厦門大學

信息学院软件工程系

《计算机网络》实验报告

题　　目　实验五　CISCO IOS 路由器基本配置

班　　级　　　　软件工程 2018 级 2 班

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1 实验目的

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）

2 实验环境

Router eSIM v1.1　　CNNA Network Visualizer 6.0

3 实验结果

首先用 Router eSIM v1.1 模拟路由的配置

```
Router>enable
Router#show startip-config
                    ^
% Invalid input detected at '^' marker.

Router#show startup-config
 %% Non-volatile configuration memory is not present
Router#config t
Enter configuration commands, one per line.  End with END.
Router(config)#hostname lab_A
lab_A(config)#banner motd #
Enter TEXT message.  End with the character '#'.
Accounting Department

You have entered a secured system.
Authorized access onlt' #
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 223.8.151.1 204.204.7.1 199.6.13.2
lab_A(config)#ip host lab_D 210.93.105.1 204.204.7.2
lab_A(config)#ip host lab_E 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 serial 0
lab_A(config-if)#ip address 201.100.11.1 255.255.255.0
lab_A(config-if)#exit
Lab_A(config)#interface serial 0
```
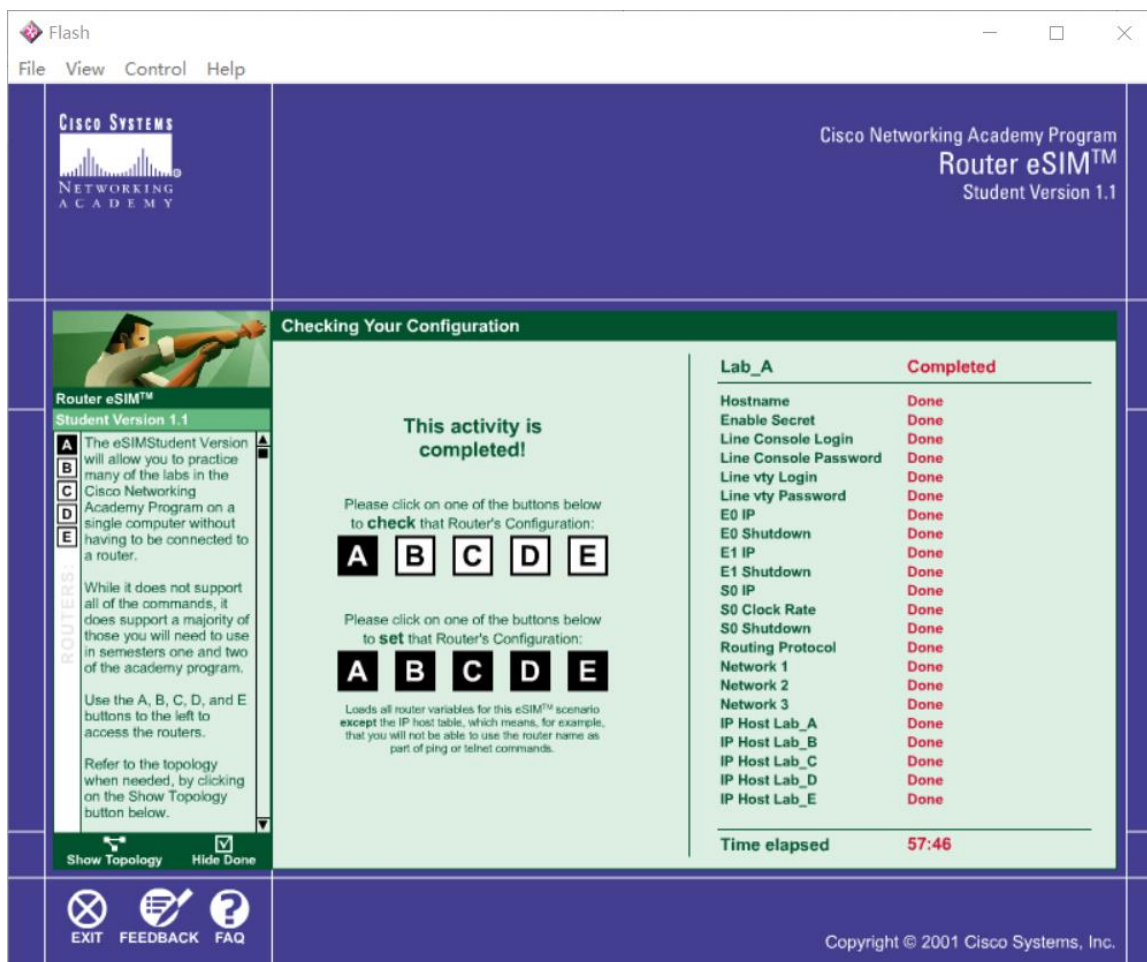
如图，配置完成，下面进行打印路由表，ping 操作

```
