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静态路由配置

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静态路由的原理

- 静态路由是指由手工配置的路由信息。当网络的拓扑结构或链路的状态发生变化时，需要手工去修改路由表中相关的静态路由信息。
- 静态路由信息在缺省情况下是私有的，不会传递给其他的路由器。当然，网管员也可以通过对路由器进行设置使之成为共享的。
- 静态路由一般适用于比较简单的网络环境，在这样的环境中，网络管理员易于清楚地了解网络的拓扑结构，便于设置正确的路由信息。

静态路由优缺点

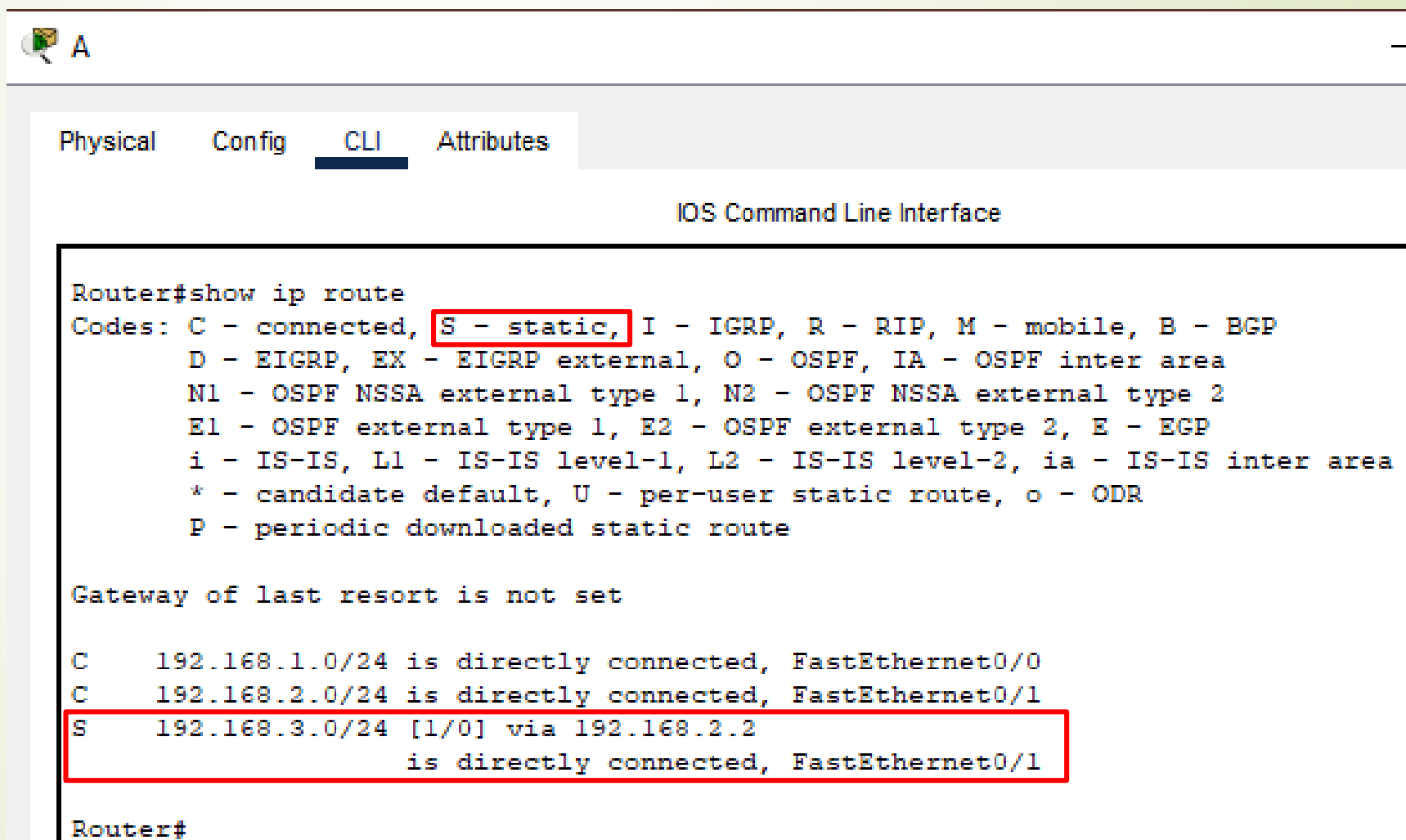
- **优点：**使用静态路由的另一个好处是网络安全保密性高。动态路由因为需要路由器之间频繁地交换各自的路由表，而对路由表的分析可以揭示网络的拓扑结构和网络地址等信息。因此，网络出于安全方面的考虑也可以采用静态路由。
- **缺点：**大型和复杂的网络环境通常不宜采用静态路由。一方面，网络管理员难以全面地了解整个网络的拓扑结构；另一方面，当网络的拓扑结构和链路状态发生变化时，路由器中的静态路由信息需要大范围地调整，这一工作的难度和复杂程度非常高。

