



哈尔滨工业大学
HARBIN INSTITUTE OF TECHNOLOGY

实验报告

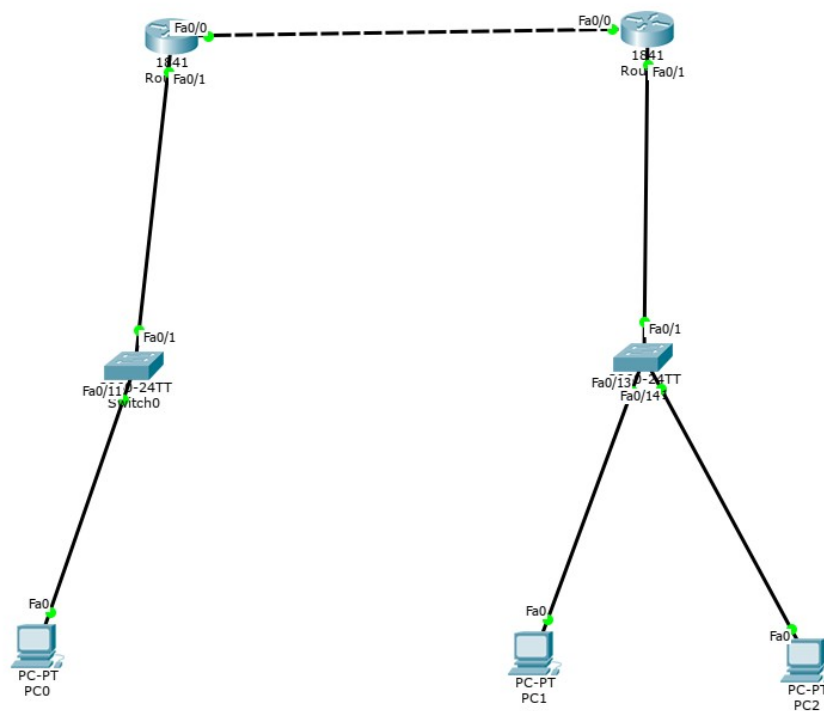
开课学期： 2023 年春季
课程名称： 计算机网络
实验名称： RIP 路由配置及协议分析
实验性质： 课内实验
实验时间： 4 月 21 日 地点： T2507
学生专业： 计算机科学与技术
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报告成绩： _____

实验与创新实践教育中心印制

2023 年 3 月

实验四 RIP 路由配置及协议分析

1. 给出你自己的实验组网图（把你在 Cisco Packet Tracer 上的拓扑图截图即可）。



2. 在启动 RIP 协议前，在 R0 上 ping 各台计算机，看是否能够 ping 通？通过在 R0 上查看路由表，分析其原因？

在 PC0 上：

1. ping 192.168.2.1 网关 - 通

```
Packet Tracer PC Command Line 1.0
PC>
PC>ping 192.168.2.1

Pinging 192.168.2.1 with 32 bytes of data:

Reply from 192.168.2.1: bytes=32 time=1ms TTL=255
Reply from 192.168.2.1: bytes=32 time=0ms TTL=255
Reply from 192.168.2.1: bytes=32 time=0ms TTL=255
Reply from 192.168.2.1: bytes=32 time=0ms TTL=255

Ping statistics for 192.168.2.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 1ms, Average = 0ms

PC>
PC>
```

2. ping 192.168.3.1 网关 - 不通

上查

```
PC0
Physical Config Desktop Custom Interface

Command Prompt
Ping statistics for 192.168.2.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 1ms, Average = 0ms

PC>
PC>ping 192.168.3.1

Pinging 192.168.3.1 with 32 bytes of data:

Reply from 192.168.2.1: Destination host unreachable.
Reply from 192.168.2.1: Destination host unreachable.
Reply from 192.168.2.1: Destination host unreachable.
Reply from 192.168.2.1: Destination host unreachable.

Ping statistics for 192.168.3.1:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

PC>
```

