计算机网络实验报告

第六组人员名单

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一、使用技术

- RIPv2动态路由
- Vlan路由连接
- 交换机子网划分，交换机之间Trunk构建
- ACL防火墙设置
- NAT网络地址转换

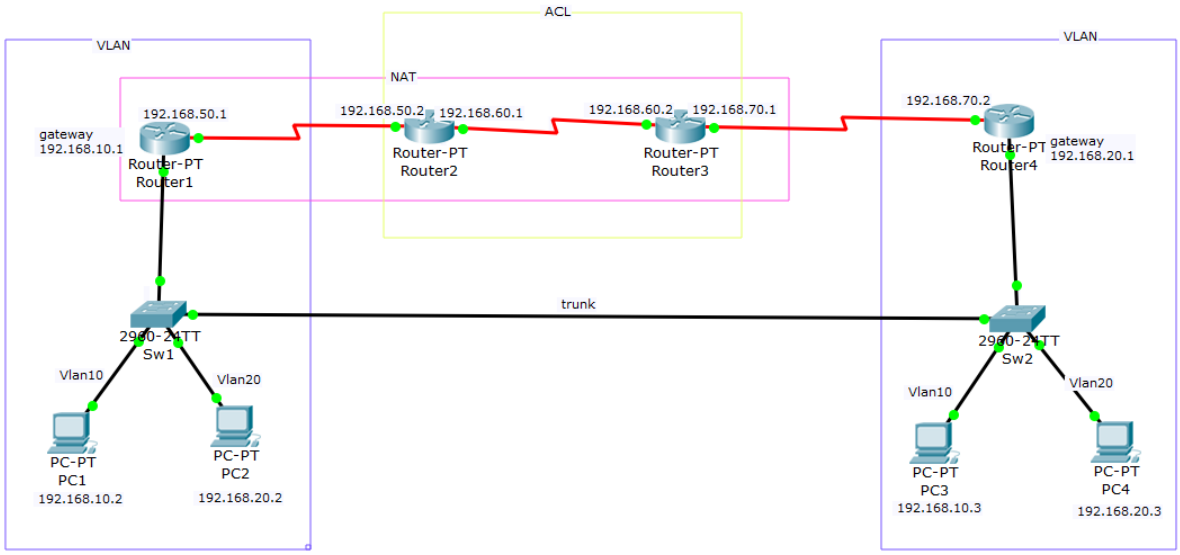
二、实验目标

- 掌握不同设备之间的连接方式
- 掌握在路由器上配置RIPv2动态路由
- 掌握查看和调试RIPv2过程信息
- 了解交换机Vlan的布局和配置
- 熟悉trunk的配置和使用
- 熟悉Vlan之间信息传递过程
- 掌握静态NAT的配置和使用
- 掌握动态NAT的配置和使用
- 掌握路由器和交换机的命令使用
- 掌握ACL的配置

三、实验内容

- 按照拓扑进行连接
- 配置各个设备的接口以及ip地址等信息
- 配置交换机Vlan以及trunk
- 配置RIPv2
- 配置NAT
- 配置ACL

四、实验拓扑



五、实验步骤

1、配置交换机

(i.) Trunk

配置Sw1

```
switch>enable
switch#conf t
switch(config)#hostname Sw1
Sw1(config)#int g 1/0/23
Sw1(config)#switchport mode trunk
```

配置Sw2

```
switch>enable
switch#conf t
switch(config)#hostname Sw2
Sw2(config)#int g 1/0/23
Sw2(config)#switchport mode trunk
```

(ii.) 划分Vlan

配置Sw1

```
Sw1(config)#vlan 10
Sw1(config-vlan)#vlan 20
```

配置Sw2

```
Sw2(config)#vlan 10
Sw2(config-vlan)#vlan 20
```

(iii.) Vlan

配置Sw1

```
Sw1(config)#int g1/0/1
Sw1(config-if)#switchport mode access
Sw1(config-if)#switchport access vlan 10
Sw1(config-if)#int g1/0/2
Sw1(config-if)#switchport mode access
Sw1(config-if)#switchport access vlan 20
Sw1(config-if)#int g1/0/24
Sw1(config-if)#switchport mode access
Sw1(config-if)#switchport access vlan 10
```

