

实验一 组网与路由器配置

一 实验目的

掌握交换机、路由器的工作原理，学会基本利用网络设备进行组网，掌握IP地址配置和路由器配置方法，使得不同网络的主机之间在网络层相互通信。

二 实验环境

网络仿真工具：Cisco packet Tracer7.0

三 实验内容

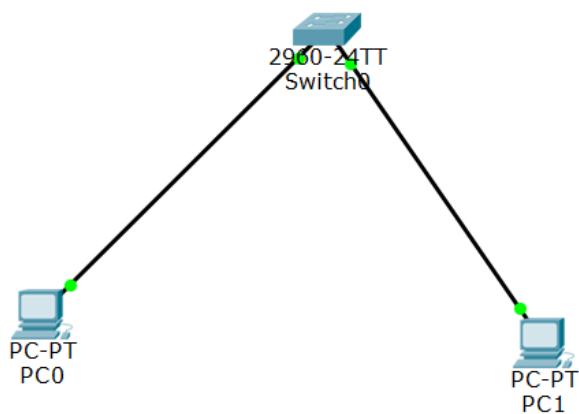
- 1) 局域网组网
- 2) IP 地址配置
- 3) 路由表配置（静态路由、动态路由）

在熟悉以上操作的基础上，完成实验任务五

四 实验步骤

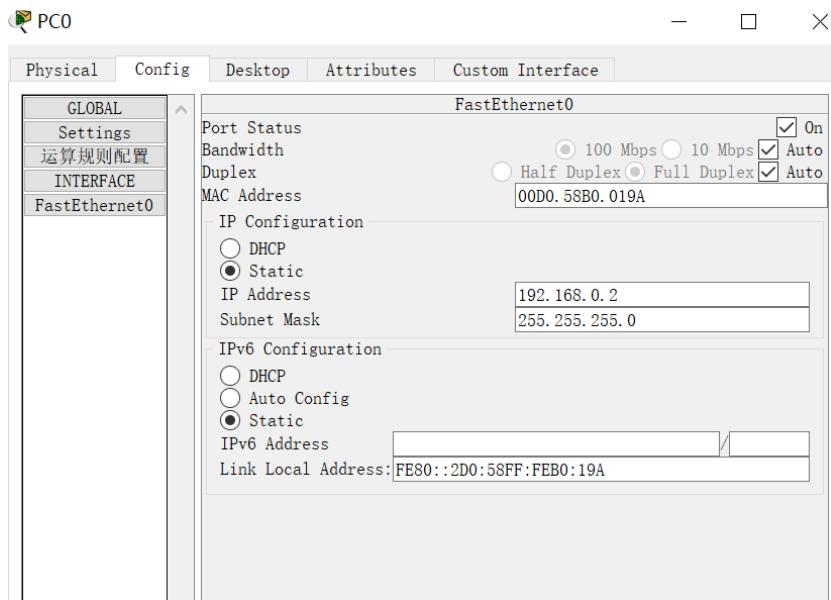
1. 交换机连接主机

- 网络拓扑图：



- 为主机配置 IP 地址和子网掩码

设备	接口	IP 地址	子网掩码
PC0	FastEthernet	192.168.0.2	255.255.255.0
PC1	FastEthernet	192.168.0.3	255.255.255.0



- 测试两台主机之间的连通性

```

Packet Tracer PC Command Line 1.0
C:\>ping
C:\>ping 192.168.0.3

Pinging 192.168.0.3 with 32 bytes of data:

Reply from 192.168.0.3: bytes=32 time<1ms TTL=128
Reply from 192.168.0.3: bytes=32 time<1ms TTL=128
Reply from 192.168.0.3: bytes=32 time<1ms TTL=128
Reply from 192.168.0.3: bytes=32 time=1ms TTL=128

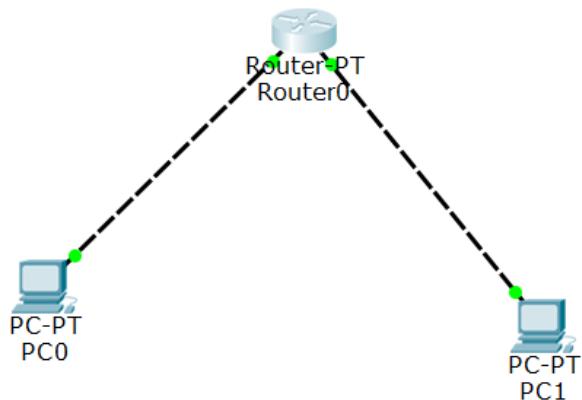
Ping statistics for 192.168.0.3:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 1ms, Average = 0ms

c:\>

