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	

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1 实验目的

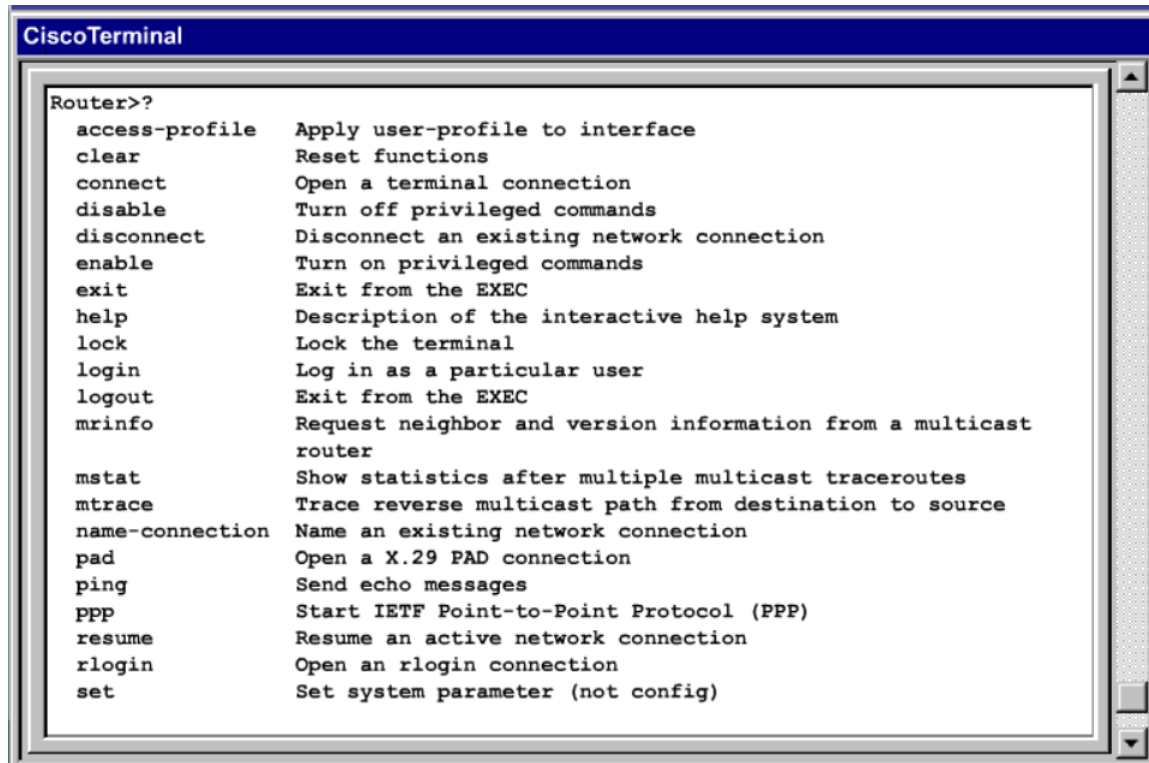使用 Router eSIM v1.1 模拟器来模拟路由器的配置环境；使用 CCNA Network Visualizer 6.0 配置静态路由、动态路由和交换机端口的 VLAN（虚拟局域网）

2 实验环境

Windows10

Router_eSIM_v11、CCNA Network Visualizer 6.0

3 实验结果

1、用 CISIO Router eSIM v1 模拟器来模拟路由器的配置：

查看相关指令：


```
CiscoTerminal

Router>?
  access-profile    Apply user-profile to interface
  clear             Reset functions
  connect           Open a terminal connection
  disable           Turn off privileged commands
  disconnect        Disconnect an existing network connection
  enable            Turn on privileged commands
  exit              Exit from the EXEC
  help              Description of the interactive help system
  lock              Lock the terminal
  login             Log in as a particular user
  logout            Exit from the EXEC
  mrinfo            Request neighbor and version information from a multicast
                    router
  mstat             Show statistics after multiple multicast traceroutes
  mtrace            Trace reverse multicast path from destination to source
  name-connection   Name an existing network connection
  pad               Open a X.29 PAD connection
  ping              Send echo messages
  ppp               Start IETF Point-to-Point Protocol (PPP)
  resume            Resume an active network connection
  rlogin            Open an rlogin connection
  set               Set system parameter (not config)
```

查看路由器运行状态：

```
3182_cyy#show running-config
Building configuration...

Current configuration:
!
version 12.0
service timestamps debug uptime
service timestamps log uptime
no service password-encryption
!
hostname 3182_cyy
!
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
!
!
```

```
3182_cyy#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 2 hours, 42 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.
2 Ethernet/IEEE 802.3 interface(s)
2 Serial network interface(s)
32K bytes of non-volatile configuration memory.
8192K bytes of processor board System flash (Read ONLY)
```

