

## Domain 04 Demo 03

### Implementing Network Segmentation and VLANs

**Objective:** To implement network segmentation and VLANs within a single physical infrastructure to enhance security and performance

**Tools required:** Cisco Packet Tracer and Windows Server 2022

**Prerequisites:** None

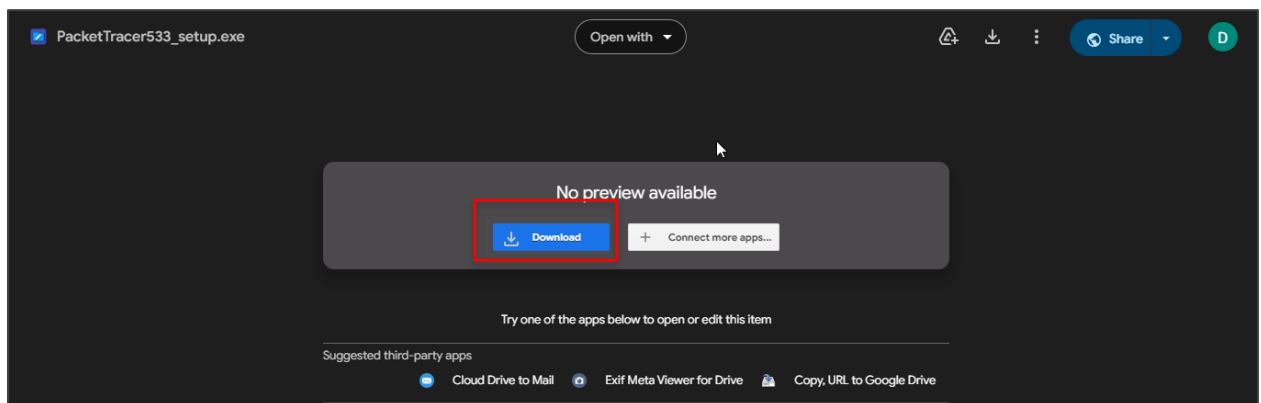
Steps to be followed:

1. Install the Cisco Packet Tracer
2. Load sample network and connect devices
3. Assign IP addresses and verify initial connectivity
4. Create VLANs
5. Assign ports to VLANs and verify configuration

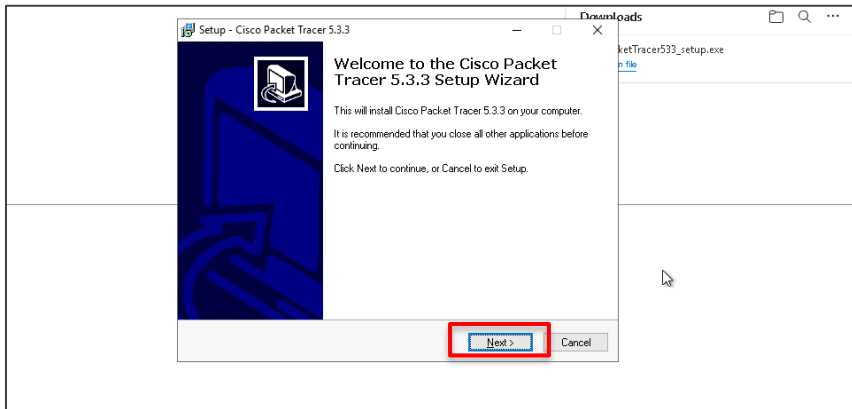
#### Step 1: Install the Cisco Packet Tracker

1.1 Download the Cisco Packet Tracer from the following URL:

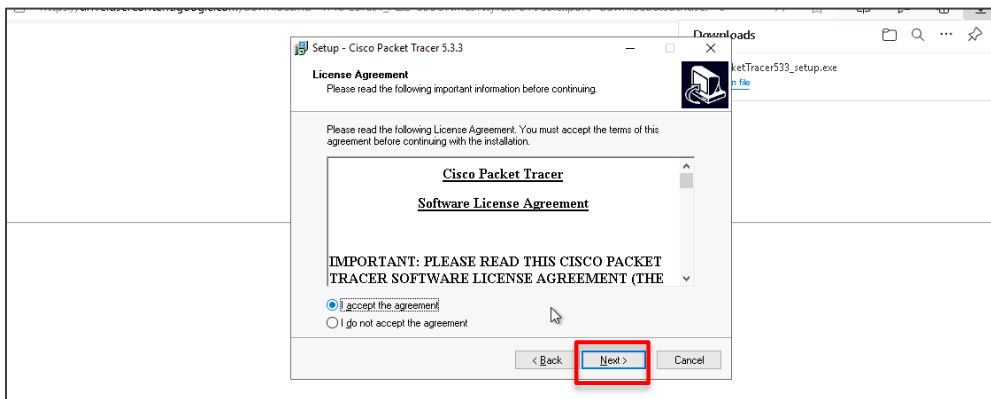
[https://drive.google.com/file/d/1PKPL5RxH\\_AZ2-6S6UNmc3NsjYBxrCY9a/view](https://drive.google.com/file/d/1PKPL5RxH_AZ2-6S6UNmc3NsjYBxrCY9a/view)



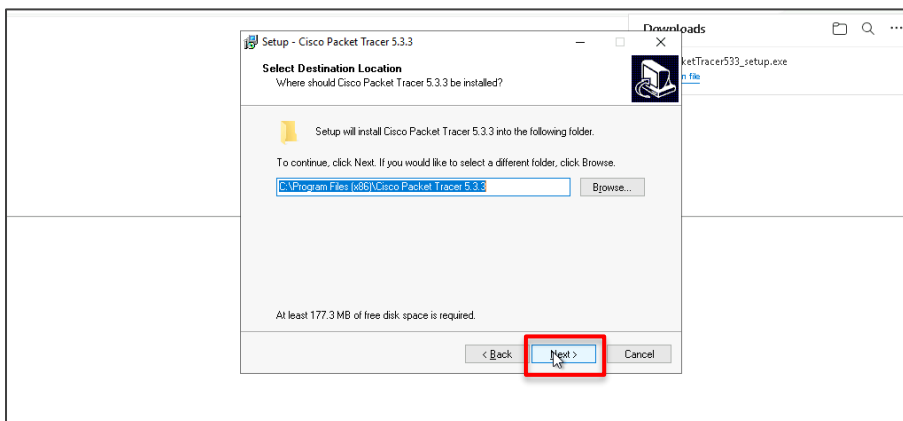
1.2 To start the installation process, run the downloaded executable file and click **Next**



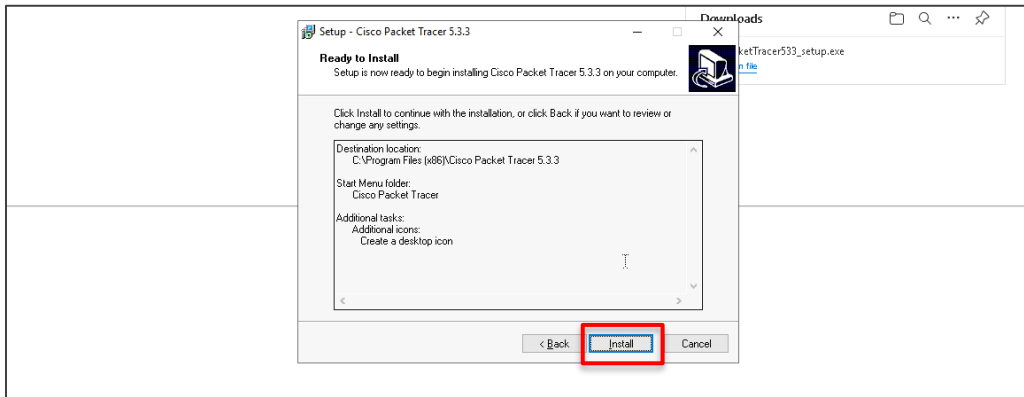
1.3 Click on **I accept the agreement** to start the installation and click on **Next**



