

廈門大學



信息学院软件工程系

《计算机网络》实验报告

题 目 实验四 CISCO IOS 路由器基本配置

班 级 数字媒体技术 2023 级 1 班

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实验时间 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

```

v 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: 0.000000000 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

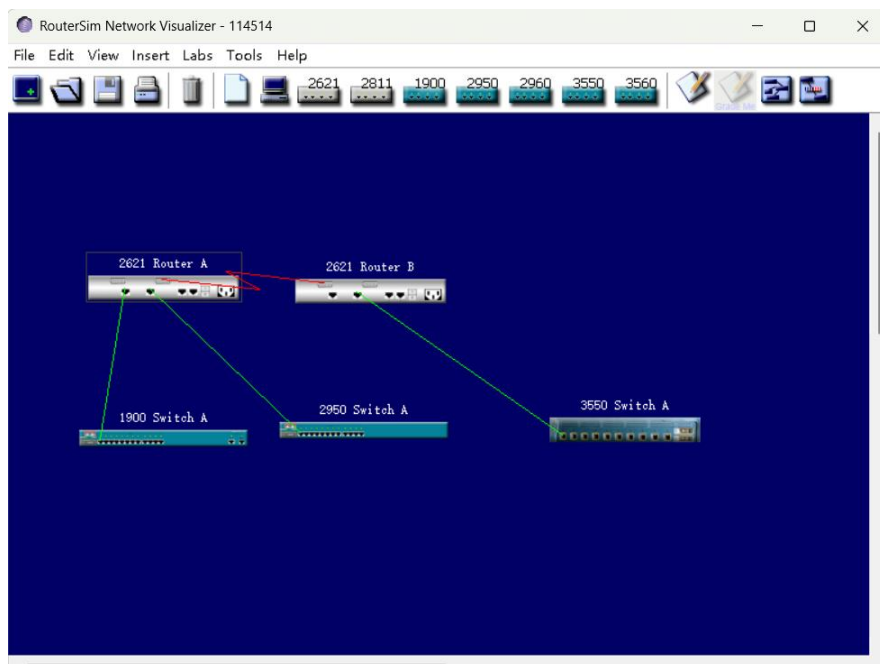
```

> Frame 3: Packet, 55 bytes on wire (440 bits), 55 bytes captured (440 bits) on interface \Device\NPF_{EB0
> Ethernet II, Src: AzureWaveTec_7f:6b:a9 (70:66:55:7f:6b:a9), Dst: XiaomiMobile_5a:a0:36 (44:df:65:5a:a0:
v 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#conf t
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