静态路由的配置命令

- 配置路由器接口地址：
`ip address xxx.xxx.xxx.xxx subnetmask x.x.x.x`
- 启用（激活）端口：
`no shutdown`
- 配置目标网段ip地址、目标子网掩码和下一路由器接口ip地址
`ip route xxx.xxx.xxx.xxx xxx.xxx.xxx.xxx
xxx.xxx.xxx.xxx`
- 或配置：目标网段ip地址 目标子网掩码，送出接口
`ip route xxx.xxx.xxx.xxx xxx.xxx.xxx.xxx xx/xx`

查看路由配置情况

► Show ip route



```
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

C     192.168.1.0/24 is directly connected, FastEthernet0/0
C     192.168.2.0/24 is directly connected, FastEthernet0/1
S     192.168.3.0/24 [1/0] via 192.168.2.2
                                     is directly connected, FastEthernet0/1

Router#
```


查看路由器上接口信息

► Show ip interface brief

通常包括接口名称、IP地址、接口状态等信息

```
R2
File Edit View Options Transfer Script Tools Window Help
PC1 R1 R2 x R3 PC2
R2#show ip interface brief
Interface IP-Address OK? Method Status Protocol
Ethernet0/0 unassigned YES unset administratively down down
Ethernet0/1 unassigned YES unset administratively down down
Ethernet0/2 unassigned YES unset administratively down down
Ethernet0/3 unassigned YES unset administratively down down
Serial1/0 192.168.12.2 YES manual up up
Serial1/1 192.168.23.2 YES manual up up
Serial1/2 unassigned YES unset administratively down down
Serial1/3 unassigned YES unset administratively down down
R2#
```

删除路由器配置

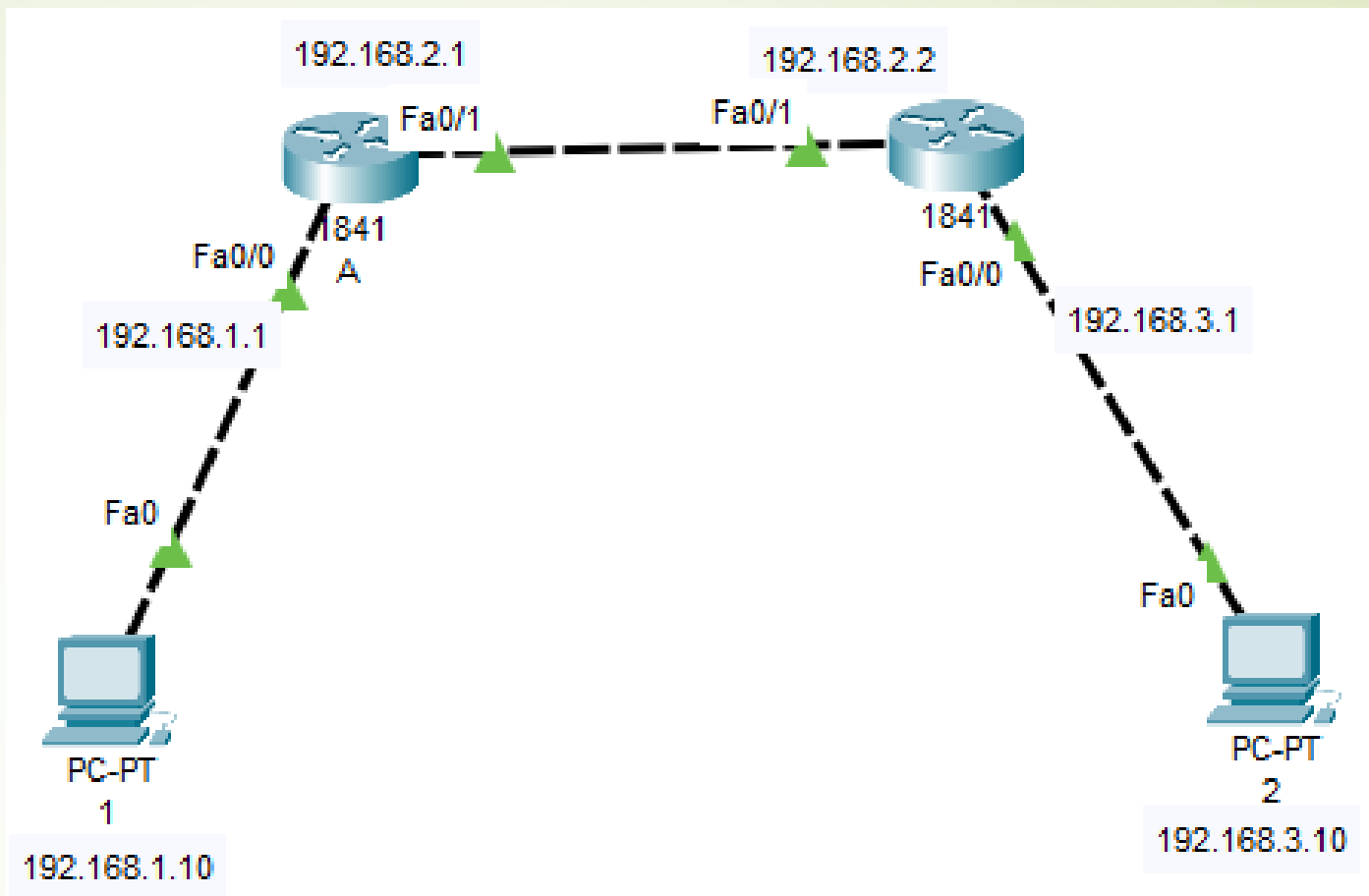
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no ip route xxx.xxx.xxx.xxx xxx.xxx.xxx.xxx
xx/xx

