



计算机科学与技术学院
School of Computer Science and Technology



VLAN实验

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1 安装软件



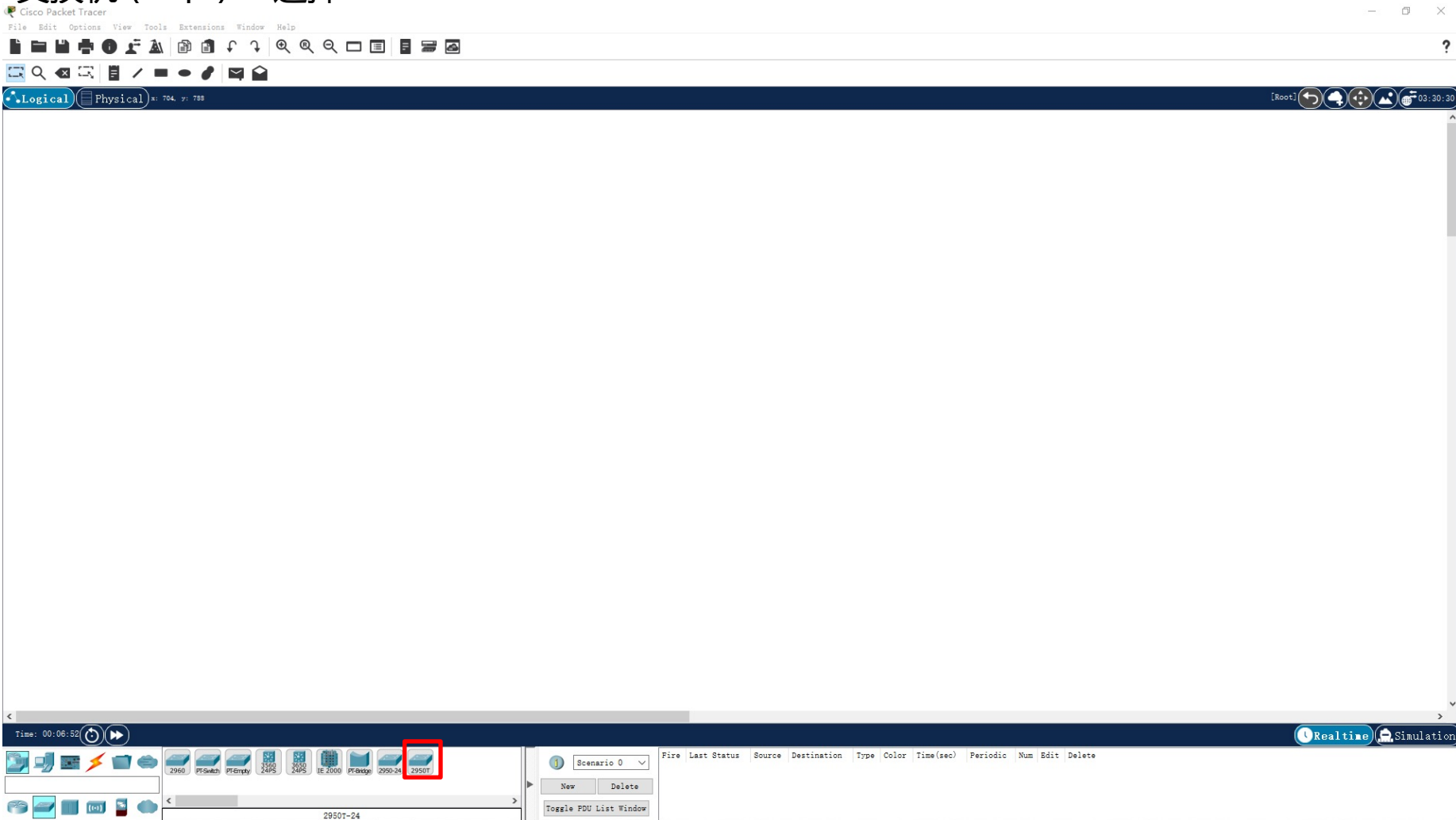