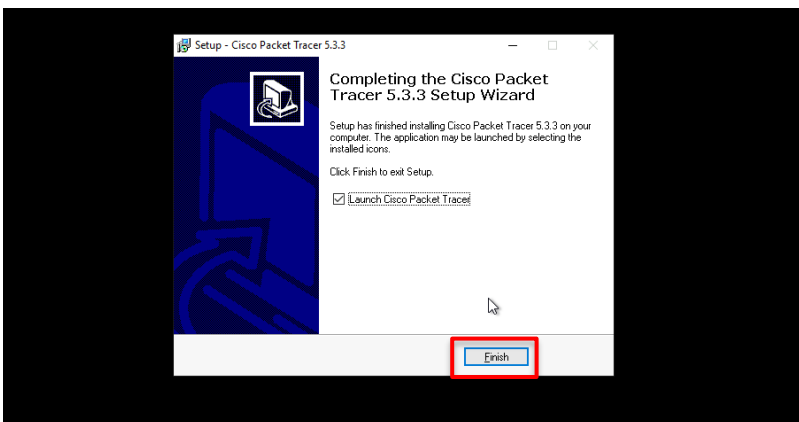
1.4 Select the destination where the Cisco Packet Tracer will be installed



## 1.5 Click on Install

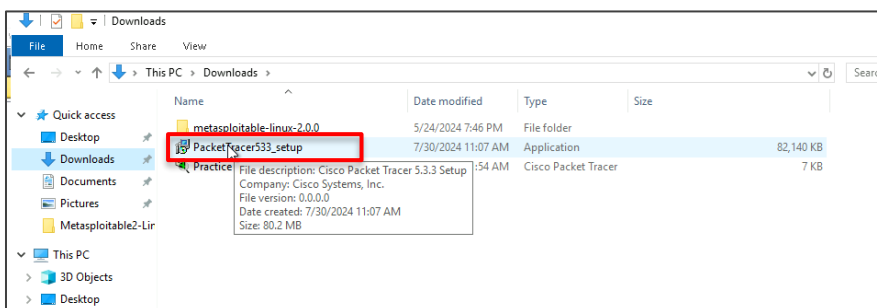


## 1.6 Click on the Finish button once the installation is complete

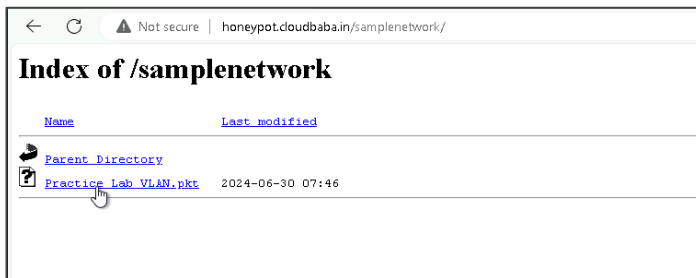


## Step 2: Load sample network and connect devices

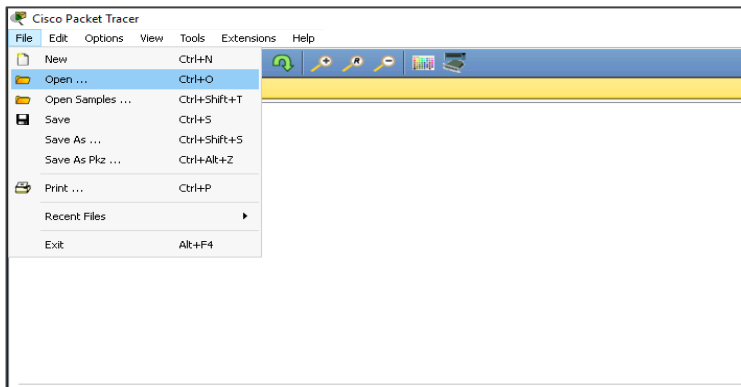
### 2.1 Open Cisco Packet Tracer



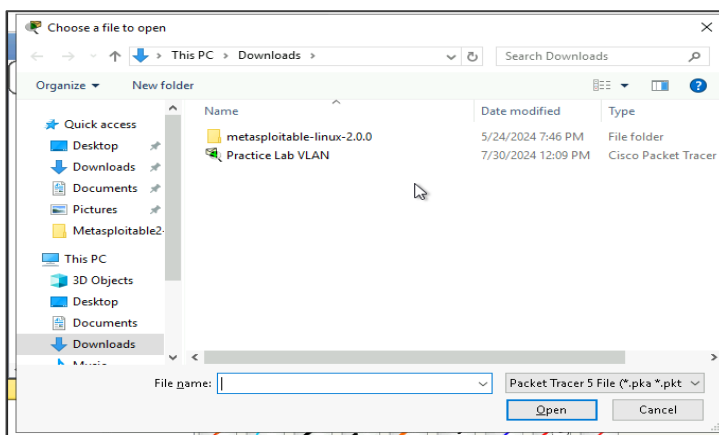
## 2.2 Download a sample network file from [honeypot.cloudbaba.in/samplenetwork/](https://honeypot.cloudbaba.in/samplenetwork/)



