# Weekly Assessment -7

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## Week7- DHCP & OSI layers Analysis

**AIM:** To configure a **DHCP Server** in Cisco Packet Tracer and analyze network communication using the **OSI Model** through **Simulation Mode**.

**Description:**

DHCP (Dynamic Host Configuration Protocol) automatically assigns IP addresses to network devices, simplifying network management. The OSI (Open Systems Interconnection) Model helps understand how data moves across a network in seven layers.

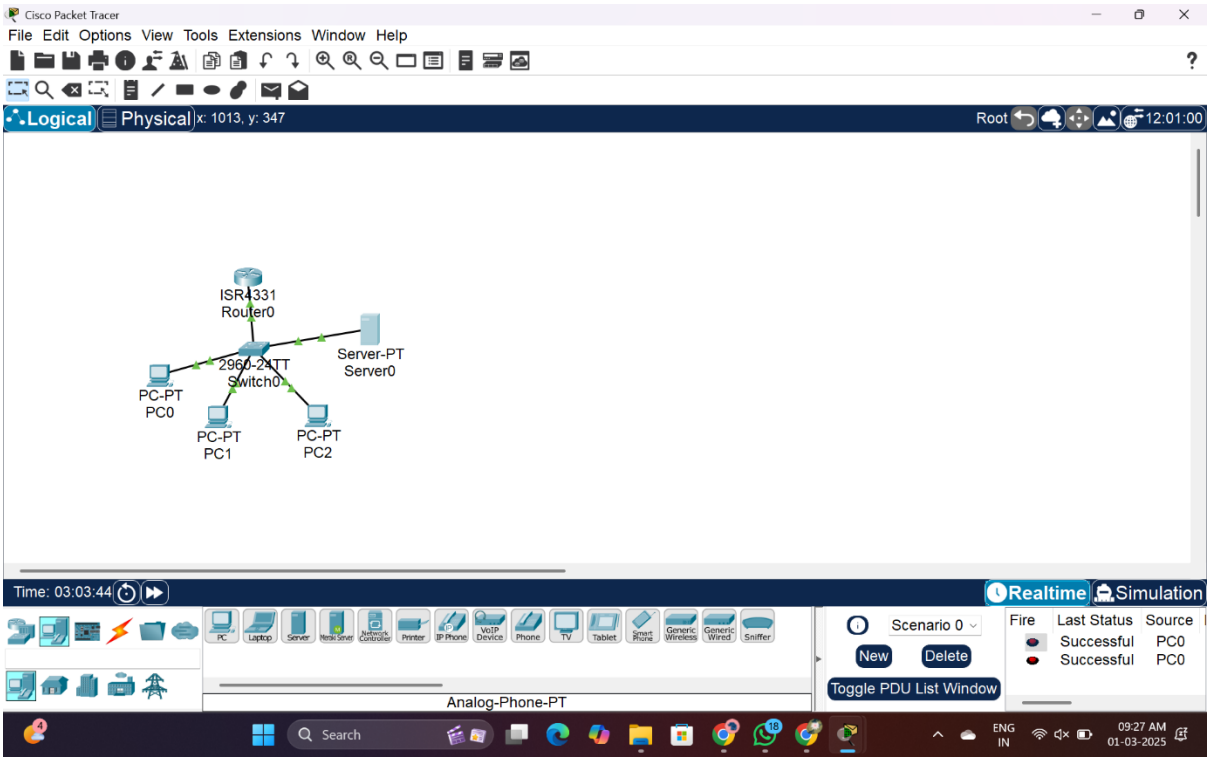
In this experiment, we:

- Configure a DHCP Server to assign IP addresses dynamically.
- Set up a router as the default gateway.
- Analyze OSI Layer communication using Simulation Mode.
- Verify the TCP 3-Way Handshake in a web request.

