静态路由配置

冯巾松

fengjinsong@tongji.edu.cn

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。

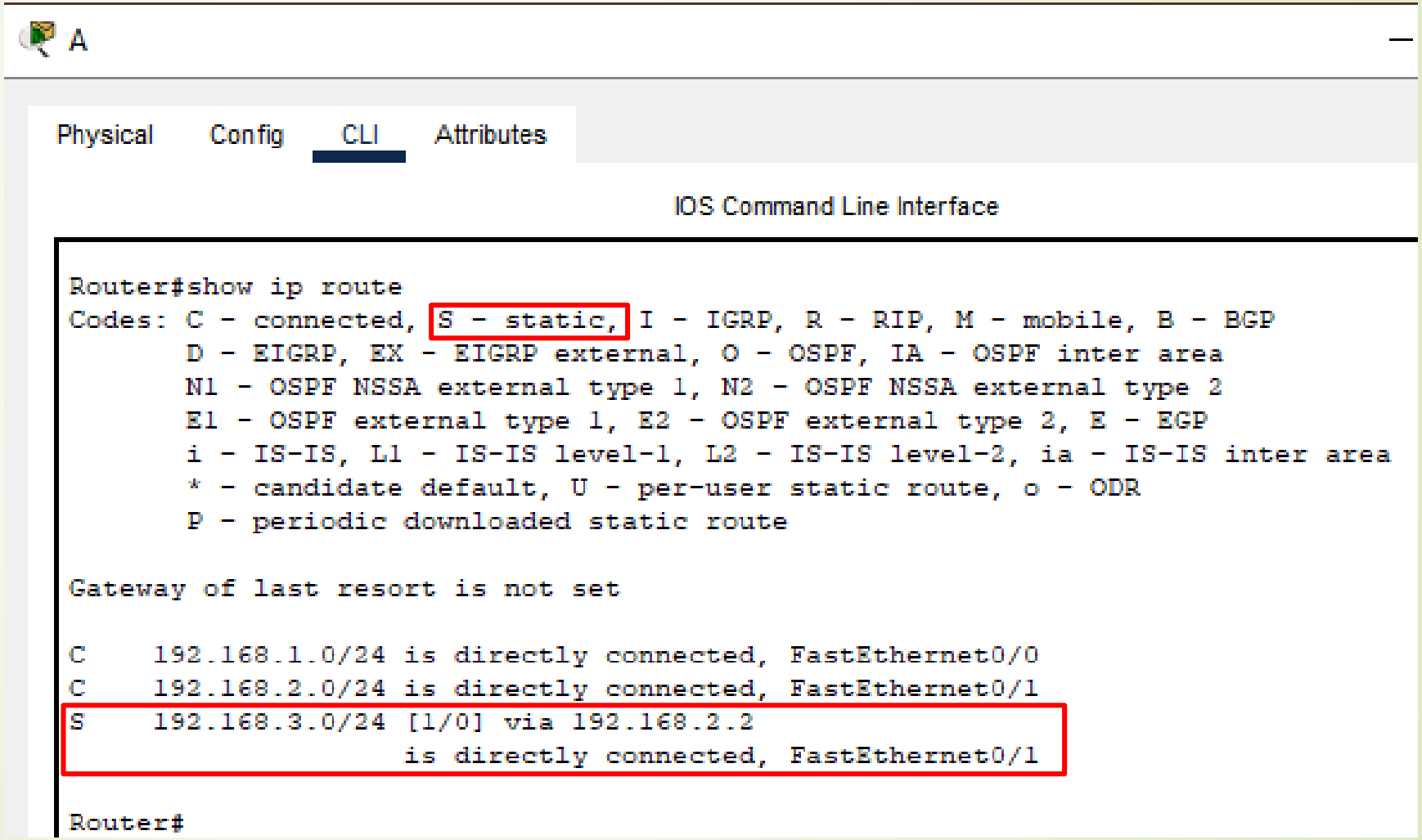
- 缺点：大型和复杂的网络环境通常不宜采用静态路由。 一方面，网络管理员难以全面地了解整个网络的拓扑结构；另一方面，当网络的拓扑结构和链路状态发生变化时，路由器中的静态路由信息需要大范围地调整，这一工作的难度和复杂程度非常高。