3. ping 192.168.3.13 PC1 - 不通

4. ping 192.168.3.14 PC2 - 不通

```
PC>ping 192.168.3.13

Pinging 192.168.3.13 with 32 bytes of data:

Reply from 192.168.2.1: Destination host unreachable.
Reply from 192.168.2.1: Destination host unreachable.

Ping statistics for 192.168.3.13:
    Packets: Sent = 2, Received = 0, Lost = 2 (100% loss),

Control-C
^C
PC>ping 192.168.3.14

Pinging 192.168.3.14 with 32 bytes of data:

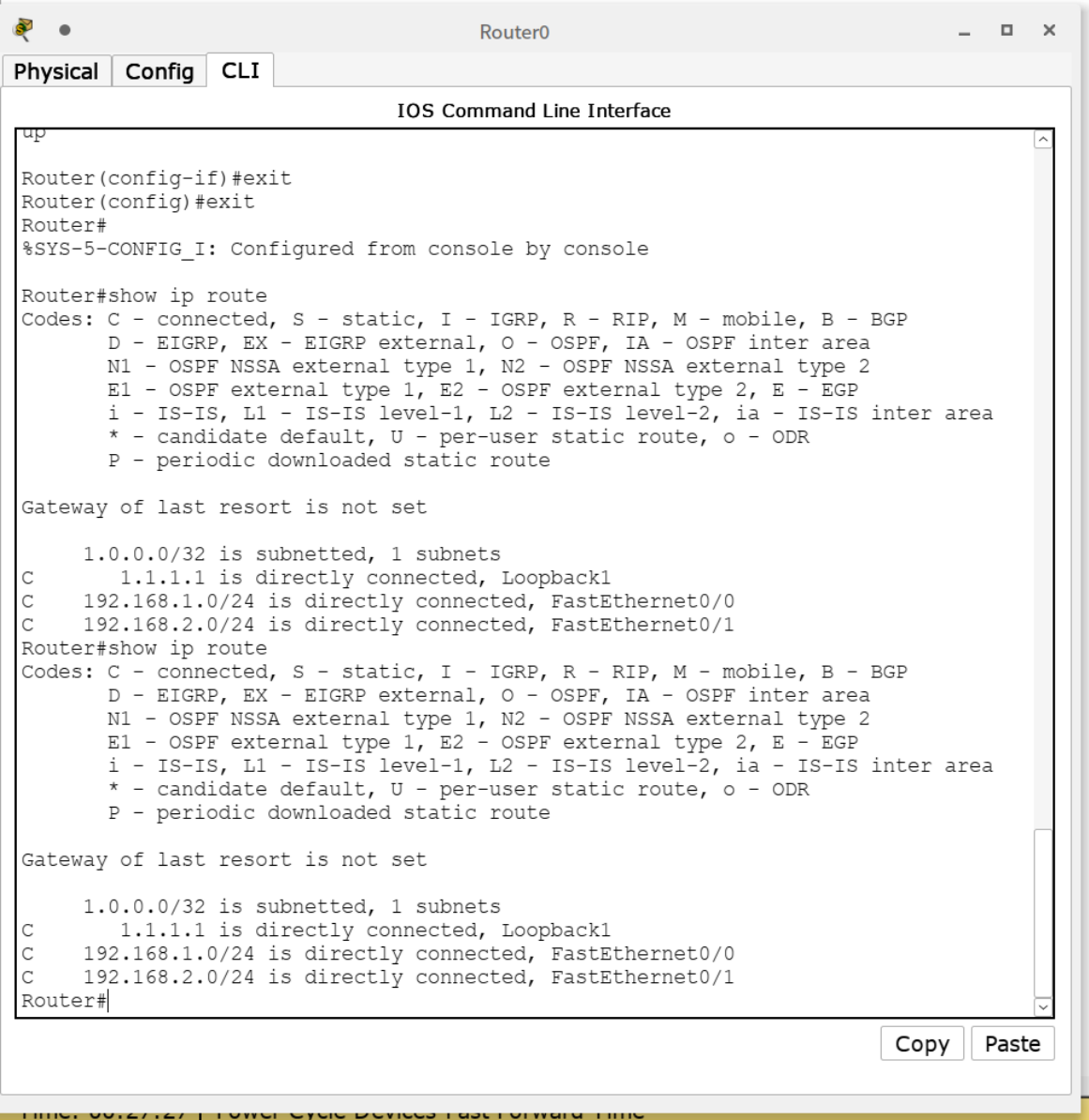
Reply from 192.168.2.1: Destination host unreachable.
Reply from 192.168.2.1: Destination host unreachable.

Ping statistics for 192.168.3.14:
    Packets: Sent = 2, Received = 0, Lost = 2 (100% loss),

Control-C
^C
PC>
```