## 2.3 In the Cisco Packet Tracer application, go to the **File** menu and select **Open**

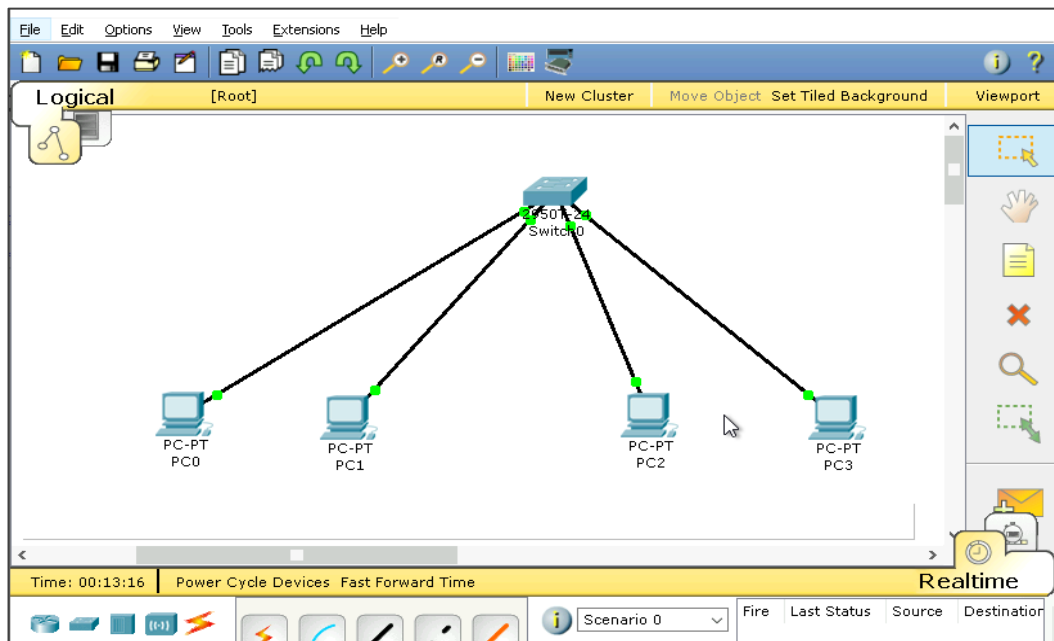


## 2.4 Locate and open the downloaded sample network file



2.5 In the workspace, connect the PCs to the respective ports on the switch:

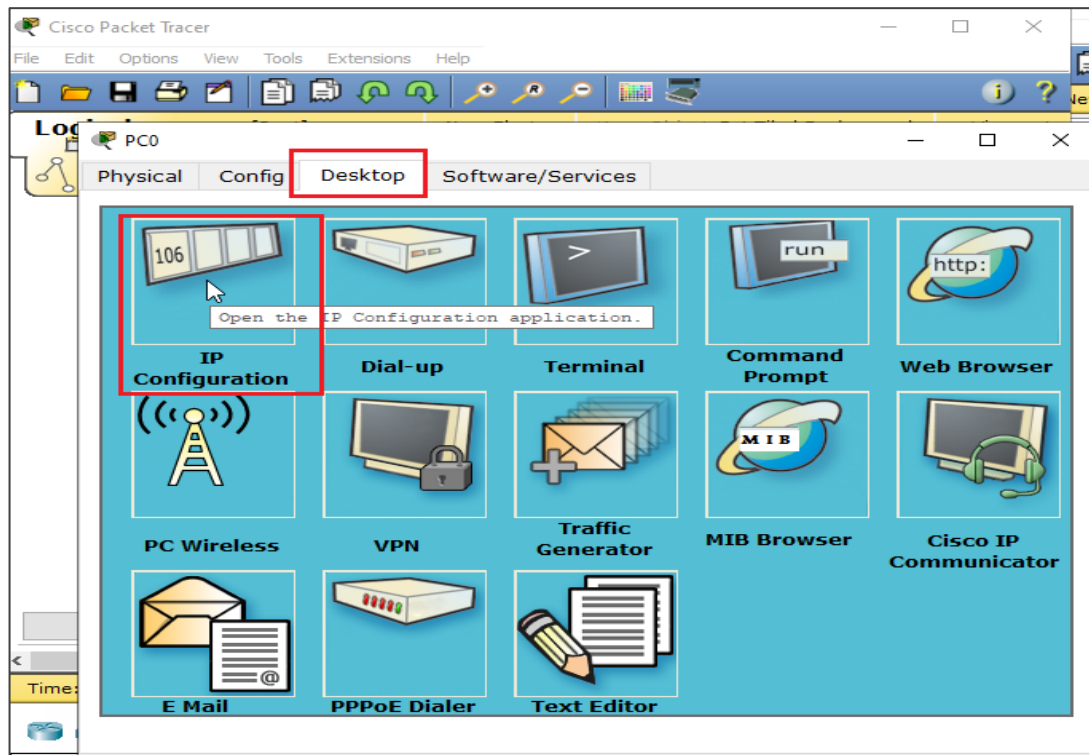
PC0 to **FastEthernet0/1**, PC1 to **FastEthernet0/2**, PC2 to **FastEthernet0/3**, PC3 to **FastEthernet0/4**



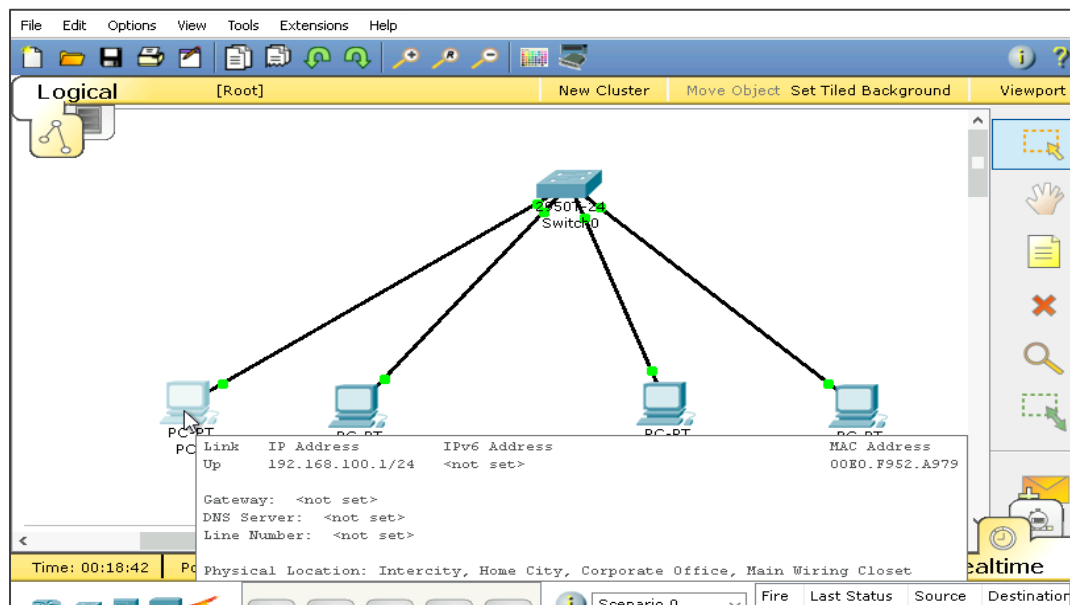
Verify that the connections are established by checking the link status indicators

