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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实验时间 2020 年 4 月 8 日

2020 年 4 月 21 日

1 实验目的

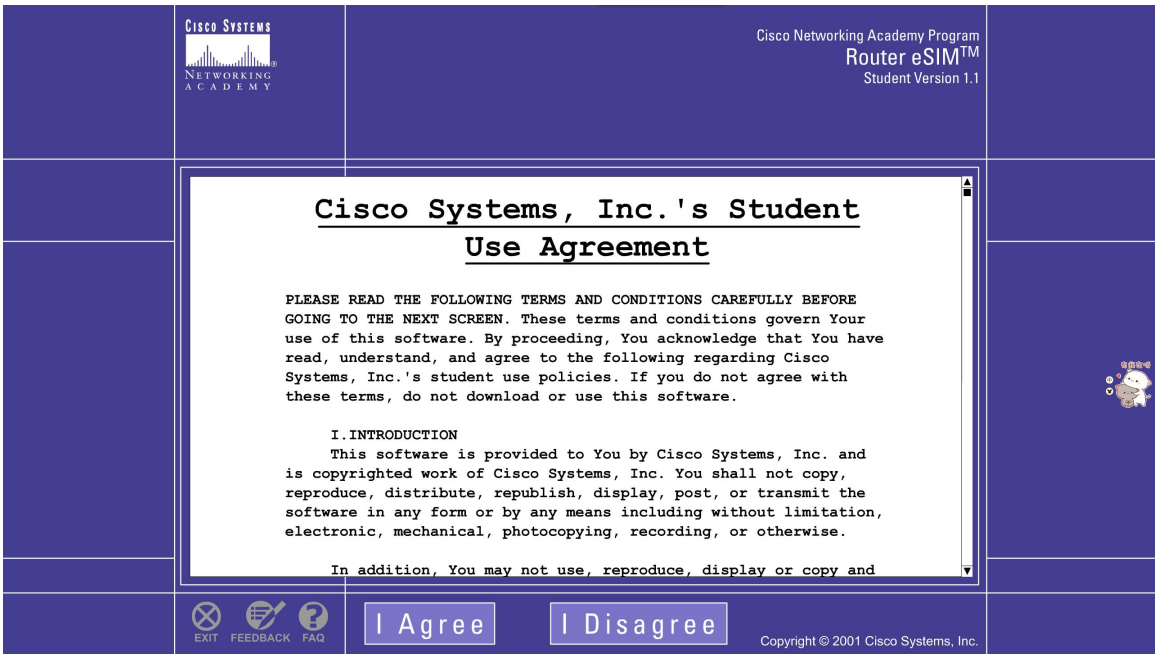
使用 Router eSIM v1.1 模拟器来模拟路由器的配置环境；使用 CCNA Network Visualizer 6.0 配置静态路由、动态路由和交换机端口的 VLAN（虚拟局域网）。

2 实验环境

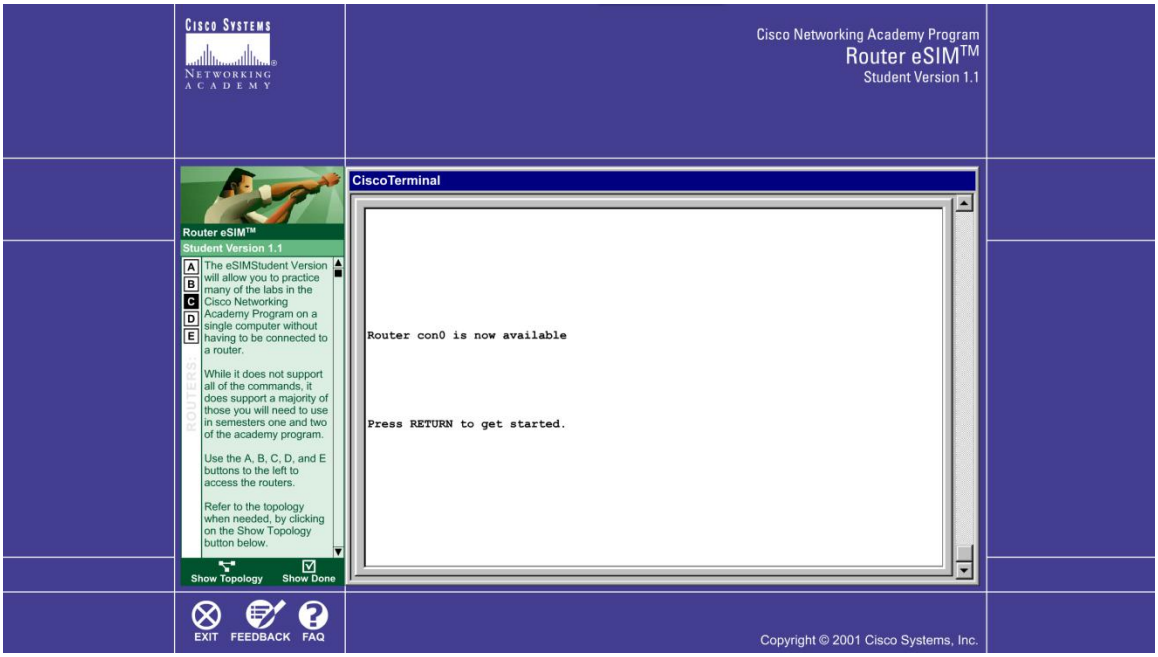
操作系统：Windows 10，实验工具：Router eSIM v1.1，CCNA Network Visualizer 6.0。

3 实验结果

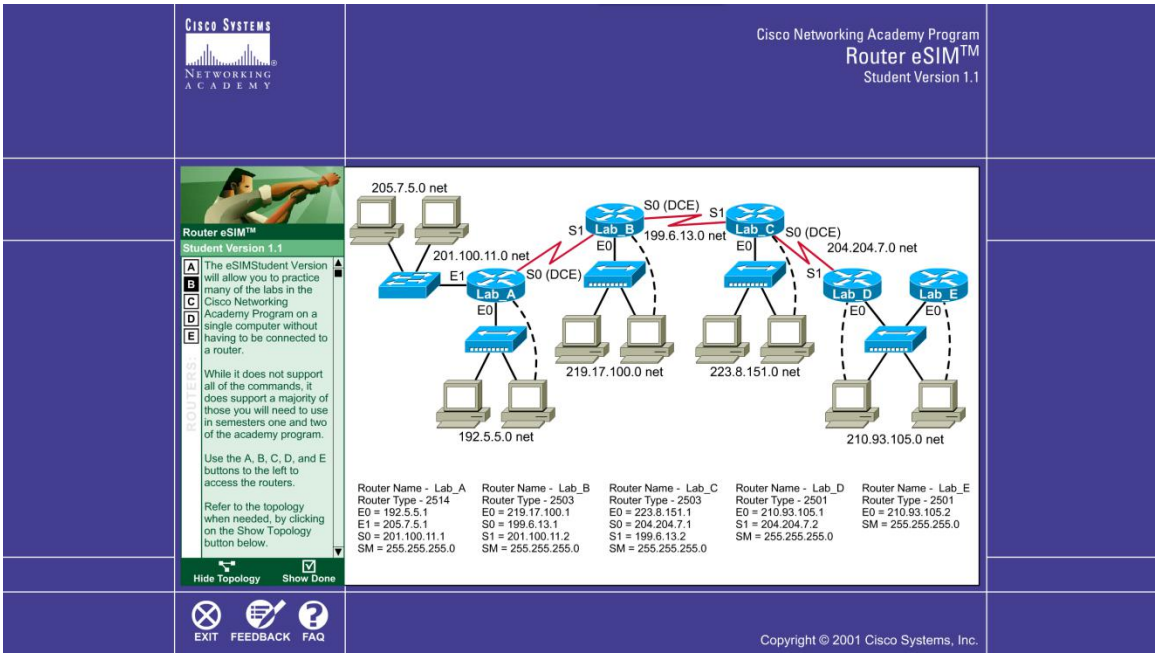
Router eSIM v1.1 启动界面：



主界面：


Cisco Systems
Networking Academy
Cisco Networking Academy Program
Router eSIM™
Student Version 1.1
Router eSIM™
Student Version 1.1
A
B
C
D
E
routers
The eSIMStudent Version will allow you to practice many of the labs in the Cisco Networking Academy Program on a single computer without having to be connected to a router.
While it does not support all of the commands, it does support a majority of those you will need to use in semesters one and two of the academy program.
Use the A, B, C, D, and E buttons to the left to access the routers.
Refer to the topology when needed, by clicking on the Show Topology button below.
Show Topology
Show Done
CiscoTerminal
Router con0 is now available
Press RETURN to get started.
EXIT
FEEDBACK
FAQ
Copyright © 2001 Cisco Systems, Inc.

拓扑图：


Cisco Systems
Networking Academy
Cisco Networking Academy Program
Router eSIM™
Student Version 1.1
Router eSIM™
Student Version 1.1
A
B
C
D
E
routers
The eSIMStudent Version will allow you to practice many of the labs in the Cisco Networking Academy Program on a single computer without having to be connected to a router.
While it does not support all of the commands, it does support a majority of those you will need to use in semesters one and two of the academy program.
Use the A, B, C, D, and E buttons to the left to access the routers.
Refer to the topology when needed, by clicking on the Show Topology button below.
Hide Topology
Show Done
205.7.5.0 net
201.100.11.0 net
E1
S0 (DCE)
Lab_A
E0
192.5.5.0 net
S1
Lab_B
E0
S0 (DCE)
199.6.13.0 net
219.17.100.0 net
S1
Lab_C
E0
S0 (DCE)
204.204.7.0 net
223.8.151.0 net
S1
Lab_D
E0
Lab_E
E0
210.93.105.0 net
Router Name - Lab_A
Router Type - 2514
E0 = 192.5.5.1
E1 = 205.7.5.1
S0 = 201.100.11.1
SM = 255.255.255.0
Router Name - Lab_B
Router Type - 2503
E0 = 219.17.100.1
S0 = 199.6.13.1
S1 = 201.100.11.2
SM = 255.255.255.0
Router Name - Lab_C
Router Type - 2503
E0 = 223.8.151.1
S0 = 204.204.7.1
S1 = 199.6.13.2
SM = 255.255.255.0
Router Name - Lab_D
Router Type - 2501
E0 = 210.93.105.1
S1 = 204.204.7.2
SM = 255.255.255.0
Router Name - Lab_E
Router Type - 2501
E0 = 210.93.105.2
SM = 255.255.255.0
EXIT
FEEDBACK
FAQ
Copyright © 2001 Cisco Systems, Inc.

