CS & IT ENGINEERING

Computer Network

1500 Series

Lecture No.- 05

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Recap of Previous Lecture

Topic One topic

Topic Two topic

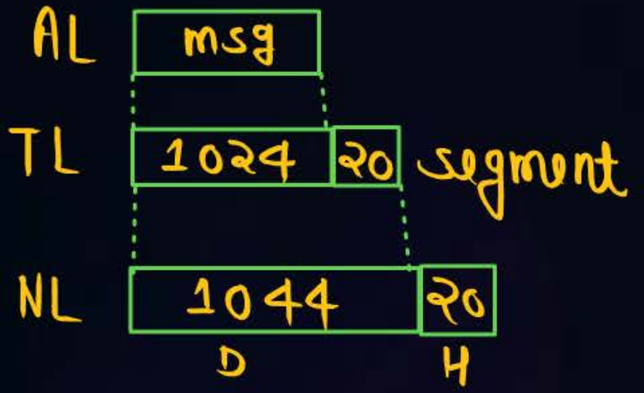
Topics to be Covered

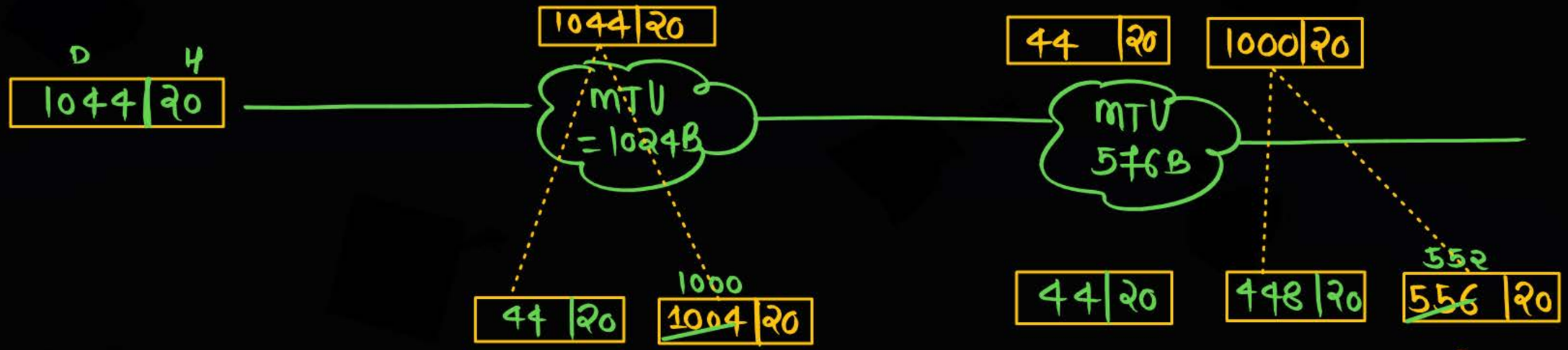
Topic TCP

Topic

[NAT]

#Q. Suppose a TCP message that contains 1024 bytes of data and 20 bytes of TCP header is passed to IP for delivery across two networks interconnected by a router (i.e., it travels from the source host to a router to the destination host). The first network has an MTU of 1024 bytes; the second has an MTU of 576 bytes. Each network's MTU gives the size of the largest IP datagram that can be carried in a link-layer frame. Find the sum of offset value of all the fragments. Assume all IP headers are 20 bytes. (194)