## Step 3: Assign IP addresses and verify initial connectivity

### 3.1 Click on **IP Configuration** under the **Desktop** tab

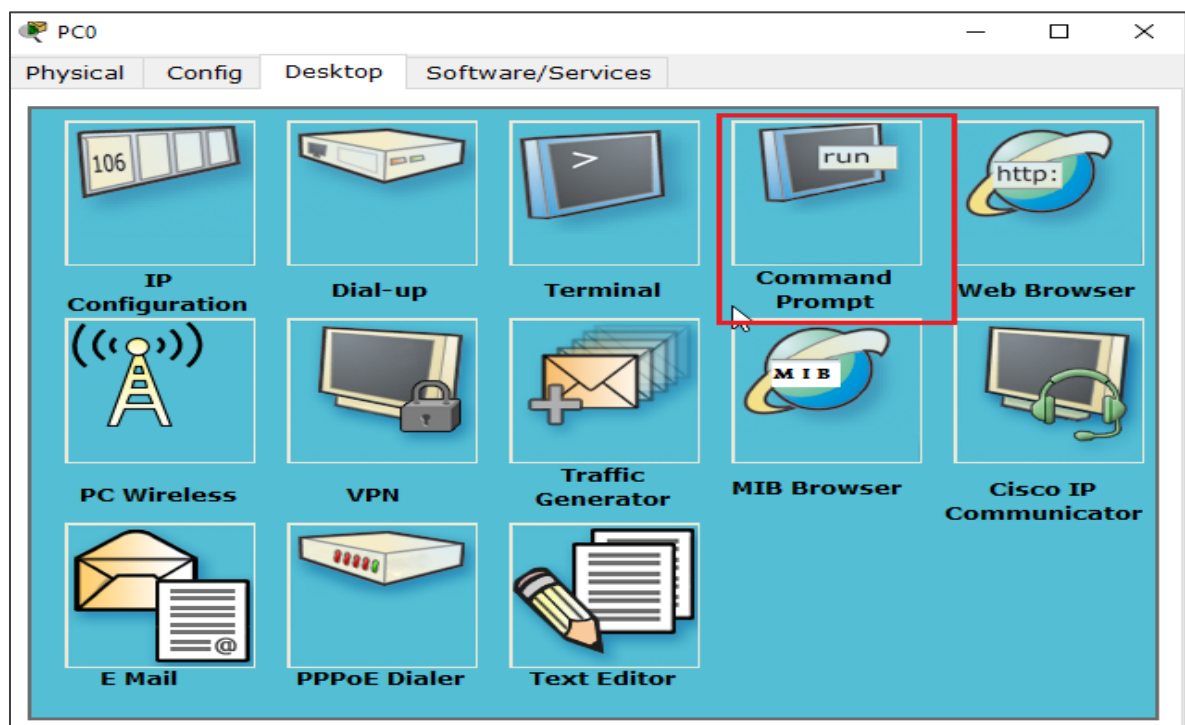


### 3.2 Verify connectivity details by hovering over PCs

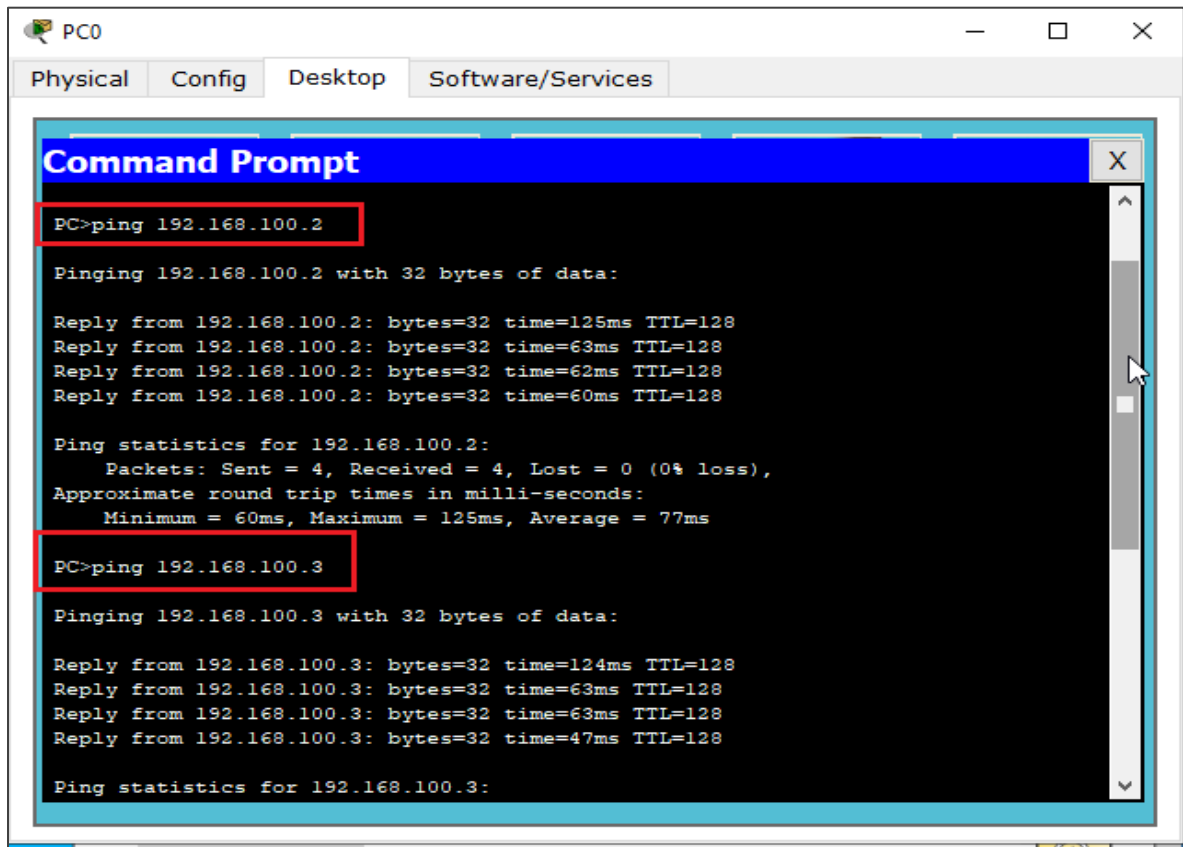


**Note:** Repeat the step for **PC1, PC2** and **PC3**

### 3.3 Open the **Command Prompt** on each PC and verify connectivity by pinging between PCs



3.4 Execute the commands **ping 192.168.100.2**, **ping 192.168.100.3**, and **ping 192.168.100.4** in PC0 to see that the networks communicate with each other



The screenshot shows a window titled "PC0" with tabs for "Physical", "Config", "Desktop", and "Software/Services". The "Desktop" tab is active, displaying a "Command Prompt" window. The Command Prompt has a blue title bar and a black background with white text. The text shows two ping commands being executed, each with its results and statistics. The first command is "PC>ping 192.168.100.2" and the second is "PC>ping 192.168.100.3". Both commands show successful results with 0% loss and various round trip times.

```
PC0
Physical Config Desktop Software/Services

Command Prompt

PC>ping 192.168.100.2

Pinging 192.168.100.2 with 32 bytes of data:

Reply from 192.168.100.2: bytes=32 time=125ms TTL=128
Reply from 192.168.100.2: bytes=32 time=63ms TTL=128
Reply from 192.168.100.2: bytes=32 time=62ms TTL=128
Reply from 192.168.100.2: bytes=32 time=60ms TTL=128

Ping statistics for 192.168.100.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 60ms, Maximum = 125ms, Average = 77ms

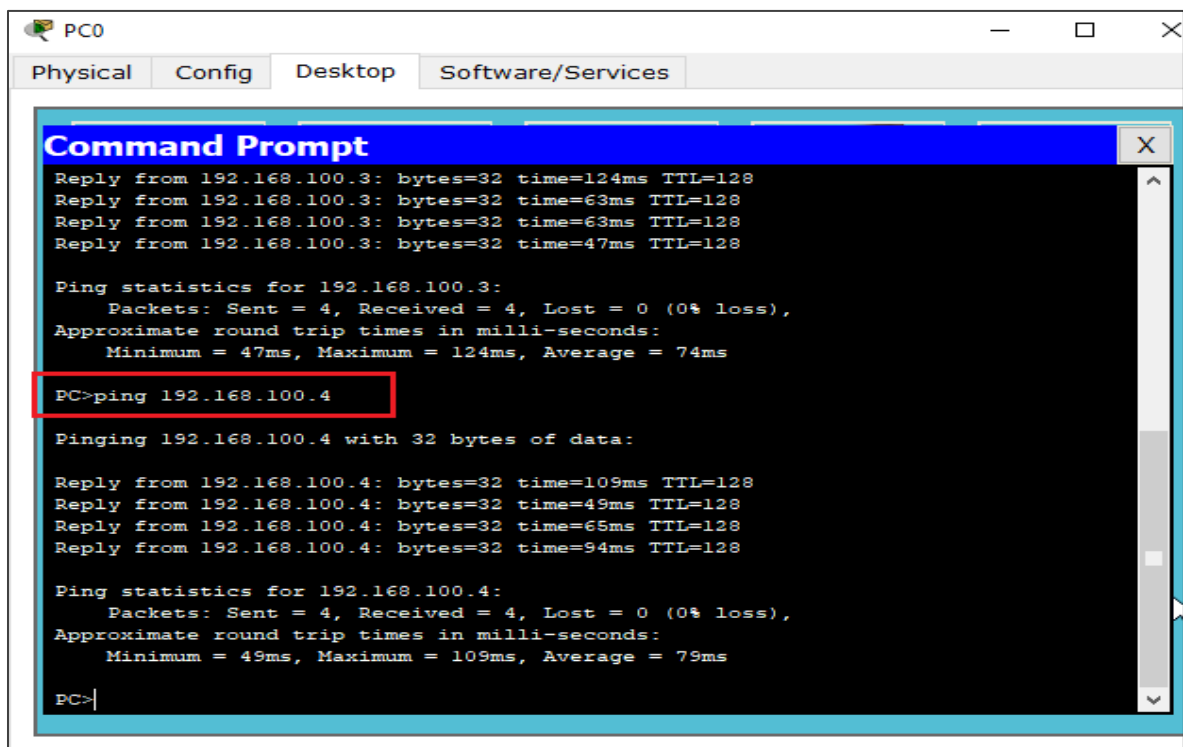
PC>ping 192.168.100.3

Pinging 192.168.100.3 with 32 bytes of data:

Reply from 192.168.100.3: bytes=32 time=124ms TTL=128
Reply from 192.168.100.3: bytes=32 time=63ms TTL=128
Reply from 192.168.100.3: bytes=32 time=63ms TTL=128
Reply from 192.168.100.3: bytes=32 time=47ms TTL=128

Ping statistics for 192.168.100.3:
```





