Aim:- Implementation of basic Ethernet using cisco packet tracer to understand & make IP, TCP & UDP Header Analysis.

Objective:-

1. An overview on header (i.e Ethernet, IP, TCP, UDP), ICMP, FTP, TFIP)
2. Configuration of an Ethernet using the network device in cisco packet tracer.
3. Simulating the Ethernet by transmitting ICMP, FTP & TFTP message between two & devices.
4. Understanding & analysing different field of IP, TCP & UDP header after simulation.

Theory:-

Objective 1:-

Ethernet header → It is a 14 byte component of a ethernet frame that contains essential info for network transmission, including the destination & source mac address & either type field to identify the encapsulated protocol.

IP header → It is a metadata at the beginning of an IP packet that contains essential information for routing & delivery, such as the source & destination

Name:_____ Regd. Number:_____

IP addresses packet length, & time to live (TTL)

TCP header → It is a block of info attached to each TCP segment that contains essential details for reliable & ordered data transfer, including sources & destination ports, sequence no & control flag.

UDP header → It is a 8 byte field in the user data protocol that contains 4 parts: source port, destination port, length and checksum.

ICMP :→ stands for Internet Control Msg protocol, a network layer protocol used by devices using routers to send error msg & operational information.

FTP → set of rules that computer use to transfer file between themselves over a network like clint server model.

TFTP → Simple, light wt network protocol for transferring files between computers, commonly used for task like network device bootstraping & transferring small configuration files over a local network, rather than the internet.

Objective-2 :-

Configuring an Ethernet network in Cisco packet tracer involves planning the network topology, connecting devices with appropriate cables & then configuring each device with an IP address, subnet mask, & default gateway.

Objective-3 :-

Ethernet enables data transfer between devices in a LAN using MAC addresses. In simulation, ICMP check connectivity, FTP transfer files reliably using TCP & TFTP transfer files simply using UDP. These protocol show how communication works across different OSI layer over an Ethernet network.

Objective4 :-

In a network simulation, analyzing IP, TCP & UDP headers help understand how data is structured & transmitted.

↳ IP header → contain source & destination IP addressed, version, TTL & protocol type -used for routing packet network

↳ TCP header → ensures reliable, connection -oriented communication.

 Regd. Number:_____

↳ UDP header → provides fast, connection less communication without reliability checks.

PDU Information at Device: Switch1

OSI Model | Inbound PDU Details | Outbound PDU Details

At Device: Switch1
Source: PC0
Destination: PC4

In Layers

Layer 2: Ethernet II Header
000C.CFA5.D0D7 >>
0030.A321.48A8
Layer 1: Port FastEthernet0/4

1. FastEthernet0/4 receives the frame

Out Layers

Layer 2: Ethernet II Header
000C.CFA5.D0D7 >>
0030.A321.48A8
Layer 1: Port(s): FastEthernet0/2

Challenge Me | << Previous Layer | Next Layer >>

OSI Model | Inbound PDU Details | Outbound PDU Details

PDU Formats

Ethernet II

0	4	8	Bytes
PREAMBLE: 101010...10	SF	DEST ADDR:0030.A321.48A8	
SRC ADDR:000C.CFA5.D0	TYPE:0x08	DATA (VARIABLE LENGTH	FCS:0x00000000