改变路由器的名字：

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

查看路由器的配置文件：

```
lab_A#show running-config
Building configuration...

Current configuration:
!
version 12.0
service timestamps debug uptime
service timestamps log uptime
no service password-encryption
!
hostname lab_A
!
enable password
!
!
ip subnet-zero
ip host lab_A 192.5.5.1 205.7.5.1 201.100.11.1
ip host lab_B 219.17.100.1 199.6.13.1 201.100.11.2
ip host lab_C 223.8.151.1 204.204.7.1 199.6.13.2
ip host lab_D 210.93.105.1 204.204.7.2
ip host lab_E 210.93.105.2
!
!
```

显示串口的配置情况：

```
lab_A#show interface serial 0
Serial0 is administratively down, line protocol is down
   Internet address is 201.100.11.1/24
   Hardware is HD64570
   MTU 1500 bytes, BW 1544 Kbit, DLY 20000 usec,
      reliability 255/255, txload 1/255, rxload 1/255
   Encapsulation HDLC, loopback not set
   Keepalive set (10 sec)
   Last input never, output never, output hang never
   Last clearing of "show interface" counters never
   Input queue: 0/75/0 (size/max/drops); Total output drops: 0
   Queueing strategy: weighted fair
   Output queue: 0/1000/64/0 (size/max total/threshold/drops)
      Conversations  0/0/256 (active/max active/max total)
      Reserved Conversations 0/0 (allocated/max allocated)
   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 abort
      0 packets output, 0 bytes, 0 underruns
      0 output errors, 0 collisions, 1 interface resets
      0 output buffer failures, 0 output buffers swapped out
```

查看 IOS 的版本信息：

```
lab_A#show version
Cisco Internetwork Operating System Software
IOS (tm) 2500 Software (C2500-IS-L), Version 12.0(5), RELEASE SOFTWARE (fc1)
Copyright (c) 1986-1999 by cisco Systems, Inc.
Copyright (c) 1986-1999 by cisco Systems, Inc.
Image text-base: 0x0303D744, data-base: 0x00001000

ROM: System Bootstrap, Version 5.2(8a), RELEASE SOFTWARE
BOOTFLASH: 3000 Bootstrap Software (IGS-RXBOOT), Version 10.2(8a), RELEASE SOFTW
ARE (fc1)

Router uptime is 0 hours, 33 minutes
System restarted by power-on
System image file is "flash:ip.plus.c2500-is-l_120-5.bin"

cisco 2500 (68030) processor (revision D) with 4096K/2048K bytes of memory.
Processor board ID 02930235, with hardware revision 00000000
Bridging software.
X.25 software, Version 3.0.0.
Basic Rate ISDN software, Version 1.1.
2 Ethernet/IEEE 802.3 interface(s)
2 Serial network interface(s)
32K bytes of non-volatile configuration memory.
```

设置当日消息标题：

```
lab_A(config)#
lab_A(config)#banner motd #
Enter TEXT message.  End with the character '#'.
Accounting Department
You have entered a secured system.
Authorized access only! #
lab_A(config)#_
```

建立名字解析的映射表：

```
#
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)#
```

为路由器接口配置 IP 地址：

```
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)#_
```

配置充当 DEC 端的串行端口：

```
lab_A#config t
Enter configuration commands, one per line.  End with
lab_A(config)#interface serial 0
lab_A(config-if)#clock rate 56000
lab_A(config-if)#
```

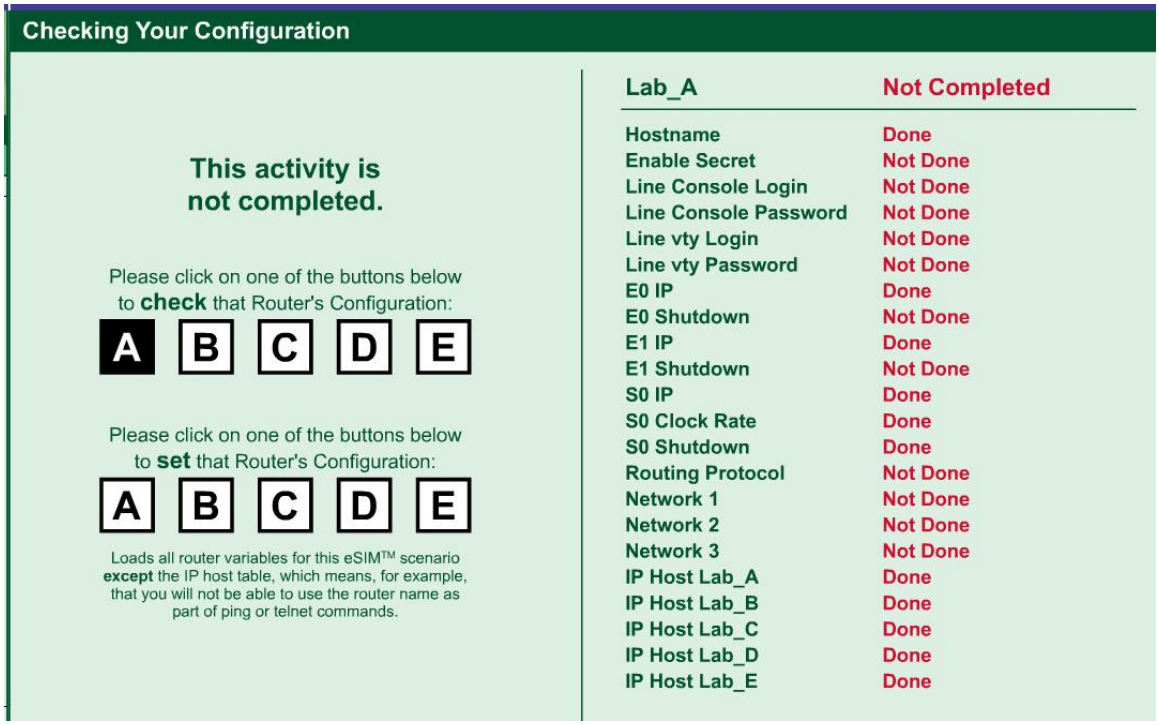
手工开启端口：

```
lab_A#configure term
Enter configuration commands, one per line.  End with END.
lab_A(config)#interface serial 0
lab_A(config-if)#no shutdown
lab_A(config-if)#
```

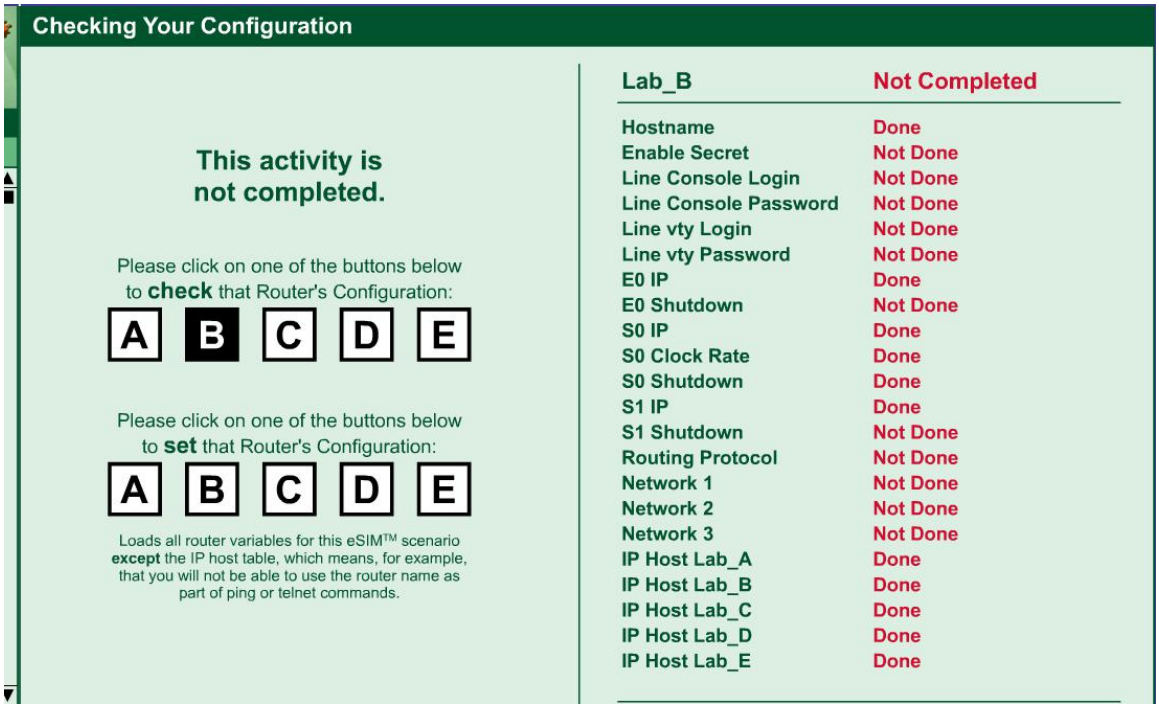
查看串口的配置情况：

```
lab_A#show interface serial 0
Serial0 is administratively down, line protocol is down
   Internet address is 201.100.11.1/24
   Hardware is HD64570
   MTU 1500 bytes, BW 1544 Kbit, DLY 20000 usec,
      reliability 255/255, txload 1/255, rxload 1/255
   Encapsulation HDLC, loopback not set
   Keepalive set (10 sec)
   Last input never, output never, output hang never
   Last clearing of "show interface" counters never
   Input queue: 0/75/0 (size/max/drops); Total output drops: 0
   Queueing strategy: weighted fair
   Output queue: 0/1000/64/0 (size/max total/threshold/drops)
      Conversations  0/0/256 (active/max active/max total)
      Reserved Conversations 0/0 (allocated/max allocated)
   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 abort
      0 packets output, 0 bytes, 0 underruns
      0 output errors, 0 collisions, 1 interface resets
      0 output buffer failures, 0 output buffers swapped out
```

