

廈門大學



信息學院軟件工程系

《計算機網絡》實驗報告

題 目 实验四 CISCO IOS 路由器基本配置

班 級 数字媒体技术 2023 级 1 班

姓 名 张林

學 号 37220232203919

實驗時間 2025 年 11 月 4 日

2025 年 11 月 4 日

填写说明

- 1、本文件为 Word 模板文件，建议使用 Microsoft Word 2024 打开，在可填写的区域中如实填写；
- 2、填表时勿改变字体字号，保持排版工整，打印为 PDF 文件提交；
- 3、文件总大小尽量控制在 1MB 以下，最大勿超过 5MB；
- 4、在实验课结束 14 天内，按实验报告提交到我校课程网站的指定位置，源代码等主要材料上传在公开的代码托管平台上。
- 5、鼓励同学之间探讨，鼓励合理使用人工智能平台，提升效率，但不应滥用相关资源，如抄袭代码和代写作业。

1 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。

2 实验环境

|Windows11 |

3 实验结果

1、按照附件一描述使用 Router eSIM v1.1 模拟器来模拟路由器的配置环境
enable 进入超级用户， config terminal 进入全局配置，使用 hostname 将路由器 A 名称修改为 lab_a，使用 banner motd 修改当日消息标题

```
Router#config terminal
Enter configuration commands, one per line. End with END.
Router(config)#hostname lab_a
lab_a(config)#banner me
lab_a(config)#banner motd
lab_a(config)#banner motd
lab_a(config)#banner motd #
Enter TEXT message. End with the character '#'.
accounting department
#
lab_a(config)#

```

配置 ip 地址和机器名映射表

```
lab_a(config)#ip host lab_c 210.93.105.1 204.204.7.2
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
```

配置路由器接口对应的 ip 地址，配置串行 dce 接口时钟周期，设置端口为激活
配置

```
Lab_A(config)#int eth 0
Lab_A(config-if)#ip addr 192.5.5.1 255.255.255.0
Lab_A(config-if)#int eth 1
Lab_A(config-if)#ip addr 205.7.5.1 255.255.255.0
Lab_A(config-if)#int serial 0
Lab_A(config-if)#ip addr 201.100.11.1 255.255.255.0
Lab_A(config-if)#clock rate 56000
Lab_A(config-if)#not shutdown
^
* Invalid input detected at '^' marker.

Lab_A(config-if)#no shutdown
```

为路由器设置密码，配置动态路由

```
Lab_A(config-if)#exit
Lab_A(config)#line console 0
Lab_A(config-line)#login
Lab_A(config-line)#password 114514
Lab_A(config-line)#exit
Lab_A(config)#router rip
Lab_A(config-router)#network 1
Lab_A(config-router)#network 192.5.5.1
Lab_A(config-router)#ne
Lab_A(config-router)#network 205.7.5.1
Lab_A(config-router)#network 201.100.11.1
```

1) 帧格式

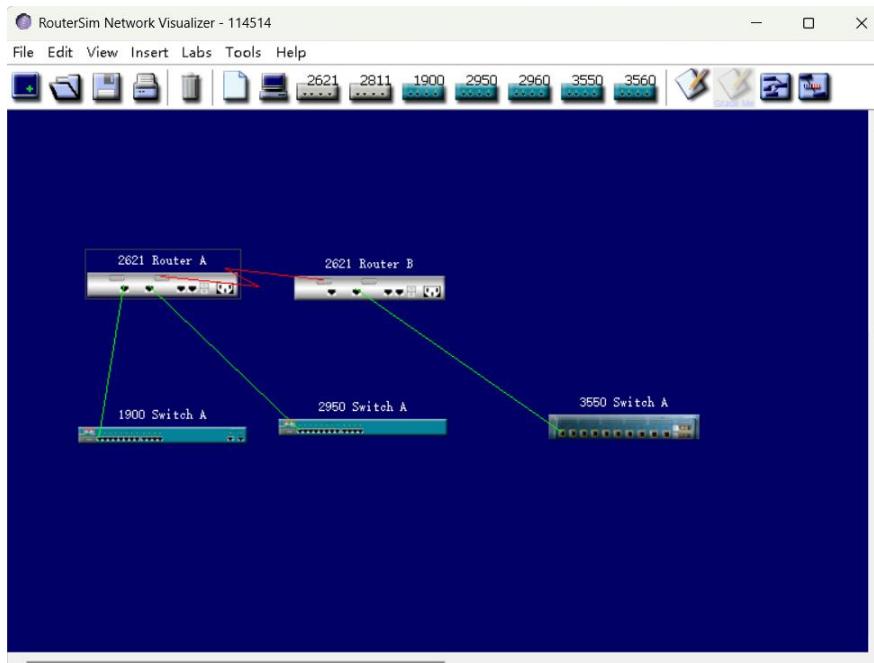
```
▼ Frame 3: Packet, 55 bytes on wire (440 bits), 55 bytes captured (440 bits) on interface \Device\NPF_{  
  Section number: 1  
  > Interface id: 0 (\Device\NPF_{EB04230A-A35B-4624-A78D-5EEFDCC8421A})  
  Encapsulation type: Ethernet (1)  
  Arrival Time: Oct 22, 2025 20:31:12.223642000 中国标准时间  
  UTC Arrival Time: Oct 22, 2025 12:31:12.223642000 UTC  
  Epoch Arrival Time: 1761136272.223642000  
  [Time shift for this packet: 0.00000000 seconds]  
  [Time delta from previous captured frame: 129.441000 milliseconds]  
  [Time delta from previous displayed frame: 129.441000 milliseconds]  
  [Time since reference or first frame: 247.226000 milliseconds]  
  Frame Number: 3  
  Frame Length: 55 bytes (440 bits)  
  Capture Length: 55 bytes (440 bits)  
  [Frame is marked: False]  
  [Frame is ignored: False]  
  [Protocols in frame: eth:ethertype:ip:tcp]  
  Character encoding: ASCII (0)
```

