置 BCDE 路由器。

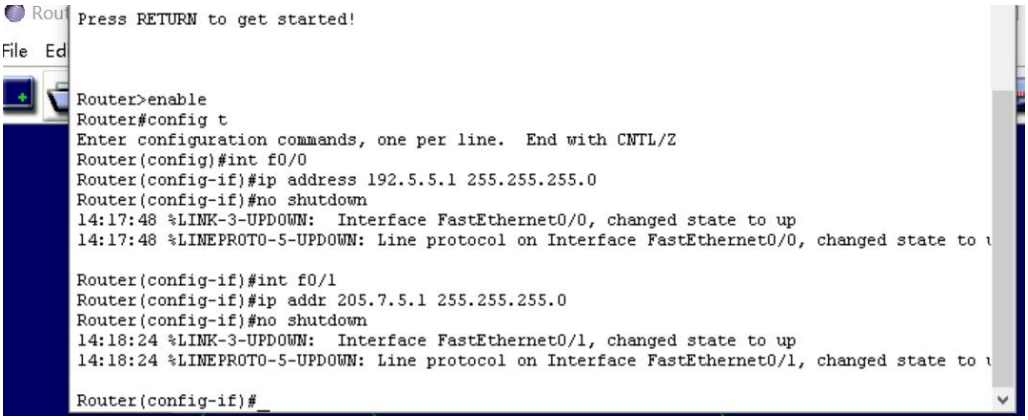
二、 静态路由设置(使用软件：CCNA Network Visualizer 6.0)

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。



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 de
       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
```

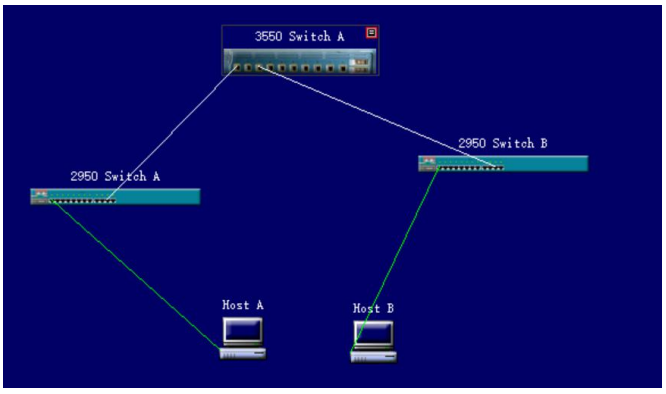
继续配置静态路由

```
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 - mo
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA exter
       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