进入全局配置模式和超级用户模式用 hostname 更改路由器名字：

```
Router>config t
          ^
% Invalid input detected at '^' marker.

Router>enable
Router#config t
Enter configuration commands, one per line.  End with END.
Router(config)#hostname 3182_cyy
3182_cyy(config)#
```

设置当日消息标题：

```
3182_cyy(config)#banner motd #
Enter TEXT message.  End with the character '#'.
Accounting Department
You have entered a secured system.
Authorized access only' #
3182_cyy(config)#
```

在路由器内建立一个 IP 地址的映射表，静态指定机器名与 IP 地址的映射关系。

```
3182_cyy(config)#ip host lab_A 192.5.5.1 205.7.5.1 201.100.11.1
3182_cyy(config)#ip host lab_B 219.17.100.1 199.6.13.1 201.100.11.2

3182_cyy(config)#ip host lab_C 223.8.151.1 204.204.7.1 199.6.13.2
3182_cyy(config)#ip host lab_D 210.93.105.1 204.204.7.2
3182_cyy(config)#ip host lab_E 210.93.105.2
3182_cyy(config)#_
```

对路由器的各个接口进行配置：

```
3182_cyy(config-if)#int eth 0
3182_cyy(config-if)#ip address 192.5.5.1 255.255.255.0
3182_cyy(config-if)#int eth 1
3182_cyy(config-if)#ip address 205.7.5.1 255.255.255.0
3182_cyy(config-if)#int serial 0
3182_cyy(config-if)#ip address 201.100.11.1 255.255.255.0
3182_cyy(config-if)#_
```

根据拓扑图查看串行接口是 DCE 端还是 DTE 端：
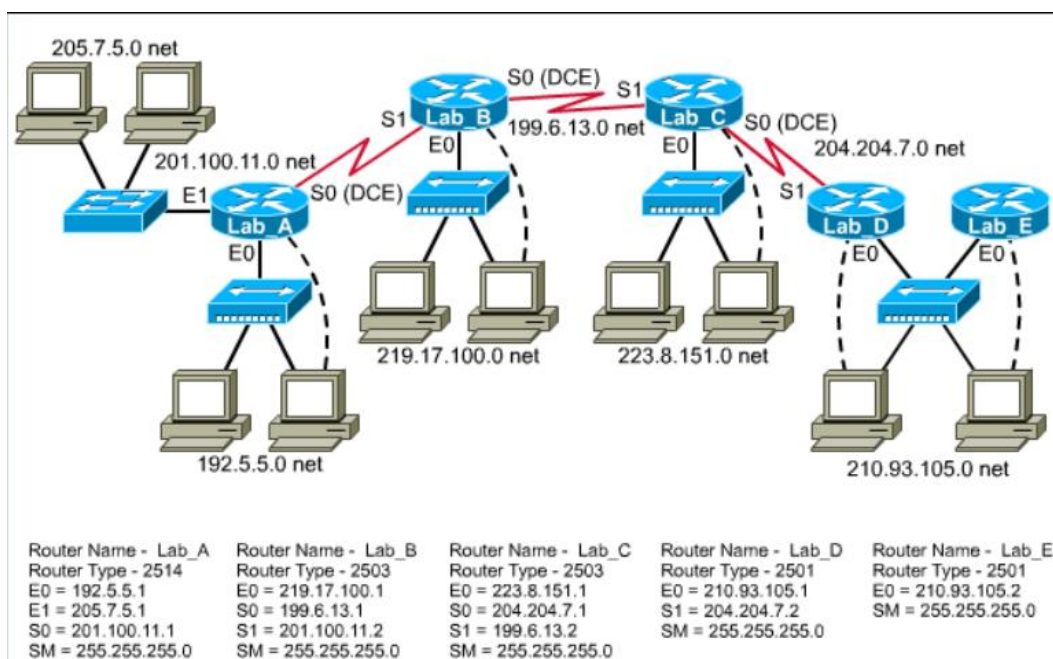
由图可知 S0 端口是 DCE

配置 clock rate:

```
3182_cyy(config)#interface serial 0
3182_cyy(config-if)#clock rate 56000
3182_cyy(config-if)#_
```

用 show 命令查看串口的配置情况：

```
3182_cyy#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
```

由图可知路由器被管理员手工关闭，打开此端口：

```
3182_cyy#config t
Enter configuration commands, one per line.  End with END.
3182_cyy(config)#int serial 0
3182_cyy(config-if)#no shutdown
```

再次查看：

```
3182_cyy#show interface serial 0
Serial0 is up, line protocol is up
   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
```

打开 E0，E1：

```
3182_cyy#config t
Enter configuration commands, one per line.  End with END.
3182_cyy(config)#int eth 0
3182_cyy(config-if)#no shutdown
3182_cyy(config-if)#int eth 1
3182_cyy(config-if)#no shutdown
```

