

# 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 2018 级 1 班

姓    名 何明祥

学    号 24320182203193

实验时间 2020 年 4 月 8 日

2020 年 4 月 10 日

## 1 实验目的

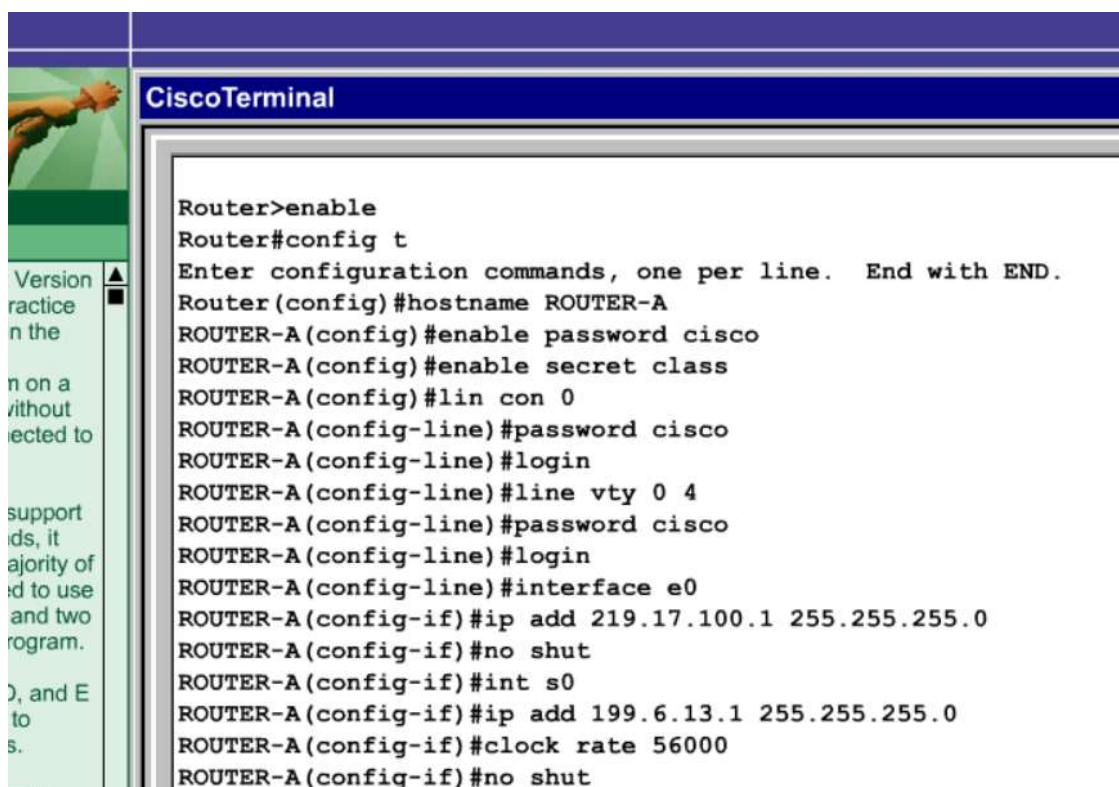
使用 Router eSIM v1.1 模拟器来模拟路由器的配置环境；使用 CCNA Network Visualizer 6.0 配置静态路由、动态路由和交换机端口的 VLAN（虚拟局域网）

## 2 实验环境

Win10, Router eSIM v1.1, CCNA Network Visualizer 6.0

## 3 实验结果

Router eSIM v1.1 的使用

A screenshot of a Cisco Terminal window. The title bar is blue and says "CiscoTerminal". The terminal text shows a sequence of commands to configure a router named "ROUTER-A". The commands include enabling the console, setting a password, configuring VTY lines, and setting IP addresses on interfaces e0 and s0. The left side of the window shows a partial view of a document with text about "Version practice".

