陕西科技大学

路由与交换 实验报告

实验[三]：动态路由协议配置

学　　生：

班　　级：

系　　别：网络工程

学　　院：电子信息与人工智能学院

实验三　动态路由协议配置　预习报告

一、实验目的

(1) 掌握动态协议分类、基本工作原理；

(2) 掌握动态协议配置方法。

二、实验条件

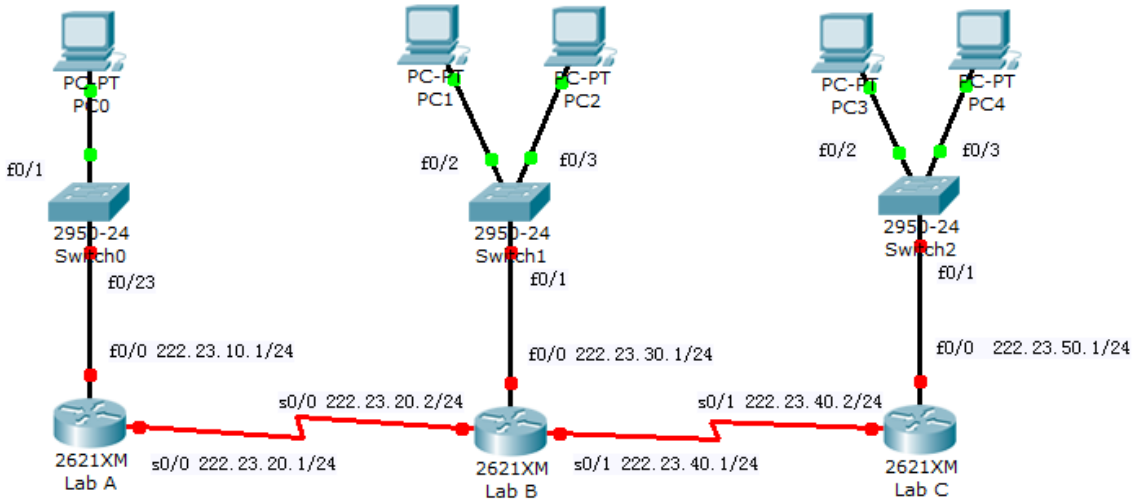
Cisco2621 Router、PacketTrace 仿真软件、具备 Windows 操作系统的 PC 机

