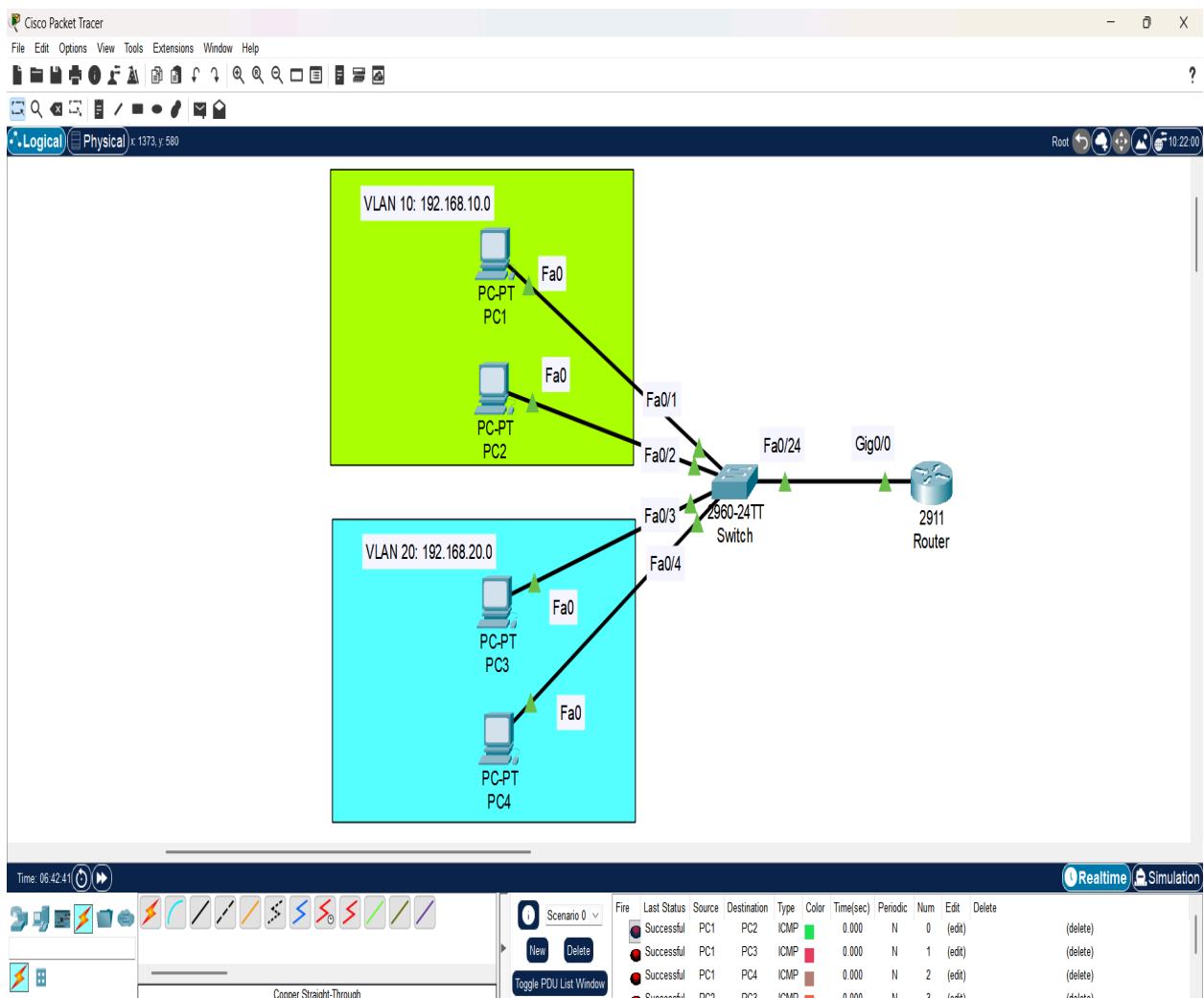


Objective:

Configure a router to provide DHCP services to multiple VLANs using router-on-a-stick.

Topology:

Router connected to switch via trunk port. Two VLANs on the switch.



