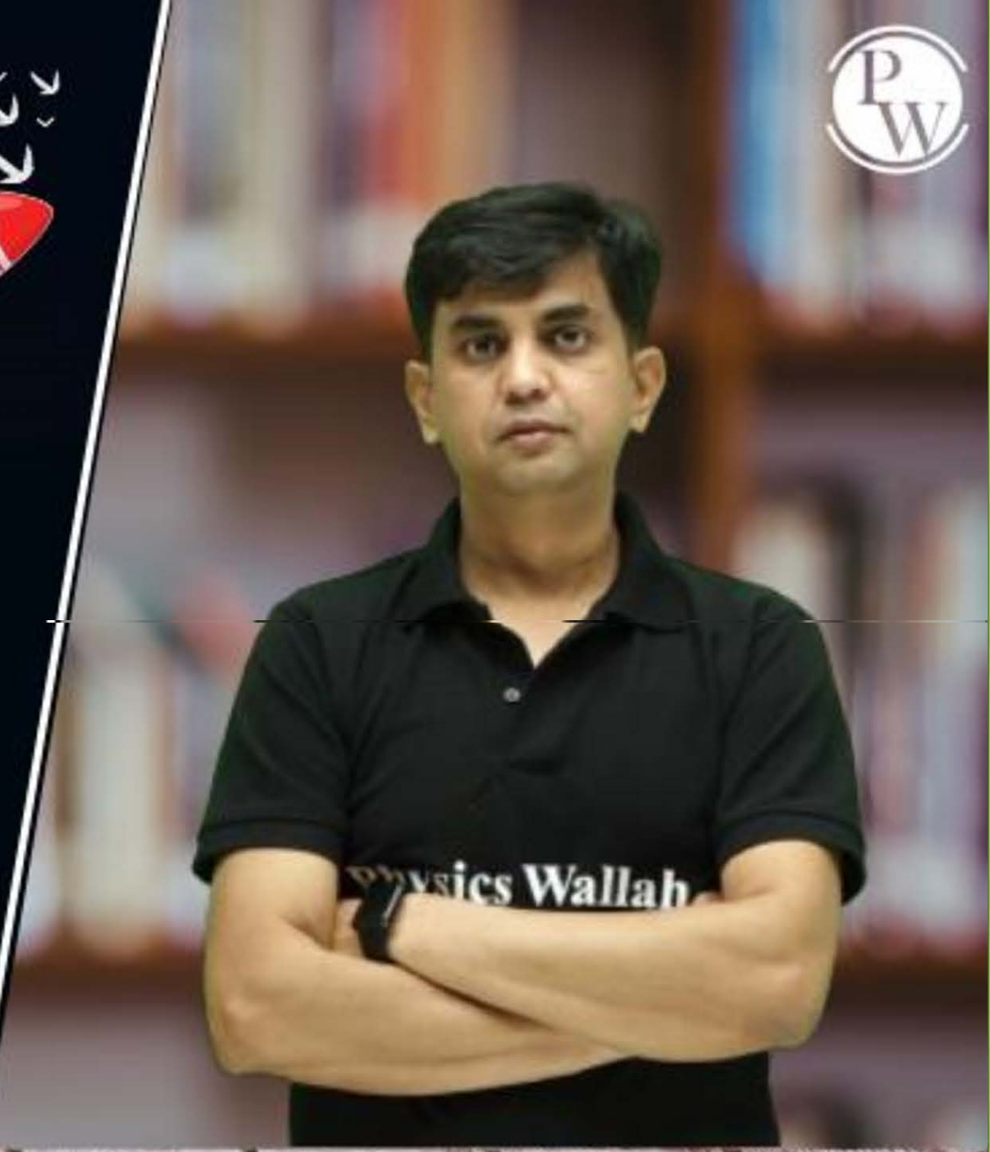
CS & IT ENGINEERING

Computer Network-1

IPv4 Header

DPP - 01 Discussion Notes



By- Abhishek Sir

[MCQ]

#Q. Identify valid IPv4 packet starting bits.