实验步骤

- 1, 规划网络地址及拓扑图;
- 2, 配置所有设备的IP、网关、子网掩码
- 3, 检查网络连通性
- 4, 配置静态路由
- 5, 再次检查网络连通性, 并查看路由表

步骤1



- ➡ 子网掩码是255.255.255.0,
- ➡ 机器1的网关是192.168.1.1
- ➡ 机器2的网关是192.168.3.1

步骤2，路由器A的配置方法一（CLI）

Router>enable	进入特权模式
Router#configure terminal	进入全局配置模式
Router(config)#hostname A	命名路由器为A
A(config)#interface f0/0	进入接口模式
A(config-if)#ip address 192.168.1.1 255.255.255.0	接口配置IP地址
A(config-if)#no shutdown	激活接口
A(config)#interface f0/1	配置另一个接口
A(config-if)#ip address 192.168.2.1 255.255.255.0	接口配置IP地址
A(config-if)#no shutdown	激活接口

路由器B配置命令类似

步骤2, 由A的 路由器配置方法: 二图界面

Cisco Packet Tracer

File Edit Options View Tools Extensions Window Help

Logical Physical x: 1272, y: 36

192.158.2.1
Fa0/1
841
A
Fa0/0
192.168.1.1
Fa0
PC-PT
1
192.168.1.10

Time: 01:46:24

Physical Config CLI Attributes

GLOBAL
Settings
Algorithm Settings
ROUTING
Static
RIP
SWITCHING
VLAN Database
INTERFACE
FastEthernet0/0
FastEthernet0/1

FastEthernet0/0

Port Status ☐ On

Bandwidth ☒ 100 Mbps ☐ 10 Mbps ☒ Auto

Duplex ☐ Half Duplex ☒ Full Duplex ☒ Auto

MAC Address 000A.F342.A101

IP Configuration
IPv4 Address 192.168.1.1
Subnet Mask 255.255.255.0

Tx Ring Limit 10

Equivalent IOS Commands

Press RETURN to get started!

```
Router>enable
Router#
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface FastEthernet0/0
Router(config-if)#ip address 192.168.1.1 255.255.255.0
Router(config-if)#
```

