



2019 年《网络技术与应用》 第一次实验报告

共享和交换以太网



李科

1711344

计算机科学与技术

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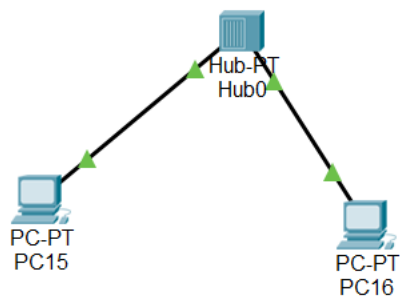
一、 实验内容

1. 在 Packet Tracer 环境下完成第二章和第三章的实验。
2. 完成第二章练习题三（3）、第三章练习题三（3）。
3. 提交完成实验后的工程文件和实验报告。

二、 实验过程

1. 第一部分：第二章实验：单集线器以太网组网

- 1) 首先启动 Packet Tracer，保证工作区处于逻辑工作模式。
- 2) 添加器件：在设备类型中选择“网络设备”，子类型选择“集线器”，拖拽一个集线器到工作区。然后在设备类型中选择“终端设备”，子类型选择“PC”，拖拽两个 PC 到工作区。
- 3) 连线：在设备选择区选择“连接”。单击自动连接，然后再单击集线器与 PC。重复 3)操作。



- 4) 设备的配置与连通性测试, PC 配置 ID。192.168.0.1- 192.168.0.2

The image shows a configuration window for a device named PC15. The window has four tabs: Physical, Config, Desktop (which is selected), and Programming. The Desktop tab contains a section titled 'IP Configuration' with a close button (X) and a scroll bar. Inside this section, the 'Interface' is set to 'FastEthernet0'. There are two main configuration areas: 'IP Configuration' and 'IPv6 Configuration'. In the 'IP Configuration' area, the 'Static' radio button is selected, and the fields are filled with: IP Address: 192.168.0.1, Subnet Mask: 255.255.255.0, Default Gateway: 0.0.0.0, and DNS Server: 0.0.0.0. In the 'IPv6 Configuration' area, the 'Static' radio button is also selected, and the fields are: IPv6 Address (empty), Link Local Address: FE80::290:CFF:FE46:D364, IPv6 Gateway (empty), and IPv6 DNS Server (empty). Below these is a section for '802.1X' configuration, where 'Use 802.1X Security' is unchecked, 'Authentication' is set to 'MD5', and 'Username' and 'Password' fields are empty. At the bottom left of the window is a 'Top' button.