NETWORK TOPOLOGY

Devices Used:

- 1 Router (Router-0)
- 1 Switch (Switch-0)
- 2 PCs (PC-1, PC-2)
- 1 Server (DHCP Server-0)



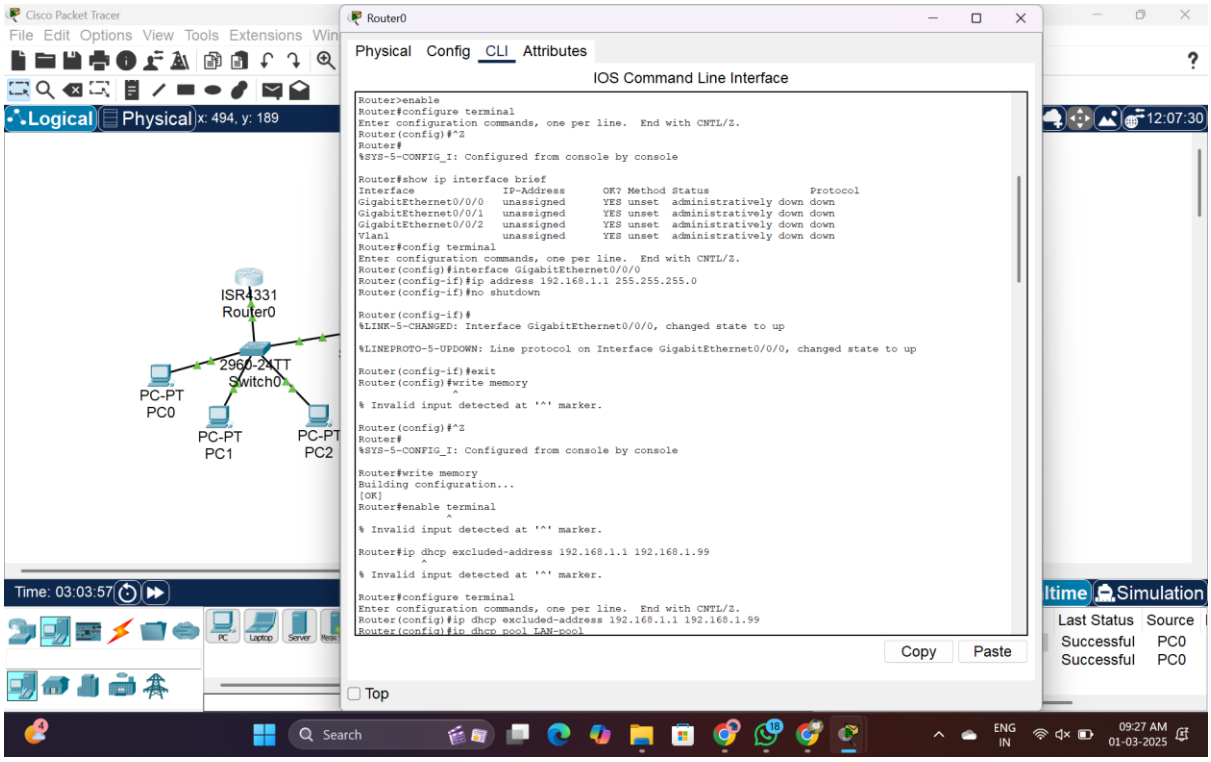

Connections:

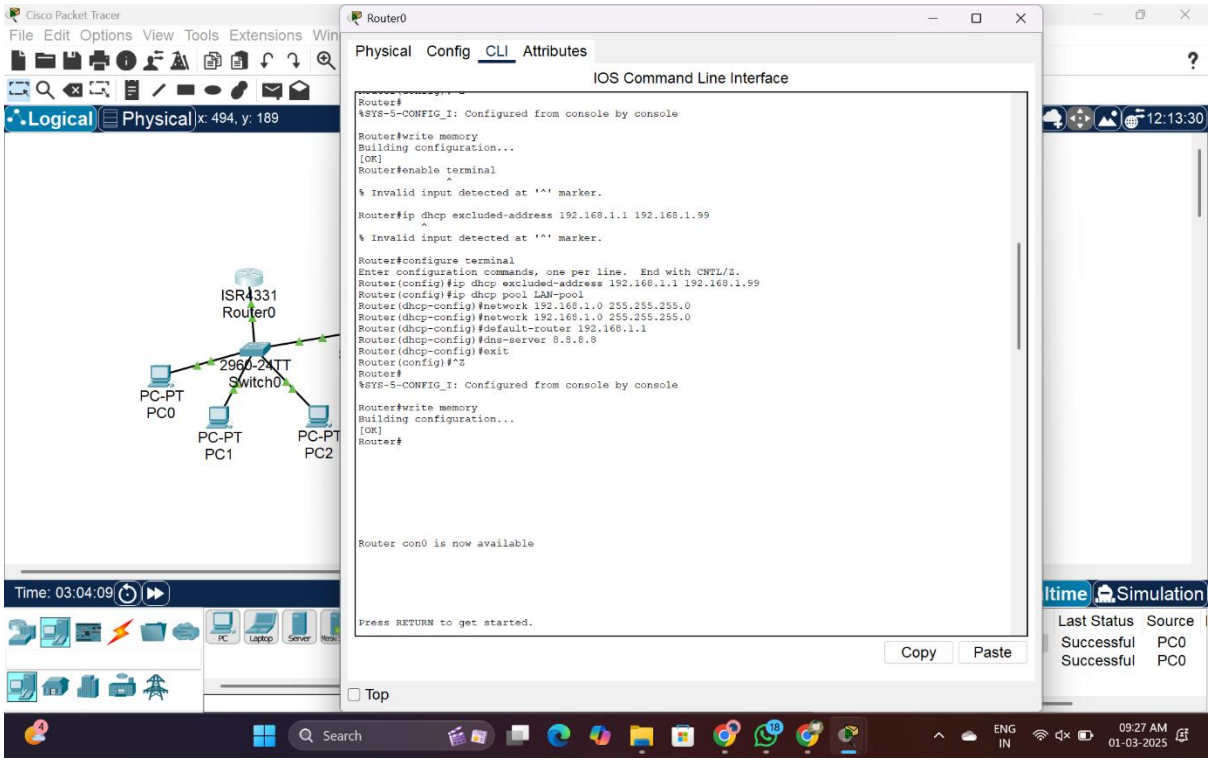
| **Device :** | **Port:** | **Device** | **Port:** |
|---|---|---|---|
| Router-0 | GigabitEthernet 0/0 | Switch-0 | FastEthernet 0/1 |
| DHCP Server | FastEthernet 0 | Switch-0 | FastEthernet 0/2 |
| PC-1 | FastEthernet 0 | Switch-0 | FastEthernet 0/3 |
| PC-2 | FastEthernet 0 | Switch-0 | FastEthernet 0/4 |

