RIP 路由配置

学生姓名：李俊杰 1850668 **合作学生：无**

实验地点：济事楼 330 **实验时间：2020 年 10 月 29 日 78 节**

【实验目的】

1.通过实验体会、理解路由信息协议（RIP）的应用范围及其应用限制。

2.通过实验理解网际网络中跳的概念。

3.通过实验再次熟悉终端、路由的配置操作以及接线原理。

4.掌握分析网络问题的一般逻辑。

【实验原理】

1.路由信息协议（RIP）

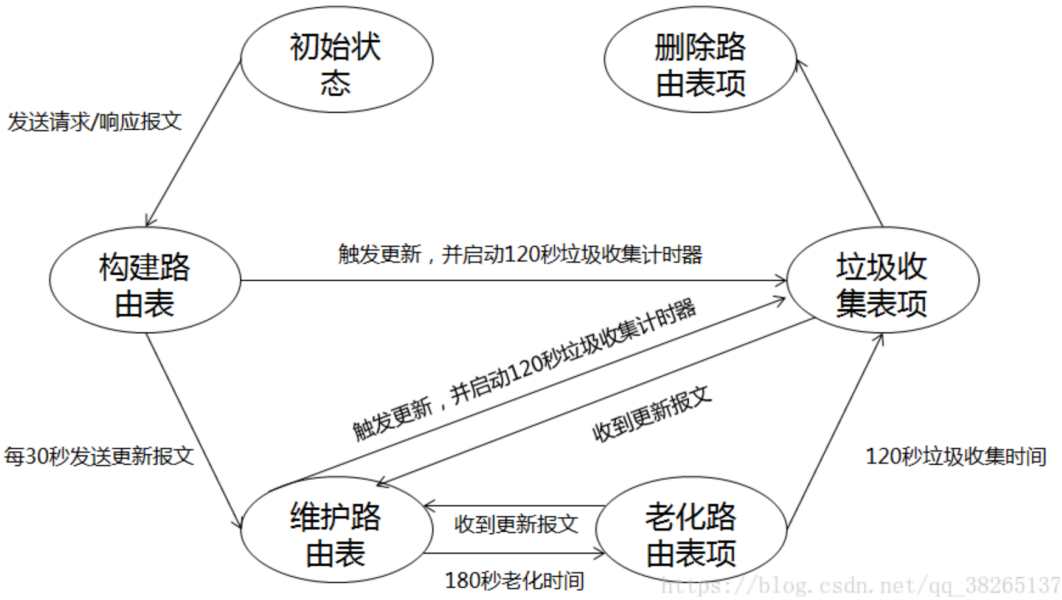
路由信息协议（Routing Information Protocol）是一种较为简单的内部网关协议（IGP），应用较早。RIP 是一种基于位置矢量算法的协议，它使用跳数（Hop Count）作为度量来衡量到达目标网络的距离，RIP 通过 UDP（用户数据报协议）进行信息的交换，使用端口号为 520。

在 RIP 网络中，设备到它直接相连的网络跳数为 0，通过一个网络通信设备可到达的网络跳数为 1，依此类推，即度量值为从本地网络到达目标网络经过的网络通信设备数。为了限制收敛时间，RIP 规定最大跳数为 15，大于或等于 16 的跳数被定义为无穷大，由于这个限制，RIP 不可能被应用于大型网络中。

2.RIP 分类

RIP 协议有两个版本，即 RIPv1 和 RIPv2，其中 RIPv1 为有类路由协议，不支持 VLSM，以广播形式进行路由表信息的更新，更新时间周期为 30 秒；而 RIPv2 属于无类路由协议，支持 VLSM，以组播形式进行路由表更新，下图为 RIP 工作过程[1]。

