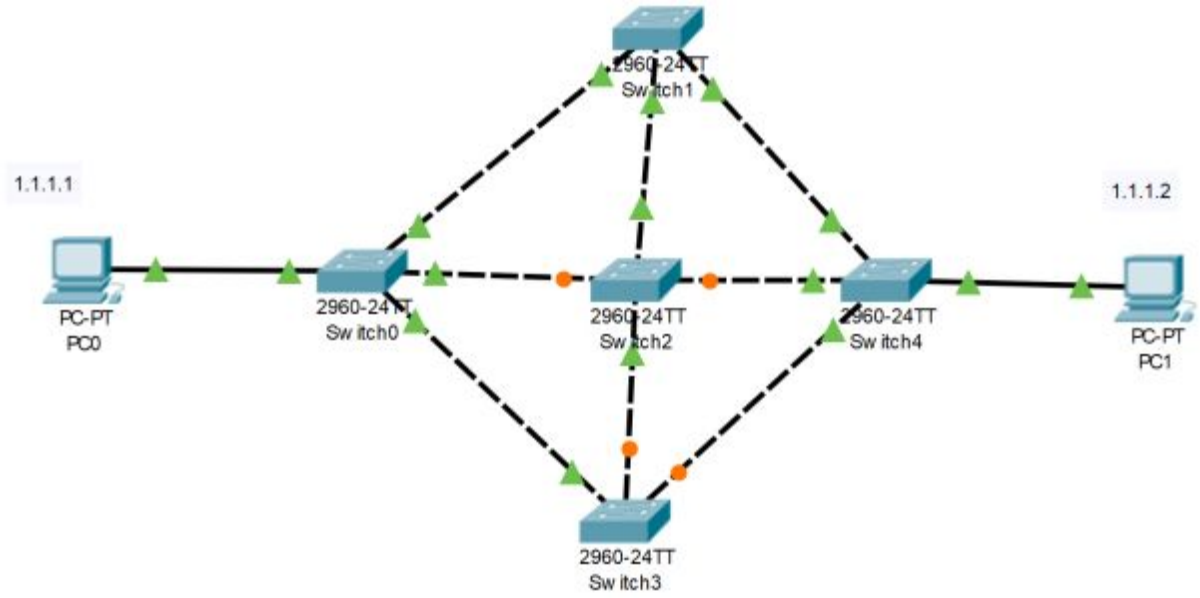
计算机网络工程

实验指导书

实验1：二层 MAC 转发路径 / 二层 Access and Trunk Port

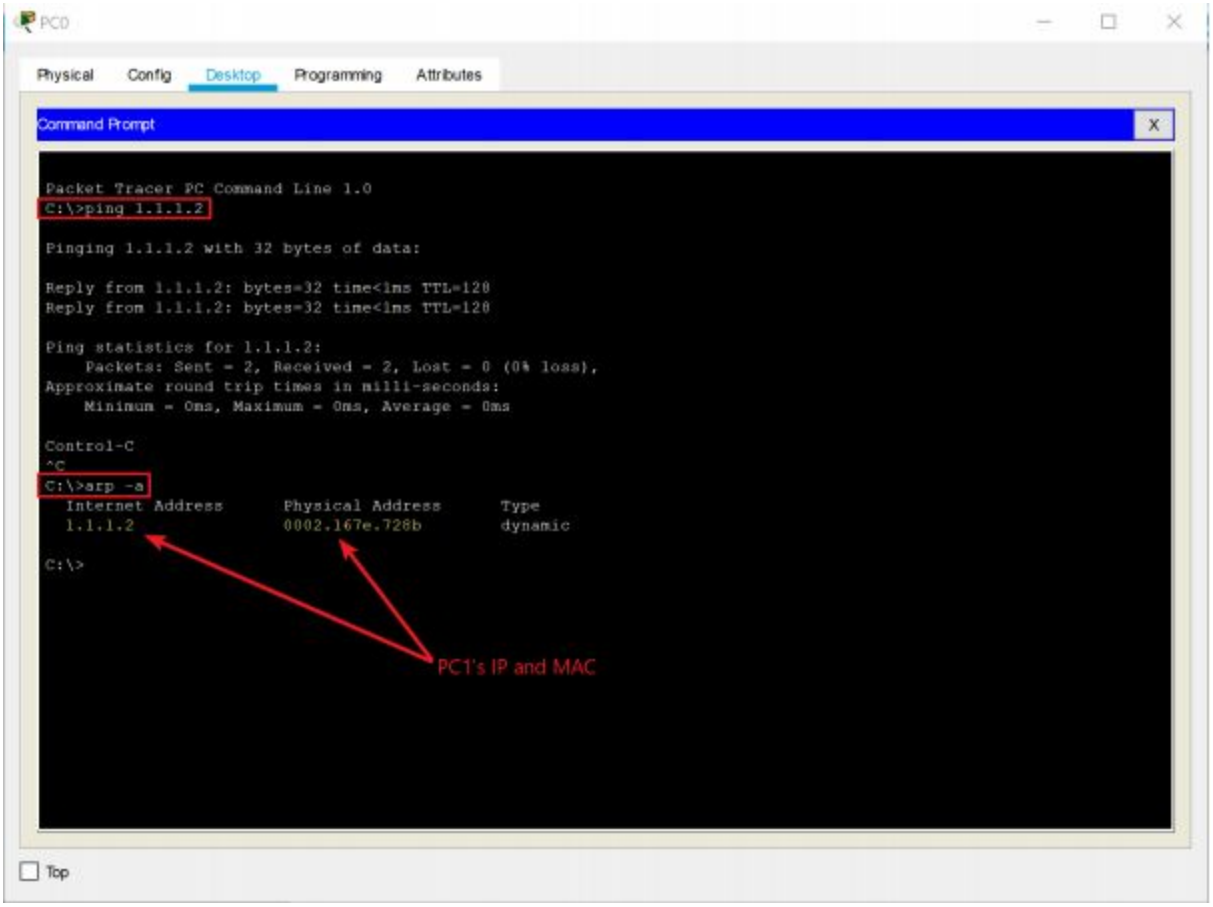


1. 二层 MAC 转发路径

目标：观察第二层数据转发路径

实验过程

步骤1 – 用 PC0 ping PC1，使用PC0上的ARP表找出PC1的MAC地址


PC0
Physical
Config
Desktop
Programming
Attributes
Command Prompt
X
Packet Tracer PC Command Line 1.0
C:\>ping 1.1.1.2
Pinging 1.1.1.2 with 32 bytes of data:
Reply from 1.1.1.2: bytes=32 time<1ms TTL=128
Reply from 1.1.1.2: bytes=32 time<1ms TTL=128
Ping statistics for 1.1.1.2:
Packets: Sent = 2, Received = 2, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 0ms, Maximum = 0ms, Average = 0ms
Control-C
^C
C:\>arp -a
Internet Address Physical Address Type
1.1.1.2 0002.167e.728b dynamic
C:\>
PC1's IP and MAC
Top

步骤2 –使用交换机的MAC表来跟踪数据转发路径

在Switch0上，从接口Fa0 / 2获悉PC1的MAC地址，并且他是连接到Switch1的

Fa0 / 1，所以下一步是检查Switch1

```
Switch0#show mac address-table
          Mac Address Table
-------------------------------------------

Vlan    Mac Address       Type        Ports
----    -----------       --------    -----

   1    0001.63da.6301    DYNAMIC     Fa0/2
   1    0002.167e.728b    DYNAMIC     Fa0/2
   1    000c.cfa0.5da5    DYNAMIC     Fa0/1
   1    0010.117d.1e01    DYNAMIC     Fa0/3
   1    0030.f211.9d03    DYNAMIC     Fa0/4
Switch0#
```