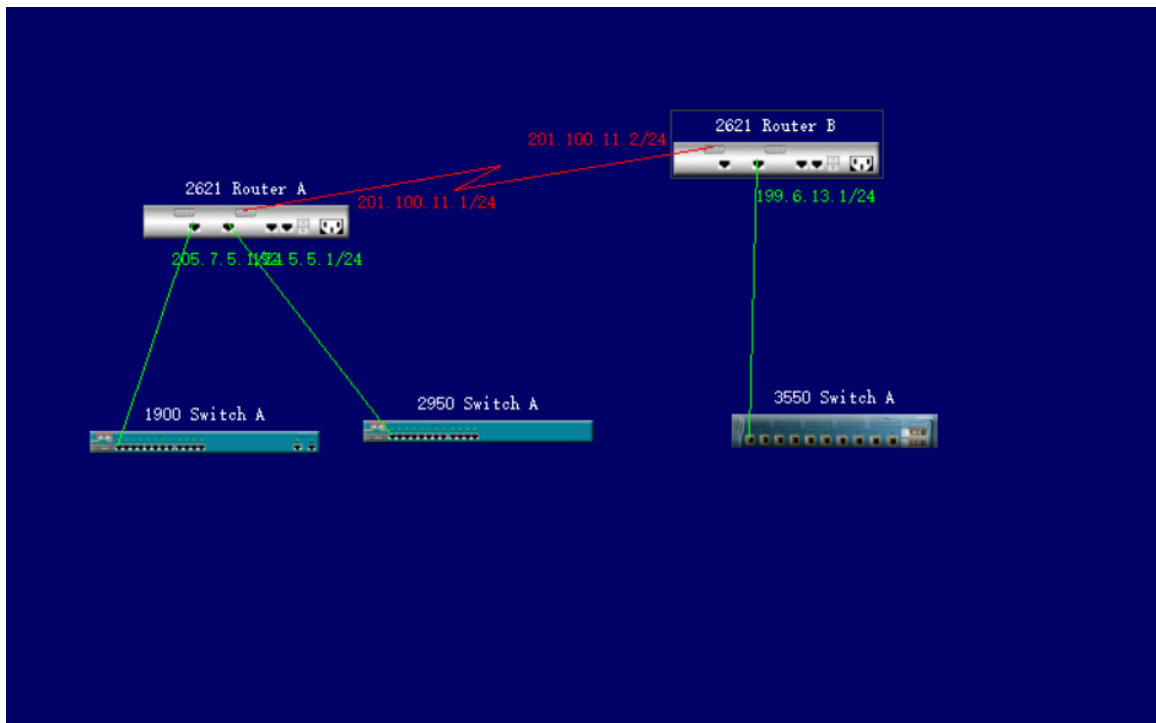
Router(config-if)#int s0/1
Router(config-if)#ip add
Router(config-if)#ip address 201.100.11.2 255.255.255.0
Router(config-if)#no shut
Router(config-if)#no shutdown
14:43:12 %LINK-3-UPDOWN: Interface Serial0/1, changed state to up
14:43:12 %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/1, changed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

```

Console for 2621 Router A
File Edit View Tools Help

Router Con0 is now available

Press RETURN to get started!

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)#

```

```

Console for 2621 Router B
File Edit View Tools Help

Router>enab
Router>enab
Router>enable
Router#router rip
^
% Invalid input detected at '^' marker.
Router#conf
Router#configure t
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z
Router(config)#router rip
Router(config-router)#new
Router(config-router)#newwo
Router(config-router)#net
Router(config-router)#network 201.100.11.0
Router(config-router)#net
Router(config-router)#network 199.6.13.0
Router(config-router)#exit
Router(config)#exit
Router#show ip protocol
Routing Protocol is "rip"
  Sending updates every 30 seconds, next due in 14 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
    Serial0/1           1      1 2
    FastEthernet0/0     1      1 2
  Automatic network summarization is in effect
  Maximum path: 4
  Routing for networks:
    201.100.11.0
    199.6.13.0
  Routing information sources:
    Gateway          Distance    Last Update
  Distance: <default is 120>

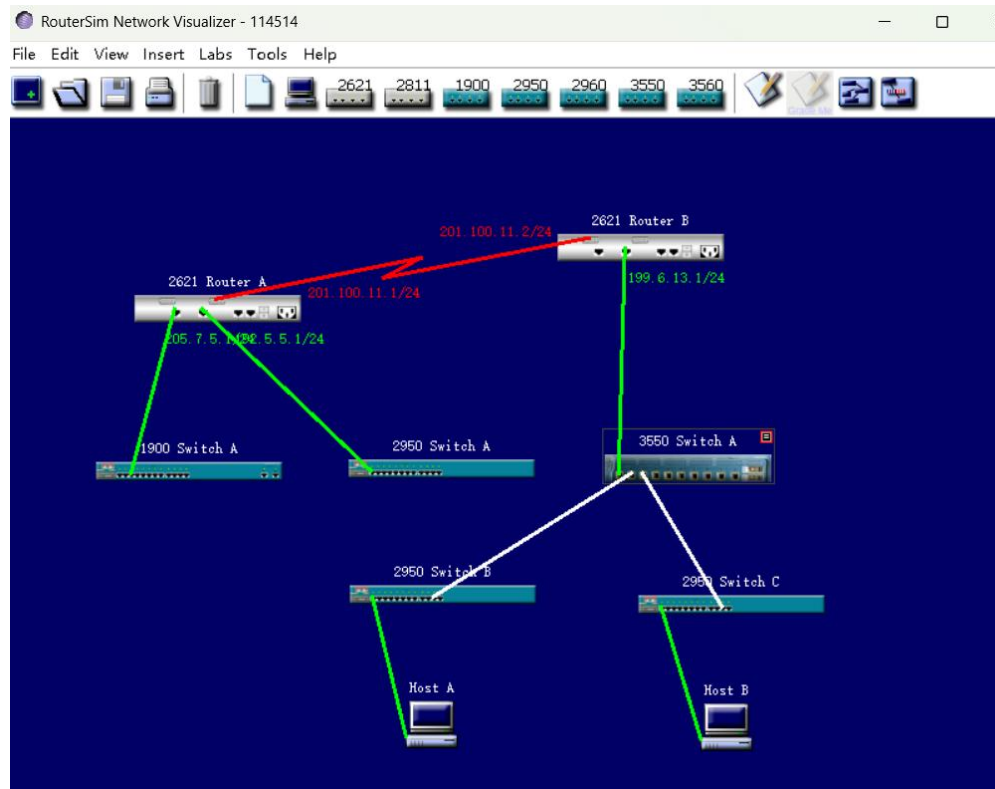
Router#show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP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