三、实验原理及相关知识

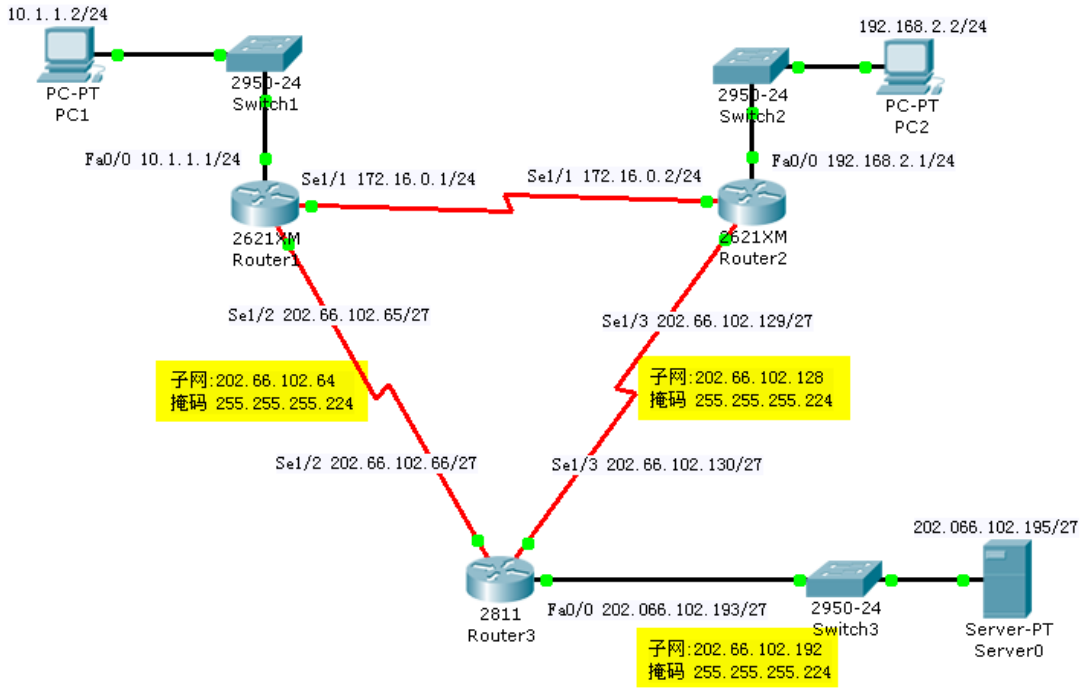
动态协议配置方法

四、实验内容

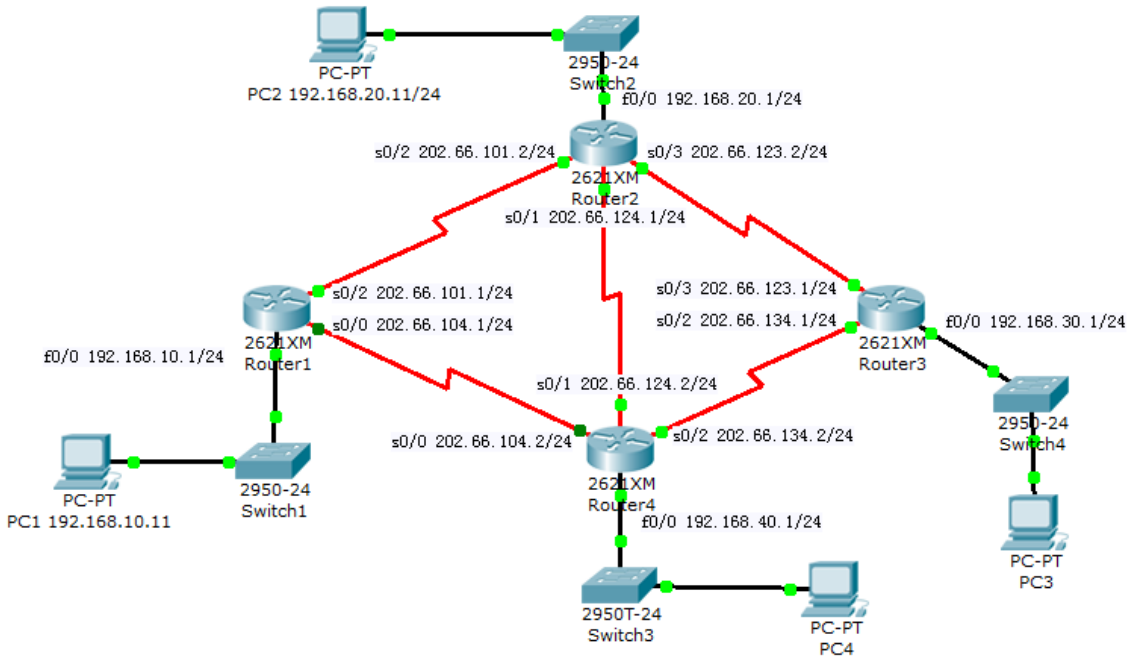
1. RIP 路由协议配置



2. EIGRP 路由协议配置



3. OSPF 路由协议配置



实验三　动态路由协议配置

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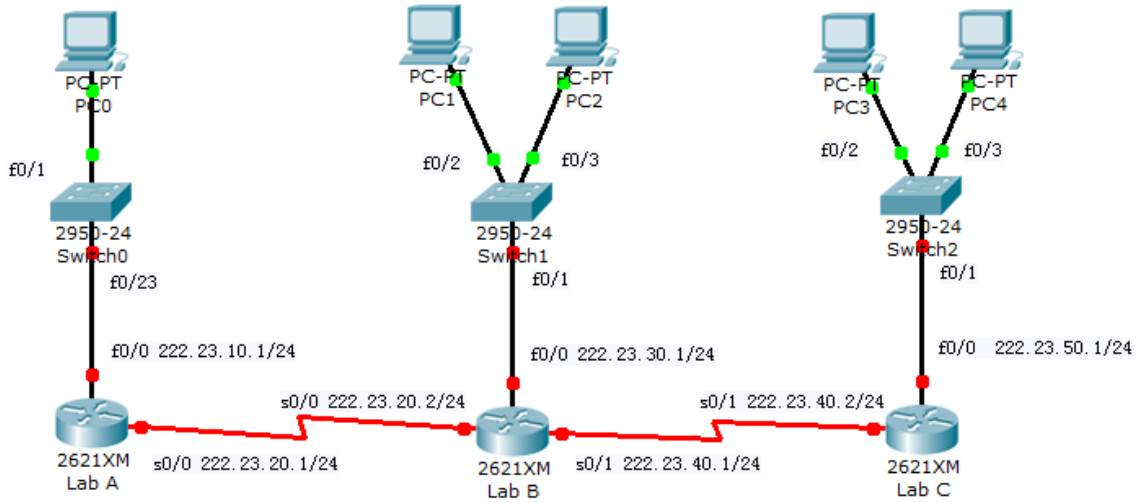
四、实验步骤

1. RIP 路由协议配置

网络拓扑结构和 IP 设置如图。



1.1 配置RIP路由协议

(1) 配置路由器 Router1 路由

```
Router(config)#router rip
Router(config-router)#version 1
Router(config-router)#network 222.23.10.0
Router(config-router)#network 222.23.20.0
```

(2) 配置路由器 Router2 路由

```
Router(config)#router rip
Router(config-router)#version 1
Router(config-router)#net 222.23.20.0
Router(config-router)#net 222.23.30.0
Router(config-router)#net 222.23.40.0
```

(3) 配置路由器 Router3 路由

```
Router(config)#router rip
Router(config-router)#version 1
```

```
Router(config-router)#net 222.23.40.0
Router(config-router)#net 222.23.50.0
```

(4) 配置之后路由器 Router1 的路由信息

```
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    222.23.10.0/24 is directly connected, FastEthernet0/0
C    222.23.20.0/24 is directly connected, Serial1/0
R    222.23.30.0/24 [120/1] via 222.23.20.2, 00:00:17, Serial1/0