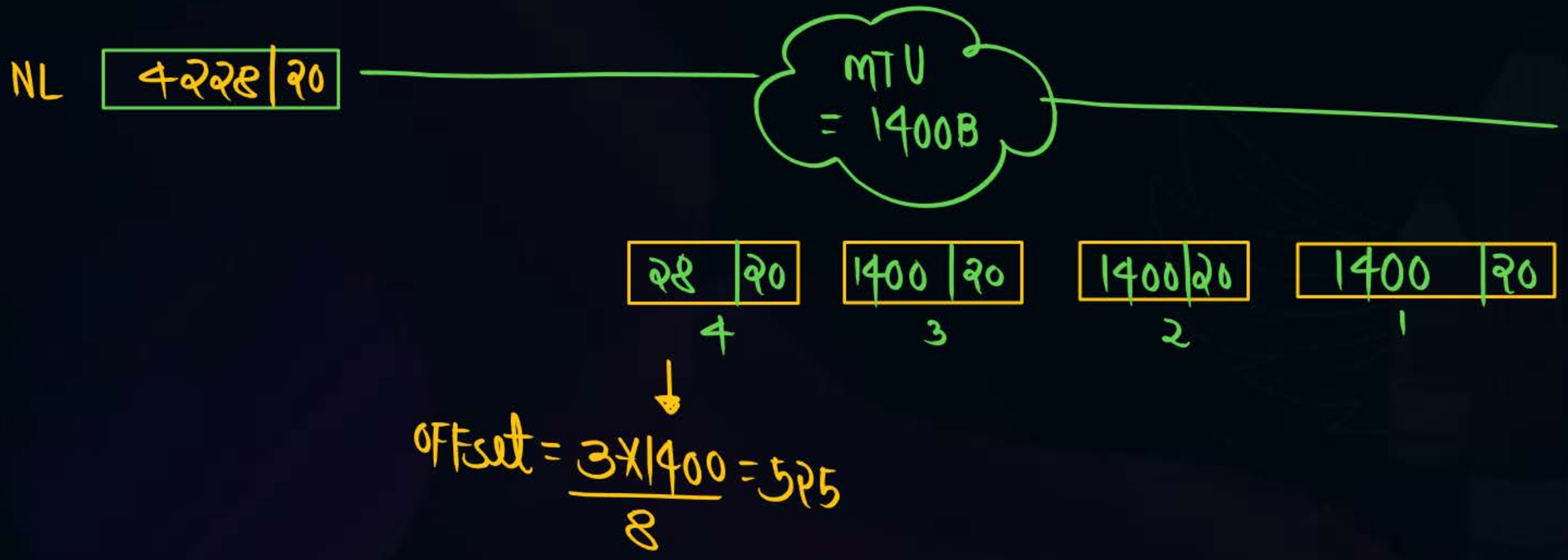
$\frac{552+448}{8} = 125$ $\frac{552}{8} = 69$ $\frac{0}{8} = 0$

Fragment offset

Sum of offset = 125 + 69 + 0 = 194

[NAT]

#Q. The transport layer passes a packet size of 4228 to networks layer. The size of header at network layer is 20 bytes and maximum transmission unit (MTU) at underlying layer (DDL) is 1400 bytes excluding header. Find number of fragments and offset value of last fragment at IPv4 packet?



[NAT]

#Q. An IP datagram of size 2000 bytes arrives at a router. The router has to forward this packet on a link whose MTU is 300 bytes. Assume size of IP-Header is 20 bytes. The number of fragments that IP datagram will be divided into transmission is _____?

(Ans: 8)

[MCQ]

#Q. A datagram of 4000 bytes (20 bytes of IP Header + 3980 bytes of IP payload) arrives at a router and must be forwarded the link with MTU of 1500 bytes including header size of 20 bytes then at what byte the 2nd fragment is ended?

A 2960

B 1480

C 2959

D 1479


D
H
NL
3980
20
MTU
1500
2959
1480
1479
0
1480
20
1480
20

[NAT]

#Q. In an IPv4 diagram, the value of total-length field is $(00A0)_{16}$ and the value of the header-length (HLEN) is $(5)_{16}$. How many bytes of payload are being carried by the datagram? What is the efficiency (ratio of the payload length to the total length) of this datagram?