[1] 图片引自 https://blog.csdn.net/qq_38265137/article/details/80503512。



【实验设备】

1. 一台运行 Windows 的计算机。

2. Cisco 仿真终端软件 Cisco Packet Tracer。

【实验步骤】

1.首先对网络进行规划并绘出网络拓扑图。

2.按照一下拓扑图及相关 PC、串口、端口的配置信息（IP 地址、子网掩码、网关）进行相关的网络拓扑构建以及配置。

路由器配置相关命令如下：

路由器 2：

interface FastEthernet 0/0

ip address 192.168.1.254 255.255.255.0

no shutdown

interface FastEthernet 0/1

ip address 10.60.2.254 255.255.255.0

no shutdown

interface Serial 0/0/0

ip address 202.120.17.18 255.255.255.0

Clock rate 56000

no shutdown

路由器 3：

interface FastEthernet 0/0

ip address 172.16.3.254 255.255.255.0

no shutdown

interface FastEthernet 0/1

ip address 118.8.4.254 255.255.255.0

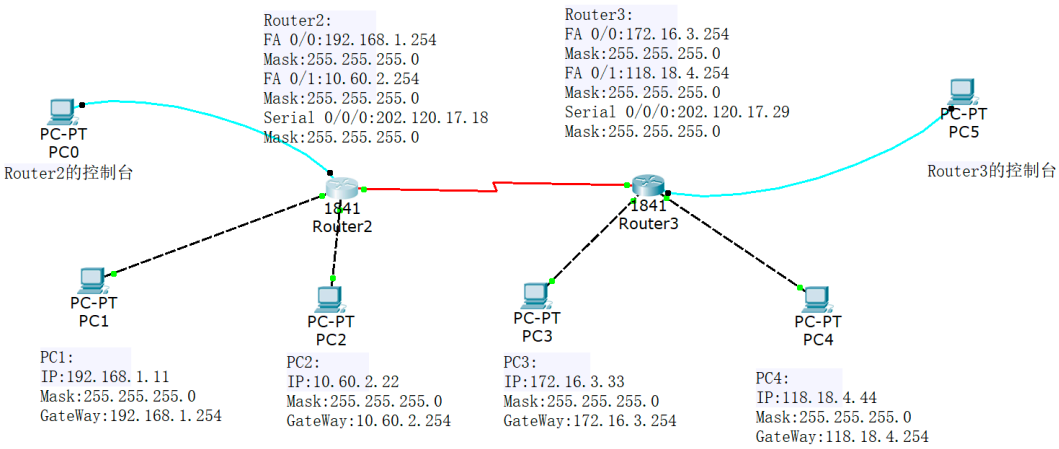
no shutdown

interface Serial 0/0/0

ip address 202.120.17.29 255.255.255.0

Clock rate 56000

no shutdown



3.在配置 RIP 之前检查各台 PC 间能否相互 ping 通。

4.在 Router2 上配置 RIP 如下：

router rip

router 192.168.1.1

router 10.60.2.22

router 202.120.17.18

5.在 Router3 上配置 RIP 如下：

router rip

router 172.16.3.33

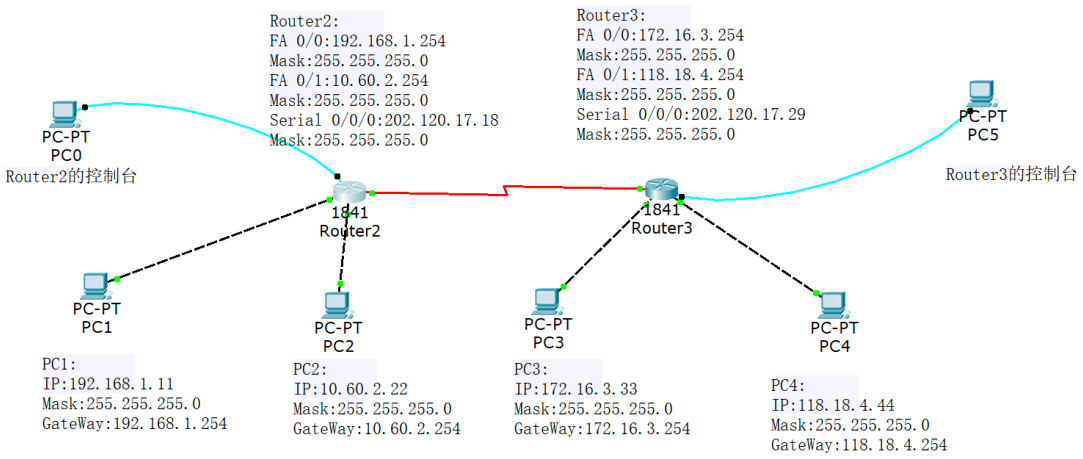
router 118.18.4.44

router 202.120.17.29

6.在配置 RIP 之后检查各台 PC 间能否相互 ping 通。

