路由器基本配置大作业

Boson NetSim

实验目的

1.掌握路由器的基本知识；

2.掌握路由器端口的配置；

3.掌握路由协议的基本配置；

4.熟悉使用 Boson Netsim 模拟器。

实验内容

1.本实验要求自行构建一个网络拓扑，要求包括 3 个以上路由器(路由器采用串行连接)，用于连接两个以太网，每个以太网至少包括 1 台主机；

2.完成路由器、主机等设备的配置；使用 RIP 或 OSPF 来维护路由器的路由表。

3.实验配置完成后，两台主机要能够相互 ping 通

4.实验报告要包括网络拓扑、配置以及结果

实验步骤

1. 绘制拓扑图

选择 3620 型路由器，

Router1 和 Router3：各有一个 Ethernet，一个 Serial

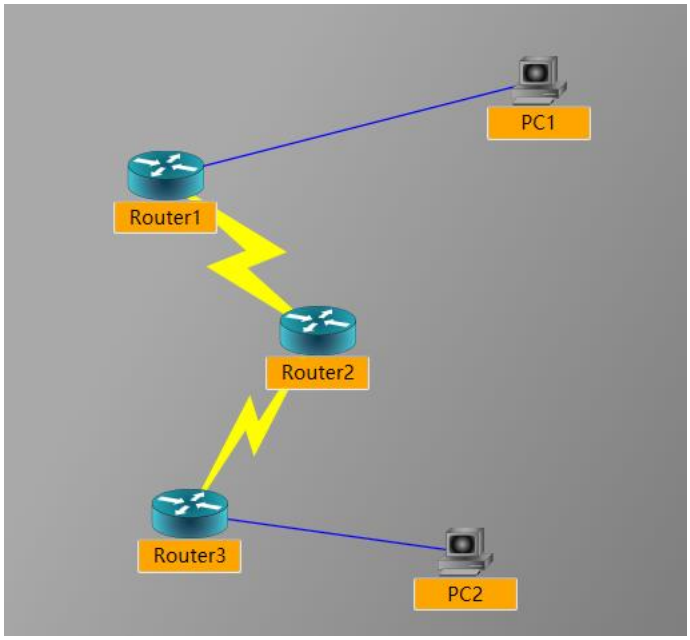
Router2：2 个 Serial

将 PC1 连接到 Router1 的 Ethernet 接口上。

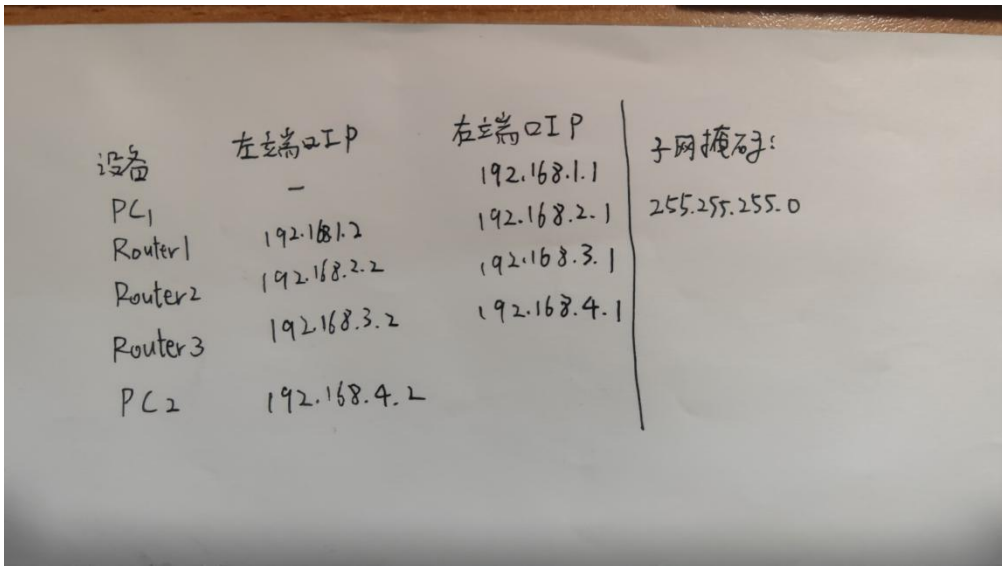
将 PC2 连接到 Router3 的 Ethernet 接口上。

通过 Router1 的 Serial 接口将 Router1 与 Router3 连接起来。

通过 Router3 的 Serial 接口将 Router3 与 Router2 连接起来。如图所示：



2. 配置路由



依据上表配置路由端口和路由协议

Router1：

```
Router>enable
Router#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#hostname Router1
Router1(config)#int Ethernet0/0
Router1(config-if)#ip address 192.168.1.2 255.255.255.0
Router1(config-if)#no shutdown
00:00:59: %LINK-3-UPDOWN: Interface Ethernet0/0, changed state to up
00:00:59: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/0, changed state to up
Router1(config-if)#int Serial0/0
Router1(config-if)#encapsulation hdlc
Router1(config-if)#ip address 192.168.2.1 255.255.255.0
Router1(config-if)#no shutdown
00:01:41: %LINK-3-UPDOWN: Interface Serial0/0, changed state to up
00:01:49: %LINK-3-UPDOWN: Interface Serial0/0, changed state to down
Router1(config-if)#clock rate 64000
Router1(config-if)#end
00:03:11: %LINK-3-UPDOWN: Interface Serial0/0, changed state to up
00:03:11: %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0, changed state to up
```

```
Router1#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Router1(config)#router rip
Router1(config-router)#net 192.168.1.0
Router1(config-router)#net 192.168.2.0
Router1(config-router)#end
```