RounterA#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

R    204.204.7.0      /24 [120/2] via 201.100.11.2, 00:00:03, Serial0
R    223.8.151.0      /24 [120/2] via 201.100.11.2, 00:00:04, Serial0
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
R    210.93.105.0     /24 [120/3] via 201.100.11.2, 00:00:04, Serial0
```
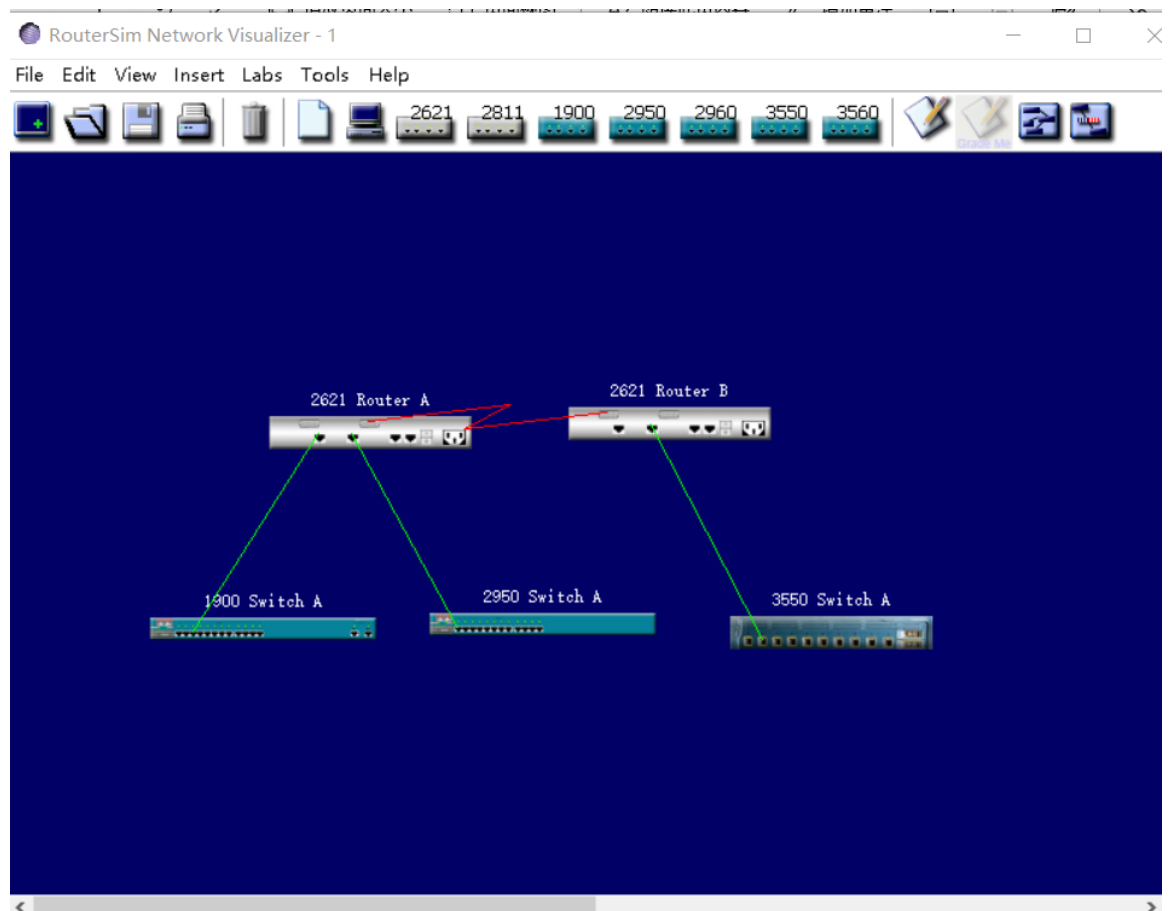
```
RounterA#ping 210.93.105.1
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echoes to 210.93.105.1, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 32/33/36 ms
```
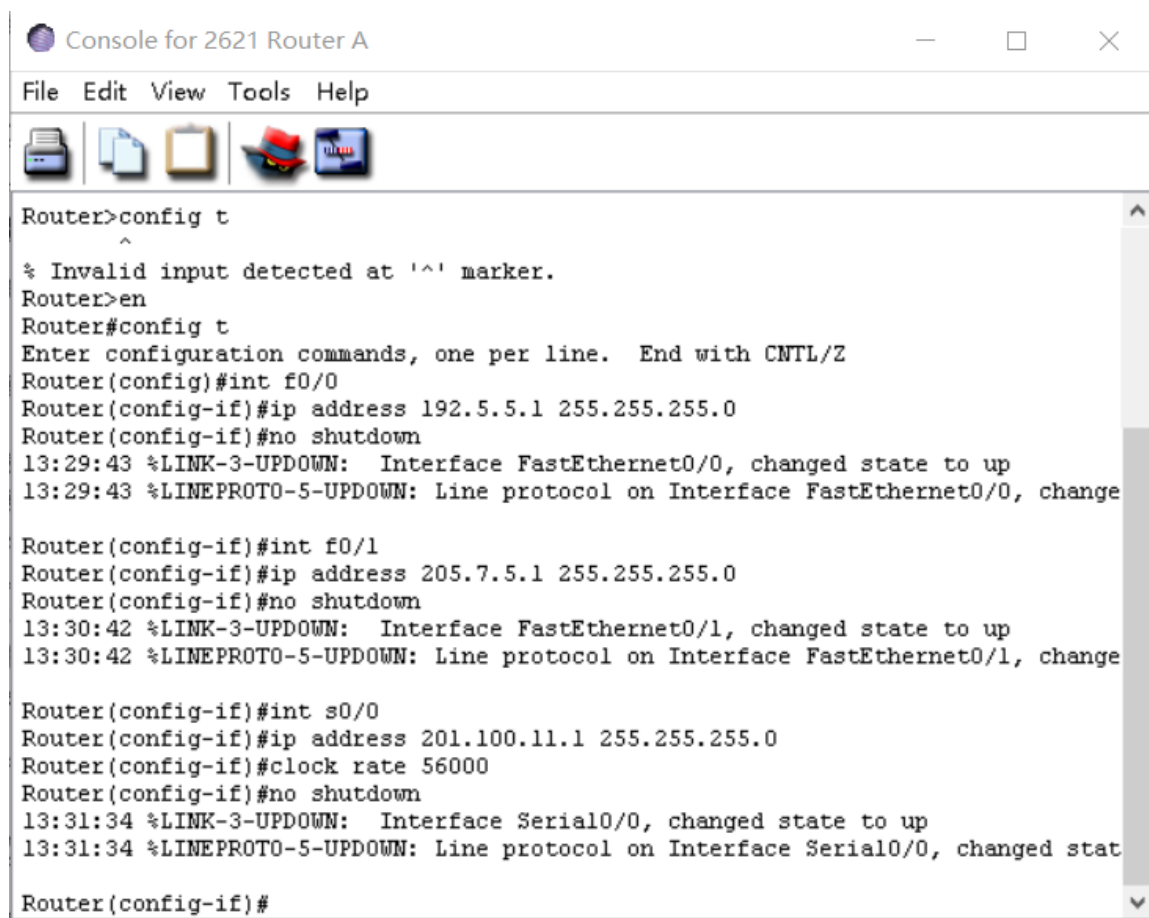
如图所示，成功