**PROCEDURE**

**Step 1: Configure the Router (Default Gateway)**

1. Click **Router-0** → **CLI**.
2. Enter commands:
3. Type show ip interface brief to verify.


Cisco Packet Tracer
File Edit Options View Tools Extensions Win
Logical Physical x: 494, y: 189
12:07:30
ISR4331
Router0
2960-24TT
Switch0
PC-PT
PC0
PC-PT
PC1
PC-PT
PC2
Time: 03:03:57
Router0
Physical Config CLI Attributes
IOS Command Line Interface
Router>enable
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#^Z
Router#
%SYS-5-CONFIG_I: Configured from console by console
Router#show ip interface brief
Interface IP-Address OK? Method Status Protocol
GigabitEthernet0/0/0 unassigned YES unset administratively down down
GigabitEthernet0/0/1 unassigned YES unset administratively down down
GigabitEthernet0/0/2 unassigned YES unset administratively down down
Vlan1 unassigned YES unset administratively down down
Router#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface GigabitEthernet0/0/0
Router(config-if)#ip address 192.168.1.1 255.255.255.0
Router(config-if)#no shutdown
Router(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0/0, changed state to up
Router(config-if)#exit
Router(config)#write memory
^
% Invalid input detected at '^' marker.
Router(config)#^Z
Router#
%SYS-5-CONFIG_I: Configured from console by console
Router#write memory
Building configuration...
[OK]
Router#enable terminal
^
% Invalid input detected at '^' marker.
Router#ip dhcp excluded-address 192.168.1.1 192.168.1.99
^
% Invalid input detected at '^' marker.
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#ip dhcp excluded-address 192.168.1.1 192.168.1.99
Router(config)#ip dhcp pool LAN-pool
Copy
Paste
Top
Simulation
Last Status Source
Successful PC0
Successful PC0
Search
ENG
IN
09:27 AM
01-03-2025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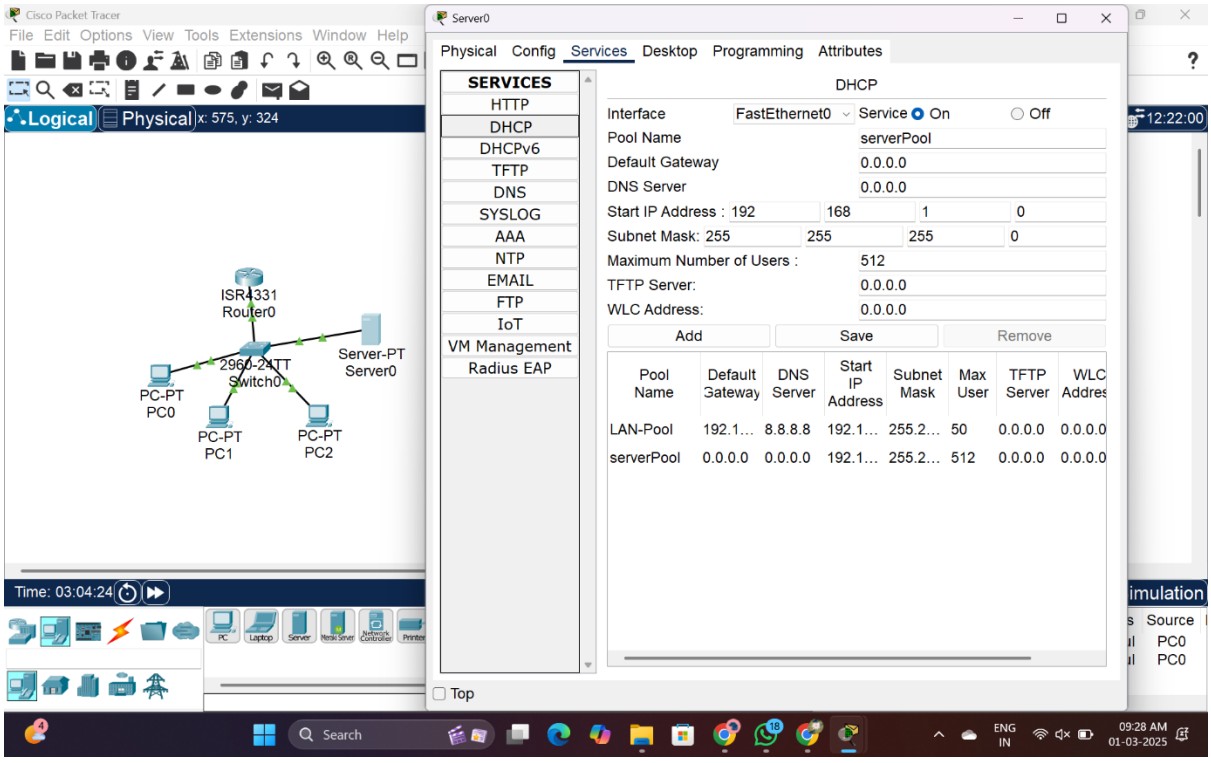
^
% Invalid input detected at '^' marker.
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#ip dhcp excluded-address 192.168.1.1 192.168.1.99
Router(config)#ip dhcp pool LAN-pool
Router(dhcp-config)#network 192.168.1.0 255.255.255.0
Router(dhcp-config)#network 192.168.1.0 255.255.255.0
Router(dhcp-config)#default-router 192.168.1.1
Router(dhcp-config)#dns-server 8.8.8.8
Router(dhcp-config)#exit
Router(config)#^Z
Router#
%SYS-5-CONFIG_I: Configured from console by console
Router#write memory
Building configuration...
[OK]
Router#
Router con0 is now available
Press RETURN to get started.
Copy
Paste
Top
Simulation
Last Status Source
Successful PC0
Successful PC0
Search
ENG
IN
09:27 AM
01-03-2025