The screenshot shows a window titled "PC0" with tabs for "Physical", "Config", "Desktop", and "Software/Services". The "Desktop" tab is active, displaying a "Command Prompt" window. The Command Prompt shows the results of a ping command to 192.168.100.3, followed by a new ping command to 192.168.100.4 which is highlighted with a red box. The output for the second ping shows four successful replies with varying times and a 79ms average.

```
PC0
Physical Config Desktop Software/Services

Command Prompt
Reply from 192.168.100.3: bytes=32 time=124ms TTL=128
Reply from 192.168.100.3: bytes=32 time=63ms TTL=128
Reply from 192.168.100.3: bytes=32 time=63ms TTL=128
Reply from 192.168.100.3: bytes=32 time=47ms TTL=128

Ping statistics for 192.168.100.3:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 47ms, Maximum = 124ms, Average = 74ms

PC>ping 192.168.100.4

Pinging 192.168.100.4 with 32 bytes of data:

Reply from 192.168.100.4: bytes=32 time=109ms TTL=128
Reply from 192.168.100.4: bytes=32 time=49ms TTL=128
Reply from 192.168.100.4: bytes=32 time=65ms TTL=128
Reply from 192.168.100.4: bytes=32 time=94ms TTL=128

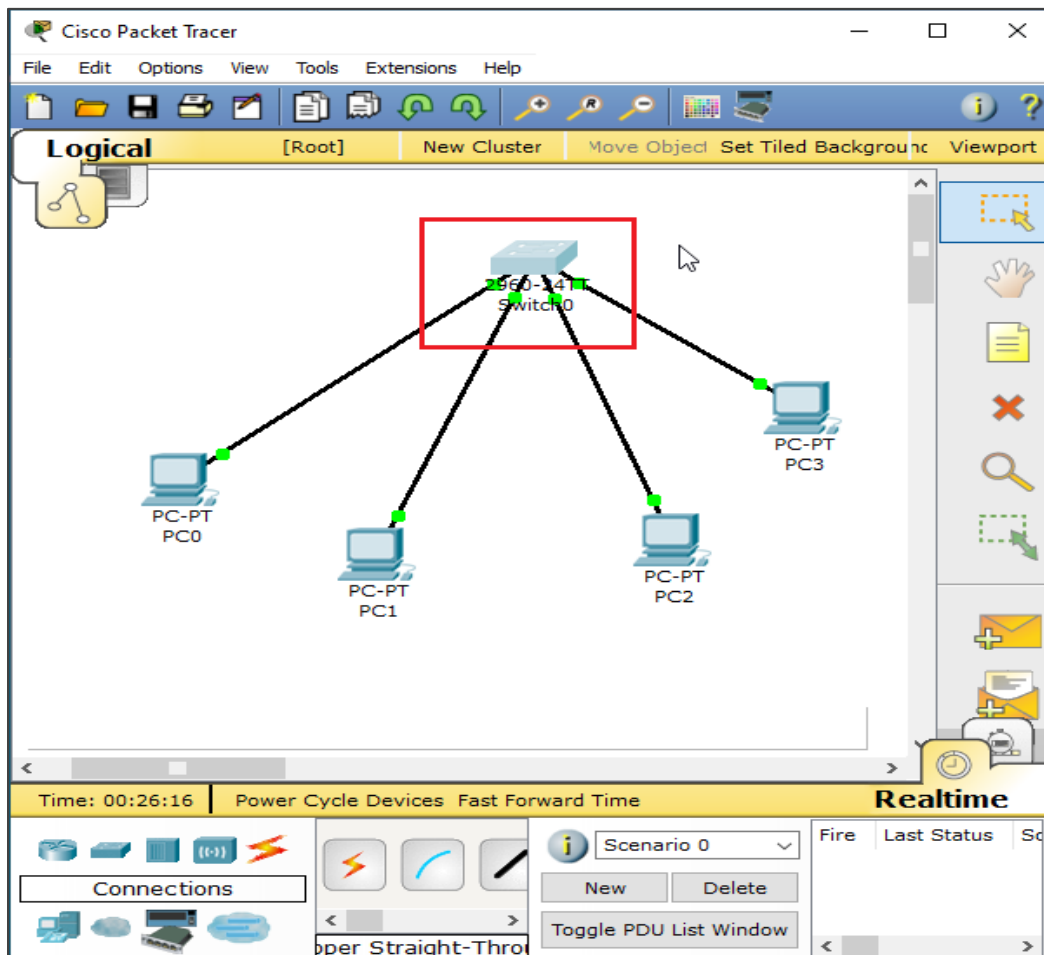
Ping statistics for 192.168.100.4:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 49ms, Maximum = 109ms, Average = 79ms

PC>
```

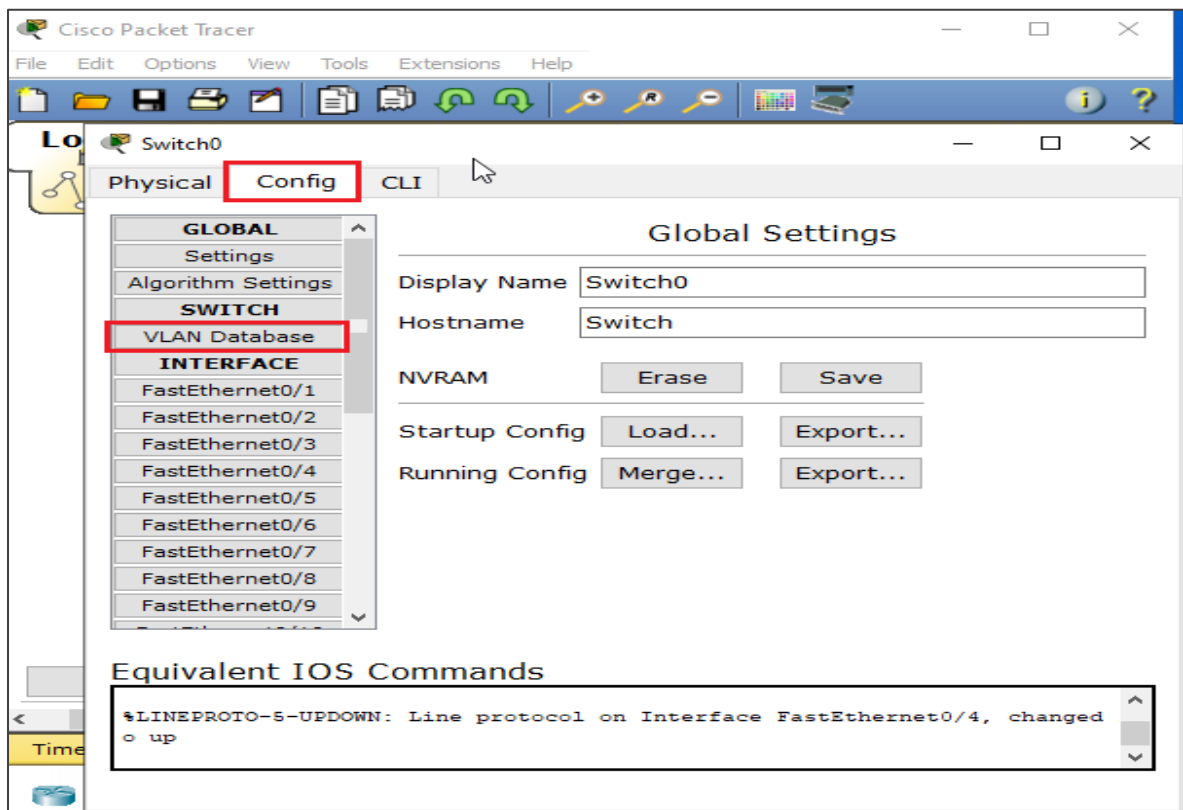
Repeat the process on **PC1**, **PC2**, and **PC3**