- **1. 安装软件**

方法同第一个实验，或者直接使用本文件夹下的安装包。

2 创建拓扑结构

• 2.1 选择组件

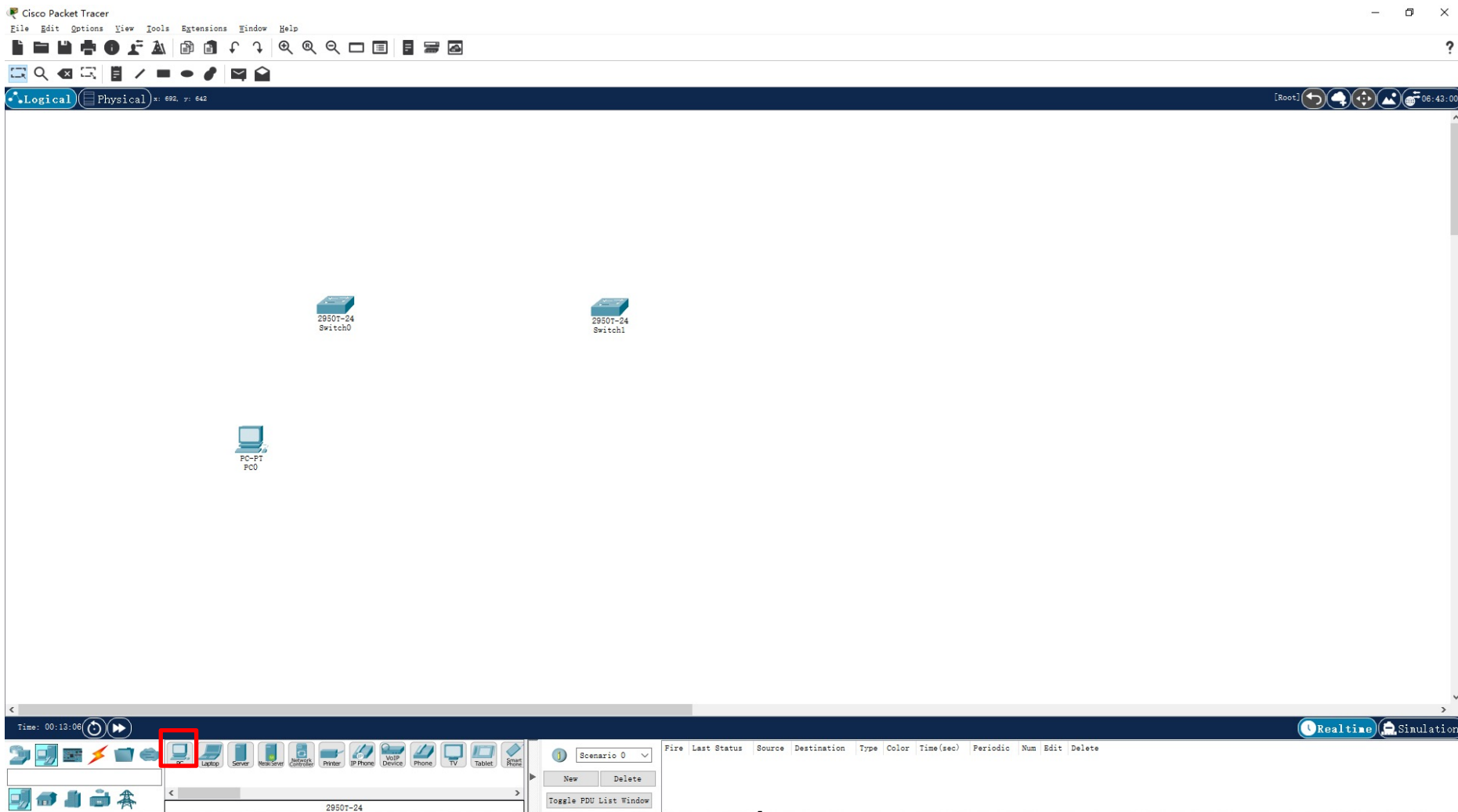
交换机（2个）：选择Network Devices->Switches->2950T



