

# 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 路由器模拟配置

班    级 软件工程 2018 级 2 班

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实验时间 2020 年 4 月 21 日

2020 年 4 月 21 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）。

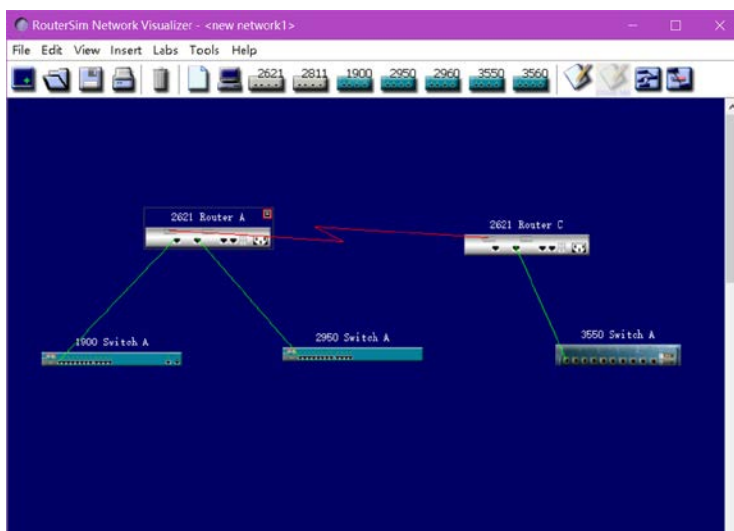
## 2 实验环境

Windows

## 3 实验结果

配置静态路由：

连接设备图，参考资料上使用 Router2600，但实际实验软件中只有 2621



配置 RouterA: DCE 端

```
Console for 2621 Router A
File Edit View Tools Help
Router(config)#configuration
Router(config)#
% Invalid input detected at '^' marker.
Router(config)#int f0/0
Router(config-if)#ip address 192.5.5.1 255.255.255.0
Router(config-if)#no shutdown
13:12:55 %LINK-3-UPDOWN: Interface FastEthernet0/0, changed state to up
13:12:55 %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, change
Router(config-if)#int f0/1
Router(config-if)#ip addr 205.7.5.1 255.255.255.0
Router(config-if)#no shutdown
13:13:41 %LINK-3-UPDOWN: Interface FastEthernet0/1, changed state to up
13:13:41 %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, change
```

```

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
Router(config-if)#no shutdown
13:21:27 %LINK-3-UPDOWN: Interface Serial0/0, changed state to up
13:21:27 %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0, changed state to up

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

```

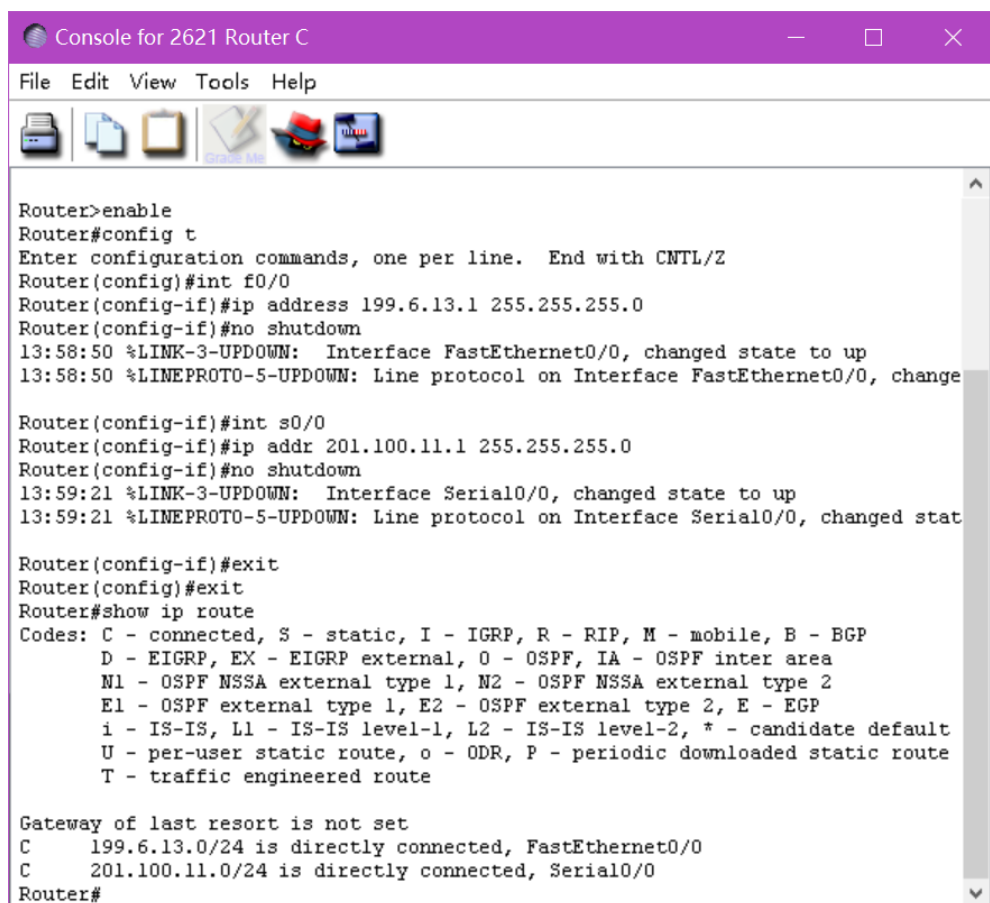
```

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:DTE 端



