南昌大学实验报告

学生姓名：_____ 学 号：_____ 专业班级：_____

实验类型：■ 验证 □ 综合 □ 设计 □ 创新 实验日期：_____ 实验成绩：_____

一、实验项目名称

静态路由和动态路由的比较

二、实验目的

1、熟悉路由器的配置

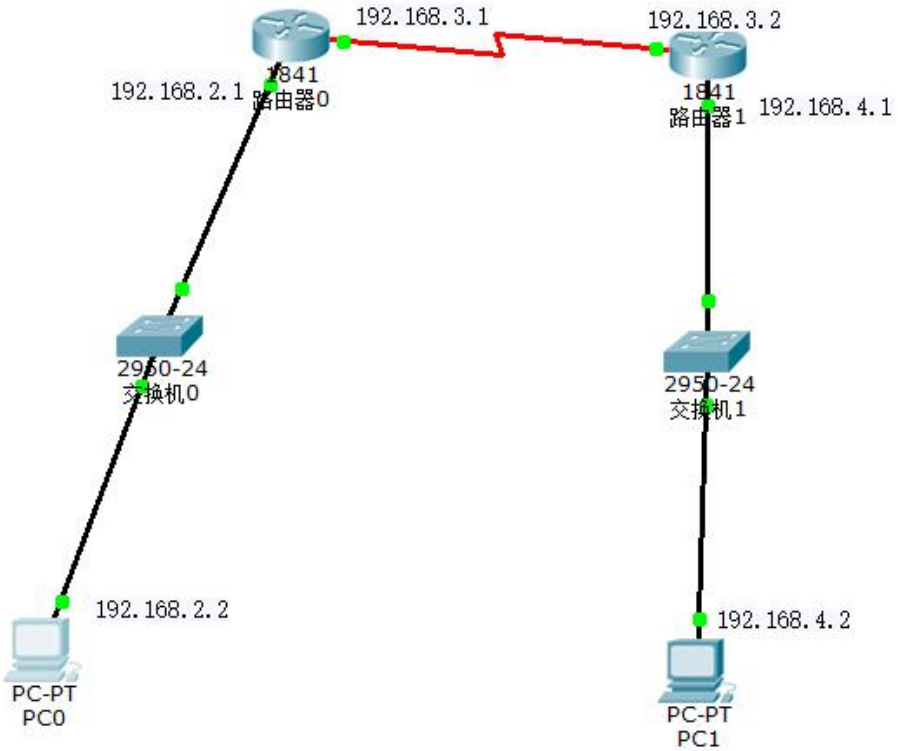
2、了解路由器和路由表的功能

3、能够进行静态路由和动态路由的配置

4、比较静态路由和动态路由的各自优缺点

二、实验基本原理

网络拓扑结构：



IP 地址分配

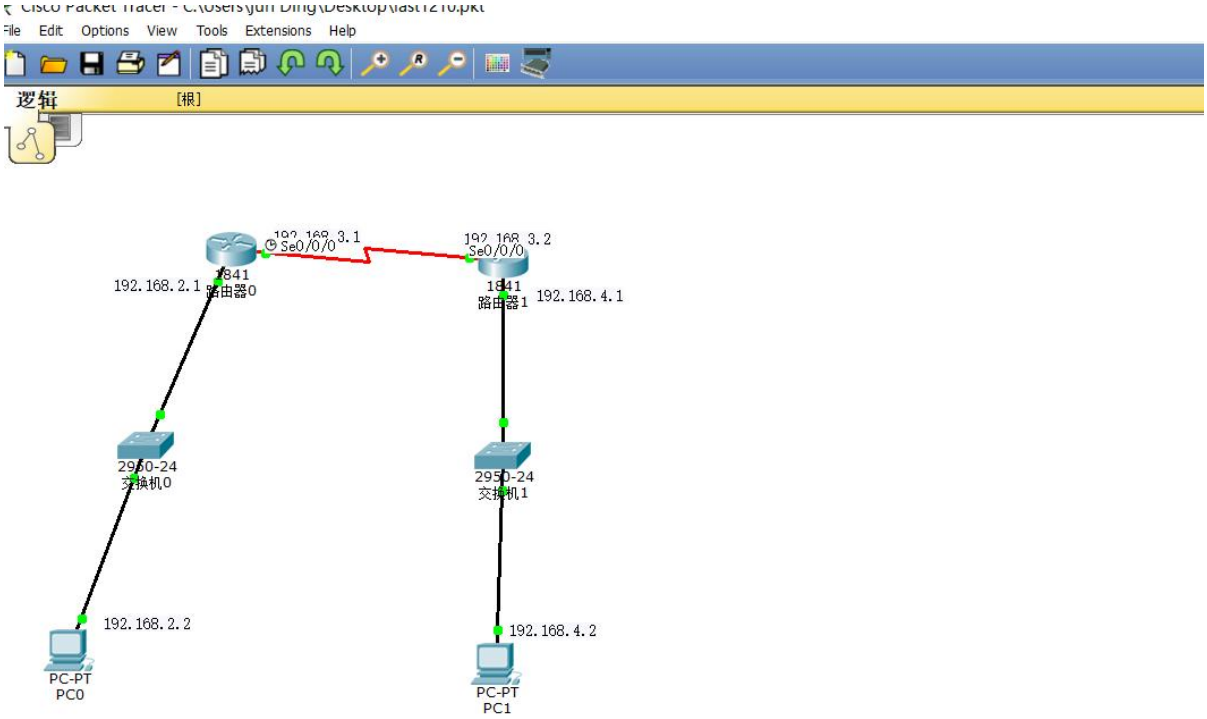
	IP 地址/掩码	网关
PC0	192.168.2.2	192.168.2.1
PC1	192.168.4.2	192.168.4.1
Router0 以太口	192.168.2.1	----------
Router0 广域网接口	192.168.3.1	----------
Router1 以太口	192.168.4.1	----------
Router1 广域网接口	192.168.3.2	----------