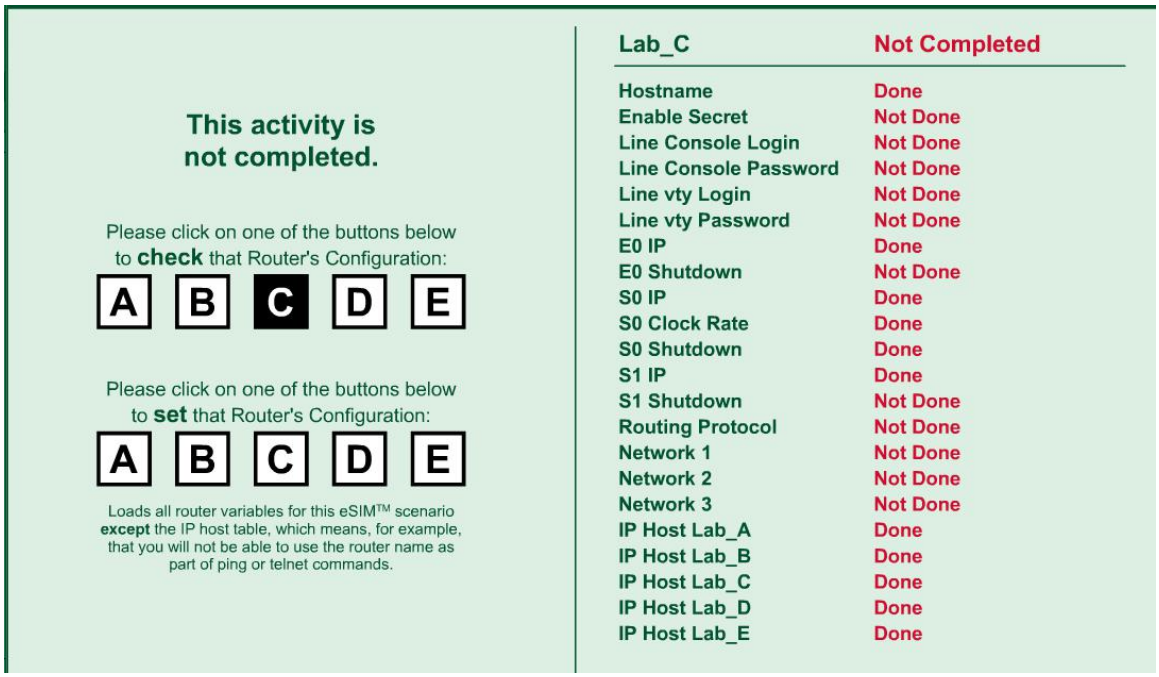
Lab_A 配置完成：



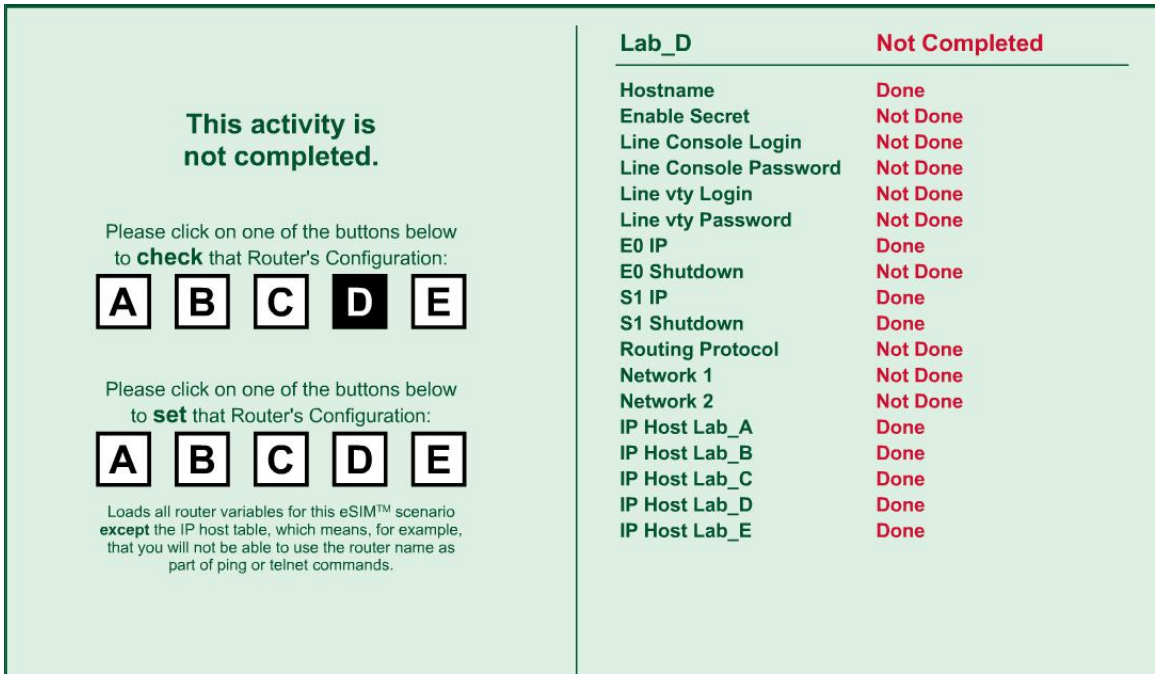
Lab_B 配置完成：



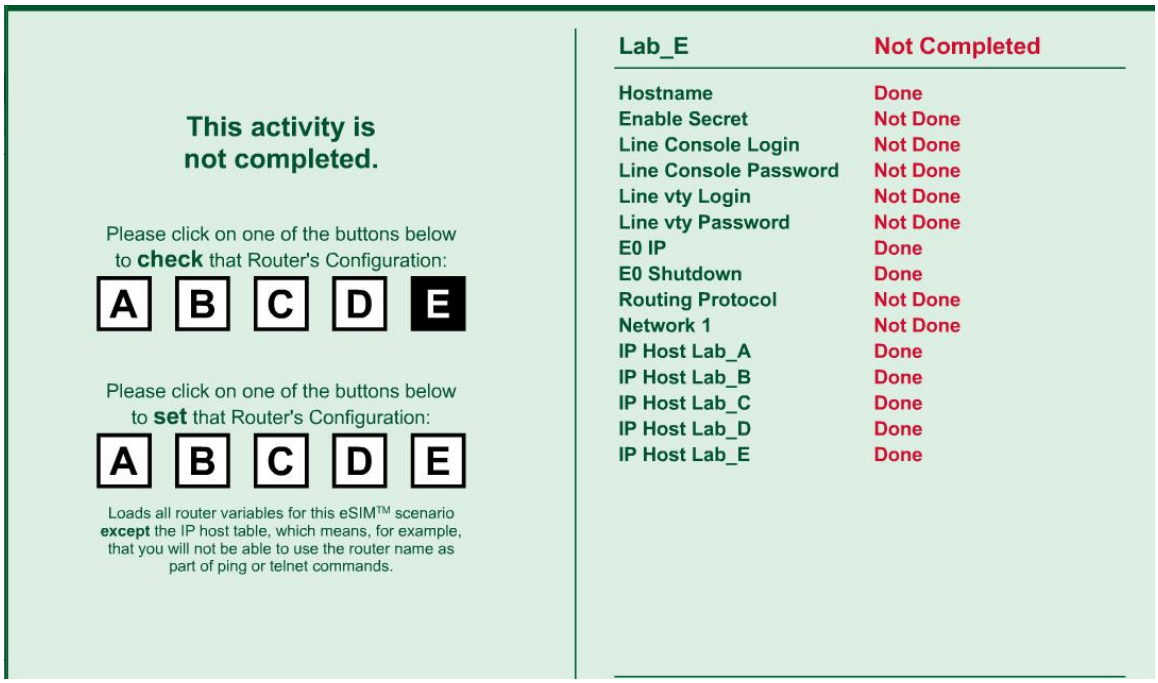
Lab_C 配置完成：



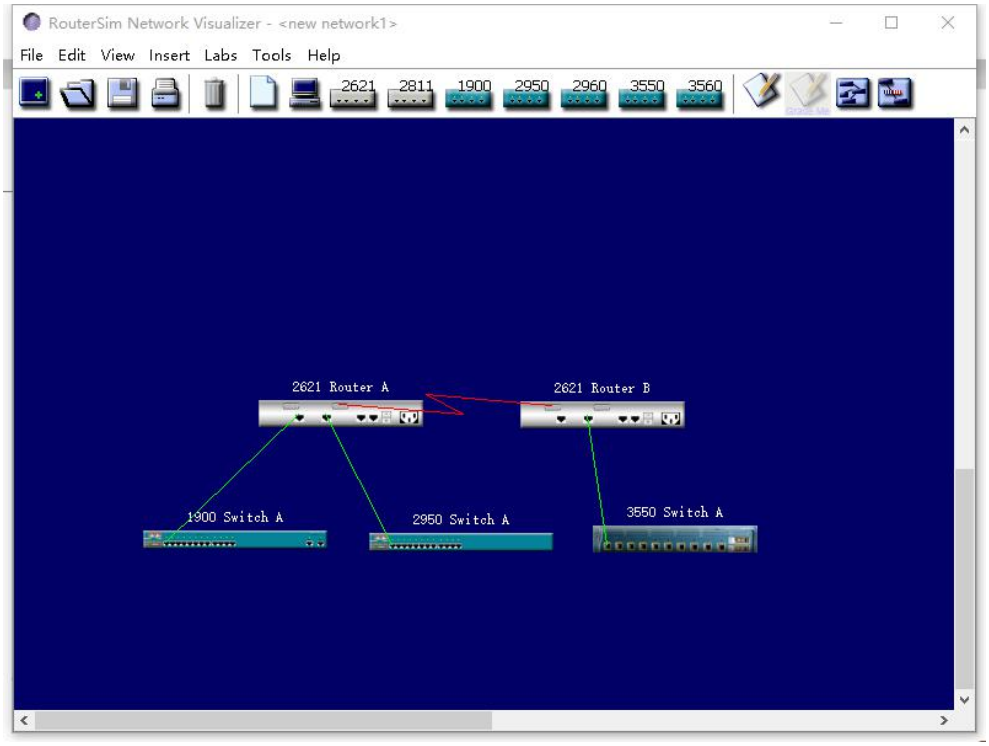
Lab_D 配置完成：



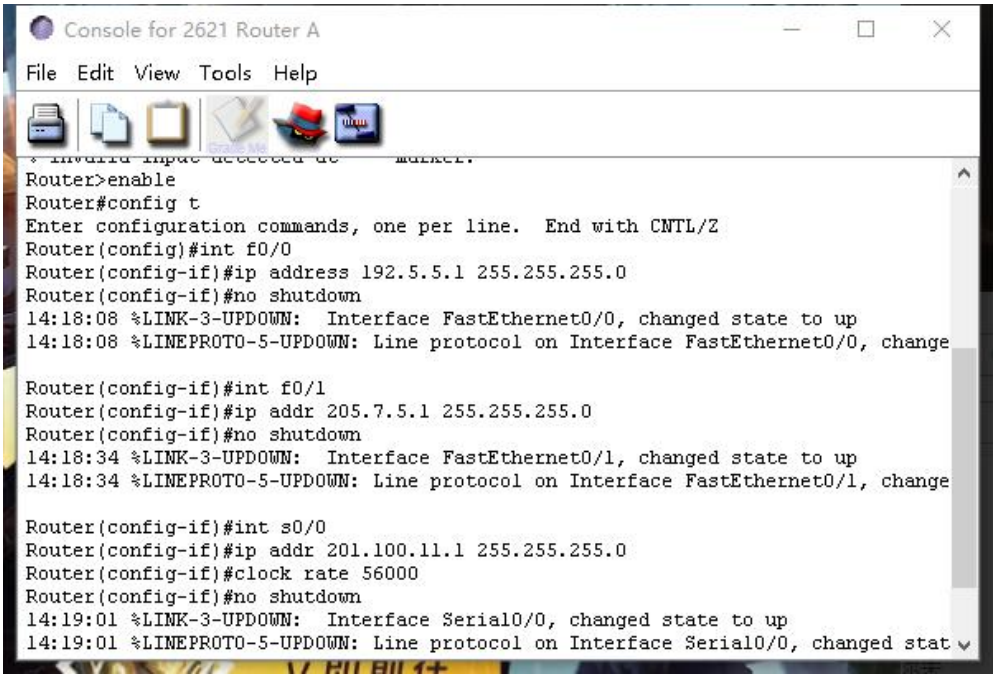
Lab_E 配置完成：



设备连接图：



路由器 A 设置：

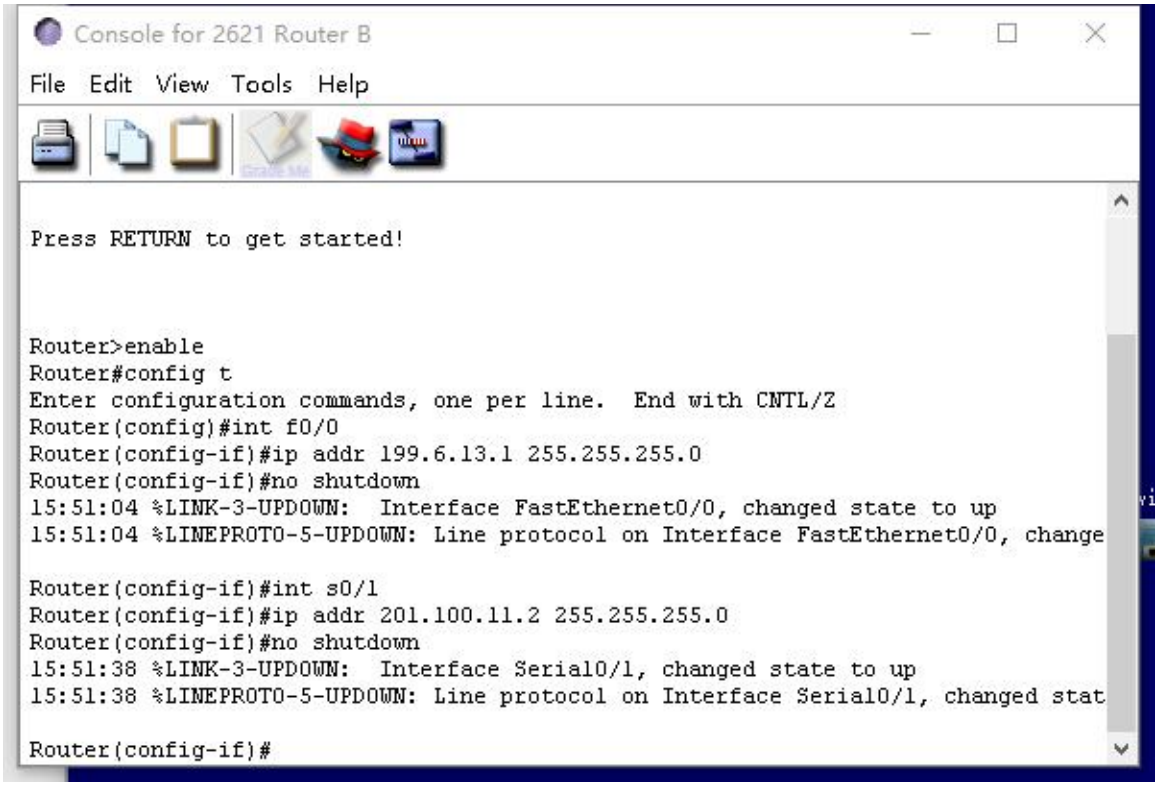