VER HLEN

A 01010100

B 01010101

C 01000100

D 01000101

Ans: D

[NAT]

#Q. Consider initial bits of an IPv4 packet are "01000111", calculate header size (in bytes)?

VER HLEN

$HLEN = (0111)_2 = 7$ word

Header Size = (HLEN × 4) byte

= (7 × 4) byte

= 28 byte

Ans = 28

[NAT]

#Q. Consider initial bits of an IPv4 packet are "01001110", calculate options (optional header) size (in bytes)?

VER HLEN

$HLEN = (1110)_2 = 14$ words

Base Header Size = 5 words

Options size = (HLEN − 5) words

= (14 − 5) words

= 9 words

= 9 * 4 bytes = 36 bytes

Ans = 36

[NAT]

#Q. Consider an IPv4 packet with the value of HLEN (header length) field is 5, and the value of the total length field is 879. How many bytes of data the packet is carrying in its payload field ?

HLEN = 5 words

TL = 879 bytes

payload size = [TL − (HLEN * 4)] bytes

= [879 − (5 * 4)] bytes

= 859

Ans = 859

[NAT]

#Q. Consider UDP segment of size 2000 bytes is passed to IP for delivery. MTU (maximum transmission unit) for source network is 300 bytes and IPv4 header size is 20 bytes. How many total number of IP fragments required to transmit the UDP segment ?

UDP Segment Size = 2000 bytes

MTU = 300 bytes

Header Size = 20 bytes

Payload Size = [MTU − Header Size]

= (300 − 20) bytes

= 280 bytes

No. of IP fragments (N) = $\left\lceil \frac{\text{UDP segment size}}{\text{payload size}} \right\rceil$

$N = \left\lceil \frac{2000 \text{ bytes}}{280 \text{ bytes}} \right\rceil = \lceil 7.14 \rceil = 8$

Ans = 8

[NAT]

#Q. Consider UDP segment of size 2000 bytes is passed to IP for delivery. MTU (maximum transmission unit) for source network is 300 bytes and IPv4 header size is 20 bytes. Calculate size of the last fragment in bytes after fragmentation ?

Total length of last fragment

$= \text{Header size} + [\text{UDP segment size} - (N-1) * \text{Payload size}]$

$= 20 \text{ byte} + [2000 - (8-1) * 280] \text{ bytes}$

$= (20 + 40) \text{ bytes}$

$= 60 \text{ bytes}$

Ans = 60

[NAT]

#Q. Consider UDP segment of size 2000 bytes is passed to IP for delivery. MTU (maximum transmission unit) for source network is 300 bytes and IPv4 header size is 20 bytes. Calculate offset value of the last fragment after fragmentation ?

Offset value at last fragment

$$= \left[\frac{(N-1) * \text{Payload size}}{8}\right] = \left[\frac{(8-1) * 280 \text{ byte}}{8}\right] = 245$$

Ans = 245

[NAT]

#Q. Consider UDP segment of size 1540 bytes is passed to IP for delivery. MTU (maximum transmission unit) for source network is 300 bytes and IPv4 header size is 40 bytes. How many total number of IP fragments required to transmit the UDP segment ?

UDP segment size = 1540 bytes
MTU = 300 bytes
Header size = 40 bytes

Payload size = [MTU − Header size]
= (300 − 40) = 260 bytes
[Not multiple of 8 bytes]
= 256 bytes

No. of IP fragments (N)
$= \left\lceil \frac{\text{UDP segment size}}{\text{Payload size}} \right\rceil$ N = 6
$= \left\lceil \frac{1540 \text{ bytes}}{256 \text{ bytes}} \right\rceil = \lceil 6.01 \rceil = X$

No. of UDP byte remain after 5 fragment
= [UDP Seg. size − 5 * payload size]
= (1540 − 5 * 256) = 260 bytes

Ans = 6

[NAT]

#Q. Consider UDP segment of size 1540 bytes is passed to IP for delivery. MTU (maximum transmission unit) for source network is 300 bytes and IPv4 header size is 40 bytes. Calculate size of the last fragment in bytes after fragmentation ?