$TL = (00A0)_{16}$

$16^1 16^0$

$10 * 16^1 = 160$

$HLEN = (5)_{16}$

16^0

$5 * 16^0 = 5$

Header size $= 5 * 4 = 20$ Byte

$TL = D + H$

$D = TL - H$

$D = 160 - 20 = 140$

$\text{efficiency} = \frac{140}{160}$

$= 0.875$

$= 87.5\%$

[MSQ]

#Q. Can each of the following be the value of the offset field in a datagram? (H.W)

A 8

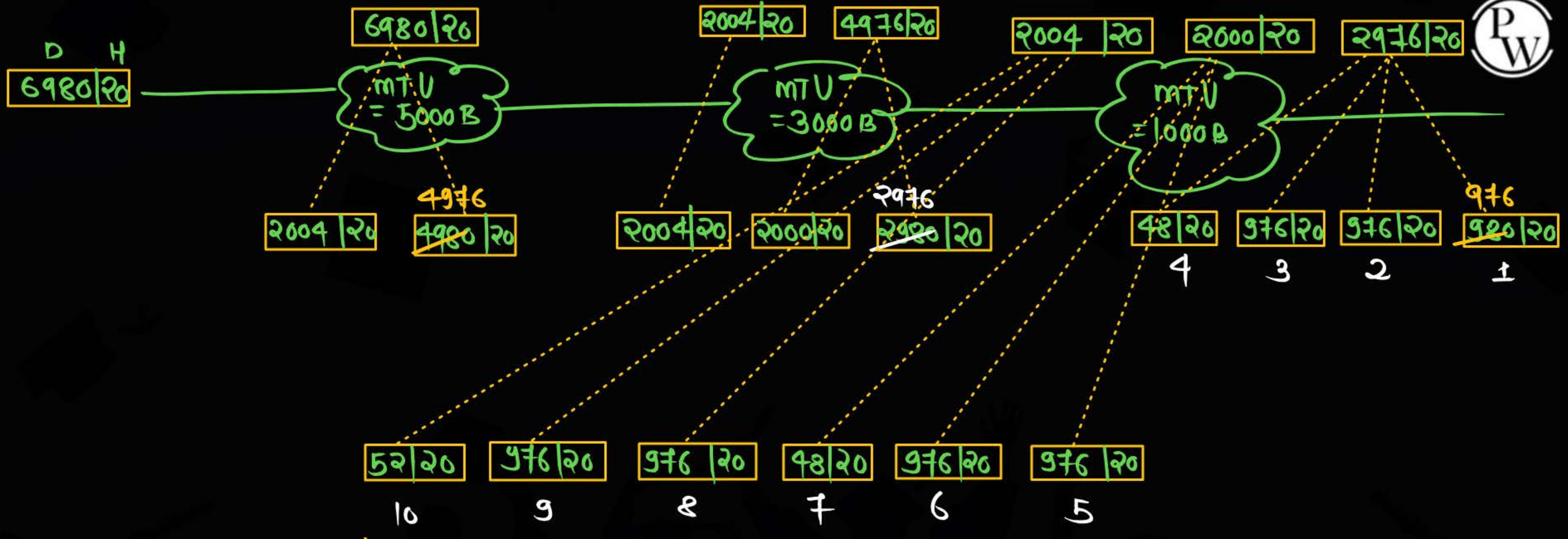
B 31

C 73

D 56

[NAT]

An IP packet originally has a size of 7000 bytes including 20-byte header and 6980-bytes payload. To reach the destination, the route goes through three networks, A, B, and C. Network A is the one where the sender is directly connected, and Network C is where the receiver is directly connected. Network A has an MTU of 5000 bytes. Network B has an MTU of 3000 bytes. Network C has an MTU of 1000 bytes. How many fragments of original IP packet are received by the receiver? also Find the offset Value of Last Fragment ? (5 min)



$$\text{Offset} = \frac{2976+2000+976+976}{8} = \frac{6928}{8} = 866$$

$$[6980-52=6928]$$

[MCQ]

In IPv4 packet format, the value of HLEN is 10 and offset value is 200. The total length of packet is 300 bytes. Find first and last byte number of payload/ data packet?

(H·W)

A 200, 460

B 200, 459

C 1600, 1860

D 1600, 1859

[MSQ]

The transport layer passes a packet size of 4228 to network layer. The size of header at network layer is 20 bytes and maximum transmission unit (MTU) at underlying layer (DDL) is 1420 bytes. Which of the following options is/are TRUE?