```

Console for 2621 Router C
File Edit View Tools Help

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
13:58:50 %LINK-3-UPDOWN: Interface FastEthernet0/0, changed state to up
13:58:50 %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, 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)#no shutdown
13:59:21 %LINK-3-UPDOWN: Interface Serial0/0, changed state to up
13:59:21 %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0, 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    199.6.13.0/24 is directly connected, FastEthernet0/0
C    201.100.11.0/24 is directly connected, Serial0/0
Router#

```

A 端测试不连通:

```

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

```

配置静态路由：

```

Router(config)#ip route 199.6.13.0 255.255.255.0 201.100.11.2
Router(config)#exit

```

测试连通

```

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

```

动态路由 RIP 配置：



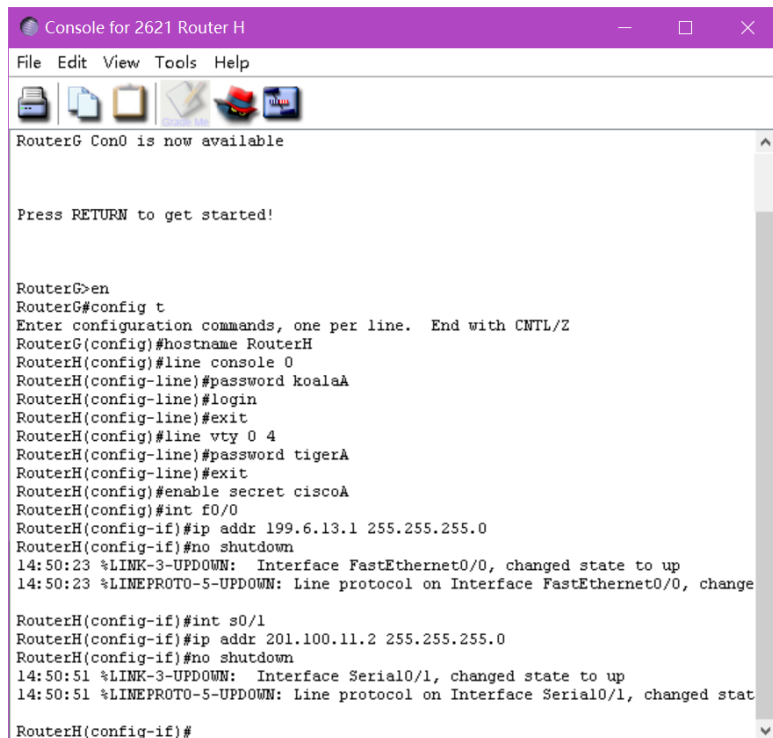
```

Console for 2621 Router D
File Edit View Tools Help
Enter configuration commands, one per line. End with CTRL/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)#exit
Router#sh 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#

```

Cisco 路由器访问列表配置：

按照材料中进行基本配置之后，路由器有了密码



```
RouterG Con0 is now available

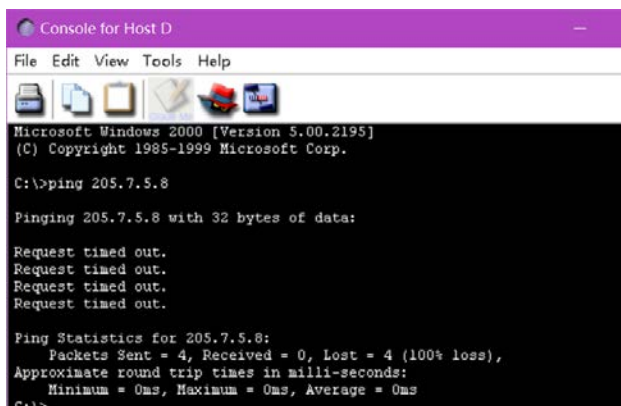
Press RETURN to get started!