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

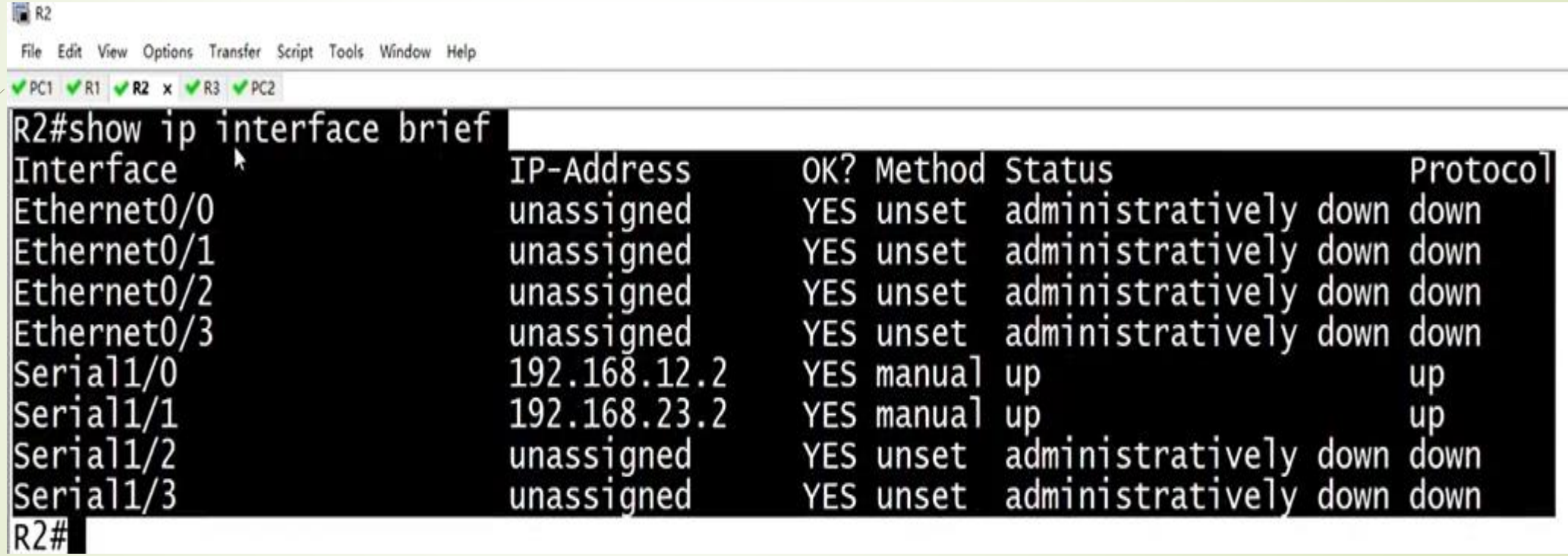
- Show ip route