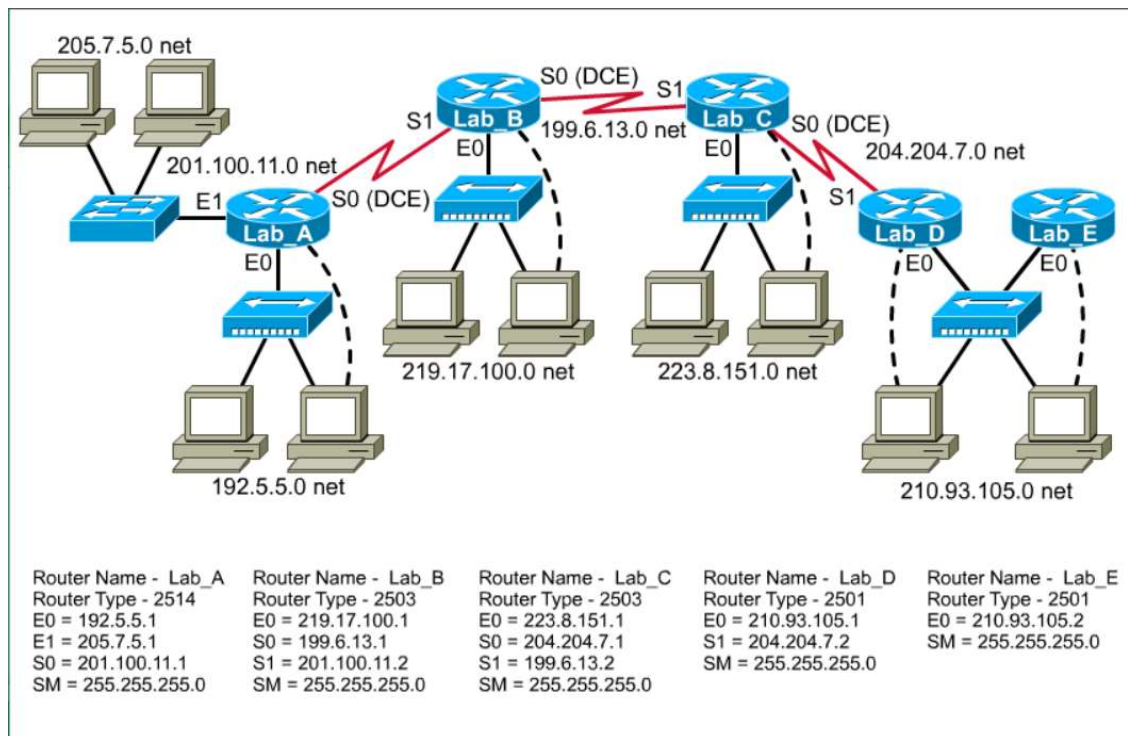
```
Router>enable
Router#config t
Enter configuration commands, one per line. End with END.
Router(config)#hostname ROUTER-A
ROUTER-A(config)#enable password cisco
ROUTER-A(config)#enable secret class
ROUTER-A(config)#lin con 0
ROUTER-A(config-line)#password cisco
ROUTER-A(config-line)#login
ROUTER-A(config-line)#line vty 0 4
ROUTER-A(config-line)#password cisco
ROUTER-A(config-line)#login
ROUTER-A(config-line)#interface e0
ROUTER-A(config-if)#ip add 219.17.100.1 255.255.255.0
ROUTER-A(config-if)#no shut
ROUTER-A(config-if)#int s0
ROUTER-A(config-if)#ip add 199.6.13.1 255.255.255.0
ROUTER-A(config-if)#clock rate 56000
ROUTER-A(config-if)#no shut
```

```

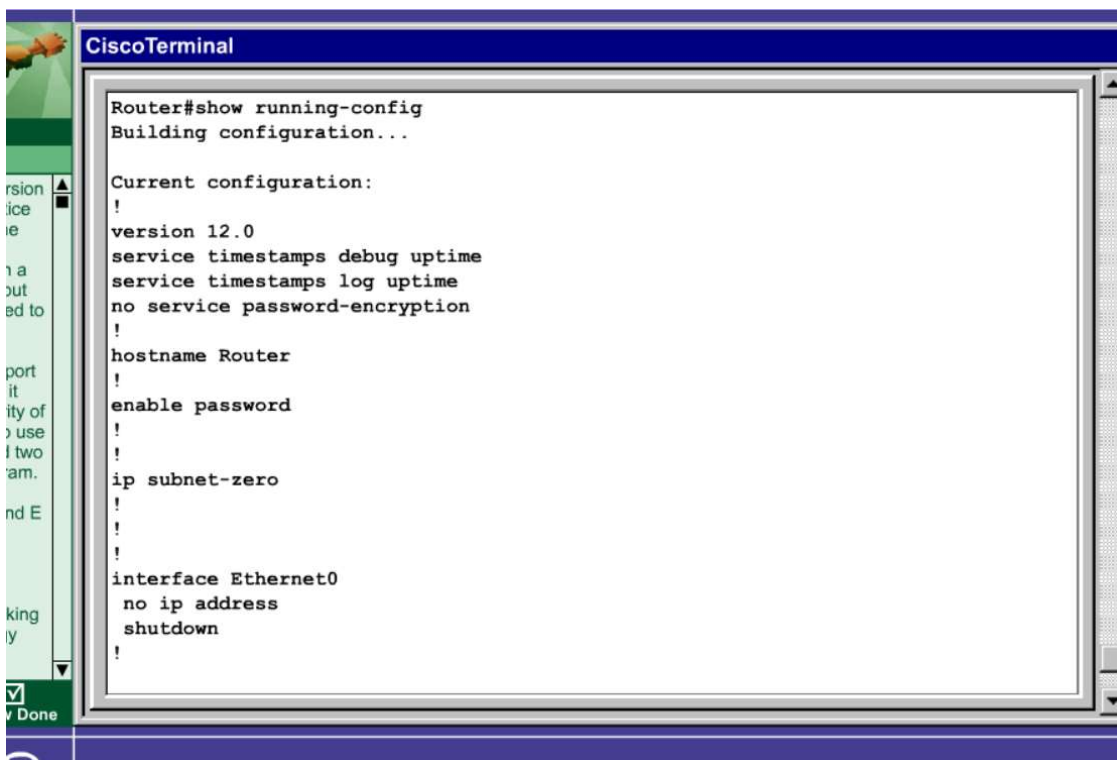
ROUTER-A(config-if)#exit
ROUTER-A(config)#router rip
ROUTER-A(config-router)#network 201.100.11.0
ROUTER-A(config-router)#network 219.17.100.0
ROUTER-A(config-router)#network 199.6.13.0
ROUTER-A(config-router)#exit
ROUTER-A(config)#ip host ROUTER-A 192.5.5.1 205.7.5.1 201.100.11.1
ROUTER-A(config)#ip host ROUTER-B 219.17.100.1 199.6.13.1 201.100.11.2
ROUTER-A(config)#ip host ROUTER-C 223.8.151.1 204.204.7.1 199.6.13.2
ROUTER-A(config)#ip host ROUTER-D 210.93.105.1 204.204.7.2
ROUTER-A(config)#ip host ROUTER-E 210.93.105.2
ROUTER-A(config)#exit
00:332:43: %SYS-5-CONFIG_I: Configured from console by console
ROUTER-A#exit

```

Show topology



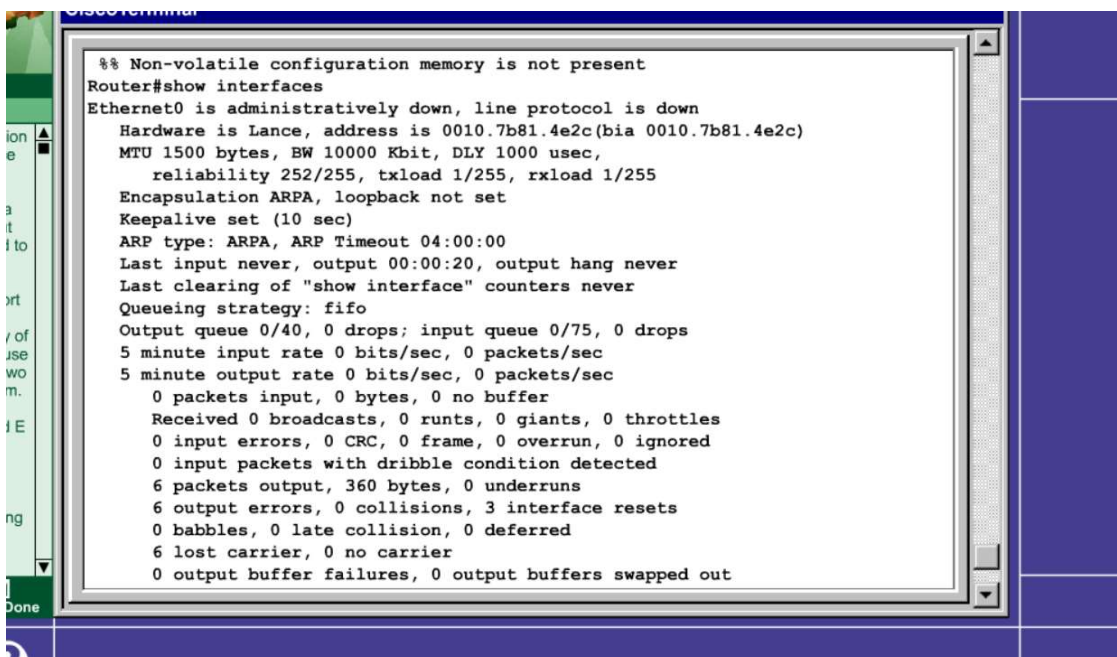
Show running-config



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

Current configuration:
!
version 12.0
service timestamps debug uptime
service timestamps log uptime
no service password-encryption
!
hostname Router
!
enable password
!
!
ip subnet-zero
!
!
!
interface Ethernet0
  no ip address
  shutdown
!
```

Show interfaces