2) IP 报文格式

```
> Frame 3: Packet, 55 bytes on wire (440 bits), 55 bytes captured (440 bits) on interface \Device\NPF_{EB04230A-A35B-4624-A78D-5EEFDCC8421A}  
> Ethernet II, Src: AzureWaveTec_7f:6b:a9 (70:66:55:7f:6b:a9), Dst: XiaomiMobile_5a:a0:36 (44:df:65:5a:a0:36)  
▼ Internet Protocol Version 4, Src: 192.168.10.25, Dst: 219.229.81.200  
  0100 .... = Version: 4  
  .... 0101 = Header Length: 20 bytes (5)  
  > Differentiated Services Field: 0x00 (DSCP: CS0, ECN: Not-ECT)  
  Total Length: 41  
  Identification: 0x45cb (17867)  
  > 010. .... = Flags: 0x2, Don't fragment  
  ...0 0000 0000 0000 = Fragment Offset: 0  
  Time to Live: 128  
  Protocol: TCP (6)  
  Header Checksum: 0xbc94 [validation disabled]  
  [Header checksum status: Unverified]  
  Source Address: 192.168.10.25  
  Destination Address: 219.229.81.200  
  [Stream index: 1]  
> Transmission Control Protocol, Src Port: 1826, Dst Port: 443, Seq: 1, Ack: 1, Len: 1
```

2、配置 ccna

放置设备并连接



配置 routerA 各端口 IP 地址

```
Console for 2621 Router A
File Edit View Tools Help
Router>enable
Router#con
Router#conf
Router#configure t
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z
Router(config)#int f0/0
Router(config-if)#ip add
Router(config-if)#ip address 192.5.5.1 255.255.255.0
Router(config-if)#no shutdown
14:35:35 %LINK-3-UPDOWN: Interface FastEthernet0/0, changed state to up
14:35:35 %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, change

Router(config-if)#int f0/1
Router(config-if)#ip add
Router(config-if)#ip address 205.7.5.1 255.255.255.0
Router(config-if)#no shutdown
14:35:57 %LINK-3-UPDOWN: Interface FastEthernet0/1, changed state to up
14:35:57 %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, change

Router(config-if)#int s0/0
Router(config-if)#ip add
Router(config-if)#ip address 201.100.11.1 255.255.255.0
Router(config-if)#clock rate 56000
Router(config-if)#no shutdown
14:36:46 %LINK-3-UPDOWN: Interface Serial0/0, changed state to up
14:36:46 %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0, changed stat

Router(config-if)#

```

```

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      205.7.5.0/24 is directly connected, FastEthernet0/1
C      192.5.5.0/24 is directly connected, FastEthernet0/0
C      201.100.11.0/24 is directly connected, Serial0/0
Router#