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



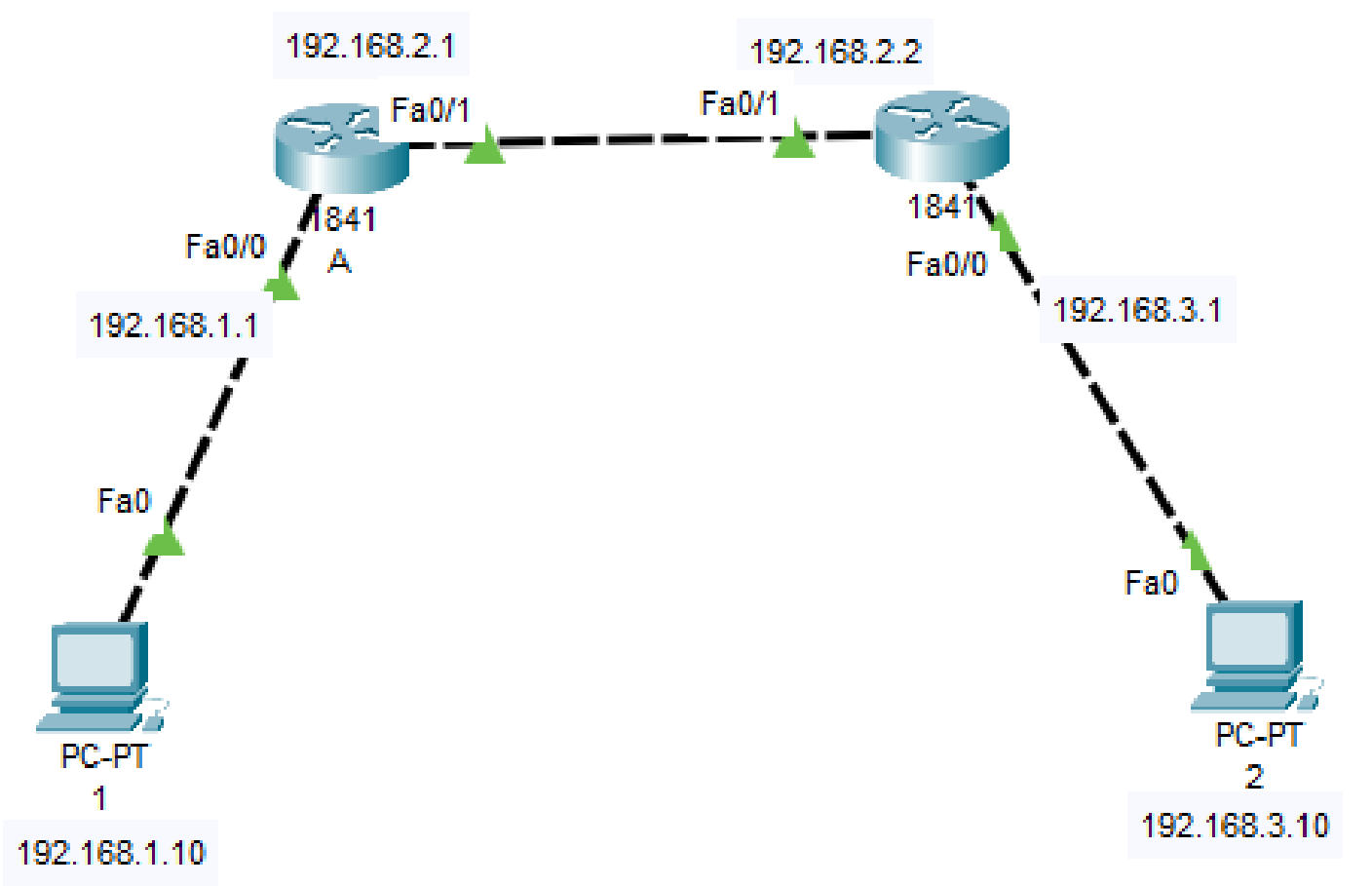
删除路由器配置

- 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