R    222.23.40.0/24 [120/1] via 222.23.20.2, 00:00:17, Serial1/0
R    222.23.50.0/24 [120/2] via 222.23.20.2, 00:00:17, Serial1/0
```

(5) 配置之后路由器Router2的路由信息

```
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

R    222.23.10.0/24 [120/1] via 222.23.20.1, 00:00:04, Serial1/0
C    222.23.20.0/24 is directly connected, Serial1/0
C    222.23.30.0/24 is directly connected, FastEthernet0/0
C    222.23.40.0/24 is directly connected, Serial1/1
R    222.23.50.0/24 [120/1] via 222.23.40.2, 00:00:20, Serial1/1
```

(6) 配置之后路由器Router3的路由信息

```
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

R    222.23.10.0/24 [120/2] via 222.23.40.1, 00:00:17, Serial1/1
R    222.23.20.0/24 [120/1] via 222.23.40.1, 00:00:17, Serial1/1
R    222.23.30.0/24 [120/1] via 222.23.40.1, 00:00:17, Serial1/1
C    222.23.40.0/24 is directly connected, Serial1/1
C    222.23.50.0/24 is directly connected, FastEthernet0/0
```

1.2 测试连通性

⑴ 路由器 Lab_A ping 路由器 Lab_C

```
Router#ping 222.23.40.2

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 222.23.40.2, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 43/51/66 ms
```