```

2. 路由器连接主机

- 网络拓扑图



● 配置 IP 地址

设备	接口	IP 地址	子网掩码	默认网关
PC0	FastEthernet	192.168.1.2	255.255.255.0	192.168.1.1
PC1	FastEthernet	192.168.2.2	255.255.255.0	192.168.2.1
Router	FastEthernet0/0	192.168.1.1	255.255.255.0	
Router	FastEthernet1/0	192.168.2.1	255.255.255.0	

● 路由器接口 (FastEthernet0) IP 地址配置示例：

Physical Config CLI Attributes

IOS Command Line Interface

```
PT 1001 (PTSC2005) processor (revision 0x200) with 60416K/5120K bytes of memory
Processor board ID PT0123 (0123)
PT2005 processor: part number 0, mask 01
Bridging software.
X.25 software, Version 3.0.0.
4 FastEthernet/IEEE 802.3 interface(s)
2 Low-speed serial(sync/async) network interface(s)
32K bytes of non-volatile configuration memory.
63488K bytes of ATA CompactFlash (Read/Write)

--- System Configuration Dialog ---
Continue with configuration dialog? [yes/no]: no

Press RETURN to get started!

Router>en
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#int f0/0
Router(config-if)#ip address 192.168.1.1 255.255.255.0
Router(config-if)#no shutdown

Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up

Router(config-if)#exit
Router(config)#int f1/0
Router(config-if)#ip address 192.168.2.1 255.255.255.0
Router(config-if)#no shutdown

Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet1/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet1/0, changed state to up
```

● 测试主机之间的是否连通

3. 路由器直连

● 网络拓扑



● IP 地址配置

设备	接口	IP 地址	子网掩码	默认网关
PC0	FastEthernet	192.168.1.2	255.255.255.0	192.168.1.1
PC1	FastEthernet	192.168.2.2	255.255.255.0	192.168.2.1
Router0	FastEthernet0/0	192.168.1.1	255.255.255.0	
	S2/0	172.16.1.1	255.255.255.0	
Router1	FastEthernet0/0	192.168.2.1	255.255.255.0	
	S2/0	172.16.1.2	255.255.255.0	

Router0 串口配置

Router0

Physical Config CLI Attributes

IOS Command Line Interface

```
Router(config)#interface Serial2/0
Router(config-if)#shutdown

Router(config-if)#
%LINK-5-CHANGED: Interface Serial2/0, changed state to
administratively down

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0,
changed state to down
no ip address
Router(config-if)#exit
Router(config)#int s2/0
Router(config-if)#ip address 172.16.1.1 255.255.255.0
Router(config-if)#clock rate 64000
Router(config-if)#
Router(config-if)#exit
Router(config)#interface Serial2/0
Router(config-if)#
Router(config-if)#
Router(config-if)#no shut down

Router(config-if)#
%LINK-5-CHANGED: Interface Serial2/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0,
changed state to up
```

Copy Paste

Router1 串口配置

Router1

Physical Config CLI Attributes

IOS Command Line Interface

```
Enter configuration commands, one per line. End with
CTRL/Z.
Router(config)#interface FastEthernet0/0
Router(config-if)#no shutdown

Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state
to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface
FastEthernet0/0, changed state to up
ip address 192.168.2.1 255.255.255.0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface FastEthernet0/0
Router(config-if)#exit
Router(config)#int s2/0
Router(config-if)#ip address 172.16.1.2 255.255.255.0
Router(config-if)#no shutdown

Router(config-if)#
%LINK-5-CHANGED: Interface Serial2/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0,
changed state to up

Router(config-if)#