下面进行使用 CNNA network 6.0 配置操作

配置如上图所示

下面开始配置静态路由

```
Console for 2621 Router A                                    —   □   ✕

File  Edit  View  Tools  Help

🖨  📋  ⬜  🔴  🔲

Router>config t
         ^
% Invalid input detected at '^' marker.
Router>en
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
13:29:43 %LINK-3-UPDOWN:  Interface FastEthernet0/0, changed state to up
13:29:43 %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, change

Router(config-if)#int f0/1
Router(config-if)#ip address 205.7.5.1 255.255.255.0
Router(config-if)#no shutdown
13:30:42 %LINK-3-UPDOWN:  Interface FastEthernet0/1, changed state to up
13:30:42 %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, change

Router(config-if)#int s0/0
Router(config-if)#ip address 201.100.11.1 255.255.255.0
Router(config-if)#clock rate 56000
Router(config-if)#no shutdown
13:31:34 %LINK-3-UPDOWN:  Interface Serial0/0, changed state to up
13:31:34 %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0, changed stat

Router(config-if)#
```
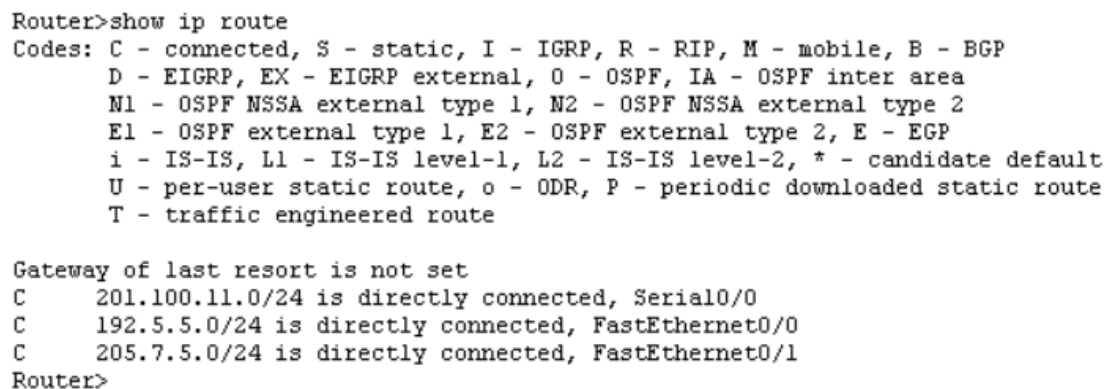
对路由器 A 进行配置，对路由器 B 也是进行类似操作

```
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 route
       T - traffic engineered route

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

对路由器的路由表进行查看

```
Router>en
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
Router#
```

此时 ping 路由器 B 上的交换机，无法联通

```
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
       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 route
       T - traffic engineered route

       U - per-user static route, o - ODR, P - periodic downloaded static route
       T - traffic engineered route