⑵ 路由器Lab_C ping路由器Lab_A

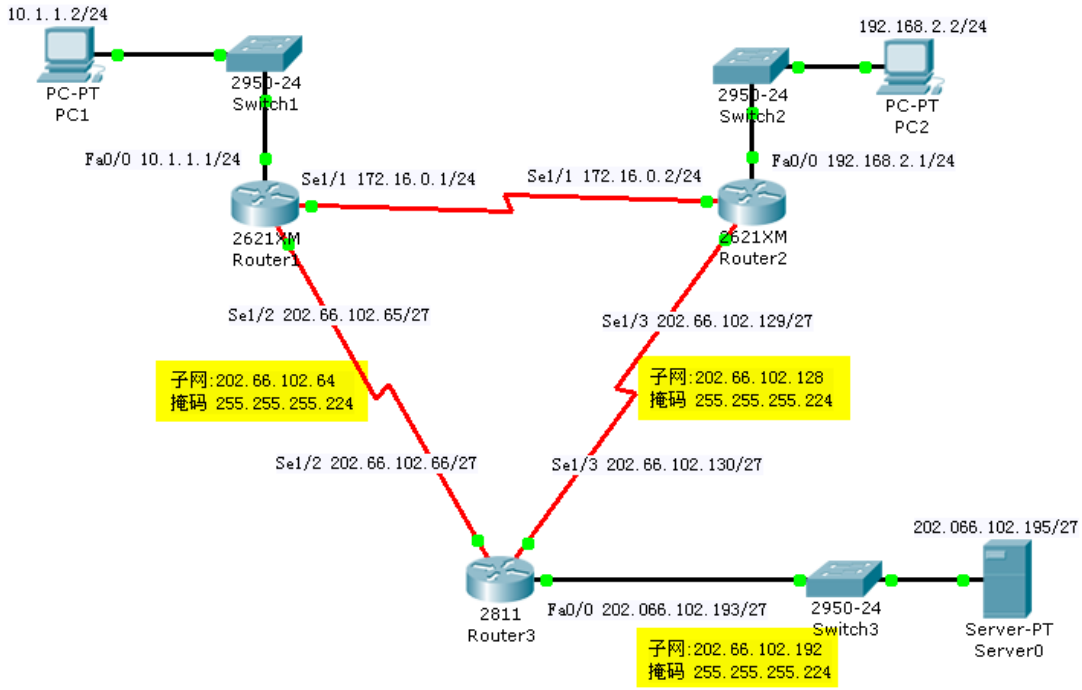
```
Router#ping 222.23.10.1

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 222.23.10.1, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 39/33/39 ms
```

⑶ 在各主机间使用ping命令，测试主机间的连通性。

在模拟器当中，使用测试工具进行连通性测试，各台主机均可互相连通。

2. EIGRP 路由协议配置

网络拓扑结构和 IP 设置如图。



2.1 配置 EIGRP 路由协议

(1) 配置路由器 Router1 路由

```
Router(config)#router eigrp 250
Router(config-router)#network 10.1.1.0 0.0.0.255
Router(config-router)#network 172.16.0.0 0.0.0.255
Router(config-router)#network 202.66.102.64 0.0.0.31
Router(config-router)#no auto-summary
```

(2) 配置路由器 Router2 路由

```
Router(config)#router eigrp 250
Router(config-router)#network 172.16.0.0 0.0.0.255
Router(config-router)#network 192.168.2.0 0.0.0.255
Router(config-router)#network 202.66.102.128 0.0.0.31
Router(config-router)#no auto-summary
```

(3) 配置路由器 Router3 路由

```
Router(config)#router eigrp 250
Router(config-router)#network 202.66.102.128 0.0.0.31
Router(config-router)#network 202.66.102.192 0.0.0.31
Router(config-router)#network 202.66.102.64 0.0.0.31
Router(config-router)#no auto-summary
```