Total length of last fragment

= Header Size + [UDP seg. size − (N−1) * payload size]

= 40 bytes + [1540 − (6−1) * 256] bytes

= (40 + 260) bytes = 300 bytes

Ans = 300

[NAT]

#Q. Consider UDP segment of size 1540 bytes is passed to IP for delivery. MTU (maximum transmission unit) for source network is 300 bytes and IPv4 header size is 40 bytes. Calculate offset value of the last fragment after fragmentation ?

offset value of last fragment

$$= \left[\frac{(N-1) * \text{payload size}}{8}\right] = \left[\frac{(6-1) * 256 \text{ byte}}{8}\right] = 160$$

Ans = 160

[NAT]

#Q. Consider an IPv4 datagram of size 3000 bytes arrives at a router. The router has to forward this packet on a link whose MTU (maximum transmission unit) is 500 bytes. Assume that the size of the IP header is 20 bytes. How many total number of IP fragments required to transmit the UDP segment ?

TL = 3000 bytes
Header Size = 20 bytes
Old payload size = [TL − Header Size]
= (3000 − 20) = 2980 bytes

MTU = 500 bytes
New Payload size
= (MTU − Header Size)
= (500 − 20)
= 480 bytes

No. of IP fragments (N)
$= \left\lceil \frac{\text{Old payload size}}{\text{New payload size}} \right\rceil$
$= \left\lceil \frac{2980 \text{ bytes}}{480 \text{ bytes}} \right\rceil = \lceil 6.20 \rceil$
N = 7

Ans = 7

[NAT]

#Q. Consider an IPv4 datagram of size 3000 bytes arrives at a router. The router has to forward this packet on a link whose MTU (maximum transmission unit) is 500 bytes. Assume that the size of the IP header is 20 bytes. Calculate size of the last fragment in bytes after fragmentation ?

Total length of last fragments

= Header Size + [Old payload size − (N−1) * New Payload size]

= 20 bytes + [2980 − 6 * 480] bytes

= (20 + 100) = 120 bytes

Ans = 120

[NAT]

#Q. Consider an IPv4 datagram of size 3000 bytes arrives at a router. The router has to forward this packet on a link whose MTU (maximum transmission unit) is 500 bytes. Assume that the size of the IP header is 20 bytes. Calculate offset value of the last fragment after fragmentation ?

[Note : offset value in the arrived fragment is 0]

offset value for last fragment

$$= \text{old offset} + \left\lceil \frac{(N-1) * \text{New Payload size}}{8} \right\rceil$$

$$= 0 + \left\lceil \frac{(7-1) * 480 \text{ byte}}{8} \right\rceil = 360$$

Ans = 360

[NAT]

#Q. Consider a UDP segment consisting of 3000 bytes is passed to IP for delivery across two networks. The first network can carry a maximum payload of 2000 bytes per datagram and the second network can carry a maximum payload of 1000 bytes per datagram, excluding network overhead. How many total number of IP fragments in the second network for this transmission ?