Gateway of last resort is not set
S     199.6.13.0 [1/0] via 201.100.11.2
C     201.100.11.0/24 is directly connected, Serial0/0
C     192.5.5.0/24 is directly connected, FastEthernet0/0
C     205.7.5.0/24 is directly connected, FastEthernet0/1
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 100 percent (5/5), round-trip min/avg/max = 4/4/4 ms
Router#
```
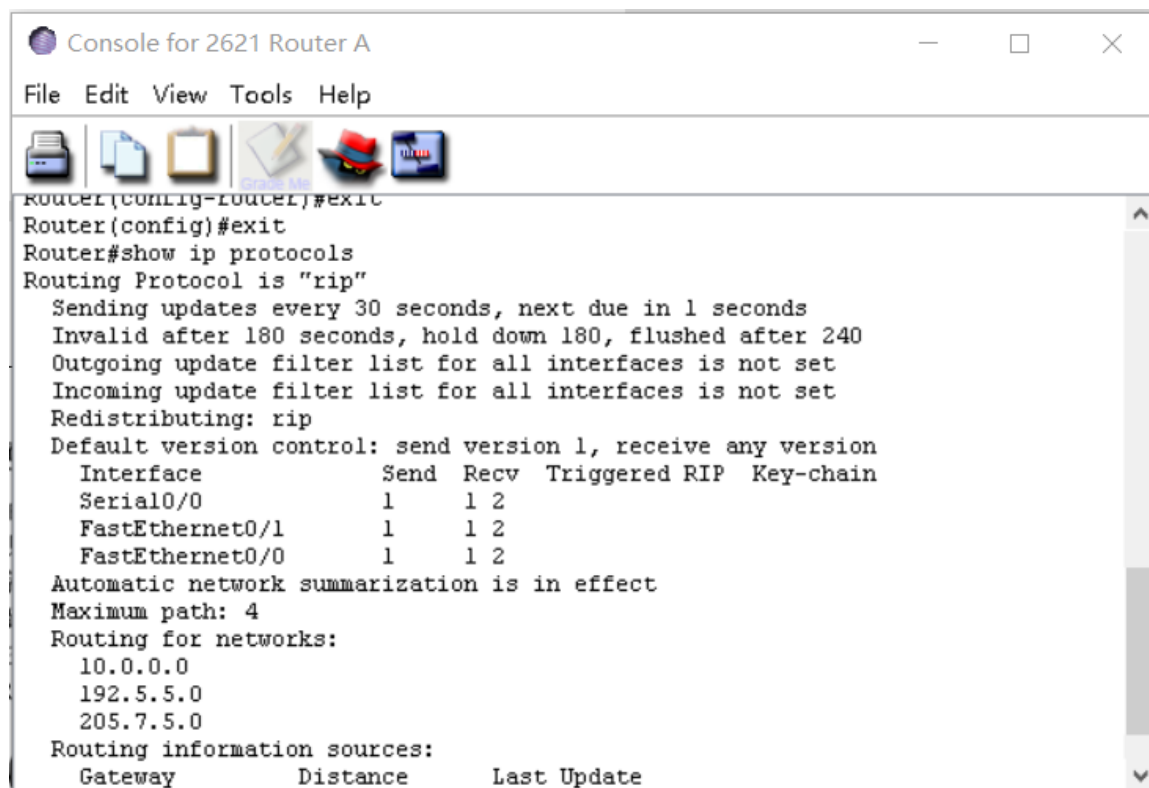
如上图，在配置静态路由以后就可以 ping 通了

下面进行动态路由配置

```
Gateway of last resort is not set
S      199.6.13.0 [1/0] via 201.100.11.2
C      201.100.11.0/24 is directly connected, Serial0/0
C      192.5.5.0/24 is directly connected, FastEthernet0/0
C      205.7.5.0/24 is directly connected, FastEthernet0/1
Router#config t
Enter configuration commands, one per line.  End with CNTL/Z
Router(config)#router rip
Router(config-router)#network 192.5.5.0
Router(config-router)#network 205.7.5.0
Router(config-router)#
```

首先启动 RIP 协议，并指定作用的网络

Console for 2621 Router A — □ ×

File Edit View Tools Help