VLAN Design:

VLAN 10 (SALES)

VLAN 20 (IT)



Switch

Physical Config **CLI** Attributes

IOS Command Line Interface

```
%LINK-5-CHANGED: Interface FastEthernet0/1, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to up
%LINK-5-CHANGED: Interface FastEthernet0/2, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/2, changed state to up
%LINK-5-CHANGED: Interface FastEthernet0/3, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/3, changed state to up
%LINK-5-CHANGED: Interface FastEthernet0/4, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/4, changed state to up

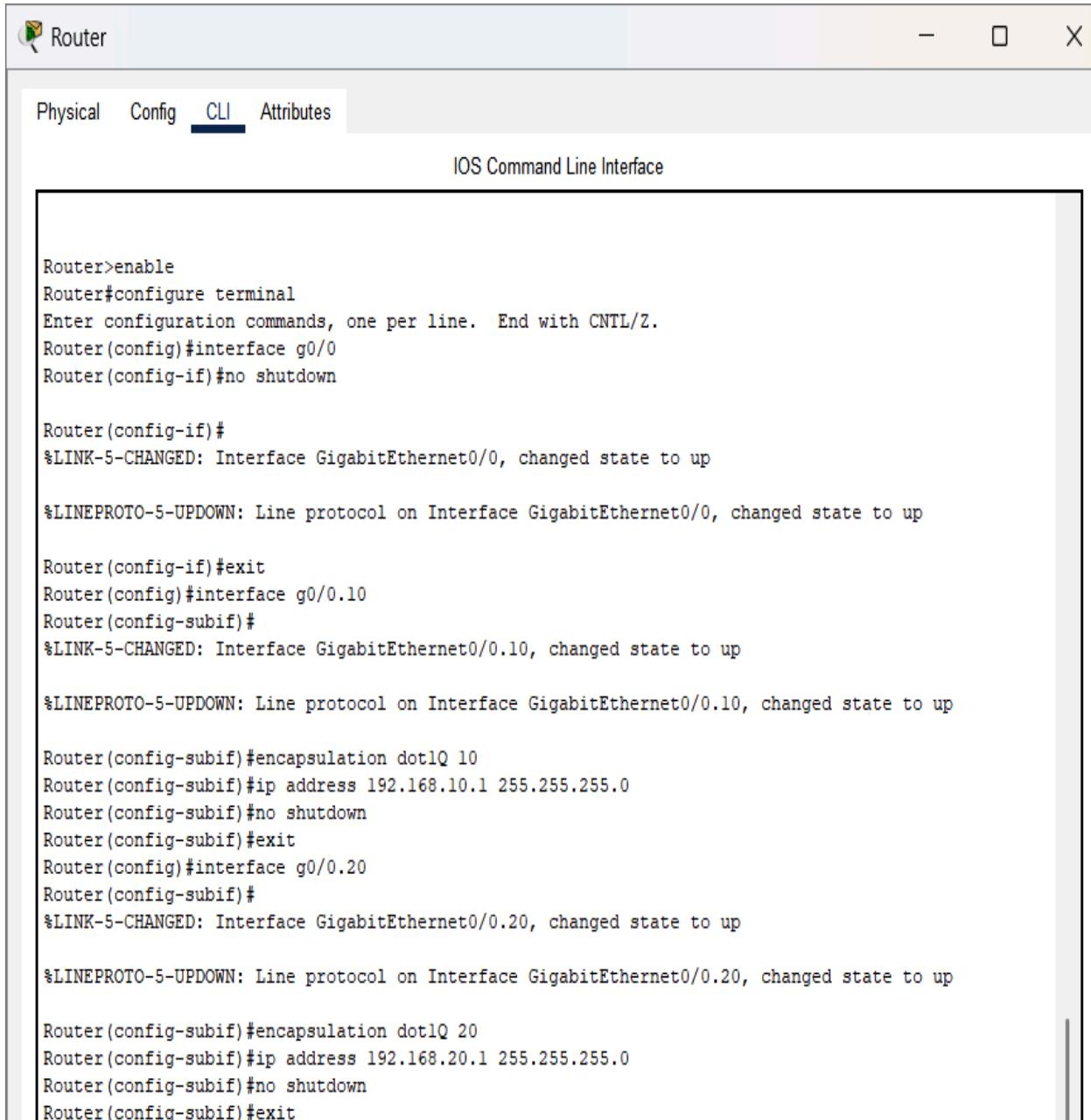
Switch>enable
Switch#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#vlan 10
Switch(config-vlan)#name SALES
Switch(config-vlan)#exit
Switch(config)#vlan 20
Switch(config-vlan)#name IT
Switch(config-vlan)#exit
Switch(config)#interface range fa0/1-2
Switch(config-if-range)#switchport mode access
Switch(config-if-range)#switchport access vlan 10
Switch(config-if-range)#exit
Switch(config)#interface range fa0/3-4
Switch(config-if-range)#switchport mode access
Switch(config-if-range)#switchport access vlan 20
Switch(config-if-range)#exit
Switch(config)#interface fa0/24
Switch(config-if)#switchport mode trunk
Switch(config-if)#exit
Switch(config)#end
Switch#
%SYS-5-CONFIG_I: Configured from console by console

Switch#
```