```
%% Non-volatile configuration memory is not present
Router#show interfaces
Ethernet0 is administratively down, line protocol is down
  Hardware is Lance, address is 0010.7b81.4e2c(bia 0010.7b81.4e2c)
  MTU 1500 bytes, BW 10000 Kbit, DLY 1000 usec,
    reliability 252/255, txload 1/255, rxload 1/255
  Encapsulation ARPA, loopback not set
  Keepalive set (10 sec)
  ARP type: ARPA, ARP Timeout 04:00:00
  Last input never, output 00:00:20, output hang never
  Last clearing of "show interface" counters never
  Queueing strategy: fifo
  Output queue 0/40, 0 drops; input queue 0/75, 0 drops
  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 input packets with dribble condition detected
    6 packets output, 360 bytes, 0 underruns
    6 output errors, 0 collisions, 3 interface resets
    0 babbles, 0 late collision, 0 deferred
    6 lost carrier, 0 no carrier
    0 output buffer failures, 0 output buffers swapped out
```

CCNA Network Visualizer 6.0 配置静态路由

Router A 配置

```

Console for 2621 Router A
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 192.5.5.1 255.255.255.0
Router(config-if)#no shutdown
09:50:46 %LINK-3-UPDOWN: Interface FastEthernet0/0, changed state to up
09:50:46 %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up

Router(config-if)#int f0/1
Router(config-if)#ip address 205.7.5.1 255.255.255.0
Router(config-if)#no shutdown
09:58:36 %LINK-3-UPDOWN: Interface FastEthernet0/1, changed state to up
09:58:36 %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to up

Router(config-if)#int s0/0
Router(config-if)#ip addr 201.100.11.1 255.255.255.0
Router(config-if)#clock rate 56000
%Error: This command applies only to DCE interfaces
Router(config-if)#clock rate 56000
Router(config-if)#no shutdown
10:03:10 %LINK-3-UPDOWN: Interface Serial0/0, changed state to up
10:03:10 %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0, changed state to up

Router(config-if)#exit
Router(config)#exit
Router#

```

```

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#

```

Router B 配置同



```

Router(config-if)#no shutdown
^
% Invalid input detected at '^' marker.
Router(config-if)#no shutdown
10:38:14 %LINK-3-UPDOWN: Interface Serial0/1, changed state to up
10:38:14 %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/1, changed state to up

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#

```

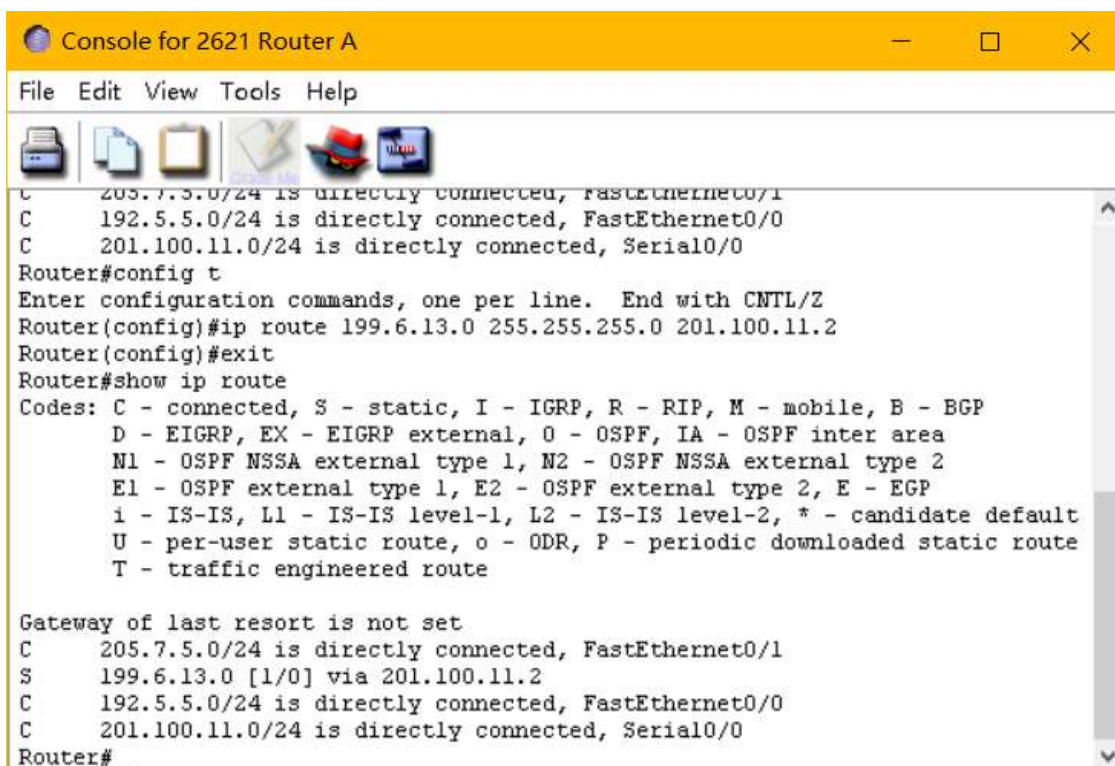
测试是否连通

```

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 100 percent (5/5), round-trip min/avg/max = 0/0/0 ms
Router#

```

配置静态路由