Router2：

```
Router(config)#hostname Router2
Router2(config)# int Serial0/0
Router2(config-if)#encapsulation hdlc
Router2(config-if)#ip address 192.168.2.2 255.255.255.0
Router2(config-if)#no shutdown
00:03:09: %LINK-3-UPDOWN: Interface Serial0/0, changed state to up
00:03:11: %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0, changed state to up
Router2(config-if)#clock rate 64000
Router2(config-if)#int Serial0/1
Router2(config-if)#encapsulation hdlc
Router2(config-if)#ip address 192.168.3.1 255.255.255.0
Router2(config-if)#no shutdown
00:03:58: %LINK-3-UPDOWN: Interface Serial0/1, changed state to up
00:04:05: %LINK-3-UPDOWN: Interface Serial0/1, changed state to down
Router2(config-if)#clock rate 64000
00:05:59: %LINK-3-UPDOWN: Interface Serial0/1, changed state to up
00:05:59: %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/1, changed state to up
Router2(config-if)#end
```

```
Router2#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Router2(config)#router rip
Router2(config-router)#net 192.168.2.0
Router2(config-router)#net 192.168.3.0
Router2(config-router)#end
```

Router3：

```
Router3(config-if)#ip address 192.168.4.1 255.255.255.0
Router3(config-if)#no shutdown
00:05:24: %LINK-3-UPDOWN: Interface Ethernet0/0, changed state to up
00:05:25: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/0, changed state to up
Router3(config-if)#int Serial0/0
Router3(config-if)#encapsulation hdlc
Router3(config-if)#ip address 192.168.3.2 255.255.255.0
Router3(config-if)#no shutdown
00:05:58: %LINK-3-UPDOWN: Interface Serial0/0, changed state to up
00:05:59: %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0, changed state to up
Router3(config-if)#clock rate 64000
Router3(config-if)#end
```

```
Router3#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Router3(config)#router rip
Router3(config-router)#net 192.168.3.0
Router3(config-router)#net 192.168.4.0
Router3(config-router)#end
```

PC1：

```
Press Enter to begin
C:>ipconfig /ip 192.168.4.2 255.255.255.0
C:>ipconfig /ip 192.168.1.1 255.255.255.0
C:>ipconfig /dg 192.168.1.2
C:>ping 192.168.2.1
```

PC2：

```
Press Enter to begin
C:>ipconfig /ip 192.168.4.2 255.255.255.0
C:>ipconfig /dg 192.168.4.1
C:>ping 192.168.4.1
```

3. 主机和路由互 ping：

PC1 ping Router1:

```
Pinging 192.168.2.1 with 32 bytes of data:
Reply from 192.168.2.1: bytes=32 time=68ms TTL=241
Reply from 192.168.2.1: bytes=32 time=63ms TTL=241
Reply from 192.168.2.1: bytes=32 time=53ms TTL=241
Reply from 192.168.2.1: bytes=32 time=58ms TTL=241
Reply from 192.168.2.1: bytes=32 time=58ms TTL=241

Ping statistics for 192.168.2.1:
     Packets: Sent = 5, Received = 5, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
     Minimum = 53ms, Maximum =  68ms, Average =  60ms
```

PC1 ping Router2:

```
C:>ping 192.168.3.1

Pinging 192.168.3.1 with 32 bytes of data:
Reply from 192.168.3.1: bytes=32 time=48ms TTL=241
Reply from 192.168.3.1: bytes=32 time=51ms TTL=241
Reply from 192.168.3.1: bytes=32 time=68ms TTL=241
Reply from 192.168.3.1: bytes=32 time=65ms TTL=241
Reply from 192.168.3.1: bytes=32 time=68ms TTL=241

Ping statistics for 192.168.3.1:
     Packets: Sent = 5, Received = 5, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
     Minimum = 48ms, Maximum =  68ms, Average =  60ms
```

PC1 ping Router3:

```
C:>ping 192.168.4.1

Pinging 192.168.4.1 with 32 bytes of data:
Reply from 192.168.4.1: bytes=32 time=68ms TTL=241
Reply from 192.168.4.1: bytes=32 time=49ms TTL=241
Reply from 192.168.4.1: bytes=32 time=49ms TTL=241
Reply from 192.168.4.1: bytes=32 time=57ms TTL=241
Reply from 192.168.4.1: bytes=32 time=58ms TTL=241

Ping statistics for 192.168.4.1:
     Packets: Sent = 5, Received = 5, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
     Minimum = 49ms, Maximum =  68ms, Average =  56ms
```

