

ASSIGNMENT FORMAT

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
Connects devices within the same network (LAN)	Connects multiple networks together (LAN to WAN, LAN to LAN)
Creates a network	Connects different networks
Layer 2 (DataLink) (<i>some advanced switches also work on Layer 3</i>)	Layer 3 (Network layer)
Uses MAC address	Uses IP address
Based on MAC address table	Based on routing table
All ports belong to one broadcast domain (unless VLAN used)	Each interface is its own broadcast domain
Each port creates its own collision domain	Each port creates its own collision domain
Faster within LAN	Used for LAN, WAN, MAN
Doesn't provide default gateway	Provides default gateway for network
Limited security features	Strong security features (firewall, NAT, ACLs)
Office LAN devices connected using a switch	Router connects LAN to the internet.

Q2. Draw a network topology with the following devices:

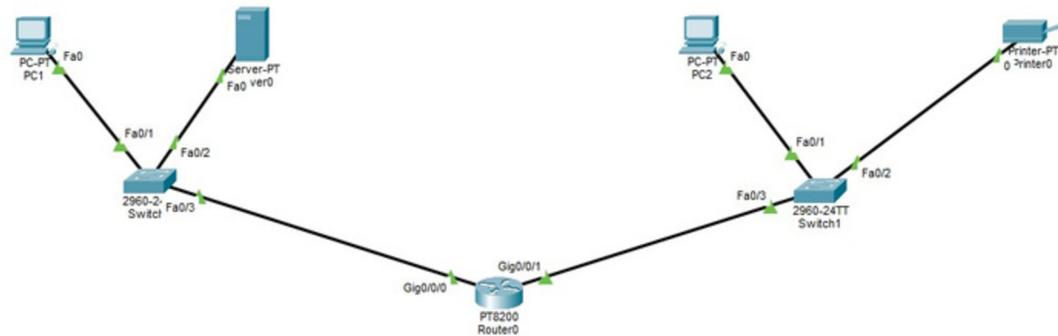
- (1) Two PC's PC1 & PC2
- (2) Two switches
- (3) One Server & One Printer
- (4) One Router
- (5) Connect them with cables

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 FastEthernet0/1 FastEthernet0/2 FastEthernet0/3	—	00E0.A338.3B01 00E0.A338.3B02 00E0.A338.3B03
PC2	10.10.10.20	0005.5EEB.9D93
Printer	10.10.10.30	00D0.D3E8.C41A
Switch2 FastEthernet0/1 FastEthernet0/2 FastEthernet0/3	—	0060.3E40.8401 0060.3E40.8401 0060.3E40.8401
Router GigabitEthernet0/1 GigabitEthernet0/2	192.168.10.10 10.10.10.1	0083.BE3C.3ED01 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>`(`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

```
Cisco Packet Tracer PC Command Line 1.0
C:>ping 10.10.10.20

Pinging 10.10.10.20 with 32 bytes of data:

Request timed out.
Reply from 10.10.10.20: bytes=32 time<1ms TTL=127
Reply from 10.10.10.20: bytes=32 time=8ms TTL=127
Reply from 10.10.10.20: bytes=32 time=8ms TTL=127

Ping statistics for 10.10.10.20:
  Packets: Sent = 3, Received = 3, Lost = 1 (25% loss),
  Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 8ms, Average = 5ms

C:>ping 10.10.10.20

Pinging 10.10.10.20 with 32 bytes of data:
Reply from 10.10.10.20: bytes=32 time=8ms TTL=127
```

0.980	--	PC1	ICMP
0.981	PC1	Switch0	ICMP
0.982	Switch0	Router0	ICMP
0.983	Router0	Switch1	ICMP
0.984	Switch1	PC2	ICMP
0.985	PC2	Switch1	ICMP
0.986	Switch1	Router0	ICMP
0.987	Router0	Switch0	ICMP
0.988	Switch0	PC1	ICMP

5.Check ARP table and list your observations

```

Switch>enable
Switch#show mac address-table
      Mac Address Table
-----
Vlan   Mac Address        Type      Ports
----  -----
  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

Event List				
Vis.	Time(sec)	Last Device	At Device	Type
—	0.001	PC1	Switch0	ARP
—	0.002	Switch0	Server0	ARP
—	0.002	Switch0	Router0	ARP
—	0.003	Server0	Switch0	ARP
—	0.004	Switch0	PC1	ARP
—	0.004	—	PC1	ICMP
—	0.005	PC1	Switch0	ICMP
—	0.006	Switch0	Server0	ICMP
—	0.007	Server0	Switch0	ICMP
—	0.008	Switch0	PC1	ICMP
	0.901		Switch1	STP

Reset Simulation Constant Delay Captured to: 0.901 s

Play Controls:

Event List Filters - Visible Events: ACL Filter, ARP, BGP, Bluetooth, CAPI/WAP, CDP, DHCP, DHCPv6, DNS, DTP, EAPOL, EIGRP, EIGRPv6, FTP, H.323, HSRP, HSRPv6, HTTP, HTTPS, ICMP, ICMPv6, IEC, IPSec, ISAKMP, IoT, IoT TCP, LACP, LLDP, MODBUS, Meraki, NDP, NETFLOW, NTP, OSPF, OSPFv6, PAgP, POP3, PPP, PPPoED, PTP, Profinet, RADIUS, REP, RIP, RIPng, RTP, SCCP, SMTP, SNMP, SSH, STP, SYSLOG, TACACS, TCP, TFTT, Telnet, UDP, USB, VTP

[Edit Filters](#) [Show All/None](#)

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

Event List				
Vis.	Time(sec)	Last Device	At Device	Type
—	0.000	—	PC2	ARP
—	0.001	PC2	Switch1	ARP
—	0.002	Switch1	Printer0	ARP
—	0.002	Switch1	Router0	ARP
—	0.003	Printer0	Switch1	ARP
—	0.004	Switch1	PC2	ARP
—	0.004	—	PC2	ICMP
—	0.005	PC2	Switch1	ICMP
—	0.006	Switch1	Printer0	ICMP
—	0.007	Printer0	Switch1	ICMP
n nns	—	Switch1	PC2	ICMP

Reset Simulation Constant Delay

Captured to: 0.439 s

Play Controls:

Event List Filters - Visible Events

ACL Filter, ARP, BGP, Bluetooth, CAPWAP, CDP, DHCP, DHCPv6, DNS, DTP, EAPOL, EIGRP, EIGRPv6, FTP, H.323, HSRP, HSRPv6, HTTP, HTTPS, ICMP, ICMPv6, IEC, IPsec, ISAKMP, IoT TCP, LACP, LLDP, MODBUS, Meraki, NDP, NETFLOW, NTP, OSPF, OSPFv6, PaqP, POP3, PPP, PPPoED, PTP, Profinet, RADIUS, REP, RIP, RIPng, RTP, SCCP, SMTP, SNMP, SSH, STP, SYSLOG, TACACS, TCP, TFTP, Telnet, UDP, USB, VTP

[Edit Filters](#) [Show All/None](#)