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步骤2,
路由器A配置端

FastEthernet0/1

Cisco Packet Tracer

File Edit Options View Tools Extensions

Logical Physical x: 1220, y: 374

192.158.2.1
Fa0/1
1841
A
Fa0/0
192.168.1.1
Fa0
PC-PT
1
192.168.1.10

Time: 01:48:13

Physical Config CLI Attributes

GLOBAL
Settings
Algorithm Settings
ROUTING
Static
RIP
SWITCHING
VLAN Database
INTERFACE
FastEthernet0/0
FastEthernet0/1

FastEthernet0/1

Port Status ☐ On
Bandwidth 100 Mbps 10 Mbps ☒ Auto
Duplex Half Duplex Full Duplex ☒ Auto
MAC Address 000A.F342.A102

IP Configuration
IPv4 Address 192.168.2.1
Subnet Mask 255.255.255.0

Tx Ring Limit 10

Equivalent IOS Commands

```
Router>enable
Router#
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface FastEthernet0/0
Router(config-if)#ip address 192.168.1.1 255.255.255.0
Router(config-if)#ip address 192.168.1.1 255.255.255.0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface FastEthernet0/1
Router(config-if)#no ip address
Router(config-if)#ip address 192.168.2.1 255.255.255.0
Router(config-if)#
```

☐ Top

步骤3，检查此时网络连通性

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Physical Config Desktop Programming Attributes

Command Prompt

Cisco Packet Tracer PC Command Line 1.0

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=14ms TTL=255
Reply from 192.168.1.1: bytes=32 time<1ms TTL=255
Reply from 192.168.1.1: bytes=32 time<1ms TTL=255
Reply from 192.168.1.1: bytes=32 time<1ms TTL=255
Reply from 192.168.1.1: bytes=32 time<1ms TTL=255
```

Ping statistics for 192.168.1.1:

```
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 14ms, Average = 3ms
```

C:\>ping 192.168.2.1

Pinging 192.168.2.1 with 32 bytes of data:

```
Request timed out.
Request timed out.
Request timed out.
Request timed out.
```

Ping statistics for 192.168.2.1:

```
Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
```

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Physical Config Desktop Programming Attributes

Command Prompt

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<1ms TTL=255
Reply from 192.168.3.1: bytes=32 time<1ms TTL=255
Reply from 192.168.3.1: bytes=32 time<1ms TTL=255
Reply from 192.168.3.1: bytes=32 time<1ms TTL=255
```

Ping statistics for 192.168.3.1:

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

C:\>ping 192.168.2.2

Pinging 192.168.2.2 with 32 bytes of data:

```
Request timed out.
Request timed out.
Request timed out.
Request timed out.
```

Ping statistics for 192.168.2.2:

```
Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
```

步骤4，路由器A的静态路由CLI配置方式

目标网段ip地址

目标子网掩码

下一路由器接口ip地址

```
A(config)#ip route 192.168.3.0 255.255.255.0 192.168.2.2  
A(config)#ip route 192.168.3.0 255.255.255.0 f0/1
```