PC15

Physical Config **Desktop** Programming Attributes

IP Configuration X

Interface FastEthernet0

IP Configuration

☐ DHCP ☒ Static

IP Address 192.168.0.1

Subnet Mask 255.255.255.0

Default Gateway 0.0.0.0

DNS Server 0.0.0.0

IPv6 Configuration

☐ DHCP ☐ Auto Config ☒ Static

IPv6 Address /

Link Local Address FE80::290:CFF:FE46:D364

IPv6 Gateway

IPv6 DNS Server

802.1X

☐ Use 802.1X Security

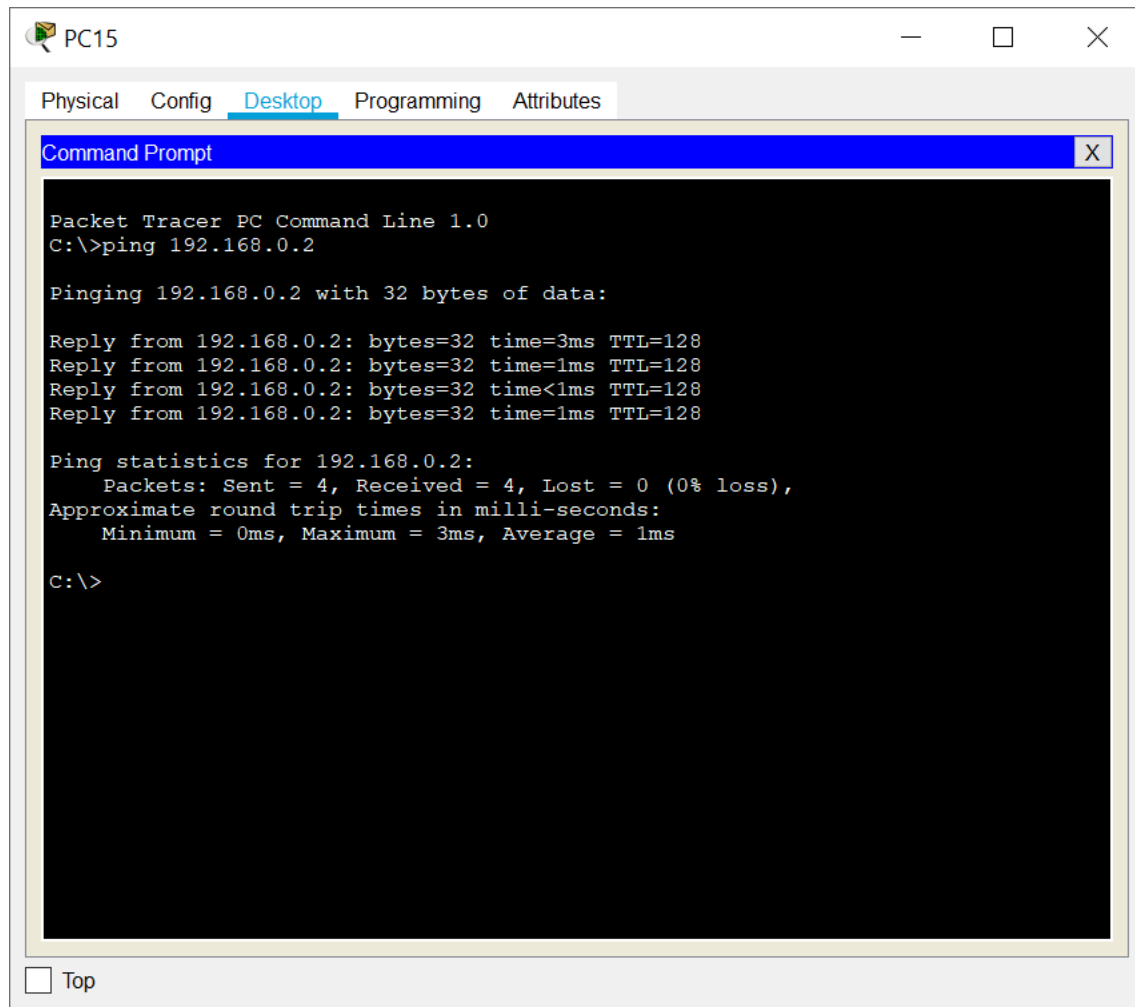
Authentication MD5

Username

Password

☐ Top

由 PC15 发送 ping 到 PC16



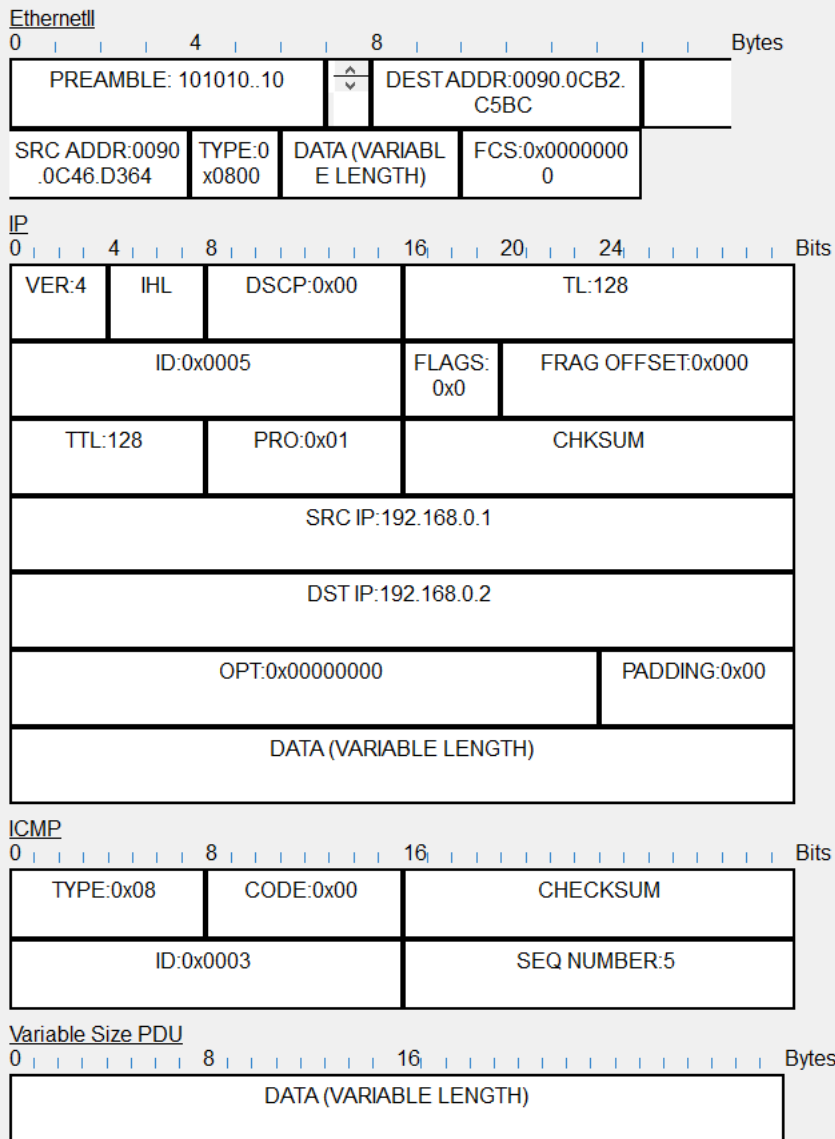
数据包内容如下：

PDU Information at Device: Hub0



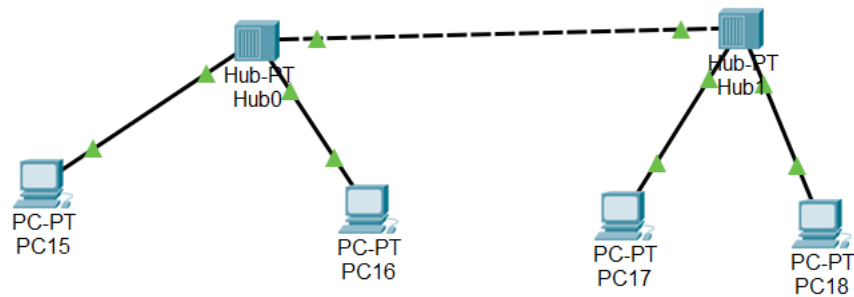
OSI Model [Inbound PDU Details](#) Outbound PDU Details