## Step 4: Create VLANs

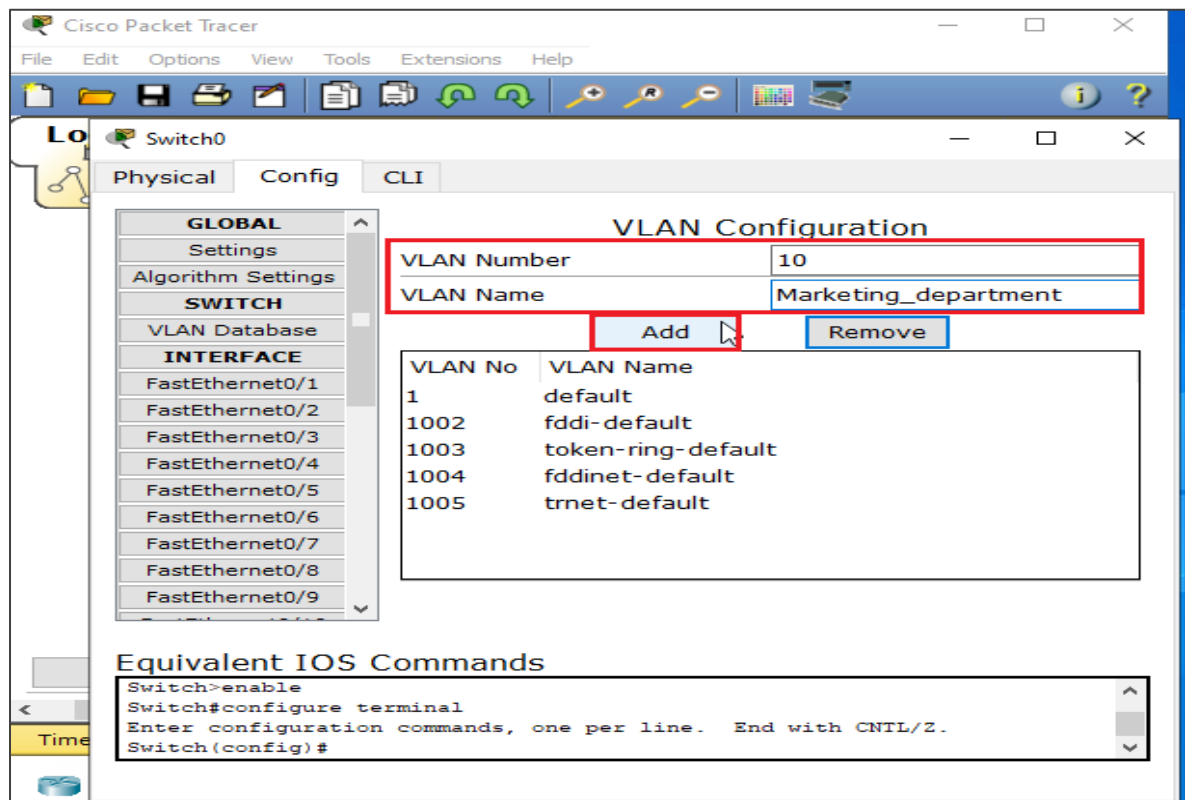
4.1 In the Cisco Packet Tracer, click the **2960 switch** in the workspace



#### 4.2 Navigate to the **Config** tab and select **VLAN Database**



4.3 Enter the value in **VLAN Number** as **10**, name it **Marketing\_department**, and click **Add**



4.4 Add another VLAN configuration by setting the VLAN Number to **11**, naming it **Research\_&\_development**, and clicking **Add**

**Switch0**

Physical Config CLI

**GLOBAL**

- Settings
- Algorithm Settings

**SWITCH**

- VLAN Database

**INTERFACE**

- FastEthernet0/1
- FastEthernet0/2
- FastEthernet0/3
- FastEthernet0/4
- FastEthernet0/5
- FastEthernet0/6
- FastEthernet0/7
- FastEthernet0/8
- FastEthernet0/9

**VLAN Configuration**

VLAN Number: 11

VLAN Name: Research\_&\_development

Add Remove

VLAN No	VLAN Name
1	default
10	Marketing_department
1002	fddi-default
1003	token-ring-default
1004	fddinet-default
1005	trnet-default

**Equivalent IOS Commands**

```
Switch(config)#vlan 10
Switch(config-vlan)#name Marketing_department
Switch(config-vlan)#exit
Switch(config)#
```

## Step 5: Assign ports to VLANs and verify the configuration

5.1 Assign FastEthernet0/1 and FastEthernet0/2 to VLAN 10 by selecting the **INTERFACE**, setting the **VLAN** field to **10** under Access, and clicking **Apply**

The screenshot shows the configuration window for Switch0 in Cisco Packet Tracer. The window has three tabs: Physical, Config, and CLI. The Config tab is active. On the left, a tree view shows the configuration hierarchy: GLOBAL, Settings, Algorithm Settings, SWITCH, VLAN Database, and INTERFACE. The INTERFACE section is highlighted with a red box, and a list of interfaces (FastEthernet0/1 through FastEthernet0/9) is shown below it. The main configuration area is titled 'FastEthernet0/1'. It contains several settings: Port Status is checked 'On'; Bandwidth is checked 'Auto' with radio buttons for 10 Mbps and 100 Mbps (100 Mbps is selected); Duplex is checked 'Auto' with radio buttons for Full Duplex and Half Duplex (Full Duplex is selected). Under the 'Access' tab, the 'VLAN' field is set to 10. The 'Tx Ring Limit' is set to 10. At the bottom, a section titled 'Equivalent IOS Commands' shows the following commands: Switch(config)#, Switch(config)#, Switch(config)#interface FastEthernet0/1, and Switch(config-if)#.

Switch0

Physical Config CLI

GLOBAL

Settings

Algorithm Settings

SWITCH

VLAN Database

**INTERFACE**

FastEthernet0/1

FastEthernet0/2

FastEthernet0/3

FastEthernet0/4

FastEthernet0/5

FastEthernet0/6

FastEthernet0/7

FastEthernet0/8

FastEthernet0/9

FastEthernet0/1

Port Status ☒ On

Bandwidth ☒ Auto

☐ 10 Mbps ☒ 100 Mbps

Duplex ☒ Auto

☒ Full Duplex ☐ Half Duplex

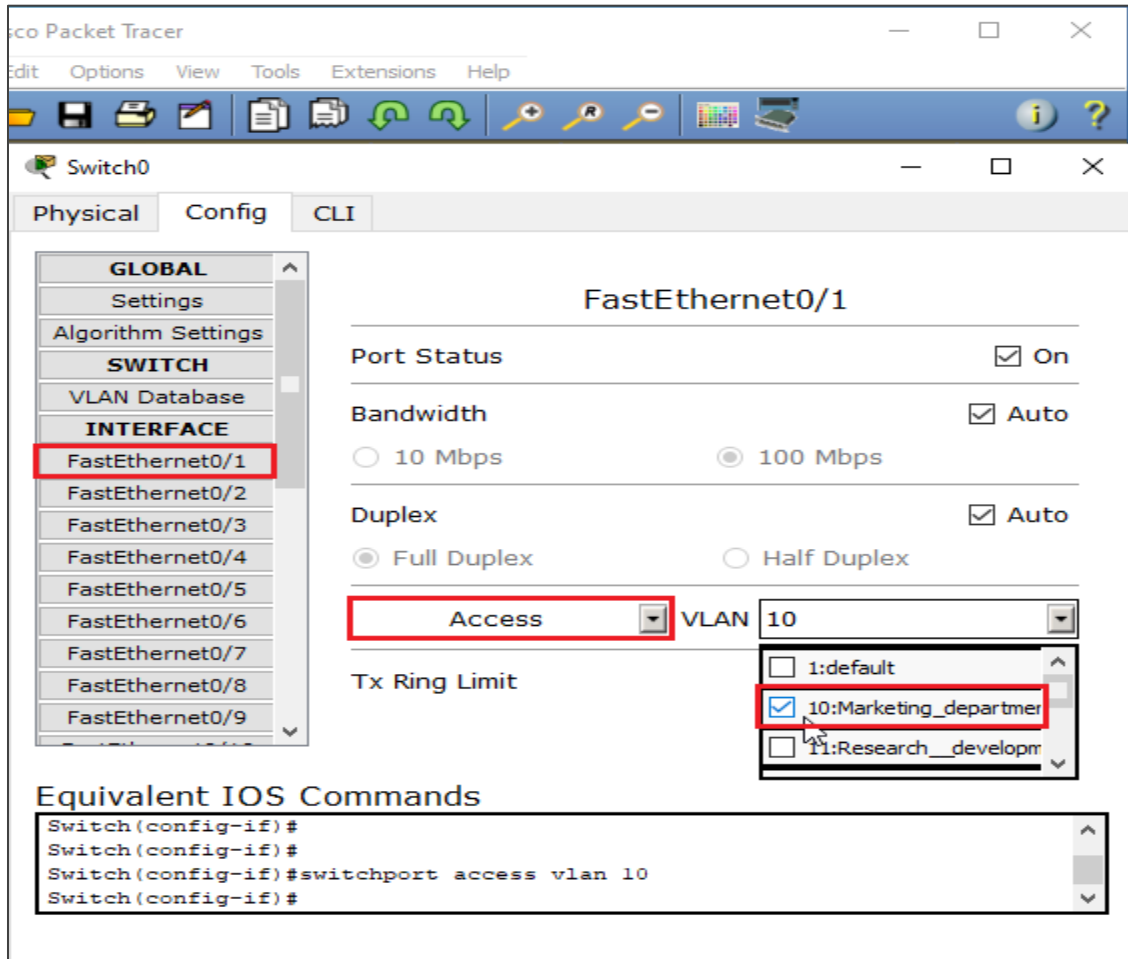
Access  VLAN

Tx Ring Limit

Equivalent IOS Commands

```
Switch(config)#
Switch(config)#
Switch(config)#interface FastEthernet0/1
Switch(config-if)#
```

