# ASSIGNMENT FORMAT

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|---|---|---|---|
| **COURSE** | Cyber security | **ASSIGNMENT NO** | 4 |
| **MODULE** | Networking Hardware | **ASSIGNMENT DATE** | 4/12/25 |
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Q1. What is the difference between Switch and Router?

Ans:

| SWITCH | ROUTER |
|---|---|
| Connectsdeviceswithin the same network (LAN) | Connects multiple networks together (LAN to WAN, LAN to LAN) |
| Creates a network | Connects different networks |
| Layer 2 (DataLink) *(some advanced switches also work on Layer 3)* | Layer 3 (Network layer) |
| Uses **MAC address** | Uses **IP address** |
| Based onMAC address table | Based on routing table |
| All portsbelong to one broadcastdomain (unless VLAN used) | Each interface is its own broadcast domain |
| Eachportcreates its own collisiondomain | Each port creates its own collision domain |
| FasterwithinLAN | Used for LAN, WAN, MAN |
| Doesn'tprovide default gateway | Provides default gateway for network |
| Limitedsecurity features | Strong security features (firewall, NAT, ACLs) |
| OfficeLANdevices connectedusing a switch | Router connects LAN to the internet. |

Q2.Draw a network topology with the following devices:

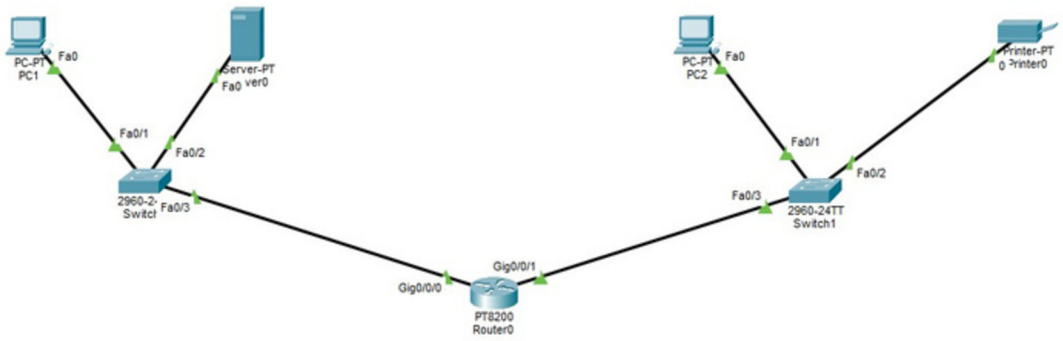
(1) Two PC's PC1 & PC2
(2) Two switches
(3) One Server & One Printer
(4) One Router
(5) Connect them with cables

**Task:**

- Assign IP Address to each network
- Delete ARP table at PC1, ping PC1 to PC2 in Simulation Mode
- Show ARP and IP entries both inbound and outbound
- Connect ARP and IP entries at each stage using simulation mode

Ans:

**1. Draw the Network and show the topology**




**2. Show IP Address allocation and highlight MAC address of all devices**

| DEVICES | IP ADDRESS | MAC ADDRESS |
|---|---|---|
| PC1 | 192.168.10.20 | 0060.5C89.B740 |
| Server | 192.168.10.30 | 00D0.9776.C44C |

| | | |
|---|---|---|
| Switch1<br>FastEthernet0/1<br>FastEthernet0/2<br>FastEthernet0/3 | — | <br>00E0.A338.3B01<br>00E0.A338.3B02<br>00E0.A338.3B03 |
| PC2 | 10.10.10.20 | 0005.5EEB.9D93 |
| Printer | 10.10.10.30 | 00D0.D3E8.C41A |
| Switch2<br>FastEthernet0/1<br>FastEthernet0/2<br>FastEthernet0/3 | — | <br>0060.3E40.8401<br>0060.3E40.8401<br>0060.3E40.8401 |
| Router<br>GigibiEthernet0/1<br>GigibiEthernet0/2 | <br>192.168.10.10<br>10.10.10.1 | <br>0083.BE3C.3ED01<br>0083.BE3C.3ED02 |

## 3.Delete ARP entry of PC1 and switch to Simulation Mode

For Window (Command Prompt):

1. Open Command Prompt on PC1.
2. Type `arp -d <IP_Address_of_Target_Device>` (e.g., `arp -d 192.168.1.1`) and press Enter.
3. Use `arp -a` to verify the entry is gone or incomplete.

## 4. Send Ping packet from PC1 to PC2

**PC1 → Ping Command**

- On PC1, open CMD and type: `ping 192.168.1.10`

**Outbound from PC1**

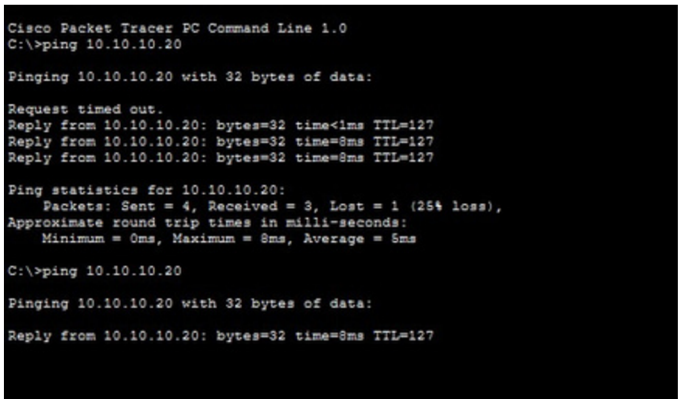
- ARP Request: PC1 broadcasts ARP asking "who has this IP?"
- ICMP Echo Request: After knowing PC2's MAC, PC1 sends ICMP Echo Request to PC2