PC1 ping PC2:

```
C:>ping 192.168.4.2

Pinging 192.168.4.2 with 32 bytes of data:
Reply from 192.168.4.2: bytes=32 time=64ms TTL=241
Reply from 192.168.4.2: bytes=32 time=60ms TTL=241
Reply from 192.168.4.2: bytes=32 time=72ms TTL=241
Reply from 192.168.4.2: bytes=32 time=55ms TTL=241
Reply from 192.168.4.2: bytes=32 time=51ms TTL=241

Ping statistics for 192.168.4.2:
     Packets: Sent = 5, Received = 5, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
     Minimum = 51ms, Maximum =  72ms, Average =  60ms
```

PC2 ping Router1:

```
C:>ping 192.168.1.1

Pinging 192.168.1.1 with 32 bytes of data:
Reply from 192.168.1.1: bytes=32 time=55ms TTL=241
Reply from 192.168.1.1: bytes=32 time=63ms TTL=241
Reply from 192.168.1.1: bytes=32 time=72ms TTL=241
Reply from 192.168.1.1: bytes=32 time=56ms TTL=241
Reply from 192.168.1.1: bytes=32 time=66ms TTL=241

Ping statistics for 192.168.1.1:
     Packets: Sent = 5, Received = 5, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
     Minimum = 55ms, Maximum =  72ms, Average =  62ms
```

PC2 ping Router2:

```
C:>ping 192.168.2.1

Pinging 192.168.2.1 with 32 bytes of data:
Reply from 192.168.2.1: bytes=32 time=60ms TTL=241
Reply from 192.168.2.1: bytes=32 time=60ms TTL=241
Reply from 192.168.2.1: bytes=32 time=65ms TTL=241
Reply from 192.168.2.1: bytes=32 time=70ms TTL=241
Reply from 192.168.2.1: bytes=32 time=67ms TTL=241

Ping statistics for 192.168.2.1:
     Packets: Sent = 5, Received = 5, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
     Minimum = 60ms, Maximum =  70ms, Average =  64ms
```

PC2 ping Router3:

```
C:>ping 192.168.3.1

Pinging 192.168.3.1 with 32 bytes of data:
Reply from 192.168.3.1: bytes=32 time=59ms TTL=241
Reply from 192.168.3.1: bytes=32 time=57ms TTL=241
Reply from 192.168.3.1: bytes=32 time=63ms TTL=241
Reply from 192.168.3.1: bytes=32 time=64ms TTL=241
Reply from 192.168.3.1: bytes=32 time=71ms TTL=241

Ping statistics for 192.168.3.1:
     Packets: Sent = 5, Received = 5, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
     Minimum = 57ms, Maximum =  71ms, Average =  63ms
```

PC2 ping PC1:1

```
C:>ping 192.168.1.1

Pinging 192.168.1.1 with 32 bytes of data:
Reply from 192.168.1.1: bytes=32 time=55ms TTL=241
Reply from 192.168.1.1: bytes=32 time=63ms TTL=241
Reply from 192.168.1.1: bytes=32 time=72ms TTL=241
Reply from 192.168.1.1: bytes=32 time=56ms TTL=241
Reply from 192.168.1.1: bytes=32 time=66ms TTL=241

Ping statistics for 192.168.1.1:
     Packets: Sent = 5, Received = 5, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
     Minimum = 55ms, Maximum =  72ms, Average =  62ms
```

4. 通过 show ip route 命令查看各个路由器连接情况

R1 路由

```
Gateway of last resort is not set

C    192.168.1.0 is directly connected, Ethernet0/0
C    192.168.2.0 is directly connected, Serial0/0
R    192.168.3.0 [120/1] via 192.168.2.2, 00:07:27, Serial0/0
R    192.168.4.0 [120/2] via 192.168.2.2, 00:04:14, Serial0/0
```

R2 路由

```
Gateway of last resort is not set

C    192.168.2.0 is directly connected, Serial0/0
C    192.168.3.0 is directly connected, Serial0/1
R    192.168.1.0 [120/1] via 192.168.2.1, 00:06:44, Serial0/0
R    192.168.4.0 [120/1] via 192.168.3.2, 00:06:19, Serial0/1
```

R3 路由

```
C    192.168.4.0 is directly connected, Ethernet0/0
C    192.168.3.0 is directly connected, Serial0/0
R    192.168.2.0 [120/1] via 192.168.3.1, 00:05:35, Serial0/0
R    192.168.1.0 [120/2] via 192.168.3.1, 00:02:44, Serial0/0
```

5. 总结：

遇到的问题：
一开始一直 incomplete command 报错，尝试 5.3 9.9 10 11 版本均报错，最后发现是 Boson 没有按 README 安装。严格按照其安装后得以运行。
配完路由 ping 不上，后来发现是 Router2 给了 4 个 Serial 端口，然后路由配的端口写错了。

收获：掌握了路由器的基本知识，掌握了路由器端口的配置，掌握了路由协议的基本配置，学会了使用 Boson Netsim 模拟器。