2 创建拓扑结构

• 2.1 选择组件

工作站PC（6个）：选择End Devices->End Devices->PC



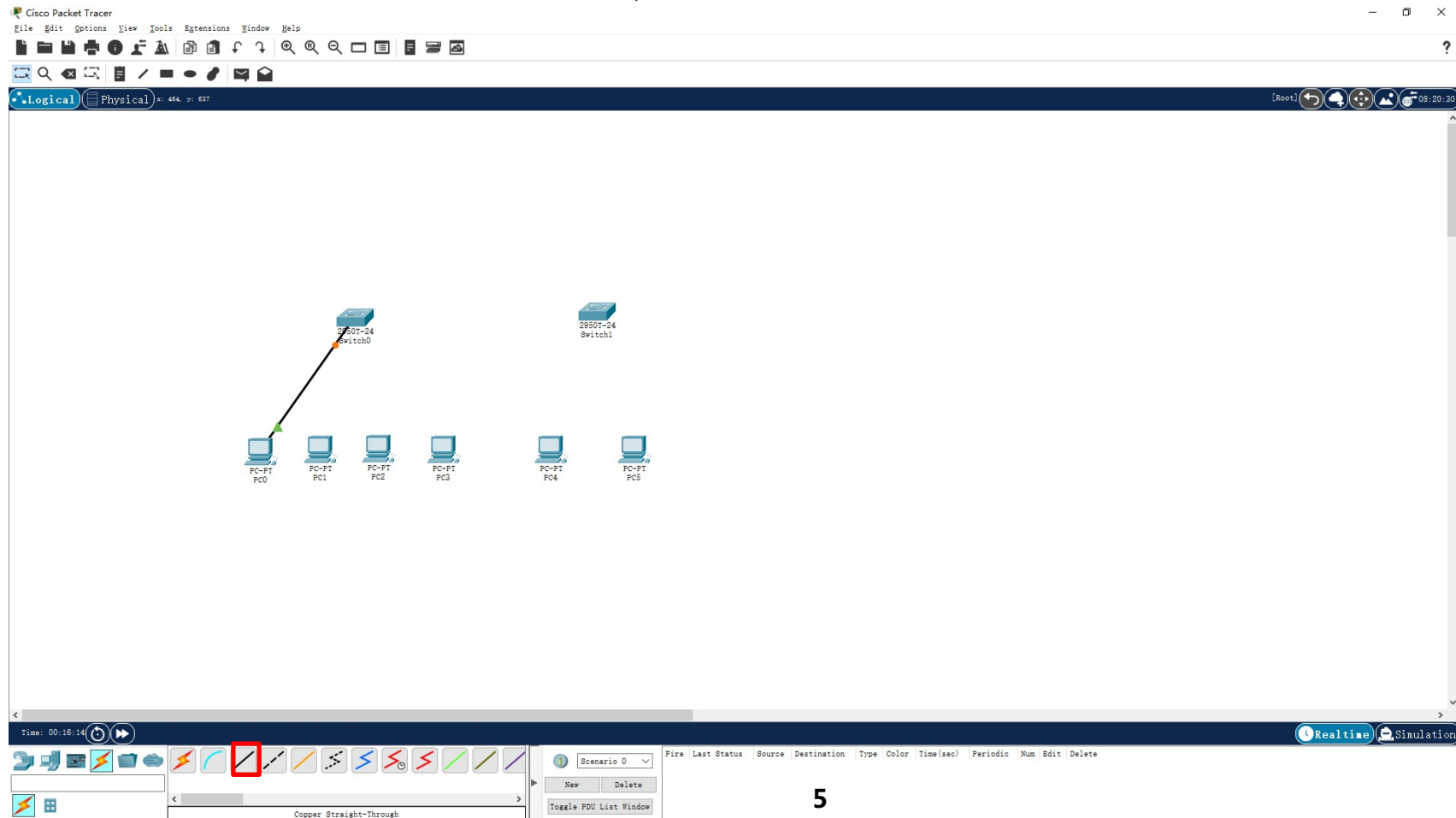
2 创建拓扑结构

• 2.1 选择组件

直通线：选择Connections->Connections->Copper Straight-Through

PC0-PC3的f0分别与Switch0的f0/3、f0/4、f0/6、f0/7连接(f表示FastEthernet)