路由器 A 路由表：

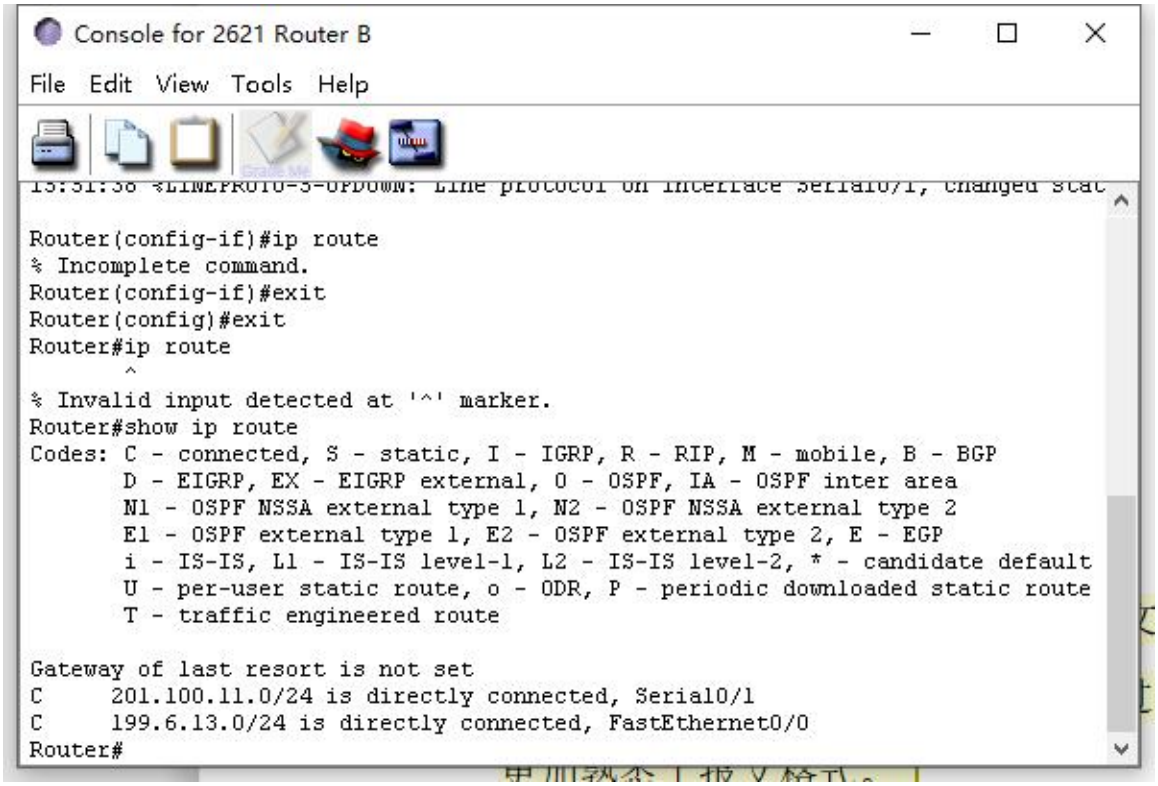
```
Router(config-if)#exit
Router(config)#exit
Router#show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external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

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

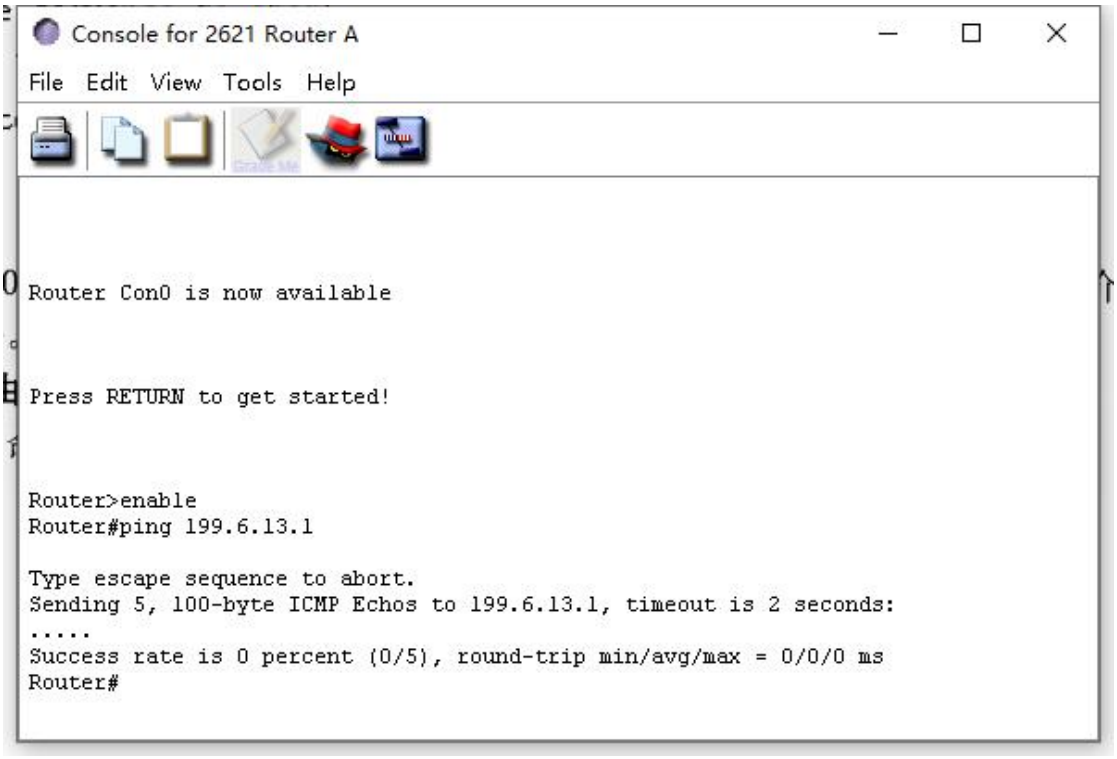
路由器 B 设置：