```
Router(config-router)#exit
Router(config)#exit
Router#show ip protocols
Routing Protocol is "rip"
  Sending updates every 30 seconds, next due in 1 seconds
  Invalid after 180 seconds, hold down 180, flushed after 240
  Outgoing update filter list for all interfaces is not set
  Incoming update filter list for all interfaces is not set
  Redistributing: rip
  Default version control: send version 1, receive any version
    Interface            Send  Recv  Triggered RIP  Key-chain
    Serial0/0            1     1 2
    FastEthernet0/1      1     1 2
    FastEthernet0/0      1     1 2
  Automatic network summarization is in effect
  Maximum path: 4
  Routing for networks:
    10.0.0.0
    192.5.5.0
    205.7.5.0
  Routing information sources:
    Gateway        Distance     Last Update
```

查看协议类型，配置成功

下面开始配置交换机端口的 VLAN
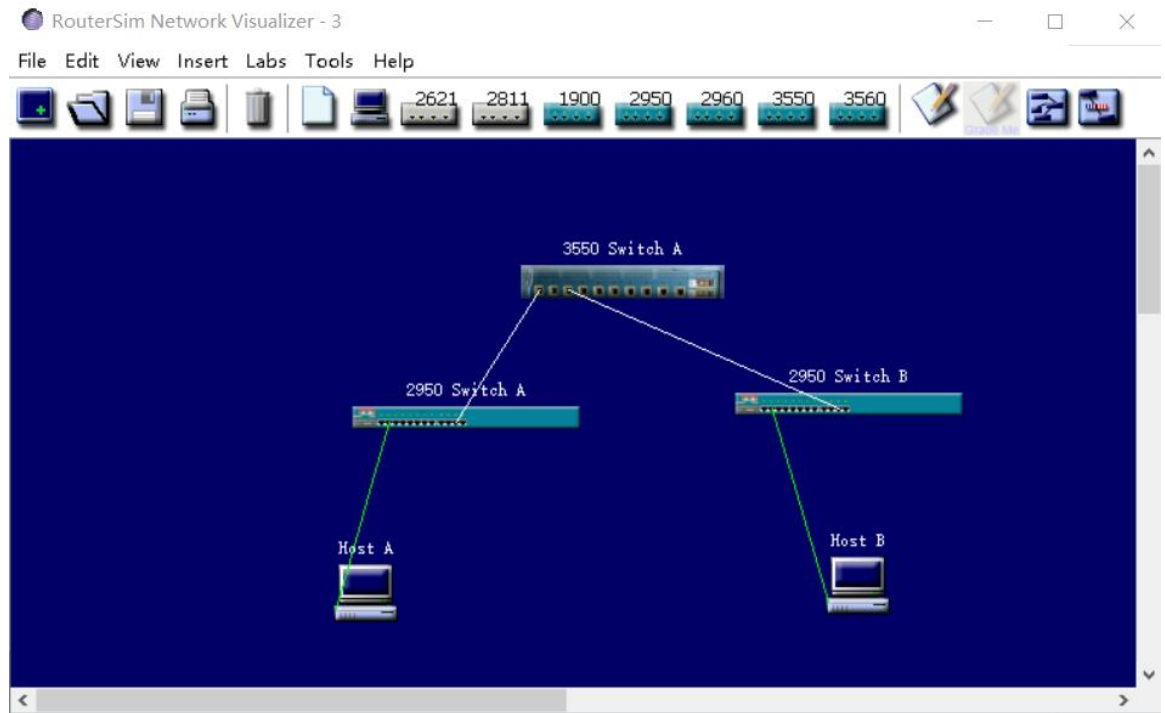
创建如图所示的连接图

首先设置 VTP 域

```
Console for 2950 Switch A                          —    □    ×
File  Edit  View  Tools  Help


Press RETURN to get started!


switch>en
switch#config t
Enter configuration commands, one per line.  End with CNTL/Z
switch(config)#hostname 2950A
2950A(config)#vtp domain Cisco
Changing VTP domain name from NULL to Cisco
2950A(config)#vtp mode ?
  client      Set the device to client mode.
  server      Set the device to server mode.
  transparent Set the device to transparent mode.

2950A(config)#vtp mode client
Setting device to VTP CLIENT mode.
2950A(config)#exit
2950A#
```

然后配置 trunk


```
Console for 3550 Switch A                          —    □    ×
File  Edit  View  Tools  Help

% Invalid input detected at '^' marker.
3550A#config t
Enter configuration commands, one per line.  End with CNTL/Z
3550A(config)#interface fa0/1
3550A(config-if)#switchport trunk encapsulation ?
  dot1q       Interface uses only 802.1q trunking encapsulation when trunking
  isl         Interface uses only ISL trunking encapsulation when trunking
  negotiate   Device will negotiate trunking encapsulation with peer on
              interface