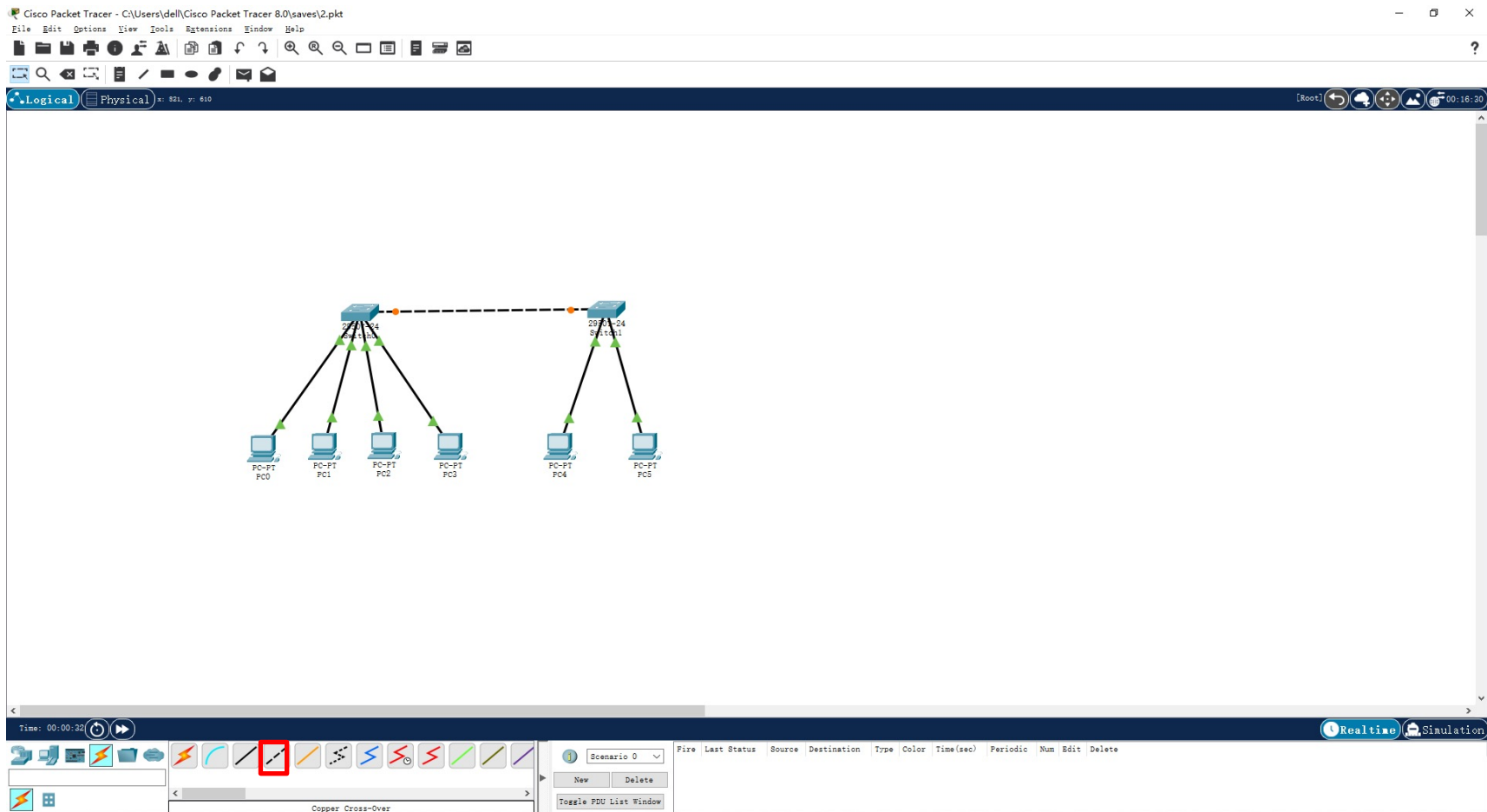
PC4-PC5的f0分别与Switch1的f0/3、f0/6连接



2 创建拓扑结构

• 2.1 选择组件

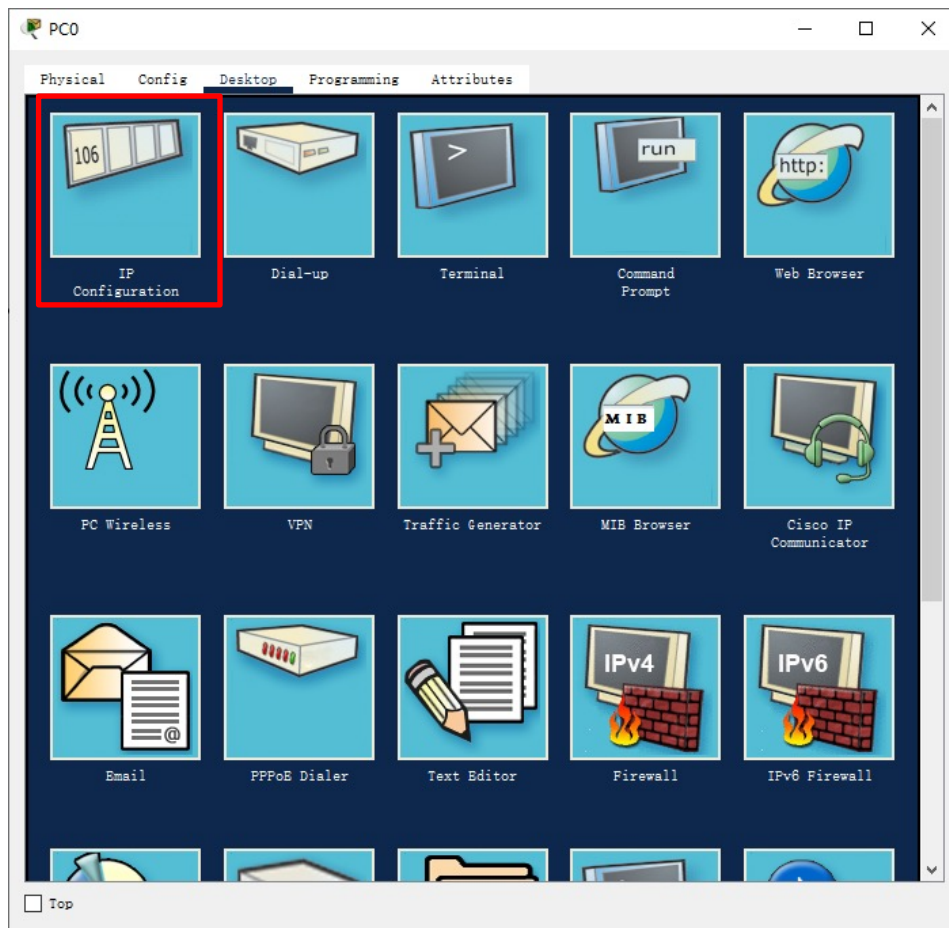
双绞线：选择Connections->Connections->Copper Cross-Over
Switch0的f0/1与Switch1的f0/1通过双绞线连接



