

南昌大学

NANCHANG UNIVERSITY

网络工程配置实训



题 目：_____网络综合配置随堂测试_____

学 院：_____软件学院_____

专 业：_____信息安全_____

班 级：_____193 班_____

完成人数：_____1 人_____

成 员：_____8003119100 丁俊_____

起讫日期：_____2021.7.16-2021.7.17_____

任课教师：_____鄢志辉_____

完成时间：_____7.16_____

填表日期：_____2021____年____7____月____16____日_____

大作业的要求和内容：（包括题目选择范围、技术要求、递交时间、考核方法等）

在 2021 年 7 月 16 日课堂上完成考评，并于 2021 年 9 月 15 日之前提交实验报告

一、实验目的

- 检验静态路由配置和使用
- 检验 OSPF 动态路由配置和使用
- 检验访问控制列表的配置和使用

二、实验环境

- 运行 Windows 操作系统计算机一台
- Cisco Packet Tracer 软件

三、实验要求

整个实验最高得分不超过 100 分。

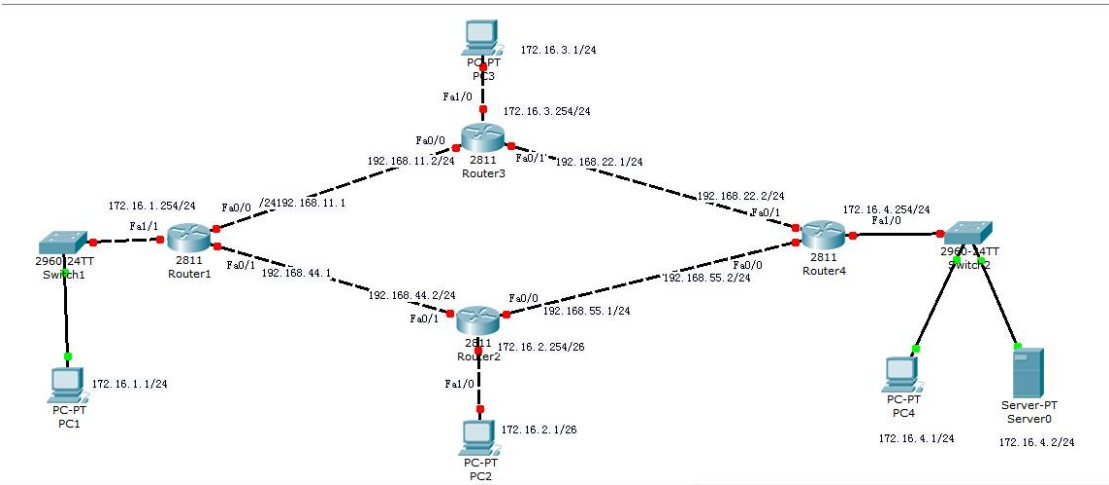
- 1、整个实验 3 个小项，每完成一个小项完成实验要求各得分 25 分。
- 2、在 50 分钟内正确完成所有三个小项，加 10 分，在 70 分钟内正确完成所有三个小项，加 5 分。限 120 分钟内完成实验（不含实验报告）。
- 3、做完之后可申请老师检查实验结果，老师提问考评，老师每检查一次发现有错误没完全实现实验要求，扣 5 分，最多扣 10 分。
- 4、实验期间不许相互交流讨论，发现一次扣 5 分。
- 5、配置设备不要重启，保留配置过程记录。
- 6、检查实验时讲述做了哪些配置，如何实现的，演示用哪些命令验证的实验结果。
- 7、课后提交实验报告，实验报告要有具体的实验步骤，要有截图，可对实验原理展开论述，要有详细的实验总结和思考。实验报告最多

得 25 分。实验报告文件名为 “学号+姓名+实验名称.doc”。

8、实验成绩综合考虑实验完成质量、实验完成速度、实验报告是否详实、实验报告是否有新心得。

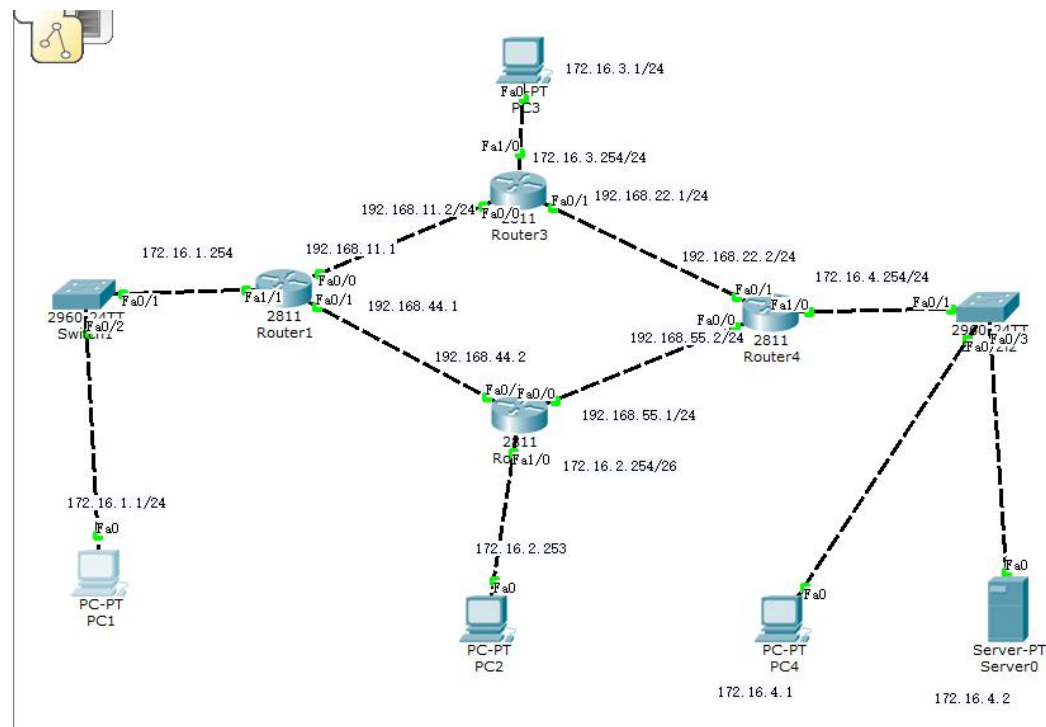
四、实验内容

1、小项一拓扑图及具体要求：



实验时请在拓扑图上标出各端口号及 IP 地址。在以上拓扑图上要求实现所有网络之间实现可达。通过在 Router1、Router2、Router3、Router4 之间上配置静态路由协议实现，不允许使用静态默认路由。到达每个网段都有多条路径的静态路由。

拓扑图如下：



步骤

先给各台主机和路由器端口配置 ip 地址，如图所示

静态路由配置如下：

Router1:

```
Router>en
```

```
Router#config t
```

```
Router(config)#ip route 172.16.3.0 255.255.255.0 192.168.11.2
```

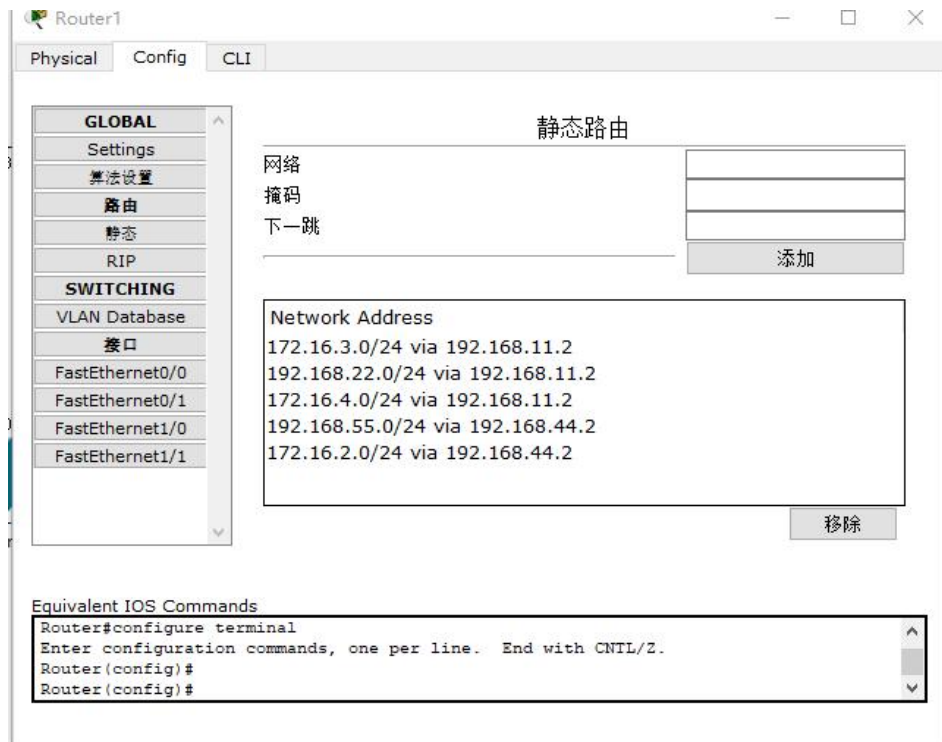
```
Router(config)#ip route 192.168.22.0 255.255.255.0 192.168.11.2
```

```
Router(config)#ip route 172.16.4.0 255.255.255.0 192.168.11.2
```

```
Router(config)#ip route 192.168.55.0 255.255.255.0 192.168.44.2
```

```
Router(config)#ip route 172.16.2.0 255.255.255.0 192.168.44.2
```

```
Router(config)#exit
```



Router2:

Router>en

Router#config t

Router(config)#ip route 172.16.1.0 255.255.255.0 192.168.44.1

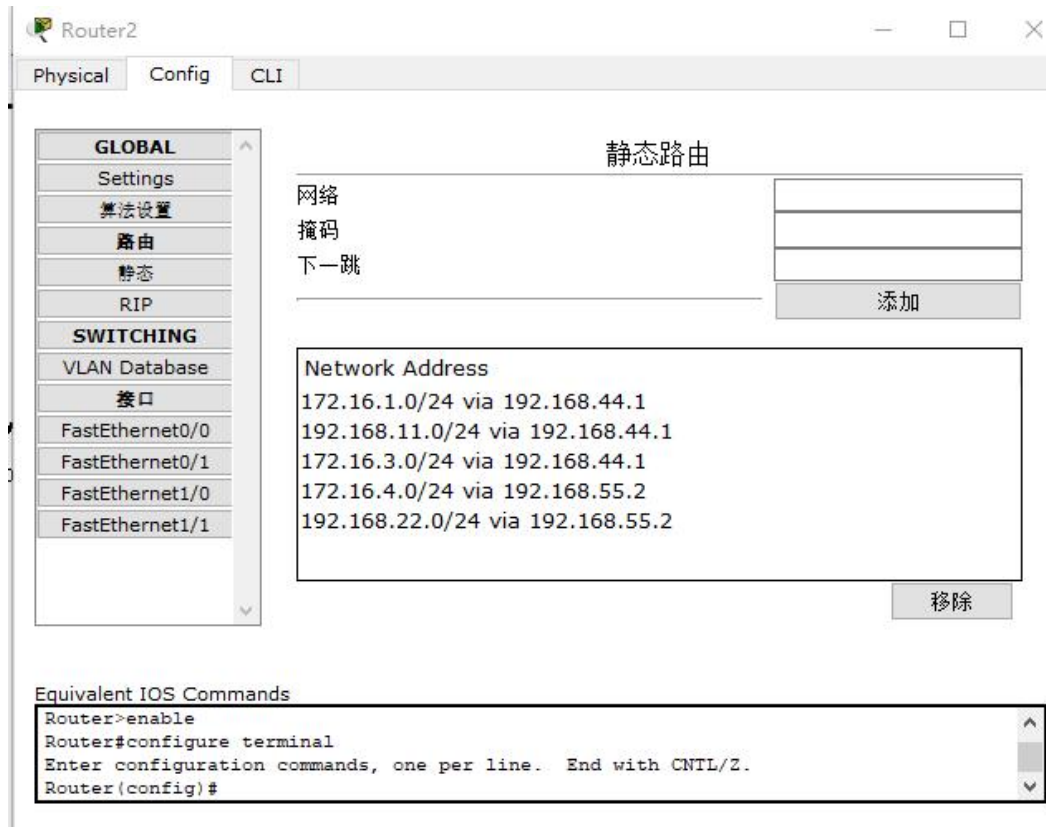
Router(config)#ip route 192.168.11.0 255.255.255.0 192.168.44.1