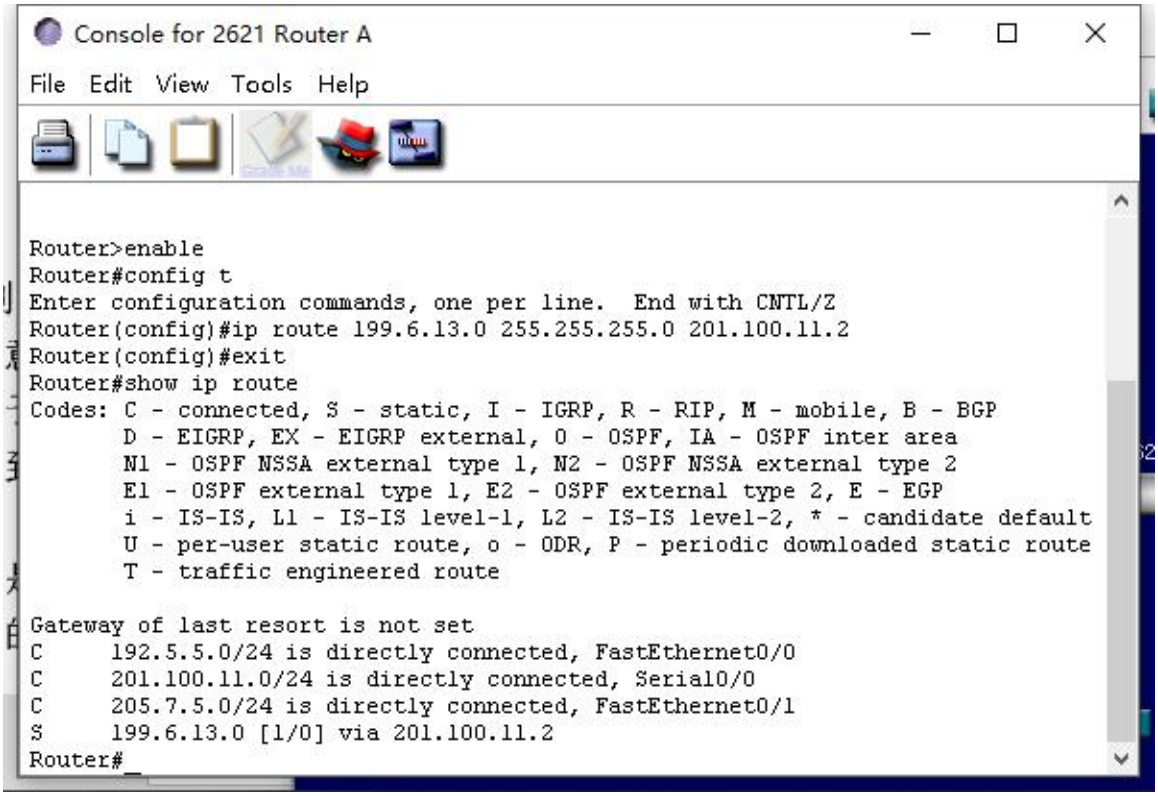
路由器 B 路由表：



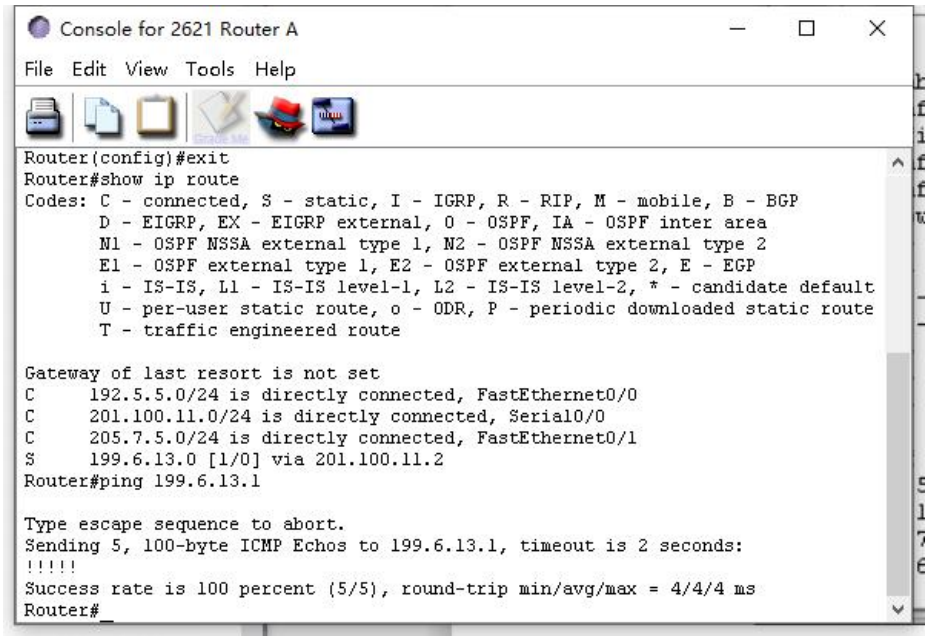
Ping 199.6.13.1：



设置路由器 A 静态路由：

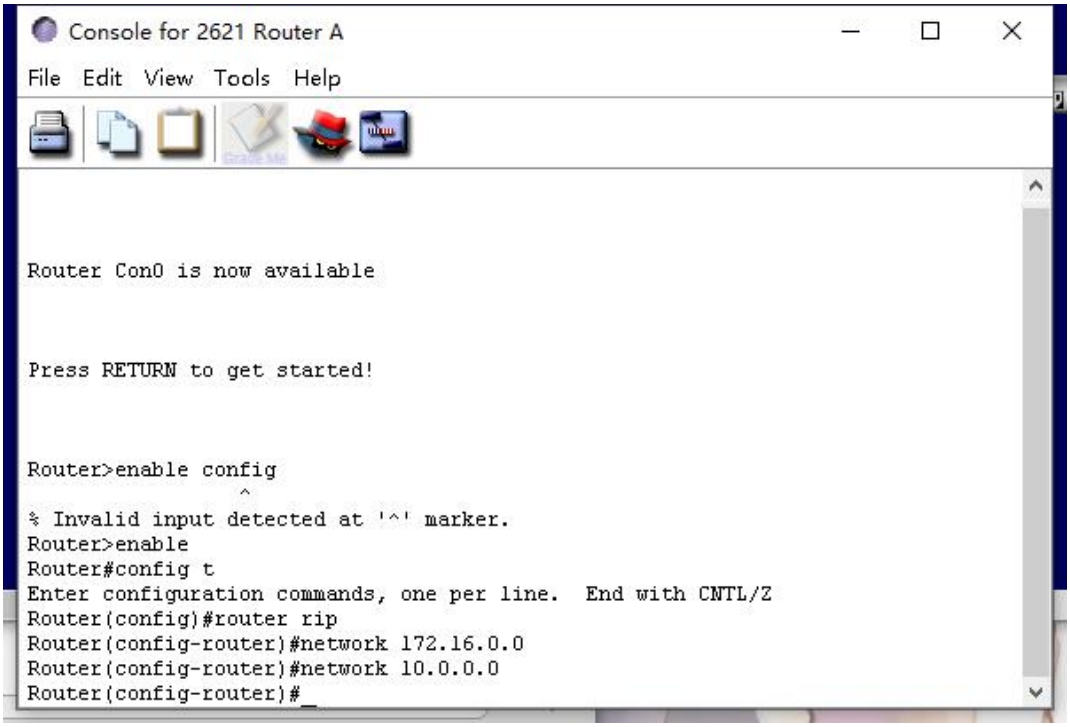


检验连通性：良好

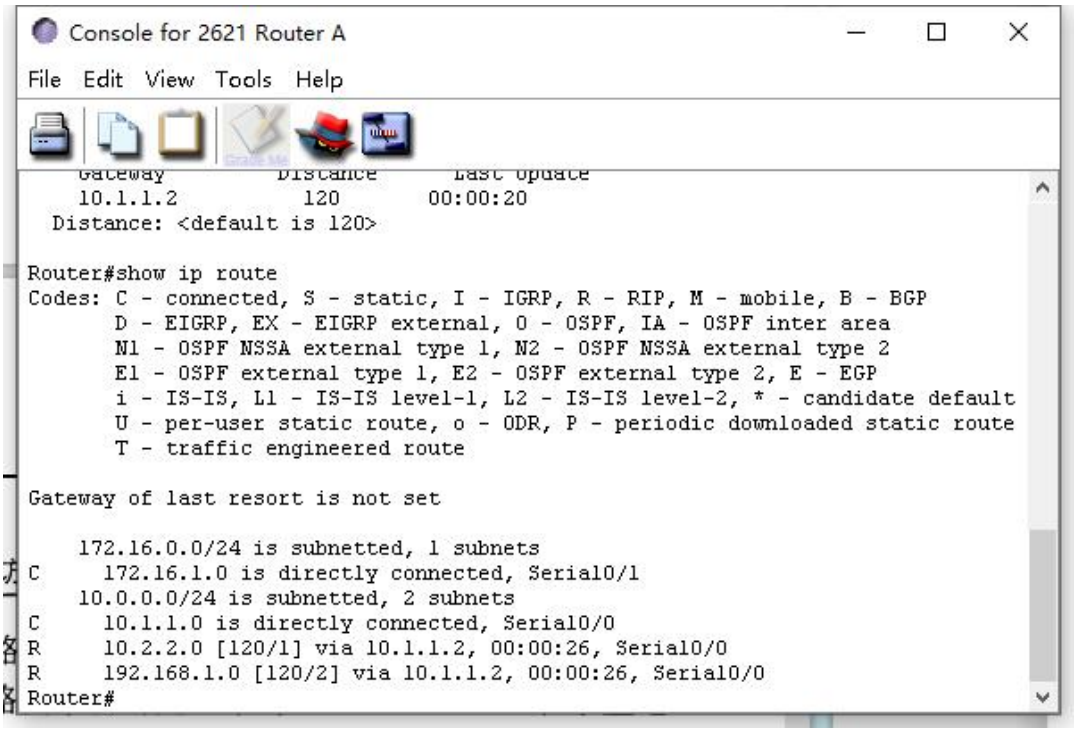


动态路由：

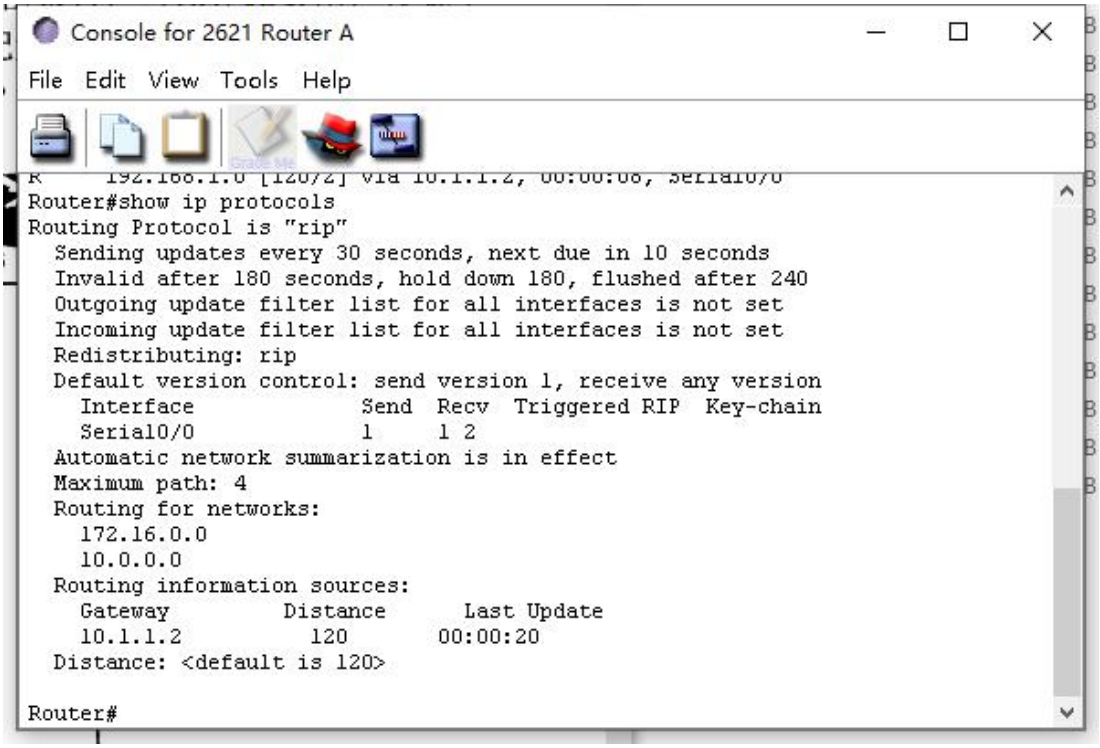
配置 Router A：RIP



检查路由器 A 的路由表

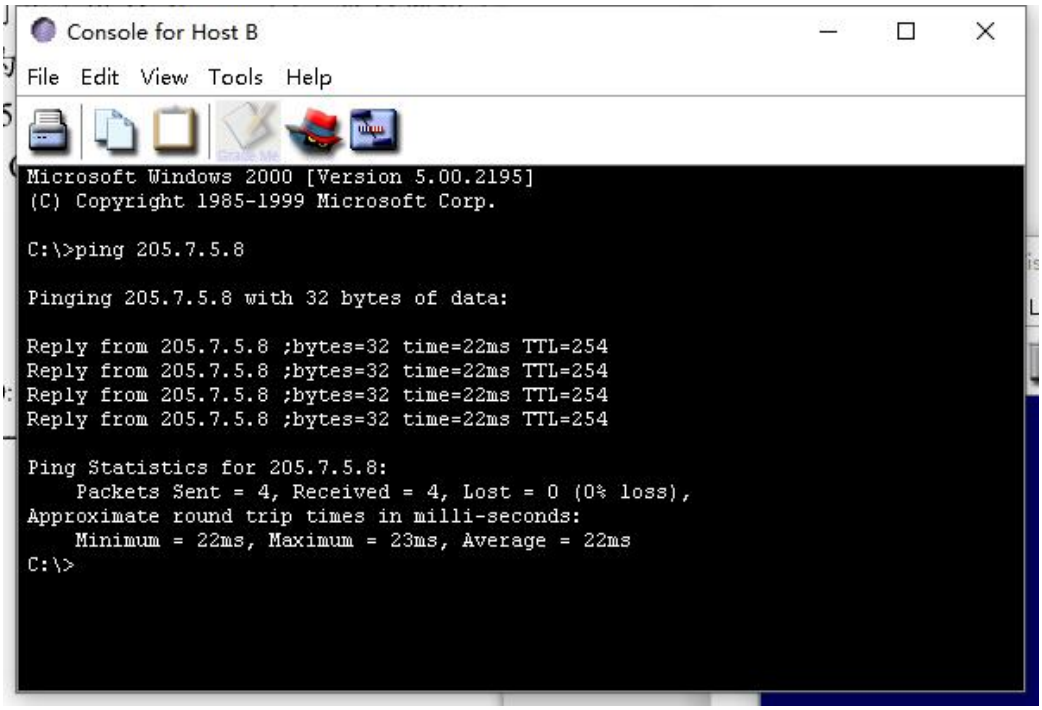