送出接口

步骤4，路由器B的静态路由配置

类似路由其A的静态路由命令

步骤4, 路由器的静态路由配置方式

Cisco Packet Tracer

File Edit Options View Tools Extensions Window Help

Logical Physical x: 1114, y: 197

192.158.2.1 Fa0/1 1841 A 192.169.2.2 Fa0/1 184 B 192.168.1.1 Fa0/0 PC-PT 1 192.168.1.10

Config

GLOBAL

Settings

Algorithm Settings

ROUTING

Static

RIP

SWITCHING

VLAN Database

INTERFACE

FastEthernet0/0

FastEthernet0/1

Static Routes

Network 192.168.3.0

Mask 255.255.255.0

Next Hop 192.168.2.2

Add

Network Address

192.168.3.0/24 via 192.168.2.2

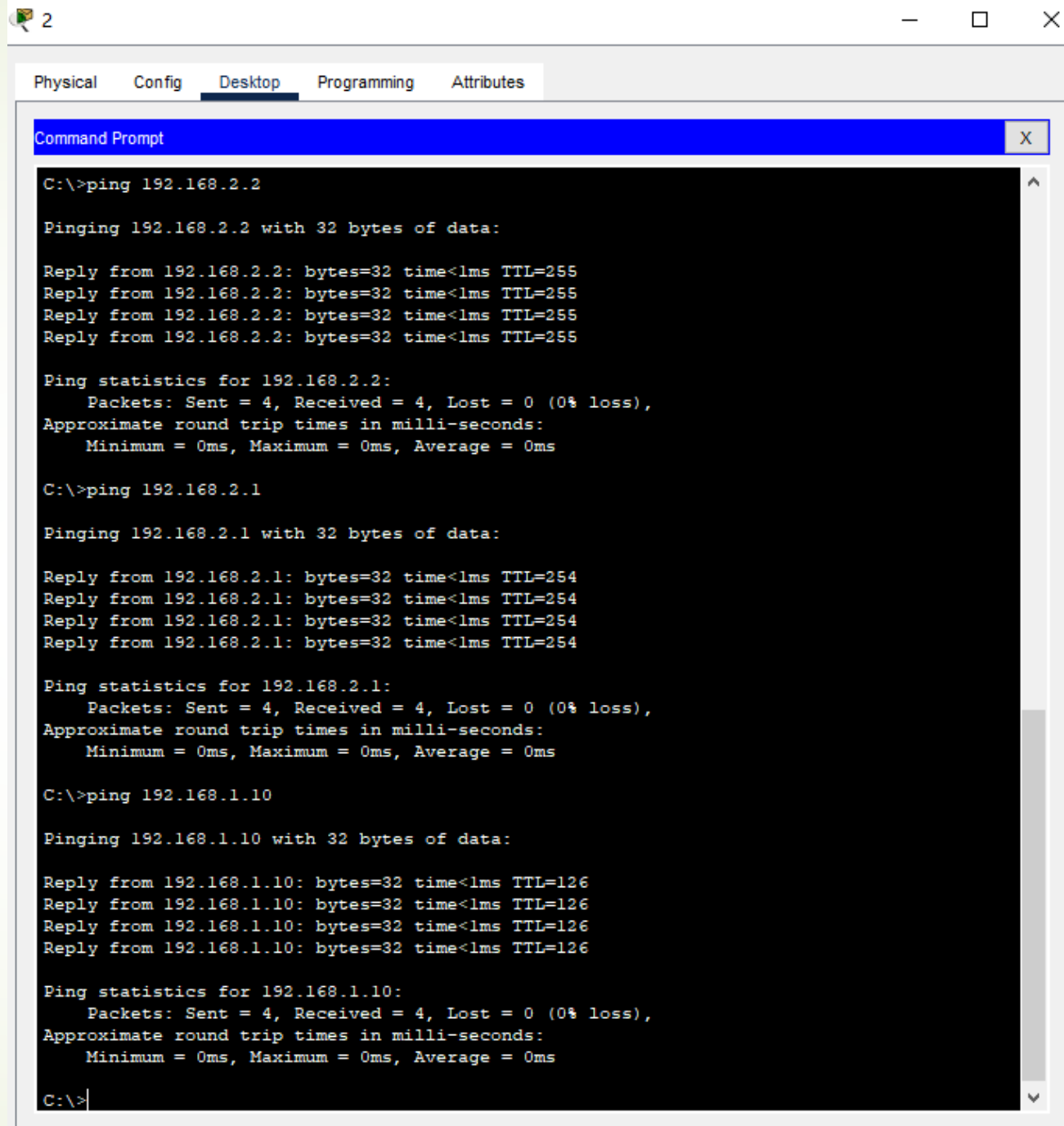
Remove

Equivalent IOS Commands

```
Router(config)#end
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#
Router(config)#
%SYS-5-CONFIG_I: Configured from console by console

Router(config)#interface FastEthernet0/1
Router(config-if)#
Router(config-if)#exit
Router(config)#
Router(config)#ip route 192.168.3.0 255.255.255.0 192.168.2.2
Router(config)#
```