```

RouterB 同理

```

Router#conr
Router#configure t
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z
Router(config)#int f0/0
Router(config-if)#ip add
Router(config-if)#ip address 199.6.13.1 255.255.255.0
Router(config-if)#no shut
Router(config-if)#no shutdown
14:42:49 %LINK-3-UPDOWN: Interface FastEthernet0/0, changed state to up
14:42:49 %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, change

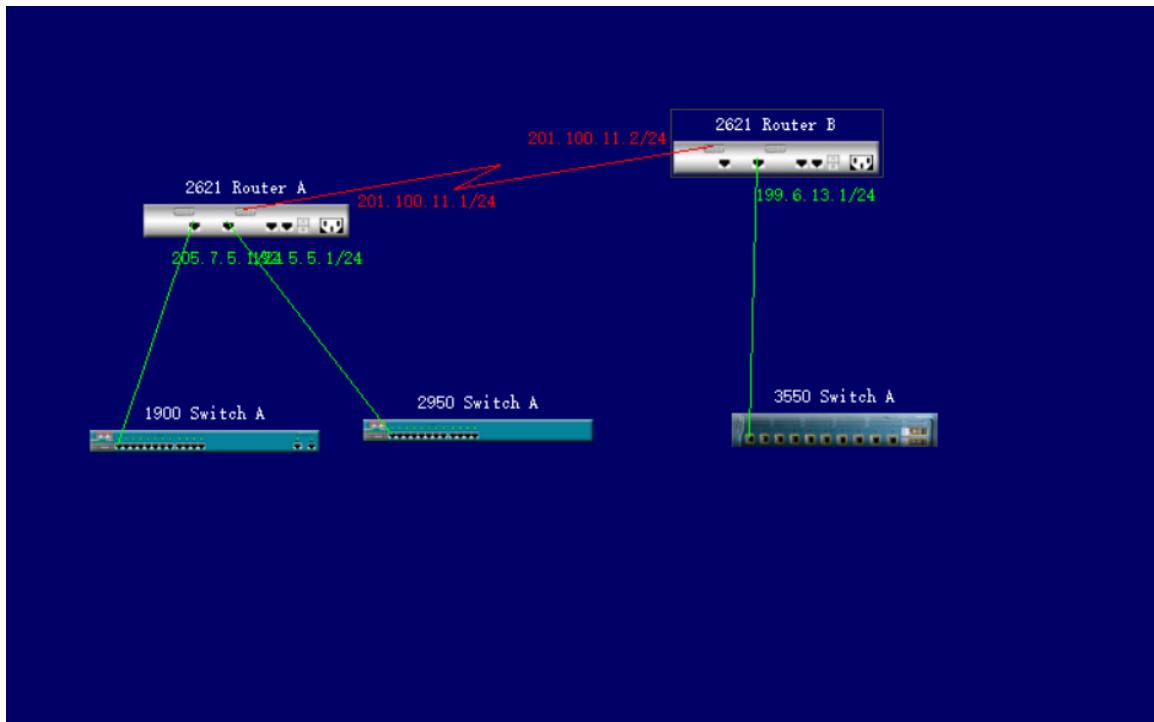
Router(config-if)#int s0/1
Router(config-if)#ip add
Router(config-if)#ip address 201.100.11.2 255.255.255.0
Router(config-if)#no shut
Router(config-if)#no shutdown
14:43:12 %LINK-3-UPDOWN: Interface Serial0/1, changed state to up
14:43:12 %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/1, changed stat

Router(config-if)#exit
Router(config)#exit
Router#show ip rou
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      199.6.13.0/24 is directly connected, FastEthernet0/0
C      201.100.11.0/24 is directly connected, Serial0/1
Router#

```

结果



为 routerA 配置静态路由

```
Console for 2621 Router A
File Edit View Tools Help
Icons | Grade Me

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#ip route 199.6.13.0 255.255.255.0 201.100.11.2
^
% Invalid input detected at '^' marker.
Router#con
Router#conf
Router#configure t
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z
Router(config)#ip route 199.6.13.0 255.255.255.0 201.100.11.2
Router(config)#exit
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#
```