3550A(config-if)#switchport trunk encapsulation dot1q
16:10:57: %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, char
to down
16:10:57: %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, char
3550A(config-if)#switchport mode trunk
3550A(config-if)#interface fa0/3
3550A(config-if)#switchport trunk encapsulation dot1q
16:12:22: %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/3, char
to down
16:12:22: %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/3, char
3550A(config-if)#switchport mode trunk
3550A(config-if)#
```

```
2950A(config)#interface fa0/11
2950A(config-if)#switchport mode trunk
```
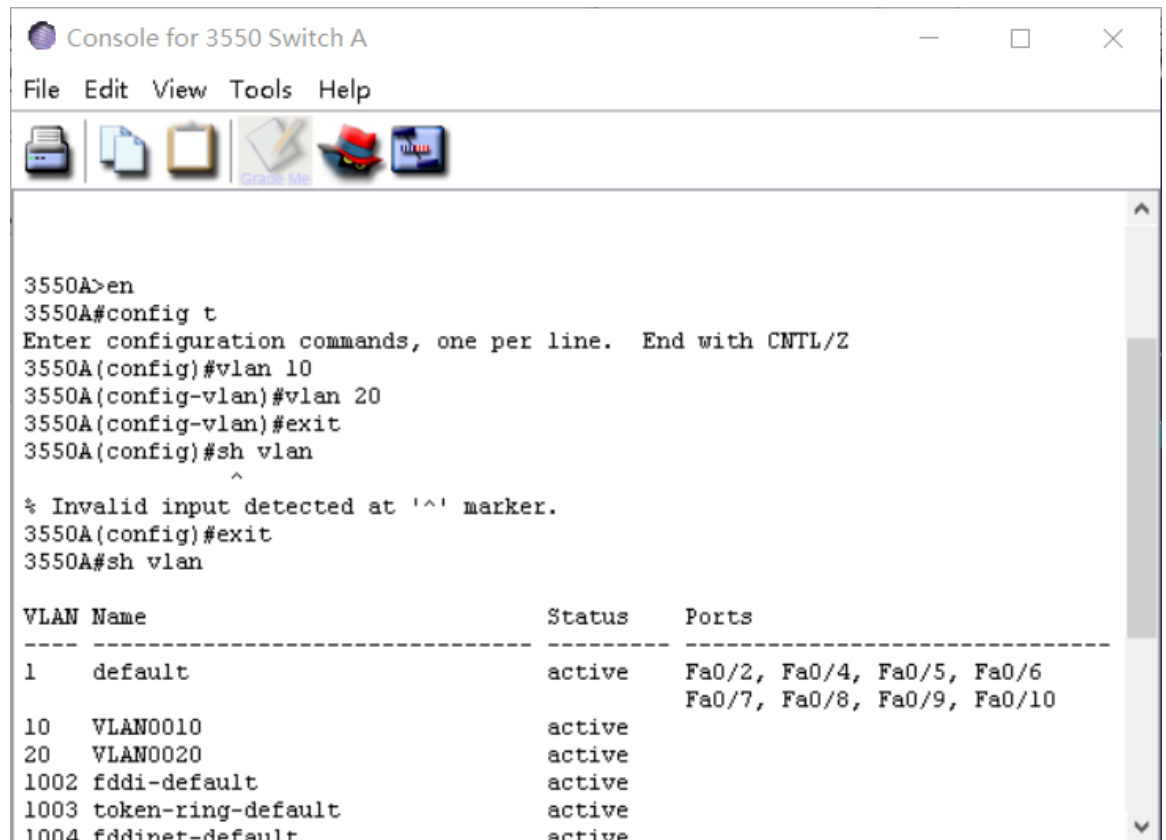
```
2950B(config)#interface fa0/11
2950B(config-if)#switchport mode trunk
```

创建 vlan 并查看

```
Console for 3550 Switch A                              —    □    ×

File  Edit  View  Tools  Help



3550A>en
3550A#config t
Enter configuration commands, one per line.  End with CNTL/Z
3550A(config)#vlan 10
3550A(config-vlan)#vlan 20
3550A(config-vlan)#exit
3550A(config)#sh vlan
                  ^
% Invalid input detected at '^' marker.
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
```

分配交换机接入 vlan