(4) 配置之后路由器 Router1 的路由信息

```
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

     10.0.0.0/24 is subnetted, 1 subnets
C       10.1.1.0 is directly connected, FastEthernet0/0
     172.16.0.0/24 is subnetted, 1 subnets
C       172.16.0.0 is directly connected, Serial1/1
D    192.168.2.0/24 [90/20514560] via 172.16.0.2, 00:02:50, Serial1/1
     202.66.102.0/27 is subnetted, 3 subnets
C       202.66.102.64 is directly connected, Serial1/2
D       202.66.102.128 [90/21024000] via 172.16.0.2, 00:02:50, Serial1/1
                       [90/21024000] via 202.66.102.66, 00:00:43, Serial1/2
D       202.66.102.192 [90/20514560] via 202.66.102.66, 00:00:41, Serial1/2
```

(5) 配置之后路由器Router2的路由信息

```
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

     10.0.0.0/24 is subnetted, 1 subnets
D       10.1.1.0 [90/20514560] via 172.16.0.1, 00:04:26, Serial1/1
     172.16.0.0/24 is subnetted, 1 subnets
C       172.16.0.0 is directly connected, Serial1/1
C    192.168.2.0/24 is directly connected, FastEthernet0/0
     202.66.102.0/27 is subnetted, 3 subnets
D       202.66.102.64 [90/21024000] via 172.16.0.1, 00:04:26, Serial1/1
                      [90/21024000] via 202.66.102.130, 00:02:18, Serial1/3
C       202.66.102.128 is directly connected, Serial1/3
D       202.66.102.192 [90/20514560] via 202.66.102.130, 00:02:16, Serial1/3
```

(6) 配置之后路由器Router3的路由信息

```
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

     10.0.0.0/24 is subnetted, 1 subnets
```

```
D       10.1.1.0 [90/20514560] via 202.66.102.65, 00:02:44, Serial1/2
     172.16.0.0/24 is subnetted, 1 subnets
D       172.16.0.0 [90/21024000] via 202.66.102.65, 00:02:44, Serial1/2
                   [90/21024000] via 202.66.102.129, 00:02:44, Serial1/3
D    192.168.2.0/24 [90/20514560] via 202.66.102.129, 00:02:44, Serial1/3
     202.66.102.0/27 is subnetted, 3 subnets
C       202.66.102.64 is directly connected, Serial1/2
C       202.66.102.128 is directly connected, Serial1/3
C       202.66.102.192 is directly connected, FastEthernet0/0
```

2.2 测试连通性

⑴ 路由器 Router1 ping 路由器 Router3

```
Router#ping 202.66.102.66

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 202.66.102.66, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 29/29/20 ms
```

⑵ 路由器Router3 ping路由器Router1

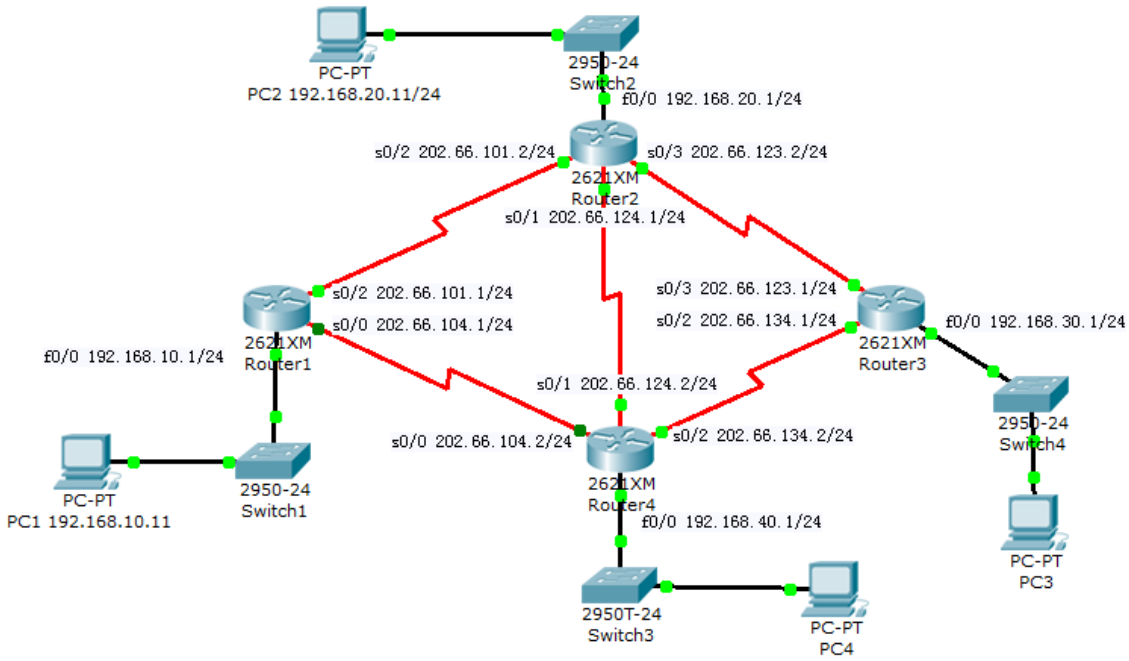
```
Router#ping 10.1.1.1

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 10.1.1.1, timeout is 2 seconds:
.!!!!
Success rate is 80 percent (4/5), round-trip min/avg/max = 28/29/31 ms
```