查看 R0 上的路由表：

实验报告



The screenshot shows a Cisco Router CLI window titled "Router0". It has three tabs: "Physical", "Config", and "CLI". The "CLI" tab is active, displaying the "IOS Command Line Interface". The text in the window shows the following sequence of commands and outputs:

```
up
Router(config-if)#exit
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console

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

      1.0.0.0/32 is subnetted, 1 subnets
C       1.1.1.1 is directly connected, Loopback1
C       192.168.1.0/24 is directly connected, FastEthernet0/0
C       192.168.2.0/24 is directly connected, FastEthernet0/1
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

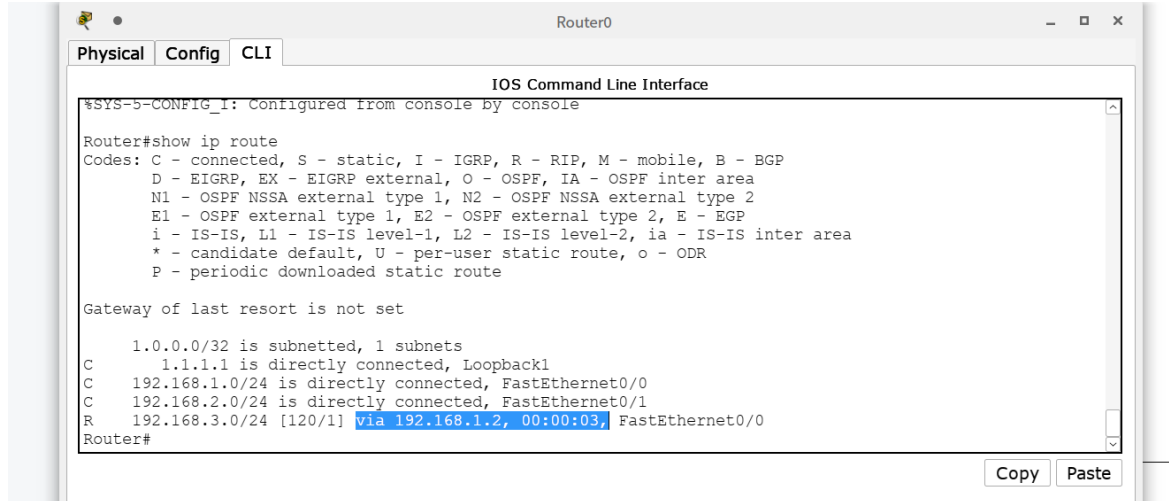
Gateway of last resort is not set

      1.0.0.0/32 is subnetted, 1 subnets
C       1.1.1.1 is directly connected, Loopback1
C       192.168.1.0/24 is directly connected, FastEthernet0/0
C       192.168.2.0/24 is directly connected, FastEthernet0/1
Router#
```

At the bottom right of the CLI window, there are "Copy" and "Paste" buttons. Below the window, a yellow status bar displays the text "Time: 00:27:27 | Power Cycle Devices Fast Forward Time".

3. 在配置 RIP 协议后，比较和配置 RIP 协议前中 R0 路由表的差异；测试 R0 和各台计算机是否能够通信，并说明原因。

配置 RIP 协议后，查看 R0 路由表如下：



```

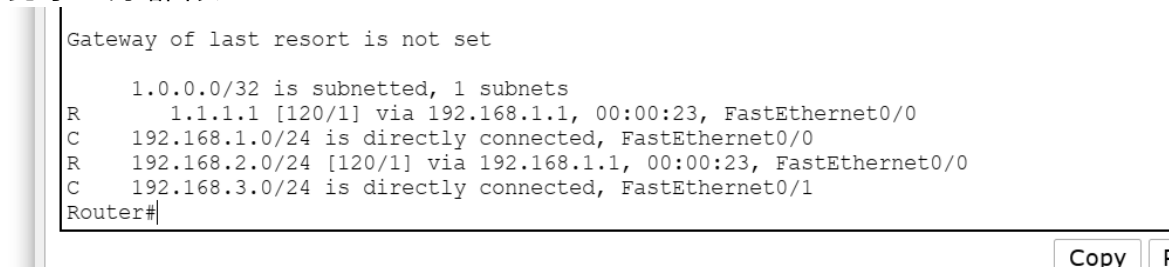
Router0
Physical Config CLI
IOS Command Line Interface
%SYS-5-CONFIG_I: Configured from console by console
Router#show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external 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

  1.0.0.0/32 is subnetted, 1 subnets
C       1.1.1.1 is directly connected, Loopback1
C       192.168.1.0/24 is directly connected, FastEthernet0/0
C       192.168.2.0/24 is directly connected, FastEthernet0/1
R       192.168.3.0/24 [120/1] via 192.168.1.2, 00:00:03, FastEthernet0/0
Router#
Copy Paste

