

# 廈門大學



## 信息学院软件工程系

### 《计算机网络》实验报告

题    目 实验五 CISCO IOS 路由器基本配置

班    级 软件工程 2021 级卓越班

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实验时间 2023 年 5 月 2 日

2023 年 5 月 2 日

# 填写说明

- 1、本文件为 Word 模板文件，建议使用 Microsoft Word 2021 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、应将材料清单上传在代码托管平台上；
- 5、在实验课结束 14 天内，按原文件发送至课程 FTP 指定位置。

## 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

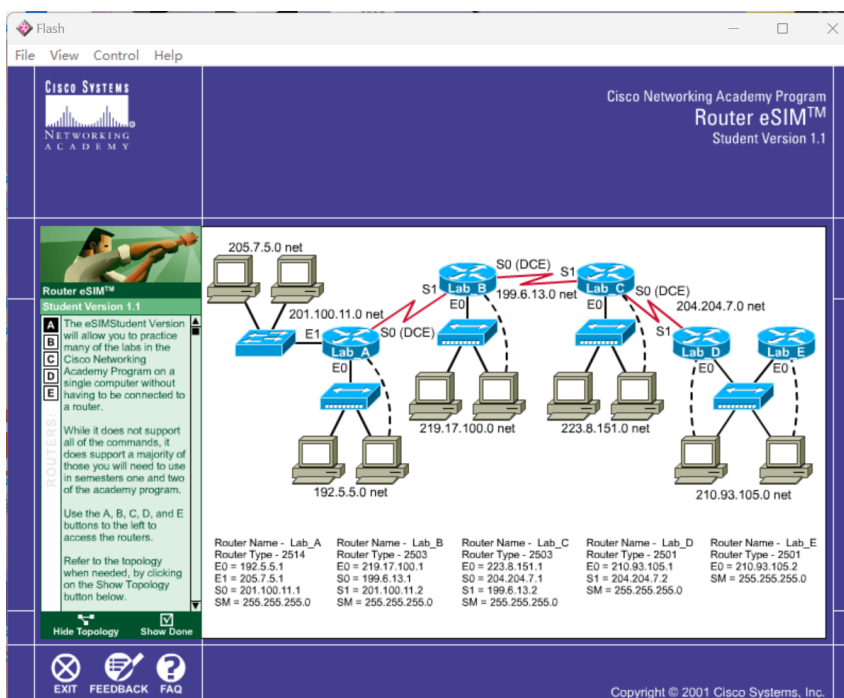
使用 Router eSIM v1.1 模拟器来模拟路由器的配置环境；

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）。

## 3 实验结果

### 3.1 Router eSIM v1.1

启动软件可以看到所需要配置的网络拓扑图，各个路由器端口的 ip 地址以及子网 ip 已经给出，我们需要对网络进一步进行配置



图中路由器出厂默认名字都为 Router，为了区分路由器需要给它们取名字，先要使用 enable 命令进入超级用户模式，之后使用命令 config t 进入全局配置模式，之后使用 hostname 修改名字为 lab\_A

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

修改当日的消息标题

```
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
#
lab_A(config)#
```

配置 ip 地址和机器名映射表，使得可以用 ip 和机器名两种方式指定接口

```
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)#_
```

配置路由器接口对应的 ip 地址

```
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 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)#_
```

为串行 DCE 接口配置时钟周期

```
lab_A(config-if)#exit
lab_A(config)#int serial 0
lab_A(config-if)#clock rate 50000
Unknown clock rate
lab_A(config-if)#clock rate 56000
lab_A(config-if)#
```

## 设置端口为激活配置

```

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

```

## 为路由器设置密码

```

lab_A(config-if)#no shutdown
lab_A(config-if)#exit
lab_A(config)#int eth 0
lab_A(config-if)#description engineering LAN,Bldg,1#
lab_A(config-if)#exit
lab_A(config)#line console 0
lab_A(config-line)#login
lab_A(config-line)#password cisco
lab_A(config-line)#_

```

## 配置动态路由

```

Enter configuration commands, one per line. End with END.
lab_A(config)#router rip
lab_A(config-router)#network 192.5.5.1
lab_A(config-router)#network 205.7.5.1
^
% Invalid input detected at '^' marker.

lab_A(config-router)#network 205.7.5.1
lab_A(config-router)#network 201.100.11.1
lab_A(config-router)#_

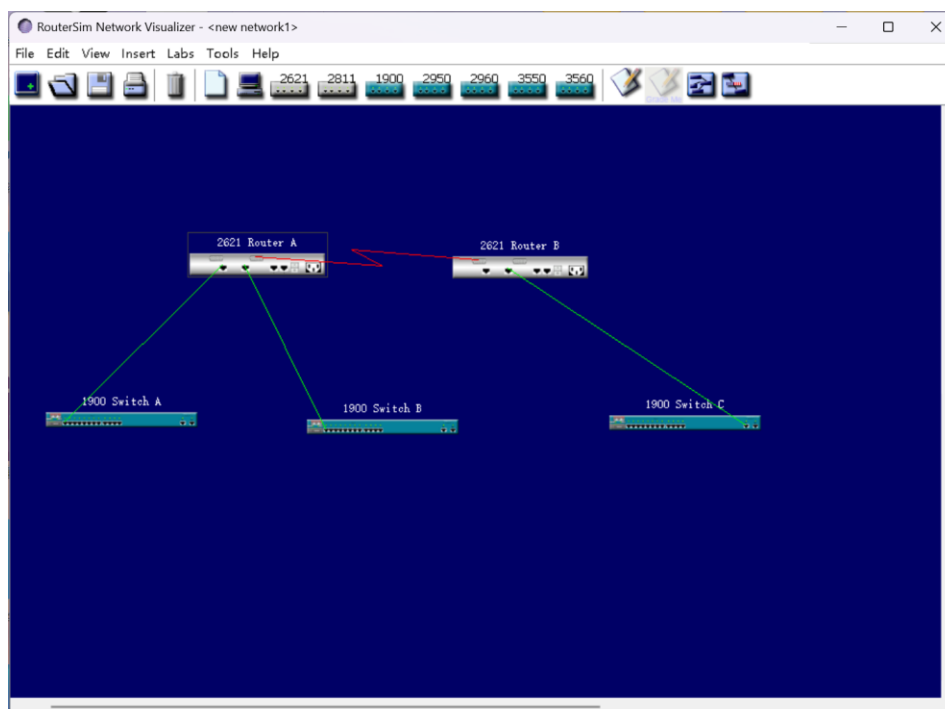
```

至此完成了 Router SIM 的 router Lab\_A 的全部配置

Lab_A	Completed
Hostname	Done
Enable Secret	Done
Line Console Login	Done
Line Console Password	Done
Line vty Login	Done
Line vty Password	Done
E0 IP	Done
E0 Shutdown	Done
E1 IP	Done
E1 Shutdown	Done
S0 IP	Done
S0 Clock Rate	Done
S0 Shutdown	Done
Routing Protocol	Done
Network 1	Done
Network 2	Done
Network 3	Done
IP Host Lab_A	Done
IP Host Lab_B	Done
IP Host Lab_C	Done
IP Host Lab_D	Done
IP Host Lab_E	Done
Time elapsed	32:28

## 3.2 CCNA Network Visualizer 6.0

### 3.2.1 配置静态路由



首先配置路由器 A 各个端口的 IP 地址，先进入全局配置模式，之后进入对应的端口，输入 IP 地址和子网掩码，之后激活该端口，对于端口 S0/0 为 DCE 端口，需要在设定 IP 地址的基础上为其设定时钟频率

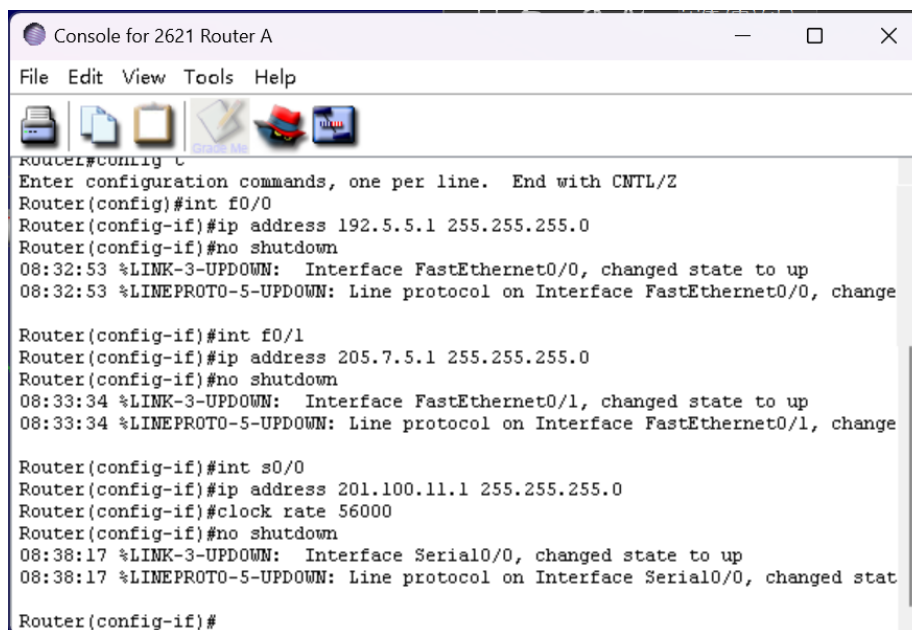
```
Console for 2621 Router A
File Edit View Tools Help

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)#int f0/0
Router(config-if)#ip address 192.5.5.1 255.255.255.0
Router(config-if)#no shutdown
08:32:53 %LINK-3-UPDOWN: Interface FastEthernet0/0, changed state to up
08:32:53 %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
08:33:34 %LINK-3-UPDOWN: Interface FastEthernet0/1, changed state to up
```



```

Console for 2621 Router A
File Edit View Tools Help

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
08:32:53 %LINK-3-UPDOWN: Interface FastEthernet0/0, changed state to up
08:32:53 %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, change

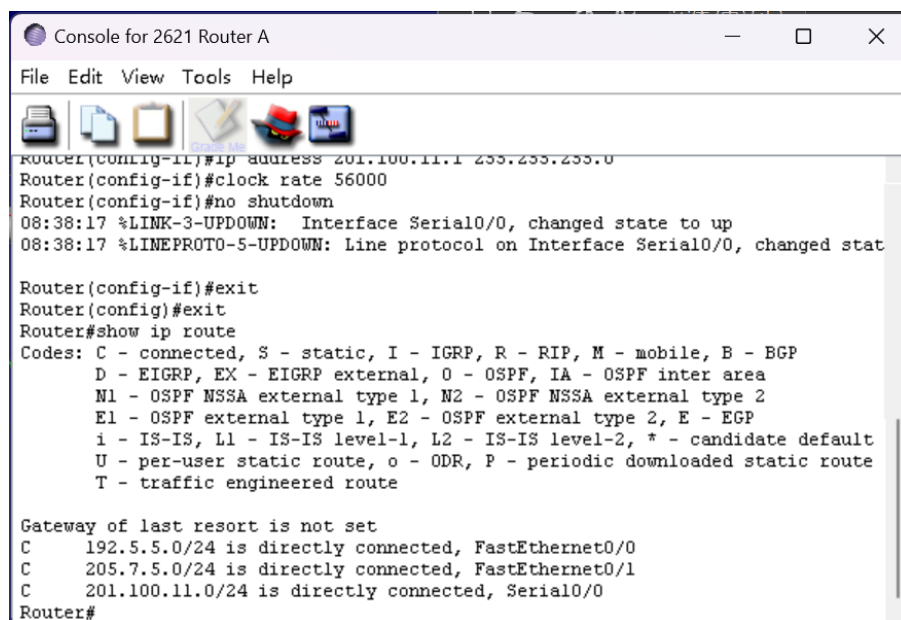
Router(config-if)#int f0/1
Router(config-if)#ip address 205.7.5.1 255.255.255.0
Router(config-if)#no shutdown
08:33:34 %LINK-3-UPDOWN: Interface FastEthernet0/1, changed state to up
08:33:34 %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, change

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
08:38:17 %LINK-3-UPDOWN: Interface Serial0/0, changed state to up
08:38:17 %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0, changed stat

Router(config-if)#_