PDU Formats

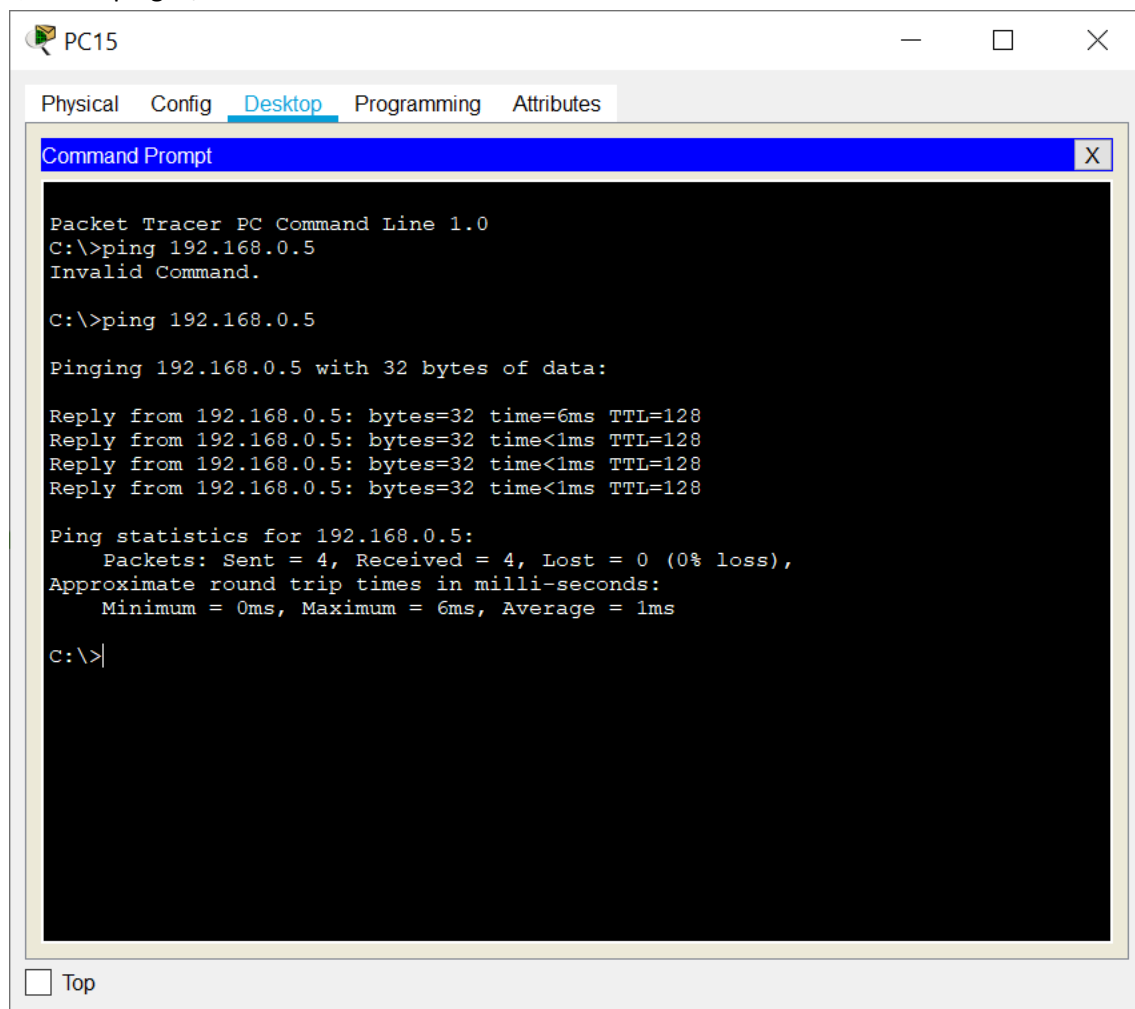


2. 第二部分：第二章练习题三（3）

























- 1) 在第一部分的基础上添加一个集线器和两个 PC，IP 分别设置为 192.168.0.4- 192.168.0.5



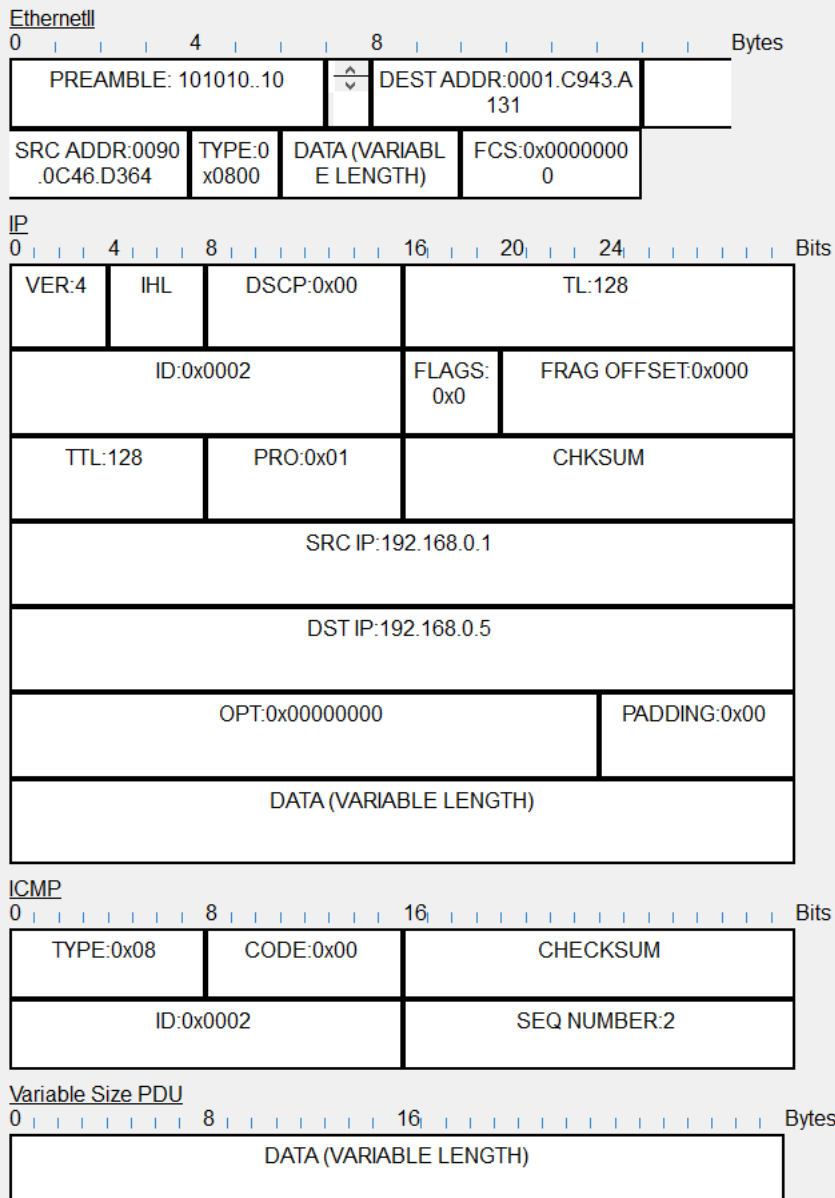
从 PC15 ping 到 18



主机与集线器用直通双绞线，集线器与集线器用交叉双绞线。

Simulation Panel				
Event List				
Vis.	Time(sec)	Last Device	At Device	Type
	0.000	--	PC15	 ARP
	0.000	--	PC15	 ICMP
	0.000	--	PC15	 ARP
	0.001	PC15	Switch1	 ARP
	0.001	--	PC15	 ARP
	0.002	PC15	Switch1	 ARP
	0.002	Switch1	PC16	 ARP
	0.002	Switch1	Switch2	 ARP
	0.003	Switch1	PC16	 ARP
	0.003	Switch1	Switch2	 ARP
	0.003	Switch2	PC17	 ARP
	0.003	Switch2	PC18	 ARP
	0.004	Switch2	PC17	 ARP
	0.004	Switch2	PC18	 ARP
	0.005	PC18	Switch2	 ARP
	0.006	Switch2	Switch1	 ARP
	0.007	Switch1	PC15	 ARP
	0.007	--	PC15	 ICMP
	0.008	PC15	Switch1	 ICMP
	0.009	Switch1	Switch2	 ICMP
	0.010	Switch2	PC18	 ICMP
	0.011	PC18	Switch2	 ICMP
	0.012	Switch2	Switch1	 ICMP
	0.013	Switch1	PC15	 ICMP

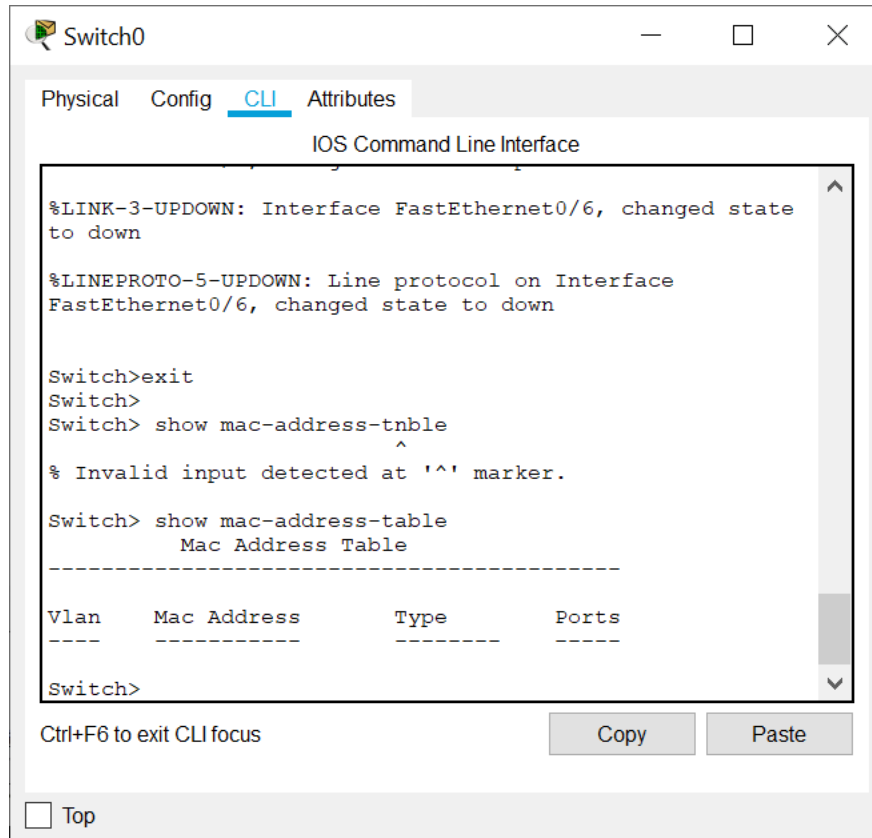
PDU Formats



3. 第三部分：第三章实验

- 1) 首先启动 Packet Tracer，保证工作区处于逻辑工作模式。

- 2) 添加器件：在设备类型中选择“网络设备”，子类型选择“集线器”，拖拽一个集线器到工作区。在设备类型中选择“网络设备”，子类型选择“交换机”，拖拽两个交换机到工作区。然后在设备类型中选择“终端设备”，子类型选择“PC”，拖拽 8 个 PC 到工作区。
- 3) 连线：在设备选择区选择“连接”。单击自动连接，然后再单击交换机/集线器与 PC。重复 3) 操作。
- 4) 配置 PC 的 IP，依次为：192.168.0.1-192.168.0.6
- 5) 单击交换机，对交换机进行配置在 CLI 界面可以直接配置交换机