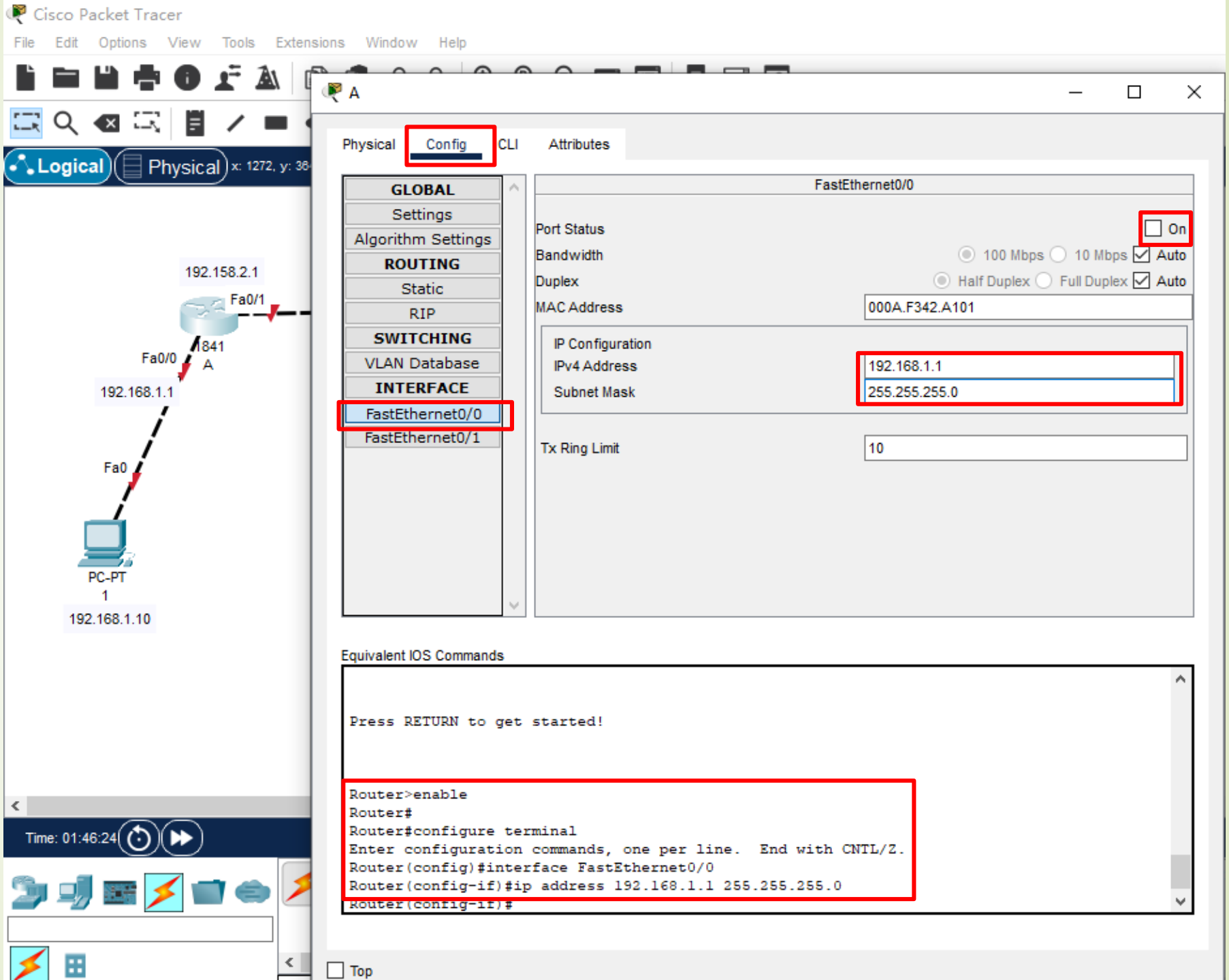
- 子网掩码是255.255.255.0,
- 机器1的网关是192.168.1.1
- 机器2的网关是192.168.3.1