2 创建拓扑结构

• 2.2 设置IP地址

单击PC0，选择Desktop->IP Configuration



2 创建拓扑结构

• 2.2 设置IP地址

在IPv4 Address和Subnet Mask处填入192.168.1.1和255.255.255.0，其余PC的设置方法相同。

PC1—PC5的IP地址分别为

192.168.1.1

192.168.1.2

192.168.1.3

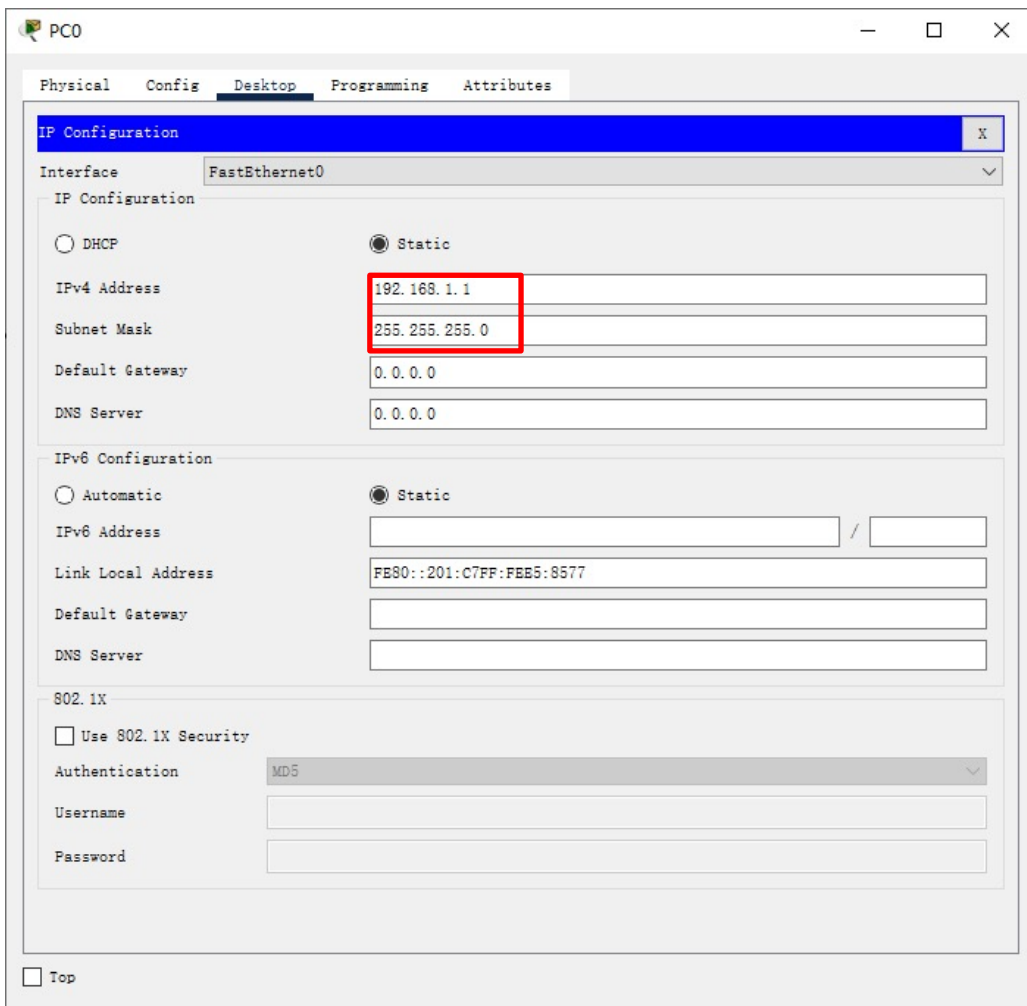
192.168.2.1

192.168.1.4

192.168.2.2

子网掩码均为

255.255.255.0



• 2.2 测试连通性

- (1) 从PC0到PC1的测试。点击工作站PC0，进入其配置窗口，选择桌面（Desktop）项，选择运行DOS命令行（Command Prompt），打开DOS命令行窗口，在DOS提示符下输入：ping 192.168.1.2后，回车确认，测试结果为连通。
- (2) 从PC0到PC2的测试。操作如(1)，测试结果为连通。
- (3) 从PC0到PC3的测试。操作如(1)，测试结果为不连通，因为不在同一网段。

PC0

Physical Config Desktop Programming Attributes

Command Prompt

```
IPv6 Address..... ::
IPv4 Address.....: 192.168.1.1
Subnet Mask.....: 255.255.255.0
Default Gateway...: ::

Bluetooth Connection:

Connection-specific DNS Suffix...:
Link-local IPv6 Address.....: ::
IPv6 Address.....: ::
IPv4 Address.....: 0.0.0.0
Subnet Mask.....: 0.0.0.0
Default Gateway...: ::

C:\>ping 192.168.1.2

Pinging 192.168.1.2 with 32 bytes of data:

Reply from 192.168.1.2: bytes=32 time<1ms TTL=128
Reply from 192.168.1.2: bytes=32 time<1ms TTL=128
Reply from 192.168.1.2: bytes=32 time<1ms TTL=128
Reply from 192.168.1.2: bytes=32 time<1ms TTL=128

Ping statistics for 192.168.1.2:
    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:

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

PC0

Physical Config Desktop Programming Attributes

Command Prompt

```