IP

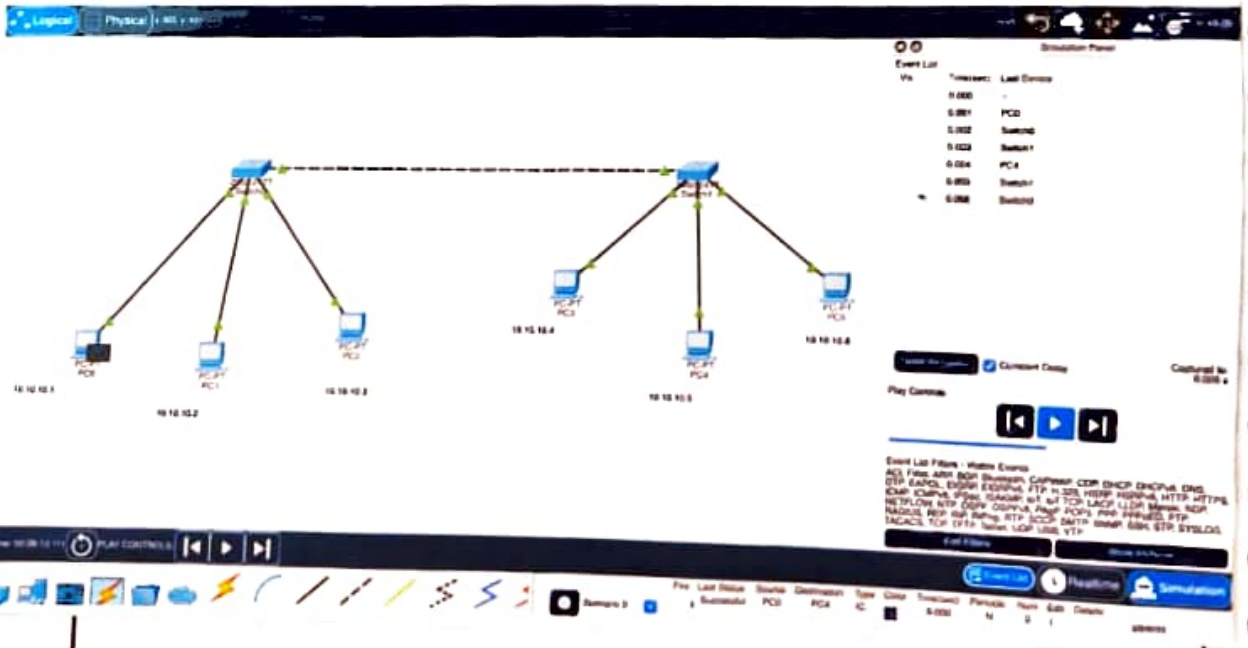
0	4	8	16	20	24	Bits
VER:4	#HL:5	DSCP:0x00	TL:28			
ID:0x0004			FLAGS:0x0	FRAG OFFSET:0x000		
TTL:255	PRO:0x01	CHKSUM				
SRC IP:10.10.10.1						
DST IP:10.10.10.5						
DATA (VARIABLE LENGTH)						

ICMP

0	8	16	Bits
TYPE:0x08	CODE:0x00	CHECKSUM	
ID:0x0005		SEQ NUMBER:4	

Variable Size PDU

0	8	16	Bytes
DATA (VARIABLE LENGTH)			



Name:_____ [2] Regd. Number:_____

Analysis →

PC0 → 10.10.10.1
PC4 → 10.10.10.4
} Here IP & ICMP layer in Inbound & outbound remain unchanged.

↳ Here there is successful connection establish.

↳ Ping 10.10.10.4
Sent = 4, received = 4, lost = 0, Avg time = 5ms TTL = 255

↳ ICMP confirms request & reply msg in layer 0 & communication is operation -al.

↳ Inbound PDU shows that data on arrival at switch 1.

Conclusion :-

↳ Successfully configured a ethernet network in CISCO packet Tracer to enable communication.

↳ Simulated data transmission using ICMP, FTP & TFTP demonstrating connectivity testing & files transfer using different transport protocol.

↳ Analyze Ethernet, IC, TCP & UDP header to understand data & role of each layer in communication.

↳ Gained a clear understanding of how protocol interact across OSI model to ensure efficient & reliable data transfer in network.

Exercise :-

① fragment offset is present in IP header.

↳ measured in 8 byte (64 bit)

So, byte Ahead = fragment offset × 8 ∴
fragment offset = 10
= 100 × 8
= 800 (Ans)

② IP Packet : 01000010

first 4bit are IP version &
Last 4 bit are IP header length.

IP version = 4 (IPV4) = 0100 (Ans)
IP header = 0010 = 2 (binary)
header length in byte = 2×4 = 8 byte (Ans)

So, I version IPV4 & header length = 8.

③ a. Source port on 0530
= $0\times16^3 + 5\times16^2 + 3\times16^2 + 0\times16^0$
= 48 × 256
= 1308 (Ans)

b. Destination port = 0x0017
= $0\times16^3 + 0\times16^2 + 1\times16^1 + 7\times16^0$
= 0 + 512 + 16 + 7
= 535

c. Header length
5000 binary → 0101 0000 0000 0010
Data offset = 5
header length = 5×4 = 20 byte

d. Window size = 0x0fff
= $0\times16^4 + 7\times16^3 + 15\times16^1 + 15\times16^0$
= 1792 + 240 + 15
= 2047.

④ a. Source Port = 0630
$0\times16^4 + 6\times16^3 + 3\times16^2 + 0\times16^1 = 1536 + 48 + 2$
$= 1586$

b. Destination port = 000D
$= 0\times16^4 + 0\times16^3 + 0\times16^2 + 13\times16^0 = 13$

c. length = UDP header + Data
= 001C
$= 0\times16^3 + 0\times16^2 + 1\times16^1 + 12\times16^0$
= 16 + 12 = 28 byte.

d. EQ17 = CheckSum

$= 14 \times 16^3 + 2 \times 16^2 + 1 \times 16^1 + 7 \times 16^0$

$= 57344 + 512 + 16 + 7$

$= 57847$ (Ans)

11-oct-25