```

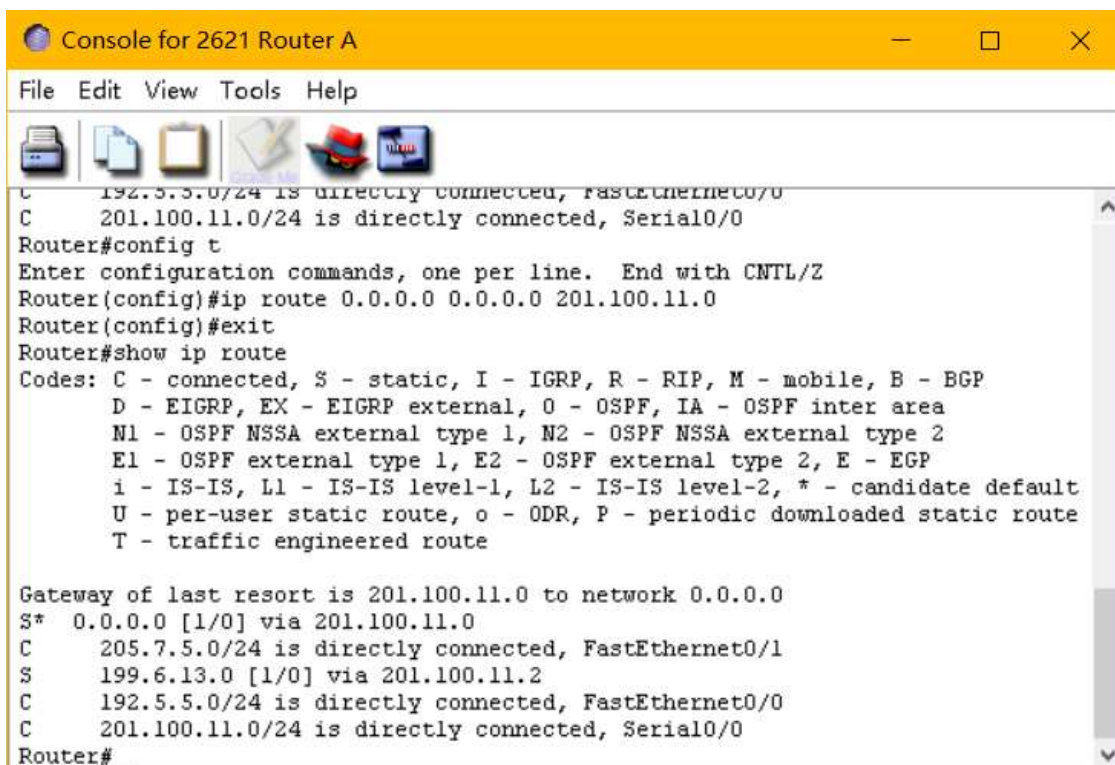
Console for 2621 Router A
File Edit View Tools Help

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#config t
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#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
S 199.6.13.0 [1/0] via 201.100.11.2
C 192.5.5.0/24 is directly connected, FastEthernet0/0
C 201.100.11.0/24 is directly connected, Serial0/0
Router#

```

配置默认路由



```

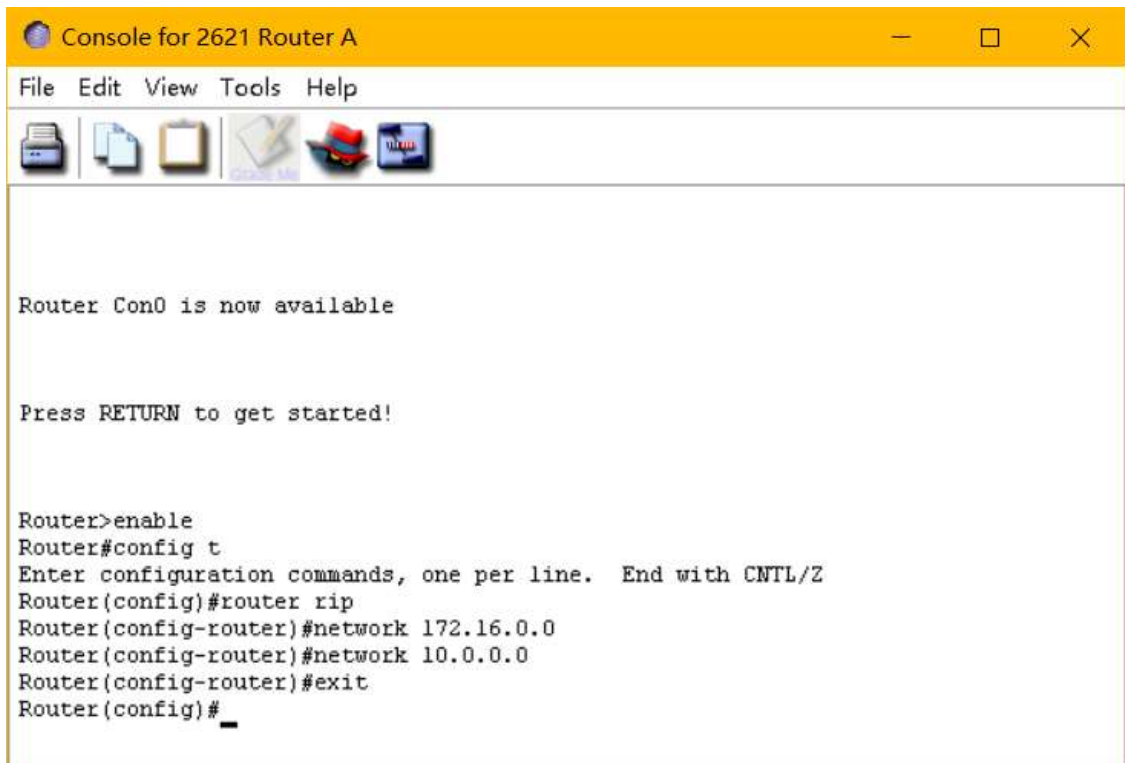
Console for 2621 Router A
File Edit View Tools Help