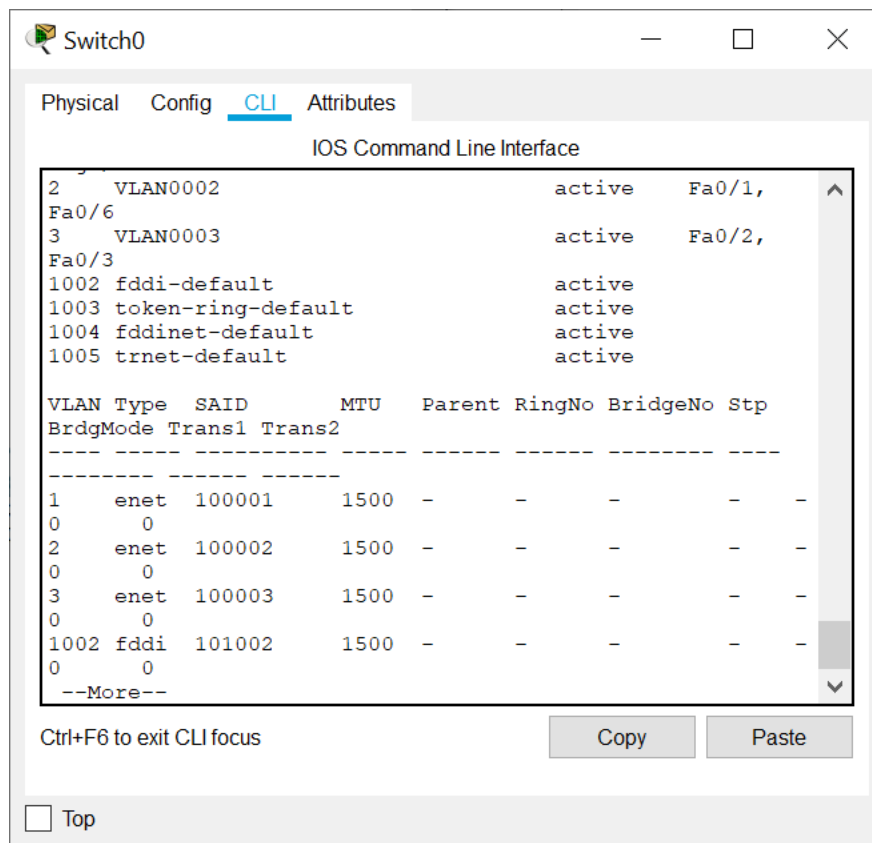
输入命令：

vlan database

Vlan 0002 name VLAN0002 //这就创建好了一个编号为 0002，名字为 VLAN0002 的虚拟网络

Exit

Show VLAN



可以看到已经创建好

接着输入：

configure terminal 进入配置终端模式

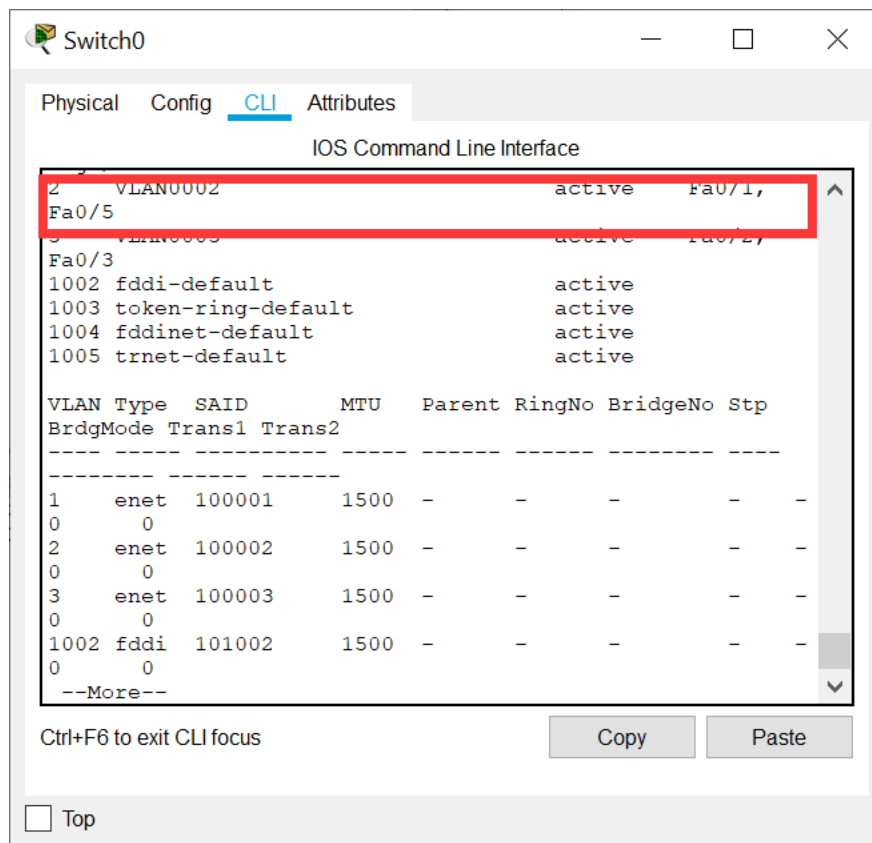
Interface Fa0/1 通知交换机配置的端口号为 1

Switchport mode access

Switchport access vlan 0002 把交换机口 1 分配给 VLAN0002

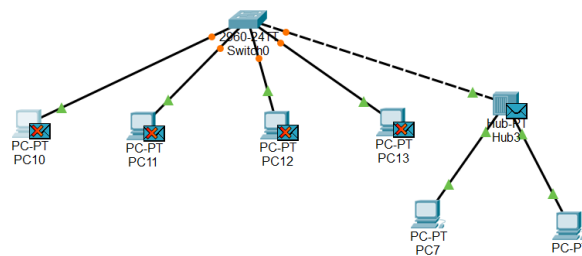
Exit

就可以看到 VLAN0002 对应的端口号已经设置好了



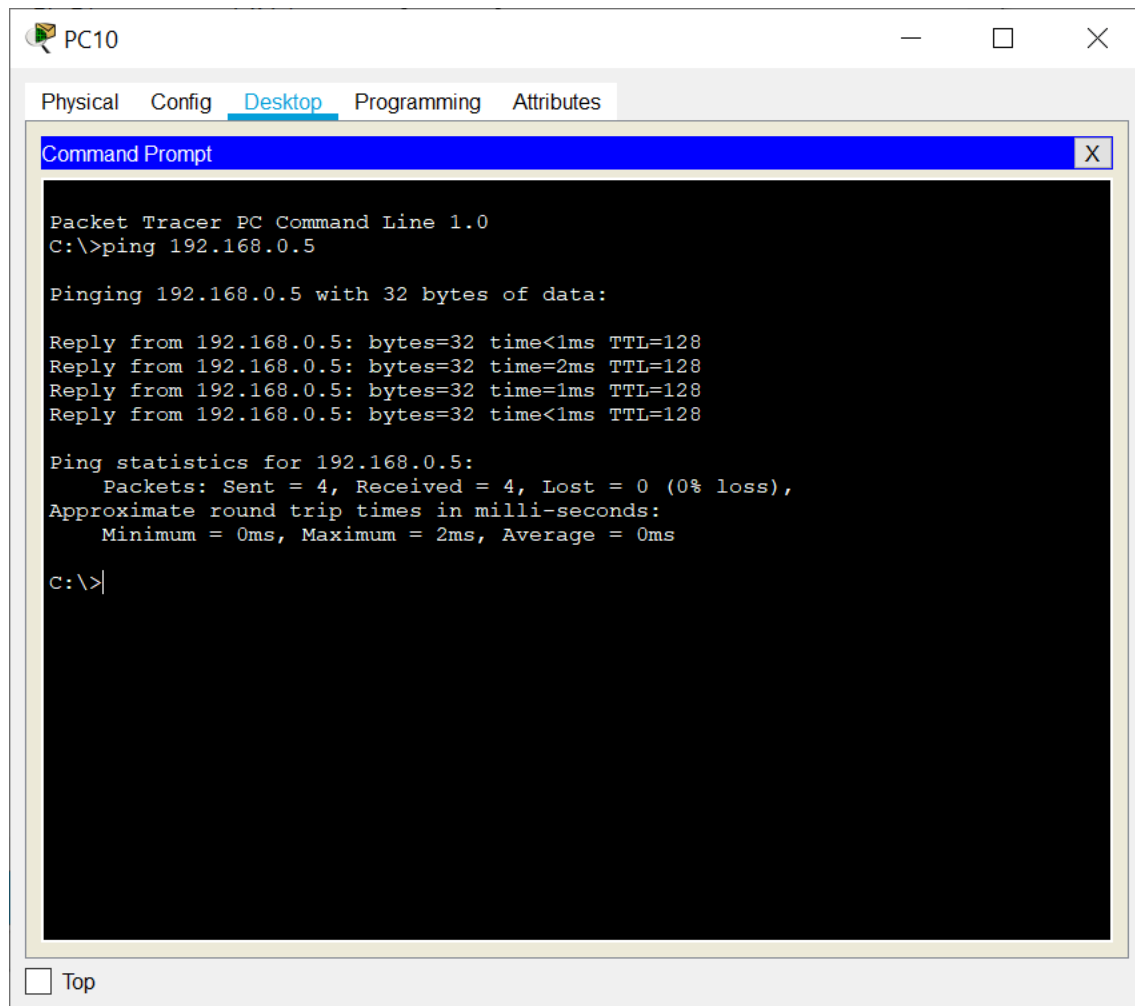
按照同样的方式把第 5 个端口也加入局域网。

- 6) 然后从 PC10 发送 ping 到 PC7, 也就是 192.168.0.1 到 192.168.0.5

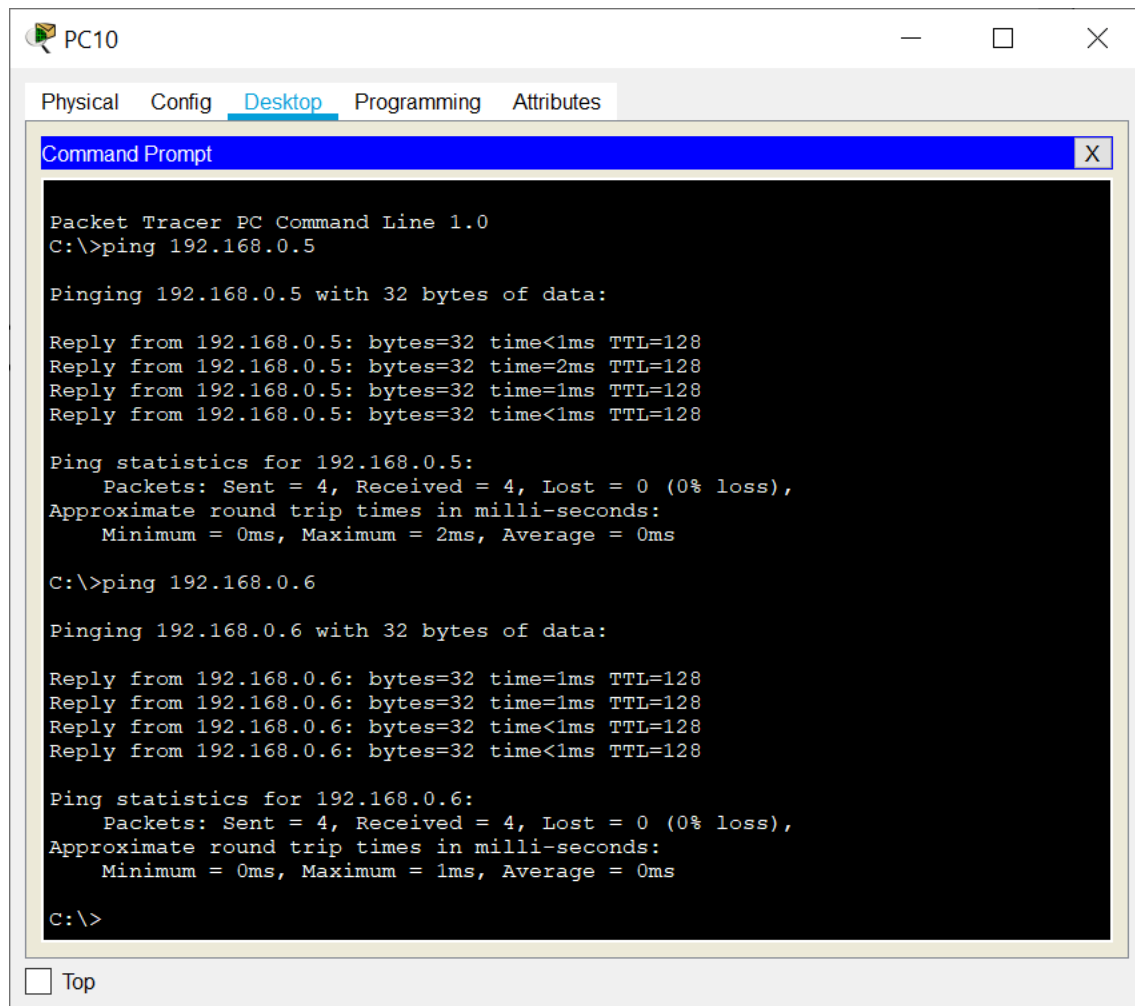


10.110	--	Switch0	Red	DTP
10.110	--	PC10	Green	ARP
10.110	--	Switch0	Red	DTP
10.110	--	PC11	Green	ARP
10.110	--	Switch0	Red	DTP
10.110	--	PC12	Green	ARP