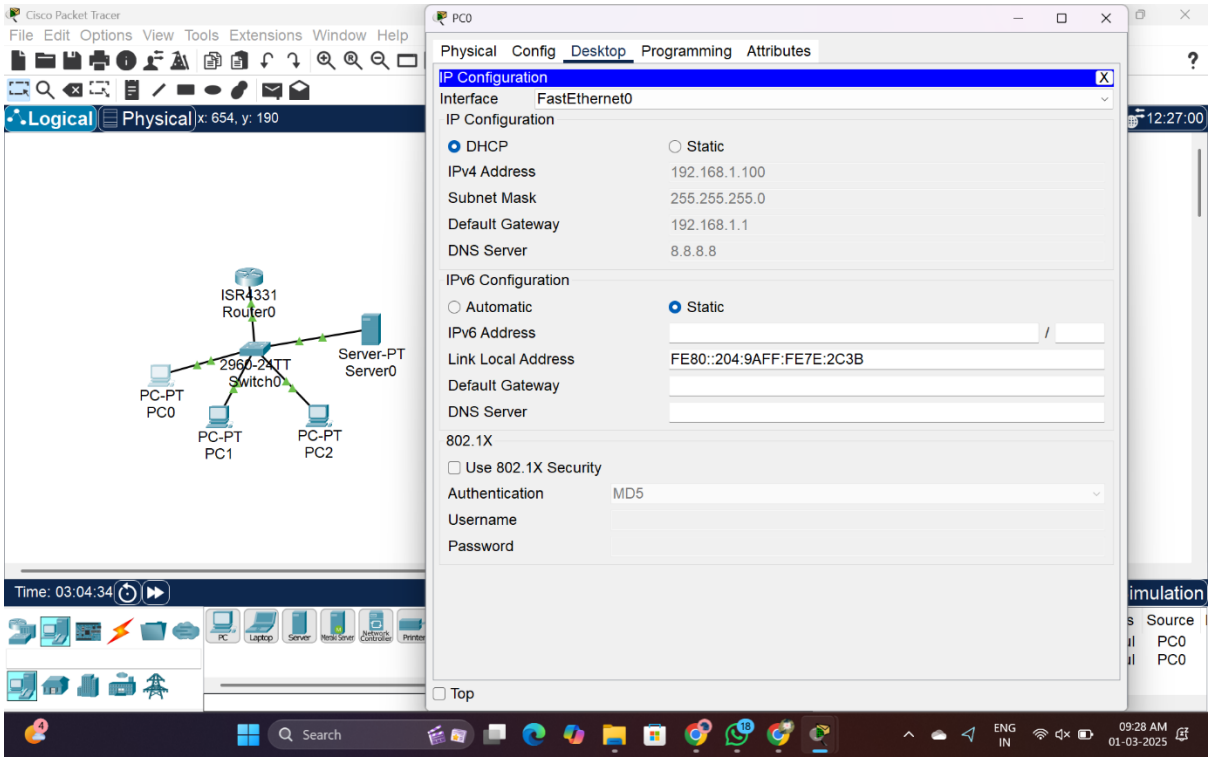
## Step 2: Configure the DHCP Server

1. Click **Server-0 → Desktop → IP Configuration**.
2. Set:
    - **IP Address:** 192.168.1.2
    - **Subnet Mask:** 255.255.255.0
    - **Default Gateway:** 192.168.1.1
3. Go to **Services Tab → DHCP**.
4. Configure:
    - **Pool Name:** LAN-Pool
    - **Default Gateway:** 192.168.1.1
    - **DNS Server:** 8.8.8.8
    - **Start IP Address:** 192.168.1.100
    - **Subnet Mask:** 255.255.255.0
5. Click **Add** and **Save**.



