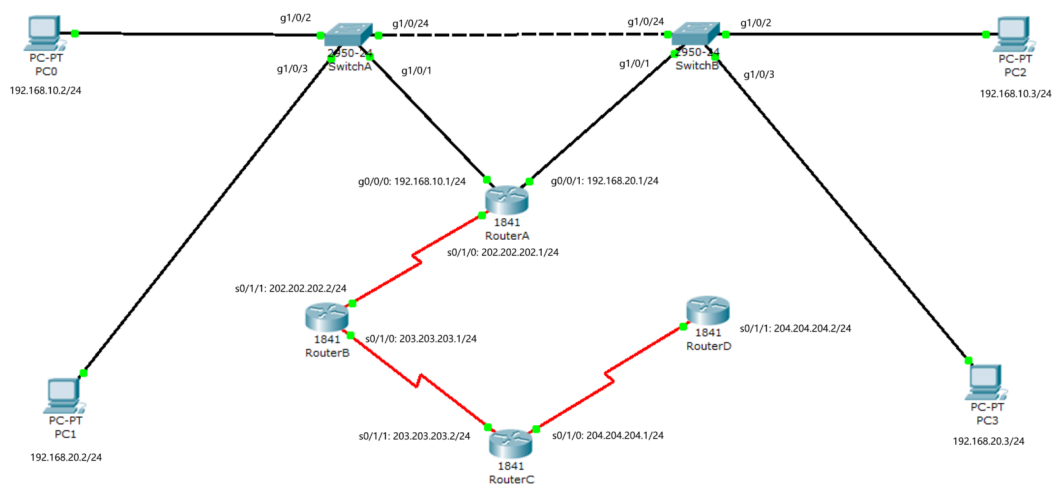


实验拓扑



- **设备**：4台路由器，2台交换机，4台PC
- **涉及技术**：VLAN，Trunk，RIP，NAT，ACL

实验步骤

1.配置PC

• PC0

- 1 IP地址：192.168.10.2/24
- 2 默认网关：192.168.10.1/24

• PC1

- 1 IP地址：192.168.20.2/24
- 2 默认网关：192.168.20.1/24

• PC2

- 1 IP地址：192.168.10.3/24
- 2 默认网关：192.168.10.1/24

• PC3

- 1 IP地址：192.168.20.3/24
- 2 默认网关：192.168.20.1/24

2.配置路由器

- RouterA

```
1 RouterA>enable
2 RouterA#config terminal
3 RouterA(config)#int g0/0/0
4 RouterA(config-if)#ip address 192.168.10.1 255.255.255.0
5 RouterA(config-if)#no shutdown
6 RouterA(config-if)#int g0/0/1
7 RouterA(config-if)#ip address 192.168.20.1 255.255.255.0
8 RouterA(config-if)#no shutdown
9 RouterA(config-if)#int s0/1/0
10 RouterA(config-if)#ip address 202.202.202.1 255.255.255.0
11 RouterA(config-if)#clock rate 64000 (如果是 DCE)
12 RouterA(config-if)#no shutdown
```

- RouterB

```
1 RouterB>enable
2 RouterB#config terminal
3 RouterB(config)#int s0/1/0
4 RouterB(config-if)#ip address 203.203.203.1 255.255.255.0
5 RouterB(config-if)#clock rate 64000 (DCE)
6 RouterB(config-if)#no shutdown
7 RouterB(config)#int s0/1/1
8 RouterB(config-if)#ip address 202.202.202.2 255.255.255.0
9 RouterB(config-if)#clock rate 64000 (如果是 DCE)
10 RouterB(config-if)#no shutdown
```

- RouterC

```
1 RouterC>enable
2 RouterC#config terminal
3 RouterC(config)#int s0/1/0
4 RouterC(config-if)#ip address 204.204.204.1 255.255.255.0
5 RouterC(config-if)#clock rate 64000 (如果是 DCE)
6 RouterC(config-if)#no shutdown
7 RouterC(config)#int s0/1/1
8 RouterC(config-if)#ip address 203.203.203.2 255.255.255.0
9 RouterC(config-if)#clock rate 64000 (如果是 DCE)
10 RouterC(config-if)#no shutdown
```

- RouterD

```
1 RouterD>enable
2 RouterD#config terminal
3 RouterD(config)#int s0/1/1
4 RouterD(config-if)#ip address 204.204.204.2 255.255.255.0
5 RouterD(config-if)#clock rate 64000 (如果是 DCE)
6 RouterD(config-if)#no shutdown
```

验证

- PC 之间可以 ping 通
- 相邻路由器之间可以 ping 通

3.配置 VLAN 和 Trunk

配置VLAN

- SwitchA

```
1 SwitchA#configure terminal
2 SwitchA(config)#int g1/0/1
3 SwitchA(config-if)#switchport mode access
4 SwitchA(config-if)#switchport access vlan 10
5 SwitchA(config-if)#int g1/0/2
6 SwitchA(config-if)#switchport mode access
7 SwitchA(config-if)#switchport access vlan 10
8 SwitchA(config-if)#int g1/0/3
9 SwitchA(config-if)#switchport mode access
10 SwitchA(config-if)#switchport access vlan 20
```

- SwitchB

```
1 SwitchB#configure terminal
2 SwitchB(config)#int g1/0/1
3 SwitchB(config-if)#switchport mode access
4 SwitchB(config-if)#switchport access vlan 20
5 SwitchB(config-if)#int g1/0/2
6 SwitchB(config-if)#switchport mode access
7 SwitchB(config-if)#switchport access vlan 10
8 SwitchB(config-if)#int g1/0/3
9 SwitchB(config-if)#switchport mode access
10 SwitchB(config-if)#switchport access vlan 20
```