```

● 配置路由表

配置之前 Router0 的路由表

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

172.16.0.0/24 is subnetted, 1 subnets

C 172.16.1.0 is directly connected, Serial2/0

C 192.168.1.0/24 is directly connected, FastEthernet0/0

Router#

测试两台主机之间的连通性：

```
Packet Tracer PC Command Line 1.0
C:\>ping 192.168.2.2

Pinging 192.168.2.2 with 32 bytes of data:

Reply from 192.168.1.1: Destination host unreachable.

Ping statistics for 192.168.2.2:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
C:\>
```

1) 静态路由配置

- ✓ 在 Router0 中添加一条到网络 192.168.2.0 的静态路由，命令如下：

```
Router(config)#ip route 192.168.2.0 255.255.255.0 172.16.1.2
```

- ✓ 查看 Router0 的路由表

C	172.16.0.0/24	is subnetted, 1 subnets
C	172.16.1.0	is directly connected, Serial2/0
C	192.168.1.0/24	is directly connected, FastEthernet0/0
S	192.168.2.0/24	[1/0] via 172.16.1.2

Router#

- ✓ 配置 Router1 的路由表
- ✓ 测试两个主机之间的连通性

```
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=3ms TTL=254
Reply from 192.168.2.1: bytes=32 time=3ms 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 = 1ms, Maximum = 3ms, Average = 2ms
C:\>
```

2) 动态路由配置

- ✓ 删除静态路由，以 Router0 为例：

```
Router(config)# no ip route 192.168.2.0 255.255.255.0 172.16.1.2
```

- ✓ 配置 RIP 协议，以 Router0 为例

```

Router#conf t
Enter configuration commands, one per line. End with
CNTL/Z.
Router(config)#router rip
Router(config-router)#network 192.168.1.0
Router(config-router)#network 172.16.1.0
Router(config-router)#exit
Router(config)#
Router(config)#interface Serial2/0
Router(config-if)#
Router(config-if)#exit
Router(config)#router rip
Router(config-router)#exit
Router(config)#exit
Router#

```

Copy

Paste

注: network: 发布直连路由选项

✓ 查看路由表, 以 Router0 为例

```

Gateway of last resort is not set

      172.16.0.0/24 is subnetted, 1 subnets
      C     172.16.1.0 is directly connected, Serial2/0
      C     192.168.1.0/24 is directly connected, FastEthernet0/0
      R     192.168.2.0/24 [120/1] via 172.16.1.2, 00:00:22,
          Serial2/0

Router#

```

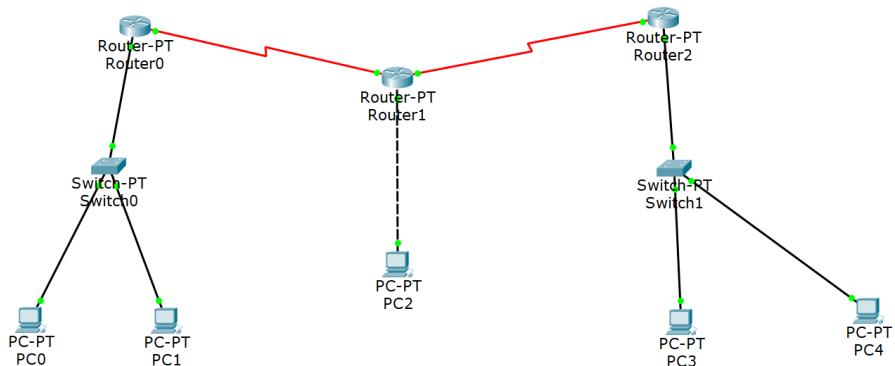
Copy

Paste

✓ 测试两台主机之间的连通性

五 实验任务

网络拓扑图:



- 1) 分配子网的网络号，配置子网内各主机的 IP 地址
 - 2) 路由器串口 IP 地址的配置
 - 3) 路由器路由表的配置（采用静态路由和动态路由两种配置方式）
- 实现不同子网内主机的连通

注意：关于子网网络号的设置

实验中涉及的子网号，子网 1 的网络号，第二段需设置为学号后 4 位的前 2 位，第三段需设置为学号后 4 位的最后两位，如学号为“2023217408”，则网络号为“**. 74. 8. 0”