## Step 3: Configure PCs to Use DHCP

1. Click **PC-1 → Desktop → IP Configuration**.
2. Select **DHCP**.
3. Repeat for **PC-2**.



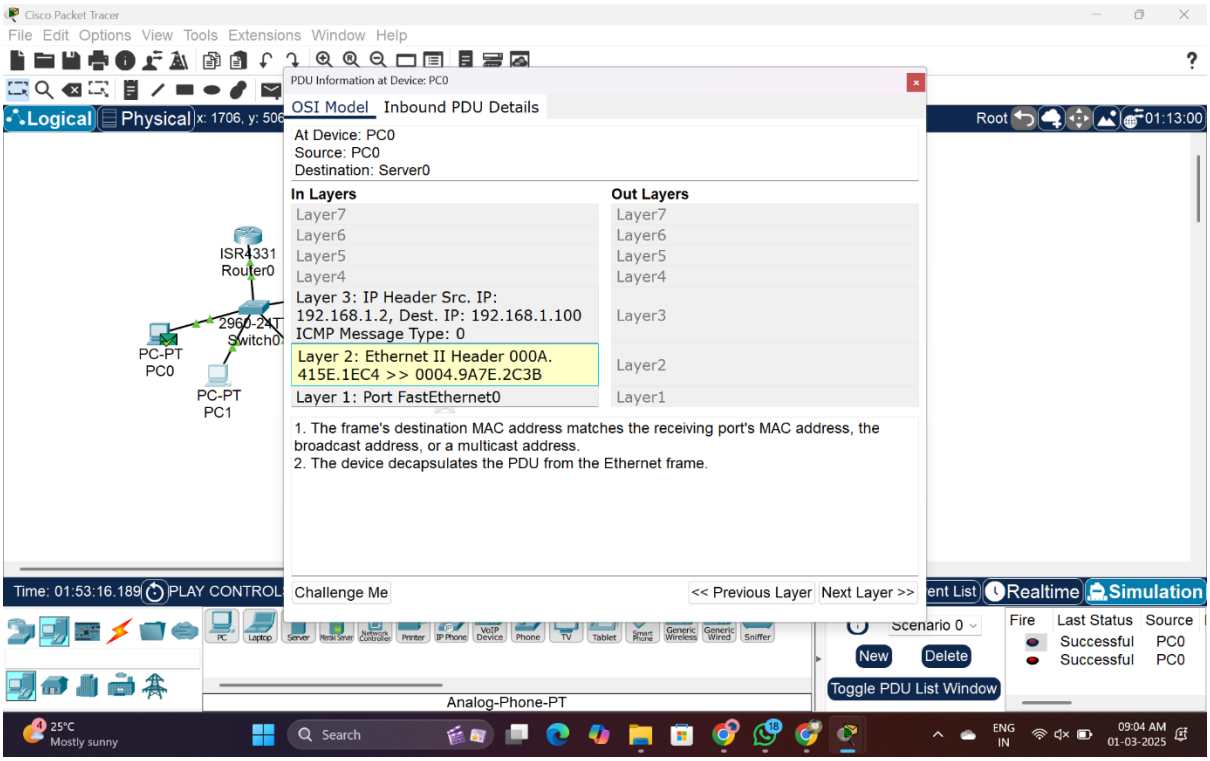

## Step 4: Enable Simulation Mode

1. Click on **Simulation Mode (Clock icon)**.
2. Click **Edit Filters**.
3. Select:
    - **ARP** (Layer 2)
    - **ICMP** (Layer 3)
    - **TCP, UDP** (Layer 4)
    - **DHCP, HTTP** (Layer 7)
4. Click **Close**.