C 192.5.5.0/24 is directly connected, FastEthernet0/0
C 201.100.11.0/24 is directly connected, Serial0/0
Router#config t
Enter configuration commands, one per line. End with CNTL/Z
Router(config)#ip route 0.0.0.0 0.0.0.0 201.100.11.0
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 201.100.11.0 to network 0.0.0.0
S* 0.0.0.0 [1/0] via 201.100.11.0
C 205.7.5.0/24 is directly connected, FastEthernet0/1
S 199.6.13.0 [1/0] via 201.100.11.2
C 192.5.5.0/24 is directly connected, FastEthernet0/0
C 201.100.11.0/24 is directly connected, Serial0/0
Router#

```

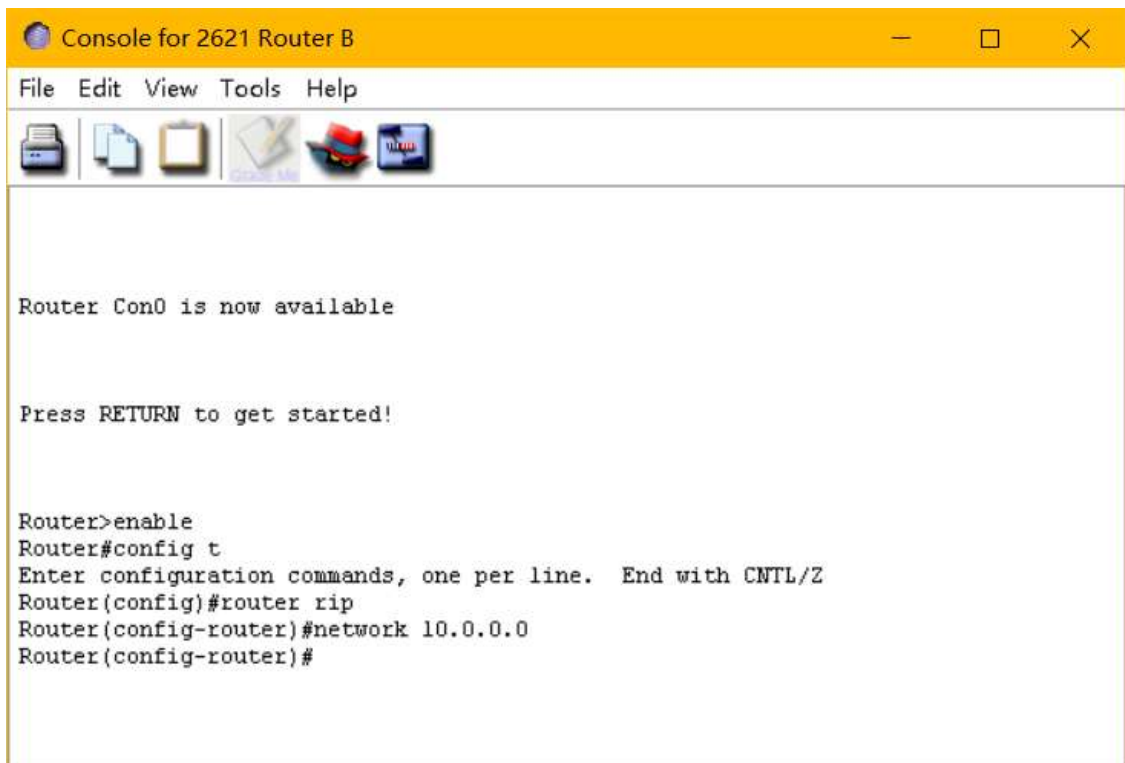
## 动态路由



```
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 172.16.0.0
Router(config-router)#network 10.0.0.0
Router(config-router)#exit
Router(config)#
```

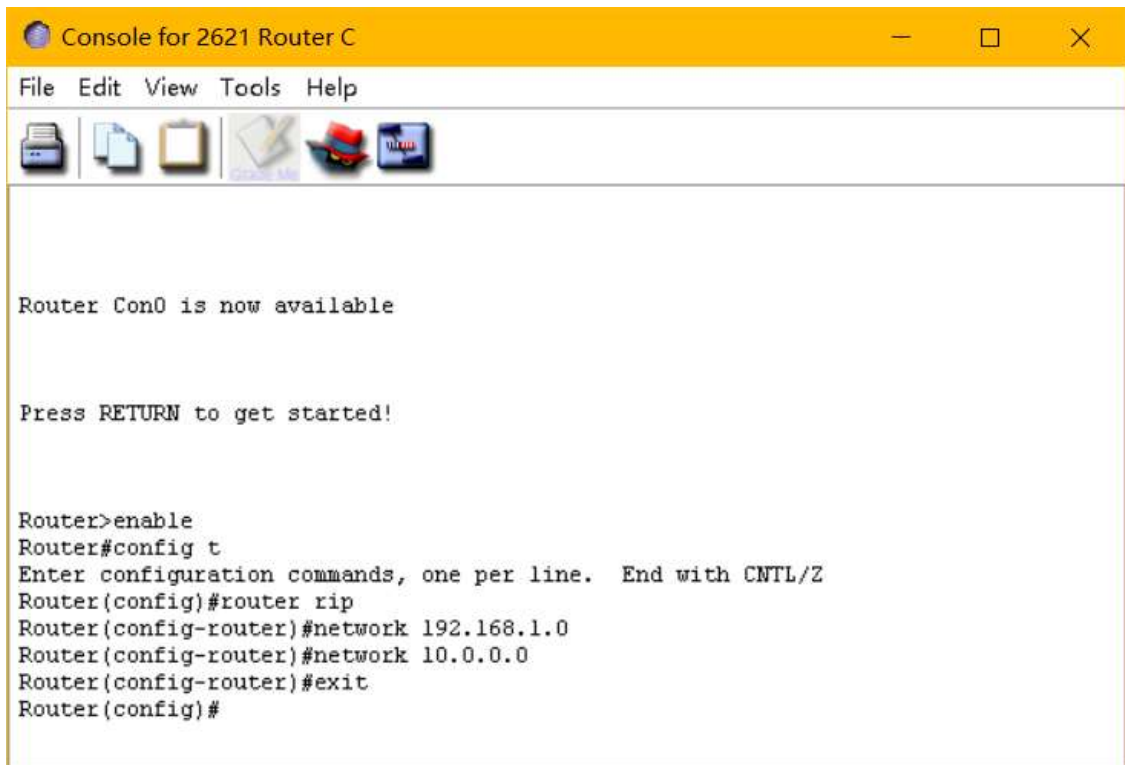


```
Router Con0 is now available

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 10.0.0.0
Router(config-router)#
```