```
2950A(config)#interface fa0/2
2950A(config-if)#switchport access vlan 10
2950A(config-if)#

2950B(config)#interface fa0/2
2950B(config-if)#switchport access vlan 20
2950B(config-if)#
```

配置第三层交换机并启动路由

```
% Invalid input detected at '^' marker.
3550A>
3550A>en
3550A#config t
Enter configuration commands, one per line.  End with CNTL/Z
3550A(config)#int vlan 10
3550A(config-if)#ip address 10.10.10.1 255.255.255.0
3550A(config-if)#no shut
3550A(config-if)#int vlan 20
3550A(config-if)#ip address 20.20.20.1 255.255.255.0
3550A(config-if)#no shut
3550A(config-if)#exit
3550A(config)#
```
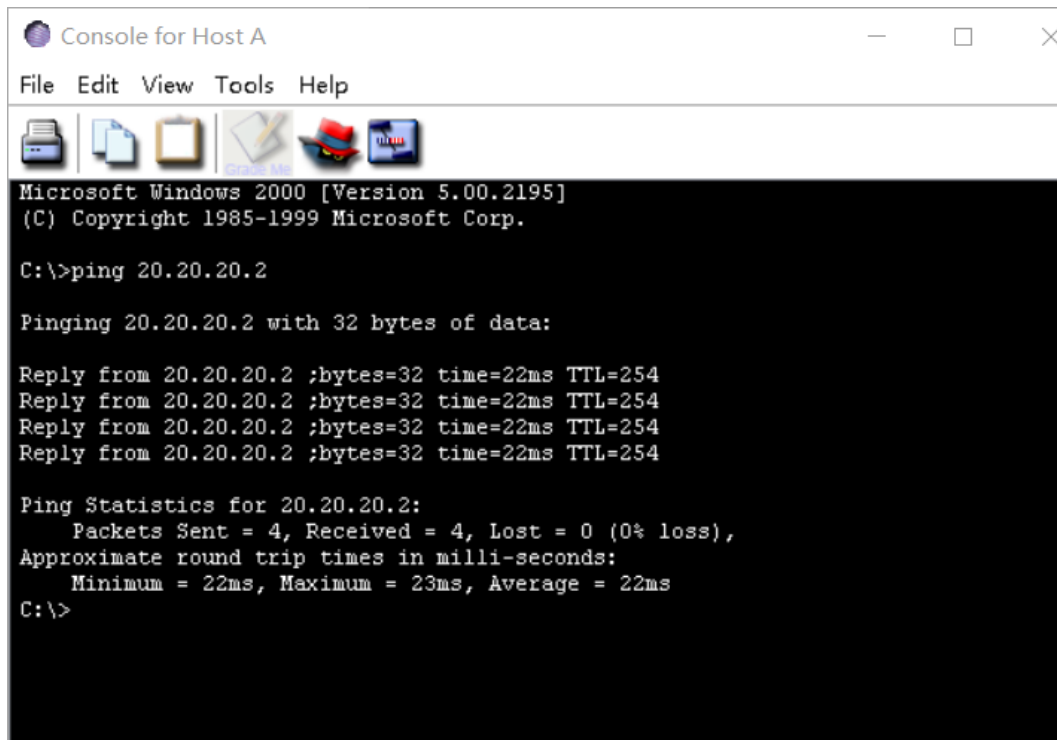
```
3550A(config)#ip routing
```

配置所有交换机

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

```
2950A(config)#int vlan 1
2950A(config-if)#ip address 192.168.10.2 255.255.255.0
2950A(config-if)#no shut
```

```
2950B(config)#int vlan 1
2950B(config-if)#ip address 192.168.10.3 255.255.255.0
2950B(config-if)#no shut
```

配置主机后，ping 测试

两台主机互相 ping，成功

```
3550A>en
3550A#ping 192.168.10.3

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.10.3, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 4/4/4 ms
3550A#
```

交换机 ping 主机，成功

4   实验总结

经过这次实验，我对路由器的原理有了更深刻的理解，并且学会了如何配置路由器