⑶ 在各主机间使用ping命令，测试主机间的连通性。

在模拟器当中，使用测试工具进行连通性测试，各台主机均可互相连通。

3. OSPF 路由协议配置

网络拓扑结构和 IP 设置如图。



3.1 配置OSPF路由协议

(1) 配置路由器 Router1 路由

```
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#router ospf 101
Router(config-router)#network 192.168.10.0 0.0.0.255 area 0
Router(config-router)#network 202.66.101.0 0.0.0.255 area 0
Router(config-router)#network 202.66.104.0 0.0.0.255 area 0
```

(2) 配置路由器 Router2 路由

```
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#router ospf 102
Router(config-router)#network 192.168.20.0 0.0.0.255 area 0
Router(config-router)#network 202.66.101.0 0.0.0.255 area 0
Router(config-router)#network 202.66.123.0 0.0.0.255 area 0
Router(config-router)#network 202.66.124.0 0.0.0.255 area 0
```

(3) 配置路由器 Router3 路由

```
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#router ospf 103
Router(config-router)#network 192.168.30.0 0.0.0.255 area 0
Router(config-router)#network 202.66.123.0 0.0.0.255 area 0
Router config-router)#network 202.66.134.0 0.0.0.255 area 0
```

(4) 配置路由器 Router4 路由

```
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#router ospf 104
Router(config-router)#network 192.168.40.0 0.0.0.255 area 0
Router(config-router)#network 202.66.104.0 0.0.0.255 area 0
Router(config-router)#network 202.66.124.0 0.0.0.255 area 0
Router(config-router)#network 202.66.134.0 0.0.0.255 area 0
```

(5) 配置之后路由器Router1的路由信息

```
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    192.168.10.0/24 is directly connected, FastEthernet0/0
O    192.168.20.0/24 [110/782] via 202.66.101.2, 00:07:41, Serial1/2
O    192.168.30.0/24 [110/1563] via 202.66.101.2, 00:04:21, Serial1/2
                     [110/1563] via 202.66.104.2, 00:01:07, Serial1/0
O    192.168.40.0/24 [110/782] via 202.66.104.2, 00:02:02, Serial1/0
C    202.66.101.0/24 is directly connected, Serial1/2
C    202.66.104.0/24 is directly connected, Serial1/0
O    202.66.123.0/24 [110/1562] via 202.66.101.2, 00:07:02, Serial1/2
O    202.66.124.0/24 [110/1562] via 202.66.101.2, 00:06:35, Serial1/2
                     [110/1562] via 202.66.104.2, 00:01:40, Serial1/0
O    202.66.134.0/24 [110/1562] via 202.66.104.2, 00:01:07, Serial1/0
```