RouterG>en
RouterG#config t
Enter configuration commands, one per line. End with CNTL/Z
RouterG(config)#hostname RouterH
RouterH(config)#line console 0
RouterH(config-line)#password koalaA
RouterH(config-line)#login
RouterH(config-line)#exit
RouterH(config)#line vty 0 4
RouterH(config-line)#password tigerA
RouterH(config-line)#exit
RouterH(config)#enable secret ciscoA
RouterH(config)#int f0/0
RouterH(config-if)#ip addr 199.6.13.1 255.255.255.0
RouterH(config-if)#no shutdown
14:50:23 %LINK-3-UPDOWN: Interface FastEthernet0/0, changed state to up
14:50:23 %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, change
RouterH(config-if)#int s0/1
RouterH(config-if)#ip addr 201.100.11.2 255.255.255.0
RouterH(config-if)#no shutdown
14:50:51 %LINK-3-UPDOWN: Interface Serial0/1, changed state to up
14:50:51 %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/1, changed stat
RouterH(config-if)#
```

路由器的 rip 配置示例

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

限制前主机可以访问 205.7.5.0，而限制后：主机 D 的访问



利用访问列表限制子网对子网 199.6.13.0 的访问

```
Router>en
Router#config t
Enter configuration commands, one per line. End with CNTL/Z
Router(config)#hostname RouterG
RouterG(config)#access-list 51 deny 192.5.5.8 255.255.255.248
RouterG(config)#access-list 51 permit any
RouterG(config)#int s0/0
RouterG(config-if)#ip access-group 51 out
RouterG(config-if)#exit
RouterG(config)#
```

A 远程登录

```
C:\>telnet 201.100.11.2
Connecting To 201.100.11.2 ...

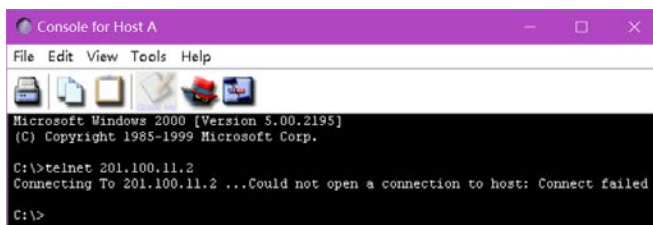
User Access Verification

Password:

RouterA>en
Password:
RouterA#exit

Connection to host lost.
```

在 RouterH 上拒绝 A 访问后



IOS 路由和 VLAN 配置

设置 VTP 域:

```

Console for 2950 Switch A
File Edit View Tools Help
switch(config)#conf t
% Invalid input detected at '^' marker.
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 Vll (lowest numbered VLAN interface found)
3550A#

```

```

Console for 2950 Switch B
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 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 SwitchB at 11-29-93 20:39:24
Local updater ID is 2950 SwitchB on interface Vll (lowest numbered VLAN interface found)
2950A#

```

```

2950A>en
2950A#conf t
Enter configuration commands, one per line. End with CNTL/Z
2950A(config)#hostname 2950B
2950B(config)#vtp domain Cisco
Changing VTP domain name from Cisco to Cisco
2950B(config)#vtp mode client
Device mode already VTP CLIENT.
2950B(config)#exit
2950B#

```

创建 VLAN，将交换机加入 VLAN

```
2950A>enable
2950A#config 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)#interface fa0/2
2950A(config-if)#switchport access vlan 20
2950A(config-if)#
```

配置第三层交换机:

```
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)#
```

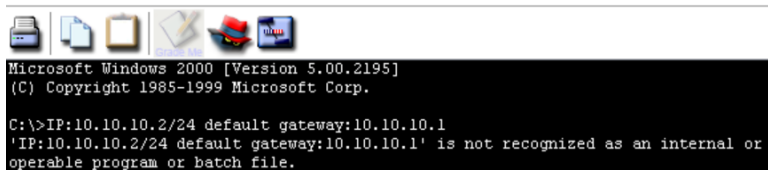
配置交换机管理地址:

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

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

2950B(config)#int vlan 1
2950B(config-if)#ip address 192.168.10.3 255.255.255.0
2950B(config-if)#no shutdown
```

配置主机:



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

C:\>IP:10.10.10.2/24 default gateway:10.10.10.1
'IP:10.10.10.2/24 default gateway:10.10.10.1' is not recognized as an internal or
operable program or batch file.
```

在 3550A 交换机上分别测试两个交换机:

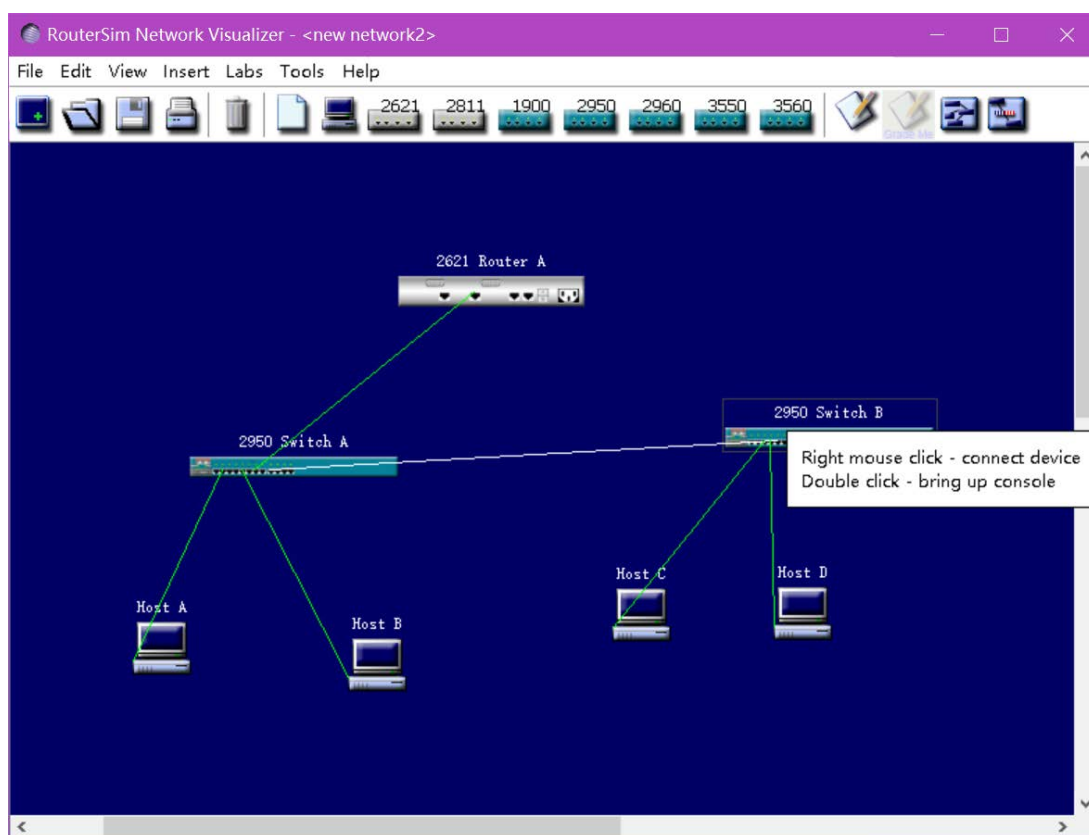


```

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 0 percent (0/5), round-trip min/avg/max = 0/0/0 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 0 percent (0/5), round-trip min/avg/max = 0/0/0 ms
3550A#
  
```



实例 2 与 1 过程与结果类似

配置验证 2950A 的 VTP 并启动。

启动 Trunk: 2950A\B 的端口, 分别为 fa0/12、fa0/11 与 fa0/12。

分配端口 VLAN 并验证

```

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
                                           Fa0/11, Fa0/12
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    BrgdMode Transl Trans
-----
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--

```

配置路由：

```

2600#config t
Enter configuration commands, one per line. End with CNTL/Z
2600(config)#hostname R2600
R2600(config)#interface fastethernet 0/0
R2600(config-if)#no ip address
R2600(config-if)#no shutdown
R2600(config-if)#interface fastethernet 0/0.1
R2600(config-subif)#encapsulation dot1q 1
R2600(config-subif)#ip address 172.16.10.1 255.255.255.0
R2600(config-subif)#interface fastethernet 0/0.2
R2600(config-subif)#encapsulation dot1q 2
R2600(config-subif)#ip address 172.16.20.1 255.255.255.0
R2600(config-subif)#interface fastethernet 0/0.3
R2600(config-subif)#encapsulation dot1q 3
R2600(config-subif)#ip address 172.16.30.1 255.255.255.0
R2600(config-subif)#exit
R2600(config)#

```

最后配置四台主机并验证其连通性。测试结果同实例 1。

## 4 实验总结

本次实验内容较多，但步骤基本按照参考资料执行的。虽然实验正常完成了，但是对于其中很多的知识点还不是理解十分透彻，需要继续去学习巩固。