浙江大学

本科实验报告

课程名称：	计算机网络基础
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浙江大学实验报告

课程名称：计算机网络基础　　实验类型：设计性实验

实验项目名称：路由器接口及路由协议配置

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实验地点：例如：曹西软件学院机房　　实验日期：2015 年 5 月 7 日开始

一、 实验目的和要求：

熟悉掌握 BOSON 路由器仿真软件的使用，并应用该软件进行路由器接口，静态路由，动态路由协议 RIP 配置，从而加深对路由器的各种接口类型以及路由行为的理解。

要求自行设计网络拓扑结构，并综合运用静态路由和动态路由协议 RIP、OSPF，实现网络各部分的互连，并能互相 ping 通。

二、 实验内容和原理

1.配置 ETHERNET 接口

2.配置点到点接口（通过 DCE 电缆连接两个路由器的 WAN 口，模拟 DDN 线路）：用 HDLC3.帧格式。

3.配置点到点接口: 用 PPP 帧格式。

4.尝试配置命令 IP SUBNET-ZERO（在讲了第五章 The NETWORK LAYER 的 IP ADDRESS 及 SUBNET 后再做）(模拟软件 ROUTERSIM 不支持本命令，只有真实路由器才支持)

5.配置 LOOPBACK 接口（虚拟接口）

6.尝试命令并观看结果：SHOW INTERFACE SERIAL 0

7.尝试命令并观看结果：SHOW INTERFACE ETHERNET 0

8.用 PING 测试两台路由器连通性。

9.配置两台路由器的静态路由：ip route 命令。

ip route 命令格式：ip route x.x.x.x　y.y.y.y　z.z.z.z

x.x.x.x----目标网络的网络地址　y.y.y.y----目标网络的 SUBNET MASK　z.z.z.z----去目标网络的下一个邻居路由器 IP 地址（与本路由器直接邻接的接口 IP 地址）