Top

Router Sub-Interface Configuration

- The router interface port is configured into subinterfaces to serve as VLAN gateways
- All these VLANs are contained in the TRUNK



The screenshot shows a software interface for managing a Cisco router. At the top, there's a title bar with a logo and the word "Router". Below the title bar, there are four tabs: "Physical", "Config", "CLI" (which is highlighted in blue), and "Attributes". Underneath the tabs, the text "IOS Command Line Interface" is displayed. The main area is a large text box containing the following configuration commands:

```
Router>enable
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface g0/0
Router(config-if)#no shutdown

Router(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0, changed state to up

Router(config-if)#exit
Router(config)#interface g0/0.10
Router(config-subif)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0.10, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0.10, changed state to up

Router(config-subif)#encapsulation dot1Q 10
Router(config-subif)#ip address 192.168.10.1 255.255.255.0
Router(config-subif)#no shutdown
Router(config-subif)#exit
Router(config)#interface g0/0.20
Router(config-subif)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0.20, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0.20, changed state to up

Router(config-subif)#encapsulation dot1Q 20
Router(config-subif)#ip address 192.168.20.1 255.255.255.0
Router(config-subif)#no shutdown
Router(config-subif)#exit
```

DHCP Configuration:

- Excluded gateway IPs
- DHCP pools created for VLAN 10 and VLAN 20
- Default gateways configured
- DNS server configured

The screenshot shows a Cisco Router interface with the 'CLI' tab selected. The window title is 'Router'. The main area displays the IOS Command Line Interface (CLI) output for configuring DHCP pools on a router.

```
Router>enable