步骤2，路由器A的配置方法一（CLI）

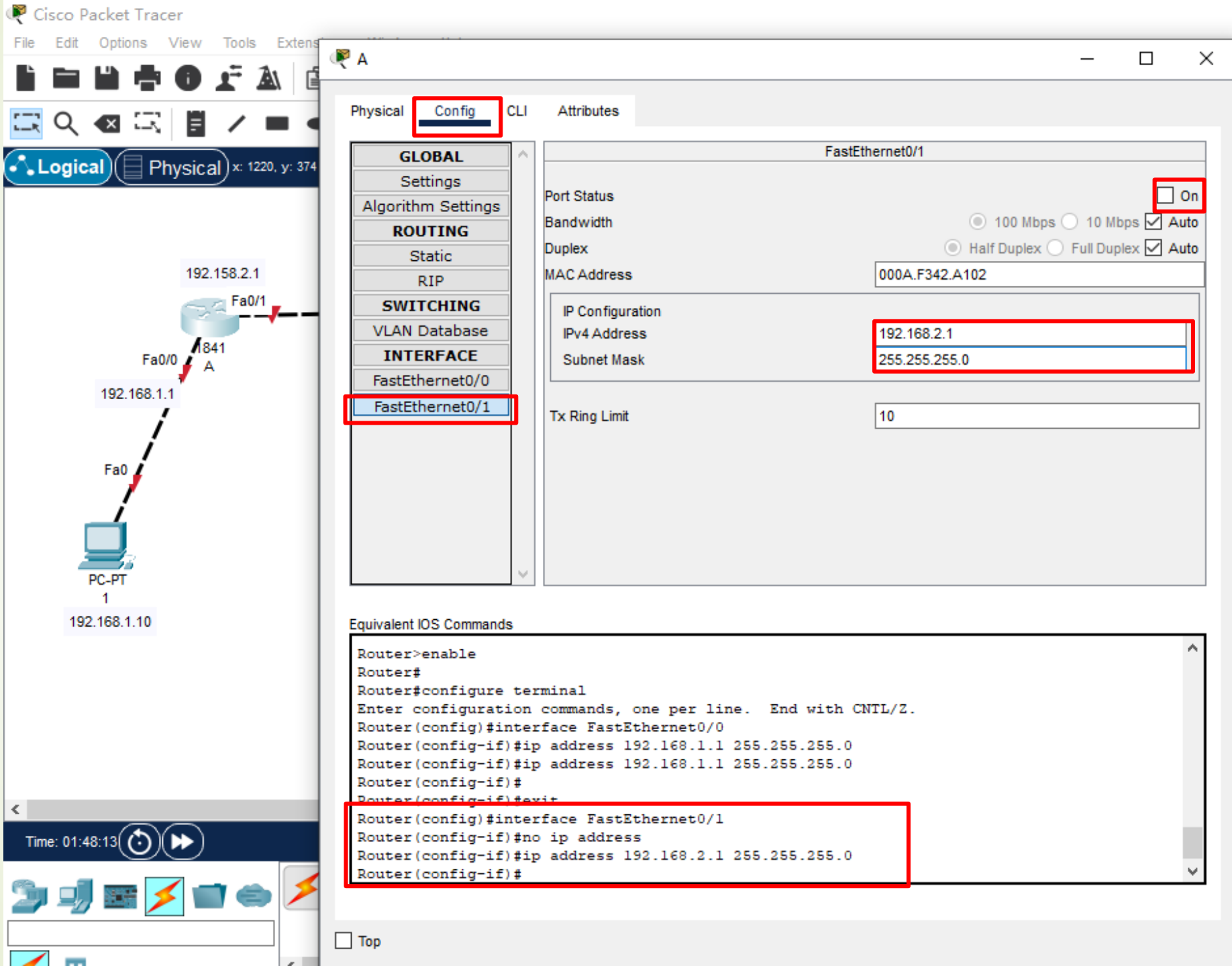
```
Router>enable                                          进入特权模式
Router#configure terminal                              进入全局配置模式
Router(config)#hostname A                              命名路由器为A
A(config)#interface f0/0                               进入接口模式
A(config-if)#ip address 192.168.1.1 255.255.255.0      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

步驟2，路由器A的配置方法：圖形界面



步驟2, 路由器A配置端口FastEthernet0/1



步骤3，检查此时网络连通性

1

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

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),
```