在Switch1上，是从Fa0 / 3获悉PC1的MAC地址，而它是连接到Switch4 的 Fa0 / 1，因此

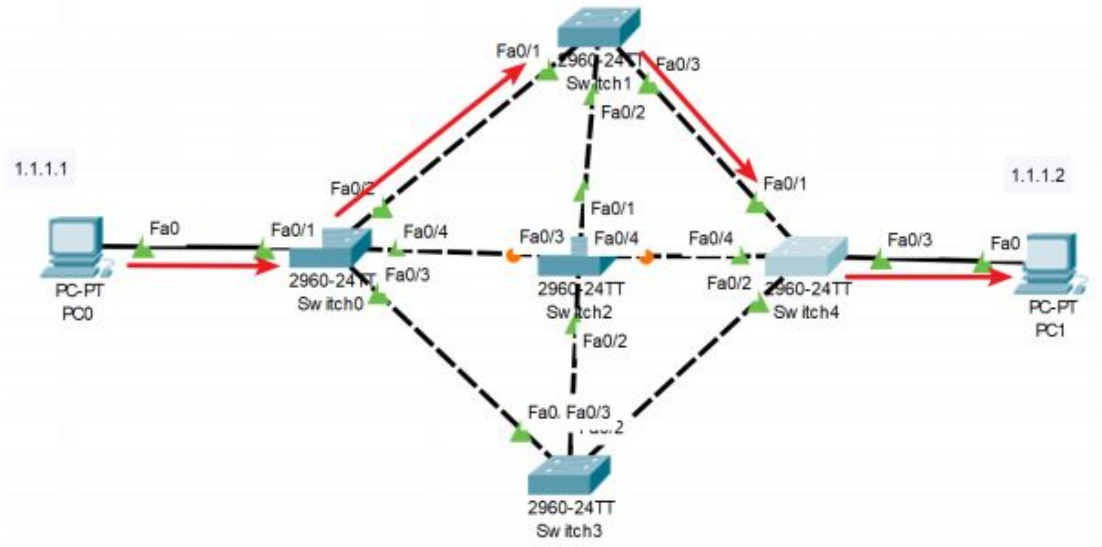
接下来是检查Switch4

```
Switch1#show mac address-table
          Mac Address Table
-------------------------------------------

Vlan    Mac Address       Type        Ports
----    -----------       --------    -----

   1    0002.1627.7201    DYNAMIC     Fa0/3
   1    0002.1671.4802    DYNAMIC     Fa0/1
   1    0002.167e.728b    DYNAMIC     Fa0/3
   1    000c.cfa0.5da5    DYNAMIC     Fa0/1
   1    0030.f211.9d01    DYNAMIC     Fa0/2
Switch1#
```

在Switch4上，他是从Fa0 / 3获悉PC1的MAC地址，而他是直接连接到PC1

```
Switch4#show mac address-table
          Mac Address Table
-------------------------------------------

Vlan    Mac Address       Type        Ports
----    -----------       --------    -----

   1    0001.63da.6303    DYNAMIC     Fa0/1
   1    0002.167e.728b    DYNAMIC     Fa0/3
   1    000c.cfa0.5da5    DYNAMIC     Fa0/1
   1    0010.117d.1e03    DYNAMIC     Fa0/2
   1    0030.f211.9d04    DYNAMIC     Fa0/4
Switch4#
```