10.110	--	Switch0	Red	DTP
10.110	--	PC13	Green	ARP
10.110	--	Switch0	Red	DTP
10.111	Switch0	PC10	Green	ARP
10.111	Switch0	PC11	Red	DTP
10.111	PC10	Switch0	Green	ARP
10.111	Switch0	PC12	Red	DTP
10.111	PC11	Switch0	Green	ARP
10.111	Switch0	PC13	Red	DTP
10.111	PC12	Switch0	Green	ARP
10.111	Switch0	PC13	Red	DTP
10.111	PC13	Switch0	Green	ARP
10.111	Switch0	Hub3	Red	DTP
10.112	Hub3	PC7	Red	DTP
10.112	Hub3	PC9	Red	DTP
10.114	--	Switch0	Blue	CDP
10.114	--	Switch0	Blue	CDP
10.114	--	Switch0	Blue	CDP
10.114	--	Switch0	Blue	CDP
Visible 10.115	Switch0	PC10	Blue	CDP
Visible 10.115	Switch0	PC11	Blue	CDP
Visible 10.115	Switch0	PC12	Blue	CDP
Visible 10.115	Switch0	PC13	Blue	CDP
Visible 10.115	Switch0	Hub3	Blue	CDP
10.116	Hub3	PC7	Blue	CDP
10.116	Hub3	PC9	Blue	CDP