同理设置路由器 B 和路由器 C 后，检查配置路由协议是否正确：

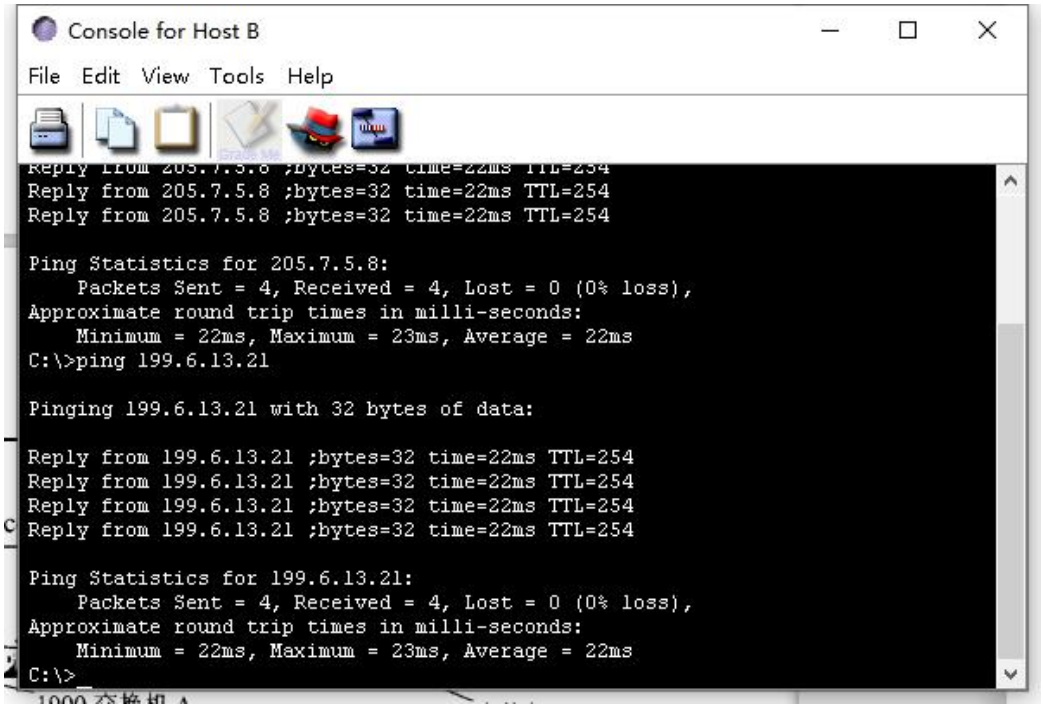


Cisco 路由器访问列表配置：

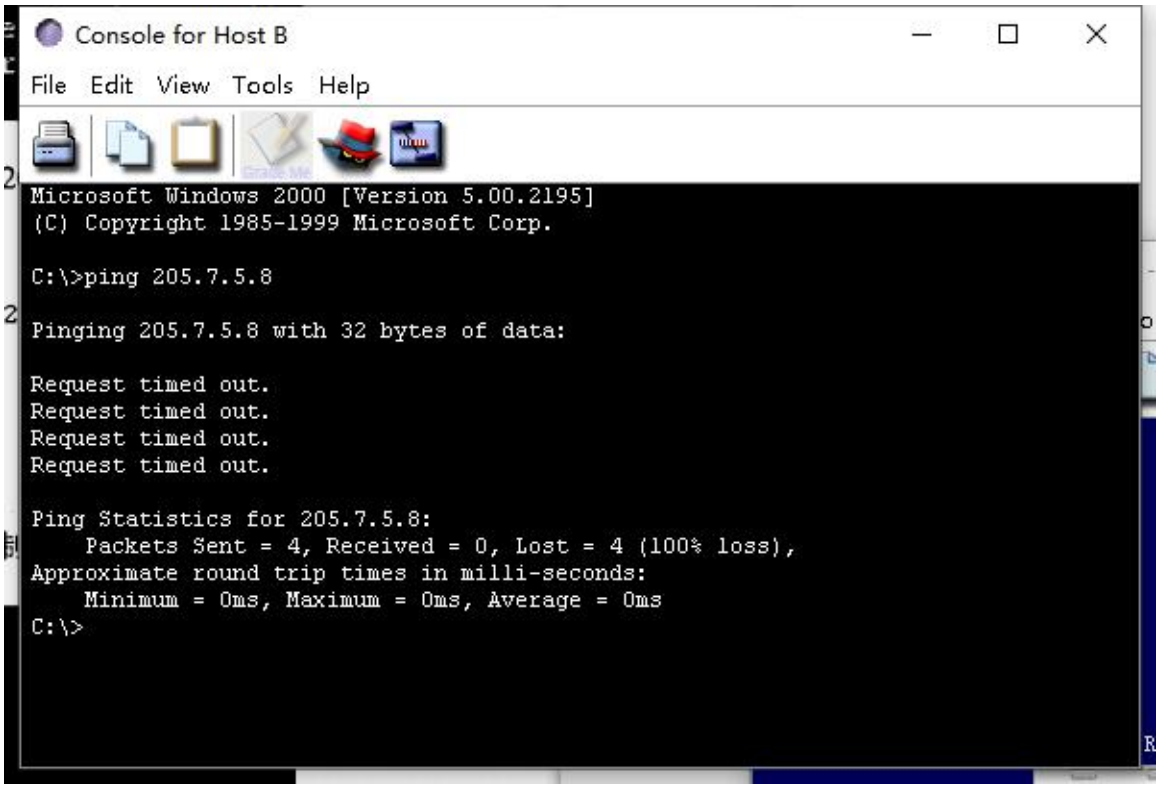
主机 B ping 主机 A（配置后）：



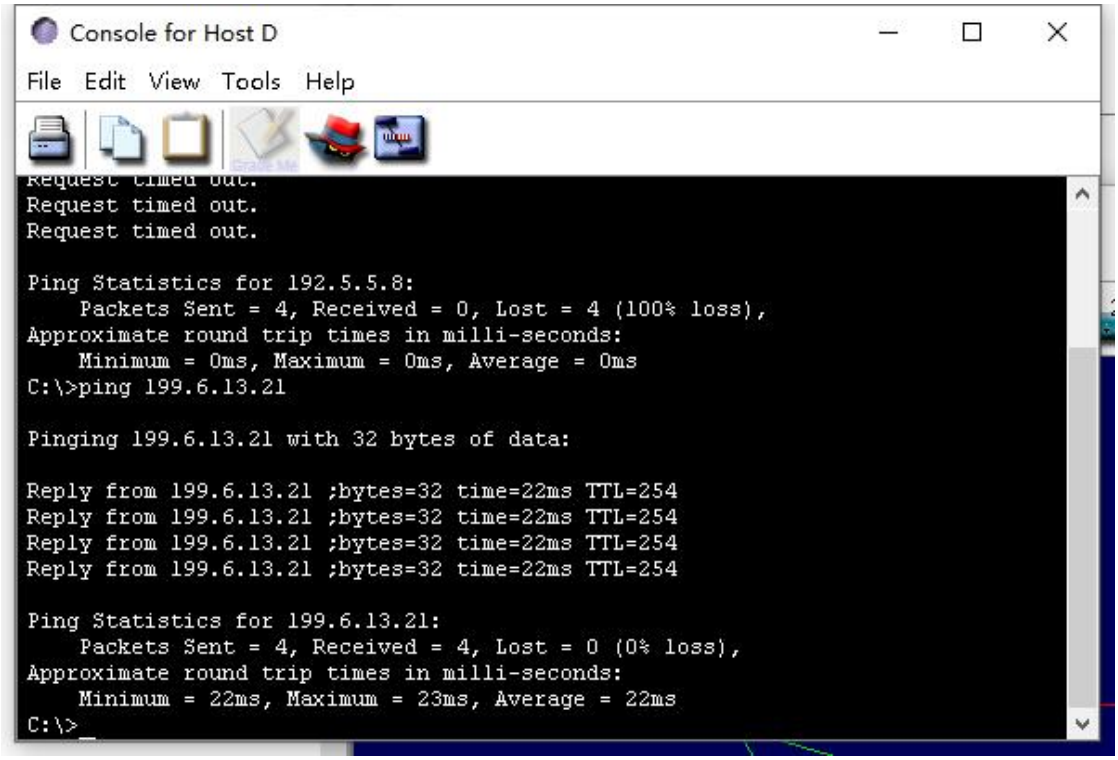
主机 B ping 主机 C（配置后）：



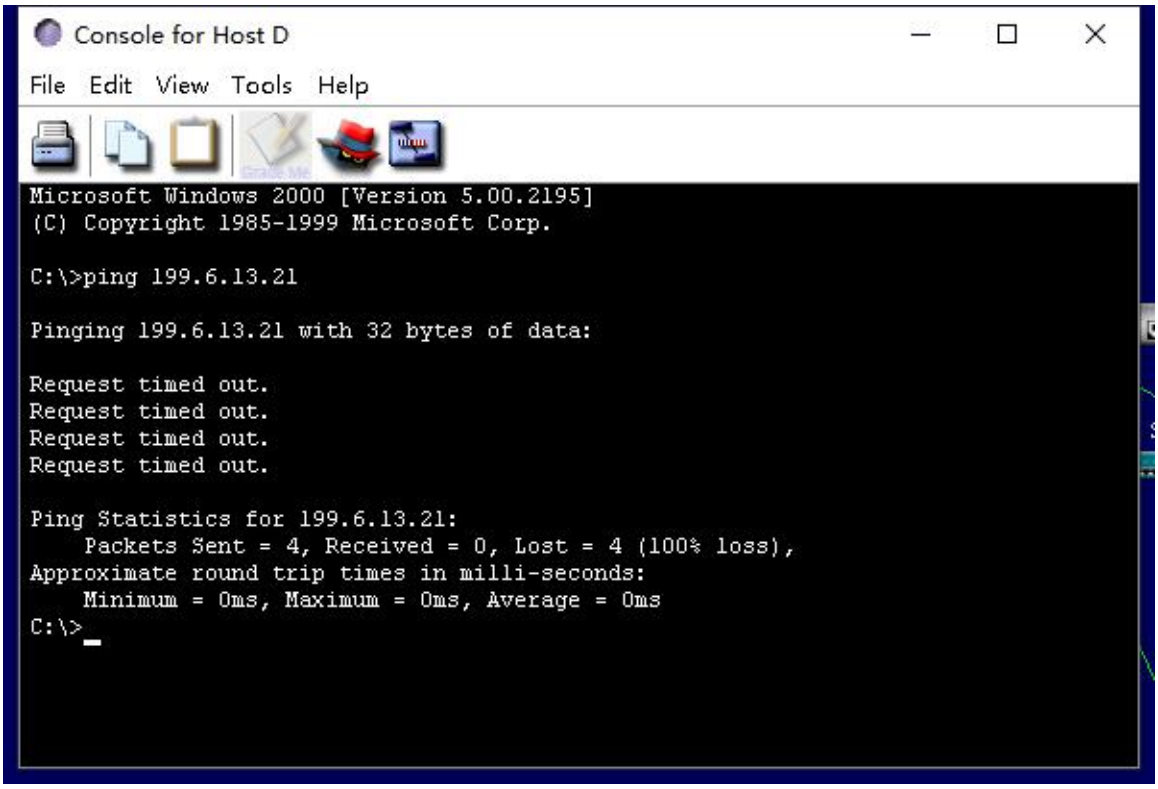
限制主机 B 后访问 205.7.5.8：



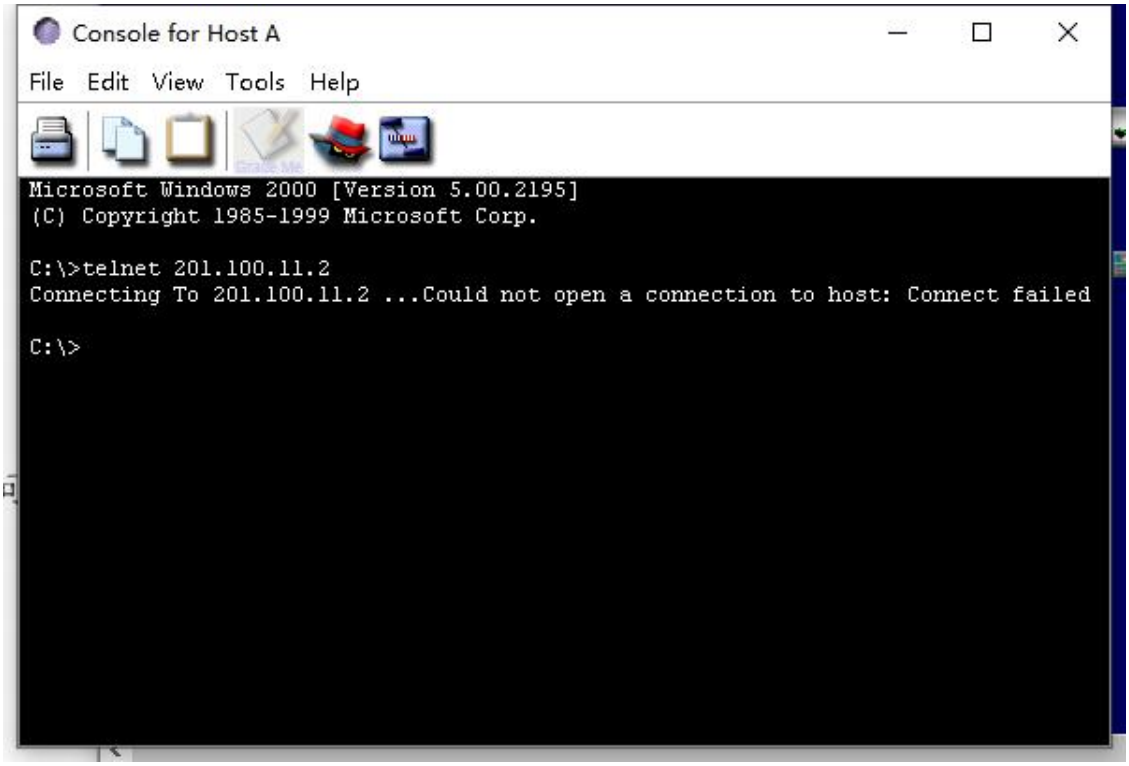
主机 D ping 主机 C：



限制后主机 D ping 主机 C：