Router(config)#ip route 172.16.3.0 255.255.255.0 192.168.44.1

Router(config)#ip route 192.168.4.0 255.255.255.0 192.168.55.2

Router(config)#ip route 192.168.22.0 255.255.255.0 192.168.55.2

Router(config)#exit



Router3:

Router>en

Router#config t

Router(config)#ip route 172.16.1.0 255.255.255.0 192.168.11.1

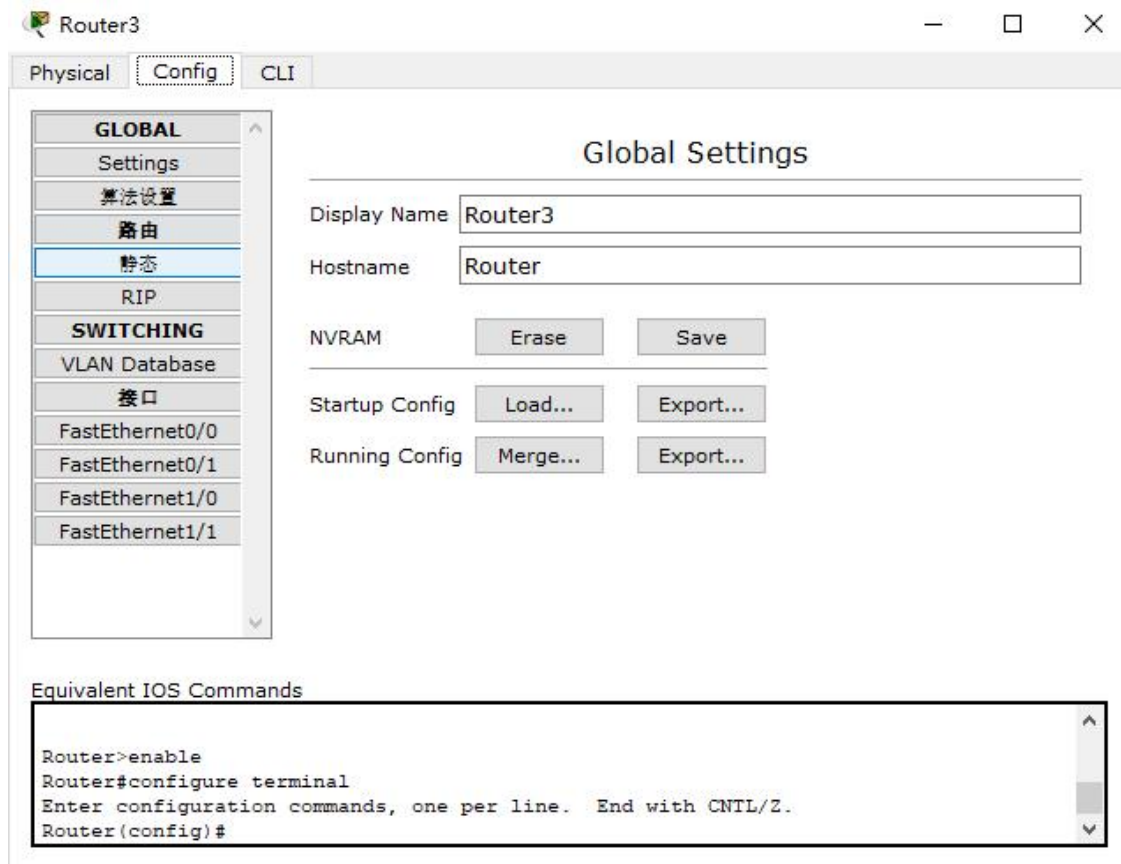
Router(config)#ip route 172.16.4.0 255.255.255.0 192.168.22.2

Router(config)#ip route 192.168.44.0 255.255.255.0 192.168.11.1

Router(config)#ip route 192.168.55.0 255.255.255.0 192.168.22.2

Router(config)#ip route 172.16.2.0 255.255.255.0 192.168.22.2

Router(config)#exit



Router4:

Router>en

Router#config t

Router(config)#ip route 172.16.3.0 255.255.255.0 192.168.22.1

Router(config)#ip route 192.168.11.0 255.255.255.0 192.168.22.1

Router(config)#ip route 172.16.1.0 255.255.255.0 192.168.22.1

Router(config)#ip route 192.168.44.0 255.255.255.0 192.168.55.1

Router(config)#ip route 172.16.2.0 255.255.255.0 192.168.55.1

Router(config)#exit

Router4

Physical Config CLI

GLOBAL

Settings

算法设置

路由

静态

RIP

SWITCHING

VLAN Database

接口

FastEthernet0/0

FastEthernet0/1

FastEthernet1/0

FastEthernet1/1

静态路由

网络

掩码

下一跳

添加

Network Address

172.16.3.0/24 via 192.168.22.1

192.168.11.0/24 via 192.168.22.1

172.16.1.0/24 via 192.168.22.1

192.168.44.0/24 via 192.168.55.1

172.16.2.0/24 via 192.168.55.1

移除

Equivalent IOS Commands

Router>enable

Router#configure terminal

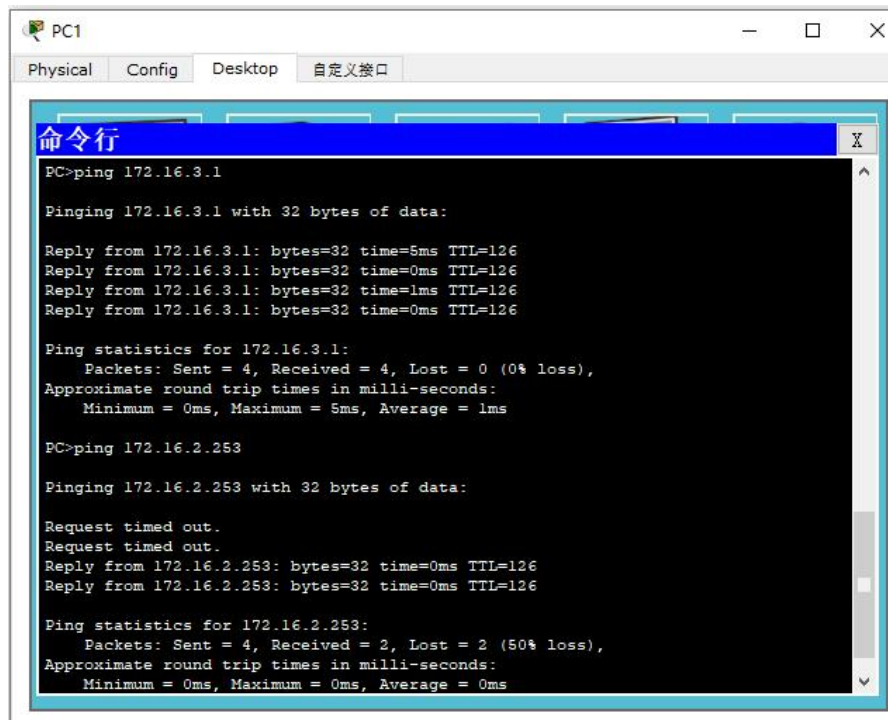
Enter configuration commands, one per line. End with CNTL/Z.

Router(config)#

上述分别给各个路由器配置到达其他网段的静态路由和下一跳地址。

验证结果

PC1pingPC2、PC3



The screenshot shows a Windows command prompt window titled "PC1" with tabs for "Physical", "Config", "Desktop", and "自定义接口". The command prompt displays the results of two ping commands. The first command is "PC>ping 172.16.3.1", which shows four successful replies with 32 bytes of data, times ranging from 0ms to 5ms, and a TTL of 126. The statistics for 172.16.3.1 show 4 packets sent, 4 received, 0 lost (0% loss), and an average round trip time of 1ms. The second command is "PC>ping 172.16.2.253", which shows two successful replies and two request timeouts. The statistics for 172.16.2.253 show 4 packets sent, 2 received, 2 lost (50% loss), and an average round trip time of 0ms.

```
PC1
Physical Config Desktop 自定义接口

命令行
PC>ping 172.16.3.1

Pinging 172.16.3.1 with 32 bytes of data:

Reply from 172.16.3.1: bytes=32 time=5ms TTL=126
Reply from 172.16.3.1: bytes=32 time=0ms TTL=126
Reply from 172.16.3.1: bytes=32 time=1ms TTL=126
Reply from 172.16.3.1: bytes=32 time=0ms TTL=126

Ping statistics for 172.16.3.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 5ms, Average = 1ms

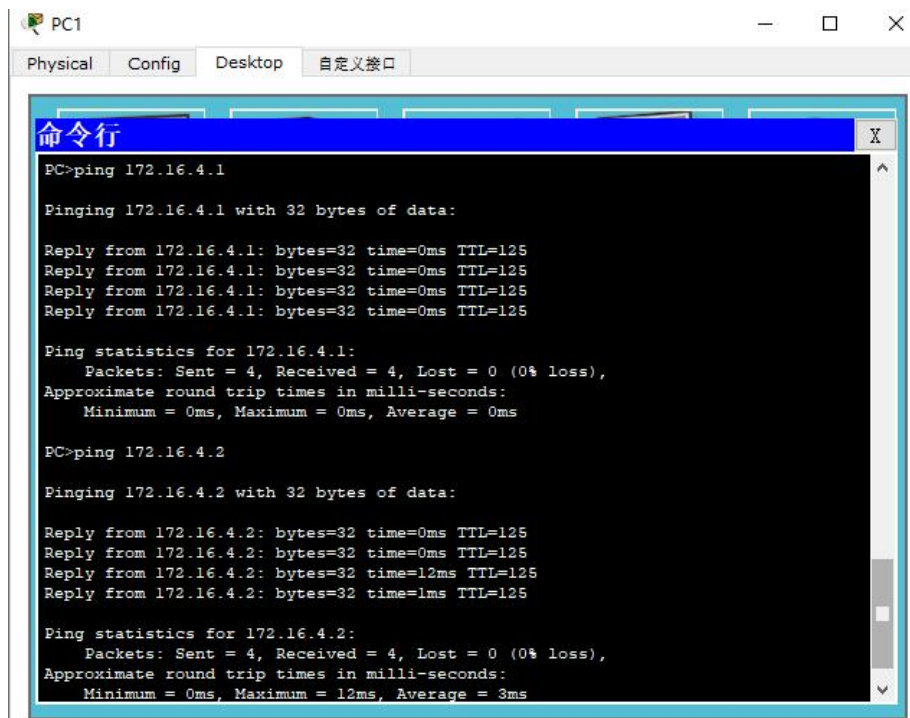
PC>ping 172.16.2.253

Pinging 172.16.2.253 with 32 bytes of data:

Request timed out.
Request timed out.
Reply from 172.16.2.253: bytes=32 time=0ms TTL=126
Reply from 172.16.2.253: bytes=32 time=0ms TTL=126

Ping statistics for 172.16.2.253:
    Packets: Sent = 4, Received = 2, Lost = 2 (50% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms
```