2、使用 CCNA Network Visualizer 进行静态路由配置：

使用模拟器在设计界面上完成网络拓扑：
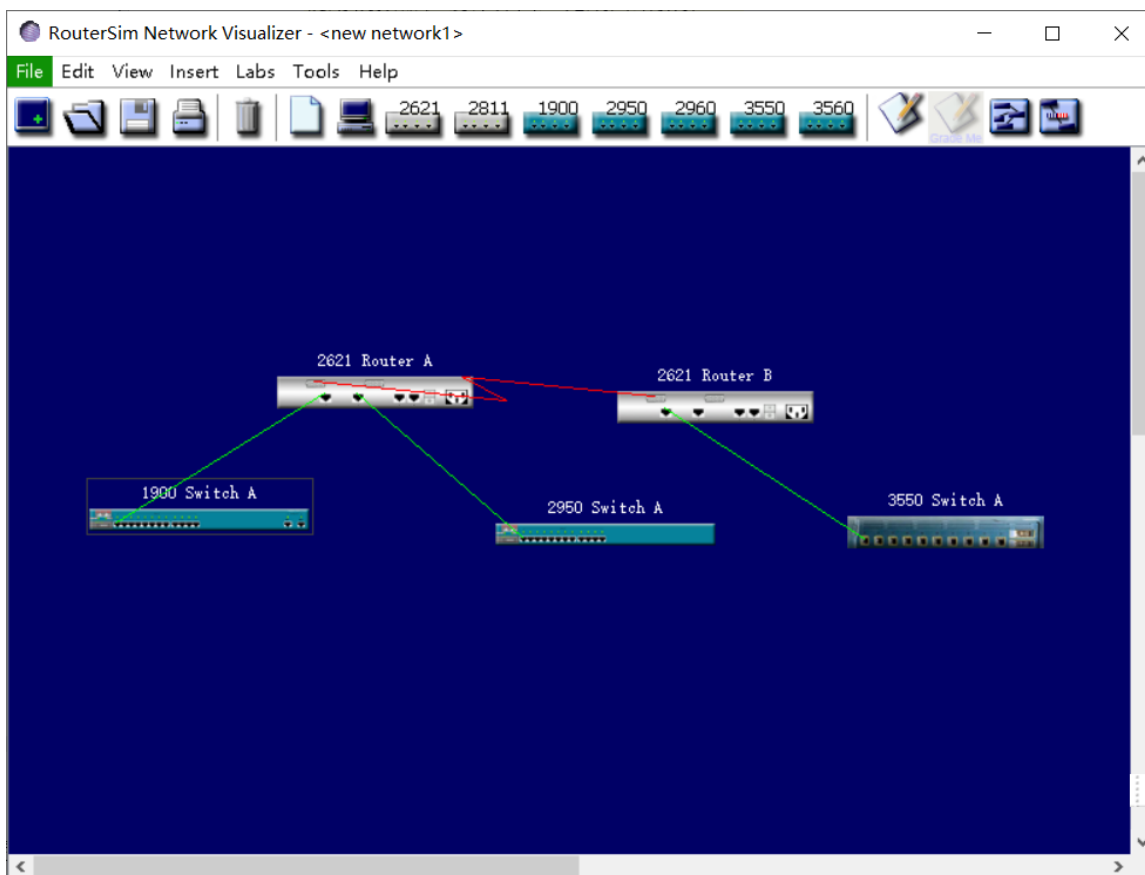
配置 RouterA:

```
Router>enable
Router#config t
Enter configuration commands, one per line.  End with CNTL/Z
Router(config)#hostname 3182_RouterA
3182_RouterA(config)#int f0/0
3182_RouterA(config-if)#ip address 192.5.5.1 255.255.255.0
3182_RouterA(config-if)#no shutdown
11:40:49 %LINK-3-UPDOWN:  Interface FastEthernet0/0, changed state to up
11:40:49 %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up

3182_RouterA(config-if)#int f0/1
3182_RouterA(config-if)#ip address 205.7.5.1 255.255.255.0
3182_RouterA(config-if)#no shutdown
11:41:17 %LINK-3-UPDOWN:  Interface FastEthernet0/1, changed state to up
11:41:17 %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to up

3182_RouterA(config-if)#int s0/1
3182_RouterA(config-if)#ip address 201.100.11.1 255.255.255.0
3182_RouterA(config-if)#clock rate 56000
3182_RouterA(config-if)#no shutdown
11:42:11 %LINK-3-UPDOWN:  Interface Serial0/1, changed state to up
11:42:11 %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/1, changed state to up
```

查看配置好的 Router_A：

```
3182_RouterA(config-if)#exit
3182_RouterA(config)#exit
3182_RouterA#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, Serial0/1
3182_RouterA#
```