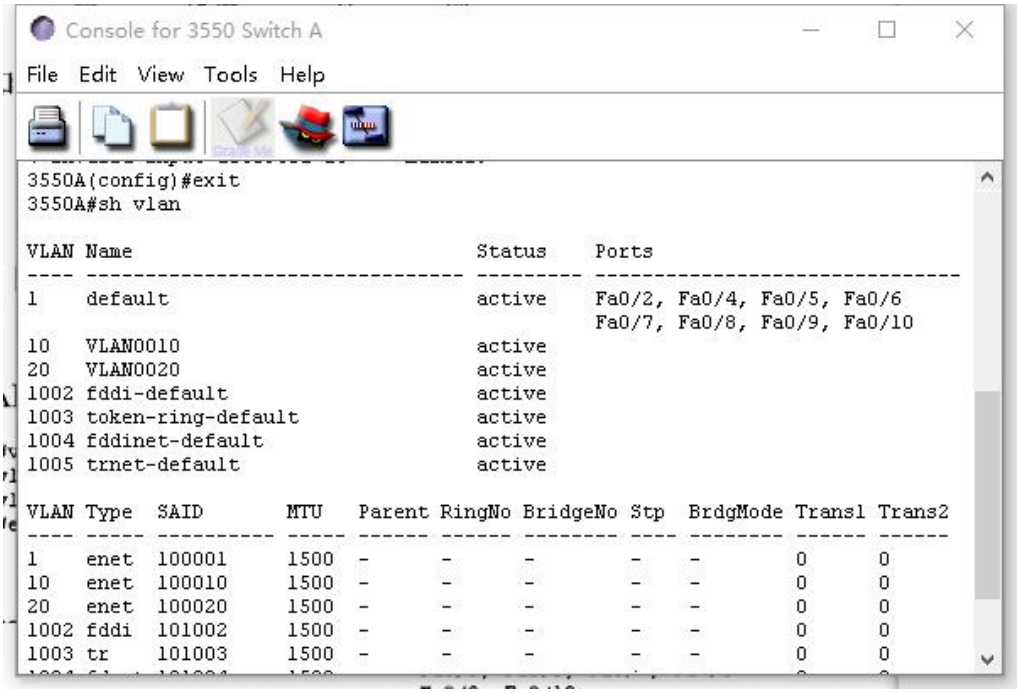


限制后在主机 A 上远程登录 RouterA：

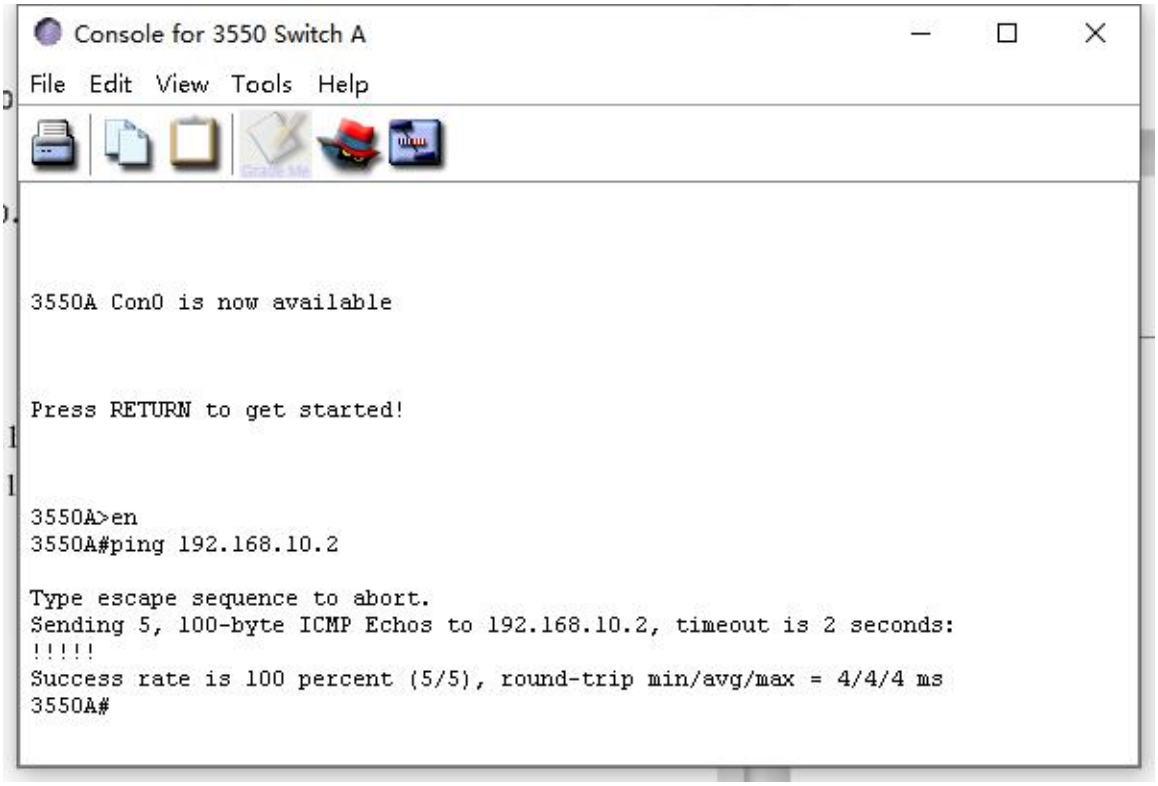


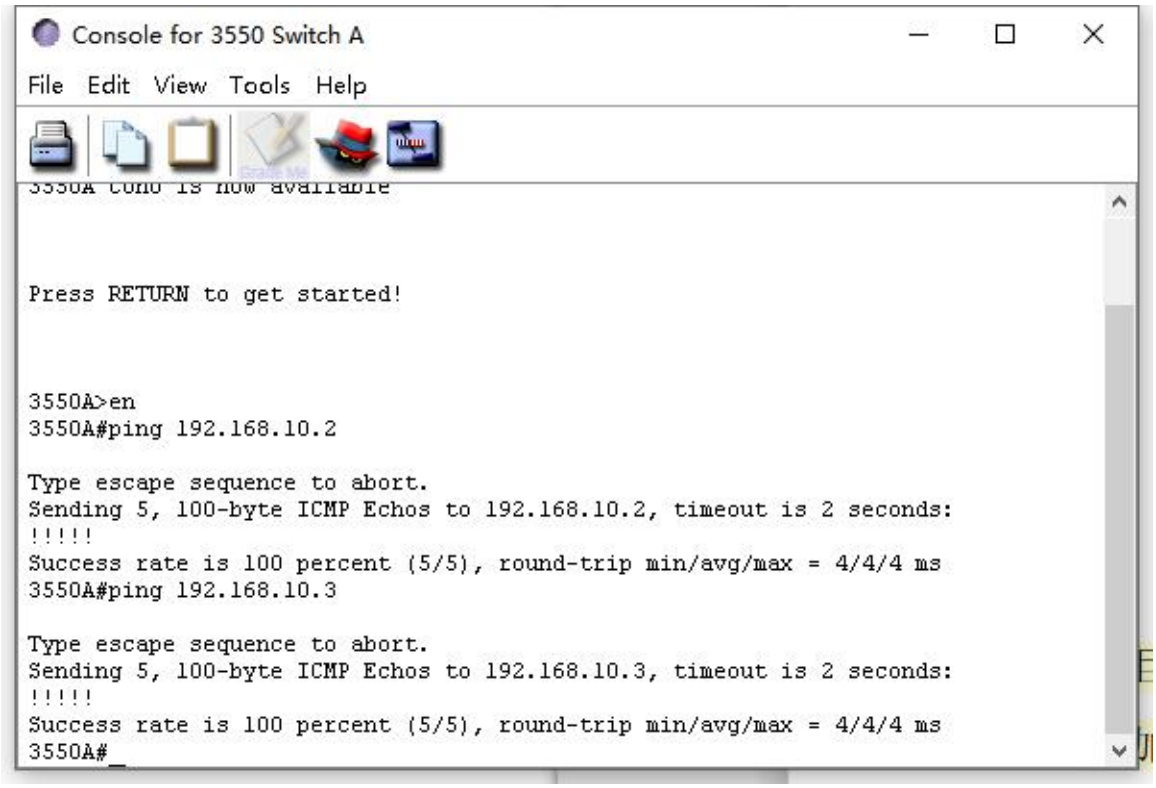
基于交换机端口的 VLAN 配置：

配置后，创建 VLAN 并验证：

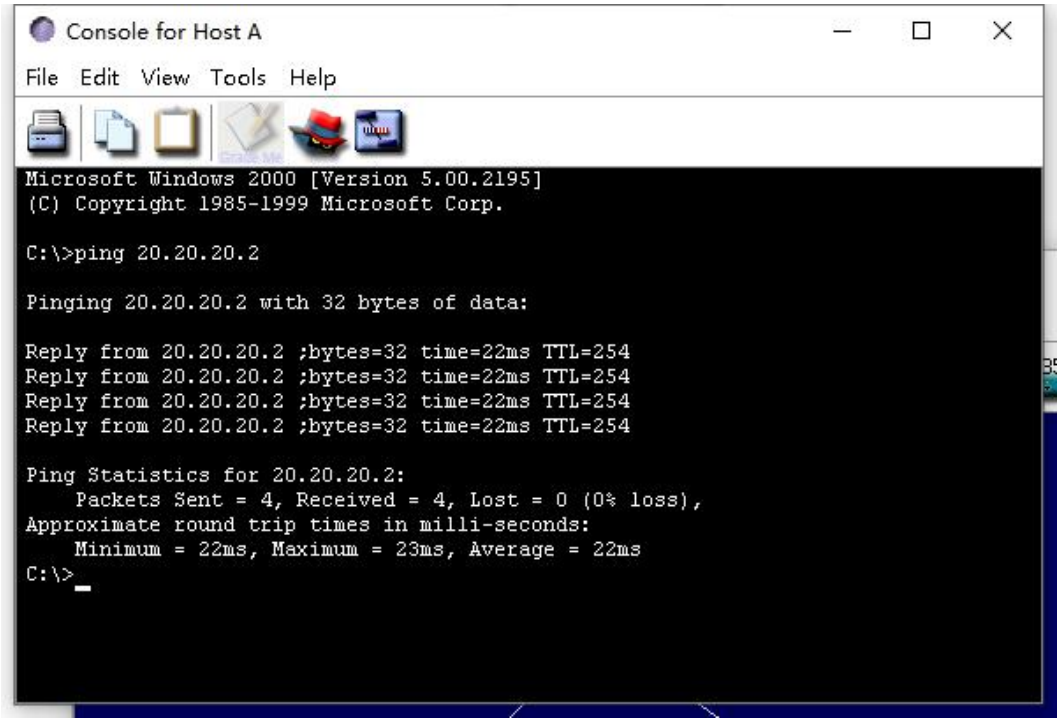


测试，在 3550 交换机上分别 ping 2950 交换机：



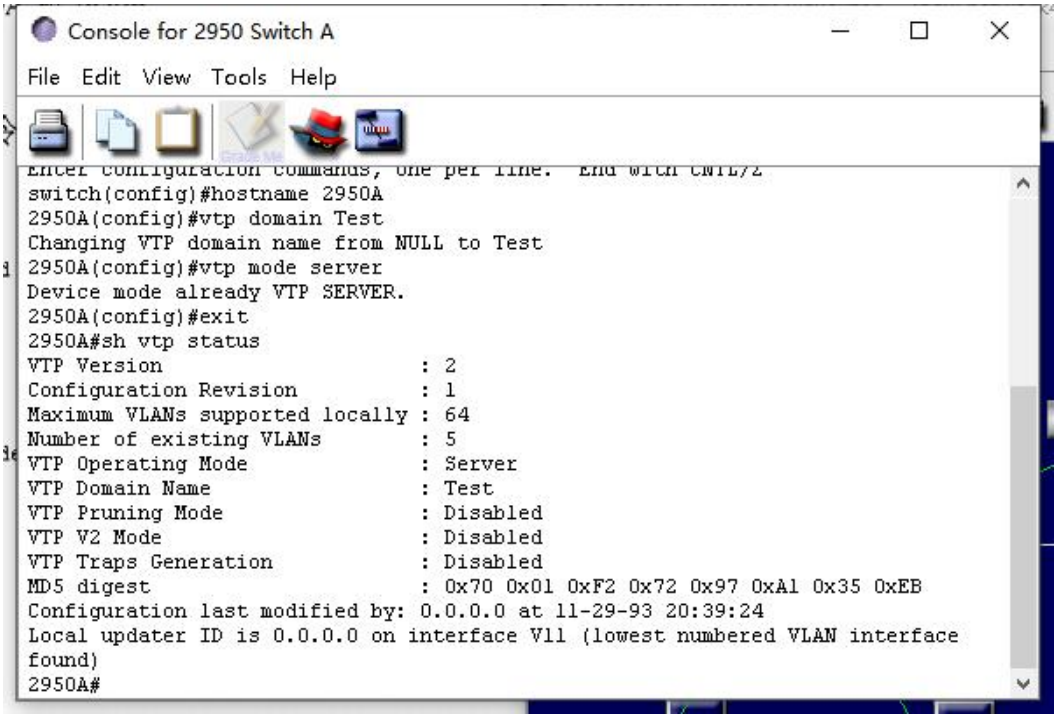


主机 A ping 主机 B：