```
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 192.168.1.0
Router(config-router)#network 10.0.0.0
Router(config-router)#exit
Router(config)#
```

Show ip protocols

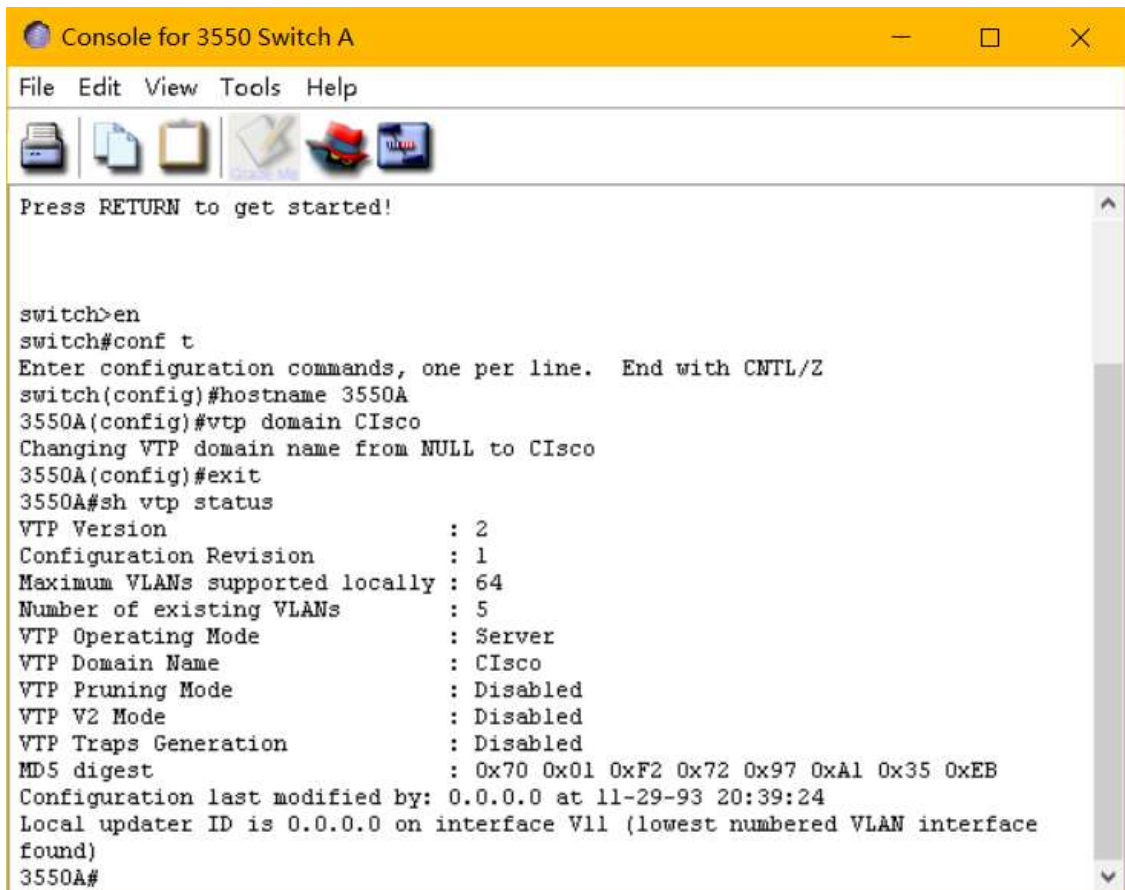


```
Router>show ip protocols
Routing Protocol is "rip"
  Sending updates every 30 seconds, next due in 26 seconds
  Invalid after 180 seconds, hold down 180, flushed after 240
  Outgoing update filter list for all interfaces is not set
  Incoming update filter list for all interfaces is not set
  Redistributing: rip
  Default version control: send version 1, receive any version
    Interface      Send Recv Triggered RIP Key-chain
  Automatic network summarization is in effect
  Maximum path: 4
  Routing for networks:
    10.0.0.0
    172.16.0.0
  Routing information sources:
    Gateway      Distance      Last Update
  Distance: <default is 120>

Router>
```

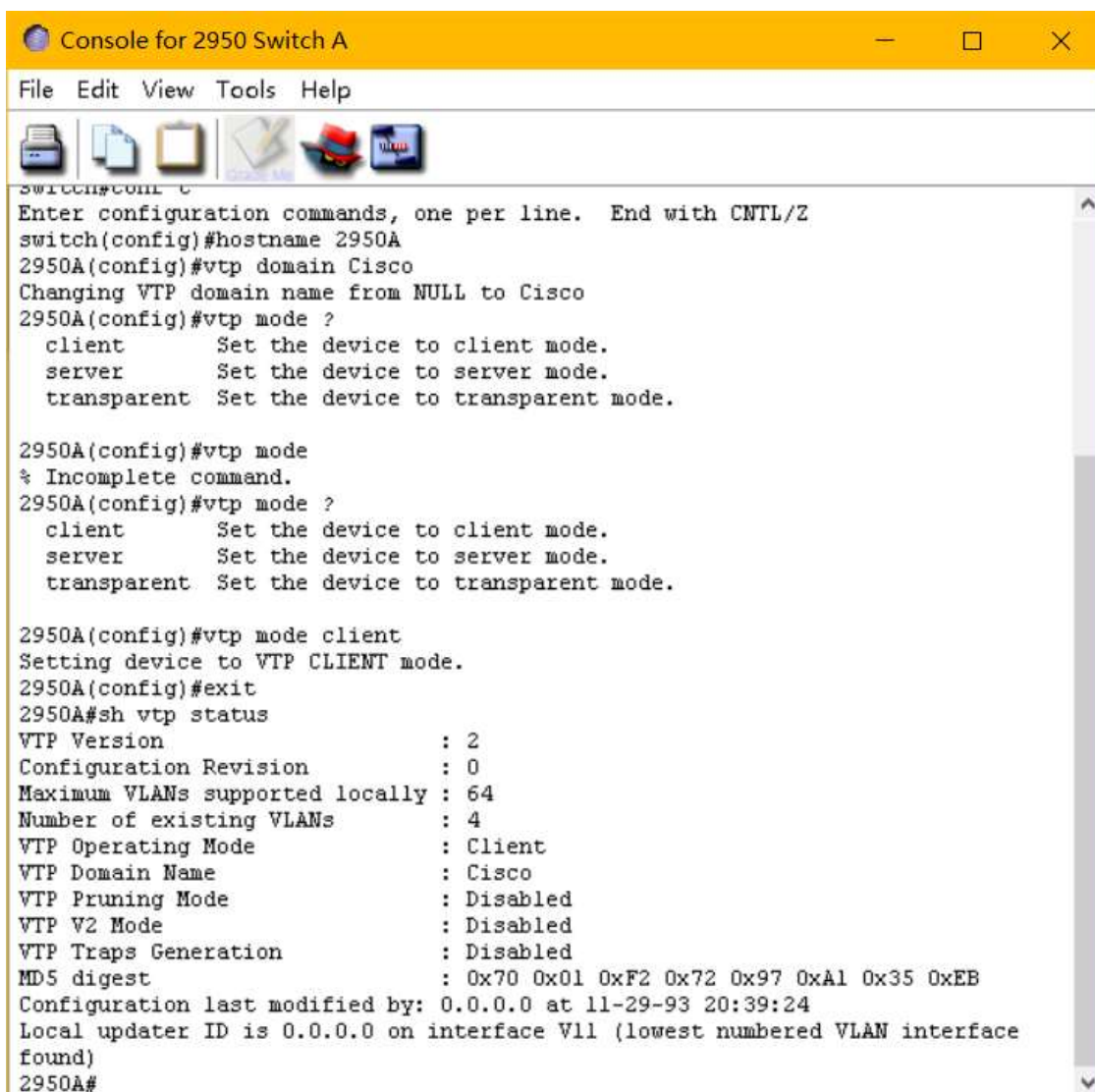
交换机端口的 VLAN（虚拟局域网）

配置 VTP 管理域



```
Console for 3550 Switch A
File Edit View Tools Help
Press RETURN to get started!