IPv6 Address..... ::
IPv4 Address.....: 192.168.1.1
Subnet Mask.....: 255.255.255.0
Default Gateway...: ::

Bluetooth Connection:

Connection-specific DNS Suffix...:
Link-local IPv6 Address.....: FE80::201:C7FF:FEE5:8577
IPv6 Address.....: ::
IPv4 Address.....: 192.168.1.1
Subnet Mask.....: 255.255.255.0
Default Gateway...: ::

Bluetooth Connection:

Connection-specific DNS Suffix...:
Link-local IPv6 Address.....: ::
IPv6 Address.....: ::
IPv4 Address.....: 0.0.0.0
Subnet Mask.....: 0.0.0.0
Default Gateway...: ::

C:\>ping 192.168.1.2

Pinging 192.168.1.2 with 32 bytes of data:

Reply from 192.168.1.2: bytes=32 time<1ms TTL=128
Reply from 192.168.1.2: bytes=32 time<1ms TTL=128
Reply from 192.168.1.2: bytes=32 time<1ms TTL=128
Reply from 192.168.1.2: bytes=32 time<1ms TTL=128

Ping statistics for 192.168.1.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>
```

• 3.1 在交换机上创建VLAN

点击Switch0进入其配置界面，选择命令行（CLI）项进行交换机配置，具体命令如下。

在交换机启动以后输入Switch>enable，进入系统模式

输入Switch#configure terminal，进入配置状态

输入Switch(config)#vlan 2，创建一个VLAN

输入Switch(config-vlan)#name VLAN2，为该VLAN命名

输入Switch(config-vlan)#exit，退出VLAN配置

输入Switch(config)#vlan 3，创建一个VLAN

输入Switch(config-vlan)#name VLAN3，为该VLAN命名

输入Switch(config)#exit，退出配置模式

输入Switch#show vlan，打印当前的VLAN配置情况

Switch1的步骤与Switch0的步骤完全相同

演示界面在下一页

• 3.1 在交换机上创建VLAN

Switch0

Physical Config **CLI** Attributes

IOS Command Line Interface