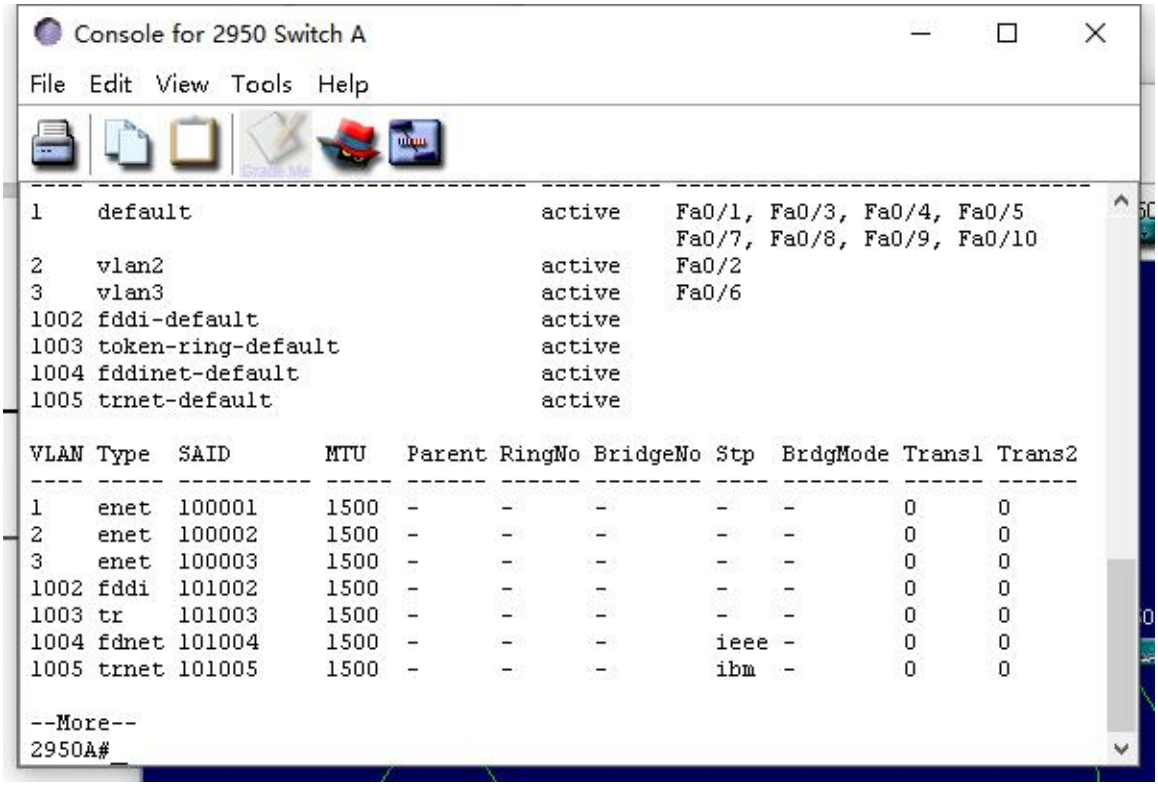


实现 VLAN 跨越多个交换机及不同 VLAN 之间的通信：

配置 VTP 并验证：

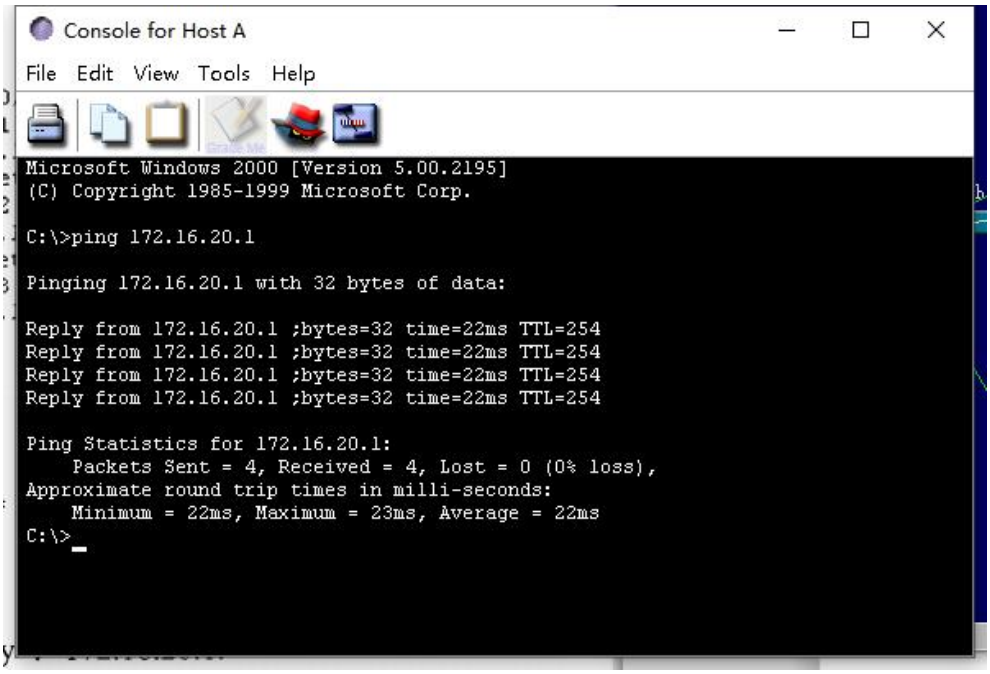


分配端口并验证：

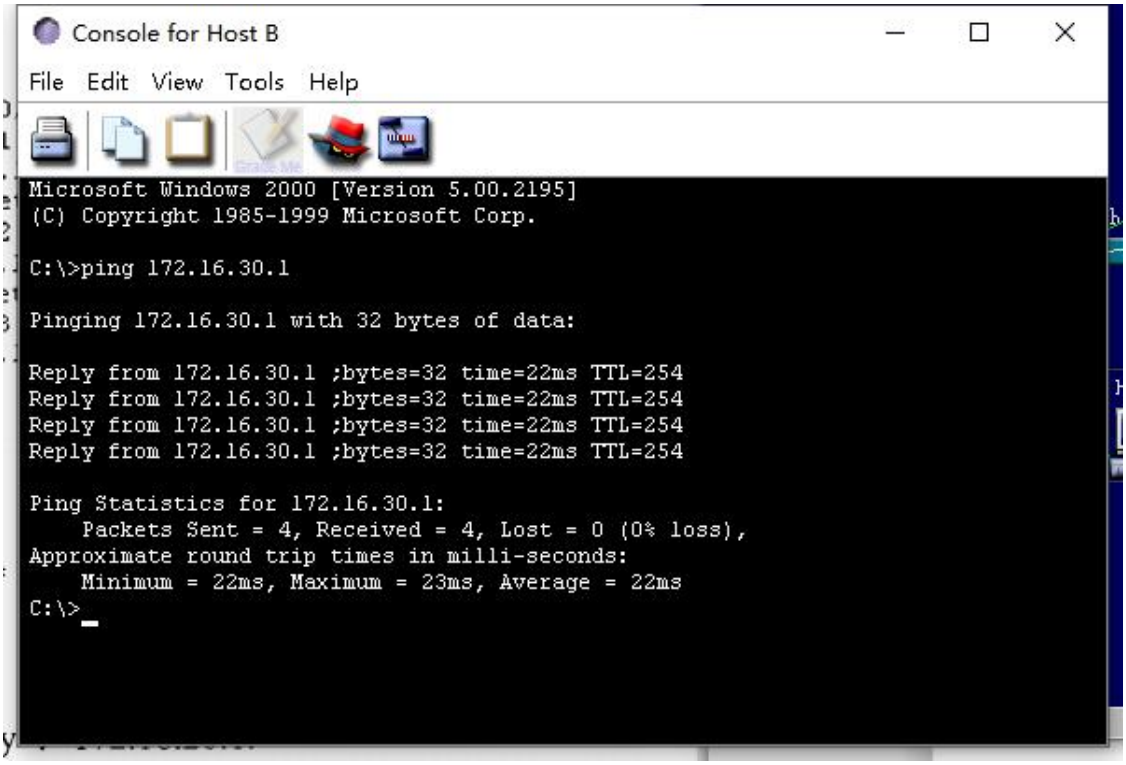


验证连通性：

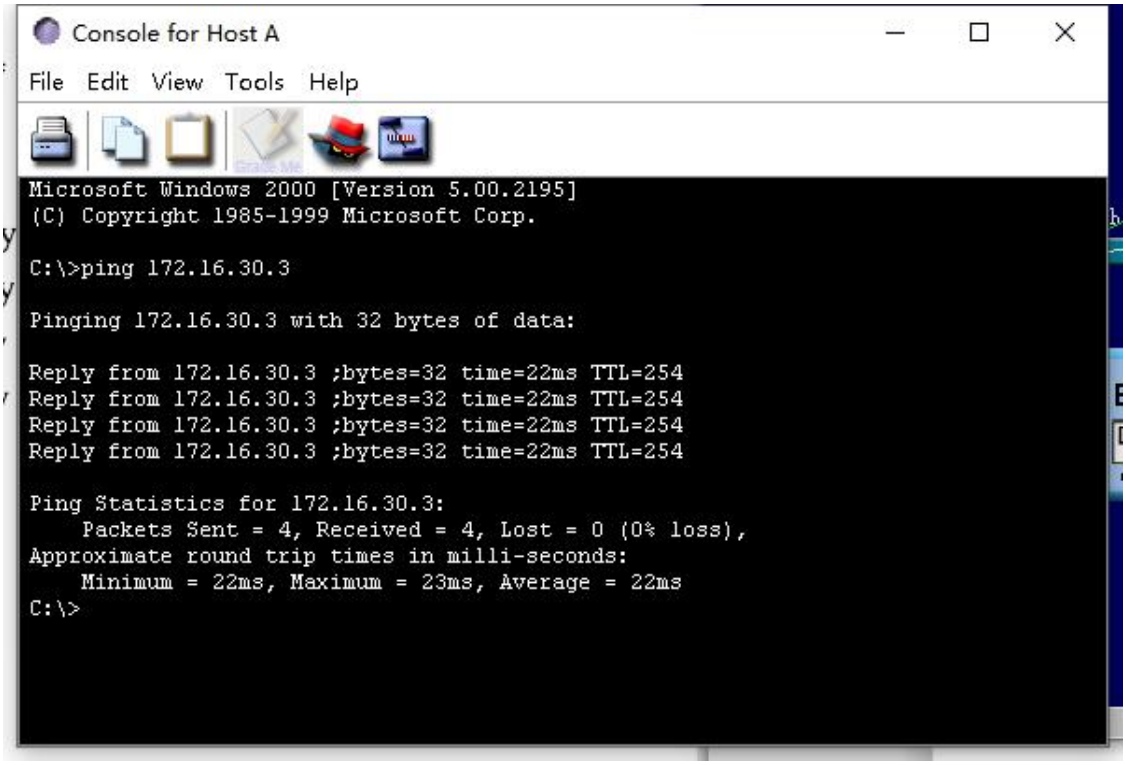
Host A ping 172.16.20.1：



Host B ping 172.16.30.1：



Host A ping Host B：



4 实验总结

动手实现了路由器的配置，熟悉了路由器的有关知识，更加熟悉路由器、交换机的工作机制。