配置 Router_B:

```
Router>enable
Router#config t
Enter configuration commands, one per line.  End with CNTL/Z
Router(config)#hostname 3182_RouterB
3182_RouterB(config)#int f0/1
3182_RouterB(config-if)#ip address 199.6.13.1 255.255.255.0
3182_RouterB(config-if)#no shutdown
12:05:18 %LINK-3-UPDOWN:  Interface FastEthernet0/1, changed state to up
12:05:18 %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to up

3182_RouterB(config-if)#int s0/1
3182_RouterB(config-if)#ip address 201.100.11.2 255.255.255.0
3182_RouterB(config-if)#no shutdown
12:08:05 %LINK-3-UPDOWN:  Interface Serial0/1, changed state to up
12:08:05 %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/1, changed state to up
```

查看配置好的 Router_B:

```
3182_RouterB(config-if)#exit
3182_RouterB(config)#exit
3182_RouterB#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, FastEthernet0/1
```

使用 ping 命令查看 A 与 B 是否互通：

```
3182_RouterA#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
```

不互通，需要配置静态路由

配置静态路由：

```
3182_RouterA>enable
3182_RouterA#config t
Enter configuration commands, one per line.  End with CNTL/Z
3182_RouterA(config)#ip route 199.6.13.0 255.255.255.0 201.100.11.2
3182_RouterA(config)#exit
3182_RouterA#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, Serial0/1
```
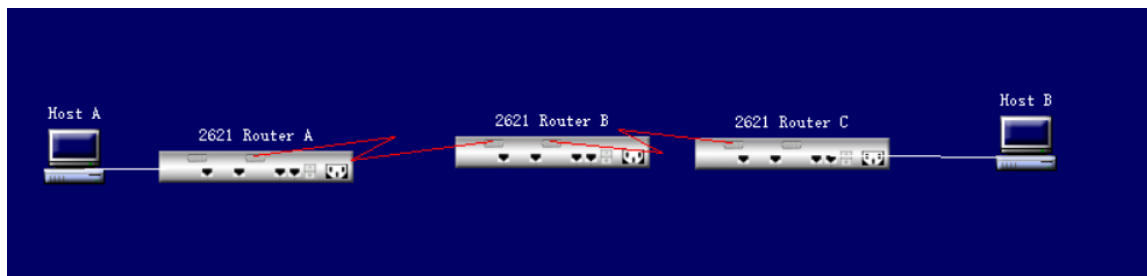
重新使用 ping 命令：

```
3182_RouterA#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
```

3、配置动态路由：

建立拓扑图：

（1）配置 RIP 协议：

Router A：

```
Router>enable
Router#config t
Enter configuration commands, one per line.  End with CNTL/Z
Router(config)#hostname RouterA
RouterA(config)#router rip
RouterA(config-router)#network 172.16.0.0
RouterA(config-router)#network 10.0.0.0
RouterA(config-router)#
```

Router B：

```
Router>enable
Router#config t
Enter configuration commands, one per line.  End with CNTL/Z
Router(config)#hostname RouterB
RouterB(config)#router rip
RouterB(config-router)#network 10.0.0.0
```

Router C：

```
Router>enable
Router#config t
Enter configuration commands, one per line.  End with CNTL/Z
Router(config)#hostname RouterC
RouterC(config)#router rip
RouterC(config-router)#network 192.168.1.0
RouterC(config-router)#network 10.0.0.0
```

（2）查看 RIP 协议的路由信息：

```
RouterA(config)#exit
RouterA#show ip protocols
Routing Protocol is "rip"
  Sending updates every 30 seconds, next due in 7 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>
```