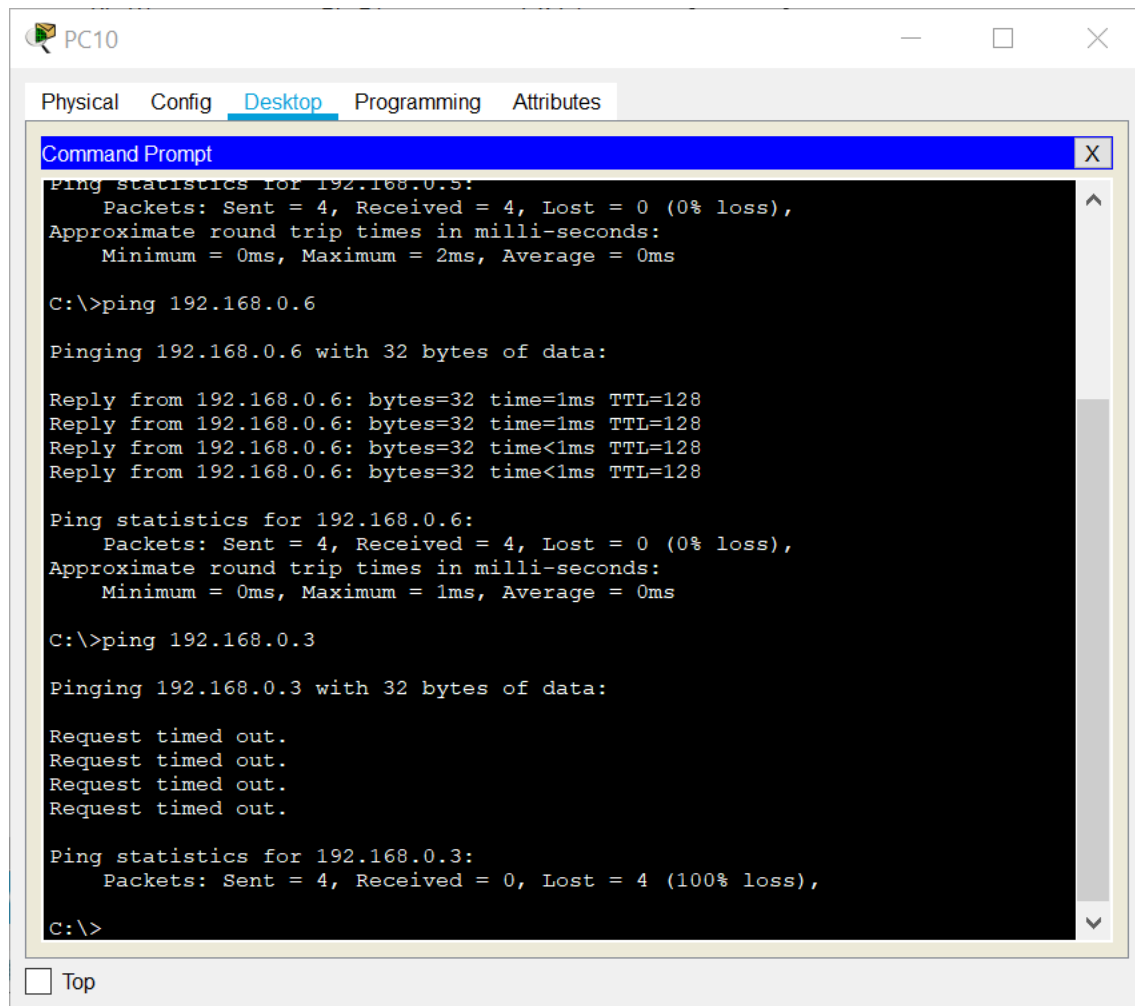
Reset Simulation ☒ Constant Delay



7) 然后从 PC10 发送 ping 到 PC9, 也就是 192.168.0.1 到 192.168.0.6



8) 然后从 PC10 发送 ping 到 PC12, 也就是 192.168.0.1 到 192.168.0.3



The screenshot shows a window titled "PC10" with tabs for "Physical", "Config", "Desktop", "Programming", and "Attributes". The "Desktop" tab is active, displaying a "Command Prompt" window. The Command Prompt shows the results of two ping commands. The first command is "ping 192.168.0.5", which succeeds with 0% loss. The second command is "ping 192.168.0.6", which also succeeds with 0% loss. The third command is "ping 192.168.0.3", which fails with 100% loss. The Command Prompt window has a "Top" button at the bottom left.

```
PC10
Physical Config Desktop Programming Attributes
Command Prompt
Ping statistics for 192.168.0.5:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 2ms, Average = 0ms

C:\>ping 192.168.0.6

Pinging 192.168.0.6 with 32 bytes of data:

Reply from 192.168.0.6: bytes=32 time=1ms TTL=128
Reply from 192.168.0.6: bytes=32 time=1ms TTL=128
Reply from 192.168.0.6: bytes=32 time<1ms TTL=128
Reply from 192.168.0.6: bytes=32 time<1ms TTL=128

Ping statistics for 192.168.0.6:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 1ms, Average = 0ms

C:\>ping 192.168.0.3

Pinging 192.168.0.3 with 32 bytes of data:

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

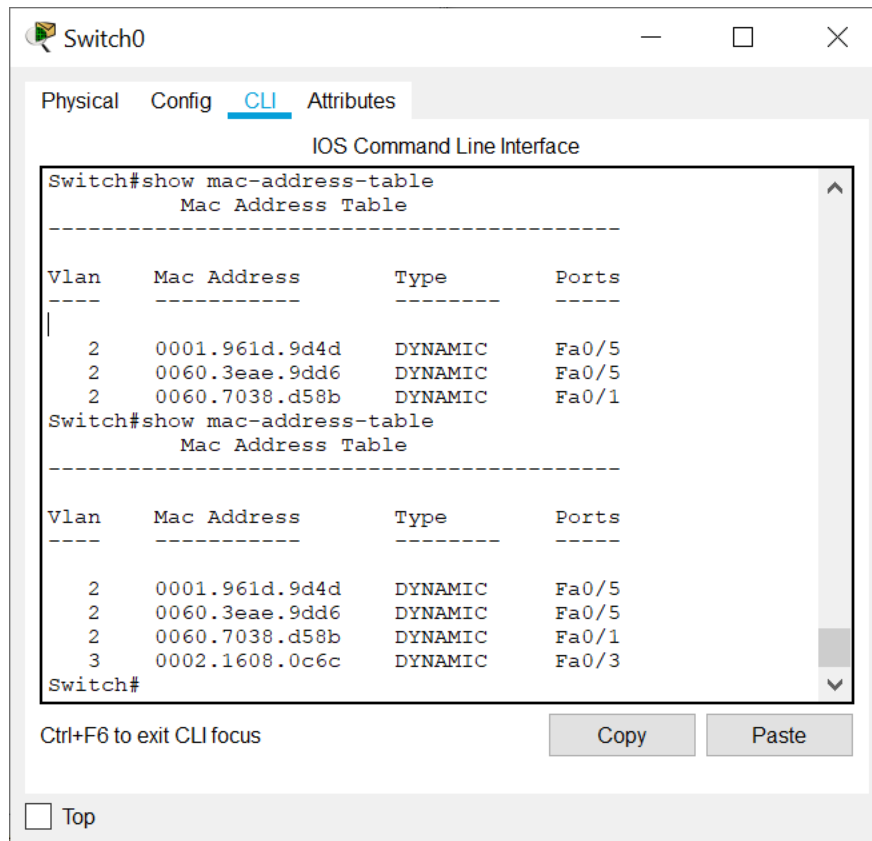
Ping statistics for 192.168.0.3:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

C:\>
```