例如：ip route　20.20.20.0　255.255.255.0　40.40.40.1

通过邻居路由器 40.40.40.1 可到达目的网络 20.20.20.0

10.尝试命令并观看结果：show ip route

11.用 PING 测试连通性。

12.配置两台路由器的 RIP 协议。

13.用 PING 测试连通性。

14.尝试命令并观看结果：show ip route

15.尝试命令并观看结果：show ip protocols

16.尝试命令并观看结果：debug ip rip　（Boson 软件模拟器不支持，packettracer 及只有真实路由器才

支持）

~~17.尝试命令并观看结果：passive-interface~~（软件模拟器不支持，只有真实路由器才支持）

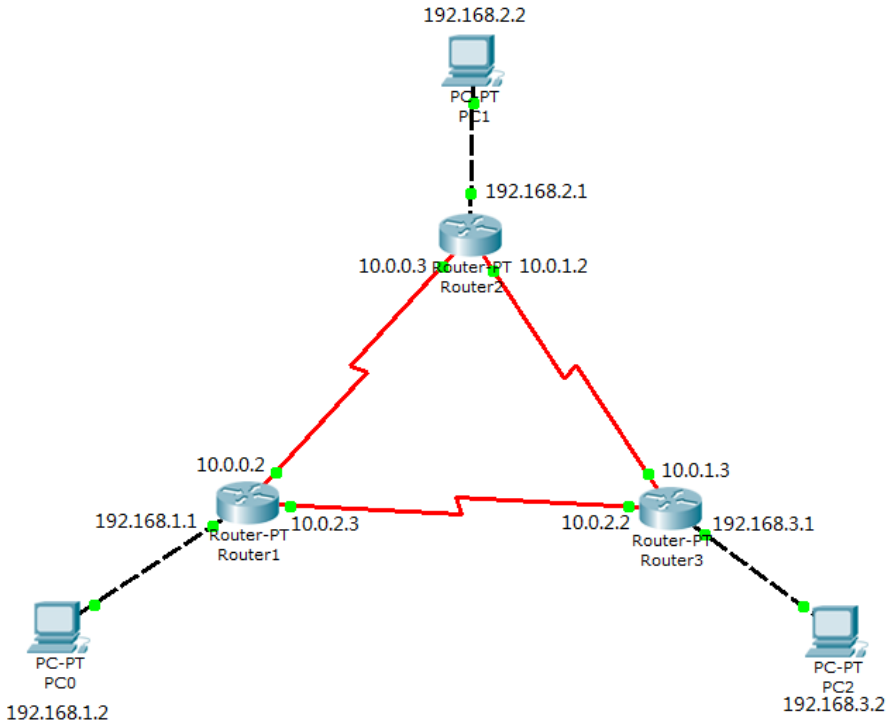
三、 主要仪器设备

PC 机。

Packet Tracer 5.0。

四、 操作方法与实验步骤

总体布局如下，Router*3(Router1, Router2, Router3)，PC*3(PC0, PC1, PC2)。



1.配置 ETHERNET 接口

配置 Router1 FastEthernet 0/0 端口 IP 为 192.168.1.1，子网掩码 255.255.255.0；

```
Router(config)#interface FastEthernet0/0
Router(config-if)#ip address 192.168.1.1 255.255.255.0
Router(config-if)#end
%SYS-5-CONFIG_I: Configured from console by console
Router#
```

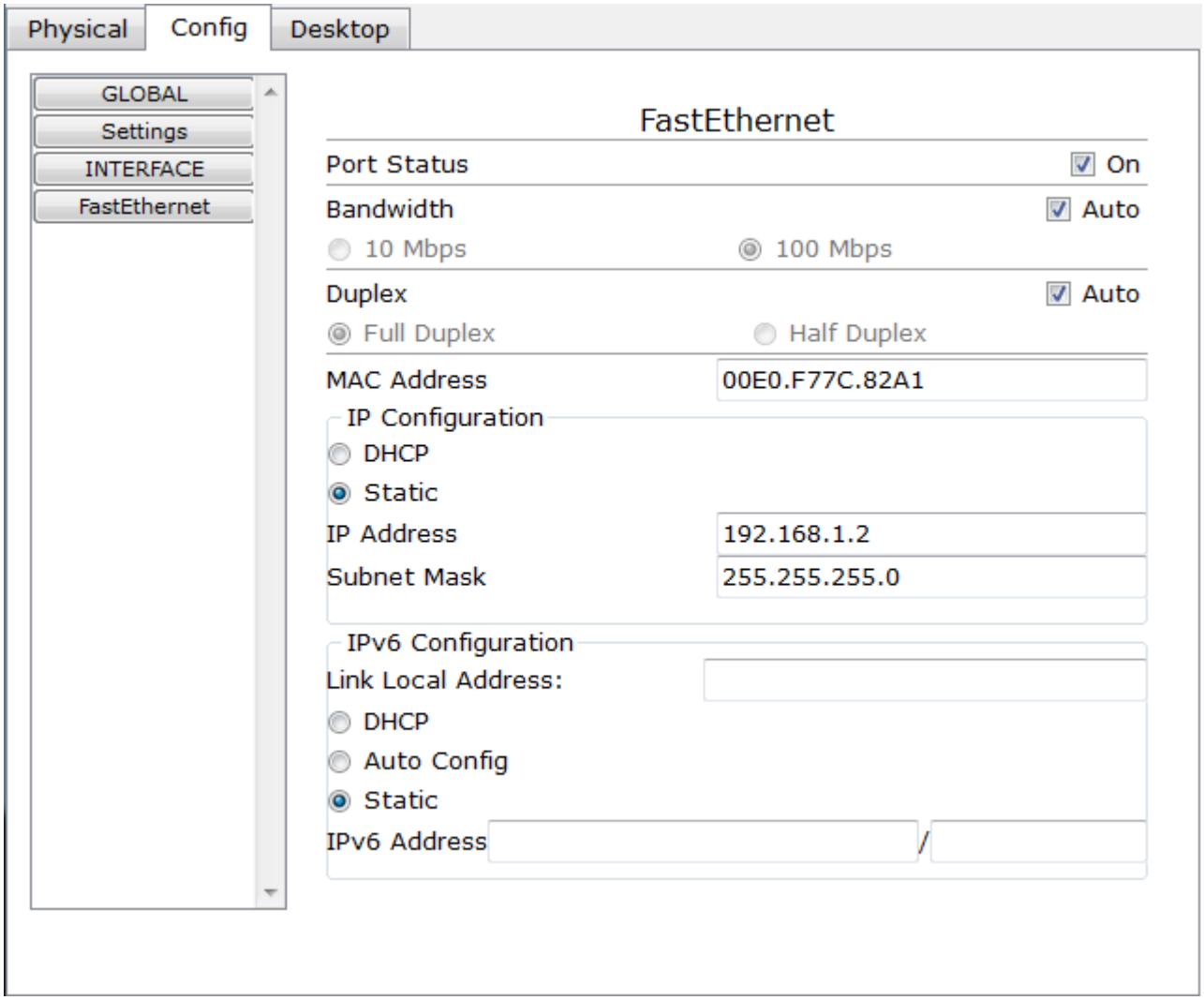
配置 Router2 FastEthernet 0/0 端口 IP 为 192.168.2.1，子网掩码 255.255.255.0；

```
Router#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#interface FastEthernet0/0
Router(config-if)#no shutdown

%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state t
o up
Router(config-if)#ip address 192.168.2.1 255.255.255.0
Router(config-if)#end
%SYS-5-CONFIG_I: Configured from console by console
Router#
```