根据以上结果，我们可以知道数据转发路径



2. 二层 Access and Trunk Port

目标：

- **VLAN 10中的PC应该能够互相ping通**
- **VLAN 20中的PC应该能够互相ping通**

实验过程

步骤1 – 创建VLAN

SW1(config)#vlan 10

SW1(config-vlan)#name HR

SW1(config-vlan)#exit

SW1(config)#vlan 20

SW1(config-vlan)#name IT

SW1(config-vlan)#

SW2(config)#vlan 10

SW2(config-vlan)#name HR

SW2(config-vlan)#exit

SW2(config)#vlan 20

SW2(config-vlan)#name IT

SW2(config-vlan)#

使用“ show vlan brief”来验证

```
SW1#show vlan brief

VLAN Name                             Status    Ports
---- -------------------------------- --------- -------------------------------
1    default                          active    Fa0/1, Fa0/2, Fa0/3, Fa0/4
                                                Fa0/5, Fa0/6, Fa0/7, Fa0/8
                                                Fa0/9, Fa0/10, Fa0/11, Fa0/12
                                                Fa0/13, Fa0/14, Fa0/15, Fa0/16
                                                Fa0/17, Fa0/18, Fa0/19, Fa0/20
                                                Fa0/21, Fa0/22, Fa0/23, Fa0/24
                                                Gig0/1, Gig0/2
10   HR                               active
20   IT                               active
1002 fddi-default                     active
1003 token-ring-default               active
1004 fddinet-default                  active
1005 trnet-default                    active
SW1#
```

步驟2 - 配置接入端口 access port

SW1(config)#int fa0/2

SW1(config-if)#switch mode access

SW1(config-if)#switch access vlan 10

SW1(config)#int fa0/3

SW1(config-if)#switch mode access

SW1(config-if)#switch access vlan 20

```
SW1(config)#do sh vl bri

VLAN Name                             Status    Ports
---- -------------------------------- --------- -------------------------------
1    default                          active    Fa0/1, Fa0/4, Fa0/5, Fa0/6
                                                Fa0/7, Fa0/8, Fa0/9, Fa0/10
                                                Fa0/11, Fa0/12, Fa0/13, Fa0/14
                                                Fa0/15, Fa0/16, Fa0/17, Fa0/18
                                                Fa0/19, Fa0/20, Fa0/21, Fa0/22
                                                Fa0/23, Fa0/24, Gig0/1, Gig0/2
10   HR                               active    Fa0/2
20   IT                               active    Fa0/3
1002 fddi-default                     active
1003 token-ring-default               active
1004 fddinet-default                  active
1005 trnet-default                    active
SW1(config)#
```

SW2(config)#int fa0/2

SW2(config-if)#sw mo ac

SW2(config-if)#sw ac vl 10

SW2(config)#int fa0/3

SW2(config-if)#sw mo ac

SW2(config-if)#sw ac vl 20

```
SW2(config)#do sh vl bri

VLAN Name                             Status    Ports
---- -------------------------------- --------- -------------------------------
1    default                          active    Fa0/1, Fa0/4, Fa0/5, Fa0/6
                                                Fa0/7, Fa0/8, Fa0/9, Fa0/10
                                                Fa0/11, Fa0/12, Fa0/13, Fa0/14
                                                Fa0/15, Fa0/16, Fa0/17, Fa0/18
                                                Fa0/19, Fa0/20, Fa0/21, Fa0/22
                                                Fa0/23, Fa0/24, Gig0/1, Gig0/2
10   HR                               active    Fa0/2
20   IT                               active    Fa0/3
1002 fddi-default                     active
1003 token-ring-default               active
1004 fddinet-default                  active
1005 trnet-default                    active
SW2(config)#
```