```

使用两次 `exit` 命令退出端口和全局终端模式，之后在超级用户模式下输入 `show` 命令查看是否成功输入 IP 地址，可以看到路由器 A 的三个端口成功完成 IP 地址分配



```

Console for 2621 Router A
File Edit View Tools Help

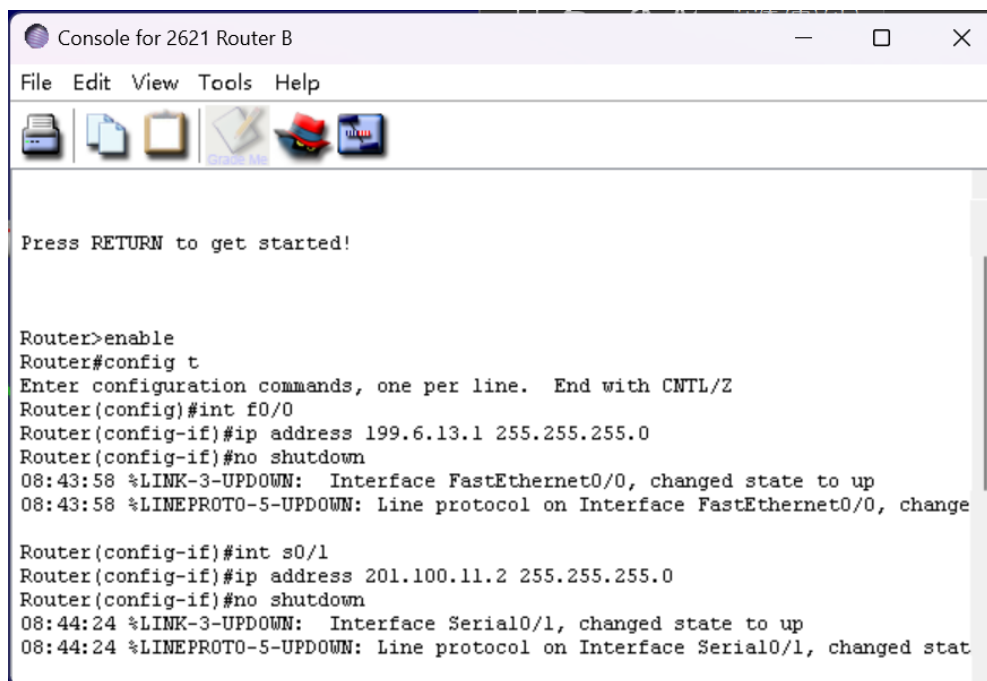
Router(config-if)#ip address 201.100.11.1 255.255.255.0
Router(config-if)#clock rate 56000
Router(config-if)#no shutdown
08:38:17 %LINK-3-UPDOWN: Interface Serial0/0, changed state to up
08:38:17 %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0, changed stat

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

```

同理配置路由器 B，因为路由器 B 的 s0/1 端口为 DTE 端口，所以无需为其设定时钟频率



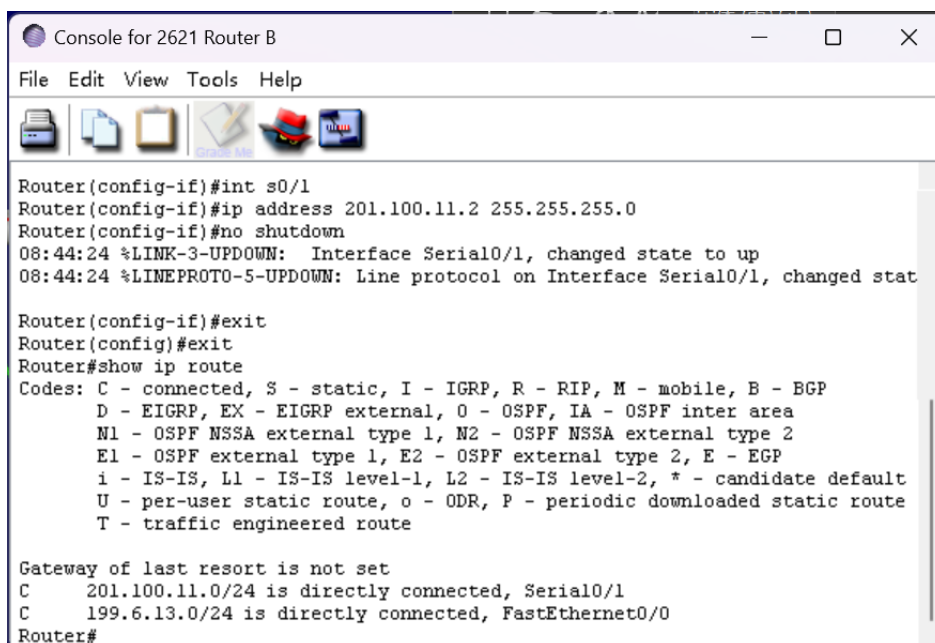
```
Console for 2621 Router B
File Edit View Tools Help

Press RETURN to get started!

Router>enable
Router#config t
Enter configuration commands, one per line. End with CNTL/Z
Router(config)#int f0/0
Router(config-if)#ip address 199.6.13.1 255.255.255.0
Router(config-if)#no shutdown
08:43:58 %LINK-3-UPDOWN: Interface FastEthernet0/0, changed state to up
08:43:58 %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, change

Router(config-if)#int s0/1
Router(config-if)#ip address 201.100.11.2 255.255.255.0
Router(config-if)#no shutdown
08:44:24 %LINK-3-UPDOWN: Interface Serial0/1, changed state to up
08:44:24 %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/1, changed stat
```

使用 show 命令查看对应的 IP 信息



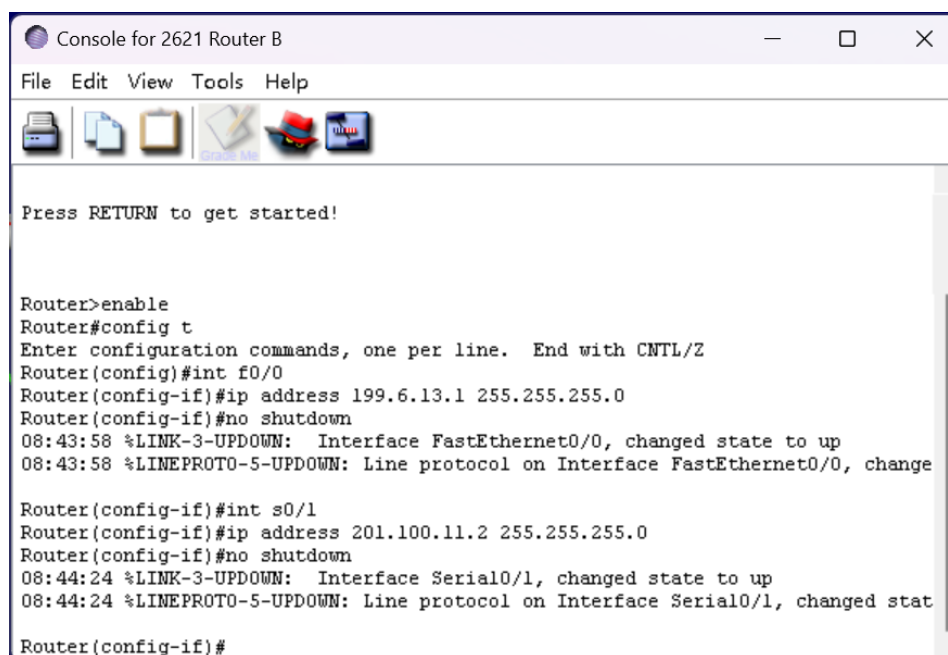
```
Console for 2621 Router B
File Edit View Tools Help

Router(config-if)#int s0/1
Router(config-if)#ip address 201.100.11.2 255.255.255.0
Router(config-if)#no shutdown
08:44:24 %LINK-3-UPDOWN: Interface Serial0/1, changed state to up
08:44:24 %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/1, changed stat

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        201.100.11.0/24 is directly connected, Serial0/1
C        199.6.13.0/24 is directly connected, FastEthernet0/0
Router#
```



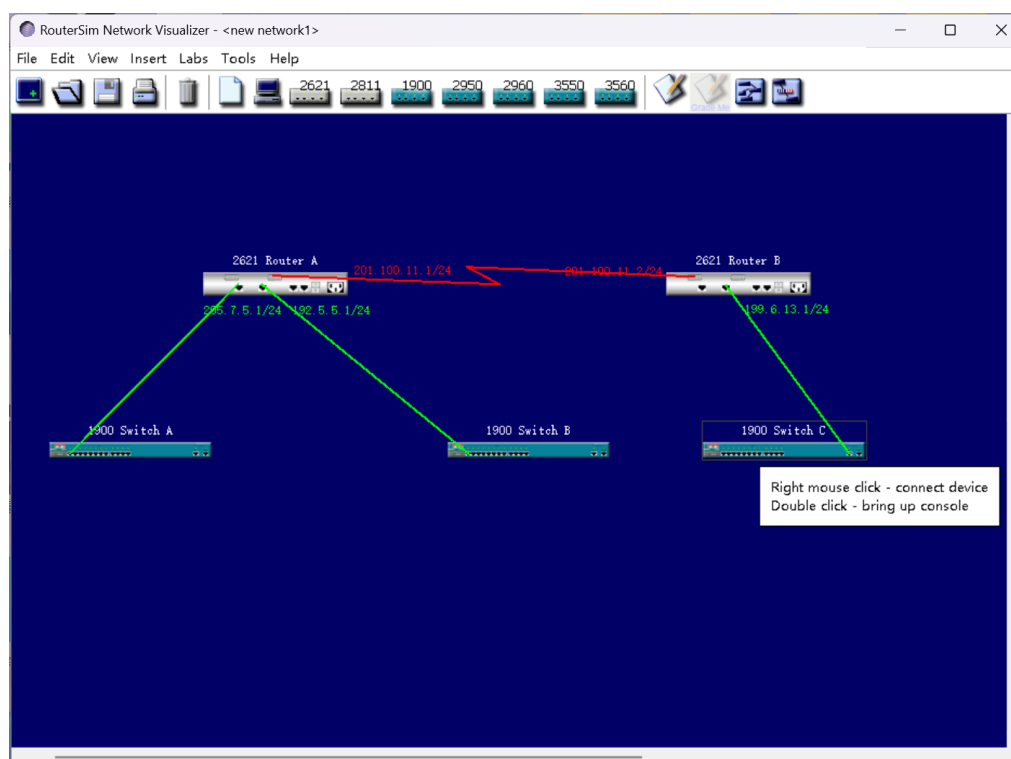


```
Console for 2621 Router B
File Edit View Tools Help

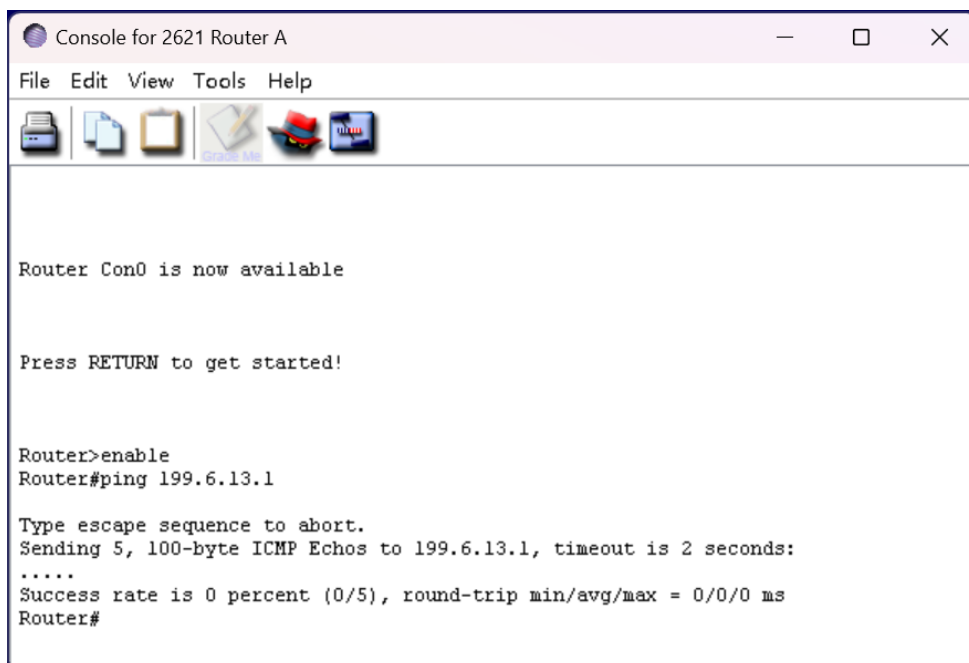
Press RETURN to get started!

Router>enable
Router#config t
Enter configuration commands, one per line. End with CNTL/Z
Router(config)#int f0/0
Router(config-if)#ip address 199.6.13.1 255.255.255.0
Router(config-if)#no shutdown
08:43:58 %LINK-3-UPDOWN: Interface FastEthernet0/0, changed state to up
08:43:58 %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, change
Router(config-if)#int s0/1
Router(config-if)#ip address 201.100.11.2 255.255.255.0
Router(config-if)#no shutdown
08:44:24 %LINK-3-UPDOWN: Interface Serial0/1, changed state to up
08:44:24 %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/1, changed stat
Router(config-if)#
```