2

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

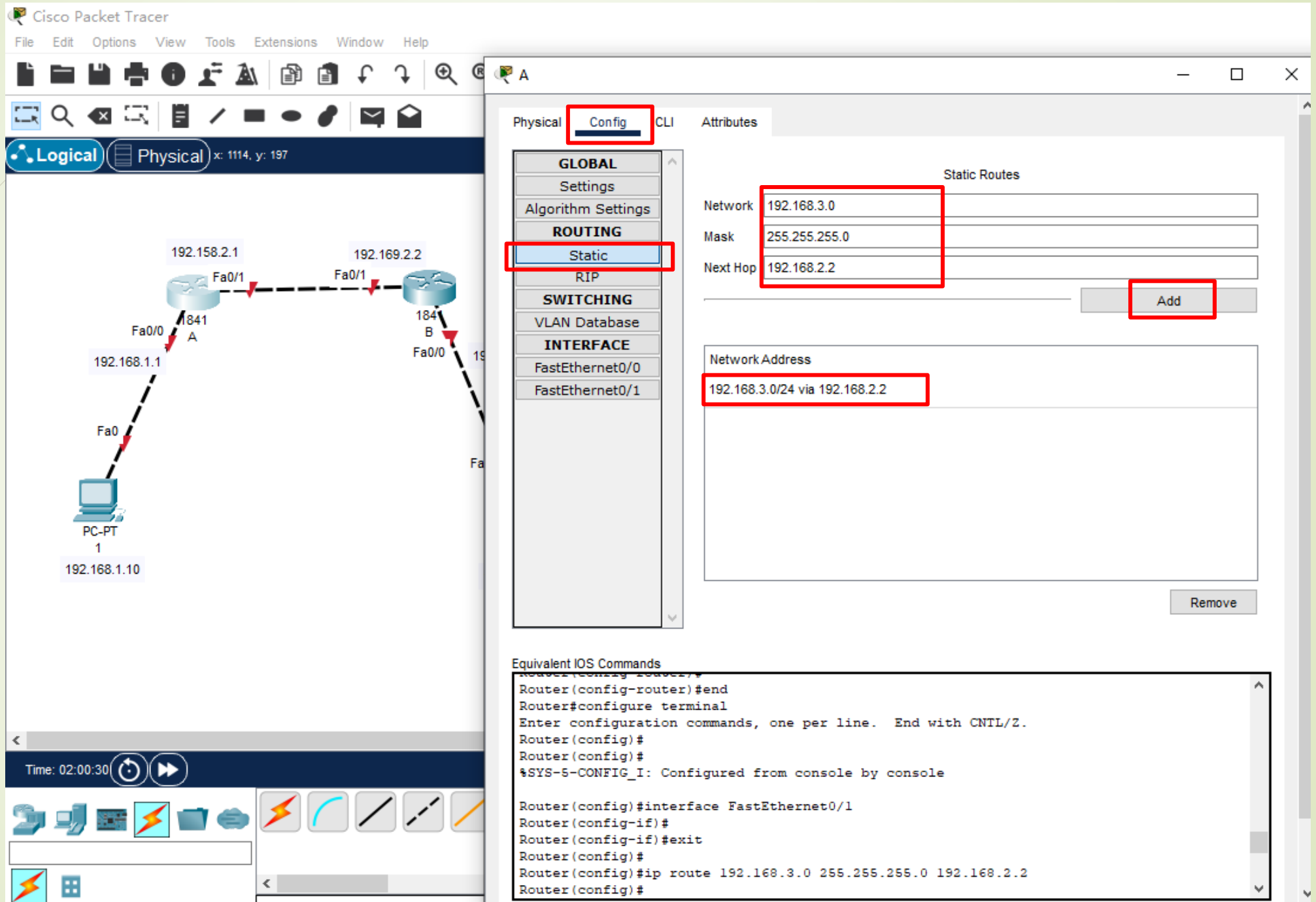
```
A(config)#ip route 192.168.3.0 255.255.255.0 192.168.2.2
A(config)#ip route 192.168.3.0 255.255.255.0 f0/1
```