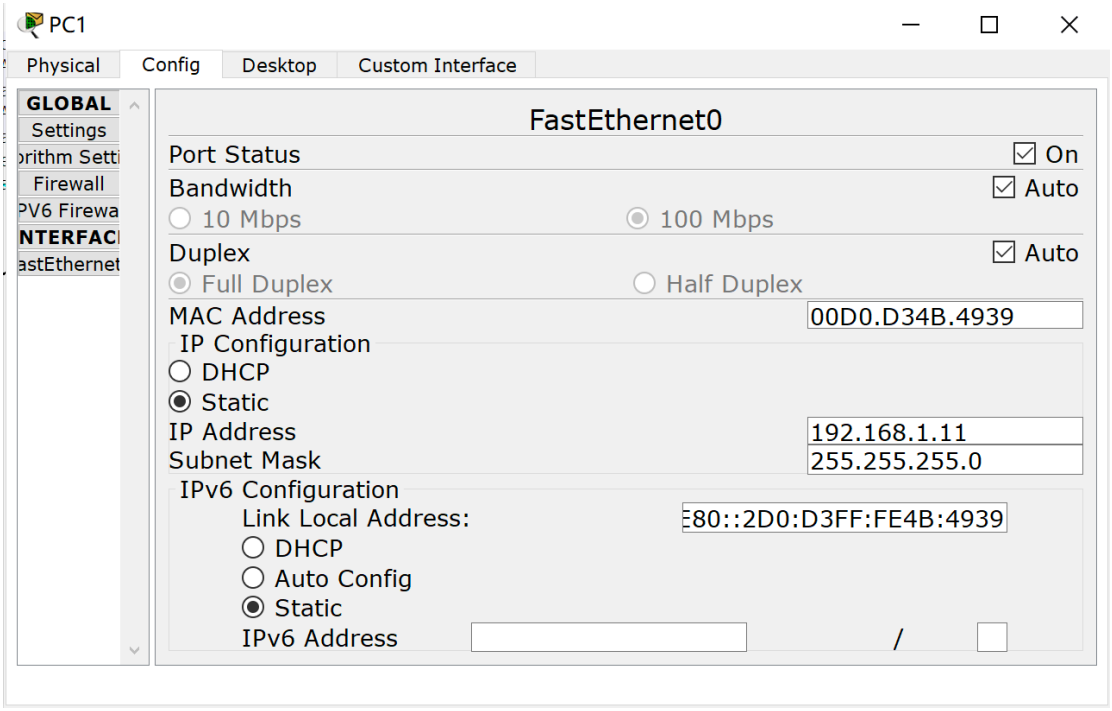
【实验现象】

1.网络规划及其拓扑图如图。

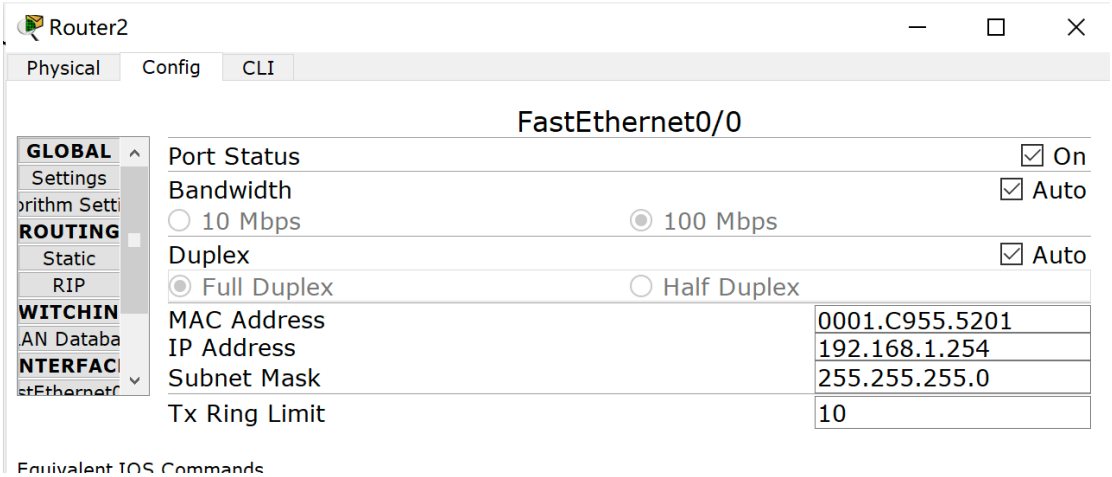


2.部分相关配置过程如图。

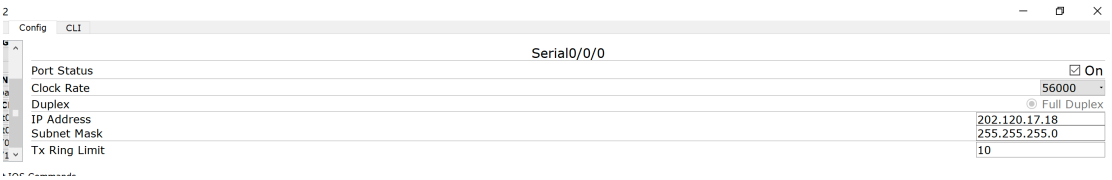
PC 的 IP 地址、子网掩码、网关配置。



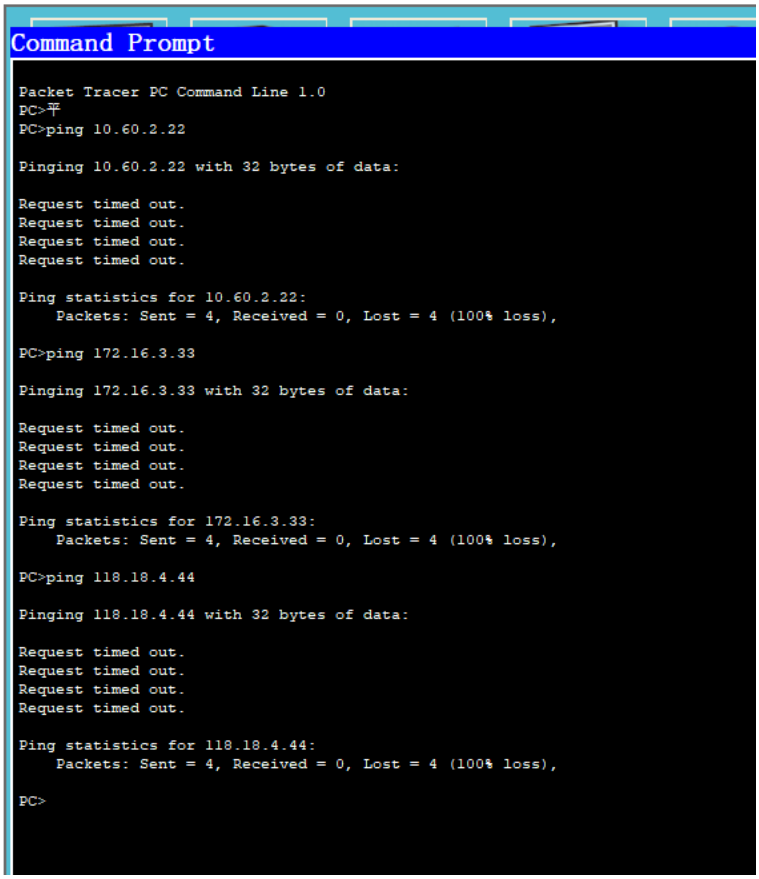
路由器端口 IP 地址、子网掩码以及启动。

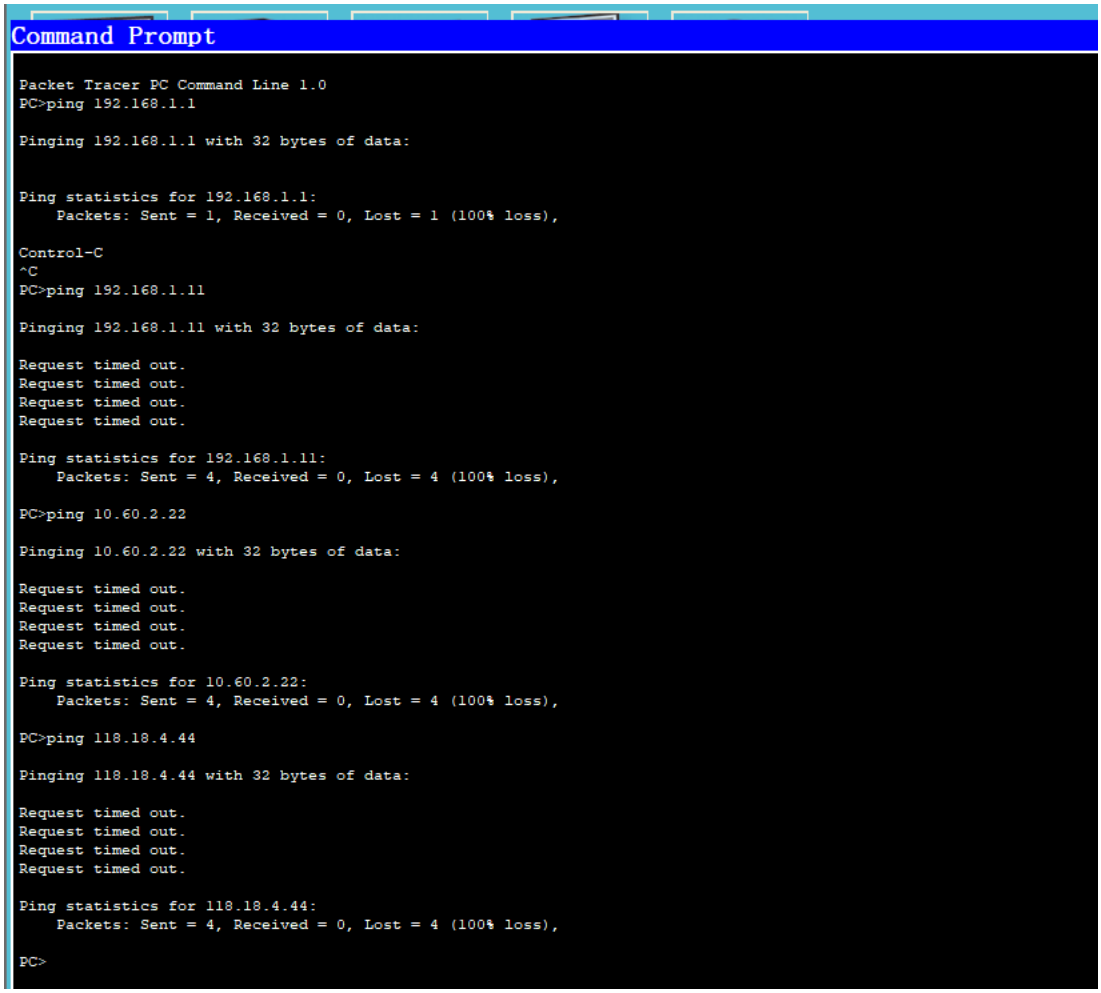


路由器串口 IP 地址、子网掩码以及启动。

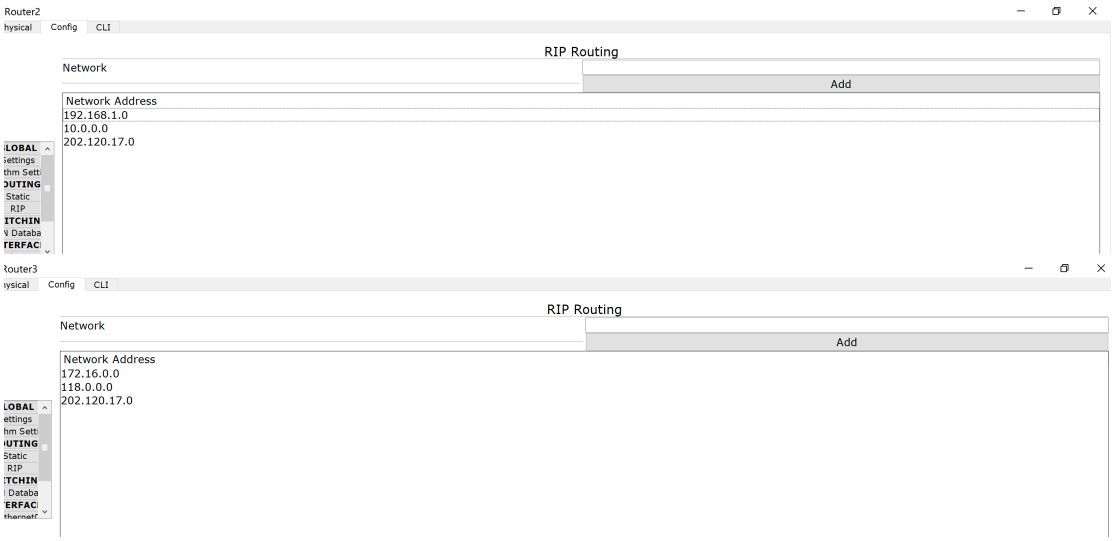


3. 在配置 RIP 之前检查各台 PC 间能否相互 ping 通，检测结果如图。


Command Prompt
Packet Tracer PC Command Line 1.0
PC>平
PC>ping 10.60.2.22
Pinging 10.60.2.22 with 32 bytes of data:
Request timed out.
Request timed out.
Request timed out.
Request timed out.
Ping statistics for 10.60.2.22:
Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
PC>ping 172.16.3.33
Pinging 172.16.3.33 with 32 bytes of data:
Request timed out.
Request timed out.
Request timed out.
Request timed out.
Ping statistics for 172.16.3.33:
Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
PC>ping 118.18.4.44
Pinging 118.18.4.44 with 32 bytes of data:
Request timed out.
Request timed out.
Request timed out.
Request timed out.
Ping statistics for 118.18.4.44:
Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
PC>