PC1pingPC3、PC4



The screenshot shows a Windows command prompt window titled "PC1" with tabs for "Physical", "Config", "Desktop", and "自定义接口". The command prompt displays the results of two ping commands. The first command is "PC>ping 172.16.4.1", which shows four successful replies with 32 bytes of data, times of 0ms, and a TTL of 125. The statistics for 172.16.4.1 show 4 packets sent, 4 received, 0 lost (0% loss), and an average round trip time of 0ms. The second command is "PC>ping 172.16.4.2", which shows four successful replies with 32 bytes of data, times ranging from 0ms to 12ms, and a TTL of 125. The statistics for 172.16.4.2 show 4 packets sent, 4 received, 0 lost (0% loss), and an average round trip time of 3ms.

```
PC1
Physical Config Desktop 自定义接口

命令行
PC>ping 172.16.4.1

Pinging 172.16.4.1 with 32 bytes of data:

Reply from 172.16.4.1: bytes=32 time=0ms TTL=125
Reply from 172.16.4.1: bytes=32 time=0ms TTL=125
Reply from 172.16.4.1: bytes=32 time=0ms TTL=125
Reply from 172.16.4.1: bytes=32 time=0ms TTL=125

Ping statistics for 172.16.4.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

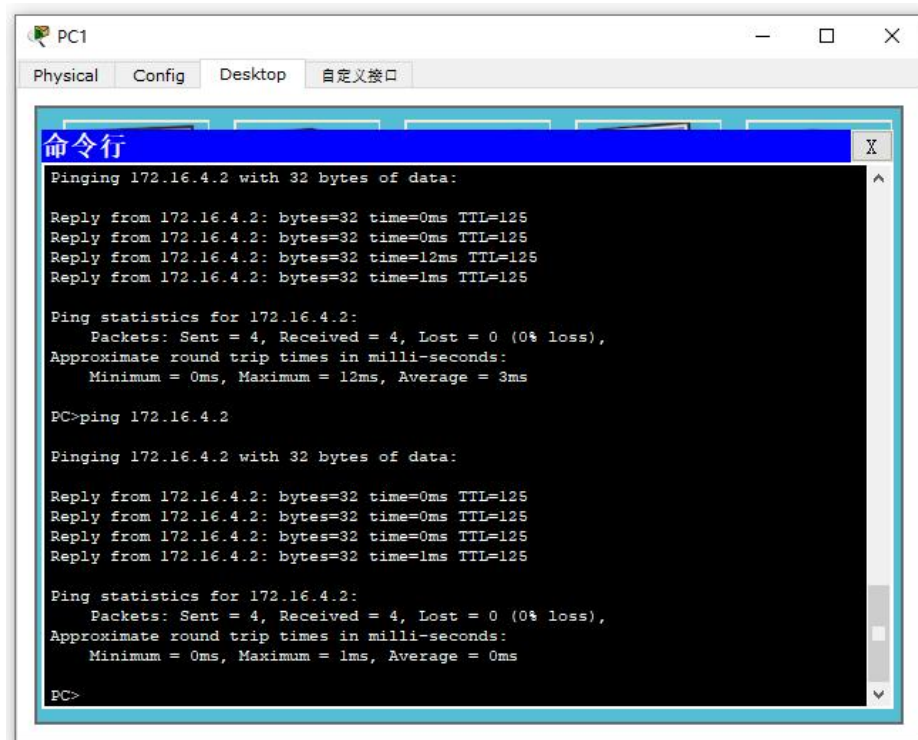
PC>ping 172.16.4.2

Pinging 172.16.4.2 with 32 bytes of data:

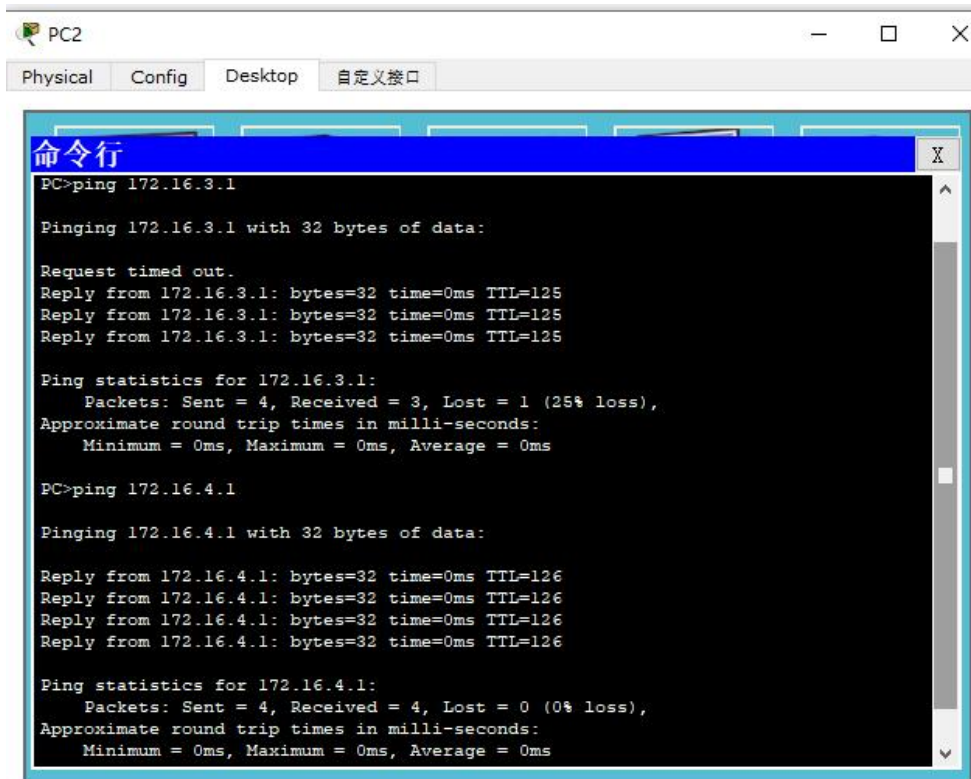
Reply from 172.16.4.2: bytes=32 time=0ms TTL=125
Reply from 172.16.4.2: bytes=32 time=0ms TTL=125
Reply from 172.16.4.2: bytes=32 time=12ms TTL=125
Reply from 172.16.4.2: bytes=32 time=1ms TTL=125

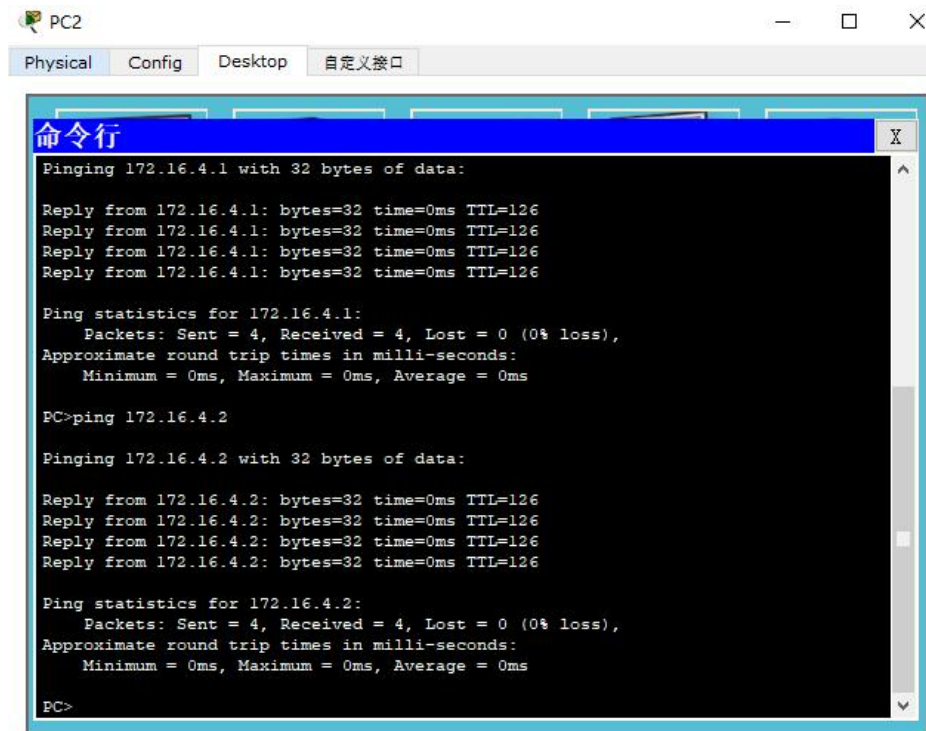
Ping statistics for 172.16.4.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 12ms, Average = 3ms
```

PC1pingServer0

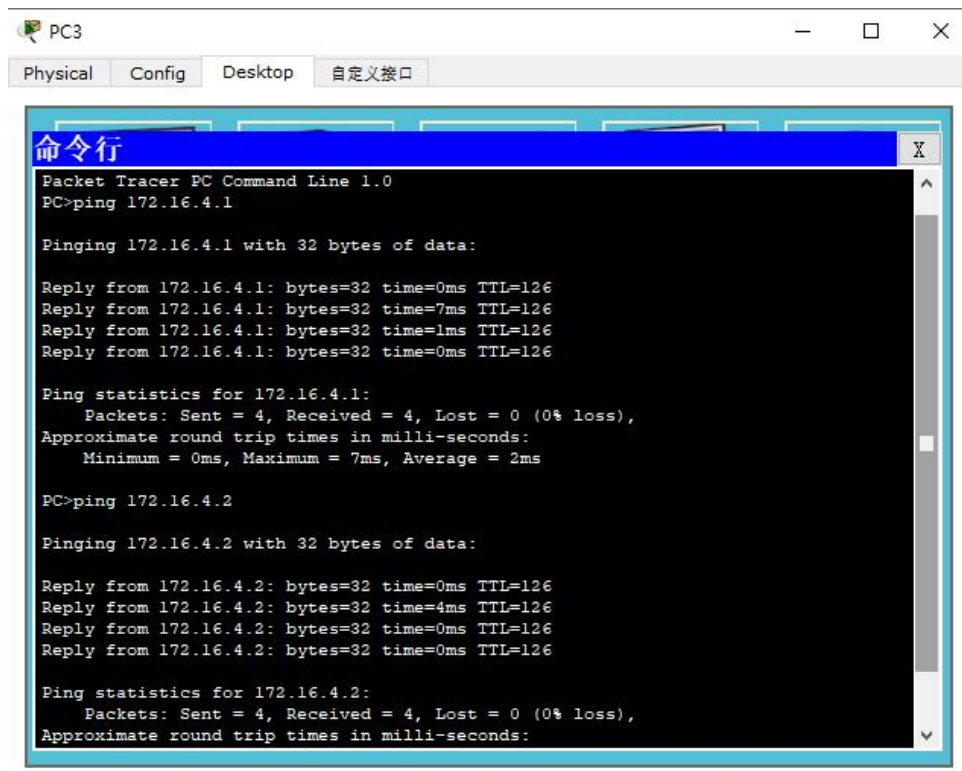


PC2pingPC3、PC4 和 Server0





PC3pingPC4 和 Server0



2、小项二拓扑图及具体要求：

拓扑图见小项目一。实验时请在拓扑图上标出各端口号及 IP 地址。要求通过访问控制列表实现 PC1 可以 ping 通 Server0, PC1 可以访问 Server0 的上的网站，PC1 无法访问 Server0 上的 ftp 服务，其他所有机器可以访问 172.16.4.0/24 的其他所有服务。（要求把以上配置每条都写出来）