送出接口

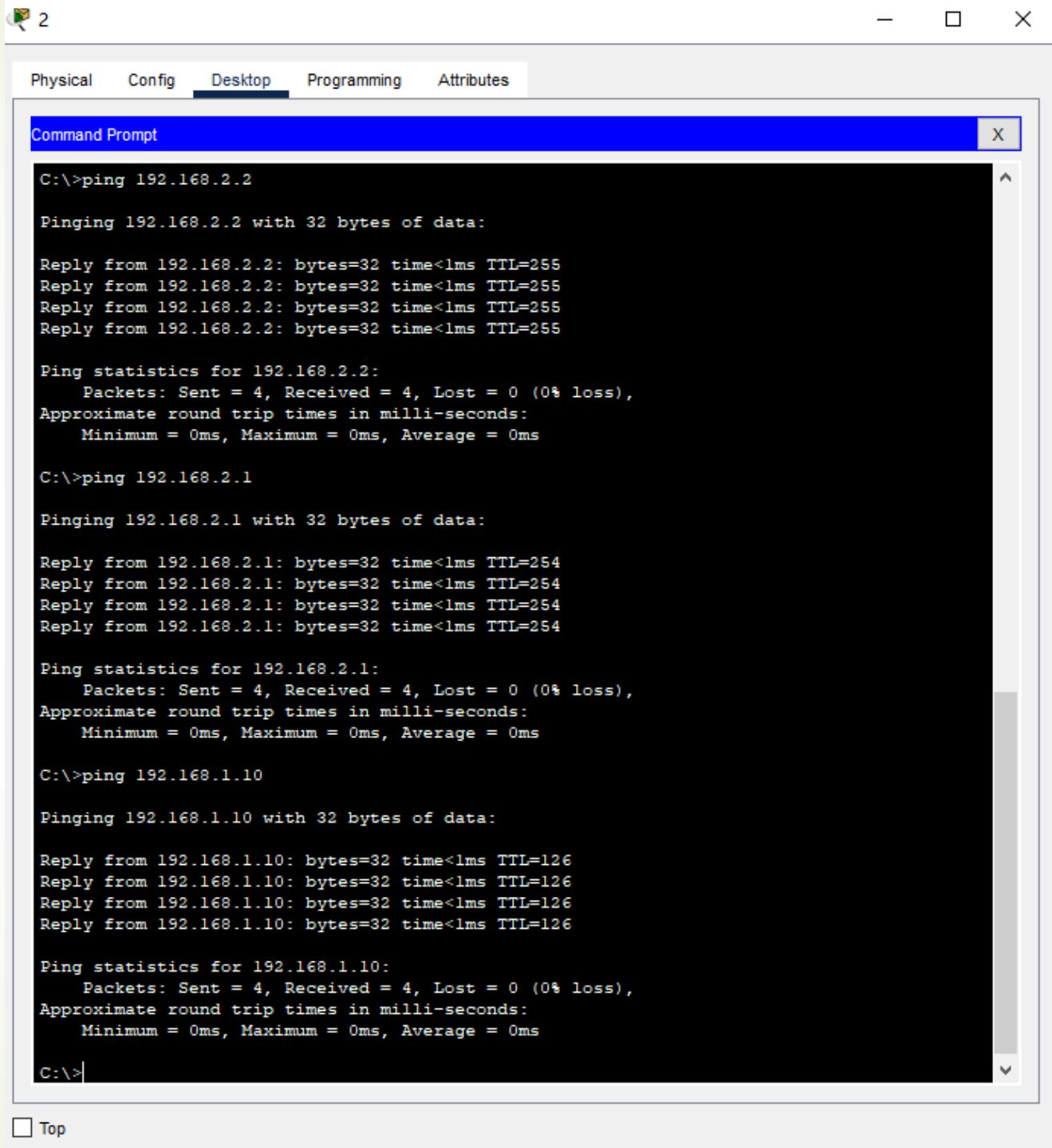
步骤4，路由器B的静态路由配置

类似路由其A的静态路由命令

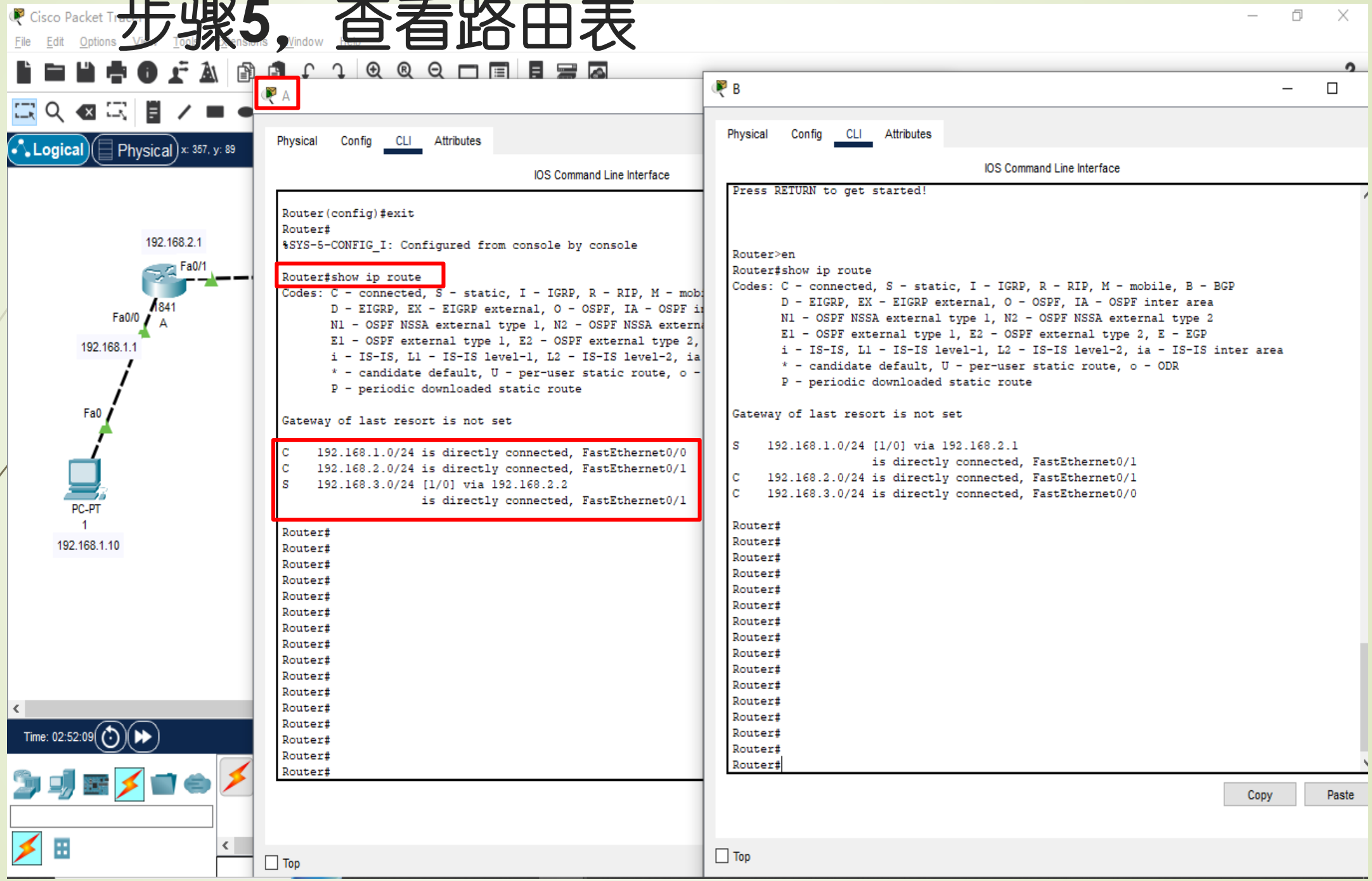
步骤4，路由器A的静态路由图形配置方式



步骤5，测试连通性


2
Physical
Config
Desktop
Programming
Attributes
Command Prompt
X
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:\>
Top

步骤5，查看路由表


Logical
Physical
192.168.2.1
Fa0/1
Fa0/0
1841
A
192.168.1.1
Fa0
PC-PT
1
192.168.1.10
Time: 02:52:09
A
Physical
Config
CLI
Attributes
IOS Command Line Interface
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 - mobi
D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF i
N1 - OSPF NSSA external type 1, N2 - OSPF NSSA externa
E1 - OSPF external type 1, E2 - OSPF external type 2,
i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia
* - candidate default, U - per-user static route, o -
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#
Top
B
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#
Copy
Paste
Top

实验内容

- 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