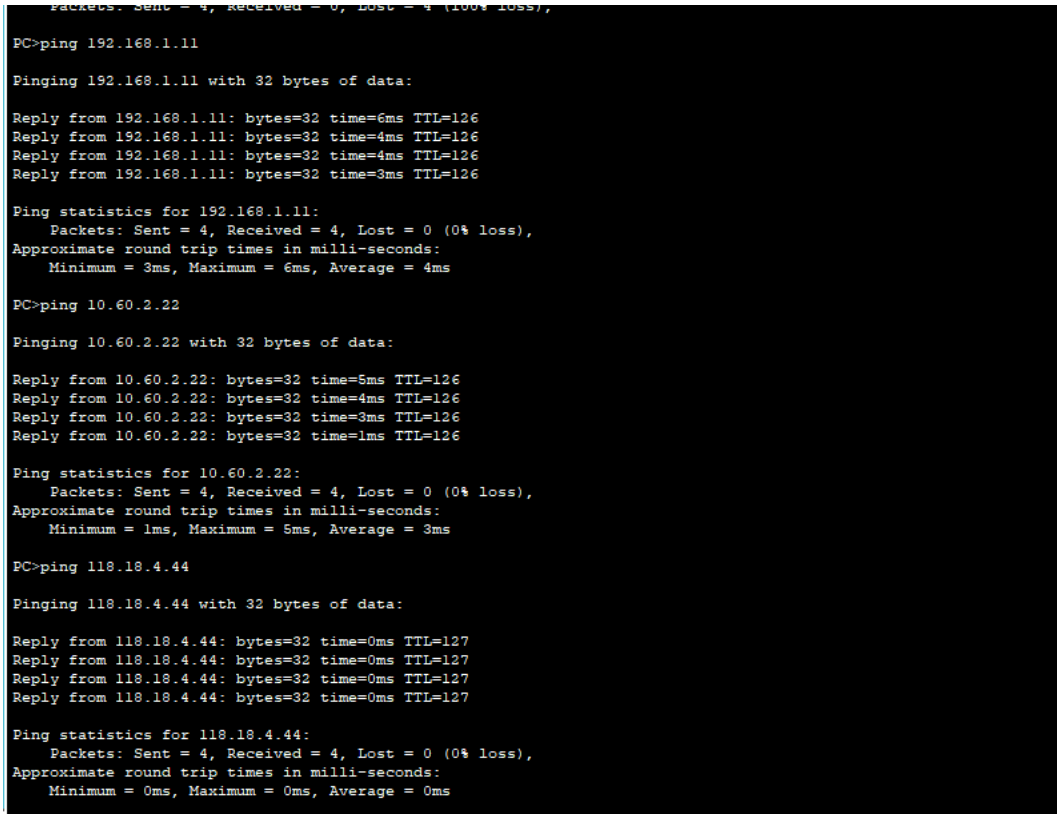
4.配置 Router2 和 Router3 的 RIP 路由表，如图。



5. 在配置 RIP 之后检查各台 PC 间能否相互 ping 通。

```
PC>ping 118.18.4.44

Pinging 118.18.4.44 with 32 bytes of data:

Request timed out.
Reply from 118.18.4.44: bytes=32 time=1ms TTL=126
Reply from 118.18.4.44: bytes=32 time=1ms TTL=126
Reply from 118.18.4.44: bytes=32 time=3ms TTL=126

Ping statistics for 118.18.4.44:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
    Minimum = 1ms, Maximum = 3ms, Average = 1ms

PC>ping 172.16.3.33

Pinging 172.16.3.33 with 32 bytes of data:

Request timed out.
Reply from 172.16.3.33: bytes=32 time=3ms TTL=126
Reply from 172.16.3.33: bytes=32 time=7ms TTL=126
Reply from 172.16.3.33: bytes=32 time=1ms TTL=126

Ping statistics for 172.16.3.33:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
    Minimum = 1ms, Maximum = 7ms, Average = 3ms

PC>ping 10.60.2.22

Pinging 10.60.2.22 with 32 bytes of data:

Request timed out.
Reply from 10.60.2.22: bytes=32 time=0ms TTL=127
Reply from 10.60.2.22: bytes=32 time=4ms TTL=127
Reply from 10.60.2.22: bytes=32 time=0ms TTL=127

Ping statistics for 10.60.2.22:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 4ms, Average = 1ms

PC>
```

```
PC>ping 118.18.4.44

Pinging 118.18.4.44 with 32 bytes of data:

Reply from 118.18.4.44: bytes=32 time=4ms TTL=126
Reply from 118.18.4.44: bytes=32 time=1ms TTL=126
Reply from 118.18.4.44: bytes=32 time=3ms TTL=126
Reply from 118.18.4.44: bytes=32 time=3ms TTL=126

Ping statistics for 118.18.4.44:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 1ms, Maximum = 4ms, Average = 2ms

PC>ping 172.16.3.33

Pinging 172.16.3.33 with 32 bytes of data:

Reply from 172.16.3.33: bytes=32 time=3ms TTL=126
Reply from 172.16.3.33: bytes=32 time=1ms TTL=126