⑹ 配置之后路由器Router2的路由信息

```
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

O    192.168.10.0/24 [110/782] via 202.66.101.1, 00:08:19, Serial1/2
C    192.168.20.0/24 is directly connected, FastEthernet0/0
O    192.168.30.0/24 [110/782] via 202.66.123.1, 00:05:13, Serial1/3
O    192.168.40.0/24 [110/782] via 202.66.124.2, 00:02:12, Serial1/1
C    202.66.101.0/24 is directly connected, Serial1/2
O    202.66.104.0/24 [110/1562] via 202.66.101.1, 00:08:19, Serial1/2
                     [110/1562] via 202.66.124.2, 00:02:12, Serial1/1
C    202.66.123.0/24 is directly connected, Serial1/3
C    202.66.124.0/24 is directly connected, Serial1/1
```

```
O    202.66.134.0/24 [110/1562] via 202.66.123.1, 00:04:49, Serial1/3
                     [110/1562] via 202.66.124.2, 00:01:49, Serial1/1
```

⑺ 配置之后路由器Router3的路由信息

```
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

O    192.168.10.0/24 [110/1563] via 202.66.123.2, 00:05:42, Serial1/3
                     [110/1563] via 202.66.134.2, 00:02:22, Serial1/2
O    192.168.20.0/24 [110/782] via 202.66.123.2, 00:05:42, Serial1/3
C    192.168.30.0/24 is directly connected, FastEthernet0/0
O    192.168.40.0/24 [110/782] via 202.66.134.2, 00:02:22, Serial1/2
O    202.66.101.0/24 [110/1562] via 202.66.123.2, 00:05:42, Serial1/3
O    202.66.104.0/24 [110/1562] via 202.66.134.2, 00:02:22, Serial1/2
C    202.66.123.0/24 is directly connected, Serial1/3
O    202.66.124.0/24 [110/1562] via 202.66.123.2, 00:05:42, Serial1/3
                     [110/1562] via 202.66.134.2, 00:02:22, Serial1/2
C    202.66.134.0/24 is directly connected, Serial1/2
```

⑻ 配置之后路由器Router4的路由信息

```
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

O    192.168.10.0/24 [110/782] via 202.66.104.1, 00:03:37, Serial1/0
O    192.168.20.0/24 [110/782] via 202.66.124.1, 00:03:08, Serial1/1
O    192.168.30.0/24 [110/782] via 202.66.134.1, 00:02:45, Serial1/2
C    192.168.40.0/24 is directly connected, FastEthernet0/0
O    202.66.101.0/24 [110/1562] via 202.66.104.1, 00:03:37, Serial1/0
                     [110/1562] via 202.66.124.1, 00:03:08, Serial1/1
C    202.66.104.0/24 is directly connected, Serial1/0
O    202.66.123.0/24 [110/1562] via 202.66.124.1, 00:03:08, Serial1/1
```

```
                    [110/1562] via 202.66.134.1, 00:02:45, Serial1/2
C    202.66.124.0/24 is directly connected, Serial1/1
C    202.66.134.0/24 is directly connected, Serial1/2
```

2.2 测试连通性

⑴ 路由器 Router1 ping 路由器 Router3

```
Router#ping 202.66.134.1

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 202.66.134.1, timeout is 2 seconds:
.!!!!
Success rate is 80 percent (4/5), round-trip min/avg/max = 39/30/23 ms
```

⑵ 在各主机间使用ping命令，测试主机间的连通性。

在模拟器当中，使用测试工具进行连通性测试，各台主机均可互相连通。

五、思考题及其它

1) 查看 RIP 的版本号用什么命令。

答：欲查看 RIP 路由的版本号，使用命令：show ip protocol。

2) EIGRP 路由汇总有什么作用？

答：路由汇总可以减少路由器的路由表大小，减小路由表的长度，提高路由器的运行速度，进而提高网络的效率和质量。

3) 下面那些是表示主机地址？那些是表示子网网络号？

①202.066.102.1/27　　②202.066.102.32/27

③202.066.102.97/27　　④202.066.102.160/27

⑤202.066.102.225/27

答：

网络地址有：②④

主机地址有：①③⑤