4、基于交换机端口的 VLAN 配置

（1）构建如下所示的拓扑图：
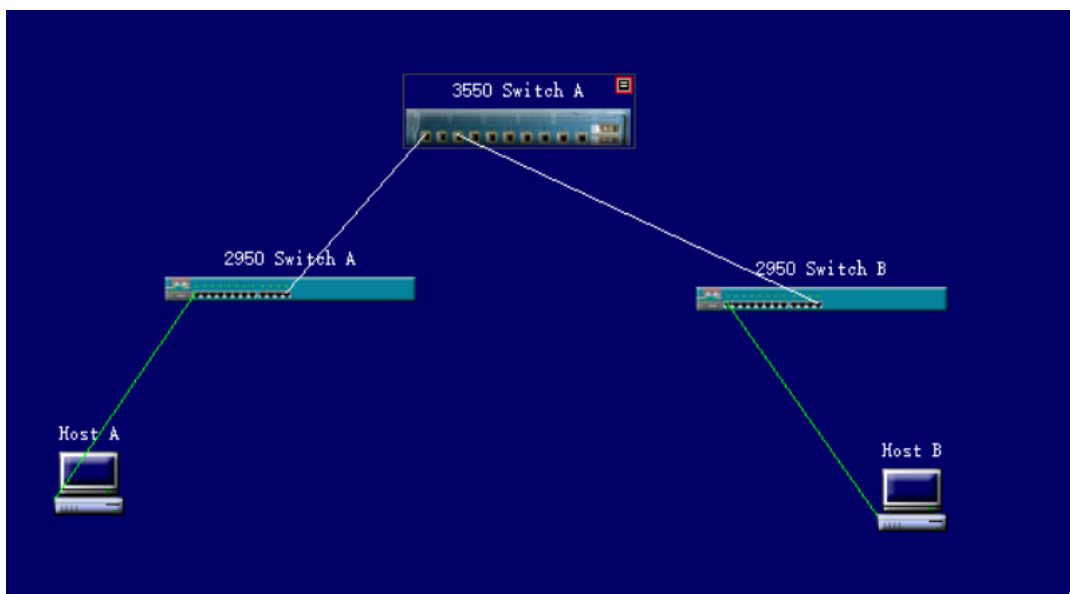
（2）设置 VTP 域：

配置 3550A：

```
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 Vl1 (lowest numbered VLAN interface
found)
3550A#
```

配置 2950A（设置为客户模式）：

```
switch>en
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 client
Setting device to VTP CLIENT mode.
2950A(config)#exit
2950A#sh 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)
2950A#
```

配置 2950B（设置为客户模式）：

```
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#sh 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 SwitchB at 11-29-93 20:39:24
Local updater ID is 2950 SwitchB on interface V11 (lowest numbered VLAN interface
found)
2950B#
```

（3）配置 Trunk

配置 3550A:

```
3550A(config-if)#interface fa0/1
3550A(config-if)#switchport trunk encapsulation ?
  dotlq      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 dotlq
13:54:25: %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state
to down
13:54:25: %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to up
3550A(config-if)#switchport mode trunk
3550A(config-if)#interface fa0/3
3550A(config-if)#switchport trunk encapsulation dotlq
13:56:09: %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/3, changed state
to down
13:56:09: %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/3, changed state to up
3550A(config-if)#switchport mode trunk
3550A(config-if)#
```

配置 2950A：

```
2950A#conf t
Enter configuration commands, one per line.  End with CNTL/Z
2950A(config)#interface fa0/12
2950A(config-if)#switchport mode trunk
```

配置 2950B：

```
2950B#conf t
Enter configuration commands, one per line.  End with CNTL/Z
2950B(config)#interface fa0/12
2950B(config-if)#switchport mode trunk
```

（4）创建 VLAN：

```
3550A(config)#vlan 10
3550A(config-vlan)#vlan 20
3550A(config-vlan)#exit
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 Transl 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
1005 trnet 101005     1500  -      -      -        ibm  -        0      0

--More--
3550A#
```

（5）分配交换机端口加入 VLAN：

```
2950A(config)#interface fa0/1
2950A(config-if)#switchport access vlan 10
2950A(config-if)#exit
2950A(config)#interface fa0/1
2950A(config-if)#switchport access vlan 20
```

（6）配置第三层交换机：

```
3550A#conf t
Enter configuration commands, one per line.  End with CNTL/Z
3550A(config)#int vlan 10
3550A(config-if)#ip address 10.10.10.1 255.255.255.0
3550A(config-if)#no shut
3550A(config-if)#int vlan 20
3550A(config-if)#ip address 20.20.20.1 255.255.255.0
3550A(config-if)#no shut
3550A(config-if)#exit
3550A(config)#ip routing
```

（7）配置各交换机的管理地址：

3550A：

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

2950A：

```
2950A(config-if)#int vlan 1
2950A(config-if)#ip address 192.168.10.2 255.255.255.0
2950A(config-if)#no shut
```