Reply from 172.16.3.33: bytes=32 time=3ms TTL=126
Reply from 172.16.3.33: bytes=32 time=1ms TTL=126

Ping statistics for 172.16.3.33:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 1ms, Maximum = 3ms, Average = 2ms

PC>ping 10.60.2.22

Pinging 10.60.2.22 with 32 bytes of data:

Reply from 10.60.2.22: bytes=32 time=0ms TTL=127
Reply from 10.60.2.22: bytes=32 time=0ms TTL=127
Reply from 10.60.2.22: bytes=32 time=0ms TTL=127
Reply from 10.60.2.22: bytes=32 time=0ms TTL=127

Ping statistics for 10.60.2.22:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms
```


Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
PC>ping 192.168.1.11
Pinging 192.168.1.11 with 32 bytes of data:
Reply from 192.168.1.11: bytes=32 time=6ms TTL=126
Reply from 192.168.1.11: bytes=32 time=4ms TTL=126
Reply from 192.168.1.11: bytes=32 time=4ms TTL=126
Reply from 192.168.1.11: bytes=32 time=3ms TTL=126
Ping statistics for 192.168.1.11:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 3ms, Maximum = 6ms, Average = 4ms
PC>ping 10.60.2.22
Pinging 10.60.2.22 with 32 bytes of data:
Reply from 10.60.2.22: bytes=32 time=5ms TTL=126
Reply from 10.60.2.22: bytes=32 time=4ms TTL=126
Reply from 10.60.2.22: bytes=32 time=3ms TTL=126
Reply from 10.60.2.22: bytes=32 time=1ms TTL=126
Ping statistics for 10.60.2.22:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 1ms, Maximum = 5ms, Average = 3ms
PC>ping 118.18.4.44
Pinging 118.18.4.44 with 32 bytes of data:
Reply from 118.18.4.44: bytes=32 time=0ms TTL=127
Reply from 118.18.4.44: bytes=32 time=0ms TTL=127
Reply from 118.18.4.44: bytes=32 time=0ms TTL=127
Reply from 118.18.4.44: bytes=32 time=0ms TTL=127
Ping statistics for 118.18.4.44:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 0ms, Maximum = 0ms, Average = 0ms

【分析讨论】