配置 Router3 FastEthernet 0/0 端口 IP 为 192.168.3.1，子网掩码 255.255.255.0；

```
Router(config)#interface FastEthernet0/0
Router(config-if)#no shutdown

%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state t
o up
Router(config-if)#ip address 192.168.3.1 255.255.255.0
Router(config-if)#end
%SYS-5-CONFIG_I: Configured from console by console
Router#
```

配置 PC0 FastEthernet 端口 IP 为 192.168.1.2，子网掩码 255.255.255.0，网关 192.168.1.1（在 Settings 中配置）；



配置 PC1 FastEthernet 端口 IP 为 192.168.2.2，子网掩码 255.255.255.0，网关 192.168.2.1（在 Settings 中配置）；

配置 PC2 FastEthernet 端口 IP 为 192.168.3.2，子网掩码 255.255.255.0，网关 192.168.3.1（在 Settings 中配置）；

2.配置点到点接口(通过 DCE 电缆连接两个路由器的 WAN 口,模拟 DDN 线路):用 HDLC3. 帧格式。

配置 Router1 Serial 2/0 端口 IP 为 10.0.0.2，子网掩码 255.255.255.0，并启用；

```
Router(config)#interface Serial2/0
Router(config-if)#ip address 10.0.0.2 255.255.255.0
Router(config-if)#no shutdown

%LINK-5-CHANGED: Interface Serial2/0, changed state to down
Router(config-if)#
```

设置时钟频率为 56000；

```
Router(config)#interface Serial2/0
Router(config-if)#clock rate 56000
Router(config-if)#end
```

配置 Router2 Serial 2/0 端口 IP 为 10.0.0.3，子网掩码 255.255.255.0，并启用；

```
Router(config)#interface Serial2/0
Router(config-if)#ip address 10.0.0.3 255.255.255.0
Router(config-if)#no shutdown

%LINK-5-CHANGED: Interface Serial2/0, changed state to up
Router(config-if)#
```

设置时钟频率为 56000；

```
Router(config)#interface Serial2/0
Router(config-if)#clock rate 56000
Router(config-if)#end
```

Router1 ping Router2，可 ping 通；

```
Router#ping 10.0.0.2

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 10.0.0.2, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 31/31/32 ms
```

3.配置点到点接口:用 PPP 帧格式。

配置 Router2 Serial 3/0 端口 IP 为 10.0.1.2，子网掩码 255.255.255.0，并启用，设置为 ppp；

```
Router(config)#interface Serial3/0
Router(config-if)#ip address 10.0.1.2 255.255.255.0
Router(config-if)#encap ppp
Router(config-if)#no shutdown

%LINK-5-CHANGED: Interface Serial3/0, changed state to down
Router(config-if)#end
%SYS-5-CONFIG_I: Configured from console by console
Router#
```