网络拓扑图上的各个端口 IP 地址信息如图所示：



接下来在路由器 A 使用 ping 命令查看路由器 A 到交换机 C 的直连网络是否连通，可以看到输入 ping 命令和交换机 C 对应的路由器端口 IP 地址后终端显示超时，证明这两个路由器并没有连通，需要为其配置静态路由或动态路由协议



```
Console for 2621 Router A
File Edit View Tools Help

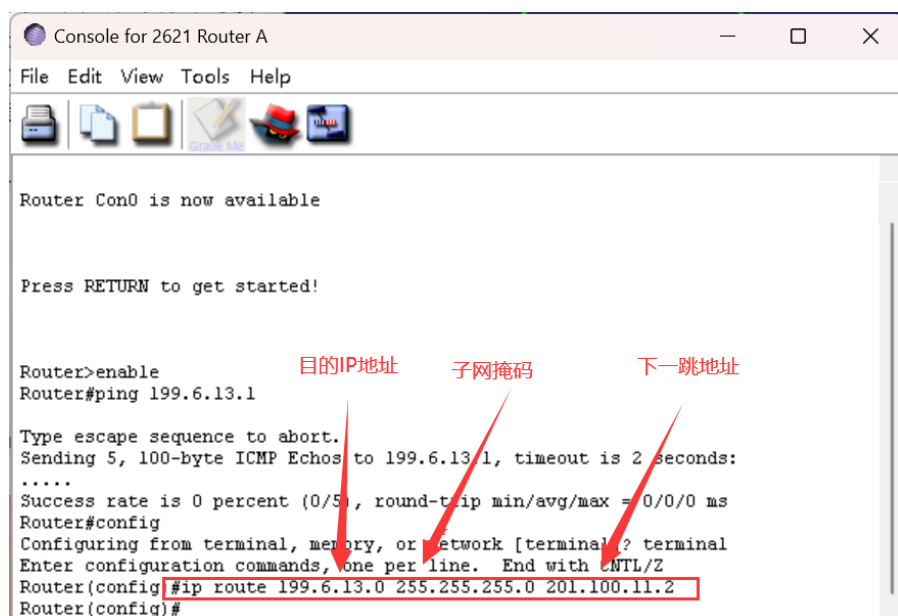
Router Con0 is now available

Press RETURN to get started!

Router>enable
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#
```

为路由器 A 配置静态路由协议，先进入全局配置模式，之后输入以下命令完成静态路由配置



```
Console for 2621 Router A
File Edit View Tools Help

Router Con0 is now available

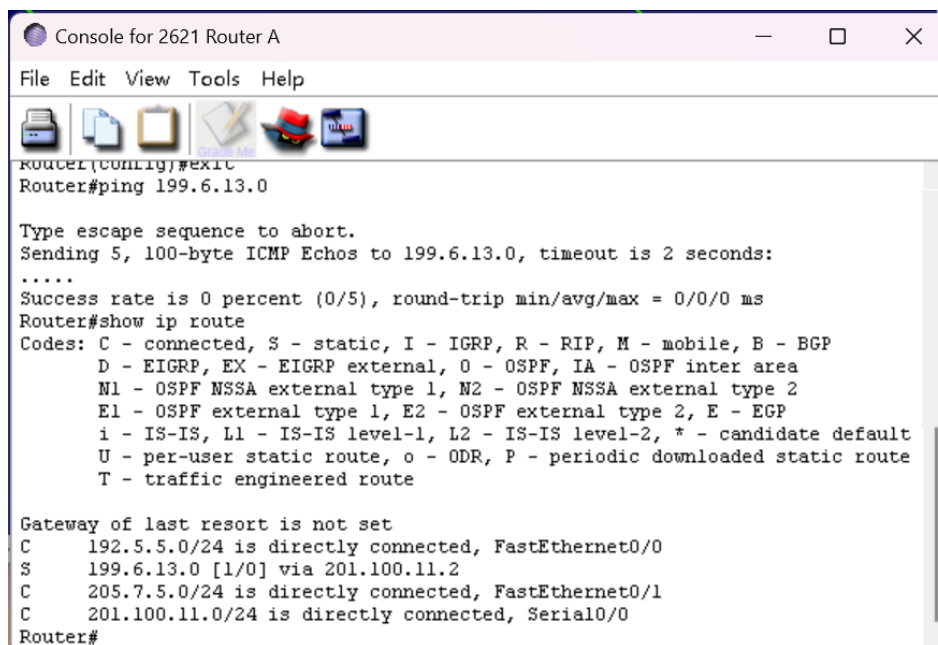
Press RETURN to get started!

Router>enable
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#config
Configuring from terminal, memory, or network [terminal?] 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)#
```

目的IP地址      子网掩码      下一跳地址

在超级用户模式下输入 show 命令可以看到了路由器 A 想连接到 199.6.13.0 这一网络需要通过 201.100.11.2，证明刚刚静态配置正确

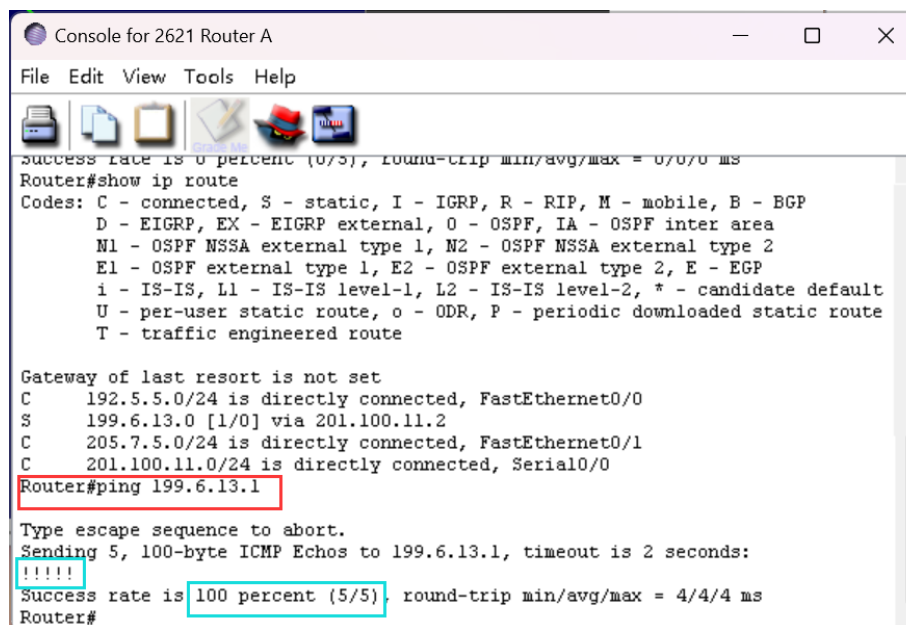


```
Router#ping 199.6.13.0

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 199.6.13.0, timeout is 2 seconds:
.....
Success rate is 0 percent (0/5), round-trip min/avg/max = 0/0/0 ms
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
S    199.6.13.0 [1/0] via 201.100.11.2
C    205.7.5.0/24 is directly connected, FastEthernet0/1
C    201.100.11.0/24 is directly connected, Serial0/0
Router#
```

最后重新输入 ping 命令查看是否连通，显示出五个感叹号并且数据全部传输，证明静态路由配置成功并且可以进行连接

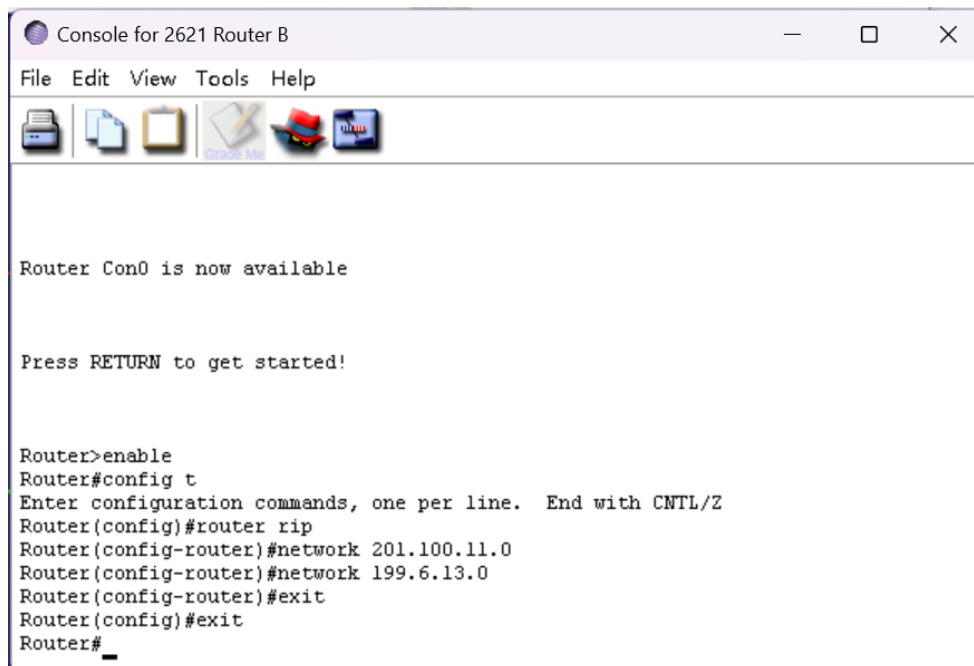


```
Router#ping 199.6.13.1

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#
```

### 3.2.2 配置动态路由

为路由器 B 配置 RIP 协议，首先进入全局配置模式，之后输入命令 `router rip` 启动 RIP 协议，之后输入 RIP 所作用的网络地址，该网络地址要和本路由器直接想连

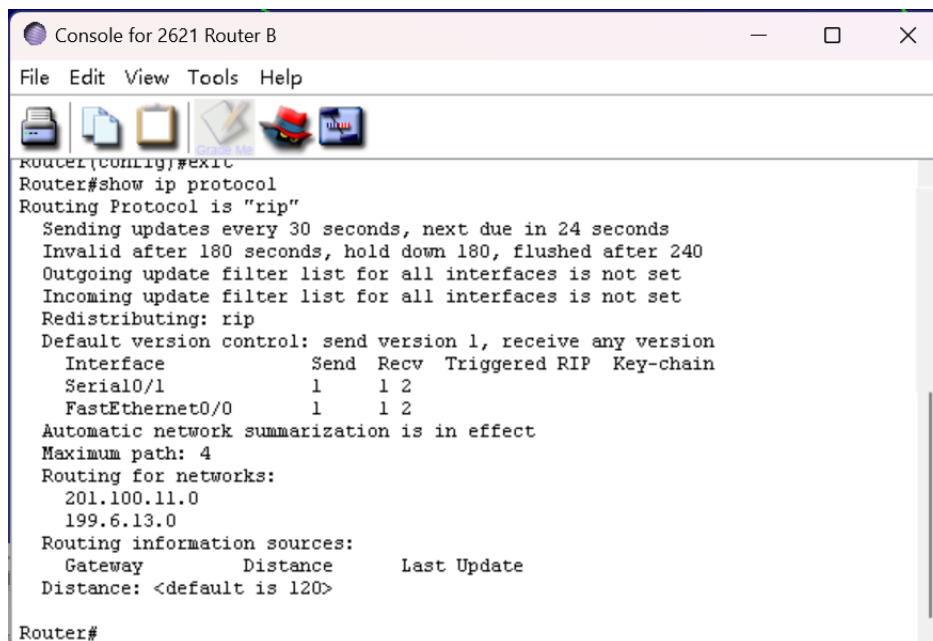


```
Router Con0 is now available

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 201.100.11.0
Router(config-router)#network 199.6.13.0
Router(config-router)#exit
Router(config)#exit
Router#
```

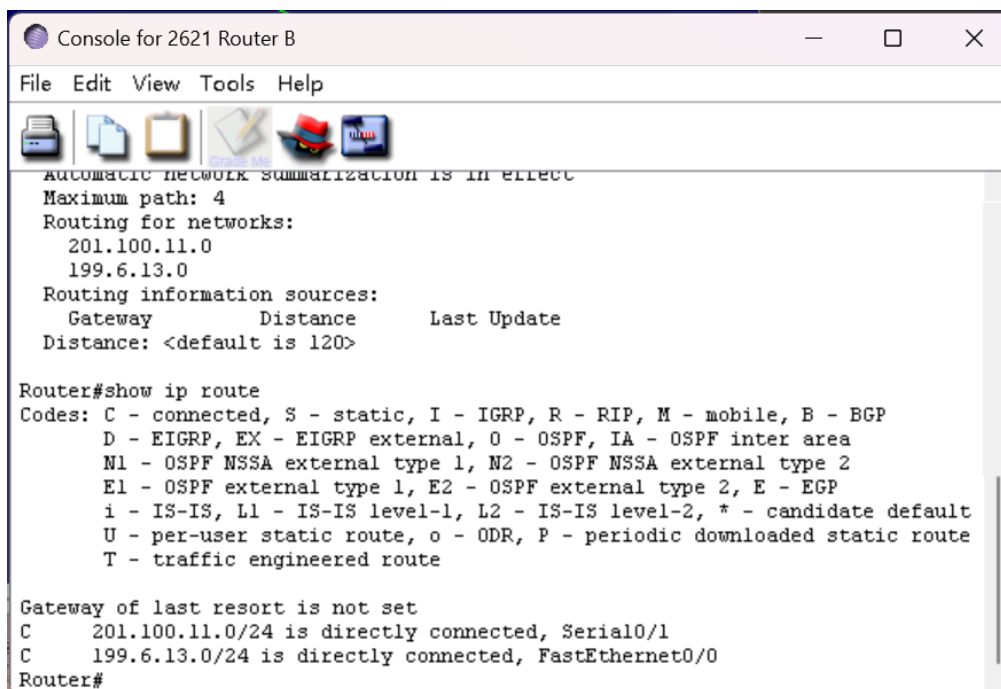
输入 `show ip protocol` 查看路由器的 RIP 协议工作情况



```
Router[config]#exit
Router#show ip protocol
Routing Protocol is "rip"
  Sending updates every 30 seconds, next due in 24 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#
```