5.2 Assign FastEthernet0/3 and FastEthernet0/4 to VLAN 11 by selecting each interface, setting the VLAN field to 11 under Access, and clicking **Apply**



The screenshot shows the Cisco Packet Tracer interface for Switch0. The 'Config' tab is selected, and the 'FastEthernet0/1' interface is chosen from the left sidebar. The configuration for this interface is displayed on the right. The 'Port Status' is set to 'On'. The 'Bandwidth' is set to 'Auto'. The 'Duplex' is set to 'Full Duplex'. The 'Access' mode is selected, and the 'VLAN' is set to '10'. The 'Tx Ring Limit' dropdown is open, showing options for '1:default', '10:Marketing\_department', and '11:Research\_development'. The 'Access' mode and 'VLAN 10' are highlighted with red boxes. The 'Equivalent IOS Commands' section shows the configuration commands for the interface.

**FastEthernet0/1**

Port Status ☒ On

Bandwidth ☒ Auto

☐ 10 Mbps ☒ 100 Mbps

Duplex ☒ Auto

☒ Full Duplex ☐ Half Duplex

**Access** VLAN **10**

Tx Ring Limit

☐ 1:default

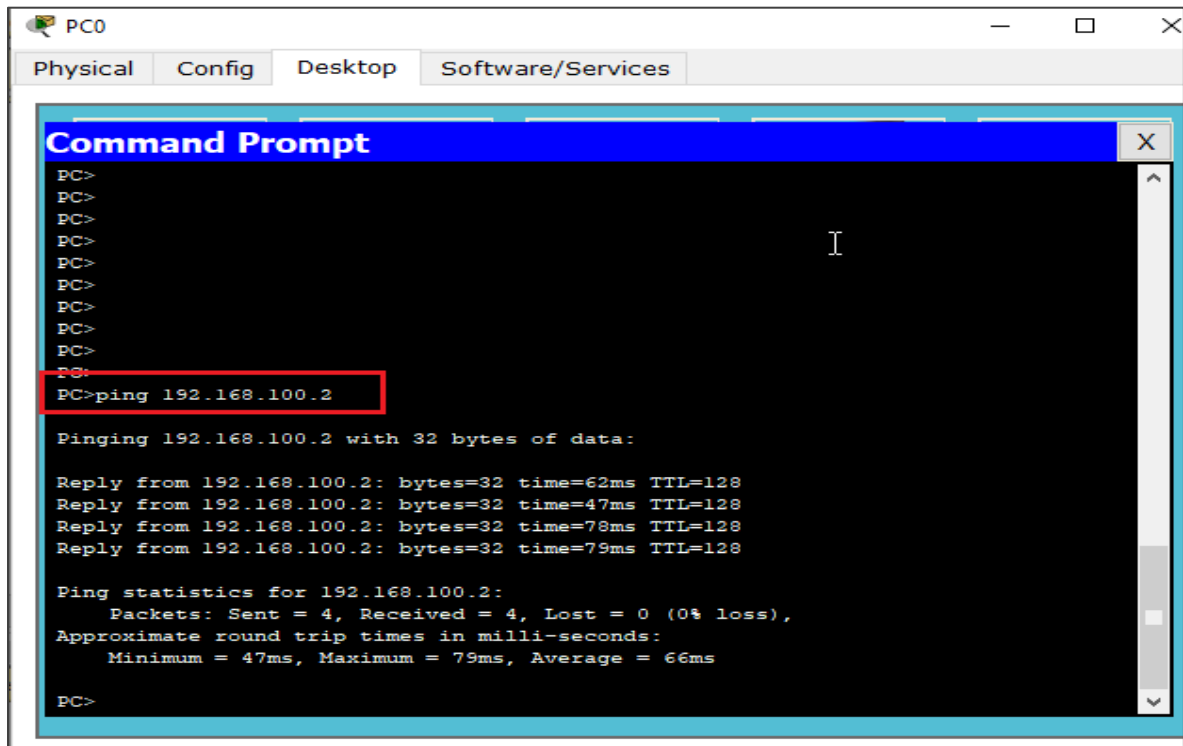
☒ 10:Marketing\_department

☐ 11:Research\_development

**Equivalent IOS Commands**

```
Switch(config-if)#
Switch(config-if)#
Switch(config-if)#switchport access vlan 10
Switch(config-if)#
```

5.3 To verify communication within VLAN 10, go to the Command Prompt on PC0 and execute **ping 192.168.100.2** to check connectivity with PC1



The screenshot shows a network simulation window for PC0. The window has tabs for Physical, Config, Desktop, and Software/Services. The Command Prompt is open, displaying the command 'PC>ping 192.168.100.2' which is highlighted with a red box. The output shows four successful replies from 192.168.100.2 with varying response times and a TTL of 128. Ping statistics indicate 0% loss.

```
PC0
Physical Config Desktop Software/Services
Command Prompt
PC>
PC>
PC>
PC>
PC>
PC>
PC>
PC>
PC>
PC>
PC>
PC>ping 192.168.100.2

Pinging 192.168.100.2 with 32 bytes of data:

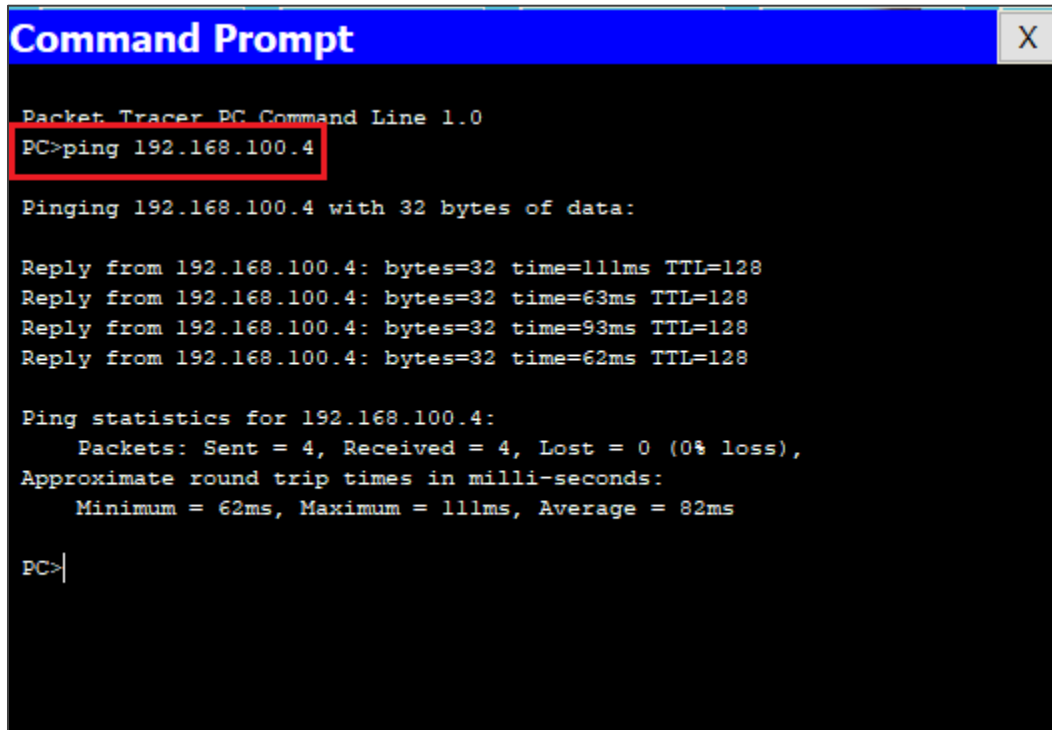
Reply from 192.168.100.2: bytes=32 time=62ms TTL=128
Reply from 192.168.100.2: bytes=32 time=47ms TTL=128
Reply from 192.168.100.2: bytes=32 time=78ms TTL=128
Reply from 192.168.100.2: bytes=32 time=79ms TTL=128

Ping statistics for 192.168.100.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 47ms, Maximum = 79ms, Average = 66ms

PC>
```