```
Switch>enable
Switch#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#vlan 2
Switch(config-vlan)#name VLAN2
Switch(config-vlan)#exit
Switch(config)#vlan 3
Switch(config-vlan)#name VLAN3
Switch(config-vlan)#exit
Switch(config)#exit
Switch#
%SYS-5-CONFIG_I: Configured from console by console

Switch#show vlan
```

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
2 VLAN2	active	
3 VLAN3	active	
1002 fddi-default	active	
1003 token-ring-default	active	
1004 fddinet-default	active	
1005 trnet-default	active	

VLAN Type	SAID	MTU	Parent	RingNo	BridgeNo	Stp	BrdgMode	Transl	Trans2

Ctrl+F6 to exit CLI focus

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☐ Top

• 3.1 在交换机上创建VLAN

Switch0和Switch1的以下步骤完全相同

在完成了VLAN的创建以后需要将交换机的端口添加到某个VLAN中，默认情况下所有的端口都属于编号为1的VLAN中。

将交换机的端口2、3、4分配成VLAN 2的成员，端口5、6、7分配成VLAN 3的成员。命令如下。

- 在配置模式下输入Switch(config)#interface range fastEthernet0/2-4,选中交换机0号模块的2号到4快速以太网端口
- 输入Switch(config-if-range)#switchport mode access，将端口的模式改为access（默认情况下也是access，因此不改也行）
- 输入Switch(config-if-range)#switchport access vlan 2，将对应的这些端口加入到编号为2的VLAN中
- 退出到系统模式下运行Switch#show vlan，可查看当前VLAN情况
按照上述方法，将端口5、6、7分配成VLAN 3的成员。

演示界面在下一页

• 3.1 在交换机上创建VLAN

Switch0

Physical Config **CLI** Attributes

IOS Command Line Interface

```
Switch#
Switch#
Switch#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#interface range fastEthernet0/2-4
Switch(config-if-range)#switchport mode access
Switch(config-if-range)#exit
Switch(config)#interface range fastEthernet0/5-7
Switch(config-if-range)#switchport mode access
Switch(config-if-range)#switchport access vlan 3
Switch(config-if-range)#exit
Switch(config)#exit
Switch#
Switch#
%SYS-5-CONFIG_I: Configured from console by console

Switch#show vlan
```

VLAN Name	Status	Ports
1 default	active	Fa0/1, 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
2 VLAN2	active	Fa0/2, Fa0/3, Fa0/4
3 VLAN3	active	Fa0/5, Fa0/6, Fa0/7
1002 fddi-default	active	
1003 token-ring-default	active	
1004 fddinet-default	active	
1005 trnet-default	active	

VLAN Type	SAID	MTU	Parent	RingNo	BridgeNo	Stp	BrdgMode	Trans1	Trans2
1	enet 1000001	1500	-	-	-	-	-	0	0
2	enet 1000002	1500	-	-	-	-	-	0	0

Ctrl+F6 to exit CLI focus

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☐ Top

• 3.2 在VLAN上测试PC连通性

- (1) 从PC0到PC1的测试，测试结果为连通（测试PC连通性的操作见步骤3）。PC0和PC1在同一个VLAN中，且在同一个网段内。
- (2) 从PC0到PC2的测试，测试结果为不通。PC0和PC2虽然IP地址属同一网段，但分处于不同VLAN中，所以不能相互通信。
- (3) 从PC2到PC3的测试，测试结果为不通。PC2和PC3在同一VLAN中，但IP地址不在同一网段内，所以不能相互通信。

```
PC0
Physical Config Desktop Programming Attributes
Command Prompt

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),

C:\>ping 192.168.1.2

Pinging 192.168.1.2 with 32 bytes of data:

Reply from 192.168.1.2: bytes=32 time<1ms TTL=128
Reply from 192.168.1.2: bytes=32 time<1ms TTL=128
Reply from 192.168.1.2: bytes=32 time<1ms TTL=128
Reply from 192.168.1.2: bytes=32 time<1ms TTL=128

Ping statistics for 192.168.1.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>ping 192.168.1.3

Pinging 192.168.1.3 with 32 bytes of data:
Request timed out.
Request timed out.
Request timed out.
Request timed out.