输入命令 `show ip route` 可以查看当前的路由表，此时还没有学习到新的地址映射



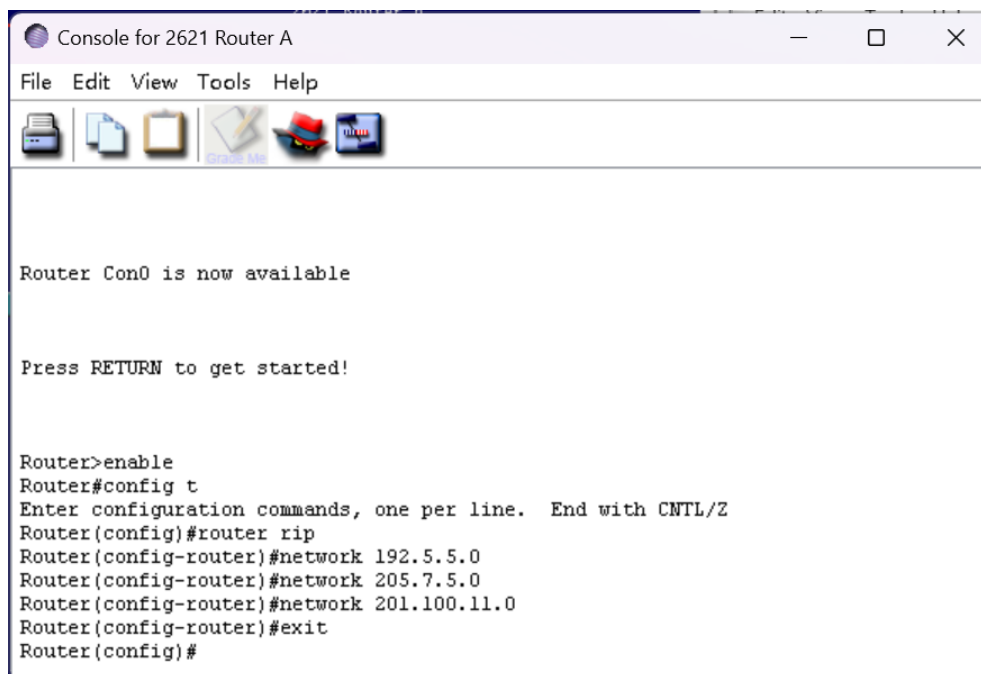
```
Console for 2621 Router B
File Edit View Tools Help

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    201.100.11.0/24 is directly connected, Serial0/1
C    199.6.13.0/24 is directly connected, FastEthernet0/0
Router#
```

同理为路由器 A 创建 RIP 协议



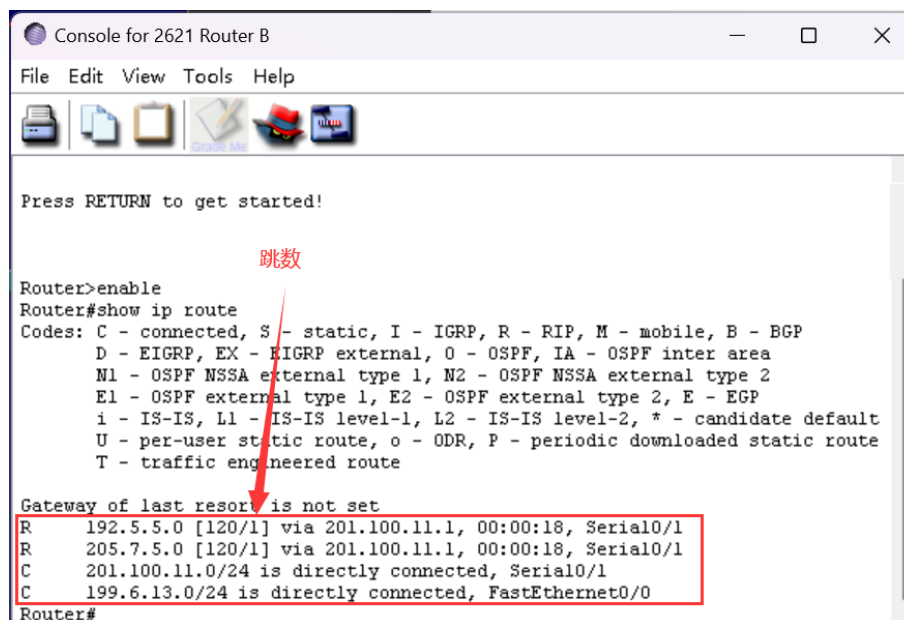
```
Console for 2621 Router A
File Edit View Tools Help

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)#
```

之后打开 B 的路由表，可以看到路由器 B 通过 RIP 协议成功学习到两个新的转发地址



```
Console for 2621 Router B
File Edit View Tools Help

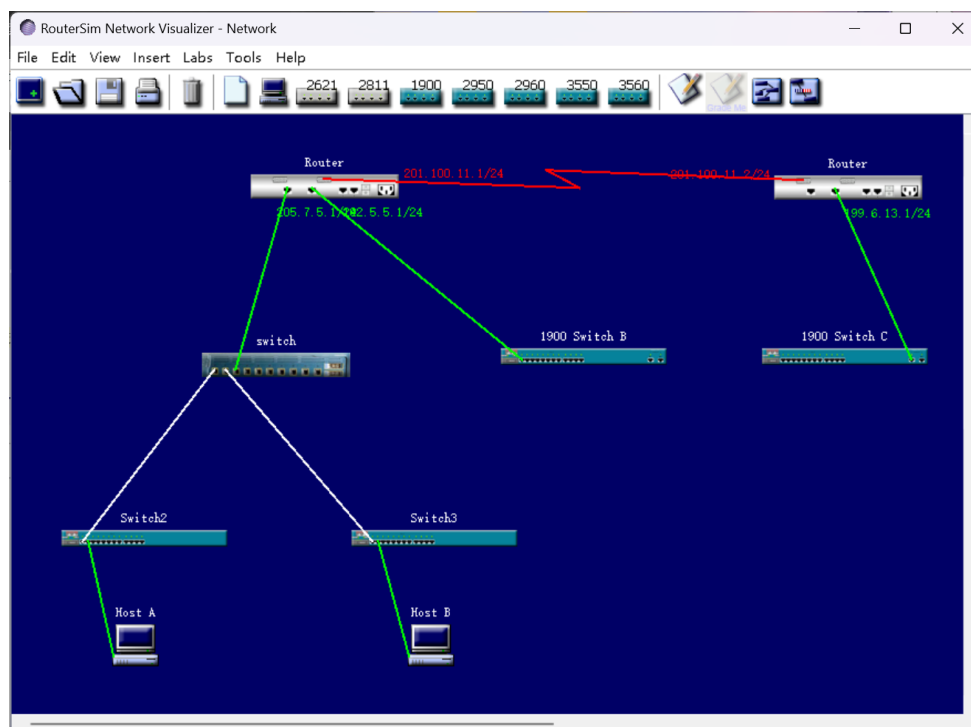
Press RETURN to get started!

Router>enable
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

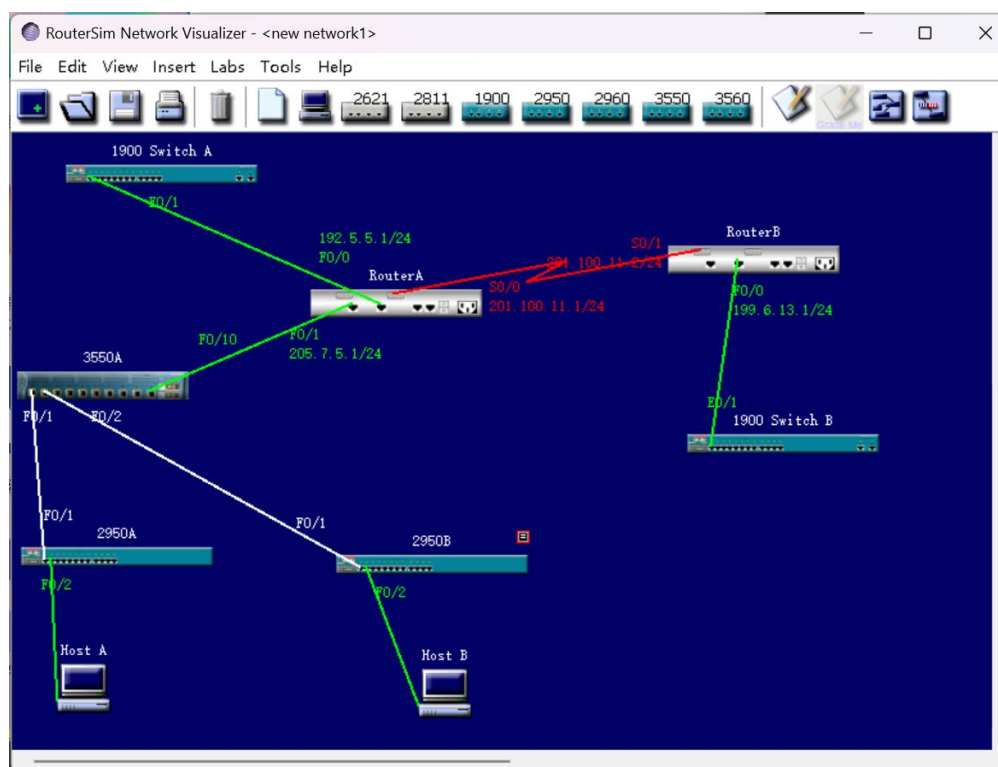
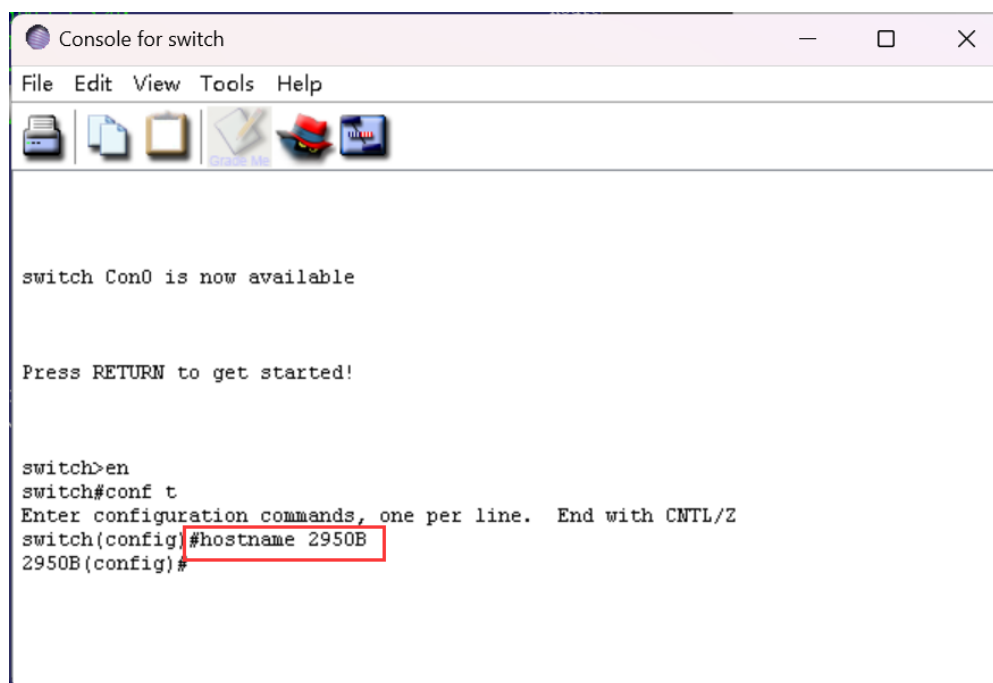
Gateway of last resort is not set
R    192.5.5.0 [120/1] via 201.100.11.1, 00:00:18, Serial0/1
R    205.7.5.0 [120/1] via 201.100.11.1, 00:00:18, Serial0/1
C    201.100.11.0/24 is directly connected, Serial0/1
C    199.6.13.0/24 is directly connected, FastEthernet0/0
Router#
```