**Step 5:** Analyze OSI Layers

Layer 7: DHCP Process

1. In Simulation Mode, click Capture/Forward.
2. Watch DHCP Discover, Offer, Request, and Acknowledgment.

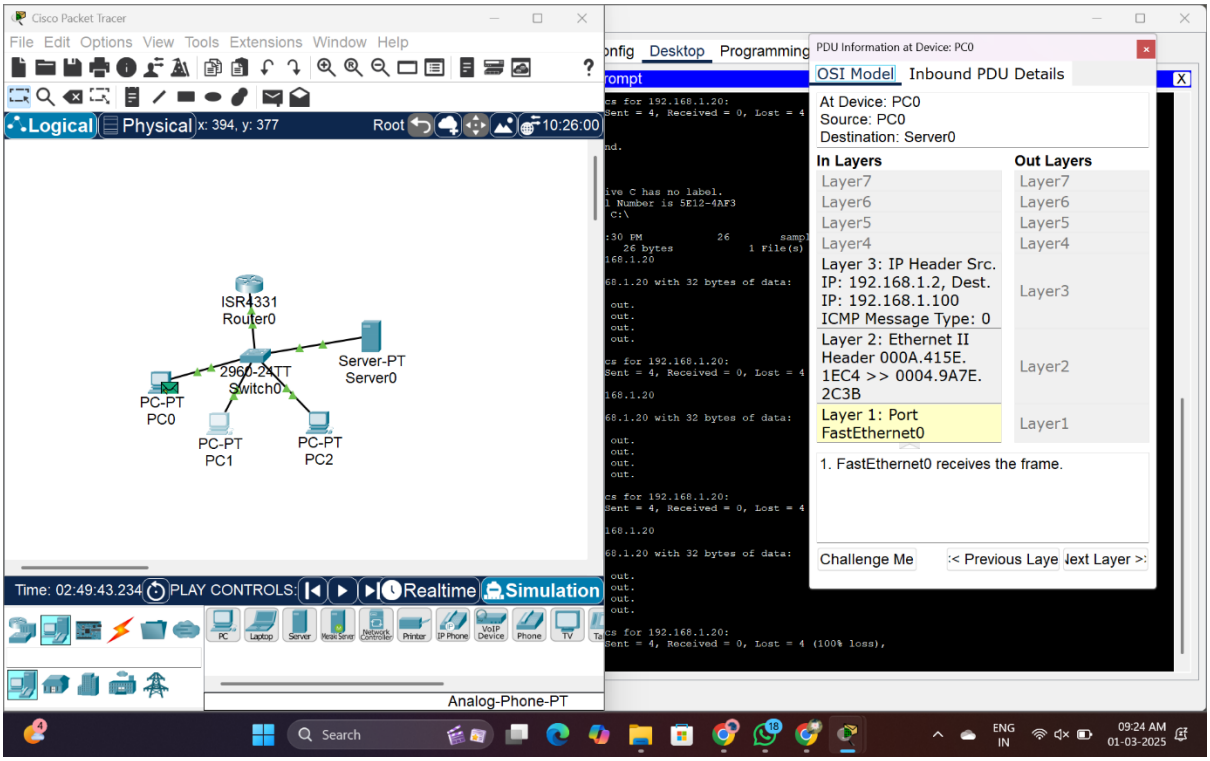



Layer 2: ARP Request & Reply

1. Click PC-1 → Command Prompt → Type:

   ping 192.168.1.20

2. Click Capture/Forward.
3. Observe ARP Request ("Who has 192.168.1.20?") and ARP Reply.

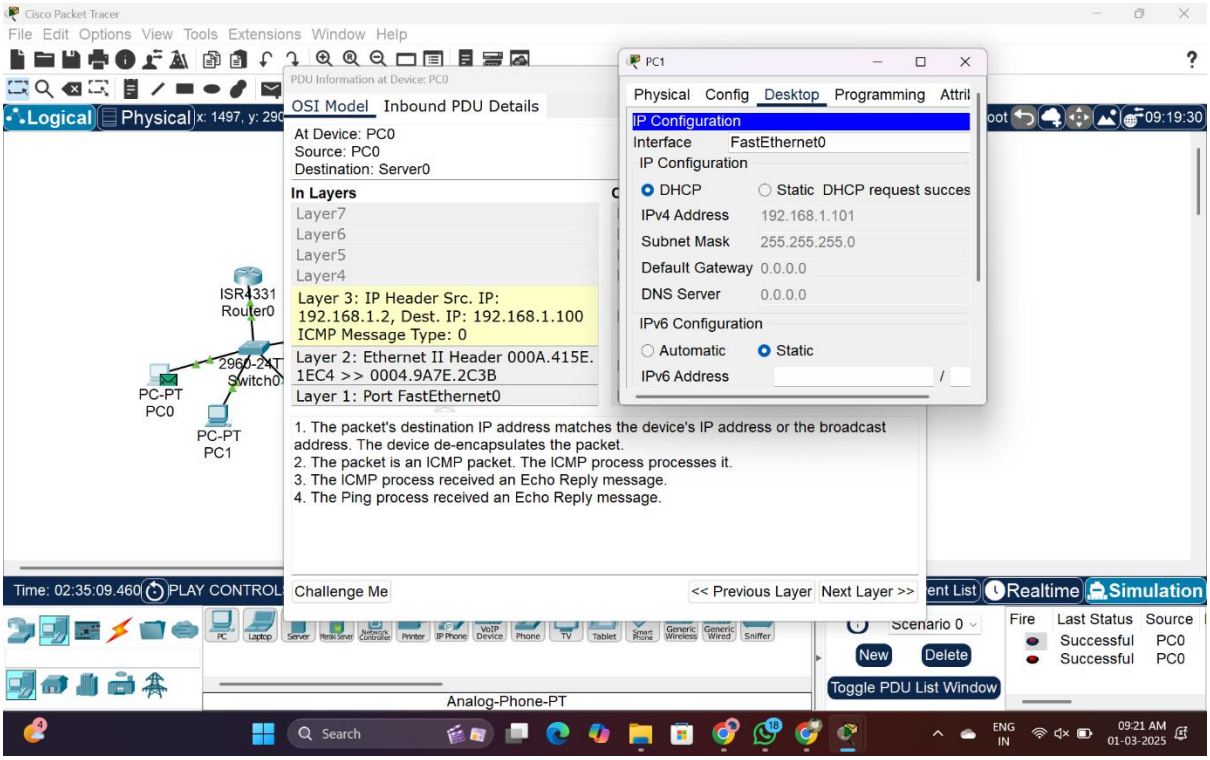



Layer 3: Ping Test (ICMP Packets)