配置 Router3 Serial 3/0 端口 IP 为 10.0.1.3，子网掩码 255.255.255.0，并启用，设置为 ppp；

```
Router(config)#interface Serial3/0
Router(config-if)#ip address 10.0.1.3 255.255.255.0
Router(config-if)#encap ppp
Router(config-if)#no shutdown

%LINK-5-CHANGED: Interface Serial3/0, changed state to up
Router(config-if)#end
%SYS-5-CONFIG_I: Configured from console by console
Router#
```

如第二步中配置 Router2, Router3 对应端口时钟频率为 56000 后，Router3 ping Router2；

```
Router#ping 10.0.1.2

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 10.0.1.2, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 31/34/46 ms
```

4.尝试配置命令 IP SUBNET-ZERO（在讲了第五章 The NETWORK LAYER 的 IP ADDRESS 及 SUBNET 后再做）(模拟软件 ROUTERSIM 不支持本命令，只有真实路由器才支持)

并不支持；

```
Router#ip subnet-zero
          ^
% Invalid input detected at '^' marker.
```

5.配置 LOOPBACK 接口（虚拟接口）

配置 Router1 Loopback ip 10.0.3.1，子网掩码 /32；

```
Router(config)#interface Loopback 0
Router(config-if)#ip address 10.0.3.1 255.255.255.255
Router(config-if)#end
%SYS-5-CONFIG_I: Configured from console by console
Router#
```

6.尝试命令并观看结果：SHOW INTERFACE SERIAL 0

结果中可看到当前端口的开启状态，ip 和子网掩码等信息；

```
Router#show interfaces s2/0
Serial2/0 is up, line protocol is up (connected)
  Hardware is HD64570
  Internet address is 10.0.0.2/24
  MTU 1500 bytes, BW 128 Kbit, DLY 20000 usec, rely 255/255, load 1/255
  Encapsulation HDLC, loopback not set, keepalive set (10 sec)
  Last input never, output never, output hang never
  Last clearing of "show interface" counters never
  Input queue: 0/75/0 (size/max/drops); Total output drops: 0
  Queueing strategy: weighted fair
  Output queue: 0/1000/64/0 (size/max total/threshold/drops)
     Conversations  0/0/256 (active/max active/max total)
     Reserved Conversations 0/0 (allocated/max allocated)
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
     10 packets input, 400 bytes, 0 no buffer
     Received 0 broadcasts, 0 runts, 0 giants, 0 throttles
     0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
     10 packets output, 400 bytes, 0 underruns
     0 output errors, 0 collisions, 1 interface resets
     0 output buffer failures, 0 output buffers swapped out
     0 carrier transitions
     DCD=up  DSR=up  DTR=up  RTS=up  CTS=up
Router#
```

7.尝试命令并观看结果：SHOW INTERFACE ETHERNET 0

通上；

```
Router#show interfaces f1/0
FastEthernet1/0 is administratively down, line protocol is down (disabled)
  Hardware is Lance, address is 0060.2f64.e902 (bia 0060.2f64.e902)
  MTU 1500 bytes, BW 100000 Kbit, DLY 100 usec, rely 255/255, load 1/255
  Encapsulation ARPA, loopback not set
  ARP type: ARPA, ARP Timeout 04:00:00,
  Last input 00:00:08, output 00:00:05, output hang never
  Last clearing of "show interface" counters never
  Queueing strategy: fifo
  Output queue :0/40 (size/max)
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
     0 packets input, 0 bytes, 0 no buffer
     Received 0 broadcasts, 0 runts, 0 giants, 0 throttles
     0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
     0 input packets with dribble condition detected
     0 packets output, 0 bytes, 0 underruns
     0 output errors, 0 collisions, 1 interface resets
     0 babbles, 0 late collision, 0 deferred
     0 lost carrier, 0 no carrier
     0 output buffer failures, 0 output buffers swapped out
Router#
```