配置Sw2

```
Sw2(config)#int g1/0/1
Sw2(config-if)#switchport mode access
Sw2(config-if)#switchport access vlan 10
Sw2(config-if)#int g1/0/2
Sw2(config-if)#switchport mode access
Sw2(config-if)#switchport access vlan 20
Sw2(config-if)#int g1/0/24
Sw2(config-if)#switchport mode access
Sw2(config-if)#switchport access vlan 20
```

2、配置路由器

(i.) 接口或者逻辑接口**ip**

配置Router1

```
Router>en
Router#conf t
Router(config)#hostname Router1
Router1(config)#int g0/0/0
Router1(config-if)#ip address 192.168.10.1 255.255.255.0
Router1(config-if)#no shutdown
Router1(config-if)#int s0/1/0
```

```
Router1(config-if)#ip address 192.168.50.1 255.255.255.0
Router1(config-if)#no shutdown
```

配置Router2

```
Router>en
Router#conf t
Router(config)#hostname Router2
Router2(config)#int s0/1/0
Router2(config-if)#ip address 192.168.50.2 255.255.255.0
Router2(config-if)#no shutdown
Router2(config)#int s0/1/1
Router2(config-if)#ip address 192.168.60.1 255.255.255.0
Router2(config-if)#no shutdown
```

配置Router3

```
Router>en
Router#conf t
Router(config)#hostname Router3
Router3(config)#int s0/1/0
Router3(config-if)#ip address 192.168.70.1 255.255.255.0
Router3(config-if)#no shutdown
Router3(config)#int s0/1/1
Router3(config-if)#ip address 192.168.60.2 255.255.255.0
Router3(config-if)#no shutdown
```

配置Router4

```
Router>en
Router#conf t
Router(config)#hostname Router4
Router4(config)#int g0/0/0
Router4(config-if)#ip address 192.168.20.1 255.255.255.0
Router4(config-if)#no shutdown
Router4(config-if)#int s0/1/0
Router4(config-if)#ip address 192.168.70.2 255.255.255.0
Router4(config-if)#no shutdown
```

(ii.) RIPv2

配置Router1

```
Router1(config)#router rip
Router1(config-router)#network 192.168.10.0
```

```
Router1(config-router)#network 192.168.20.0
Router1(config-router)#network 192.168.50.0
```

配置Router2

```
Router2(config)#router rip
Router2(config-router)#network 192.168.50.0
Router2(config-router)#network 192.168.60.0
```

配置Router3

```
Router3(config)#router rip
Router3(config-router)#network 192.168.60.0
Router3(config-router)#network 192.168.70.0
```

配置Router4

```
Router4(config)#router rip
Router4(config-router)#network 192.168.10.0
Router4(config-router)#network 192.168.20.0
Router4(config-router)#network 192.168.70.0
```

3、配置PC

手动配置PC1

```
ip address 192.168.10.2 255.255.255.0
default gateway 192.168.10.1
```

手动配置PC2

```
ip address 192.168.20.2 255.255.255.0
default gateway 192.168.20.1
```

手动配置PC3

```
ip address 192.168.10.3 255.255.255.0
default gateway 192.168.10.1
```

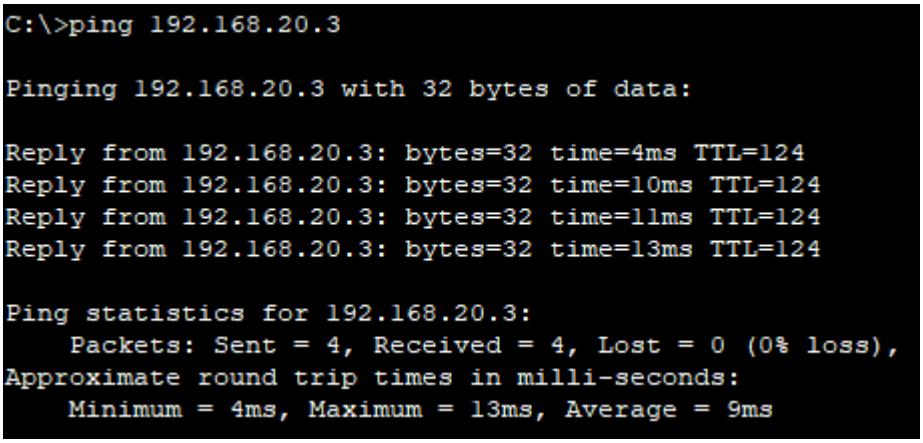
手动配置PC4

```
ip address 192.168.20.3 255.255.255.0
default gateway 192.168.20.1
```