5.4 To verify communication within VLAN 11, go to the Command Prompt on PC2 and type **ping 192.168.100.4** to check connectivity with PC3



```
Command Prompt
Packet Tracer PC Command Line 1.0
PC>ping 192.168.100.4

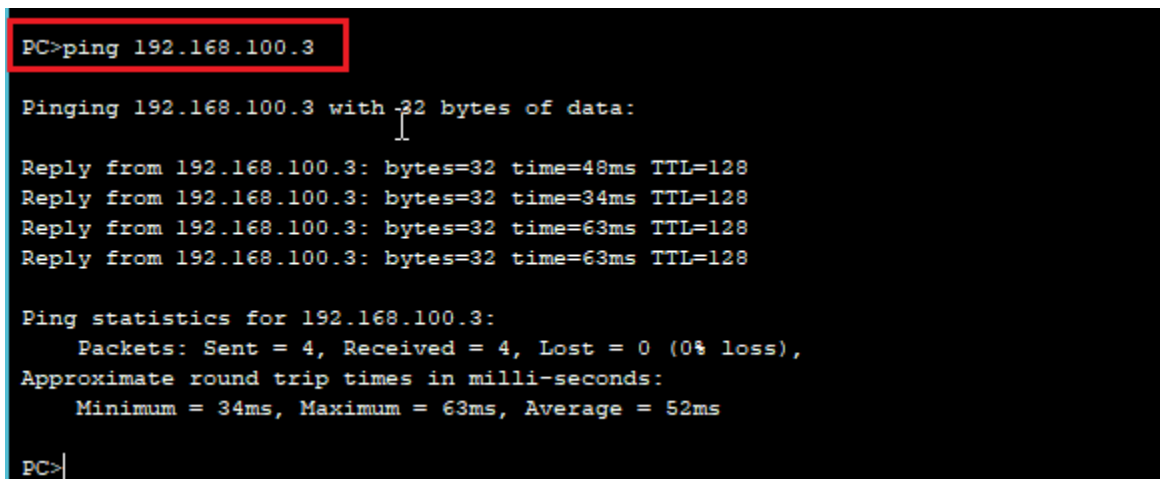
Pinging 192.168.100.4 with 32 bytes of data:

Reply from 192.168.100.4: bytes=32 time=111ms TTL=128
Reply from 192.168.100.4: bytes=32 time=63ms TTL=128
Reply from 192.168.100.4: bytes=32 time=93ms TTL=128
Reply from 192.168.100.4: bytes=32 time=62ms TTL=128

Ping statistics for 192.168.100.4:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 62ms, Maximum = 111ms, Average = 82ms

PC>
```

5.5 To verify isolation across different VLANs, go to the Command Prompt on PC0 VLAN 10 and type **ping 192.168.100.3** to ensure that communication with PC2 VLAN 11 does not occur



```
PC>ping 192.168.100.3

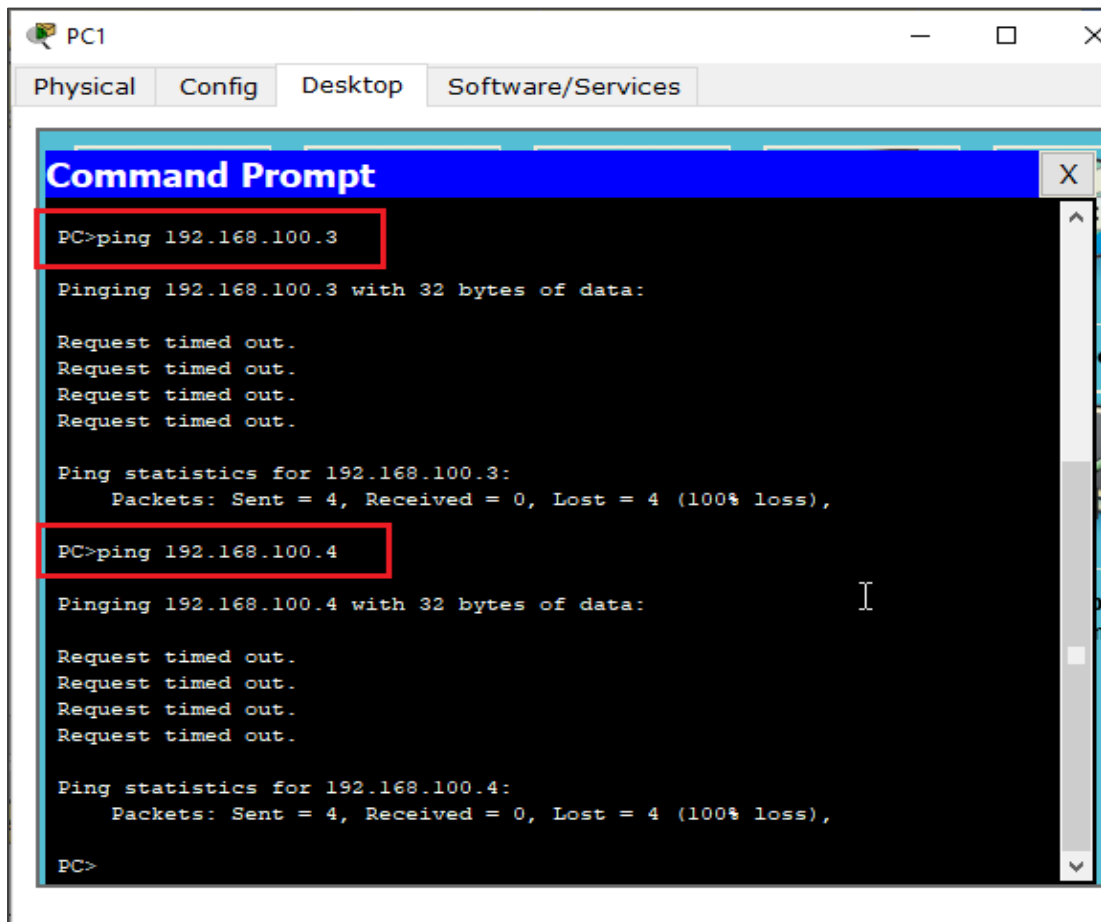
Pinging 192.168.100.3 with 32 bytes of data:

Reply from 192.168.100.3: bytes=32 time=48ms TTL=128
Reply from 192.168.100.3: bytes=32 time=34ms TTL=128
Reply from 192.168.100.3: bytes=32 time=63ms TTL=128
Reply from 192.168.100.3: bytes=32 time=63ms TTL=128

Ping statistics for 192.168.100.3:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 34ms, Maximum = 63ms, Average = 52ms

PC>
```

5.6 To verify isolation across different VLANs, go to the Command Prompt on PC1 (VLAN 10) and type **ping 192.168.100.4** to ensure that communication with PC3 (VLAN 11) does not occur



The screenshot shows a Cisco Packet Tracer interface with a window titled 'PC1'. The window has tabs for 'Physical', 'Config', 'Desktop', and 'Software/Services'. The 'Desktop' tab is active, displaying a 'Command Prompt' window. The Command Prompt shows two ping commands being executed, both resulting in 100% loss.

```
PC>ping 192.168.100.3

Pinging 192.168.100.3 with 32 bytes of data:

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

Ping statistics for 192.168.100.3:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

PC>ping 192.168.100.4

Pinging 192.168.100.4 with 32 bytes of data:

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

Ping statistics for 192.168.100.4:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

PC>
```

By following these steps, you have successfully implemented VLANs and network segmentation in a simulated environment using Cisco Packet Tracer. This implementation will allow you to logically separate network traffic, enhancing security and performance. Regular verification and testing of VLAN configurations are recommended to ensure optimal network functionality and security.