8.用 PING 测试两台路由器连通性。

在之前步骤中已测试连通性，ppp,hdlc3 都可连通；

9.配置两台路由器的静态路由：ip route 命令。

给 Router1 配置路由表，分别将网段 192.168.2.0 和 192.168.3.0 指向相邻路由端口 10.0.0.3,和 10.0.2.2；

```
Router#config t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#ip route 192.168.2.0 255.255.255.0 10.0.0.3
Router(config)#ip route 192.168.3.0 255.255.255.0 10.0.2.2
Router(config)#end
%SYS-5-CONFIG_I: Configured from console by console
Router#
```

给 Router2 配置路由表，分别将网段 192.168.3.0 和 192.168.1.0 指向相邻路由端口 10.0.1.3,和 10.0.0.2；

```
Router>enable
Router#config t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#ip route 192.168.3.0 255.255.255.0 10.0.1.3
Router(config)#ip route 192.168.1.0 255.255.255.0 10.0.0.2
Router(config)#end
%SYS-5-CONFIG_I: Configured from console by console
Router#
```

给 Router3 配置路由表，分别将网段 192.168.1.0 和 192.168.2.0 指向相邻路由端口 10.0.2.3,和 10.0.1.2；

```
Router>enable
Router#config t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#ip route 192.168.1.0 255.255.255.0 10.0.2.3
Router(config)#ip route 192.168.2.0 255.255.255.0 10.0.1.2
Router(config)#end
%SYS-5-CONFIG_I: Configured from console by console
Router#
```

10.尝试命令并观看结果：show ip route

查看 Router2 的路由信息如下，其中 C Gateway 显示了两条串口直连，S Gateway 显示了分别通往 192.168.1.0/24 和 192.168.3.0/24 两个网段的端口 10.0.0.2 和 10.0.1.3；

```
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

     10.0.0.0/24 is subnetted, 2 subnets
C       10.0.0.0 is directly connected, Serial2/0
C       10.0.1.0 is directly connected, Serial3/0
S    192.168.1.0/24 [1/0] via 10.0.0.2
S    192.168.3.0/24 [1/0] via 10.0.1.3
Router#
```

11.用 PING 测试连通性。

PC0 ping PC1，连通;

```
PC>ipconfig

IP Address.....................: 192.168.1.2
Subnet Mask....................: 255.255.255.0
Default Gateway................: 192.168.1.1

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=94ms TTL=126
Reply from 192.168.2.2: bytes=32 time=93ms TTL=126
Reply from 192.168.2.2: bytes=32 time=94ms TTL=126
Reply from 192.168.2.2: bytes=32 time=78ms 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 = 78ms, Maximum = 94ms, Average = 89ms
```

PC0 ping PC2，连通；

```
PC>ping 192.168.3.2

Pinging 192.168.3.2 with 32 bytes of data:

Reply from 192.168.3.2: bytes=32 time=94ms TTL=126
Reply from 192.168.3.2: bytes=32 time=94ms TTL=126
Reply from 192.168.3.2: bytes=32 time=78ms TTL=126
Reply from 192.168.3.2: bytes=32 time=93ms TTL=126

Ping statistics for 192.168.3.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 78ms, Maximum = 94ms, Average = 89ms

PC>
```

PC1 ping PC0, PC2，连通;

```
PC>ipconfig

IP Address.....................: 192.168.2.2
Subnet Mask....................: 255.255.255.0
Default Gateway................: 192.168.2.1

PC>ping 192.168.3.2

Pinging 192.168.3.2 with 32 bytes of data:

Reply from 192.168.3.2: bytes=32 time=78ms TTL=126
Reply from 192.168.3.2: bytes=32 time=93ms TTL=126
Reply from 192.168.3.2: bytes=32 time=90ms TTL=126
Reply from 192.168.3.2: bytes=32 time=78ms TTL=126

Ping statistics for 192.168.3.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 78ms, Maximum = 93ms, Average = 84ms

PC>ping 192.168.1.2

Pinging 192.168.1.2 with 32 bytes of data:

Reply from 192.168.1.2: bytes=32 time=94ms TTL=126
Reply from 192.168.1.2: bytes=32 time=78ms TTL=126
Reply from 192.168.1.2: bytes=32 time=80ms TTL=126
Reply from 192.168.1.2: bytes=32 time=78ms TTL=126

Ping statistics for 192.168.1.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 78ms, Maximum = 94ms, Average = 82ms

PC>
```