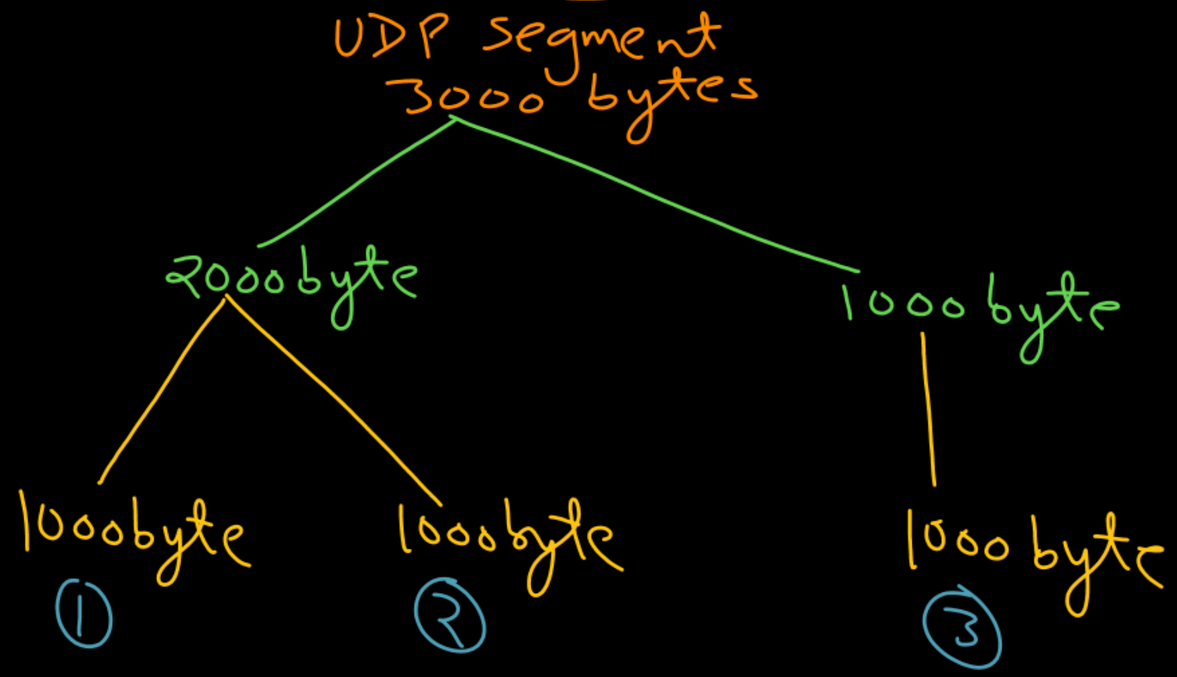
UDP Seg. size = 3000 byte

1st Network :-

Payload size$_1$ = 2000 bytes

2nd Network :-

Payload size$_2$ = 1000 bytes



Ans = 3

[MCQ]

#Q. Time-to-live (TTL) field in IPv4 header is used to prevent _____ .

A. Collision of packets.

B. Fragmentation of packet

C. Indefinite traversing of packets

D. Retransmission of packets.

Ans: C

[MCQ]

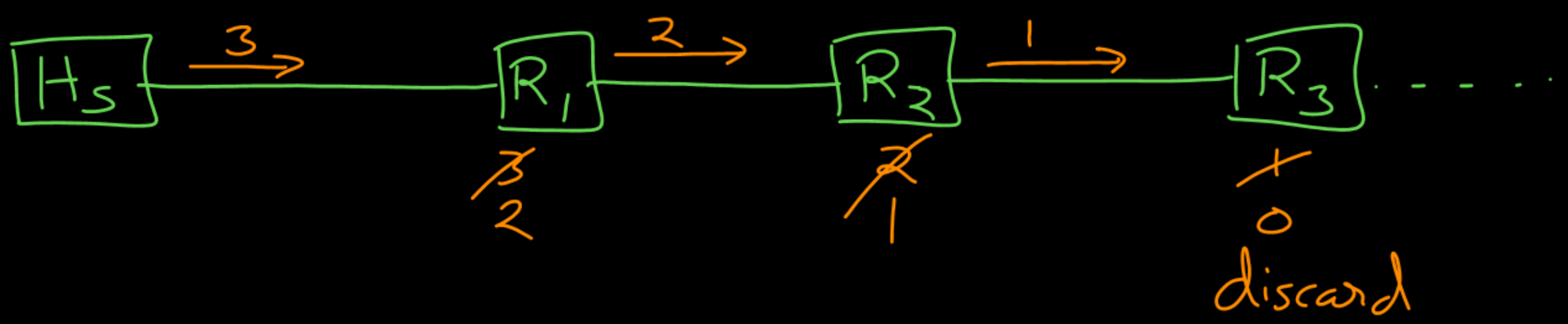
#Q. The TTL (time-to-live) field of an IPv4 datagram is 3, how many hops can this packet travel before being dropped ?

A 1 hop

B 2 hops

C 3 hops

D 4 hop



Ans: C

[MSQ]

#Q. In the TCP/IP protocol suite, which one of the following is NOT part of the IPv4 header ?

A. Source IP Address

B. Destination IP Address

C. Source Port Number

D. Destination Port Number

Part of segment

Ans: C & D

THANK - YOU