### 3.2.3 配置交换机端口

在网络中加入两个新的交换机和主机，用于构建交换机连接网络

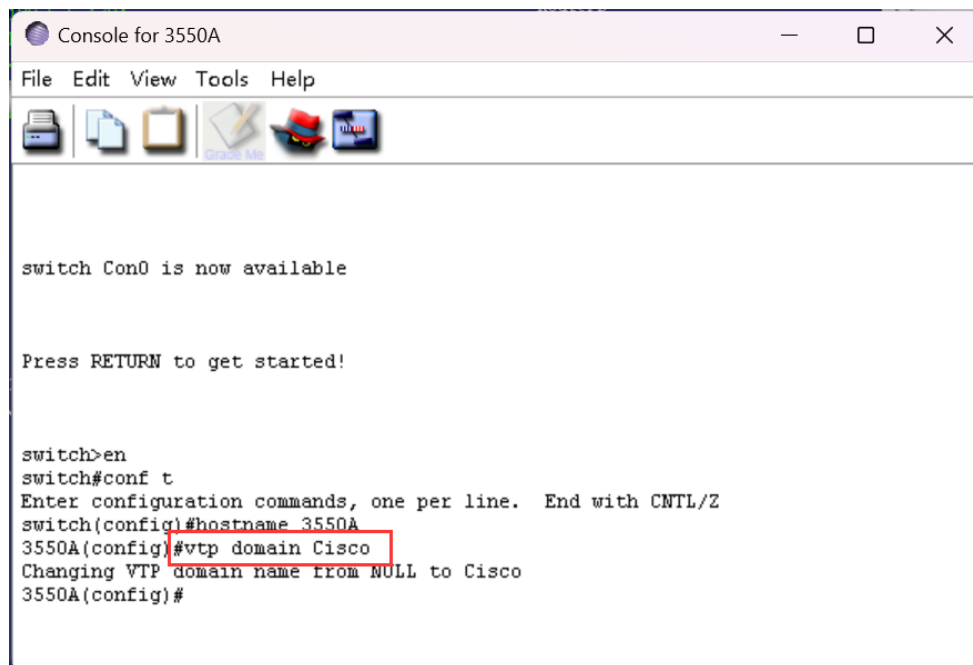


为了方便辨识修改交换机的名字，先进入各个交换机的全局配置模式，之后使用 `hostname` 修改设备名字，最后修改的结果如图所示



## 配置 VTP 域

在交换机 3550A 上修改 VTP 域名称为 “Cisco”



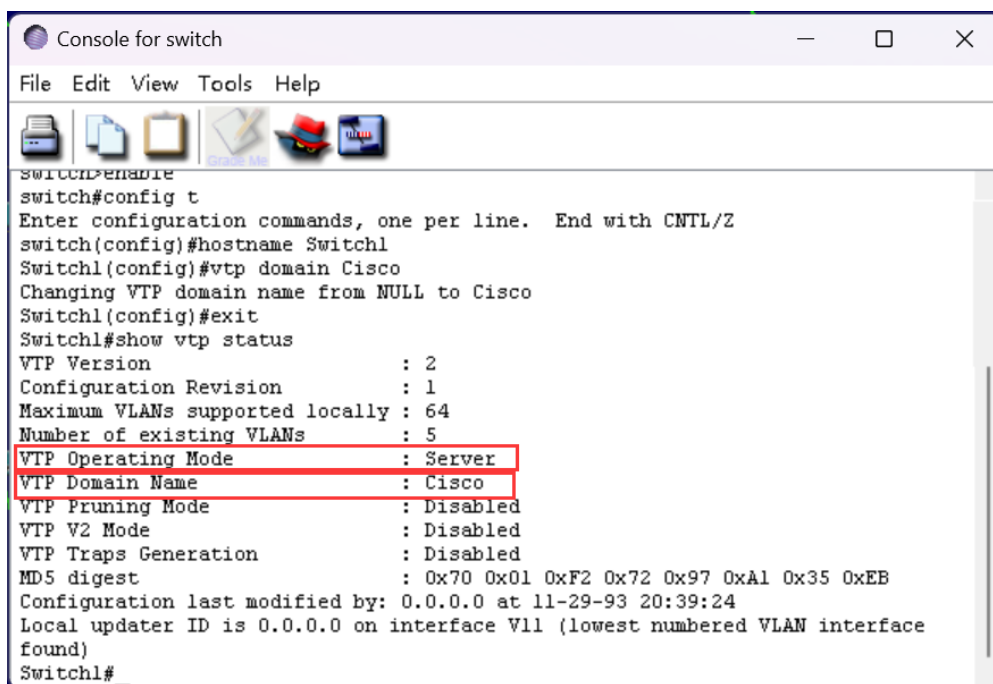
```
Console for 3550A
File Edit View Tools Help

switch Con0 is now available

Press RETURN to get started!

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)#
```

在超级用户模式下可以通过 show vtp status 查看 VTP 的配置情况



```
Console for switch
File Edit View Tools Help

switch>enable
switch#config t
Enter configuration commands, one per line. End with CNTL/Z
switch(config)#hostname Switch1
Switch1(config)#vtp domain Cisco
Changing VTP domain name from NULL to Cisco
Switch1(config)#exit
Switch1#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)
Switch1#
```



对于交换机 2950A 和 2950B 配置和交换机 3550A 基本相同，但是需要注意使用 vtp mode client 将它们的模式修改为客户模式

```
Console for Switch2
File Edit View Tools Help

Switch2 Con0 is now available

Press RETURN to get started!

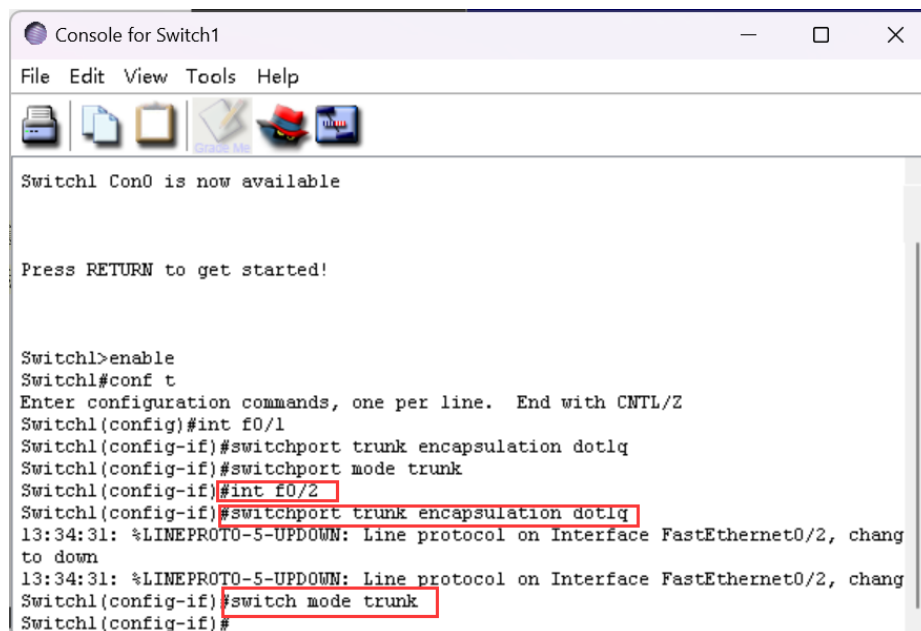
Switch2>enable
Switch2#vtp domain Cisco
^
% Invalid input detected at '^' marker.
Switch2#conf t
Enter configuration commands, one per line. End with CNTL/Z
Switch2(config)#vtp domain Cisco
Changing VTP domain name from Cisco to Cisco
Switch2(config)#vtp mode client
Setting device to VTP CLIENT mode.
Switch2(config)#
```

```
Console for Switch2
File Edit View Tools Help

Switch2#conf t
Enter configuration commands, one per line. End with CNTL/Z
Switch2(config)#vtp domain Cisco
Changing VTP domain name from Cisco to Cisco
Switch2(config)#vtp mode client
Setting device to VTP CLIENT mode.
Switch2(config)#exit
Switch2#show vtp status
VTP Version : 2
Configuration Revision : 1
Maximum VLANs supported locally : 64
Number of existing VLANs : 5
VTP Operating Mode : Client
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: 2950 SwitchA at 11-29-93 20:39:24
Local updater ID is 2950 SwitchA on interface V11 (lowest numbered VLAN interface found)
Switch2#
```

## 配置 trunk

需要将 3550A 的两个和其他交换机相连的端口配置为 Trunk 端口，先分别进入 3550A 的 fa0/1 和 fa0/2 端口，之后配置为 Trunk 端口并进行封装



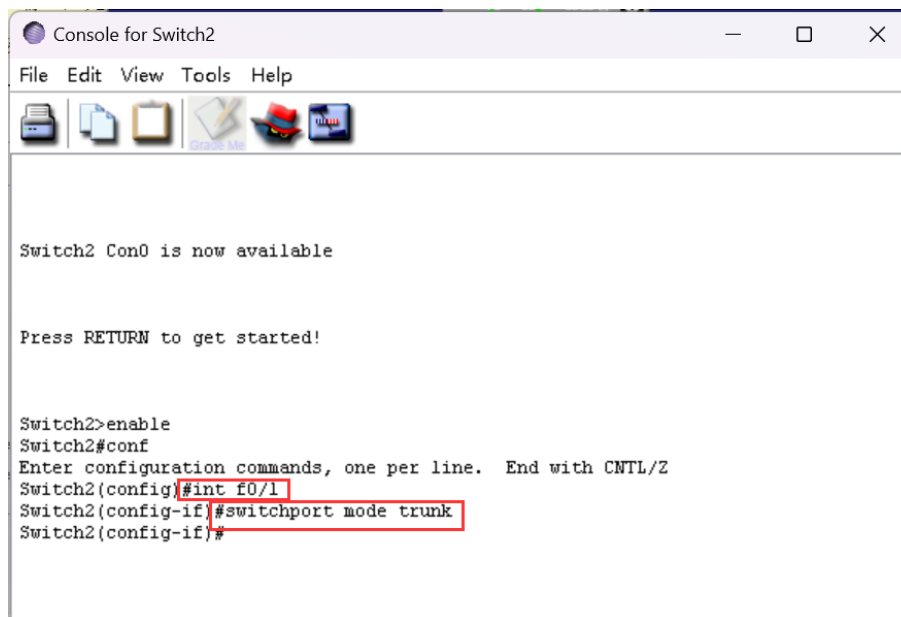
```
Console for Switch1
File Edit View Tools Help

Switch1 Con0 is now available

Press RETURN to get started!

Switch1>enable
Switch1#conf t
Enter configuration commands, one per line. End with CNTL/Z
Switch1(config)#int f0/1
Switch1(config-if)#switchport trunk encapsulation dot1q
Switch1(config-if)#switchport mode trunk
Switch1(config-if)#int f0/2
Switch1(config-if)#switchport trunk encapsulation dot1q
13:34:31: %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/2, chang
to down
13:34:31: %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/2, chang
Switch1(config-if)#switch mode trunk
Switch1(config-if)#
```

之后需要将和 3550A 相连的交换机的端口也设置为 Trunk 端口

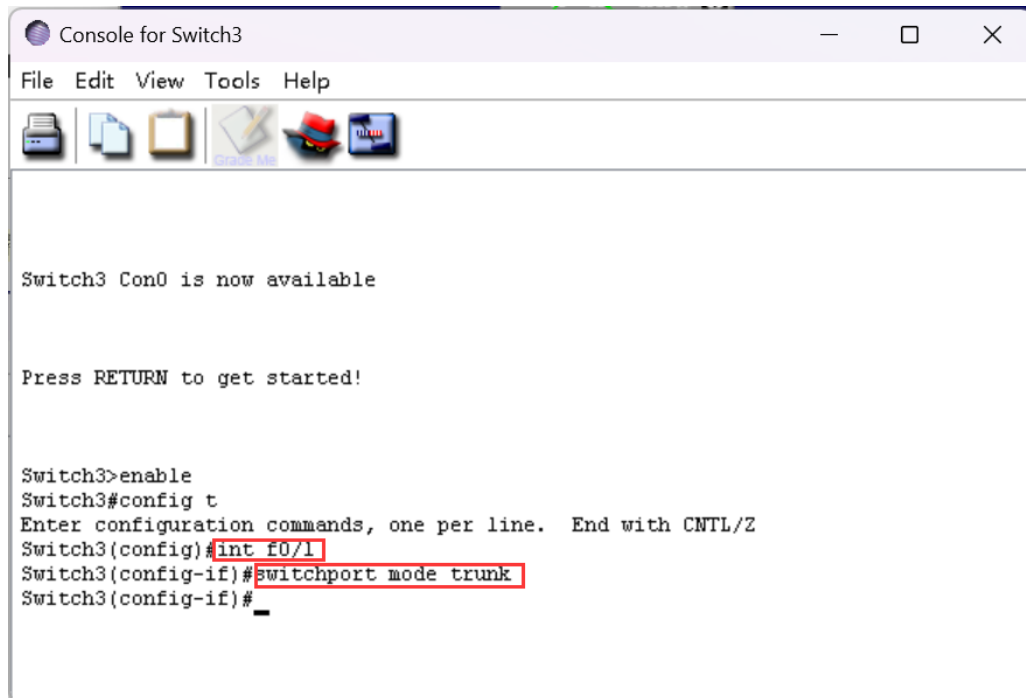


```
Console for Switch2
File Edit View Tools Help

Switch2 Con0 is now available

Press RETURN to get started!

Switch2>enable
Switch2#conf
Enter configuration commands, one per line. End with CNTL/Z
Switch2(config)#int f0/1
Switch2(config-if)#switchport mode trunk
Switch2(config-if)#
```