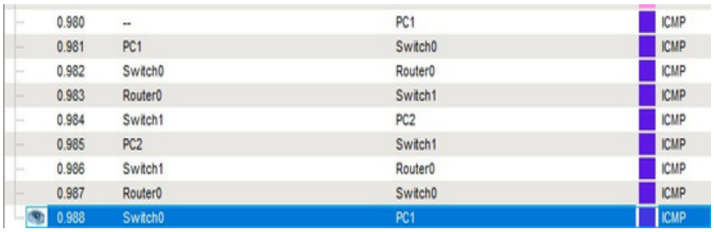
**At PC2**

- ARP Reply: PC2 replies with its MAC address
- Receives ICMP Echo Request
- Sends ICMP Echo Reply back to PC1

Inbound at PC1

- ICMP Echo Reply received
- Results show reply time & packet status



## 5.CheckARP table and list your observations

```
Switch>enable
Switch#show mac address-table
          Mac Address Table
-------------------------------------------

Vlan    Mac Address       Type        Ports
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   1    000b.be3c.ed01    DYNAMIC     Fa0/3
   1    0060.5c89.b740    DYNAMIC     Fa0/1
Switch#
```

```
Router>
Router>show arp
Protocol  Address          Age (min)  Hardware Addr   Type   Interface
Internet  10.10.10.1              -   000B.BE3C.ED02  ARPA   GigabitEthernet0/0/1
Internet  10.10.10.20             0   0005.5EEB.9D93  ARPA   GigabitEthernet0/0/1
Internet  192.168.10.10           -   000B.BE3C.ED01  ARPA   GigabitEthernet0/0/0
Internet  192.168.10.20           0   0060.5C89.B740  ARPA   GigabitEthernet0/0/0
Router>
```

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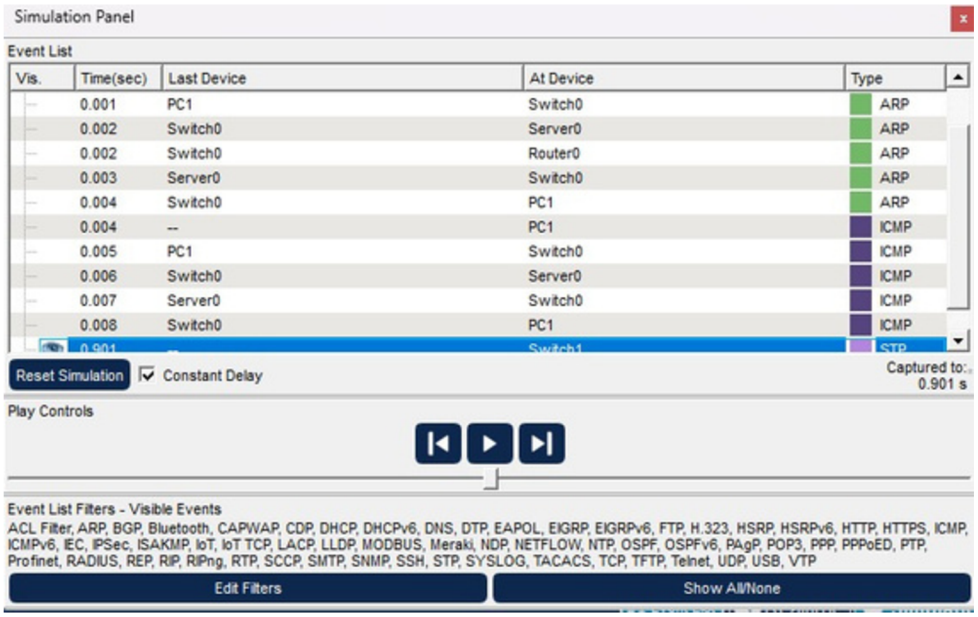
Observations:

- ARP maps IP address to MAC address.
- Entries can be dynamic (auto) or static (manual).
- Dynamic entries expire, static ones don't.
- Shows the network interface used (Ethernet/Wi-Fi).
- Some systems show age/timeout and flags.
- Shows devices you recently communicated with.
- Always contains your default gateway entry.

## 6.Send traffic from PC1 to Server using Simulation Mode




# Steps for connection between PC1 → Server → back

1. PC1 prepares data for Server (IP & Port).
2. ARP request sent to find MAC address of Gateway/Server.
3. ARP reply gives destination MAC.
4. Frame forwarded to default gateway.
5. Router forwards packet towards Server using routing.
6. Server receives packet and processes request.
7. Server replies back to PC1 (reverse path).
8. Router sends reply to PC1 MAC.
9. PC1 receives reply and communication completes

# Observations on ARP & IP (Inbound + Outbound Traffic)

**Outbound (PC1 sending)**

- PC1 first checks ARP cache.
- If no entry → ARP Request broadcast.
- Receives ARP Reply, learns MAC dynamically.
- Packet is sent to gateway using Layer-2 MAC but destination Layer-3 IP.
- ARP entry appears as "dynamic".

**Inbound (Reply from server)**

- Server/router already knows the MAC from previous communication.
- Response uses the stored ARP entry.
- No new ARP required unless entry is expired.
- IP header always remains end-to-end (PC1 ↔ Server).

**ARP**

- ARP works at Layer-2 ↔ Layer-3 mapping.
- IP handles logical addressing and routing.
- ARP entries get created only when traffic starts.
- Default gateway ARP entry always appears.
- ARP entries time-out if not used.

7.**Send traffic from PC2 to Printer using Simulation Mode**