CS & IT ENGINEERING

COMPUTER NETWORKS

IPv4 Header & Fragmentation

Lecture No-4

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IPv4 Header

IPv4 Header

VER	HL	Services	Total Length
Identification No.		Flags	Fragment offset
Time to Live		Protocol	Header checksum
Source IP Address			
Destination IP Address			
Option			

Problem Solving
On
IPv4 Header

Q.1

In an IPv4 packet the value of HLEN is $(1100)_2$. How many Byte of options are being carried by this packet ?

A 40 Byte

B 60 Byte

C 12 Byte

D 28 Byte ✓

HLEN = $(1100)_2$ = 12

Header size = 12 * 4 = 48 Byte

option = 48 − 20 (Fixed Length Header)

= 28 Byte

Q.2

In an IPv4 packet, the value of HLEN is 5, and the value of total length field is $(0048)_{16}$. How many Bytes of the data are being carried by this packet

52.

HLEN = 5

Header size = 5*4 = 20 Byte

TL = Data + Header

Data = TL - H

= 72 - 20 = 52 Byte

Total length = $(0048)_{16}$

$16^1 16^0$

$4*16^1 + 8*16^0$

64 + 8 = 72

Q.3

An IPv4 packet has arrived with the first few Hexa decimal digits as shown below

$(450000\ 5C000\ 30000\ 59\ 06\ \ldots\ldots)_{16}$

VER HL Services Total Length IDNo Flag & Fragment offset TTL

How many Hops can this packet take before being dropped ?

A 30

B 59

C 89

D 90

$TTL = (59)_{16}$

$16^1\ 16^0$

$5*16^1 + 9*16^0$

$80 + 9 = 89$

Q.4

In an IPv4 packet the value of HLEN is $(1000)_2$. How many Byte of options are being carried by this packet ?

HLEN = $(1000)_2$ = $(8)_{10}$

Header size = 8 * 4 = 32 Byte

option = 32 - 20 = 12 Byte

Q.5

An IPv4 packet has the first few Hexa decimal digit as shown below

First row | 2nd row | 3rd row

450000 5C 000 3 0000 59 06

TTL | Protocal

The above packet is belong to which protocol

ICMP → (01)
IGMP → (02)
TCP → (06)
UDP → (17)
OSPF → (89)

Protocal = $(06)_{16}$

16^0

$6 * 16^0 = 6$ (TCP)

(A) TCP

(B) UDP

(C) ICMP

(D) IGMP

Q.6

In an IPv4 packet the value of HLEN is 10 and value of total length field is '0084' Hexadecimal how many byte of data are being carried by this packet ?