```

多出了一条 RIP 路由信息，即要到达 192.168.3.0/24 网段，下一个转发端口是 192.168.2.1。此时 R1 的路由表：



```

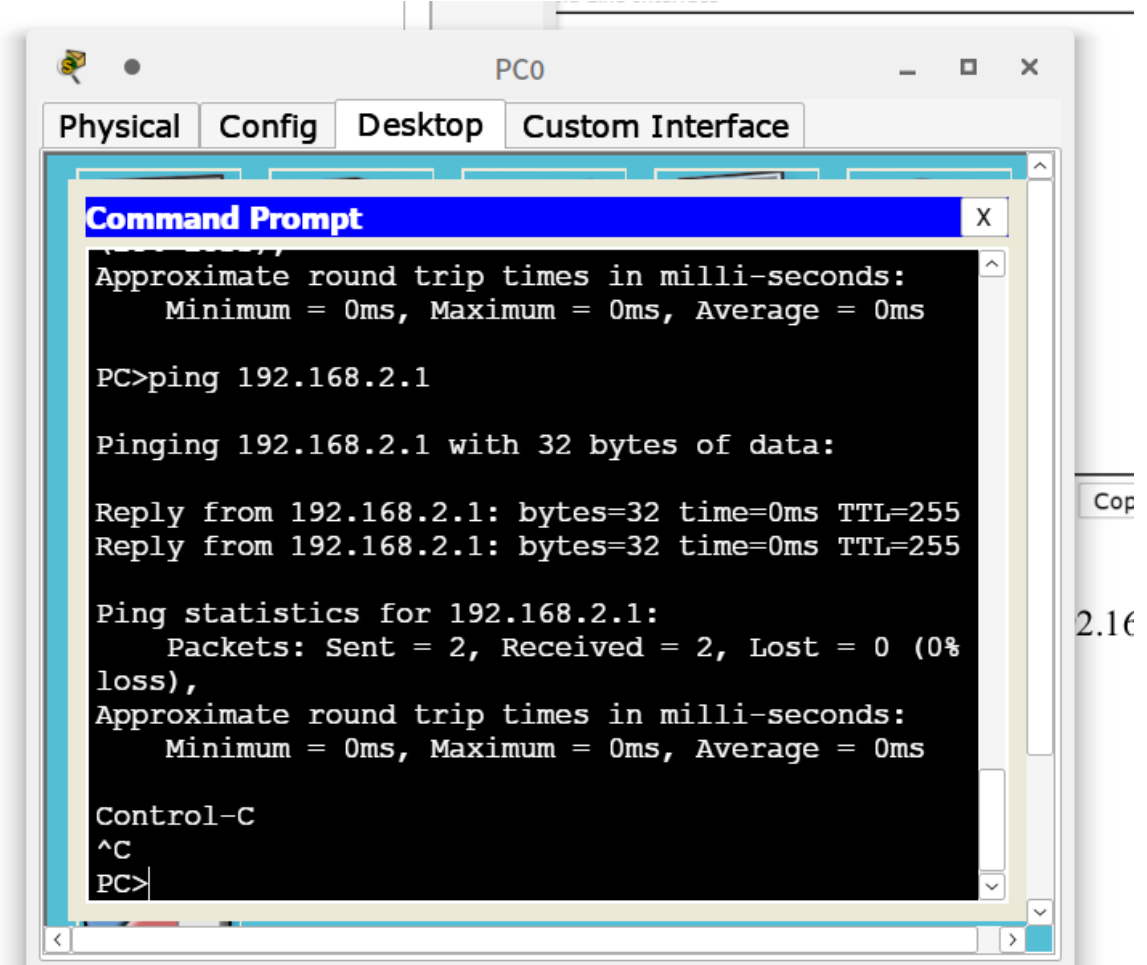
Gateway of last resort is not set

  1.0.0.0/32 is subnetted, 1 subnets
R       1.1.1.1 [120/1] via 192.168.1.1, 00:00:23, FastEthernet0/0