1. Click PC-1 → Command Prompt → Type:

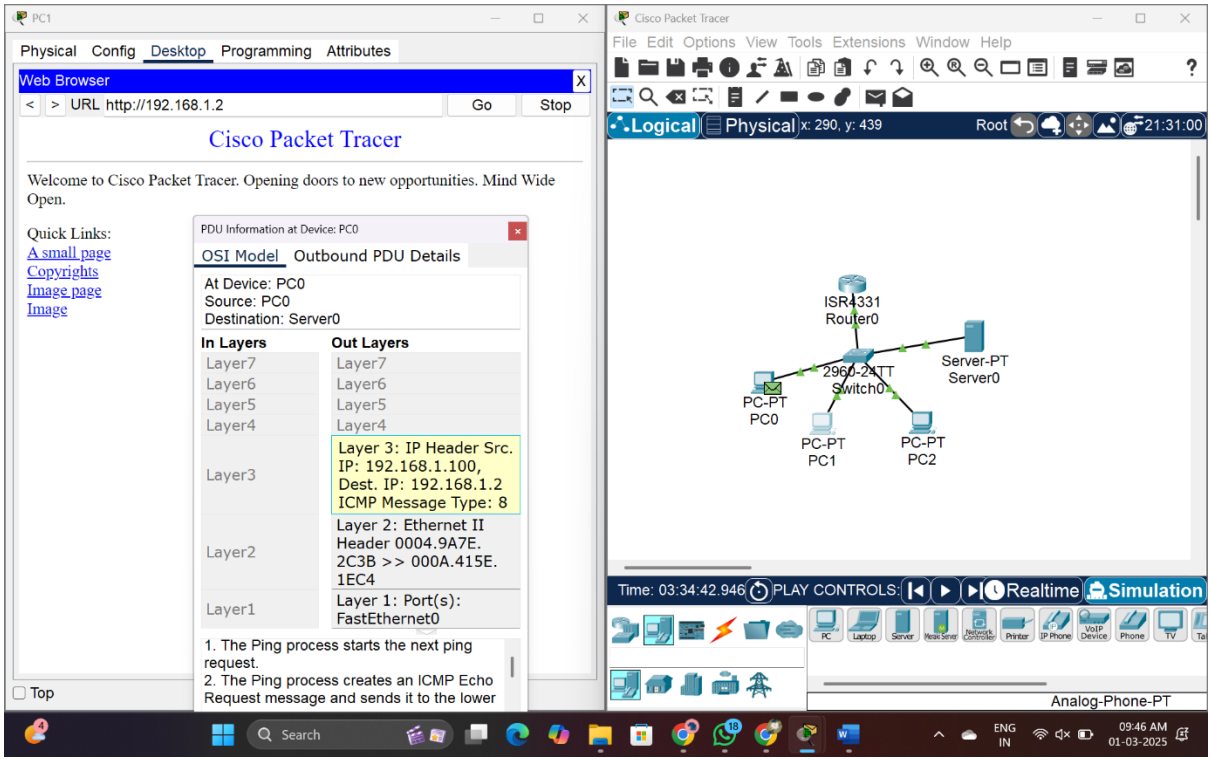
   ping 192.168.1.20

2. Click Capture/Forward and watch ICMP packets travel.



Layer 4: TCP 3-Way Handshake

1. Click PC-1 → Web Browser → Enter 192.168.1.2.
2. Click Capture/Forward.
3. Watch the SYN → SYN-ACK → ACK process.




- *SYN Packet Sent (PC-1 → Server)*
- *SYN-ACK Packet Received (Server → PC-1)*
- *ACK Packet Sent (PC-1 → Server, Connection Established)*

Layer 7: HTTP Request & Response

1. Click Server-0 → Services → Enable HTTP.
2. Click PC-1 → Web Browser → Enter 192.168.1.2.
3. Click Capture/Forward and observe the HTTP GET Request & Response.

**CONCLUSION**

- **Configured a DHCP Server** to assign IPs automatically.
- **Verified OSI Layers** using Simulation Mode.
- **Captured DHCP, ARP, ICMP, TCP, and HTTP traffic** step by step.
- **Confirmed the TCP 3-Way Handshake** for web communication.