通过在 Router4 上配置扩展访问控制列表来实现。

拓扑图如图小项一。

Router4:

```
Router(config)#access-list 100 deny tcp host 172.16.1.1 host 172.16.4.2 eq 21
```

```
Router(config)#access-list 100 permit ip any any
```

```
Router(config)#access-list 100 permit tcp any any
```

```
Router(config)#interface fastEthernet 0/0
```

```
Router(config-if)#ip access-group 100 in
```

```
Router(config)#interface fastEthernet 0/1
```

```
Router(config-if)#ip access-group 100 in
```



查看 router4 访问控制表

```
CopyRouter4(1)
Physical Config CLI
IOS Command Line Interface
%LINK-5-CHANGED: Interface FastEthernet1/1, changed state to up
%LINK-5-CHANGED: Interface FastEthernet1/1, changed state to administratively do
wn
%LINK-5-CHANGED: Interface Vlan1, changed state to administratively down
%SYS-5-CONFIG_I: Configured from console by console
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state t
o up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state t
o up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet1/0, changed state t
o up
Router>en
Router#show access-list 100
Extended IP access list 100
  deny tcp host 172.16.1.1 host 172.16.4.2 eq ftp
  permit ip any any
  permit tcp any any
Router#
```

验证结果

PC1ping 通 Server0


```
CopyPC1(1)
Physical Config Desktop 自定义接口

命令行
Pinging 172.16.4.1 with 32 bytes of data:

Request timed out.
Request timed out.
Request timed out.
Reply from 172.16.4.1: bytes=32 time=0ms TTL=125

Ping statistics for 172.16.4.1:
    Packets: Sent = 4, Received = 1, Lost = 3 (75% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

PC>ping 172.16.4.1

Pinging 172.16.4.1 with 32 bytes of data:

Reply from 172.16.4.1: bytes=32 time=0ms TTL=125
Reply from 172.16.4.1: bytes=32 time=4ms TTL=125
Reply from 172.16.4.1: bytes=32 time=0ms TTL=125
Reply from 172.16.4.1: bytes=32 time=1ms TTL=125

Ping statistics for 172.16.4.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 4ms, Average = 1ms

PC>|
```

PC1 无法访问 Server0 的 ftp 服务

```
CopyPC1(1)
Physical Config Desktop 自定义接口

命令行
Pinging 172.16.4.1 with 32 bytes of data:

Reply from 172.16.4.1: bytes=32 time=0ms TTL=125
Reply from 172.16.4.1: bytes=32 time=4ms TTL=125
Reply from 172.16.4.1: bytes=32 time=0ms TTL=125
Reply from 172.16.4.1: bytes=32 time=1ms TTL=125

Ping statistics for 172.16.4.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 4ms, Average = 1ms

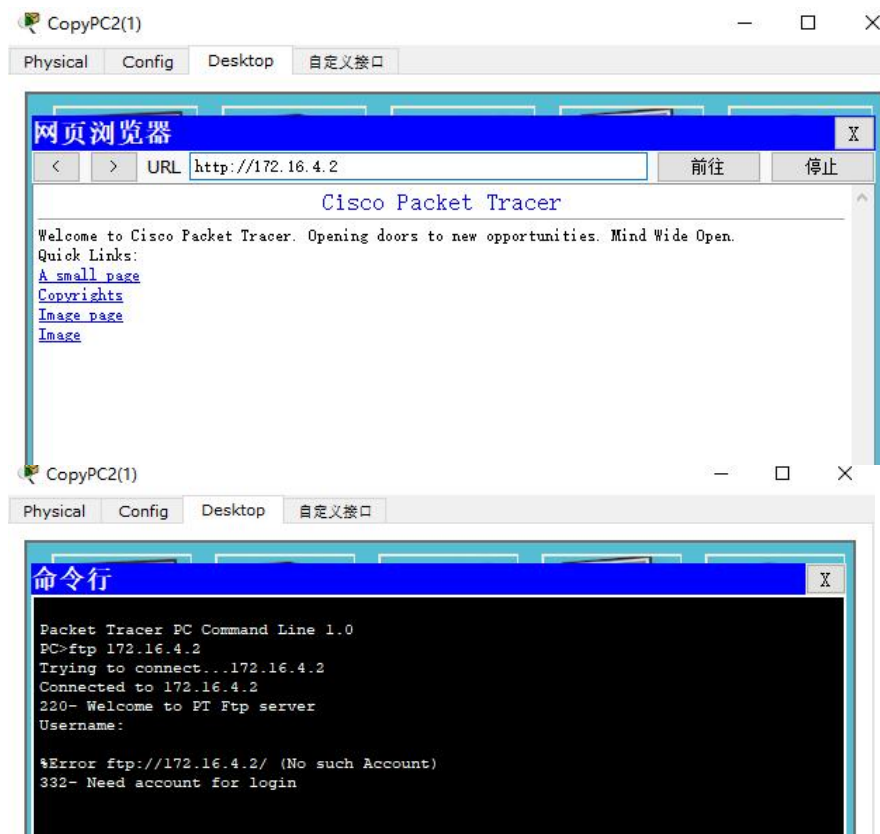
PC>ftp 172.16.4.2
Trying to connect...172.16.4.2

%Error opening ftp://172.16.4.2/ (Timed out)

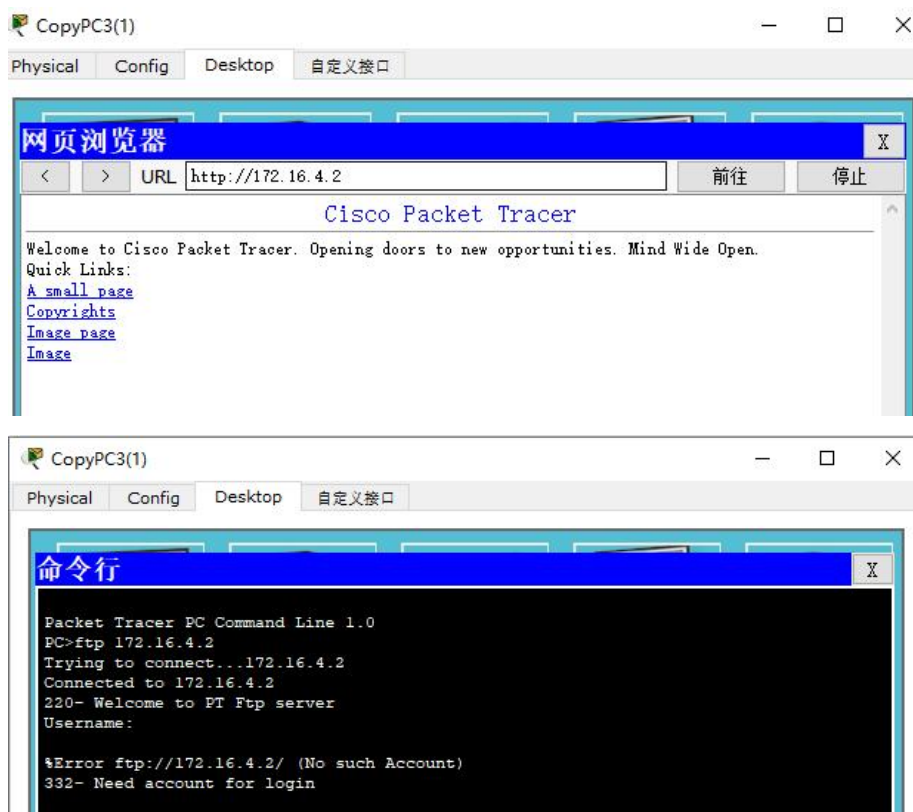
Packet Tracer PC Command Line 1.0
PC>(Disconnecting from ftp server)

Packet Tracer PC Command Line 1.0
PC>|
```

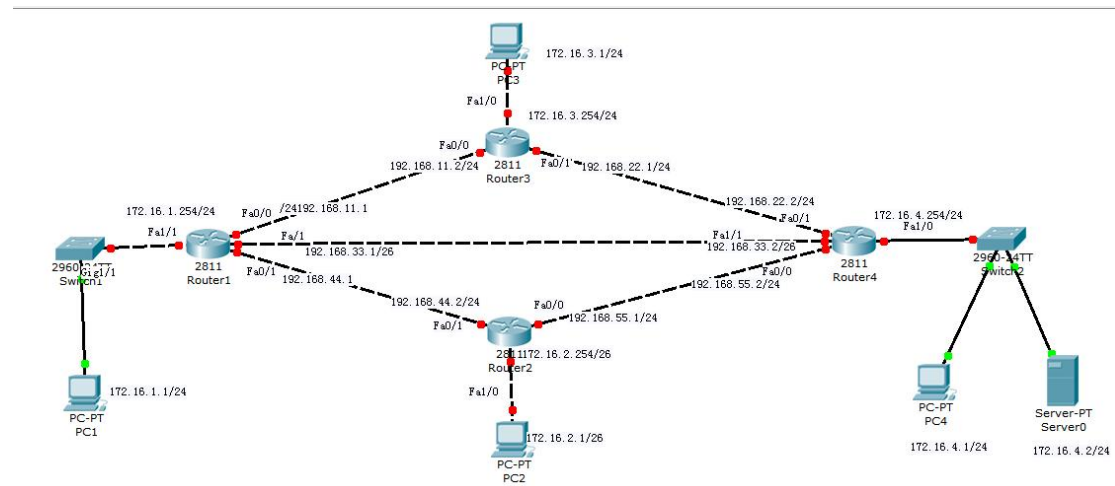
PC2 访问 Server 网站和 ftp 服务



PC3 访问 Server 网站和 ftp 服务



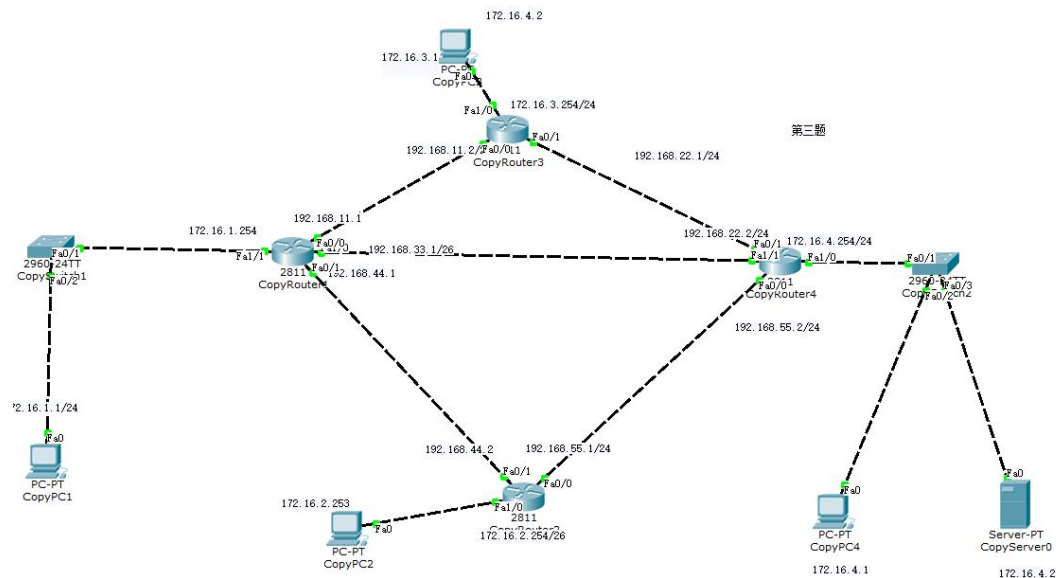
3、小项三拓扑图及具体要求：



复制或建立新的拓扑，清空配置。实验时请在拓扑图上标出各端口号及 IP 地址。通过在 Router1、Router2、Router3、Router4 之间上配置 OSPF 路由协议实现所有网络之间实现可达，不允许使用默认路由。OSPF 各端口之间必须配置密码验证，密码为自己学号。修改