2950B：

```
2950B(config-if)#int vlan 1
2950B(config-if)#ip address 192.168.10.3 255.255.255.0
2950B(config-if)#no shut
```
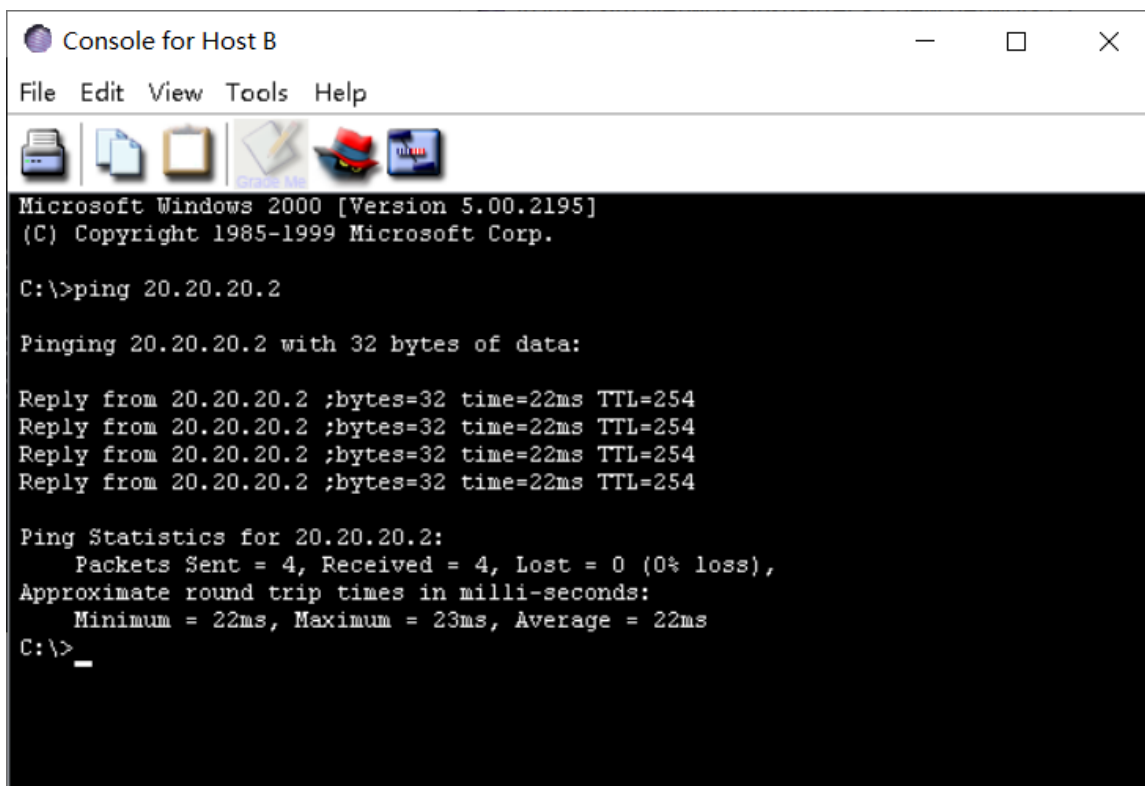
（8）配置主机 HostA 和 HostB：

（9）测试：

交换机上：

```
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#
```

主机上：

```
Console for Host B                                    —    □    ×
File  Edit  View  Tools  Help

Microsoft Windows 2000 [Version 5.00.2195]
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C:\>ping 20.20.20.2

Pinging 20.20.20.2 with 32 bytes of data:

Reply from 20.20.20.2 ;bytes=32 time=22ms TTL=254
Reply from 20.20.20.2 ;bytes=32 time=22ms TTL=254
Reply from 20.20.20.2 ;bytes=32 time=22ms TTL=254
Reply from 20.20.20.2 ;bytes=32 time=22ms TTL=254

Ping Statistics for 20.20.20.2:
    Packets Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 22ms, Maximum = 23ms, Average = 22ms
C:\>
```
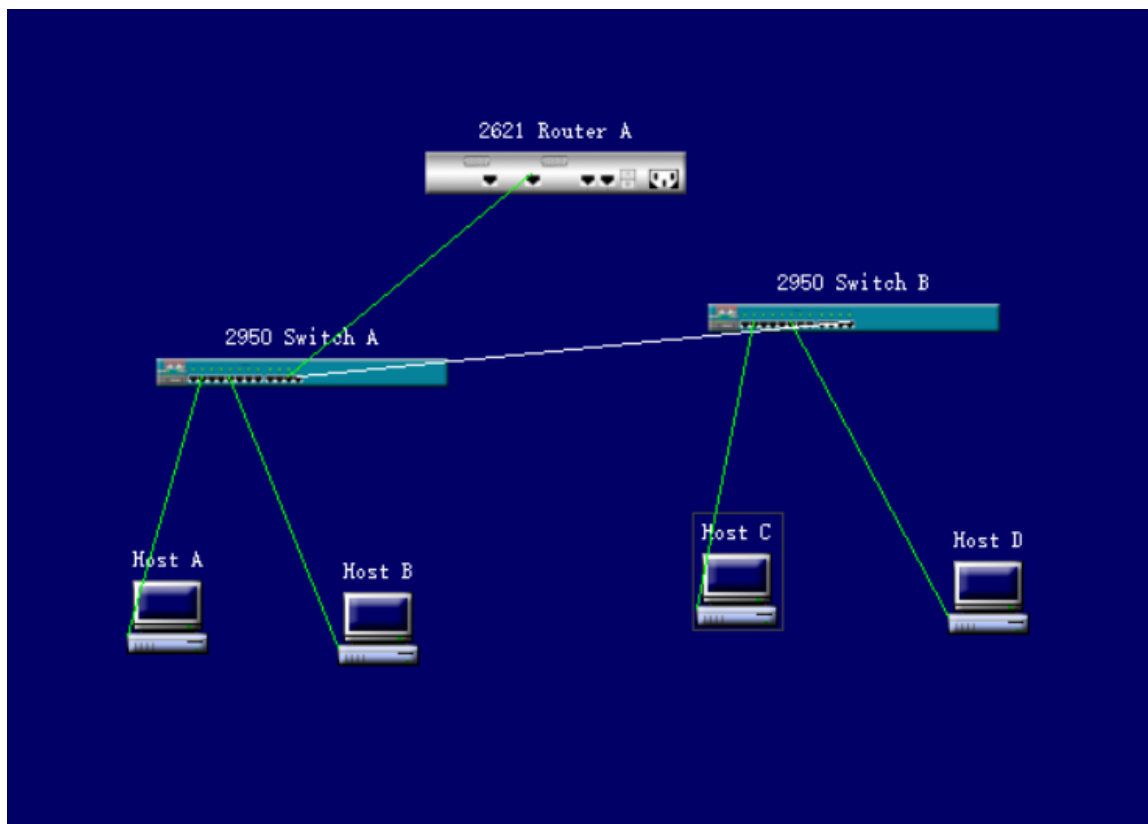
连接成功！