A. 44 Byte

B. 74 Byte

C. 92 Byte ✓

D. 84 Byte

HLEN = 10

Header size = 10 * 4 = 40 Byte

$TL = (0084)_{16}$

$16^1 16^0$

$8 * 16^1 + 4 * 16^0 = 128 + 4 = 132$

TL = D + H

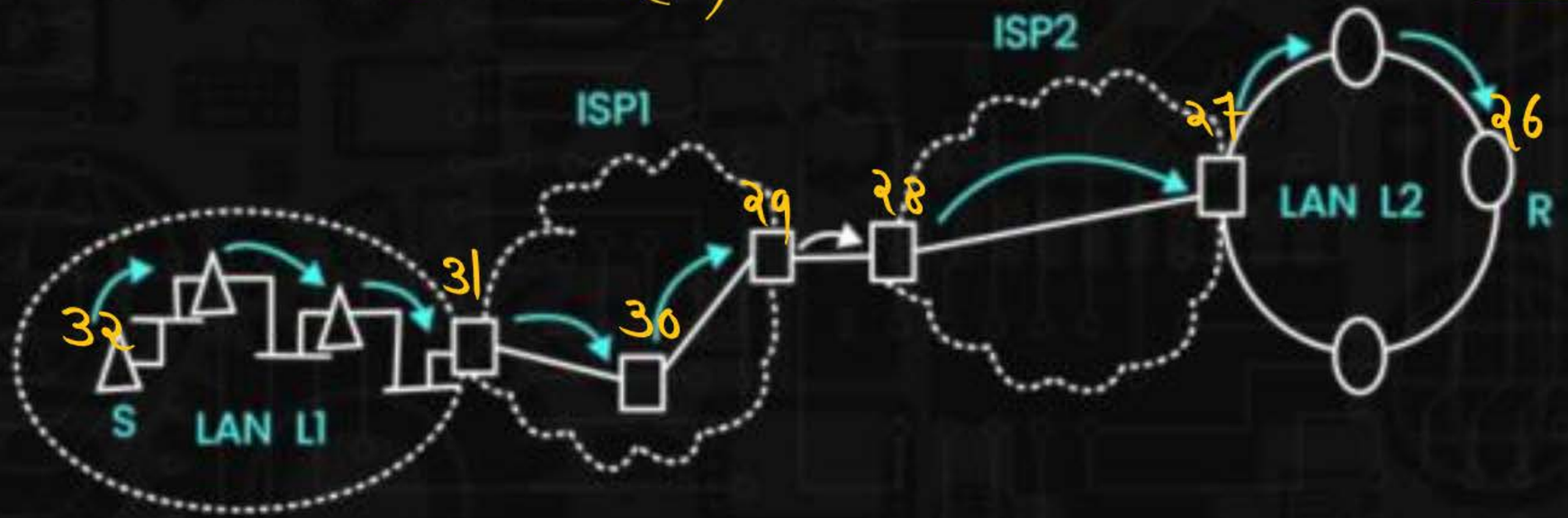
D = TL - H

D = 132 - 40 = 92 Byte

Q.7

In the diagram shown below, L1 is an Ethernet LAN and L2 is a Token-Ring LAN. An IP packet originates from sender S and traverses to R, as shown. The links within each ISP and across the two ISPs, are all point-to point optical links. The initial value of TTL field is 32. The maximum possible value of the TTL field when R receives the datagram is ____(२६)____ .

GATE 2014



Q.8

For which one of the following reasons does Internet Protocol (IP) use the time-to-live (TTL) field in the IP datagram header ?

GATE 2006

A. Ensure packets reach destination within that time.

B. Discard packets that reach later than that time

C. Prevent packets from looping indefinitely.

D. Limit the time for which a packet gets queued in intermediate routers.

Q.9

One of the header fields in an IP datagram is the Time-to-Live (TTL) field. Which of the following statements best explains the need for this field?

GATE 2010

A. It can be used to prioritize packets

B. It can be used to reduce delays

C. It can be used to optimize throughput

D. It can be used to prevent packet looping

Q.10

In the TCP/IP protocol suite, which one of the following is NOT part of the IP header? **GATE 2004**

A. Fragment Offset

B. Source IP address

C. Destination IP address

D. Destination port number

Q.11

Which one of the following fields of an IP header is NOT modified by a typical IP router? **GATE 2015**

A. Checksum

B. Source address

C. Time to Live (TTL)

D. Length

Q.12

Host A (on TCP/IP v4 network A) sends an IP datagram D to host B (also on TCP/IP v4 network B). Assume that no error occurred during the transmission of D. When D reaches B, which of the following IP header field(s) may be different from that of the original datagram D? **GATE 2014**

(i) TTL

(ii) Checksum

(iii) Fragment offset

A (i) only

B (i) and (ii) only

C (ii) and (iii) only

D (i) ,(ii) , (iii)

Q.13

Which of the following statement is TRUE?

GATE 2009

A. Both Ethernet frame and IP packet include checksum fields

B. Ethernet frame includes a checksum field and IP packet includes a CRC field

C. Ethernet frame includes a CRC field and IP packet includes a checksum field

D. Both Ethernet frame and IP packet include CRC fields

Q.14 Which can be possible header size (in bytes) in IPv_4 datagram ?

I. 20

II. 30

III. 50

IV. 60

Header size can be in b/w 20 and 60 Byte
But Always in the multiple of 4

(A) I only

(B) I and IV

(C) IV only

(D) I, II, III and IV

Q.15

An IPv4 packet has the first few Hexa decimal digit as shown below

4500005C 000 3 0000 59 06

VER HL Services TL

What is data size of IPv4 packet 72 .