路径的 cost，让 Router1 到达 172.16.4.0/24 网段有 3 条等价 OSPF 路由，Router4 到达 172.16.1.0/24 网段有 3 条等价 OSPF 路由。所有端口全部采用 area 0。

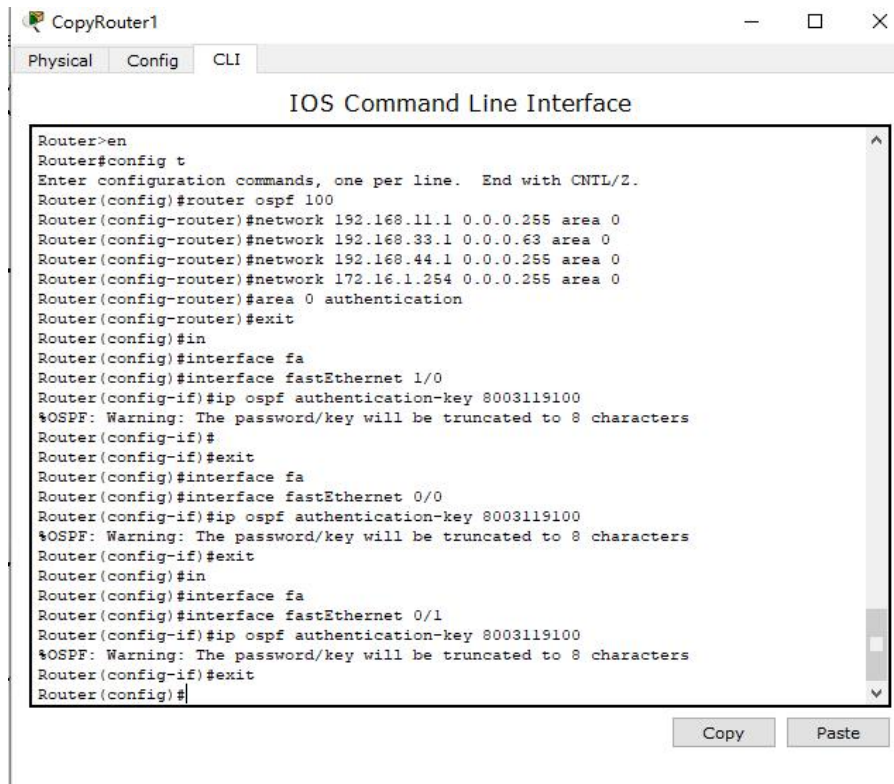
拓扑图如下：



OSPF 配置路由器命令时，找出与路由器邻接的网段和子网掩码划分到 area0 中，并对各路由器之间的连接端口进行密码验证配置；对 router1 到 router2 的中间线路设置 cost 的值为 2，其他路由之间默认的 cost 值为 1，所有有 3 条等价 OSPF 路。

学号为 8003119100

Router1 配置：



CopyRouter1

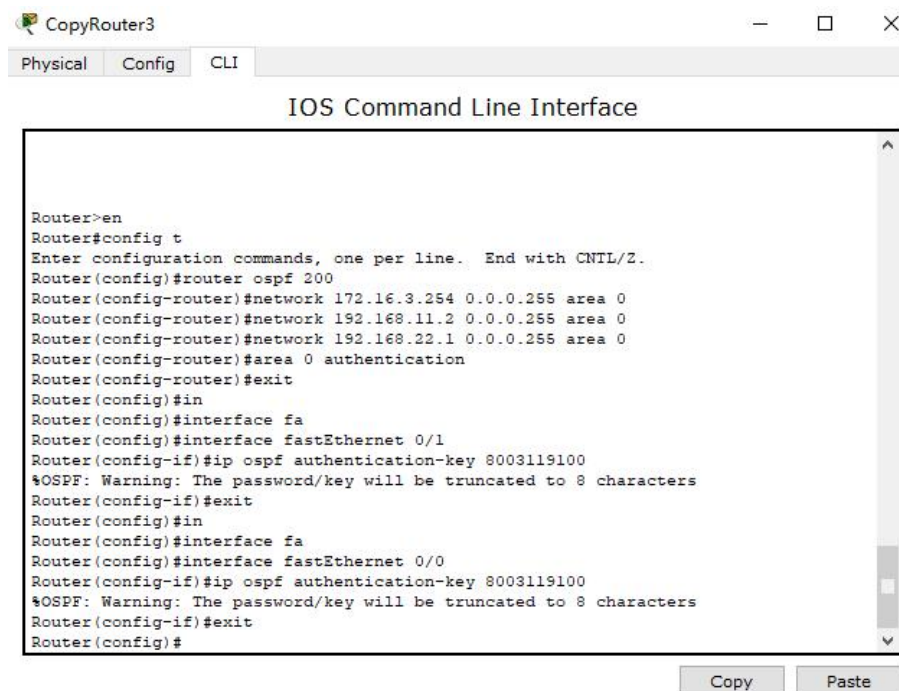
Physical Config CLI

IOS Command Line Interface

```
Router>en
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#router ospf 100
Router(config-router)#network 192.168.11.1 0.0.0.255 area 0
Router(config-router)#network 192.168.33.1 0.0.0.63 area 0
Router(config-router)#network 192.168.44.1 0.0.0.255 area 0
Router(config-router)#network 172.16.1.254 0.0.0.255 area 0
Router(config-router)#area 0 authentication
Router(config-router)#exit
Router(config)#in
Router(config)#interface fa
Router(config)#interface fastEthernet 1/0
Router(config-if)#ip ospf authentication-key 8003119100
%OSPF: Warning: The password/key will be truncated to 8 characters
Router(config-if)#
Router(config-if)#exit
Router(config)#interface fa
Router(config)#interface fastEthernet 0/0
Router(config-if)#ip ospf authentication-key 8003119100
%OSPF: Warning: The password/key will be truncated to 8 characters
Router(config-if)#exit
Router(config)#in
Router(config)#interface fa
Router(config)#interface fastEthernet 0/1
Router(config-if)#ip ospf authentication-key 8003119100
%OSPF: Warning: The password/key will be truncated to 8 characters
Router(config-if)#exit
Router(config)#
```

Copy Paste

Router2 配置:



CopyRouter3

Physical Config CLI

IOS Command Line Interface

```
Router>en
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#router ospf 200
Router(config-router)#network 172.16.3.254 0.0.0.255 area 0
Router(config-router)#network 192.168.11.2 0.0.0.255 area 0
Router(config-router)#network 192.168.22.1 0.0.0.255 area 0
Router(config-router)#area 0 authentication
Router(config-router)#exit
Router(config)#in
Router(config)#interface fa
Router(config)#interface fastEthernet 0/1
Router(config-if)#ip ospf authentication-key 8003119100
%OSPF: Warning: The password/key will be truncated to 8 characters
Router(config-if)#exit
Router(config)#in
Router(config)#interface fa
Router(config)#interface fastEthernet 0/0
Router(config-if)#ip ospf authentication-key 8003119100
%OSPF: Warning: The password/key will be truncated to 8 characters
Router(config-if)#exit
Router(config)#
```

Copy Paste

Router3 配置:

CopyRouter2

Physical Config CLI

IOS Command Line Interface

```
Router>en
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#router ospf 300
Router(config-router)#network 192.168.44.2 0.0.0.255 area 0
Router(config-router)#network 192.168.55.1 0.0.0.255 area 0
Router(config-router)#network 172.16.2.253 0.0.0.255 area 0
Router(config-router)#area 0 authentication
Router(config-router)#exit
Router(config)#in
Router(config)#interface fa0
Router(config)#interface fa
Router(config)#interface fastEthernet 0/1
Router(config-if)#ip ospf authentication-key 8003119100
%OSPF: Warning: The password/key will be truncated to 8 characters
Router(config-if)#exit
Router(config)#in
Router(config)#interface fa
Router(config)#interface fastEthernet
00:30:05: %OSPF-5-ADJCHG: Process 300, Nbr 192.168.44.1 on FastEthernet0/1 from
LOADING to FULL, Loading Done

% Incomplete command.
Router(config)#in
Router(config)#interface fa
Router(config)#interface fastEthernet
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state t
o down

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state t
o up

% Incomplete command.
Router(config)#interface FastEthernet0/0
Router(config-if)#ip ospf authentication-key 8003119100
%OSPF: Warning: The password/key will be truncated to 8 characters
Router(config-if)#exit
Router(config)#
```

Copy Paste

Router4 配置:

CopyRouter4

Physical Config CLI

IOS Command Line Interface

```
Router>en
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#router ospf 400
Router(config-router)#network 192.168.22.2 0.0.0.255 area 0
Router(config-router)#network 192.168.55.2 0.0.0.255 area 0
Router(config-router)#network 192.168.33.2 0.0.0.63 area 0
Router(config-router)#network 172.16.4.254 0.0.0.255 area 0
Router(config-router)#area 0 authentication
Router(config-router)#exit
Router(config)#in
Router(config)#interface fa
Router(config)#interface fastEthernet 0/1
Router(config-if)#ip ospf authentication-key 8003119100
%OSPF: Warning: The password/key will be truncated to 8 characters
Router(config-if)#exit
Router(config)#in
Router(config)#interface fa
Router(config)#interface fastEthernet /
00:35:13: %OSPF-5-ADJCHG: Process 400, Nbr 192.168.22.1 on FastEthernet0/1 from
LOADING to FULL, Loading Done
% Incomplete command.
Router(config)#in
Router(config)#interface fa
Router(config)#interface fastEthernet 1/1
Router(config-if)#ip ospf authentication-key 8003119100
%OSPF: Warning: The password/key will be truncated to 8 characters
Router(config-if)#exit
Router(config)#in
Router(config)#interface fa
Router(config)#interface fastEthernet 0/0
00:35:45: %OSPF-5-ADJCHG: Process 400, Nbr 192.168.44.1 on FastEthernet1/1 from
LOADING to FULL, Loading Done
```

Copy Paste

Cost 配置:

CopyRouter1

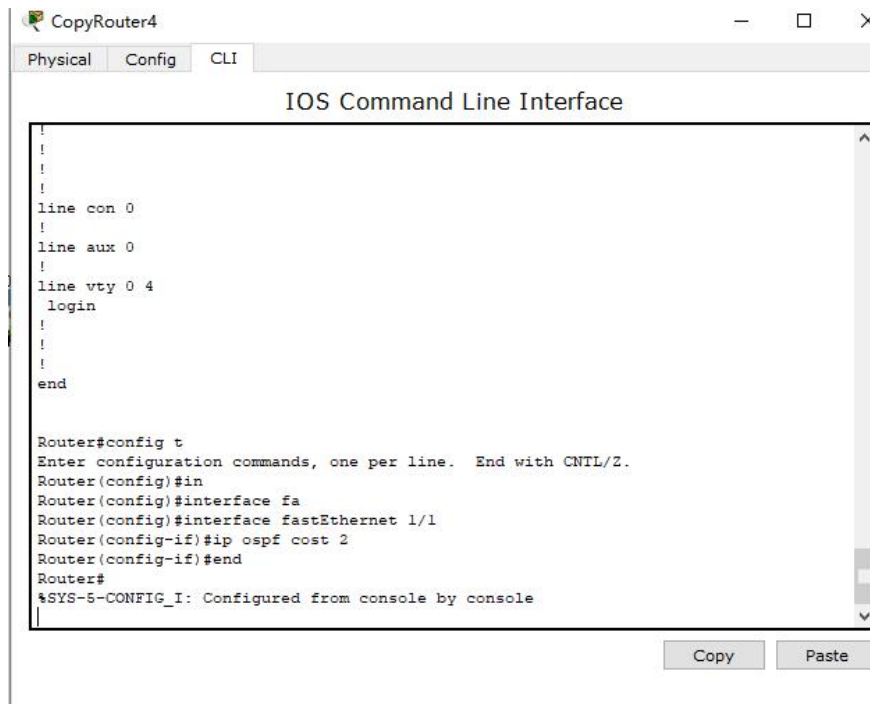
Physical Config CLI

IOS Command Line Interface

```
!
!
!
!
line con 0
!
line aux 0
!
line vty 0 4
login
!
!
!
end

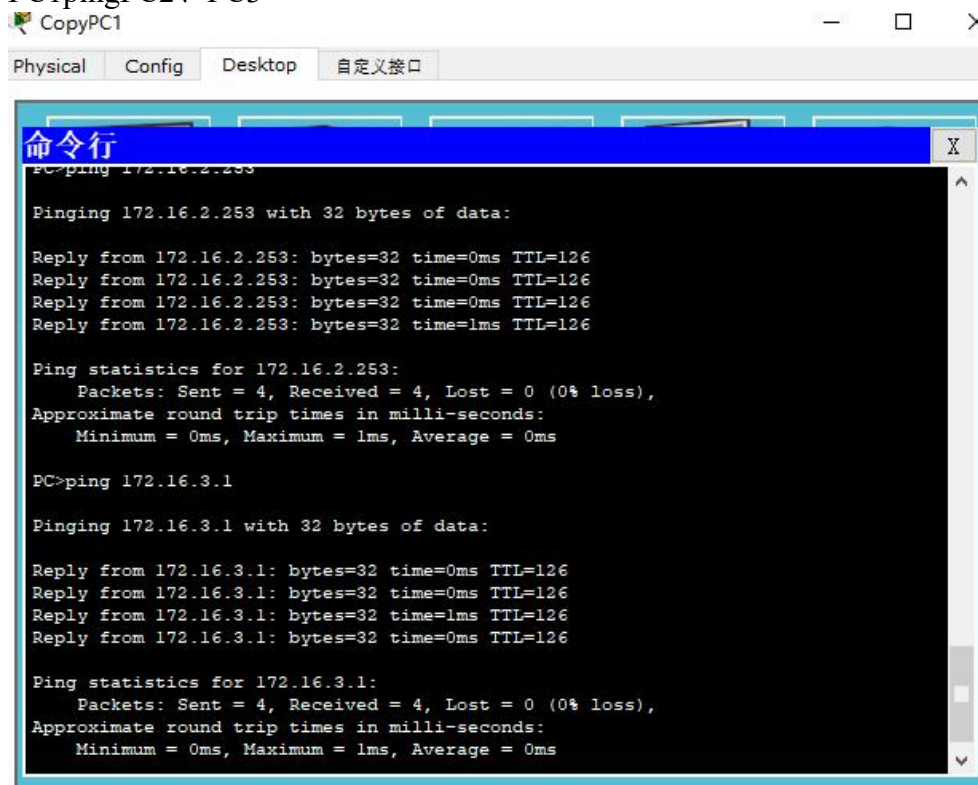
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#in
Router(config)#interface fa
Router(config)#interface fastEthernet 1/0
Router(config-if)#ip ospf cost 2
Router(config-if)#end
Router#
%SYS-5-CONFIG_I: Configured from console by console
```

Copy Paste

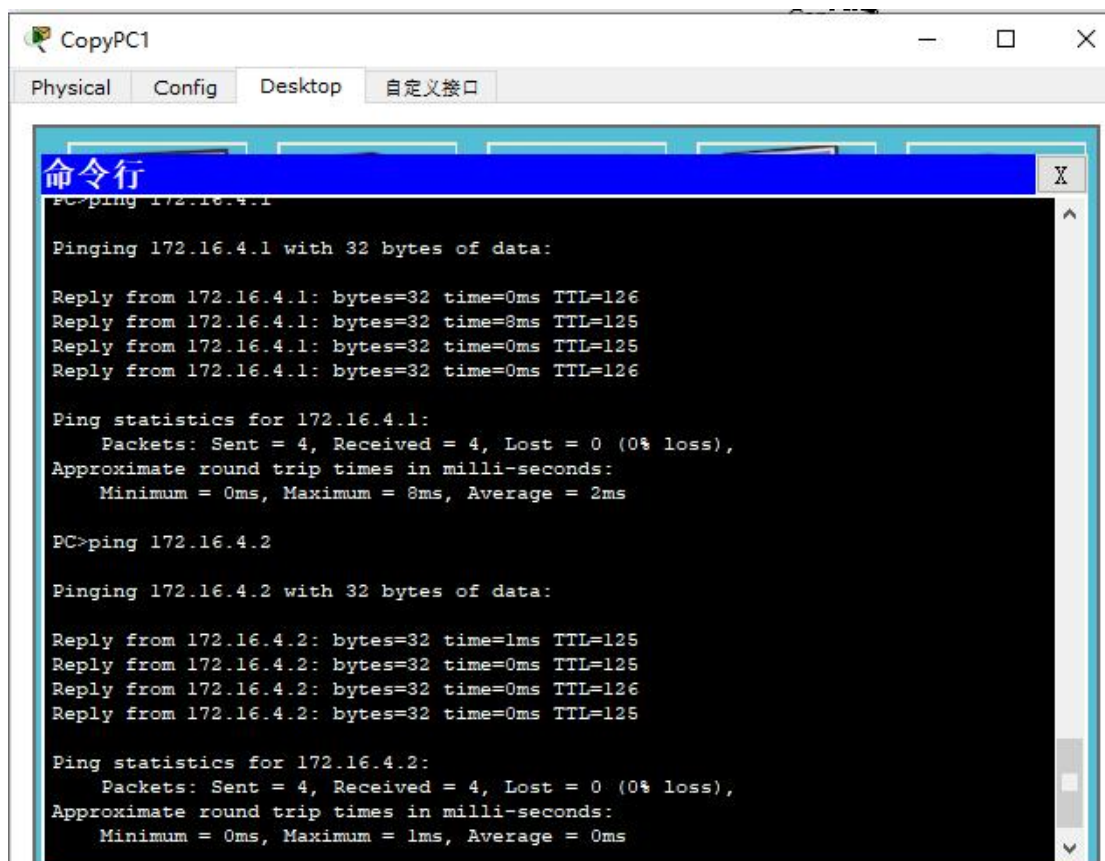


验证结果：
主机间相互 ping 通

PC1pingPC2、PC3



PC1pingPC4 和 Server0



The screenshot shows the CopyPC1 window with the 'Desktop' tab selected. A command line window titled '命令行' is open, displaying the results of two ping commands. The first command is 'PC>ping 172.16.4.1', which shows four successful replies with 0ms response times and a 100% success rate. The second command is 'PC>ping 172.16.4.2', which also shows four successful replies with 0ms response times and a 100% success rate.

```
CopyPC1
Physical Config Desktop 自定义接口

命令行
PC>ping 172.16.4.1

Pinging 172.16.4.1 with 32 bytes of data:

Reply from 172.16.4.1: bytes=32 time=0ms TTL=126
Reply from 172.16.4.1: bytes=32 time=8ms TTL=125
Reply from 172.16.4.1: bytes=32 time=0ms TTL=125
Reply from 172.16.4.1: bytes=32 time=0ms TTL=126

Ping statistics for 172.16.4.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 8ms, Average = 2ms

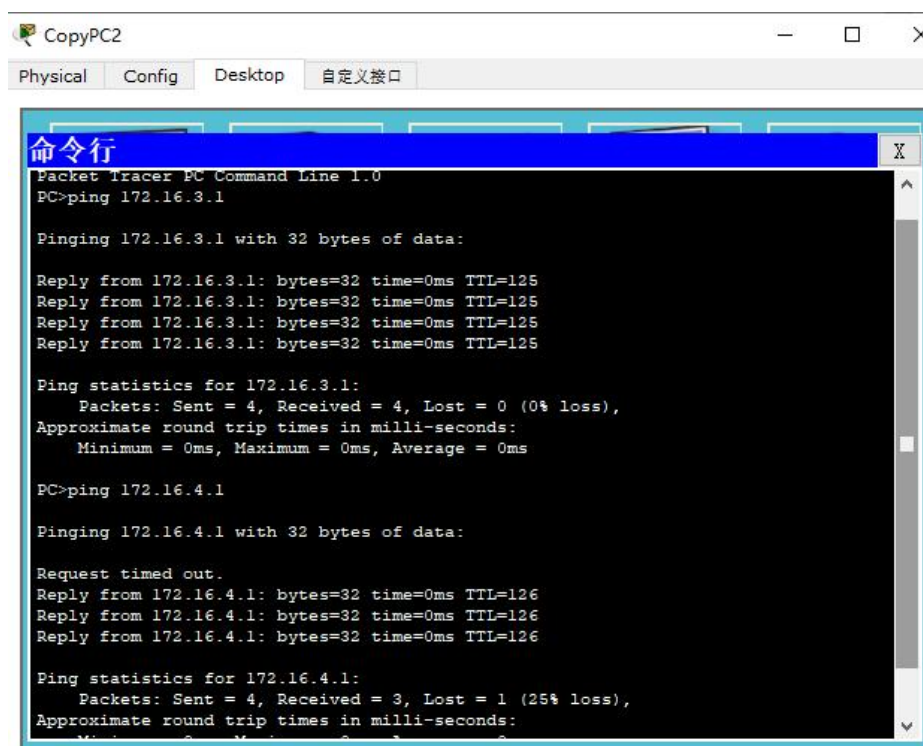
PC>ping 172.16.4.2

Pinging 172.16.4.2 with 32 bytes of data:

Reply from 172.16.4.2: bytes=32 time=1ms TTL=125
Reply from 172.16.4.2: bytes=32 time=0ms TTL=125
Reply from 172.16.4.2: bytes=32 time=0ms TTL=126
Reply from 172.16.4.2: bytes=32 time=0ms TTL=125

Ping statistics for 172.16.4.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 1ms, Average = 0ms
```