C       192.168.1.0/24 is directly connected, FastEthernet0/0
R       192.168.2.0/24 [120/1] via 192.168.1.1, 00:00:23, FastEthernet0/0
C       192.168.3.0/24 is directly connected, FastEthernet0/1
Router#
Copy F

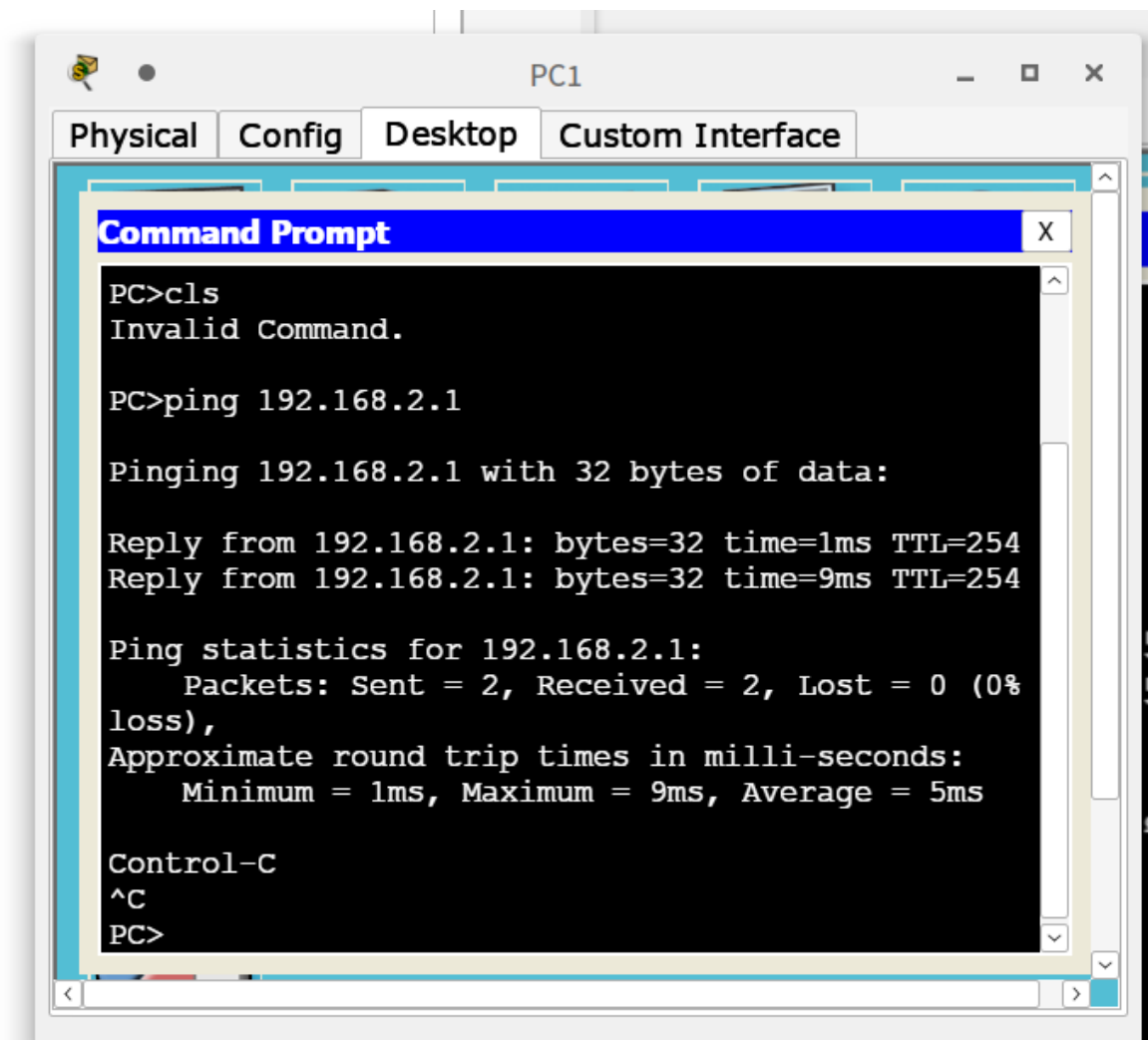
```