为 routerA routerB 配置动态路由



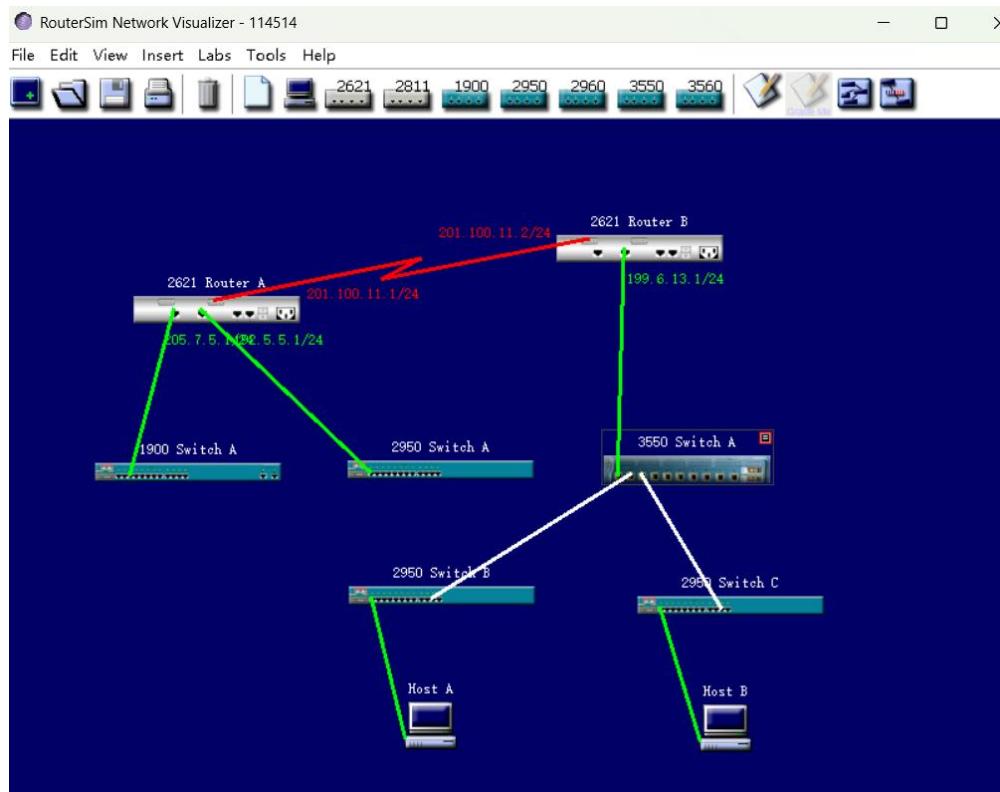
```
Router>enable
Router#config t
Enter configuration commands, one per line. End with CNTL/Z
Router(config)#router rip
Router(config-router)#network 192.5.5.0
Router(config-router)#network 205.7.5.0
Router(config-router)#network 201.100.11.0
Router(config-router)#exit
Router(config)#

```



3、配置交换机端口

连接新机器



配置 vtp domain

```
Console for 3550 Switch A
File Edit View Tools Help
SWITCH#conf t
switch#conf t
Enter configuration commands, one per line. End with CNTL/Z
switch(config)#hostname 3550A
3550A(config)#vtp domain Cisco
Changing VTP domain name from NULL to Cisco
3550A(config)#exit
3550A#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
VTP V2 Mode : Disabled
VTP Traps Generation : Disabled
MD5 digest : 0x70 0x01 0xF2 0x72 0x97 0xA1 0x35 0xEB
Configuration last modified by: 0.0.0.0 at 11-29-93 20:39:24
Local updater ID is 0.0.0.0 on interface V11 (lowest numbered VLAN interface found)
3550A#
```

```

switch>en
switch#config t
Enter configuration commands, one per line. End with CNTL/Z
switch(config)#hostname 2950B
2950B(config)#vtp domain Cisco
Changing VTP domain name from NULL to Cisco
2950B(config)#vtp mode client
Setting device to VTP CLIENT mode.
2950B(config)#

```

```

switch>en
switch#conf t
Enter configuration commands, one per line. End with CNTL/Z
switch(config)#hostname 2950C
2950C(config)#vtp domain Cisco
Changing VTP domain name from NULL to Cisco
2950C(config)#vtp mode client
Setting device to VTP CLIENT mode.
2950C(config)#

```

配置 trunk

```

3550A>en
3550A#conf t
Enter configuration commands, one per line. End with CNTL/Z
3550A(config)#int f0/2
3550A(config-if)#switchport trunk encapsulation dot1q
^
% Invalid input detected at '^' marker.
3550A(config-if)#switchport trunk encapsulation dot1q
15:22:13: %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/2, changed
to down
15:22:13: %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/2, changed
3550A(config-if)#int f0/3
3550A(config-if)#switchport trunk encapsulation dot1q
15:22:28: %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/3, changed
to down
15:22:28: %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/3, changed
3550A(config-if)#switchport mode trunk
^
% Invalid input detected at '^' marker.
3550A(config-if)#switchport mode trunk
3550A(config-if)#int f0/2
3550A(config-if)#switchport mode trunk
3550A(config-if)#

```

```

2950B>en
2950B#conf t
Enter configuration commands, one per line. End with CNTL/Z
2950B(config)#conf t
^
% Invalid input detected at '^' marker.
2950B(config)#int f0/11
2950B(config-if)#switchport mode trunk

```

```

2950C>en
2950C#conf t
Enter configuration commands, one per line. End with CNTL/Z
2950C(config)#int f0/11
2950C(config-if)#switchport mode trunk