实例 2：

（1） 设备拓扑图：

（2） 配置 VTP：

```
switch>en
switch#conf t
Enter configuration commands, one per line.  End with CNTL/Z
switch(config)#hostname 2950A
2950A(config)#vtp domain Test
Changing VTP domain name from NULL to Test
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 server
Device mode already VTP SERVER.
2950A(config)#exit
2950A#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                 : Test
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 Vl1 (lowest numbered VLAN interface
found)
```

（3） 启动 Trunk

2950A:

```
2950A(config)#interface fa0/12
2950A(config-if)#switchport mode ?
  access   Set trunking mode to ACCESS unconditionally
  dynamic  Set trunking mode to dynamically negotiate access or trunk mode
  trunk    Set trunking mode to TRUNK unconditionally

2950A(config-if)#switchport mode trunk
2950A(config-if)#interface fa0/11
2950A(config-if)#switchport mode trunk
2950A(config-if)#exit
2950A(config)#
```

2950B：

```
switch>en
switch#conf t
Enter configuration commands, one per line.  End with CNTL/Z
switch(config)#hostname 2950B
2950B(config)#interface fa/12
                           ^
% Invalid input detected at '^' marker.
2950B(config)#interface fa0/12
2950B(config-if)#switchport mode trunk
2950B(config-if)#exit
2950B(config)#
```

(4)创建 VLAN：

```
2950A#vlan database
2950A(vlan)#vlan 2 name vlan2
VLAN 2 added:
    Name: vlan2
2950A(vlan)#vlan 3 name vlan3
VLAN 3 added:
    Name: vlan3
2950A(vlan)#exit
APPLY completed.
Exiting....
2950A#
```

（4） 分配端口到 VLAN：

将 2950A 的端口加入 VLAN：

```
2950A#config t
Enter configuration commands, one per line.  End with CNTL/Z
2950A(config)#interface fastethernet 0/2
2950A(config-if)#switchport access vlan 2
2950A(config-if)#switchport mode access
2950A(config-if)#interface fastethernet 0/6
2950A(config-if)#switchport access vlan 3
2950A(config-if)#switchport mode access
```

用 Show vlan 验证:

```
2950A#show vlan

VLAN Name                             Status    Ports
---- -------------------------------- --------- -------------------------------
1    default                          active    Fa0/1, Fa0/3, Fa0/4, Fa0/5
                                                Fa0/7, Fa0/8, Fa0/9, Fa0/10
2    vlan2                            active    Fa0/2
3    vlan3                            active    Fa0/6
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
2    enet  100002     1500  -      -      -        -    -        0      0
3    enet  100003     1500  -      -      -        -    -        0      0
1002 fddi  101002     1500  -      -      -        -    -        0      0
1003 tr    101003     1500  -      -      -        -    -        0      0
1004 fdnet 101004     1500  -      -      -        ieee -        0      0
1005 trnet 101005     1500  -      -      -        ibm  -        0      0

--More--
```

将 2950B 设置为 VTP 客户模式：

```
2950B(config)#vtp domain Test
Changing VTP domain name from NULL to Test
2950B(config)#VTP mode client
Setting device to VTP CLIENT mode.
2950B(config)#
```

将 2950B 的端口加入 VLAN：

```
2950B(config)#interface fastethernet 0/2
2950B(config-if)#switchport access vlan 2
2950B(config-if)#switchport mode access
2950B(config-if)#interface faste thernet 0/6
                                 ^
% Invalid input detected at '^' marker.
2950B(config-if)#interface fastethernet 0/6
2950B(config-if)#switchport access vlan 3
2950B(config-if)#switchport mode access
2950B(config-if)#exit
2950B(config)#exit
```

用 Show vlan 验证:

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```
2950B#sh vlan

VLAN Name                             Status    Ports
---- -------------------------------- --------- -------------------------------
1    default                          active    Fa0/1, Fa0/3, Fa0/4, Fa0/5
                                                 Fa0/7, Fa0/8, Fa0/9, Fa0/10
                                                 Fa0/11
2    vlan2                            active    Fa0/2
3    vlan3                            active    Fa0/6
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 Transl Trans2
---- ----- ------- ----- ------ ------ -------- ---- -------- ------ ------
1    enet  100001  1500  -      -      -        -    -        0      0
2    enet  100002  1500  -      -      -        -    -        0      0
3    enet  100003  1500  -      -      -        -    -        0      0
1002 fddi  101002  1500  -      -      -        -    -        0      0
1003 tr    101003  1500  -      -      -        -    -        0      0
1004 fdnet 101004  1500  -      -      -        ieee -        0      0
1005 trnet 101005  1500  -      -      -        ibm  -        0      0
--More--
```

(6)此处由路由器实现 VLAN 之间的通信，对路由器进行配置：

```
Router>en
Router#conf t
Enter configuration commands, one per line.  End with CNTL/Z
Router(config)#hostname RouterA
RouterA(config)#interface fastethernet 0/0
RouterA(config-if)#no ip address
RouterA(config-if)#no shutdown
14:50:13 %LINK-3-UPDOWN:  Interface FastEthernet0/0, changed state to up
14:50:13 %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up

RouterA(config-if)#interface fastethernet 0/0.1
RouterA(config-subif)#encapsulation dot1q 1
RouterA(config-subif)#ip address 172.16.10.1 255.255.255.0
RouterA(config-subif)#interface fastethernet 0/0.2
RouterA(config-subif)#encapsulation dot1q 2
RouterA(config-subif)#ip address 172.16.20.1 255.255.255.0
RouterA(config-subif)#interface fastethernet 0/0.3
RouterA(config-subif)#encapsulation dot1q 3
RouterA(config-subif)#ip address 172.16.30.1 255.255.255.0
RouterA(config-subif)#exit
RouterA(config)#
```

（7）配置主机：

Configure Host A	×
Host Name: Host A	
○ Obtain an IP address automatically	
◉ Use the following IP address:	
IP Address	172 . 16 . 20 . 3
Subnet	255 . 255 . 255 . 0
Default Gateway	172 . 16 . 20 . 1
OK Cancel	

Configure Host B	×
Host Name: Host B	
○ Obtain an IP address automatically	
◉ Use the following IP address:	
IP Address	172 . 16 . 30 . 3
Subnet	255 . 255 . 255 . 0
Default Gateway	172 . 16 . 30 . 1
OK Cancel	

（8）验证连通性：

在属于 VLAN2 的 Host 上 ping172.16.20.1：

```
C:\>ping 172.16.20.1

Pinging 172.16.20.1 with 32 bytes of data:

Reply from 172.16.20.1 ;bytes=32 time=22ms TTL=254
Reply from 172.16.20.1 ;bytes=32 time=22ms TTL=254
Reply from 172.16.20.1 ;bytes=32 time=22ms TTL=254
Reply from 172.16.20.1 ;bytes=32 time=22ms TTL=254

Ping Statistics for 172.16.20.1:
     Packets Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
     Minimum = 22ms, Maximum = 23ms, Average = 22ms
```

在属于 VLAN3 的 Host B 上 ping172.16.30.1：

```
Microsoft Windows 2000 [Version 5.00.2195]
(C) Copyright 1985-1999 Microsoft Corp.

C:\>ping 172.16.30.1

Pinging 172.16.30.1 with 32 bytes of data:

Reply from 172.16.30.1 ;bytes=32 time=22ms TTL=254
Reply from 172.16.30.1 ;bytes=32 time=22ms TTL=254
Reply from 172.16.30.1 ;bytes=32 time=22ms TTL=254
Reply from 172.16.30.1 ;bytes=32 time=22ms TTL=254

Ping Statistics for 172.16.30.1:
     Packets Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
     Minimum = 22ms, Maximum = 23ms, Average = 22ms
C:\>
```

在 Host A 上 ping Host B：

```
Microsoft Windows 2000 [Version 5.00.2195]
(C) Copyright 1985-1999 Microsoft Corp.

C:\>ping 172.16.30.3

Pinging 172.16.30.3 with 32 bytes of data:

Reply from 172.16.30.3 ;bytes=32 time=22ms TTL=254
Reply from 172.16.30.3 ;bytes=32 time=22ms TTL=254
Reply from 172.16.30.3 ;bytes=32 time=22ms TTL=254
Reply from 172.16.30.3 ;bytes=32 time=22ms TTL=254

Ping Statistics for 172.16.30.3:
    Packets Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 22ms, Maximum = 23ms, Average = 22ms
C:\>_
```

连接成功！

4 实验总结

通过此次实验了解了路由器、交换机的基本结构，交换机、路由器、主机之间的互连方式。学会基本的 IOS 命令，掌握路由器的常规配置、配置静态路由、动态路由实现网络互通的方法，学会基于交换机端口的 VLAN 配置。通过自己动手模拟配置路由，对网络互连的方式有了更加直观的理解，对路由表的理解也加深了。