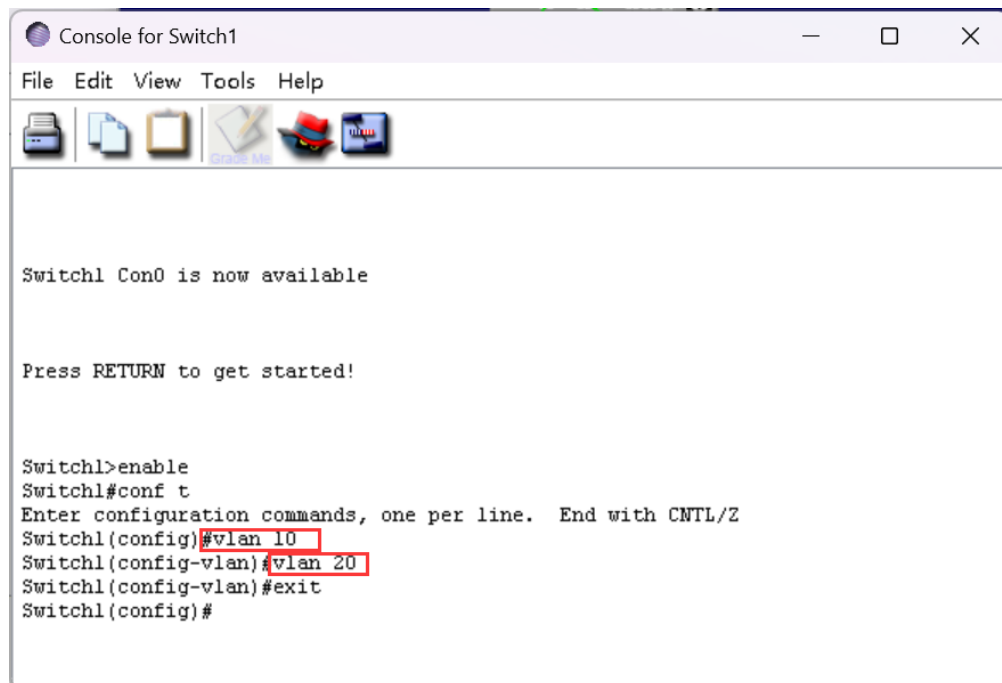


```
Switch3 Con0 is now available

Press RETURN to get started!

Switch3>enable
Switch3#config t
Enter configuration commands, one per line. End with CNTL/Z
Switch3(config)#int f0/1
Switch3(config-if)#switchport mode trunk
Switch3(config-if)#
```

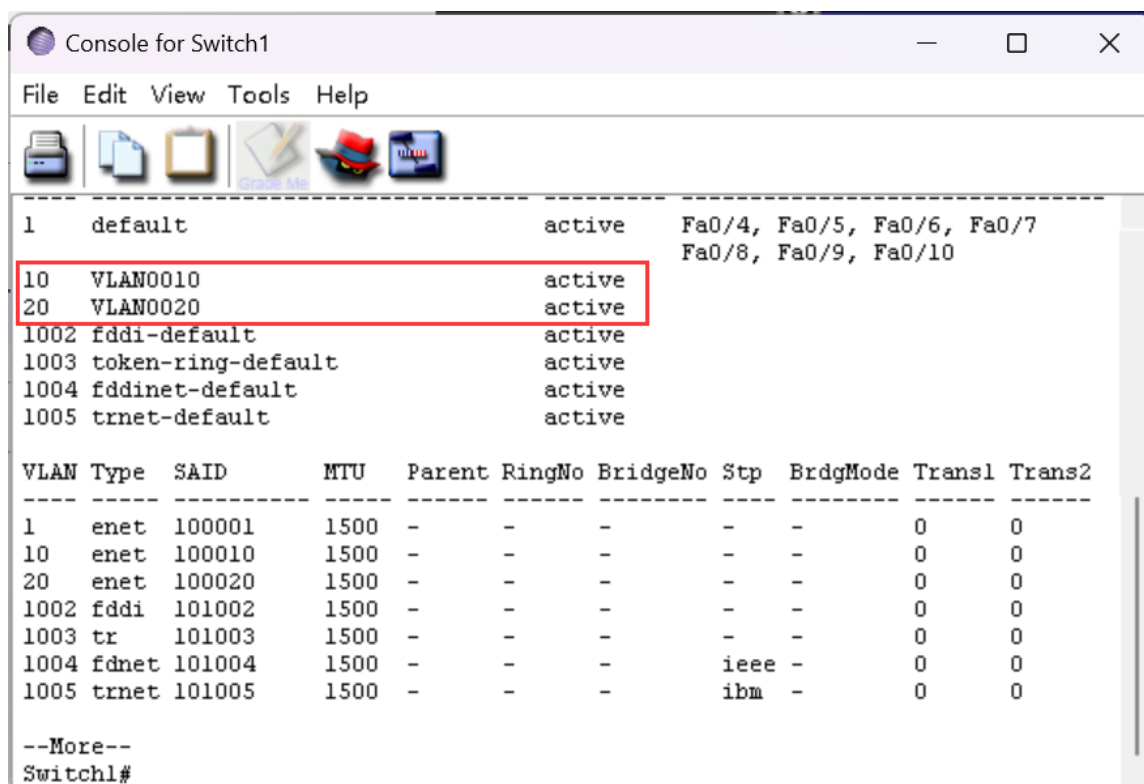
## 配置 VLAN



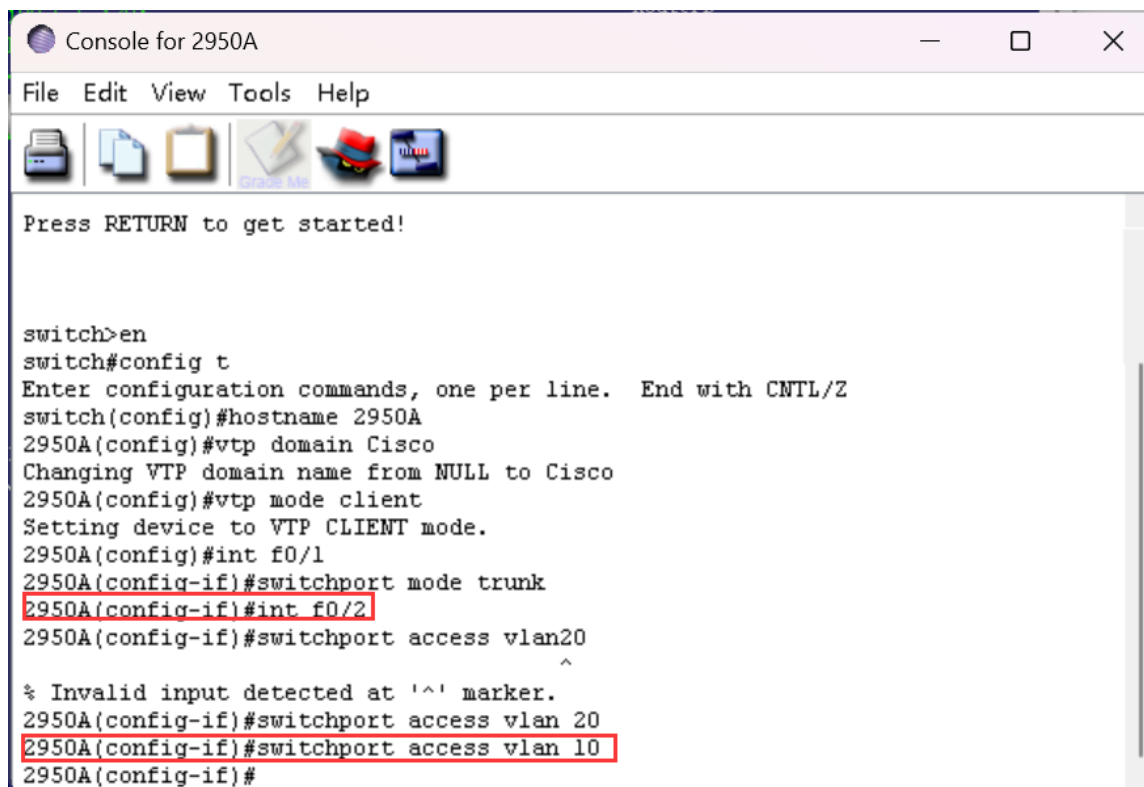
```
Switch1 Con0 is now available

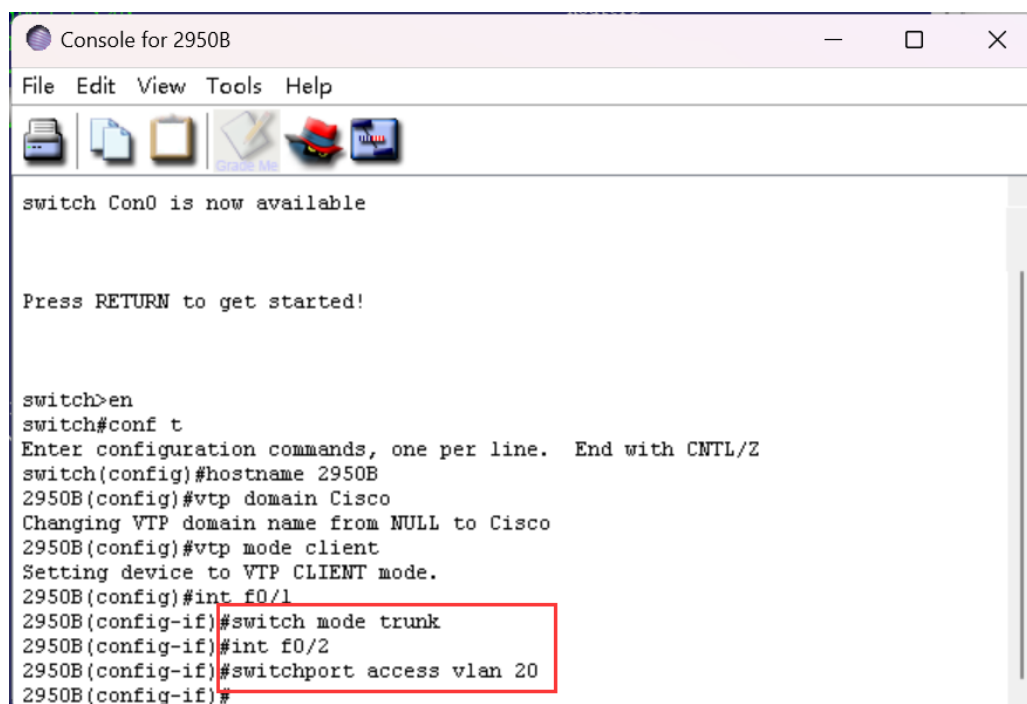
Press RETURN to get started!

Switch1>enable
Switch1#conf t
Enter configuration commands, one per line. End with CNTL/Z
Switch1(config)#vlan 10
Switch1(config-vlan)#vlan 20
Switch1(config-vlan)#exit
Switch1(config)#
```