```

配置 vlan

```

3550A>en
3550A#conf 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)#exit
3550A#show vlan

VLAN Name          Status      Ports
---- -----
1    default        active      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

```

配置三层交换机

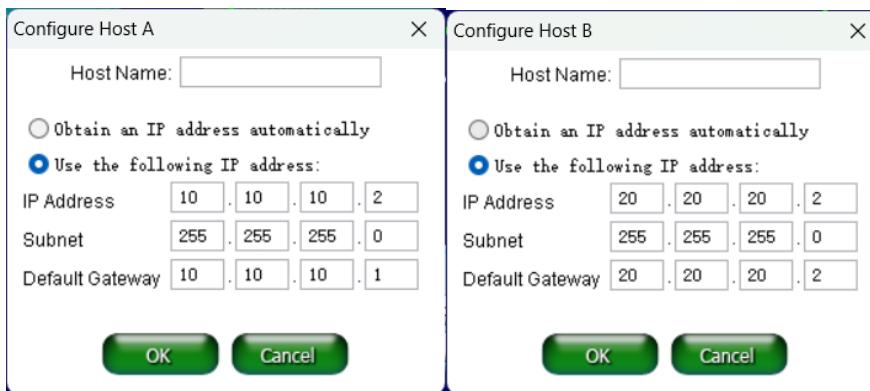
```

3550A>en
3550A#conf t
Enter configuration commands, one per line. End with CNTL/Z
3550A(config)#int vlan 10
3550A(config-if)#ip addr 10.10.10.1 255.255.255.0
3550A(config-if)#no shutdown
3550A(config-if)#int vlan 20
3550A(config-if)#ip addr 20.20.20.1 255.255.255.0
3550A(config-if)#no shutdown
3550A(config-if)#exit
3550A(config)#int vlan 1
3550A(config-if)#ip addr 205.7.5.2 255.255.255.0
3550A(config-if)#no shutdown
3550A(config-if)#

2950B>en
2950B#conf t
Enter configuration commands, one per line. End with CNTL/Z
2950B(config)#int vlan 1
2950B(config-if)#ip addr 205.7.5.3 255.255.255.0
2950B(config-if)#no shutdown
2950B(config-if)#

2950C>en
2950C#conf t
Enter configuration commands, one per line. End with CNTL/Z
2950C(config)#int vlan 1
2950C(config-if)#ip addr 205.7.5.4 255.255.255.0
2950C(config-if)#no shutdown
2950C(config-if)#

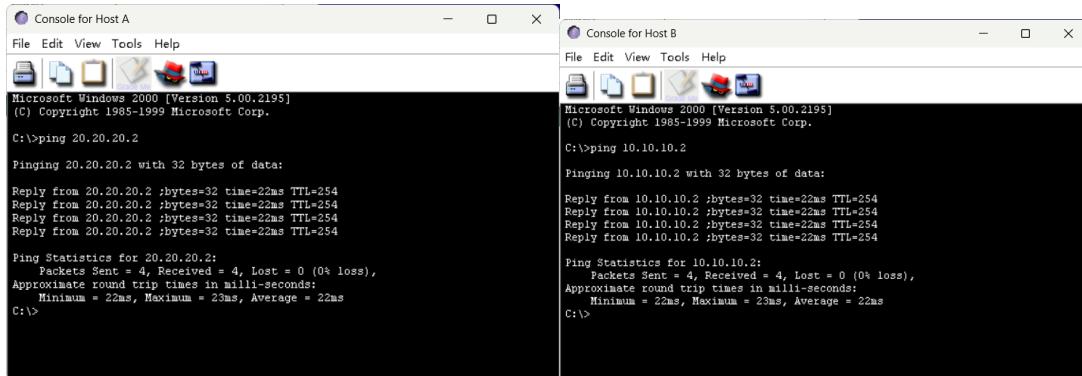
```



在 3550A ping 两台交换机

```
3550A>ping 205.7.5.3
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 205.7.5.3, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 4/4/4 ms
3550A>ping 205.7.5.4
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 205.7.5.4, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 4/4/4 ms
3550A>
```

主机 ab 互 ping



4 实验代码

本次实验的代码已上传于以下代码仓库: []。（注意：建议使用码云，并设置公开权限；本学期暂不推荐使用 GitHub；如使用厦门大学私有 Git 服务，应将 whuang@xmu.edu.cn 加入项目成员备查，本段话删除。）

5 课后思考题

（注明题号和题目文字，逐个回答课后思考题。如无，填写无。本段话删除。）

6 实验总结

1.DHCP 太伟大了，由人类来配置路由 ip 真实痛苦卓绝

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