PC2 ping PC0, PC1，连通;

```
PC>ipconfig

IP Address.....................: 192.168.3.2
Subnet Mask....................: 255.255.255.0
Default Gateway................: 192.168.3.1

PC>ping 192.168.1.2

Pinging 192.168.1.2 with 32 bytes of data:

Reply from 192.168.1.2: bytes=32 time=94ms TTL=126
Reply from 192.168.1.2: bytes=32 time=62ms TTL=126
Reply from 192.168.1.2: bytes=32 time=91ms TTL=126
Reply from 192.168.1.2: bytes=32 time=94ms TTL=126

Ping statistics for 192.168.1.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 62ms, Maximum = 94ms, Average = 85ms

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=93ms TTL=126
Reply from 192.168.2.2: bytes=32 time=94ms TTL=126
Reply from 192.168.2.2: bytes=32 time=94ms TTL=126
Reply from 192.168.2.2: bytes=32 time=93ms 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 = 93ms, Maximum = 94ms, Average = 93ms

PC>
```

12.配置两台路由器的 RIP 协议。

配置 Router1 RIP 协议；

```
Router#config t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#router rip
Router(config-router)#network 10.0.0.0
Router(config-router)#network 10.0.2.0
Router(config-router)#end
%SYS-5-CONFIG_I: Configured from console by console
Router#
```

配置 Router2 RIP 协议；

```
Router>enable
Router#config t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#router rip
Router(config-router)#network 10.0.0.0
Router(config-router)#network 10.0.1.0
Router(config-router)#end
%SYS-5-CONFIG_I: Configured from console by console
Router#
```

配置 Router3 RIP 协议；

```
Router#config t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#router rip
Router(config-router)#network 10.0.1.0
Router(config-router)#network 10.0.2.0
Router(config-router)#end
%SYS-5-CONFIG_I: Configured from console by console
Router#
```

13.用 PING 测试连通性。

PC0 ping PC1, PC2，连通正常；

```
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=94ms TTL=126
Reply from 192.168.2.2: bytes=32 time=93ms TTL=126
Reply from 192.168.2.2: bytes=32 time=78ms TTL=126
Reply from 192.168.2.2: bytes=32 time=94ms 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 = 78ms, Maximum = 94ms, Average = 89ms

PC>ping 192.168.3.2

Pinging 192.168.3.2 with 32 bytes of data:

Reply from 192.168.3.2: bytes=32 time=94ms TTL=126
Reply from 192.168.3.2: bytes=32 time=94ms TTL=126
Reply from 192.168.3.2: bytes=32 time=93ms TTL=126
Reply from 192.168.3.2: bytes=32 time=94ms TTL=126

Ping statistics for 192.168.3.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 93ms, Maximum = 94ms, Average = 93ms

PC>
```

14.尝试命令并观看结果：show ip route

查看 Router1 route 信息，信息更加完整；

```
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

     10.0.0.0/8 is variably subnetted, 4 subnets, 2 masks
C       10.0.0.0/24 is directly connected, Serial2/0
R       10.0.1.0/24 [120/1] via 10.0.0.3, 00:00:21, Serial2/0
                    [120/1] via 10.0.2.2, 00:00:09, Serial3/0
C       10.0.2.0/24 is directly connected, Serial3/0
C       10.0.3.1/32 is directly connected, Loopback0
C    192.168.1.0/24 is directly connected, FastEthernet0/0
S    192.168.2.0/24 [1/0] via 10.0.0.3
S    192.168.3.0/24 [1/0] via 10.0.2.2
Router#
```