四、主要仪器设备及耗材

PC 机、模拟程序。

五、实验步骤

1、**搭建实验拓扑结构。**(注意路由器的广域网接口的时钟频率要在有闹钟小图标的路由器接口配置。)



2、配置和分配 IP 地址。

配置(路由器 0 和 1 打开 serial 和 FastEthernet 端口):

Router>en
Router#conf t
Router(config)#interface serial 0/0/0
Router(config-if)#no shutdown

Router#en
Router#conf t
Router(config)#interface fastEthernet 0/0
Router(config-if)#no shutdown

给 **Route0** 设置时钟频率:

Router(config)#interface serial 0/0/0
Router(config-if)#clock rate 64000

分配 IP 地址:

Route0:

Router#en
Router#conf t
Router(config)#interface serial 0/0/0
Router(config-if)#ip address 192.168.3.1 255.255.255.0
Router(config-if)#exit
Router(config)#interface FastEthernet0/0
Router(config-if)#ip address 192.168.2.1 255.255.255.0

Route1:

Router#en
Router#conf t
Router(config)#interface serial 0/0/0
Router(config-if)#ip address 192.168.3.2 255.255.255.0
Router(config-if)#exit
Router(config)#interface FastEthernet0/0
Router(config-if)#ip address 192.168.4.1 255.255.255.0

路由器 0ping 通路由器 1:

Router>
Router>ping 192.168.3.2
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.3.2, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/7/21 ms

3)**静态路由设置**

Route0:

Router>en

Router#conf t

Router(config)#ip route 192.168.4.0 255.255.255.0 192.168.3.2

Route1:

Router>en

Router#conf t

Router(config)#ip route 192.168.2.0 255.255.255.0 192.168.3.1

查看静态路由(Route0)：

```
Router#show ip ro
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, 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    192.168.2.0/24 is directly connected, FastEthernet0/0
C    192.168.3.0/24 is directly connected, Serial0/0/0
S    192.168.4.0/24 [1/0] via 192.168.3.2
```

可以看到已经添加了一条到达网段 192.168.4.0 的路径，且两个网络和路由器已经连接。

查看静态路由(Route1):

```
Router#show ip ro
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, 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

S    192.168.2.0/24 [1/0] via 192.168.3.1
C    192.168.3.0/24 is directly connected, Serial0/0/0
C    192.168.4.0/24 is directly connected, FastEthernet0/0
Router#
```

可以看到添加了一条到达网段 192.168.2.0 的路径。

2）动态路由 RIP 配置。(记得要先删除掉静态路由。可以通过 router(config)#show ip route 查看路由表)

先**删除静态**路由配置:

Router#en

Router#conf t

Router(config)#no ip route 192.168.2.0 255.255.255.0 192.168.3.1

Router(config)#

再次**查看路由**信息:

Route0:

```
Router#show ip ro
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, ia - IS-IS inter
       * - candidate default, U - per-user static route, o - ODR
       P - periodic downloaded static route

Gateway of last resort is not set

C    192.168.2.0/24 is directly connected, FastEthernet0/0
C    192.168.3.0/24 is directly connected, Serial0/0/0
```

Route1:

```
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, 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    192.168.3.0/24 is directly connected, Serial0/0/0
C    192.168.4.0/24 is directly connected, FastEthernet0/0
Router#
```

可以看到两个路由器信息中都没有去往其他网段的路径，删除成功。

配置动态路由:

Router 0:

Router#en

Router#conf t

Router(config)#route rip

Router(config-router)#network 192.168.3.0

Router(config-router)#network 192.168.2.0

Router 1:

Router#en

Router#conf t

Router(config)#route rip

Router(config-router)#network 192.168.3.0

Router(config-router)#network 192.168.4.0

六、实验结果

静态路由:

```
PC>ping 192.168.4.2

Pinging 192.168.4.2 with 32 bytes of data:

Reply from 192.168.4.2: bytes=32 time=1ms TTL=126
Reply from 192.168.4.2: bytes=32 time=2ms TTL=126
Reply from 192.168.4.2: bytes=32 time=1ms TTL=126
Reply from 192.168.4.2: bytes=32 time=1ms TTL=126

Ping statistics for 192.168.4.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 1ms, Maximum = 2ms, Average = 1ms

PC>ping 192.168.2.2

Pinging 192.168.2.2 with 32 bytes of data:

Reply from 192.168.2.2: bytes=32 time=11ms TTL=128
Reply from 192.168.2.2: bytes=32 time=13ms TTL=128
Reply from 192.168.2.2: bytes=32 time=13ms TTL=128
```

```
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 1ms, Average = 0ms

PC>ping 192.168.2.2

Pinging 192.168.2.2 with 32 bytes of data:

Reply from 192.168.2.2: bytes=32 time=7ms TTL=126
Reply from 192.168.2.2: bytes=32 time=19ms TTL=126
Reply from 192.168.2.2: bytes=32 time=1ms TTL=126
Reply from 192.168.2.2: bytes=32 time=1ms TTL=126

Ping statistics for 192.168.2.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 1ms, Maximum = 19ms, Average = 7ms

PC>
```

动态 rip 信息:

路由 1:

```
C    192.168.2.0/24 is directly connected, FastEthernet0/0
C    192.168.3.0/24 is directly connected, Serial0/0/0
R    192.168.4.0/24 [120/1] via 192.168.3.2, 00:00:08, Serial0/0/0
```

路由 2:

```
R    192.168.2.0/24 [120/1] via 192.168.3.1, 00:00:02, Serial0/0/0
C    192.168.3.0/24 is directly connected, Serial0/0/0
C    192.168.4.0/24 is directly connected, FastEthernet0/0
```

从 PC0 pingPC1

```
Ping statistics for 192.168.2.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 11ms, Maximum = 13ms, Average = 12ms

PC>ping 192.168.4.2

Pinging 192.168.4.2 with 32 bytes of data:

Reply from 192.168.4.2: bytes=32 time=2ms TTL=126
Reply from 192.168.4.2: bytes=32 time=1ms TTL=126
Reply from 192.168.4.2: bytes=32 time=14ms TTL=126
Reply from 192.168.4.2: bytes=32 time=1ms TTL=126

Ping statistics for 192.168.4.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 1ms, Maximum = 14ms, Average = 4ms

PC>
```

从 PC1pingPC0:

```
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 1ms, Average = 0ms

PC>ping 192.168.2.2

Pinging 192.168.2.2 with 32 bytes of data:

Reply from 192.168.2.2: bytes=32 time=7ms TTL=126
Reply from 192.168.2.2: bytes=32 time=19ms TTL=126
Reply from 192.168.2.2: bytes=32 time=1ms TTL=126
Reply from 192.168.2.2: bytes=32 time=1ms TTL=126

Ping statistics for 192.168.2.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 1ms, Maximum = 19ms, Average = 7ms

PC>
```

七、思考讨论题或体会或对改进实验的建议

当初由于写错了一个 ip 地址而 ping 不通，下次一定要记得仔细填写 ip 和网段地址数字。还有可以尝试多路由与多网段连接测试，可以学到更多。

八、参考资料