验证

PC之间只有

- PC0(192.168.10.2) ↔ PC3(192.168.20.3)
- PC1(192.168.20.2) ↔ PC2(192.168.10.3)

能 ping 通

配置Trunk

- SwitchA

```
1 SwitchA(config)#int g1/0/24
2 SwitchA(config-if)#switchport mode trunk
3 SwitchA(config-if)#end
```

- SwitchB

```
1 SwitchB(config)#int g1/0/24
2 SwitchB(config-if)#switchport mode trunk
3 SwitchB(config-if)#end
```

验证

PC 之间能够 ping 通

4.配置RIP

- RouterA

```
1 RouterA(config)#router rip
2 RouterA(config-router)#network 192.168.10.0
3 RouterA(config-router)#network 192.168.20.0
4 RouterA(config-router)#network 202.202.202.0
5 RouterA(config-router)#end
```

- RouterB

```
1 RouterB(config)#router rip
2 RouterB(config-router)#network 202.202.202.0
3 RouterB(config-router)#network 203.203.203.0
4 RouterB(config-router)#end
```

- RouterC

```
1 RouterC(config)#router rip
2 RouterC(config-router)#network 203.203.203.0
3 RouterC(config-router)#network 204.204.204.0
4 RouterC(config-router)#end
```

- RouterD

```
1 RouterD(config)#router rip
2 RouterD(config-router)#network 204.204.204.0
3 RouterD(config-router)#end
```

验证

路由器之间能 ping 通

5.配置静态NAT

- RouterA

```
1 RouterA(config)#ip nat inside source static 192.168.10.2 202.202.202.3
2 RouterA(config)#ip nat inside source static 192.168.10.3 202.202.202.4
3 RouterA(config)#ip nat inside source static 192.168.20.2 202.202.202.5
4 RouterA(config)#ip nat inside source static 192.168.20.3 202.202.202.6
5 RouterA(config)#interface g0/0/0
6 RouterA(config-if)#ip nat inside
7 RouterA(config-if)#interface g0/0/1
8 RouterA(config-if)#ip nat inside
9 RouterA(config)#interface s0/1/0
10 RouterA(config-if)#ip nat outside
```

验证

PC 都能 ping 通 204.204.204.2

6.配置ACL

- RouterC

```
1 RouterC#config terminal
2 RouterC(config)#access-list 100 deny icmp host 202.202.202.3 host
  204.204.204.2
3 RouterC(config)#access-list 100 permit icmp any any
4 RouterC(config)#int s0/1/1
5 RouterC(config-if)#ip access-group 100 in
```

验证

只有 PC0(192.168.10.2 202.202.202.3) 不能 ping 通 204.204.204.2

功能总结

1. **VLAN 和 Trunk** 实现了局域网内的网络隔离和跨交换机的 VLAN 数据传输。
2. **RIP 动态路由** 实现了各个路由器之间的网络互通。
3. **静态 NAT** 允许内网设备访问外部网络，并实现地址映射。
4. **ACL** 实现了网络访问控制，限制了特定设备的访问权限。

5. 所有配置最终满足实验要求，PC 之间能够根据规则正常通信。

最终实验目标实现

- PC 之间均能 ping 通
 - PC0

```
PC>ping 192.168.10.3

Pinging 192.168.10.3 with 32 bytes of data:

Reply from 192.168.10.3: bytes=32 time=82ms TTL=128
Reply from 192.168.10.3: bytes=32 time=92ms TTL=128
Reply from 192.168.10.3: bytes=32 time=93ms TTL=128
Reply from 192.168.10.3: bytes=32 time=92ms TTL=128

Ping statistics for 192.168.10.3:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 82ms, Maximum = 93ms, Average = 89ms

PC>ping 192.168.20.2

Pinging 192.168.20.2 with 32 bytes of data:

Reply from 192.168.20.2: bytes=32 time=155ms TTL=127
Reply from 192.168.20.2: bytes=32 time=157ms TTL=127
Reply from 192.168.20.2: bytes=32 time=155ms TTL=127
Reply from 192.168.20.2: bytes=32 time=155ms TTL=127

Ping statistics for 192.168.20.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 155ms, Maximum = 157ms, Average = 155ms

PC>ping 192.168.20.3

Pinging 192.168.20.3 with 32 bytes of data:

Reply from 192.168.20.3: bytes=32 time=116ms TTL=127
Reply from 192.168.20.3: bytes=32 time=125ms TTL=127
Reply from 192.168.20.3: bytes=32 time=111ms TTL=127
Reply from 192.168.20.3: bytes=32 time=94ms TTL=127

Ping statistics for 192.168.20.3:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 94ms, Maximum = 125ms, Average = 111ms
```

- PC1, PC2, PC3可以访问外部网络 204.204.204.2。
 - PC1

```
PC>ping 204.204.204.2
```

```
Pinging 204.204.204.2 with 32 bytes of data:
```

```
Reply from 204.204.204.2: bytes=32 time=176ms TTL=252
```

```
Reply from 204.204.204.2: bytes=32 time=184ms TTL=252
```

```
Reply from 204.204.204.2: bytes=32 time=186ms TTL=252
```

```
Reply from 204.204.204.2: bytes=32 time=184ms TTL=252
```

```
Ping statistics for 204.204.204.2:
```

```
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),  
    Approximate round trip times in milli-seconds:
```

```
        Minimum = 176ms, Maximum = 186ms, Average = 182ms
```

- PC0 无法 ping 通 204.204.204.2 (ACL 限制生效)。

```
PC>ping 204.204.204.2
```

```
Pinging 204.204.204.2 with 32 bytes of data:
```

```
Request timed out.
```

```
Request timed out.
```

```
Request timed out.
```

```
Request timed out.
```

```
Ping statistics for 204.204.204.2:
```

```
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
```