4、vlan以及trunk测试

以PC1作为测试机器，其他机器类似

```
C:/>ping 192.168.20.2
C:/>ping 192.168.10.3
C:/>ping 192.168.20.3
```



查看vlan

```
Sw1
Sw1#sh vlan brief
```

```
Sw1#sh vlan brief

VLAN Name                              Status    Ports
---- --------------------------------- --------- -------------------------------
1    default                           active    Fa0/3, Fa0/4, Fa0/5,
Fa0/6
                                                 Fa0/7, Fa0/8, Fa0/9,
Fa0/10
                                                 Fa0/11, Fa0/12,
Fa0/13, Fa0/14
                                                 Fa0/15, Fa0/16,
Fa0/17, Fa0/18
                                                 Fa0/19, Fa0/20,
Fa0/21, Fa0/22
                                                 Gig0/1, Gig0/2
10   VLAN0010                          active    Fa0/1, Fa0/24
20   VLAN0020                          active    Fa0/2
1002 fddi-default                      active
1003 token-ring-default                active
1004 fddinet-default                   active
1005 trnet-default                     active
```

```
Sw2
Sw2#sh vlan brief
```

```
Switch#sh vlan brief

VLAN Name                              Status    Ports
---- --------------------------------- --------- -------------------------------
1    default                           active    Fa0/3, Fa0/4, Fa0/5,
Fa0/6
                                                 Fa0/7, Fa0/8, Fa0/9,
Fa0/10
                                                 Fa0/11, Fa0/12,
Fa0/13, Fa0/14
                                                 Fa0/15, Fa0/16,
Fa0/17, Fa0/18
                                                 Fa0/19, Fa0/20,
Fa0/21, Fa0/22
                                                 Gig0/1, Gig0/2
10   VLAN0010                          active    Fa0/1
20   VLAN0020                          active    Fa0/2, Fa0/24
1002 fddi-default                      active
1003 token-ring-default                active
1004 fddinet-default                   active
1005 trnet-default                     active
```

5、动态路由测试

以PC1作为测试机器，其他机器类似

```
C:/>ping 192.168.50.1
C:/>ping 192.168.60.1
C:/>ping 192.168.70.1
```

查看Router1的路由表

```
Router1#sh ip route
```

```
Router1#sh 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, ia - IS-IS
inter area
       * - candidate default, U - per-user static route, o - ODR
       P - periodic downloaded static route

Gateway of last resort is not set

C    192.168.10.0/24 is directly connected, FastEthernet1/0
R    192.168.20.0/24 [120/3] via 192.168.50.2, 00:00:16, Serial2/0
C    192.168.50.0/24 is directly connected, Serial2/0
R    192.168.60.0/24 [120/1] via 192.168.50.2, 00:00:16, Serial2/0
R    192.168.70.0/24 [120/2] via 192.168.50.2, 00:00:16, Serial2/0
```

查看Router2的路由表

```
Router2#sh ip route
```

```
Router2#sh 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, ia - IS-IS
inter area
       * - candidate default, U - per-user static route, o - ODR
       P - periodic downloaded static route

Gateway of last resort is not set

R    192.168.10.0/24 [120/1] via 192.168.50.1, 00:00:16, Serial2/0
R    192.168.20.0/24 [120/2] via 192.168.60.2, 00:00:23, Serial3/0
C    192.168.50.0/24 is directly connected, Serial2/0
C    192.168.60.0/24 is directly connected, Serial3/0
R    192.168.70.0/24 [120/1] via 192.168.60.2, 00:00:23, Serial3/0
```