15.尝试命令并观看结果：show ip protocols

查看 Router ip 协议，可看到使用了 RIP 协议；

```
Router#show ip protocols
Routing Protocol is "rip"
Sending updates every 30 seconds, next due in 17 seconds
Invalid after 180 seconds, hold down 180, flushed after 240
Outgoing update filter list for all interfaces is not set
Incoming update filter list for all interfaces is not set
Redistributing: rip
Default version control: send version 1, receive any version
  Interface              Send  Recv  Triggered RIP  Key-chain
  Serial2/0              1     2 1
  Serial3/0              1     2 1
  Loopback0              1     2 1
Automatic network summarization is in effect
Maximum path: 4
Routing for Networks:
        10.0.0.0
Passive Interface(s):
Routing Information Sources:
        Gateway         Distance      Last Update
        10.0.0.3              120      00:00:24
        10.0.2.2              120      00:00:14
Distance: (default is 120)
Router#
```

16.尝试命令并观看结果：debug ip rip （Boson 软件模拟器不支持，packettracer 及只有真实路由器才支持）

Packettracer 支持 rip debugging 指令，RIP 持续运行；

```
Router#debug ip rip
RIP protocol debugging is on
Router#RIP: received v1 update from 10.0.0.3 on Serial2/0
      10.0.1.0 in 1 hops
RIP: received v1 update from 10.0.2.2 on Serial3/0
      10.0.1.0 in 1 hops
RIP: sending  v1 update to 255.255.255.255 via Serial2/0 (10.0.0.2)
RIP: build update entries
      network 10.0.2.0 metric 1
RIP: sending  v1 update to 255.255.255.255 via Serial3/0 (10.0.2.3)
RIP: build update entries
      network 10.0.0.0 metric 1
RIP: received v1 update from 10.0.0.3 on Serial2/0
      10.0.1.0 in 1 hops
RIP: received v1 update from 10.0.2.2 on Serial3/0
      10.0.1.0 in 1 hops
RIP: sending  v1 update to 255.255.255.255 via Serial2/0 (10.0.0.2)
RIP: build update entries
      network 10.0.2.0 metric 1
RIP: sending  v1 update to 255.255.255.255 via Serial3/0 (10.0.2.3)
RIP: build update entries
      network 10.0.0.0 metric 1
```

17.尝试命令并观看结果：passive-interface （软件模拟器不支持，只有真实路由器才支持）

Passive-interface 并不被支持；

```
Router#passive interface
                ^
% Invalid input detected at '^' marker.
```

五、 实验数据记录和处理

实验具体记录和数据请查看第四大步。

六、 实验结果与分析

1 Ethernet 接口配置成功，PC0 可 ping 通 Router1 对应网关；

2 HDLC3 帧格式配置成功，Router1 可 ping 通 Router2；

3 ppp 帧格式配置成功，Router2 可 ping 通 Router3；

4 IP SUBNET-ZERO 无法配置，软件不支持；

5 Loopback 接口配置成功，采用/32 子网掩码；

6 show interfaces s 2/0 单独查看串行接口成功；

7 show interfaces e 1/0 单独查看以太接口成功；

8 路由器间可正常 ping 通，连接成功；

9 使用 ip router 手动配置路由成功；

10 show ip router 可正常查看配置的路由；

11 PC 间可正常 ping 通，网络连接正常；

12 使用 RIP 协议成功；

13 RIP 协议使用后，仍然可正常 ping 通；

14 show ip router 指令可更详尽显示信息；

15 show ip protocals 可查看到 RIP 协议的正常使用；

16 可正常使用 debug rip 功能；

17 passive interface 并不支持。

七、 讨论、心得

1 通过本次实验，学习并熟悉了 PacketTracer 5.0 软件的使用，发现确实是一款可以很好模拟局域网建设的，为实际建设提供指导意见；

2 通过对于路由器的指令配置，一方面熟悉了指令操作，另一方面也更深入了解了各个配置属性的意义；

3 更形象得了解了 HDLC3/PPP 格式的实现，Loopback 虚拟地址的形式，RIP 协议的实现以及 debug；

4 对于网络有了更深一步的了解。