PC2pingPC3、PC4



The screenshot shows the CopyPC2 window with the 'Desktop' tab selected. A command line window titled '命令行' is open, displaying the results of two ping commands. The first command is 'PC>ping 172.16.3.1', which shows four successful replies with 0ms response times and a 100% success rate. The second command is 'PC>ping 172.16.4.1', which shows one 'Request timed out' and three successful replies, resulting in a 75% success rate.

```
CopyPC2
Physical Config Desktop 自定义接口

命令行
Packet Tracer PC Command Line 1.0
PC>ping 172.16.3.1

Pinging 172.16.3.1 with 32 bytes of data:

Reply from 172.16.3.1: bytes=32 time=0ms TTL=125
Reply from 172.16.3.1: bytes=32 time=0ms TTL=125
Reply from 172.16.3.1: bytes=32 time=0ms TTL=125
Reply from 172.16.3.1: bytes=32 time=0ms TTL=125

Ping statistics for 172.16.3.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

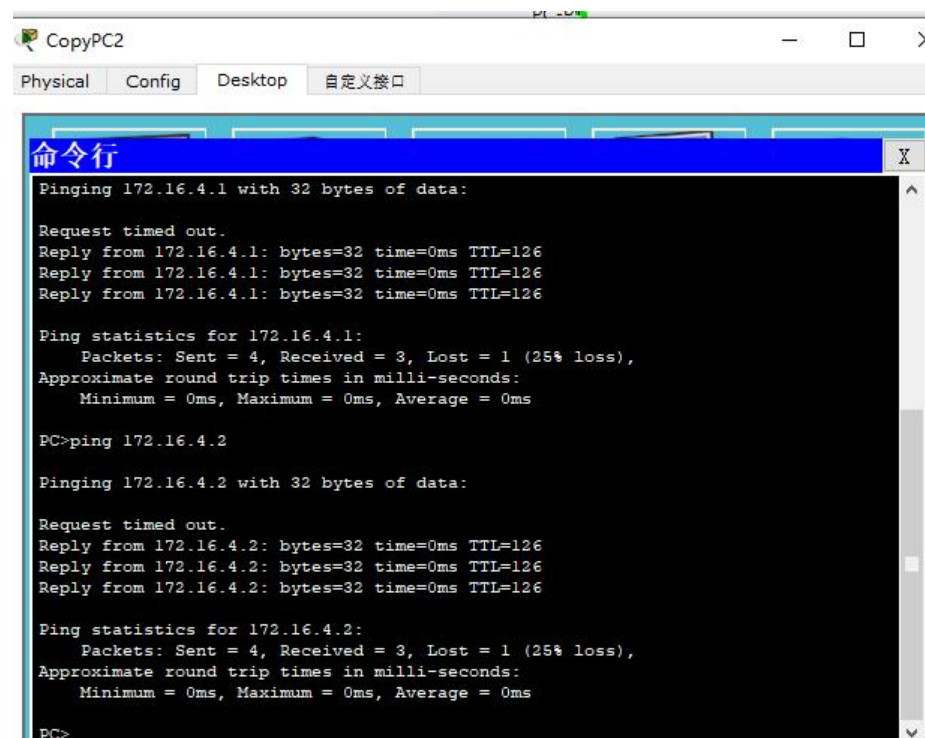
PC>ping 172.16.4.1

Pinging 172.16.4.1 with 32 bytes of data:

Request timed out.
Reply from 172.16.4.1: bytes=32 time=0ms TTL=126
Reply from 172.16.4.1: bytes=32 time=0ms TTL=126
Reply from 172.16.4.1: bytes=32 time=0ms TTL=126

Ping statistics for 172.16.4.1:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
```

PC2pingServer0



The screenshot shows a window titled "CopyPC2" with tabs for "Physical", "Config", "Desktop", and "自定义接口". The "Desktop" tab is active, displaying a command prompt window titled "命令行". The command prompt shows the results of a ping command to 172.16.4.1 and 172.16.4.2. The output for 172.16.4.1 shows a 25% loss, while the output for 172.16.4.2 shows a 25% loss.

```
PC>ping 172.16.4.1

Pinging 172.16.4.1 with 32 bytes of data:

Request timed out.
Reply from 172.16.4.1: bytes=32 time=0ms TTL=126
Reply from 172.16.4.1: bytes=32 time=0ms TTL=126
Reply from 172.16.4.1: bytes=32 time=0ms TTL=126

Ping statistics for 172.16.4.1:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

PC>ping 172.16.4.2

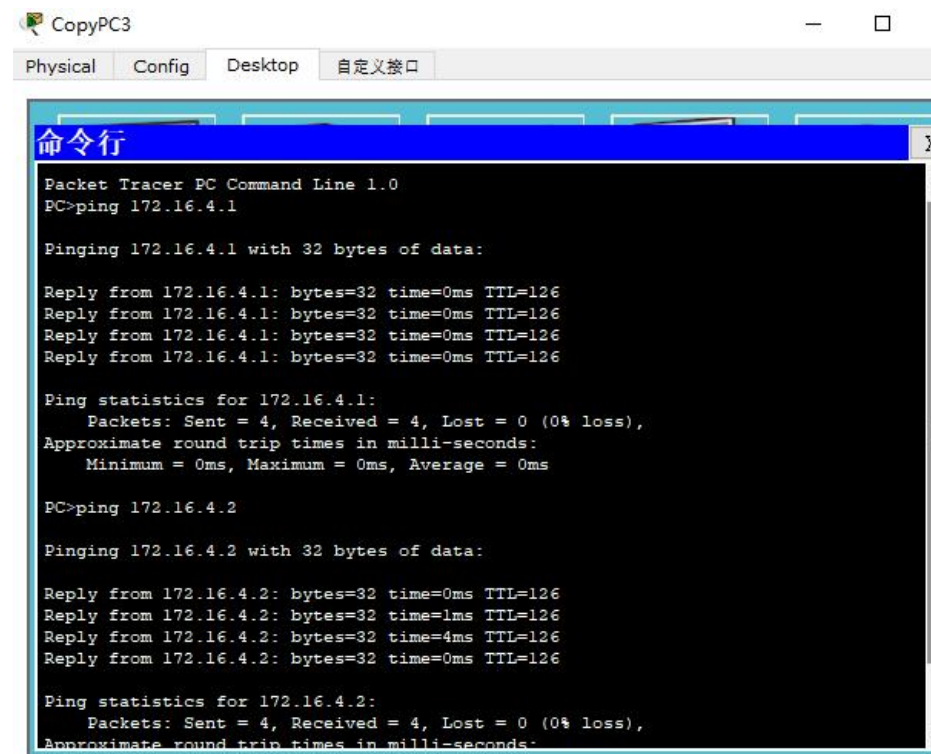
Pinging 172.16.4.2 with 32 bytes of data:

Request timed out.
Reply from 172.16.4.2: bytes=32 time=0ms TTL=126
Reply from 172.16.4.2: bytes=32 time=0ms TTL=126
Reply from 172.16.4.2: bytes=32 time=0ms TTL=126

Ping statistics for 172.16.4.2:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

PC>
```

PC3pingPC4



The screenshot shows a window titled "CopyPC3" with tabs for "Physical", "Config", "Desktop", and "自定义接口". The "Desktop" tab is active, displaying a command prompt window titled "命令行". The command prompt shows the results of a ping command to 172.16.4.1 and 172.16.4.2. The output for 172.16.4.1 shows 0% loss, while the output for 172.16.4.2 shows 0% loss.

```
Packet Tracer PC Command Line 1.0
PC>ping 172.16.4.1

Pinging 172.16.4.1 with 32 bytes of data:

Reply from 172.16.4.1: bytes=32 time=0ms TTL=126
Reply from 172.16.4.1: bytes=32 time=0ms TTL=126
Reply from 172.16.4.1: bytes=32 time=0ms TTL=126
Reply from 172.16.4.1: bytes=32 time=0ms TTL=126

Ping statistics for 172.16.4.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

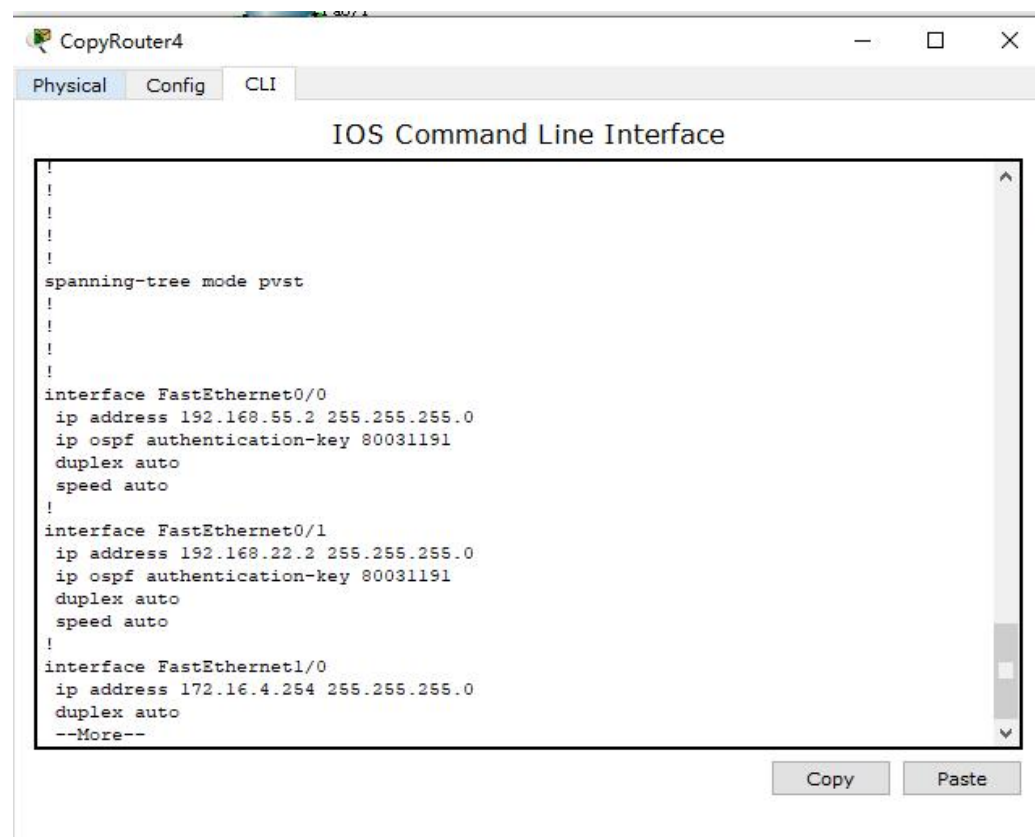
PC>ping 172.16.4.2

Pinging 172.16.4.2 with 32 bytes of data:

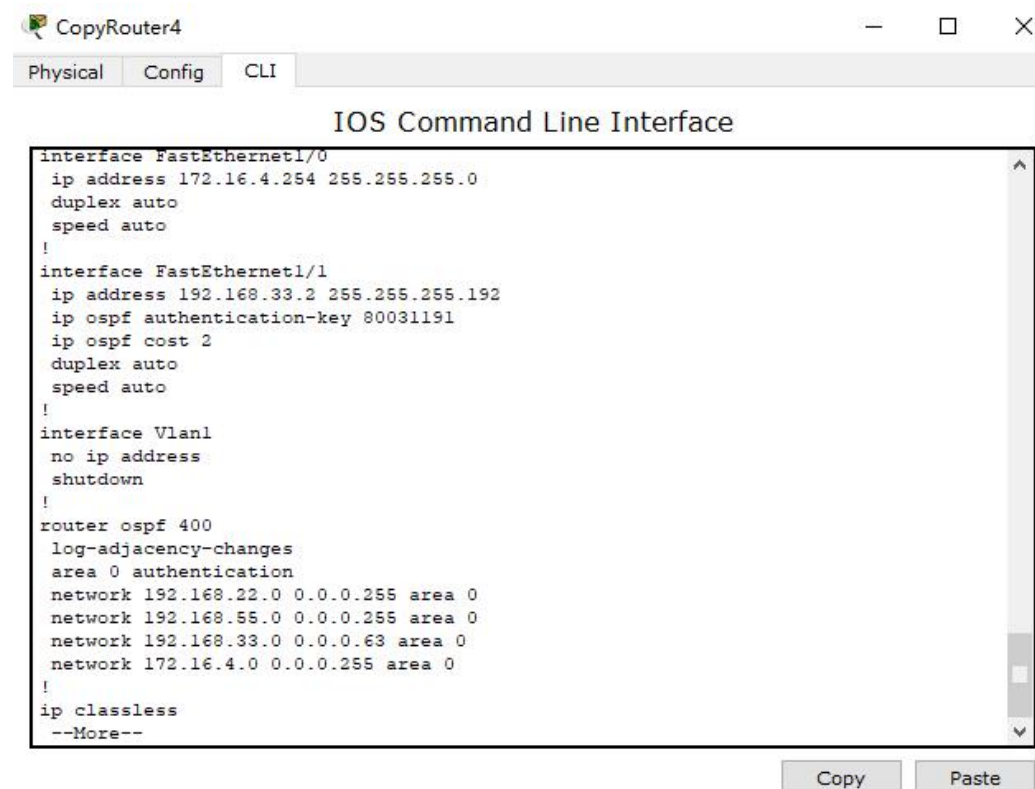
Reply from 172.16.4.2: bytes=32 time=0ms TTL=126
Reply from 172.16.4.2: bytes=32 time=1ms TTL=126
Reply from 172.16.4.2: bytes=32 time=4ms TTL=126
Reply from 172.16.4.2: bytes=32 time=0ms TTL=126

Ping statistics for 172.16.4.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
```