Ping statistics for 192.168.1.3:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

C:\>
```

```
PC2
Physical Config Desktop Programming Attributes
Command Prompt

Packet Tracer PC Command Line 1.0
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),

C:\>
```

• 3.2 在VLAN上测试PC连通性

- (1) 从PC0到PC1的测试，测试结果为连通（测试PC连通性的操作见步骤3）。PC0和PC1在同一个VLAN中，且在同一个网段内。
- (2) 从PC0到PC2的测试，测试结果为不通。PC0和PC2虽然IP地址属同一网段，但分处于不同VLAN中，所以不能相互通信。
- (3) 从PC2到PC3的测试，测试结果为不通。PC2和PC3在同一VLAN中，但IP地址不在同一网段内，所以不能相互通信。

```
PC0
Physical Config Desktop Programming Attributes
Command Prompt
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),

C:\>ping 192.168.1.2

Pinging 192.168.1.2 with 32 bytes of data:

Reply from 192.168.1.2: bytes=32 time<1ms TTL=128
Reply from 192.168.1.2: bytes=32 time<1ms TTL=128
Reply from 192.168.1.2: bytes=32 time<1ms TTL=128
Reply from 192.168.1.2: bytes=32 time<1ms TTL=128

Ping statistics for 192.168.1.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>ping 192.168.1.3

Pinging 192.168.1.3 with 32 bytes of data:

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

Ping statistics for 192.168.1.3:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

C:\>
```

```
PC2
Physical Config Desktop Programming Attributes
Command Prompt
Packet Tracer PC Command Line 1.0
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),

C:\>
```

• 3.2 在VLAN上测试PC连通性

- (1) 从PC0到PC1的测试，连通，相同VLAN，相同网段。
- (2) 从PC0到PC2的测试，不通，网段相同，但处于不同的VLAN。
- (3) 从PC0到PC4的测试，不通，相同VLAN，相同网段，但分处于两台交换机，需要配置trunk。

```
PC0
Physical Config Desktop Programming Attributes
Command Prompt
Ping statistics for 192.168.2.1:
  Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

C:\>ping 192.168.1.2

Pinging 192.168.1.2 with 32 bytes of data:

Reply from 192.168.1.2: bytes=32 time<1ms TTL=128
Reply from 192.168.1.2: bytes=32 time<1ms TTL=128
Reply from 192.168.1.2: bytes=32 time<1ms TTL=128
Reply from 192.168.1.2: bytes=32 time<1ms TTL=128

Ping statistics for 192.168.1.2:
  Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
      Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>ping 192.168.1.3

Pinging 192.168.1.3 with 32 bytes of data:

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

Ping statistics for 192.168.1.3:
  Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

C:\>ping 192.168.1.4

Pinging 192.168.1.4 with 32 bytes of data:

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


• 4.1 在交换机上配置trunk

分别在Switch0和Switch1上进行配置，命令如下。

输入Switch#configure terminal，进入配置状态

输入Switch(config)#int f0/1

输入Switch(config-if)#switchport mode trunk

输入Switch(config-if)#switchport trunk allowed vlan 1,2,3

输入Switch(config-if)#end

```
Switch>enable
Switch#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#int f0/1
Switch(config-if)#switchport mode trunk

Switch(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to down

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to up

Switch(config-if)#switchport trunk allowed vlan 1,2,3
Switch(config-if)#end
Switch#
%SYS-5-CONFIG_I: Configured from console by console

Switch#
```

Ctrl+F6 to exit CLI focus

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• 4.2 测试连通性

从PC0到PC4的测试，测试结果连通，相同VLAN，相同网段，分处于两台交换机，通过主干道相连。

```
PC0
Physical Config Desktop Programming Attributes
Command Prompt
Pinging 192.168.1.3 with 32 bytes of data:
Request timed out.
Request timed out.
Request timed out.
Request timed out.
Ping statistics for 192.168.1.3:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

C:\>ping 192.168.1.4

Pinging 192.168.1.4 with 32 bytes of data:
Request timed out.
Request timed out.
Request timed out.
Request timed out.
Ping statistics for 192.168.1.4:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

C:\>ping 192.168.1.4

Pinging 192.168.1.4 with 32 bytes of data:
Reply from 192.168.1.4: bytes=32 time<1ms TTL=128
Reply from 192.168.1.4: bytes=32 time<1ms TTL=128
Reply from 192.168.1.4: bytes=32 time<1ms TTL=128
Reply from 192.168.1.4: bytes=32 time<1ms TTL=128
Ping statistics for 192.168.1.4:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>
```



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谢 谢 !

Q & A

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