步骤5，测试连通性



```
C:\>ping 192.168.2.2

Pinging 192.168.2.2 with 32 bytes of data:

Reply from 192.168.2.2: bytes=32 time<1ms TTL=255
Reply from 192.168.2.2: bytes=32 time<1ms TTL=255
Reply from 192.168.2.2: bytes=32 time<1ms TTL=255
Reply from 192.168.2.2: bytes=32 time<1ms TTL=255

Ping statistics for 192.168.2.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

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<1ms TTL=254
Reply from 192.168.2.1: bytes=32 time<1ms TTL=254
Reply from 192.168.2.1: bytes=32 time<1ms TTL=254
Reply from 192.168.2.1: bytes=32 time<1ms TTL=254

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 = 0ms, Average = 0ms

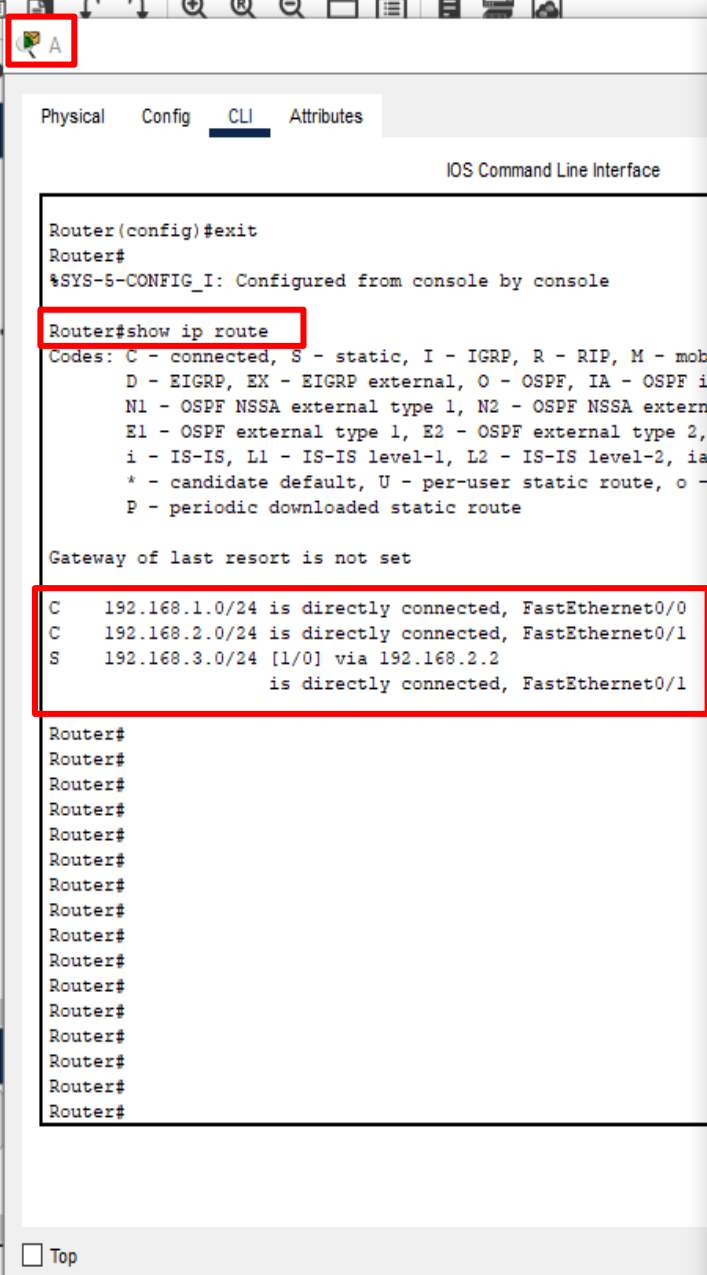
C:\>ping 192.168.1.10

Pinging 192.168.1.10 with 32 bytes of data:

Reply from 192.168.1.10: bytes=32 time<1ms TTL=126
Reply from 192.168.1.10: bytes=32 time<1ms TTL=126
Reply from 192.168.1.10: bytes=32 time<1ms TTL=126
Reply from 192.168.1.10: bytes=32 time<1ms TTL=126

Ping statistics for 192.168.1.10:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>
```



Physical

Config

CLI

Attributes

IOS Command Line Interface

Press RETURN to get started!

Router>en

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

S 192.168.1.0/24 [1/0] via 192.168.2.1

is directly connected, FastEthernet0/1

C 192.168.2.0/24 is directly connected, FastEthernet0/1

C 192.168.3.0/24 is directly connected, FastEthernet0/0

Router#

Router#

Router#

Router#

Router#

Router#

Router#

Router#

Router#

Router#

Router#

Router#

Router#

Router#

Router#

Copy

Paste

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实验内容

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- ➡ 1, 按第10页规划网络地址及拓扑图, 要求2台PC的IP地址最后一段为学号1-2位;
- ➡ 2, 配置所有设备的IP、网关、子网掩码
- ➡ 3, 检查网络连通性
- ➡ 4, 配置静态路由
- ➡ 5, 再次检查网络连通性
- ➡ 6, 查看路由表信息