同样多了 RIP 信息。

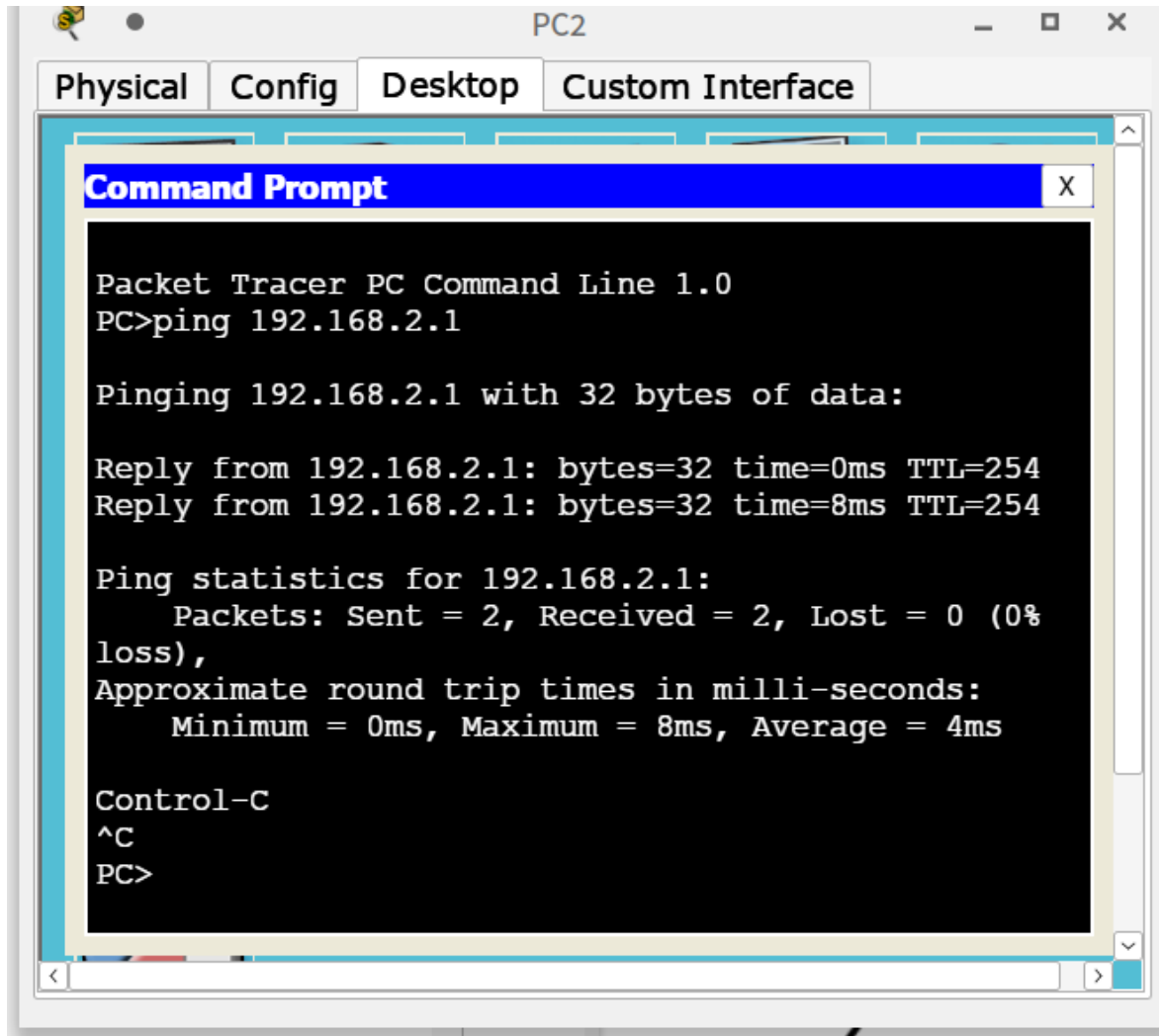
测试 PC0 与 R0 的联通：成功。



测试 PC1 与 R0 的联通性：成功。



测试 PC2 与 R0 的联通性：成功。



4. 观察你所截获的 RIP 响应报文（任选一条响应报文），填写下表：

	字段	值	含义
IP	目的地址	224.0.0.9	RIPv2 的组播地址
UDP	端口号	520	RIPv2 的指定端口
RIP	头部	命令字段	是一个应答报文
		版本号	版本 2

	路由 信息	协议族	0x2	使用 IP 协议簇
		网络地址	1.1.1.1	来源: loopback1
		网络掩码	255.255.255.255	掩码 (全 1)
		下一跳	0.0.0.0	下一跳地址
		跳数	0x10	最大跳数, 为不可达路由

5. 比较水平分割前后 R0 发给 R1 的 RIP 报文路由信息的不同, 填写到下表中。

	IP Address	Metric
取消水平分割前	1.1.1.1	0x1
	192.168.2.0	0x1
取消水平分割后	1.1.1.1	0x1
	192.168.1.0	0x1
	192.168.2.0	0x1
	192.168.3.0	0x2