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#ip dhcp excluded-address 192.168.10.1 192.168.10.9
Router(config)#ip dhcp excluded-address 192.168.20.1 192.168.20.9
Router(config)#ip dhcp pool VLAN10
Router(dhcp-config)#network 192.168.10.0 255.255.255.0
Router(dhcp-config)#default-router 192.168.10.1
Router(dhcp-config)#dns-server 8.8.8.8
Router(dhcp-config)#exit
Router(config)#ip dhcp pool VLAN20
Router(dhcp-config)#network 192.168.20.0 255.255.255.0
Router(dhcp-config)#default-router 192.168.20.1
Router(dhcp-config)#dns-server 8.8.8.8
Router(dhcp-config)#exit
Router(config)#do show ip dhcp pool

Pool VLAN10 :
  Utilization mark (high/low)      : 100 / 0
  Subnet size (first/next)        : 0 / 0
  Total addresses                 : 254
  Leased addresses                : 2
  Excluded addresses              : 2
  Pending event                  : none

  1 subnet is currently in the pool
  Current index      IP address range          Leased/Excluded/Total
  192.168.10.1       192.168.10.1           - 192.168.10.254    2    / 2    / 254

Pool VLAN20 :
  Utilization mark (high/low)      : 100 / 0
  Subnet size (first/next)        : 0 / 0
  Total addresses                 : 254
  Leased addresses                : 2
  Excluded addresses              : 2
  Pending event                  : none

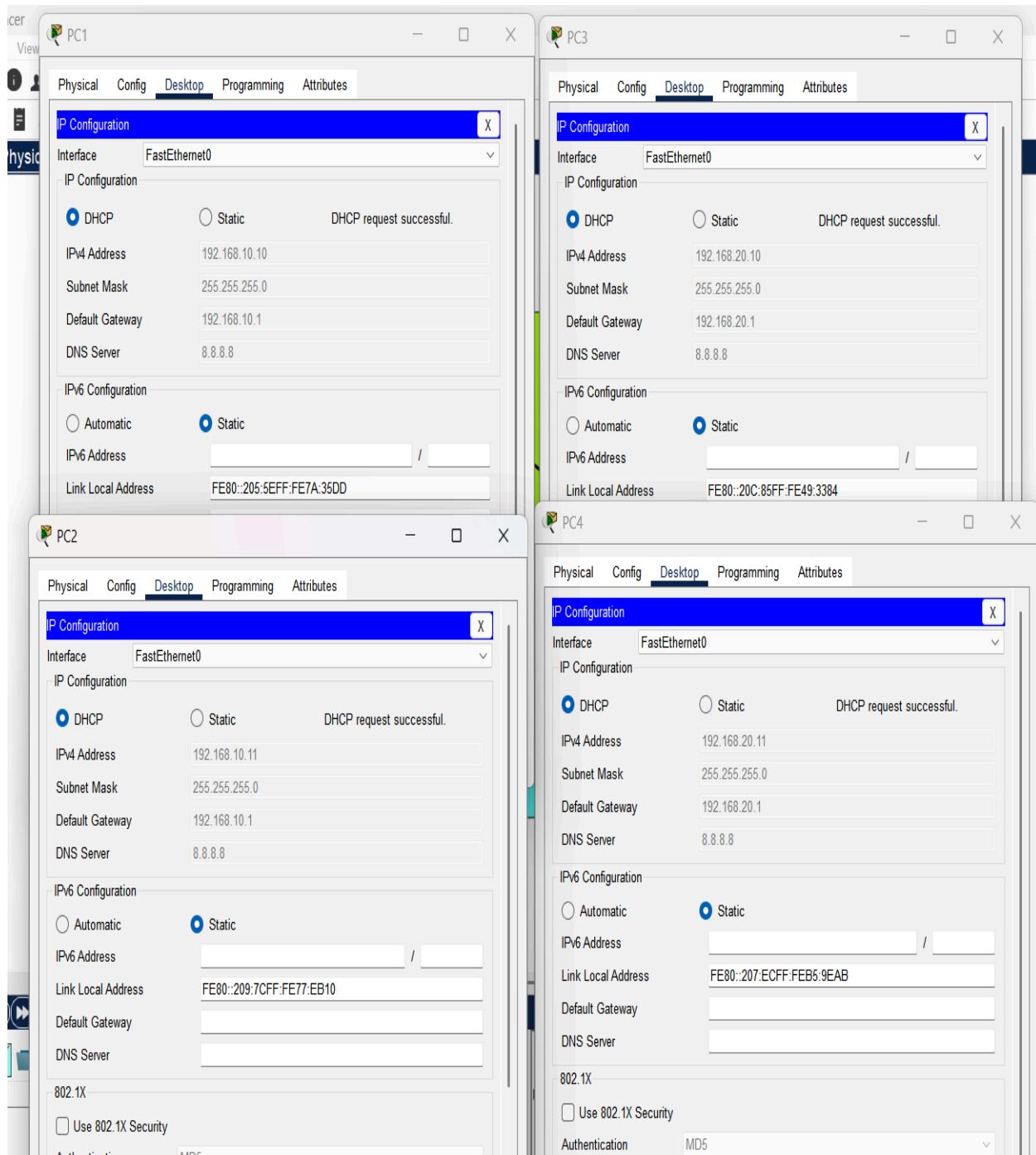
  1 subnet is currently in the pool
  Current index      IP address range          Leased/Excluded/Total
  192.168.20.1       192.168.20.1           - 192.168.20.254    2    / 2    / 254
Router(config)#do show ip dhcp binding
IP address      Client-ID/          Lease expiration      Type
               Hardware address
192.168.10.10   0005.5E7A.35DD      --                  Automatic
192.168.10.11   0009.7C77.EB10      --                  Automatic
192.168.20.10   000C.8549.3384      --                  Automatic
192.168.20.11   0007.ECB5.9EAB       --                  Automatic
Router(config)#