$HL = (5)_{16}$

$HL = 5 * 16^0 = 5$

Header size $= 5 * 4 = 20$ Byte

$TL = (005C)_{16}$

$16^1\ 16^0$

$5 * 16^1 + 12 = 92$ Byte

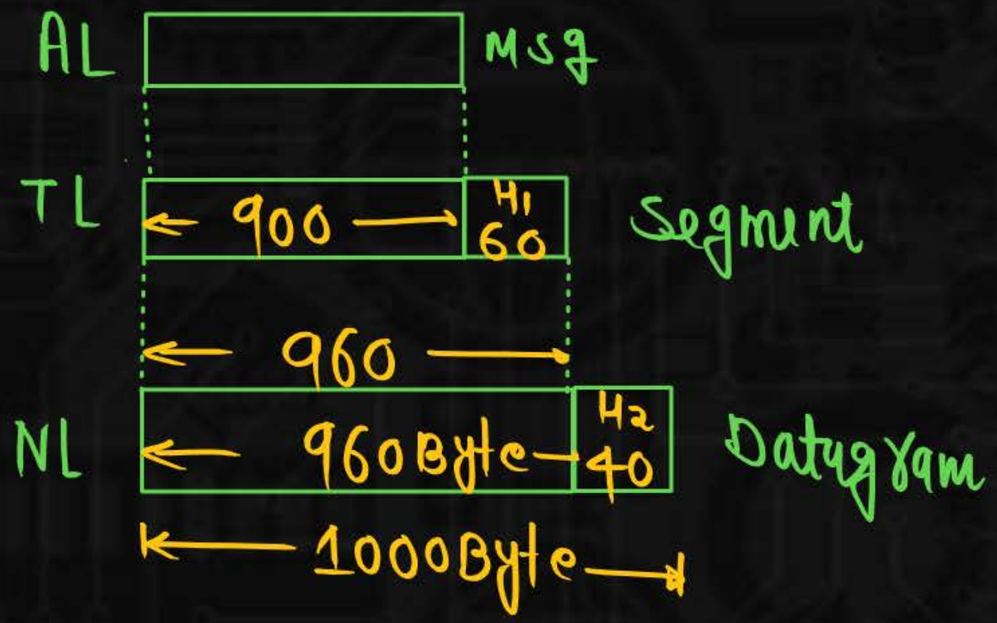
$TL = D + H$

$D = TL - H$

$D = 92 - 20 = 72$

Q.16

In a IP datagram a TCP segments is present header length field of IP datagram is 10 total length of IP datagram is 1000 byte. Header length field in TCP header is 15, then what is the size of TCP data present in the datagram.



A 988

B 952

C 964

D 900

TCP data size = Total length(IP) − IP(H) − TCP(H)

= 1000 − 40 − 60 = 900 Byte

Q.17

An ipv4 packet has arrived with the first 16 bit as $(0100\,0010\,1111\,0000)_2$ the receiver discard this packet why ?

(VER, HL)

A. Invalid VER

B. Invalid HLEN

C. Both A &B

D. NONE

$VER = (0100)_2 = 4$

$HLEN = (0010)_2 = 2$ (MIN. HLEN Value must be 5)

Header size $= 2 \times 4 = 8$ Byte

MIN. Header size $= 20$ Byte

$\frac{20}{4} = 5$ (MIN HLEN)

Q.18

An IPv4 packet has the first few Hexa decimal digit as shown below

1st row | 2nd row | 3rd row | 4th row (S.IP)

450000 5C | 000 3 0000 | 59 06 | 0000 0A0C0E05

What is Source IP Address(in decimal) of IPv4 packet _____.

$S.IP = (0A.0C.0E.05)_{16}$

$(0A)_{16}$: 16^0 : $10 * 16^0 = 10$

$(0C)_{16}$: 16^0 : $12 * 16^0 = 12$

$(0E)_{16}$: 16^0 : $14 * 16^0 = 14$

$(05)_{16}$: 16^0 : $5 * 16^0 = 5$

$S.IP = 10.12.14.5$

Q.19

Which of the following value is/are not possible of the TTL in a datagram ?

MSQ

A. 23

B. 0

C. 1

D. 301

TTL = 8 bit

Range → 0 to $2^8 - 1$

Range → 0 to 255

TTL value can never be 0. It will always in b/w 1 to 255


THANK YOU
GW
SOLDIERS !