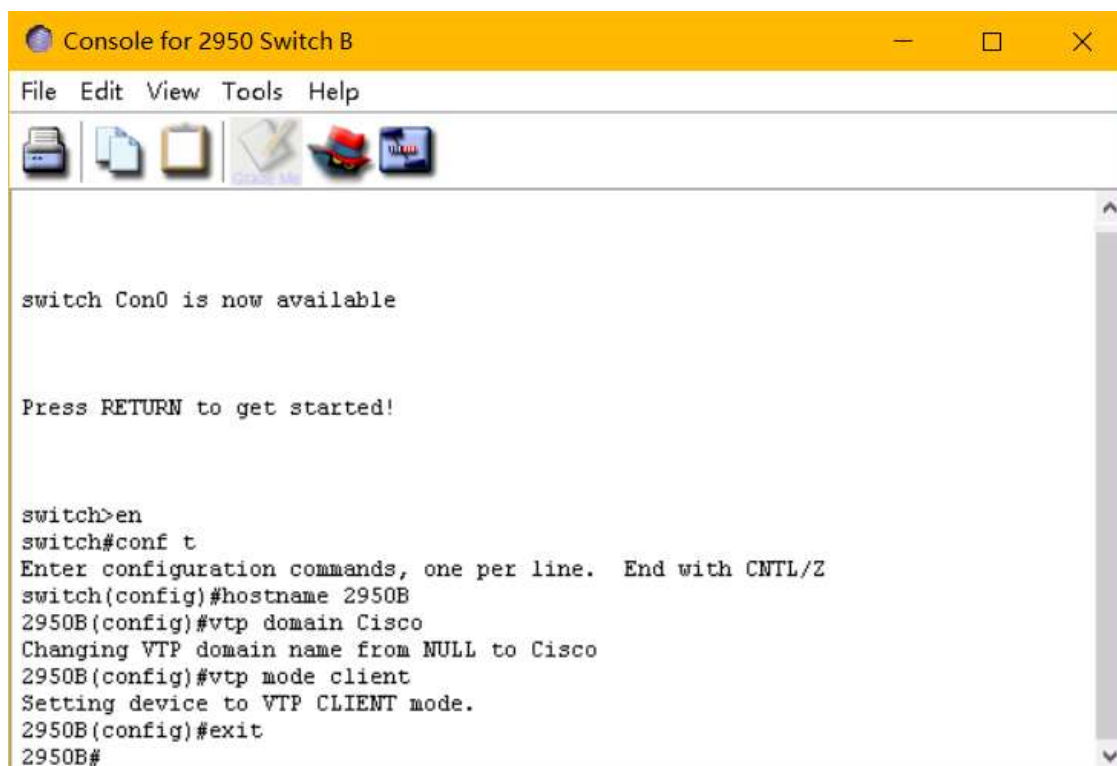
switch>en
switch#conf t
Enter configuration commands, one per line. End with CNTL/Z
switch(config)#hostname 3550A
3550A(config)#vtp domain CISco
Changing VTP domain name from NULL to CISco
3550A(config)#exit
3550A#sh vtp status
VTP Version                : 2
Configuration Revision      : 1
Maximum VLANs 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#conf 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
% Incomplete command.
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#sh vtp status
VTP Version                : 2
Configuration Revision      : 0
Maximum VLANs supported locally : 64
Number of existing VLANs    : 4
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: 0.0.0.0 at 11-29-93 20:39:24
Local updater ID is 0.0.0.0 on interface Vll (lowest numbered VLAN interface
found)
2950A#
```



```

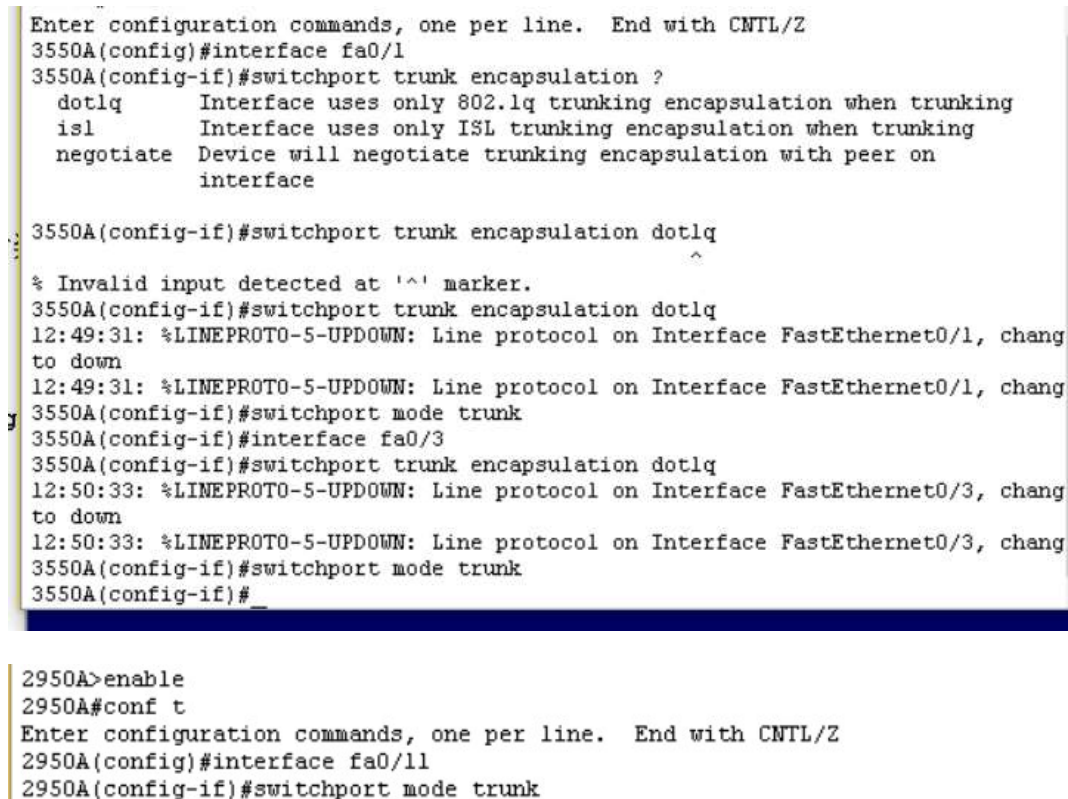
switch Con0 is now available

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)#exit
2950B#

```

## 配置 Trunk