查看Router3的路由表

```
Router3#sh ip route
```

```
Router3#sh 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, ia - IS-IS
inter area
       * - candidate default, U - per-user static route, o - ODR
       P - periodic downloaded static route

Gateway of last resort is not set

R    192.168.10.0/24 [120/2] via 192.168.60.1, 00:00:10, Serial3/0
R    192.168.20.0/24 [120/1] via 192.168.70.2, 00:00:17, Serial2/0
R    192.168.50.0/24 [120/1] via 192.168.60.1, 00:00:10, Serial3/0
C    192.168.60.0/24 is directly connected, Serial3/0
C    192.168.70.0/24 is directly connected, Serial2/0
```

查看Router4的路由表

```
Router4#sh ip route
```

```
route14#sh 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, ia - IS-IS
inter area
       * - candidate default, U - per-user static route, o - ODR
       P - periodic downloaded static route

Gateway of last resort is not set

R    192.168.10.0/24 [120/3] via 192.168.70.1, 00:00:00, Serial2/0
C    192.168.20.0/24 is directly connected, FastEthernet0/0
R    192.168.50.0/24 [120/2] via 192.168.70.1, 00:00:00, Serial2/0
R    192.168.60.0/24 [120/1] via 192.168.70.1, 00:00:00, Serial2/0
C    192.168.70.0/24 is directly connected, Serial2/0
```

6、配置ACL以及测试

(i.) 测试封杀ping命令

配置Router2

```
Router2(config)#access-list 100 deny icmp 192.168.60.1 0.0.0.0 192.168.60.2
0.0.0.0
Router2(config)#access-list 100 permit ip any any
Router2(config)#int s0/1/1
Router2(config-if)#ip access-group 100 out
```

配置Router3

```
Router3(config)#access-list 100 deny icmp host 192.168.60.1 host 192.168.60.2
Router3(config)#access-list 100 permit icmp any any
Router3(config)#int s0/1/1
Router3(config-if)#ip access-group 100 in
```

在Router2中进行检测

```
Router2(config)#exit
Router2#ping 192.168.60.2
```

```
Router2#ping 192.168.60.2

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.60.2, timeout is 2
seconds:
UUUUU
Success rate is 0 percent (0/5)
```

(ii.) 测试禁止**telnet**命令

配置Router2

```
还原Router2的配置
Router2(config)#int s0/1/1
Router2(config-if)#no ip access-group 100 out
```

配置Router3

```
还原Router3的配置
Router3(config)#int s0/1/1
Router3(config-if)#no ip access-group 100 in

开始配置telnet
Router3(config)#enable secret cisco
Router3(config)#line vty 0 4
Router3(config-line)#password cisco
```

```
Router3(config-line)#login

开始创建ACL
Router3(config)#access-list 101 deny tcp host 192.168.60.1 any eq 23
Router3(config)#access-list 101 permit ip any any
Router3(config)#int s0/1/1
Router3(config-if)#ip access-group 101 in
```

在Router2测试

```
Router2#ping 192.168.60.2
Router2#telnet 192.168.60.2
```

```
Router2#ping 192.168.60.2

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.60.2, timeout is 2
seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/1/5 ms
```

```
Router2#telnet 192.168.60.2
Trying 192.168.60.2 ...
% Connection timed out; remote host not responding
Router2#
```

7、配置NAT以及测试

配置Router2静态NAT

```
Router2(config)#ip nat inside source static 192.168.50.1 192.168.60.254
Router2(config)#int s0/1/0
Router2(config-if)#ip nat inside
Router2(config)#int s0/1/1
Router2(config-if)#ip nat outside
Router2(config)#end
```

在Router2上看NAT转换表

```
Router2#sh ip nat translations
```

```
Router2#sh ip nat translations
Pro  Inside global     Inside local       Outside local      Outside
global
---  192.168.60.254    192.168.50.1       ---                ---
```

六、功能总结

本次实验使得两个包含交换机的网络（其中每个含有两个vlan区域）可以通过相互通信。同一Vlan使用Trunk进行通信，vlan间使用路由器进行转发，而路由器之间使用RIPv2进行动态路由，在中间的两个路由器间使用了ACL进行防火墙设置，使得路由器Router3不能使用Telnet登录Router3。同时使用NAT技术，使得来自192.168.50.1的局部地址的请求通过NAT转换访问到192.168.60.2。