步骤3 - 在SW1和SW2之间配置中继端口

SW1(config-if)#int fa0/1

SW1(config-if)#switchport mode trunk

SW2(config-if)#int fa0/1

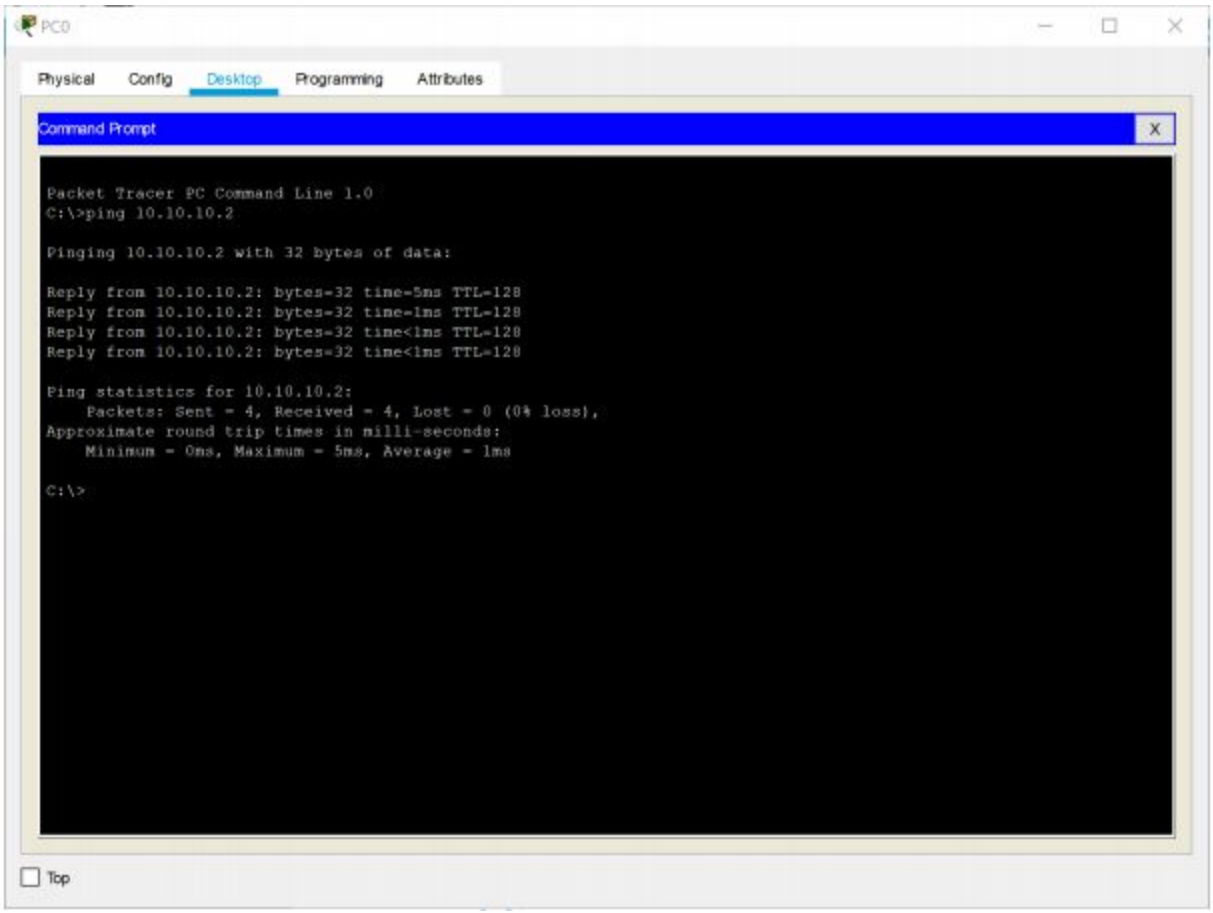
SW2(config-if)#switchport mode trunk

使用“show interface trunk”进行验证

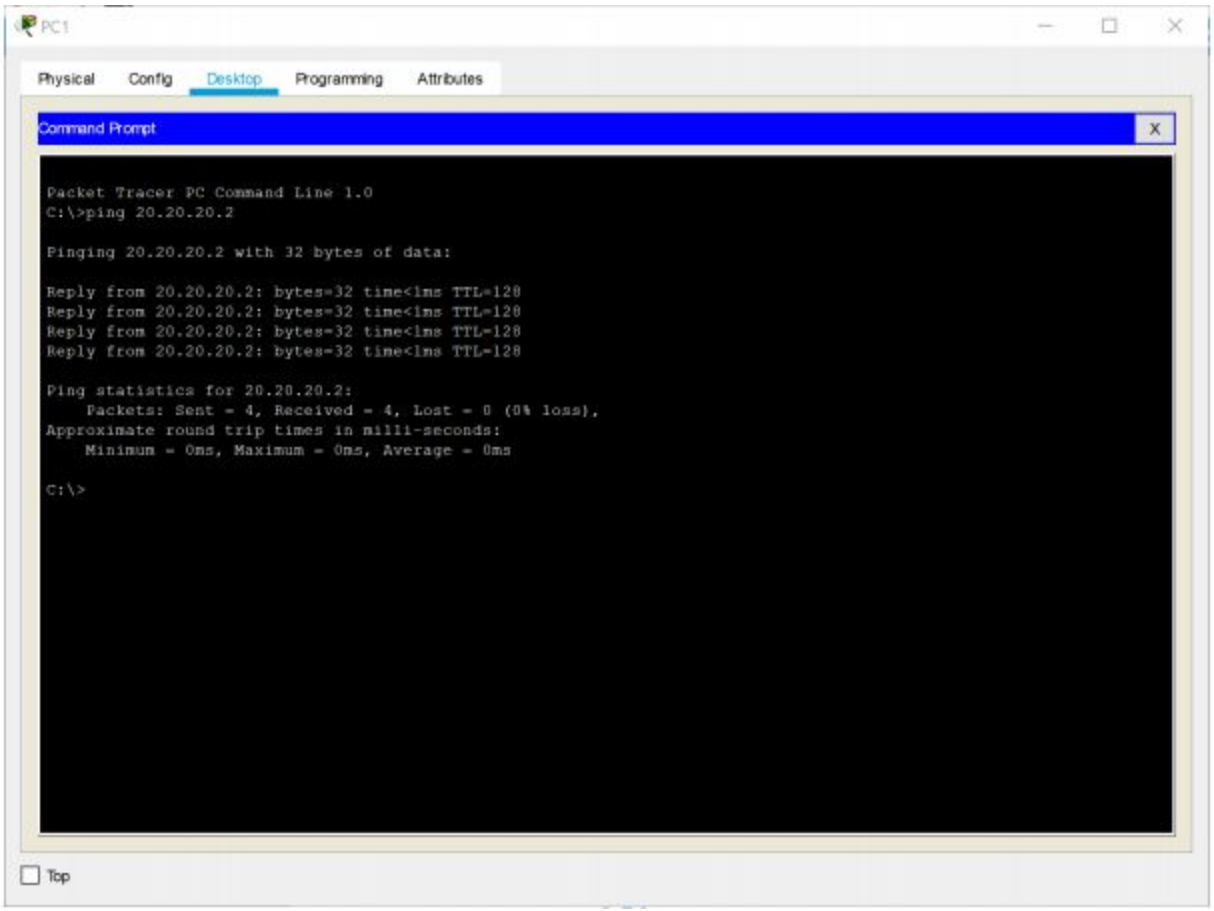
```
SW1#show interface trunk ?
  |  Output Modifiers
  <cr>
SW1#show interface trunk
Port        Mode         Encapsulation  Status        Native vlan
Fa0/1       on           802.1q         trunking      1

Port        Vlans allowed on trunk
Fa0/1       1-1005

Port        Vlans allowed and active in management domain
Fa0/1       1,10,20

Port        Vlans in spanning tree forwarding state and not pruned
Fa0/1       1,10,20

SW1#
```

步驟4 - Ping test

PC0 ping PC2



PC1 ping PC3


PC1
Physical
Config
Desktop
Programming
Attributes
Command Prompt
X
Packet Tracer PC Command Line 1.0
C:\>ping 20.20.20.2
Pinging 20.20.20.2 with 32 bytes of data:
Reply from 20.20.20.2: bytes=32 time<1ms TTL=128
Reply from 20.20.20.2: bytes=32 time<1ms TTL=128
Reply from 20.20.20.2: bytes=32 time<1ms TTL=128
Reply from 20.20.20.2: bytes=32 time<1ms TTL=128
Ping statistics for 20.20.20.2:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 0ms, Maximum = 0ms, Average = 0ms
C:\>
Top