```

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>en
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, chang
to down
15:22:13: %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/2, chang
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, chang
to down
15:22:28: %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/3, chang
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
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)#

```

```

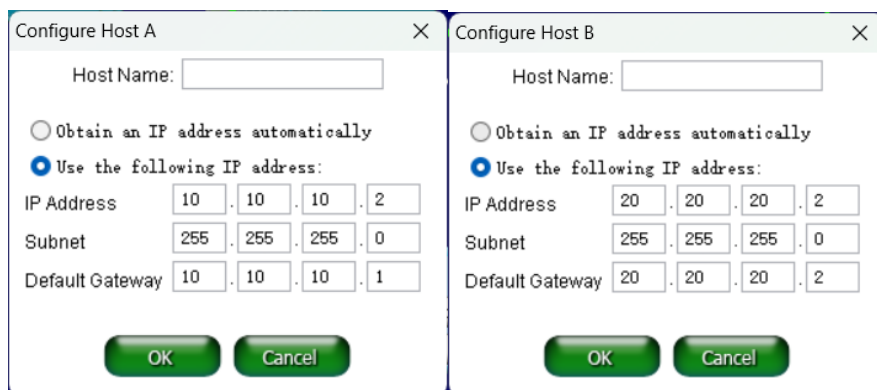
2950B>en
2950B#conf t
Enter configuration commands, one per line.  End with CNTL/Z
2950B(config)#int vlan 1
2950B(config-if)#ip addr 205.7.5.3 255.255.255.0
2950B(config-if)#no shutdown
2950B(config-if)#_

```

```

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)#

```



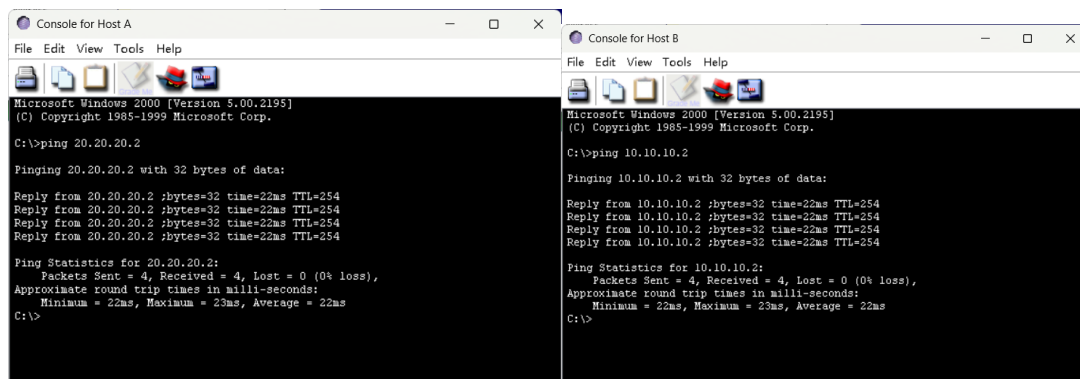
在 3550Aping 两台交换机

```
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

|