```

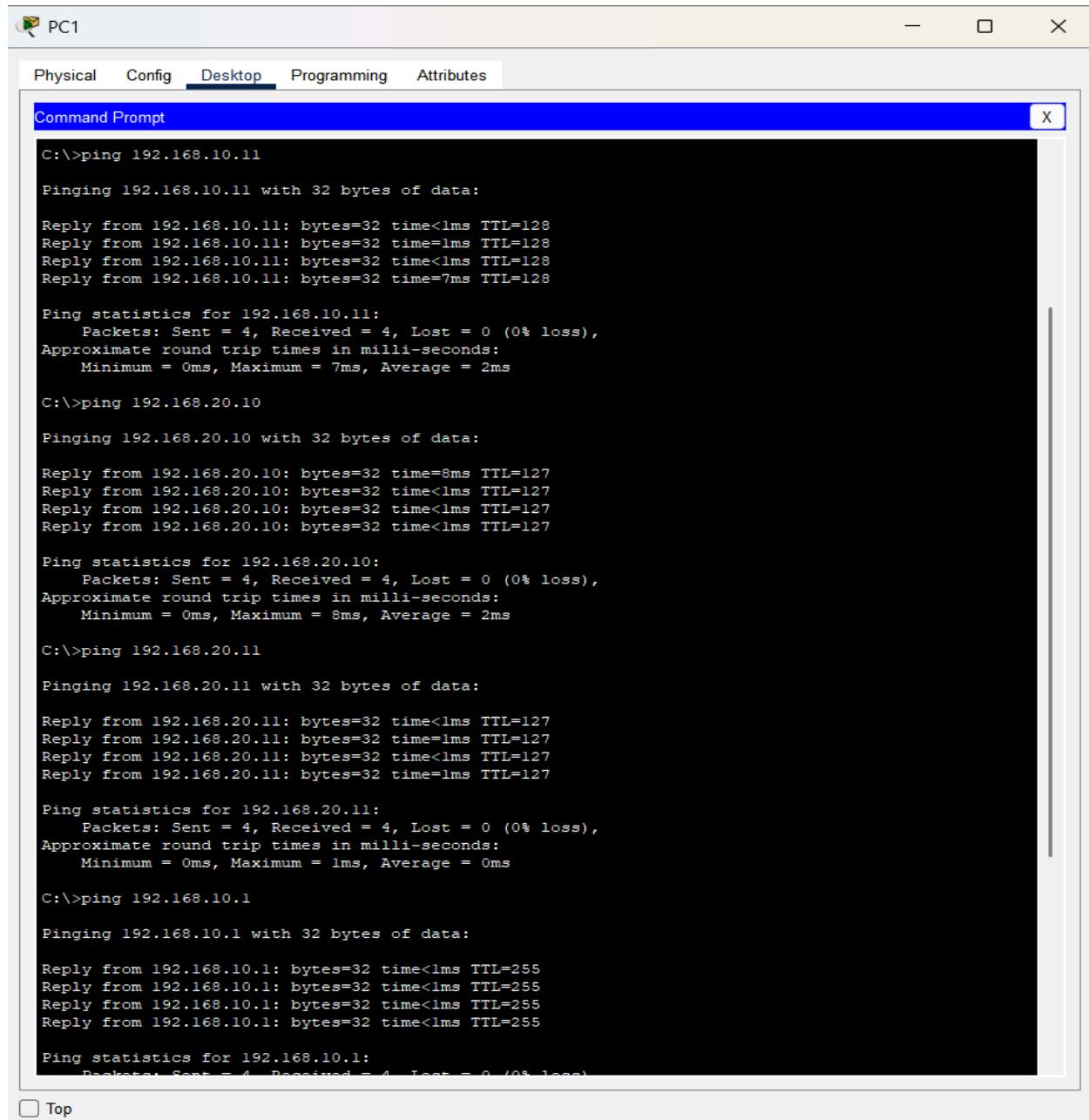
At the bottom right of the CLI window, there are 'Copy' and 'Paste' buttons. At the bottom left, there is a 'Top' button.

Verification:

- PCs receive IP addresses automatically



- Inter-VLAN ping successful



The screenshot shows a Windows Command Prompt window titled "PC1". The window has tabs at the top: Physical, Config, Desktop (which is selected), Programming, and Attributes. The main area of the window displays the output of several "ping" commands:

```
C:\>ping 192.168.10.11
Pinging 192.168.10.11 with 32 bytes of data:
Reply from 192.168.10.11: bytes=32 time<1ms TTL=128
Reply from 192.168.10.11: bytes=32 time<1ms TTL=128
Reply from 192.168.10.11: bytes=32 time<1ms TTL=128
Reply from 192.168.10.11: bytes=32 time=7ms TTL=128

Ping statistics for 192.168.10.11:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 7ms, Average = 2ms

C:\>ping 192.168.20.10
Pinging 192.168.20.10 with 32 bytes of data:
Reply from 192.168.20.10: bytes=32 time=8ms TTL=127
Reply from 192.168.20.10: bytes=32 time<1ms TTL=127
Reply from 192.168.20.10: bytes=32 time<1ms TTL=127
Reply from 192.168.20.10: bytes=32 time<1ms TTL=127

Ping statistics for 192.168.20.10:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 8ms, Average = 2ms

C:\>ping 192.168.20.11
Pinging 192.168.20.11 with 32 bytes of data:
Reply from 192.168.20.11: bytes=32 time<1ms TTL=127
Reply from 192.168.20.11: bytes=32 time=1ms TTL=127
Reply from 192.168.20.11: bytes=32 time<1ms TTL=127
Reply from 192.168.20.11: bytes=32 time=1ms TTL=127

Ping statistics for 192.168.20.11:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 1ms, Average = 0ms

C:\>ping 192.168.10.1
Pinging 192.168.10.1 with 32 bytes of data:
Reply from 192.168.10.1: bytes=32 time<1ms TTL=255

Ping statistics for 192.168.10.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss)
```

Top

Lessons Learned:

- Routers can act as DHCP servers
- Separate DHCP pools are required per VLAN
- DHCP simplifies host configuration