Experiment 2

Aim:

Implementation of basic Ethernet using Cisco Packet Tracer to understand and make IP, TCP and UDP Header Analysis.

Objectives:

1. An overview on headers (i.e. Ethernet, IP, TCP & UDP), ICMP, FTP and TFTP.
2. Configuration of an Ethernet using the network devices in Cisco Packet Tracer.
3. Simulating the Ethernet by transmitting ICMP, FTP and TFTP messages between two end devices.
4. Understanding and analysing different fields of IP, TCP and UDP headers after simulation.

Exercises:

1. Given the value available in "fragment offset" field of IP header is 100. what is the number of bytes ahead of this fragment?
2. An IP packet has arrived with the first 8 bits as 01000010. What is the version and the header length?
3. A TCP header in hexadecimal format is given as below.

   05300217 00000001 00000000 500207FF 00000000

   a. What is the source port number?

   b. What is the destination port number?

   c. What is the length of the header?

   d. What is the window size?

4. Given a UDP header in hexadecimal format 06 32 00 0D 00 1C E2 17**.** Find the following:
   a. Source port number.

   b. Destination port number.

   c. Length of user datagram.

   d. Length of the data.

Procedure

A. Building the Ethernet LAN

1. Open Cisco Packet Tracer.
2. Drag two PCs (PC0, PC1) and one 2960 Switch onto the workspace.
3. Use Copper Straight-Through cables to connect PC0 → Fa0/1 on Switch, and PC1 → Fa0/2 on Switch.

B. Configuring IP Addresses

4. On PC0: Desktop → IP Configuration:

- IP: 192.168.1.10
- Subnet Mask: 255.255.255.0
- Gateway: (leave blank for now)

5. On PC1: Desktop → IP Configuration:
   - IP: 192.168.1.20
   - Subnet Mask: 255.255.255.0

C. Generating Traffic

6. From PC0's Command Prompt, ping PC1:
7. ping 192.168.1.20
   This produces ICMP packets (inside IP packets inside Ethernet frames).
8. To generate TCP traffic:
   - Add a Server device to the topology, enable HTTP service (TCP port 80).
   - From PC0 open the Web Browser to http://<Server-IP>.

D. Capturing & Analysing Headers

9. Switch Packet Tracer from Realtime to Simulation mode (bottom right).
10. Click "Add Simple PDU" or "Capture/Forward" to send a packet.
11. The event list will show each hop. Click a packet in the list → "PDU Details" → "Inbound/Outbound PDU Details".
12. Expand the tree to view:
    - **Ethernet II header:** Destination MAC, Source MAC, Type.
    - **IP header:** Version, Header Length, Source IP, Destination IP, Protocol, Identification, TTL.
    - **TCP header (for HTTP):** Source Port, Destination Port, Sequence Number, Acknowledgment Number, Flags.

E. Record Observations

13. Take screenshots of each header for your report. Note the values of MAC addresses, IP addresses, and port numbers.

Expected Output

- Successful pings between PC0 and PC1.
- Simulation mode shows captured Ethernet frames with encapsulated IP packets.
- Detailed header fields visible for ICMP (ping), TCP (HTTP).

Observation Table (Example)

Layer	Field	Sample Value (from PDU Details)
Ethernet	Dest MAC	00:0C:29:12:34:56
Ethernet	Source MAC	00:0C:29:65:43:21
IP	Source IP	192.168.1.10
IP	Dest IP	192.168.1.20
IP	Protocol	1 (ICMP) / 6 (TCP)
TCP	Source Port	1025
TCP	Dest Port	80