☐ Top

失败。

- 9) 现在的交换机里的 mac 地址表有了变化

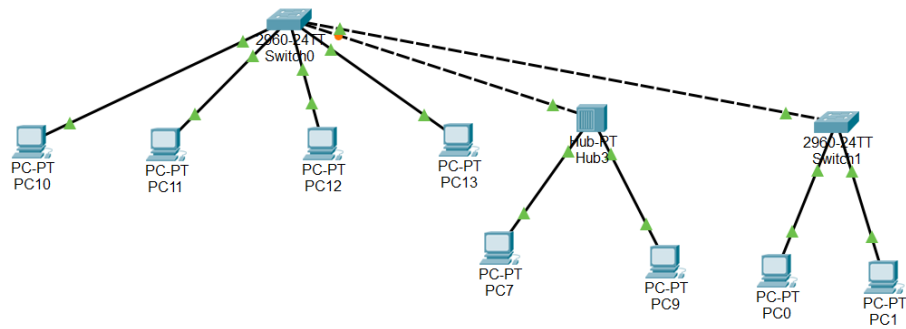


10) 结论：

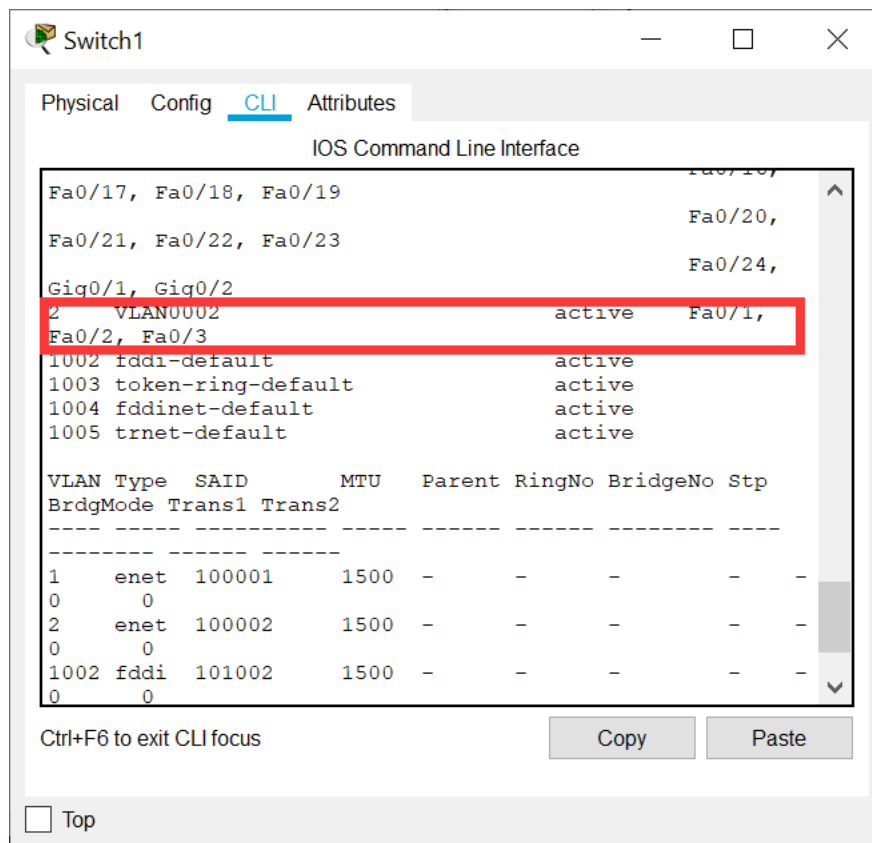
- 如果不在一个局域网里的终端是不能进行交流的。
- 交换机的 mac 地址表是边学习边更新的。
- 交换机不能分配局域网功能，也就是共享的网络都在一个局域网里。

4. 第四部分：第三章练习题三（3）

- 在第三部分的基础上加一个交换机，和两个 PC。并把交换机 1 第六个端口按上面的方法加入 VLAN0002；PC 的 IP 为 192.168.0.20-192.168.0.21

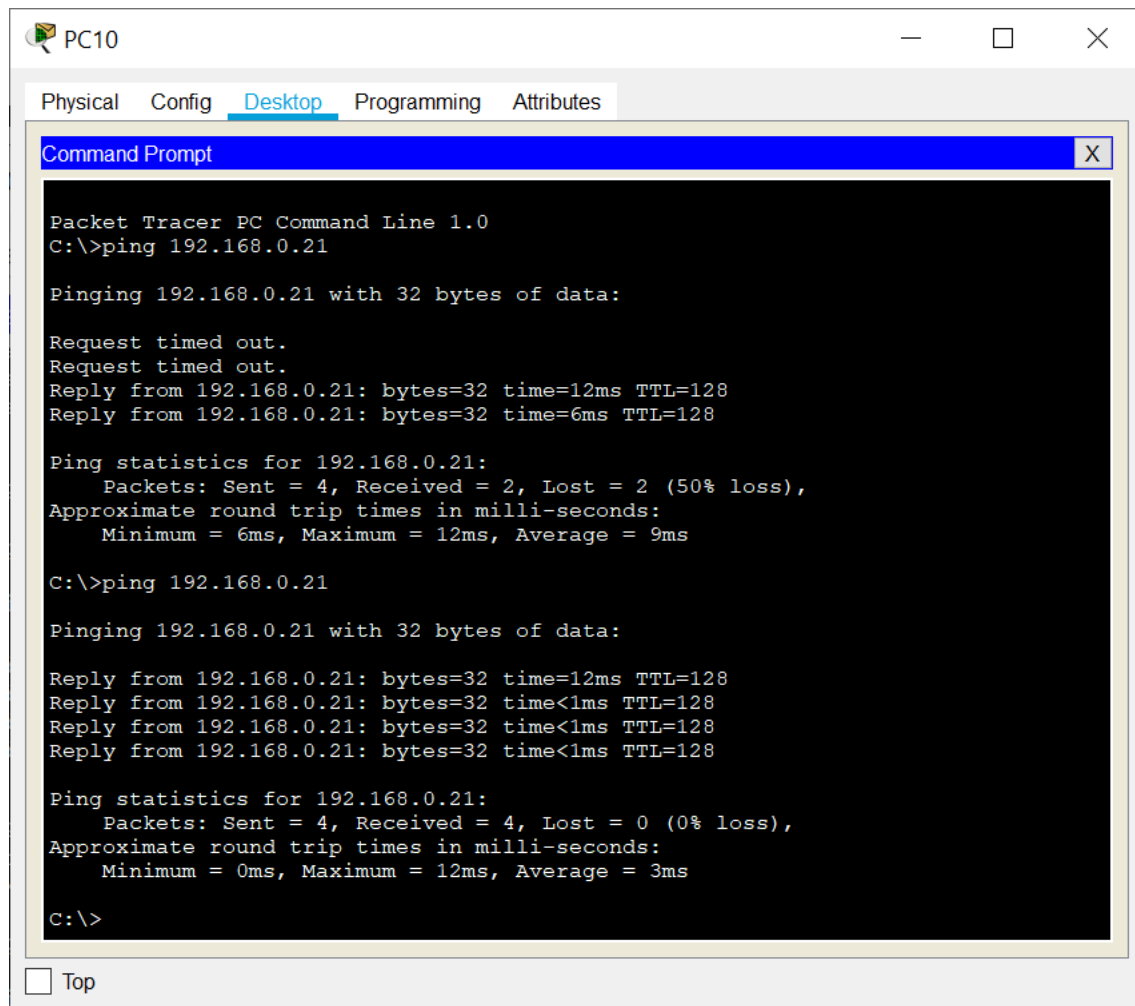


- 2) 配置交换机 2，先按第三部分的方法新建一个 VLAN，序号和名字分别为：0002，VLAN0002；然后把交换机 2 的第 1，2，3 个端口都加入 VLAN0002。