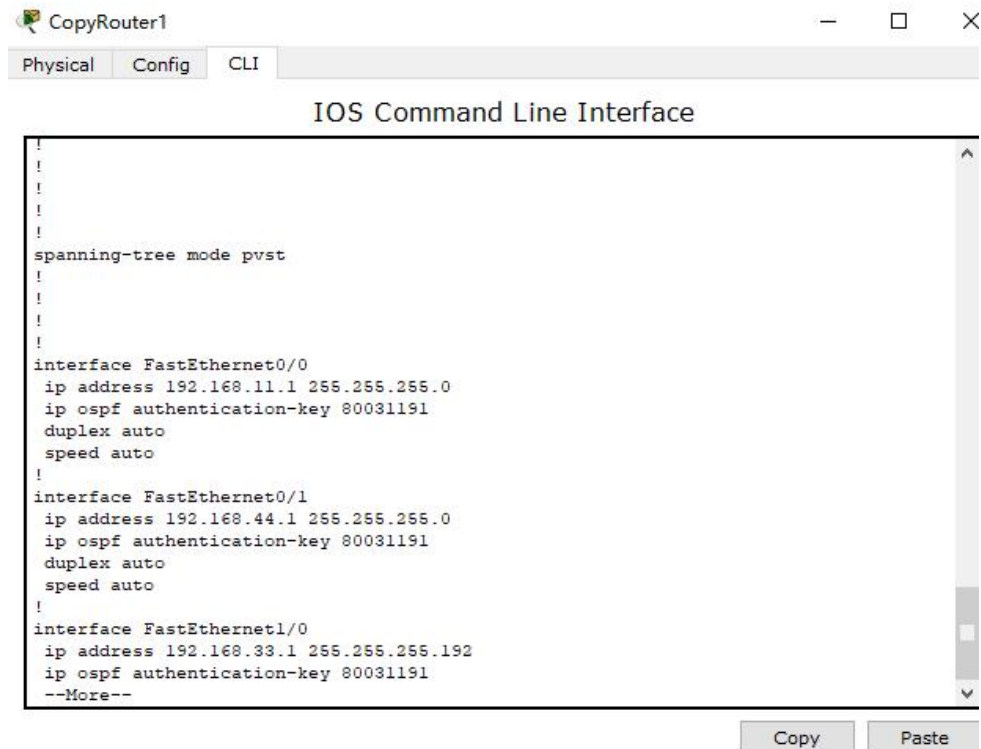
Router1 和 Router4 show run 端口信息



```
!
!
!
!
!
spanning-tree mode pvst
!
!
!
interface FastEthernet0/0
 ip address 192.168.55.2 255.255.255.0
 ip ospf authentication-key 80031191
 duplex auto
 speed auto
!
interface FastEthernet0/1
 ip address 192.168.22.2 255.255.255.0
 ip ospf authentication-key 80031191
 duplex auto
 speed auto
!
interface FastEthernet1/0
 ip address 172.16.4.254 255.255.255.0
 duplex auto
--More--
```



```
interface FastEthernet1/0
 ip address 172.16.4.254 255.255.255.0
 duplex auto
 speed auto
!
interface FastEthernet1/1
 ip address 192.168.33.2 255.255.255.192
 ip ospf authentication-key 80031191
 ip ospf cost 2
 duplex auto
 speed auto
!
interface Vlan1
 no ip address
 shutdown
!
router ospf 400
 log-adjacency-changes
 area 0 authentication
 network 192.168.22.0 0.0.0.255 area 0
 network 192.168.55.0 0.0.0.255 area 0
 network 192.168.33.0 0.0.0.63 area 0
 network 172.16.4.0 0.0.0.255 area 0
!
ip classless
--More--
```

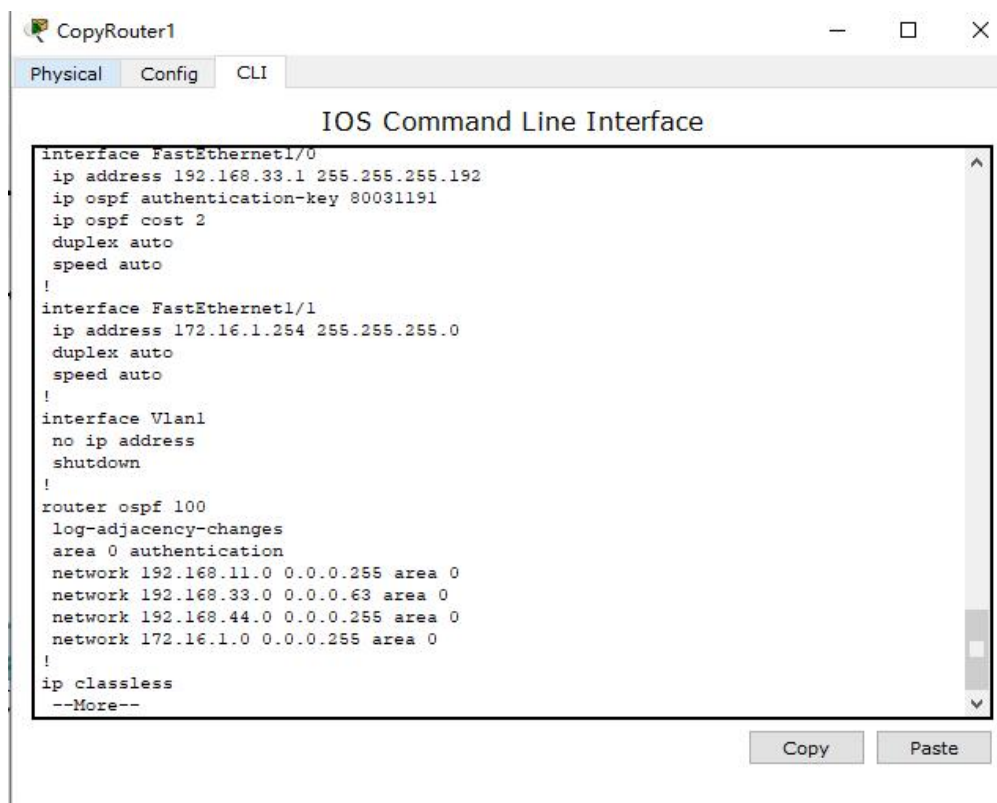
CopyRouter1

Physical Config CLI

IOS Command Line Interface

```
!
!
!
!
!
spanning-tree mode pvst
!
!
!
!
interface FastEthernet0/0
ip address 192.168.11.1 255.255.255.0
ip ospf authentication-key 80031191
duplex auto
speed auto
!
interface FastEthernet0/1
ip address 192.168.44.1 255.255.255.0
ip ospf authentication-key 80031191
duplex auto
speed auto
!
interface FastEthernet1/0
ip address 192.168.33.1 255.255.255.192
ip ospf authentication-key 80031191
--More--
```

Copy Paste



CopyRouter1

Physical Config CLI

IOS Command Line Interface

```
interface FastEthernet1/0
ip address 192.168.33.1 255.255.255.192
ip ospf authentication-key 80031191
ip ospf cost 2
duplex auto
speed auto
!
interface FastEthernet1/1
ip address 172.16.1.254 255.255.255.0
duplex auto
speed auto
!
interface Vlan1
no ip address
shutdown
!
router ospf 100
log-adjacency-changes
area 0 authentication
network 192.168.11.0 0.0.0.255 area 0
network 192.168.33.0 0.0.0.63 area 0
network 192.168.44.0 0.0.0.255 area 0
network 172.16.1.0 0.0.0.255 area 0
!
ip classless
--More--
```

Copy Paste

可见，在 router1 和 router4 之间配置了一条 cost 为 2 的一条路。

五、实验总结和思考

这次实验是有关于静态路由、访问控制列表和 ospf 路由的配置。静态路由配置的原理是为了完成路由选择工作,在路由器中保存着各种传输路径的相关数据——路由表(Routing Table),供路由选择时使用。打个比方,路由表就像我们平时使用的地图一样,标识着各种路线,路由表中保存着子网的标志信息、网上路由器的个数和下一个路由器的名字等内容。路由表可以是由系统管理员固定设置好的,也可以由系统动态修改,可以由路由器自动调整,也可以由主机控制。为了使与路由器相连的主机之间相互 ping 通,我们需要在每个路由器的静态路由表中添加与该路由器不相邻的端口之间的网段和到达此网段的下一跳地址。

访问控制表配置原理是访问列表提供了一种机制,它可以控制和过滤通过路由器的不同接口去往不同方向的信息流。通过在 Router4 上配置访问控制列表,禁止 PC1 访问 Server0 上的 ftp(端口 21),并允许其他所有主机访问 Server0 上的网站和 ftp 服务。

Ospf 配置原理是 OSPF(Open Shortest Path First 开放式最短路径优先)是一个内部网关协议(Interior Gateway Protocol,简称 IGP),用于在单一自治系统(autonomous system, AS)内决策路由,应用笛卡斯加算(Dijkstra)法被用来计算最短路径树。与 RIP 相比,OSPF 是链路状态协议,而 RIP 是距离矢量协议。通过对每台路由器用 ospf 命令把与各端口相邻的网段连接,并给各路由器之间相连的接口配置密码,要想 Router1 到达 172.16.4.0/24 网段有 3 条等价 ospf 路由,配置 router1 到 router4 之间的两个端口 cost 为 2,其他路由器之间的 cost 值默认为 1,所以就形成了三条等价路。

在配置的过程中总是出现网关没有配置或配置错误,ip 地址要小心配置,如果出错不仅会影响自身网络的连接还会造成到达其他网段路由出错。