将 2950A、B 所连设备加入虚拟局域网





The screenshot shows a terminal window titled "Console for 2950B". The window has a menu bar with "File", "Edit", "View", "Tools", and "Help". Below the menu bar are several icons: a printer, a document, a folder, a notepad, a red hat, and a Cisco logo. The main text area displays the following commands and output:

```
switch Con0 is now available

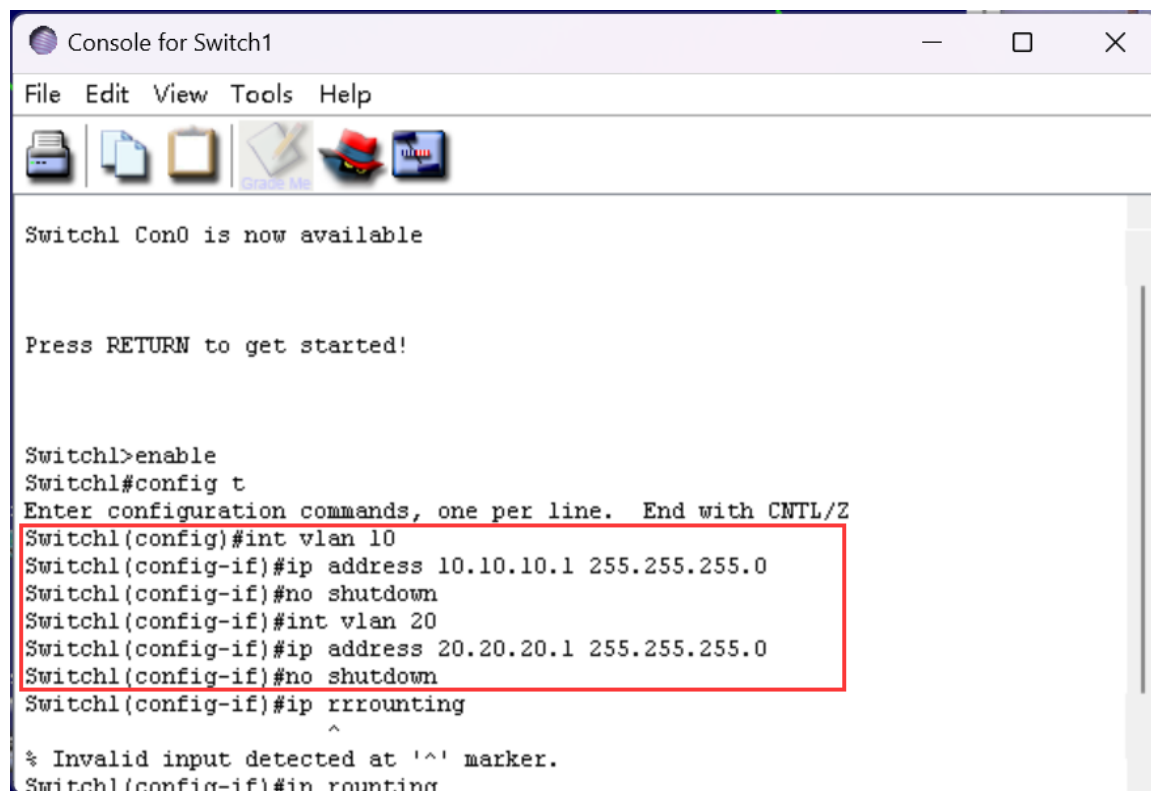
Press RETURN to get started!

switch>en
switch#conf 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)#int f0/1
2950B(config-if)#switch mode trunk
2950B(config-if)#int f0/2
2950B(config-if)#switchport access vlan 20
2950B(config-if)#
```

The last three lines of the configuration are highlighted with a red box.

配置三层交换机

给 3550A 的虚拟局域网端口配置 IP 地址，之后使用 no shutdown 命令激活



The screenshot shows a terminal window titled "Console for Switch1". The window has a menu bar with "File", "Edit", "View", "Tools", and "Help". Below the menu bar are several icons: a printer, a document, a folder, a notepad, a red hat, and a Cisco logo. The main text area displays the following commands and output:

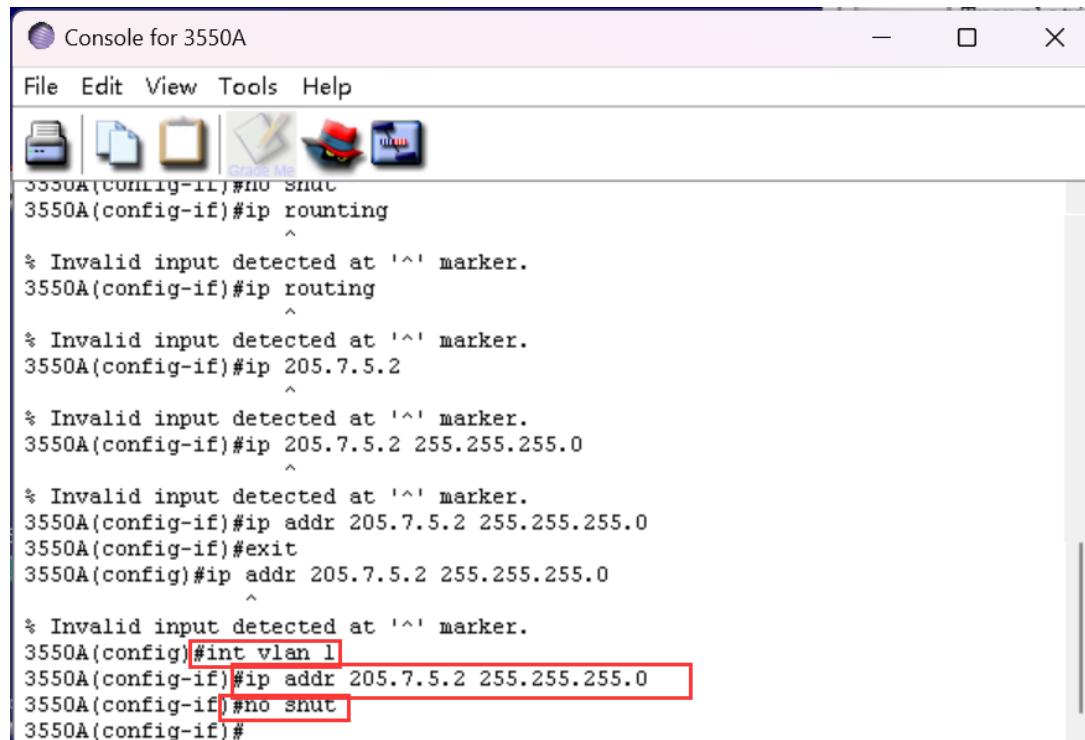
```
Switch1 Con0 is now available

Press RETURN to get started!

Switch1>enable
Switch1#config t
Enter configuration commands, one per line. End with CNTL/Z
Switch1(config)#int vlan 10
Switch1(config-if)#ip address 10.10.10.1 255.255.255.0
Switch1(config-if)#no shutdown
Switch1(config-if)#int vlan 20
Switch1(config-if)#ip address 20.20.20.1 255.255.255.0
Switch1(config-if)#no shutdown
Switch1(config-if)#ip rrrounting
Switch1(config-if)#ip rrrounting
^
% Invalid input detected at '^' marker.
Switch1(config-if)#in rrrounting
```

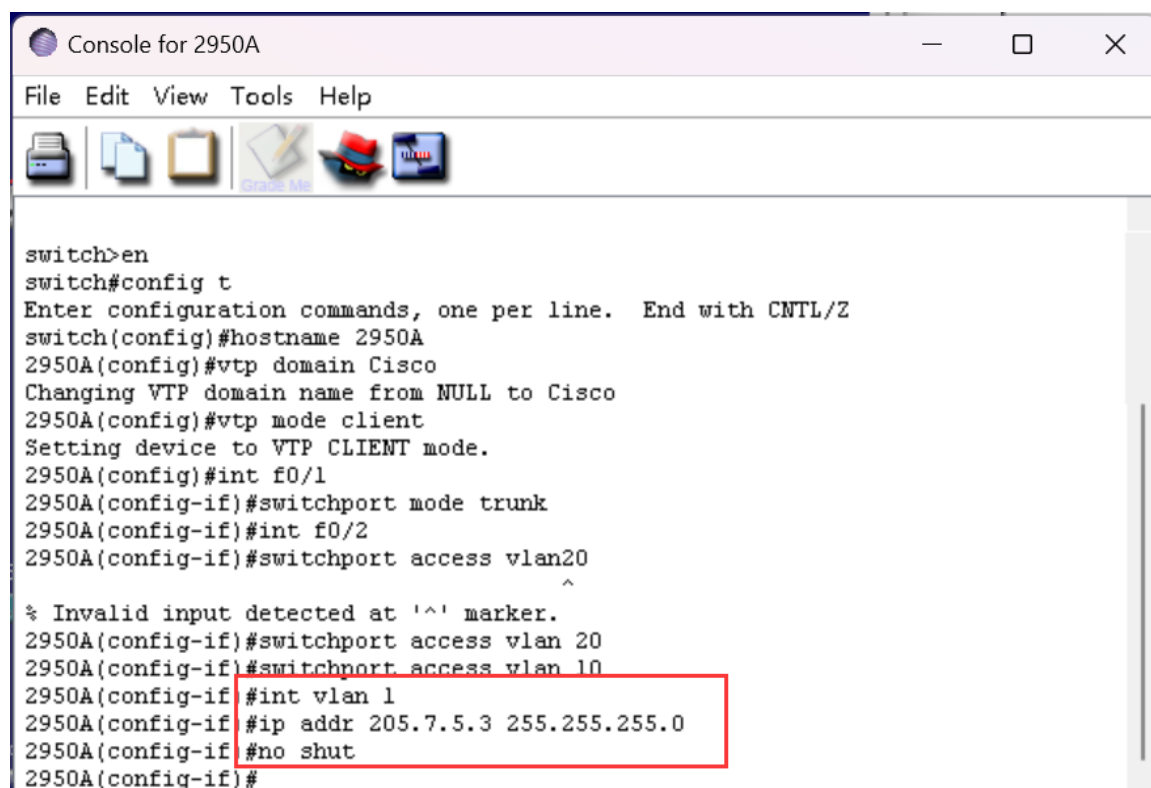
The first six lines of the configuration are highlighted with a red box.

## 配置 IP 地址

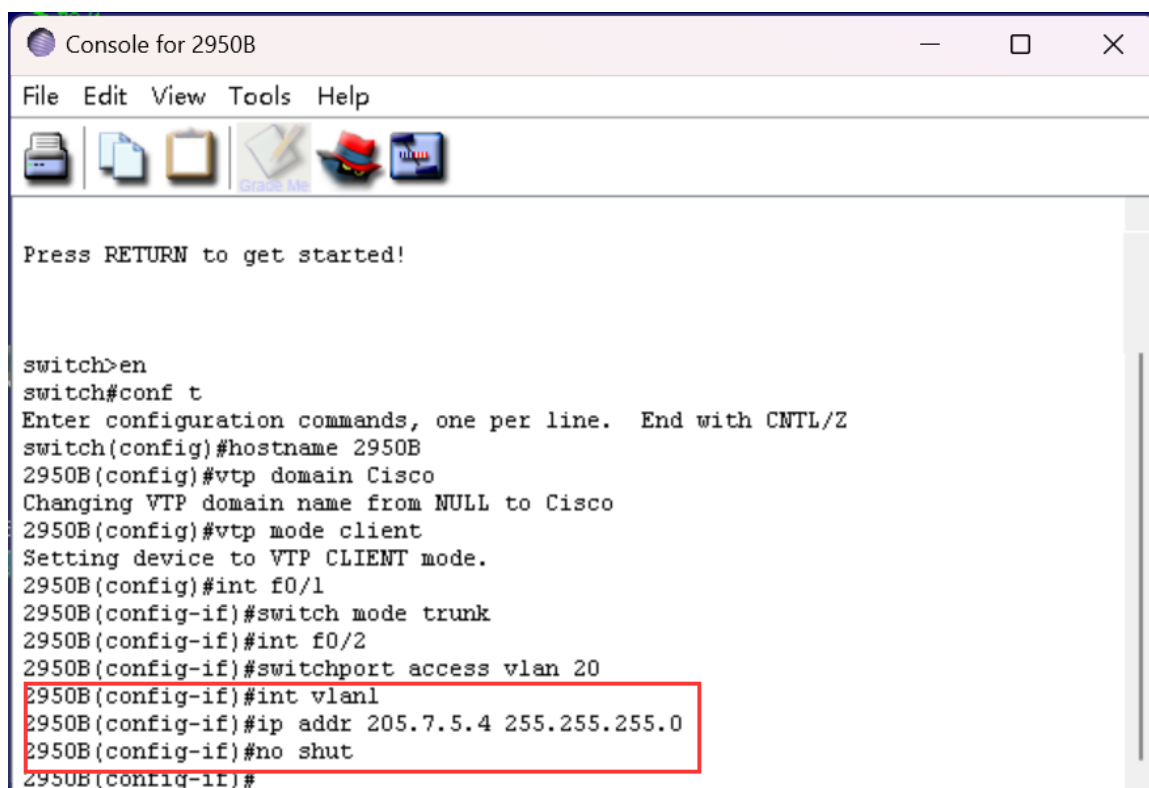


```
3550A(config-if)#no shut
3550A(config-if)#ip routing
^
% Invalid input detected at '^' marker.
3550A(config-if)#ip routing
^
% Invalid input detected at '^' marker.
3550A(config-if)#ip 205.7.5.2
^
% Invalid input detected at '^' marker.
3550A(config-if)#ip 205.7.5.2 255.255.255.0
^
% Invalid input detected at '^' marker.
3550A(config-if)#ip addr 205.7.5.2 255.255.255.0
3550A(config-if)#exit
3550A(config)#ip addr 205.7.5.2 255.255.255.0
^
% Invalid input detected at '^' marker.
3550A(config)#int vlan 1
3550A(config-if)#ip addr 205.7.5.2 255.255.255.0
3550A(config-if)#no shut
3550A(config-if)#
```