```

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
^
% Invalid input detected at '^' marker.
3550A(config-if)#switchport trunk encapsulation dot1q
12:49:31: %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed to down
12:49:31: %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed to down
3550A(config-if)#switchport mode trunk
3550A(config-if)#interface fa0/3
3550A(config-if)#switchport trunk encapsulation dot1q
12:50:33: %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/3, changed to down
12:50:33: %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/3, changed to down
3550A(config-if)#switchport mode trunk
3550A(config-if)#

```

```

2950A>enable
2950A#conf t
Enter configuration commands, one per line. End with CNTL/Z
2950A(config)#interface fa0/11
2950A(config-if)#switchport mode trunk

```

```


2950B>en
2950B#conf t
Enter configuration commands, one per line. End with CNTL/Z
2950B(config)#interface fa0/11
2950B(config-if)#switchport mode trunk

```

### 创建 VLAN

Console for 3550 Switch A

File Edit View Tools Help



```

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)#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	
1005	trnet-default	active	

VLAN	Type	SAID	MTU	Parent	RingNo	BridgeNo	Stp	BrdgMode	Trans1	Trans2
1	enet	100001	1500	-	-	-	-	-	0	0
10	enet	100010	1500	-	-	-	-	-	0	0
20	enet	100020	1500	-	-	-	-	-	0	0
1002	fddi	101002	1500	-	-	-	-	-	0	0
1003	tr	101003	1500	-	-	-	-	-	0	0
1004	fdnet	101004	1500	-	-	-	ieee	-	0	0

### 交换机端口加入 VLAN

```

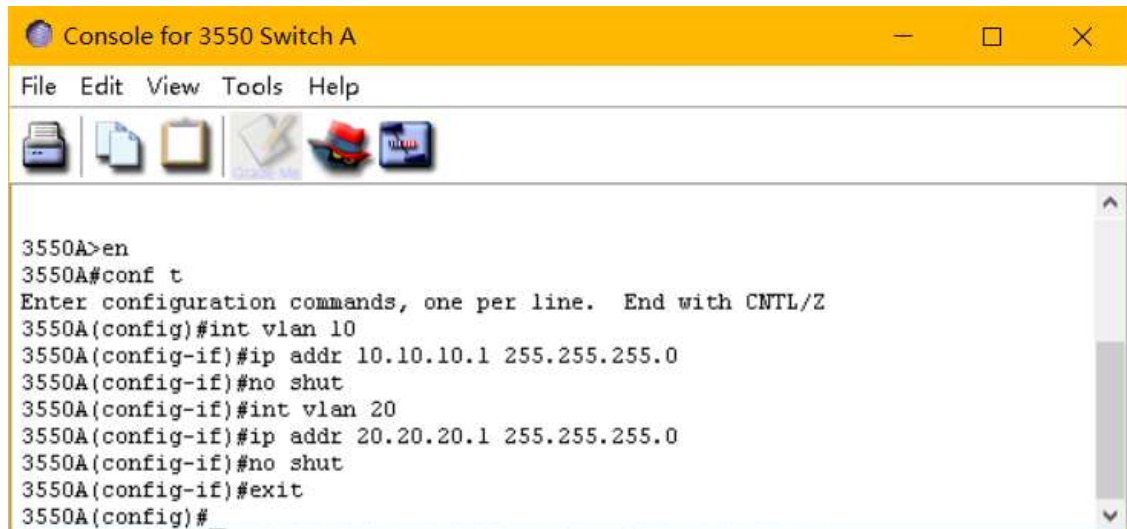
2950A>en
2950A#conf t
Enter configuration commands, one per line. End with CNTL/Z
2950A(config)#interface fa0/2
2950A(config-if)#switchport access vlan 10
2950A(config-if)#_

```



```
2950B>en
2950B#conf t
Enter configuration commands, one per line. End with CNTL/Z
2950B(config)#interface fa0/2
2950B(config-if)#switchport access vlan 20
```

### 配置第三层交换机



```
3550A(config)#ip routing
```

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

```
2950A>en
2950A#conf t
Enter configuration commands, one per line. End with CNTL/Z
2950A(config)#int vlan 1
2950A(config-if)#ip addr 192.168.10.2 255.255.255.0
2950A(config-if)#no shutdown
```

```
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 192.168.10.3 255.255.255.0
2950B(config-if)#no shutdown
```

### 配置主机

Configure Host A	Configure Host B
Host Name: <input type="text" value="Host A"/>	Host Name: <input type="text" value="Host B"/>
<input type="radio"/> Obtain an IP address automatically	<input type="radio"/> Obtain an IP address automatically
<input checked="" type="radio"/> Use the following IP address:	<input checked="" type="radio"/> Use the following IP address:
IP Address: <input type="text" value="10"/> . <input type="text" value="10"/> . <input type="text" value="10"/> . <input type="text" value="2"/>	IP Address: <input type="text" value="20"/> . <input type="text" value="20"/> . <input type="text" value="20"/> . <input type="text" value="2"/>
Subnet: <input type="text" value="255"/> . <input type="text" value="255"/> . <input type="text" value="255"/> . <input type="text" value="0"/>	Subnet: <input type="text" value="255"/> . <input type="text" value="255"/> . <input type="text" value="255"/> . <input type="text" value="0"/>
Default Gateway: <input type="text" value="10"/> . <input type="text" value="10"/> . <input type="text" value="10"/> . <input type="text" value="1"/>	Default Gateway: <input type="text" value="20"/> . <input type="text" value="20"/> . <input type="text" value="20"/> . <input type="text" value="1"/>
<input type="button" value="OK"/> <input type="button" value="Cancel"/>	<input type="button" value="OK"/> <input type="button" value="Cancel"/>

测试:

Console for 3550 Switch A

File Edit View Tools Help

3550A console is now available

Press RETURN to get started!

```
3550A>en
3550A#ping 192.168.10.2

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.10.2, timeout is 2 seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 4/4/4 ms
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#
```

。

## 4 实验总结

学会了使用 Router eSIM v1.1 的基本配置路由器操作

学会了使用 CCNA Network Visualizer 6.0 建立基本的 RouterSim Network，包括添加路由器、交换机、主机，配置 IP 地址，子网掩码，包括静态路由协议、动态路由协议和 VLAN 等。