这样交换机 1，2 都在局域网里了。

- 3) 从 PC10 发送 ping 到 PC1



The screenshot shows a Packet Tracer interface for PC10. The 'Desktop' tab is selected, displaying a 'Command Prompt' window. The window contains the output of two ping commands to 192.168.0.21. The first command shows a 50% loss of packets, while the second command shows 0% loss. The Command Prompt window has a blue title bar and a close button. Below the Command Prompt window, there is a 'Top' button.

```
Packet Tracer PC Command Line 1.0
C:\>ping 192.168.0.21

Pinging 192.168.0.21 with 32 bytes of data:

Request timed out.
Request timed out.
Reply from 192.168.0.21: bytes=32 time=12ms TTL=128
Reply from 192.168.0.21: bytes=32 time=6ms TTL=128

Ping statistics for 192.168.0.21:
    Packets: Sent = 4, Received = 2, Lost = 2 (50% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 6ms, Maximum = 12ms, Average = 9ms

C:\>ping 192.168.0.21

Pinging 192.168.0.21 with 32 bytes of data:

Reply from 192.168.0.21: bytes=32 time=12ms TTL=128
Reply from 192.168.0.21: bytes=32 time<1ms TTL=128
Reply from 192.168.0.21: bytes=32 time<1ms TTL=128
Reply from 192.168.0.21: bytes=32 time<1ms TTL=128

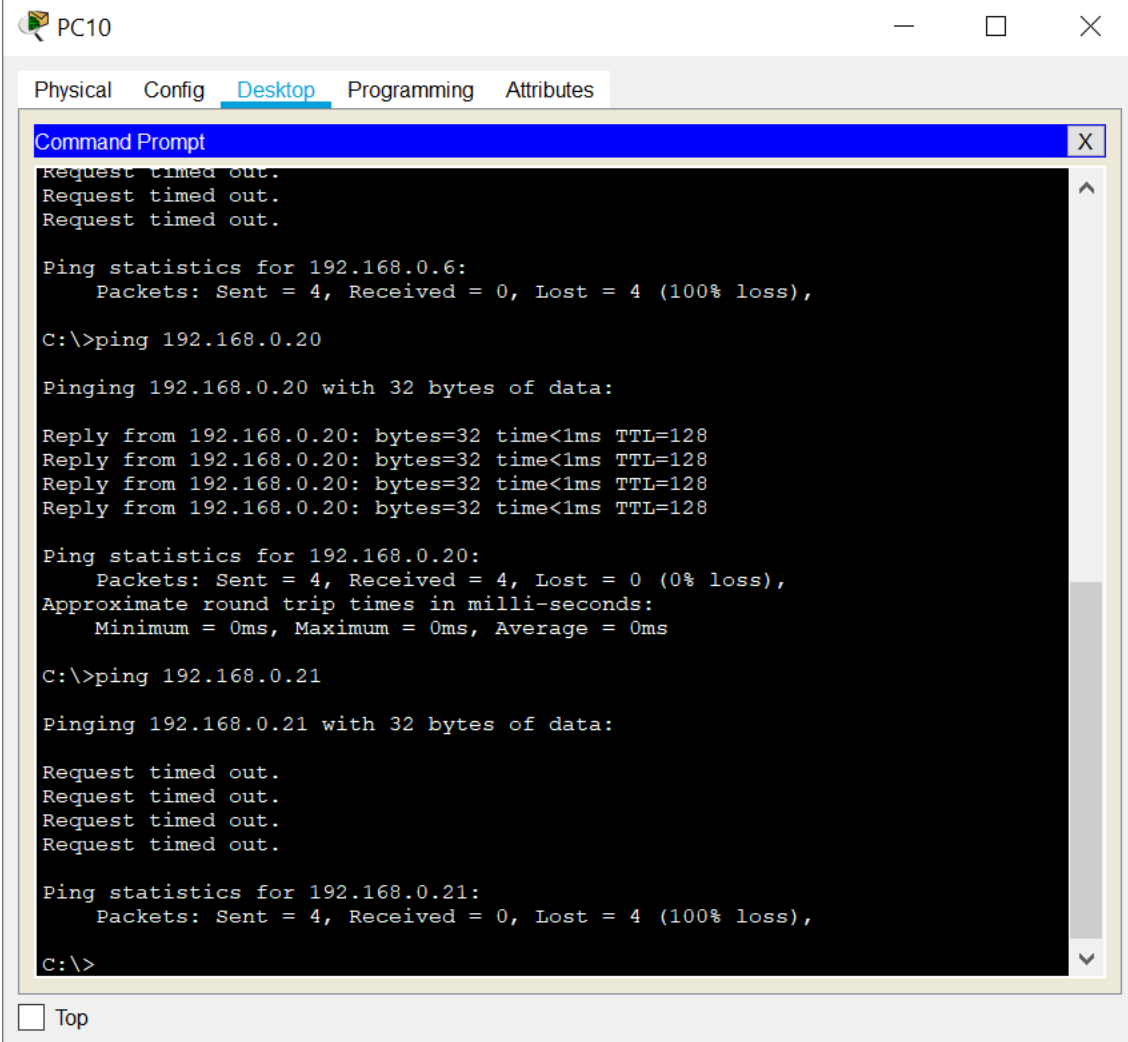
Ping statistics for 192.168.0.21:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 12ms, Average = 3ms

C:\>
```

☐ Top

成功。

如果把 PC1 的端口也就是交换机 2 的 3 端口从 VLAN 里移除，那么就会失败



```
PC10
Physical Config Desktop Programming Attributes
Command Prompt
Request timed out.
Request timed out.
Request timed out.

Ping statistics for 192.168.0.6:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

C:\>ping 192.168.0.20

Pinging 192.168.0.20 with 32 bytes of data:

Reply from 192.168.0.20: bytes=32 time<1ms TTL=128
Reply from 192.168.0.20: bytes=32 time<1ms TTL=128
Reply from 192.168.0.20: bytes=32 time<1ms TTL=128
Reply from 192.168.0.20: bytes=32 time<1ms TTL=128

Ping statistics for 192.168.0.20:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>ping 192.168.0.21

Pinging 192.168.0.21 with 32 bytes of data:

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

Ping statistics for 192.168.0.21:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

C:\>
```

4) 结论：

- A. 不同交换机之间也可以构建 VLAN，但网络序号和名称必须相同。并且，交换机互相连接的端口也必须接入局域网。
- B. 但端口变化，那局域网里相应的终端也变化。