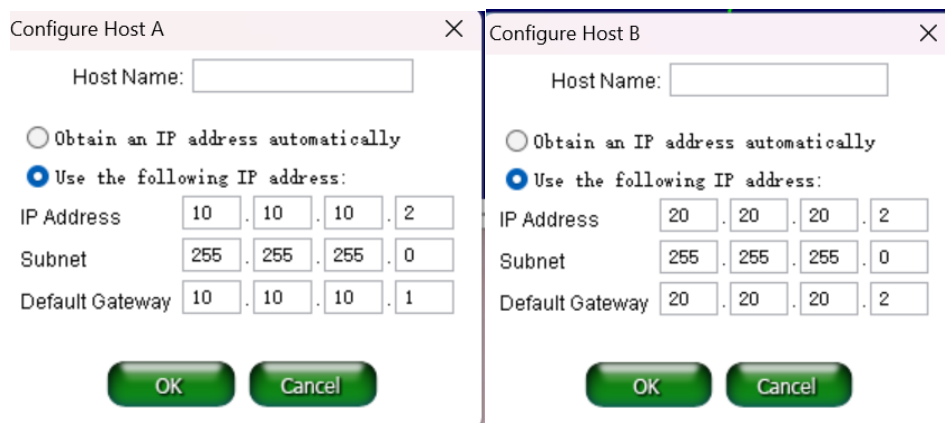
之后进入 2950A、B 配置 IP 地址



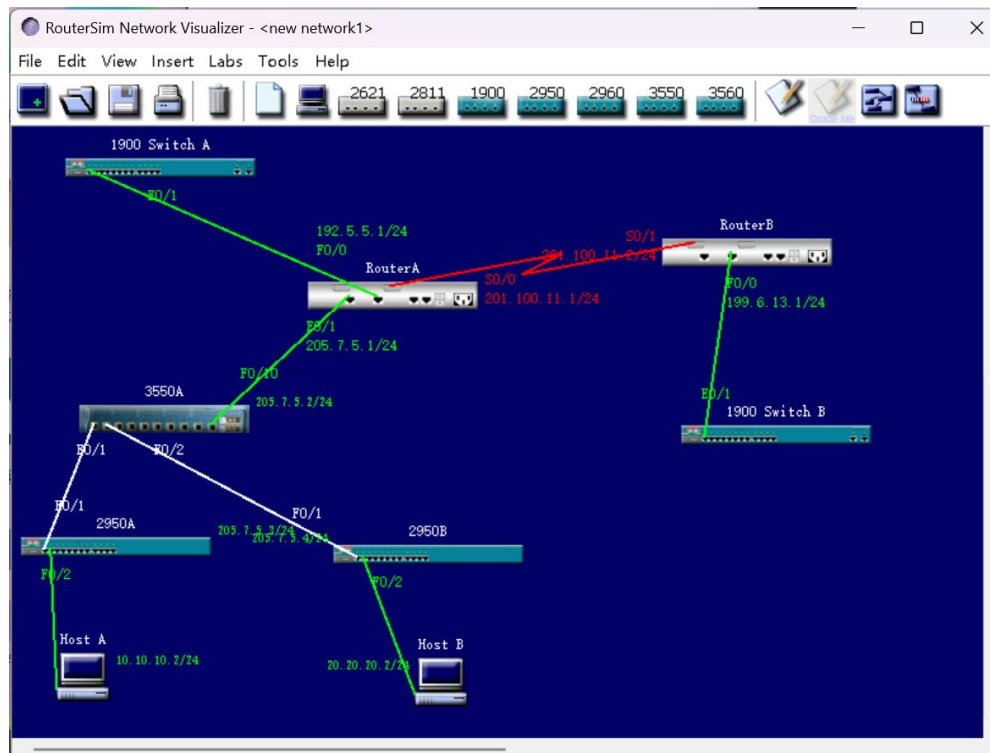
```
switch>en
switch#config t
Enter configuration commands, one per line. End with CNTL/Z
switch(config)#hostname 2950A
2950A(config)#vtp domain Cisco
Changing VTP domain name from NULL to Cisco
2950A(config)#vtp mode client
Setting device to VTP CLIENT mode.
2950A(config)#int f0/1
2950A(config-if)#switchport mode trunk
2950A(config-if)#int f0/2
2950A(config-if)#switchport access vlan 20
^
% Invalid input detected at '^' marker.
2950A(config-if)#switchport access vlan 20
2950A(config-if)#switchport access vlan 10
2950A(config-if)#int vlan 1
2950A(config-if)#ip addr 205.7.5.3 255.255.255.0
2950A(config-if)#no shut
2950A(config-if)#
```



之后为两台主机分配 IP 地址、子网掩码和网关



完成之后的网络拓扑结构上的 IP 地址如图所示



之后在 3550A 上 ping 2950A 和 2950B 显示可以成功连接

```
Console for 3550A
File Edit View Tools Help

3550A Con0 is now available

Press RETURN to get started!

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>
```



```
Console for 3550A
File Edit View Tools Help

3550A Con0 is now available

Press RETURN to get started!

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>
```

```
Console for Host B
File Edit View Tools Help

Request timed out.
Request timed out.
Request timed out.

Ping Statistics for 10.10.10.2:
  Packets Sent = 4, Received = 0, Lost = 4 (100% loss),
Approximate round trip times in milli-seconds:
  Minimum = 0ms, Maximum = 0ms, Average = 0ms
C:\>ping 192.168.10.2

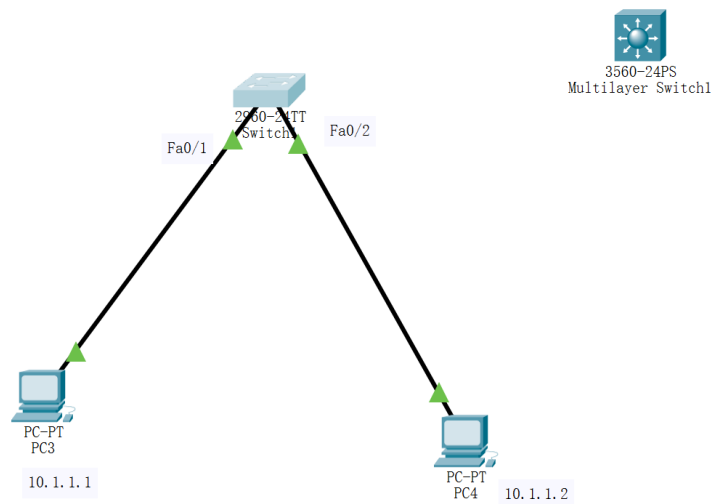
Pinging 192.168.10.2 with 32 bytes of data:

Reply from 192.168.10.2 :bytes=32 time=22ms TTL=254
Reply from 192.168.10.2 :bytes=32 time=22ms TTL=254
Reply from 192.168.10.2 :bytes=32 time=22ms TTL=254
Reply from 192.168.10.2 :bytes=32 time=22ms TTL=254

Ping Statistics for 192.168.10.2:
  Packets Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
  Minimum = 22ms, Maximum = 23ms, Average = 22ms
C:\>
```

### 3.3 思科模拟器

#### 3.3.1 配置交换机和 Vlan



先为交换机分配 ip 地址

```

Switch>enable
Switch#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#int vlan1
Switch(config-if)#ip addr 10.1.1.3 255.0.0.0
Switch(config-if)#no shutdown

Switch(config-if)#
%LINK-5-CHANGED: Interface Vlan1, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan1, changed state to up
  
```

配置后可以 ping 通 PC，第一条数据报没发送成功是因为该条需要被用于 ARP 地址解析

```

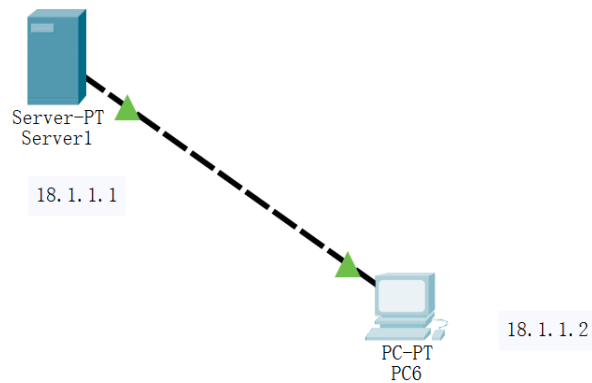
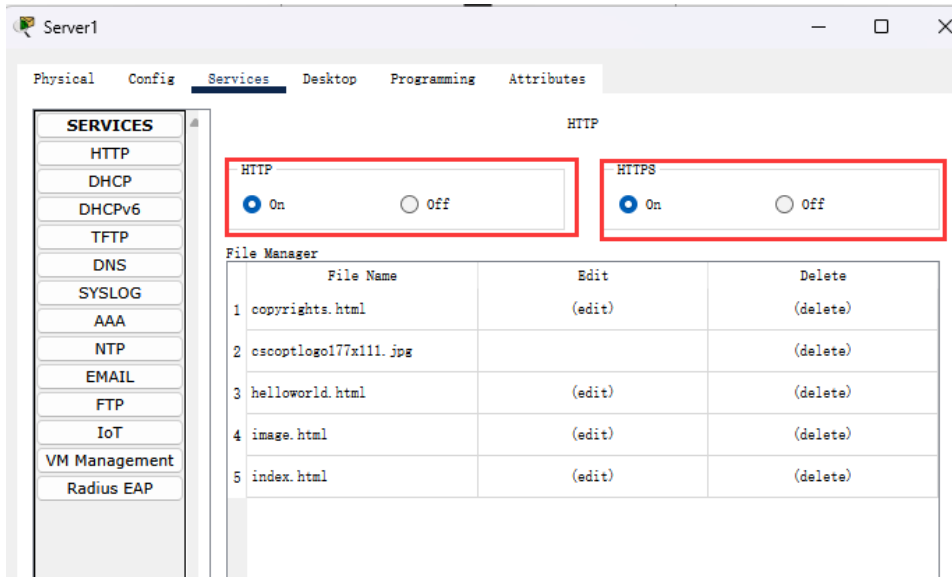
Switch(config)#exit
Switch#
%SYS-5-CONFIG_I: Configured from console by console
ping 10.1.1.1

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 10.1.1.1, timeout is 2 seconds:
.!!!!
Success rate is 80 percent (4/5), round-trip min/avg/max = 0/1/6 ms

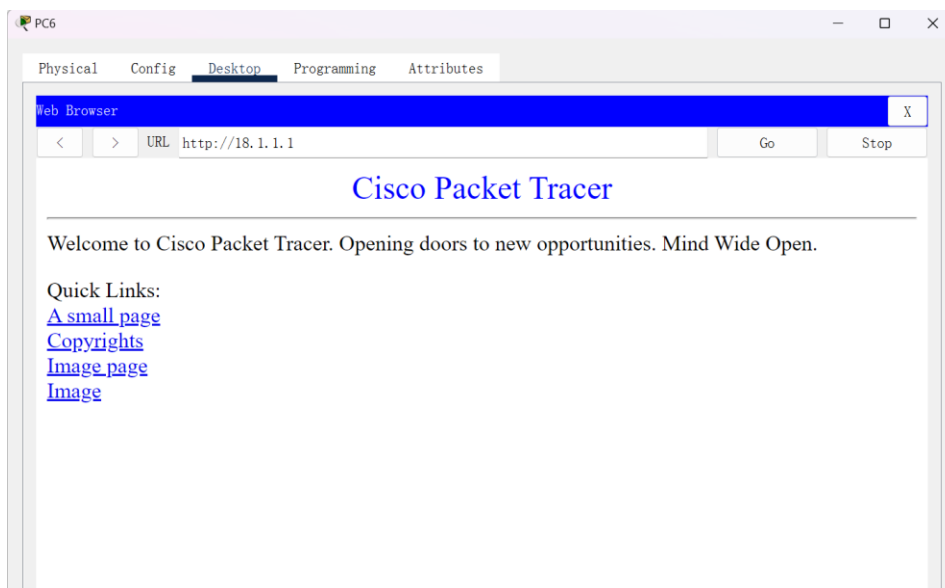
Switch#
  
```

```
Switch>enable
Switch#config t
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#ip routing
Switch(config)#router rip
Switch(config-router)#
```

### 3.3.2 终端和服务使用



配置 IP 地址后发现可以通过 HTTP 访问网页



## 4 实验代码

本次实验的代码已上传于以下代码仓库：

## 5 实验总结

1.理论结合实践，虽然路由器、三层交换机配置不是课内考点，但是学习这个对理解网络层和链路层有很大帮助

2.善于使用模拟软件有助于加深对课内知识的理解，思科模拟器功能非常齐全，除了实验要求还初步体验了物联网设备，对拓展知识面很有帮助