A. Number of fragments are 3

B. Offset value of last fragment at IPv4 packet is 350

C. Data Size of last fragmented is 28 bytes.

D. Sum of offset value of all fragments is 1050.

$\frac{3\times1400}{8}=525$ $\frac{2\times1400}{8}=350$ $\frac{1400}{8}=175$ $\frac{0}{8}=0$

SUM = 525+350+175+0 = 1050

[MCQ]

#Q. Suppose that 5000 bytes are transferred over TCP. The first byte is numbered 20050. What are the sequence numbers for each segment if data is sent in four segments with the first two segments carrying 1000 bytes and the last two segments carrying 1500 bytes?

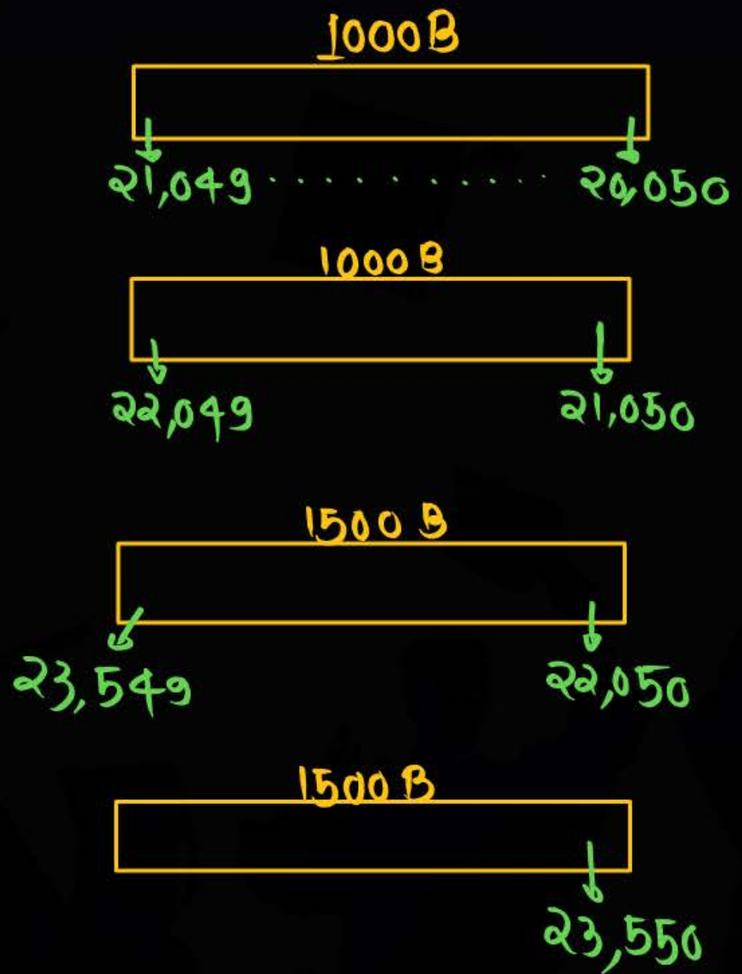
A. Sequence No. of first segment=20051, 2nd segment=21051, 3rd segment=22051, 4th segment=23551

B. Sequence No. of first segment=20050, 2nd segment=21050, 3rd segment=22050, 4th segment=23550

C. Sequence No. of first segment=20049, 2nd segment=21049, 3rd segment=22049, 4th segment=23549

D. None

5000 Byte


1000 B
21,049
21,050
1000 B
22,049
21,050
1500 B
23,549
22,050
1500 B
23,550

[MSQ]

#Q. Which of the following is/are true about IEEE 802.3 frame format?

PL

(P) (SFD) (DA) (SA) (LD) (4B)

mindata = 46B , 46B + 7B + 1B + 6B + 6B + 2B + CRC

DLL (18)

46 + 18 = 64B

A. The minimum frame size in IEEE 802.3 is 64 bytes

B. The maximum frame size in IEEE 802.3 is 1500 bytes

C. The maximum frame size in IEEE 802.3 is 1518 bytes. (1500 + 18)

Data H

D. The maximum data size in IEEE 802.3 is 1500 bytes.

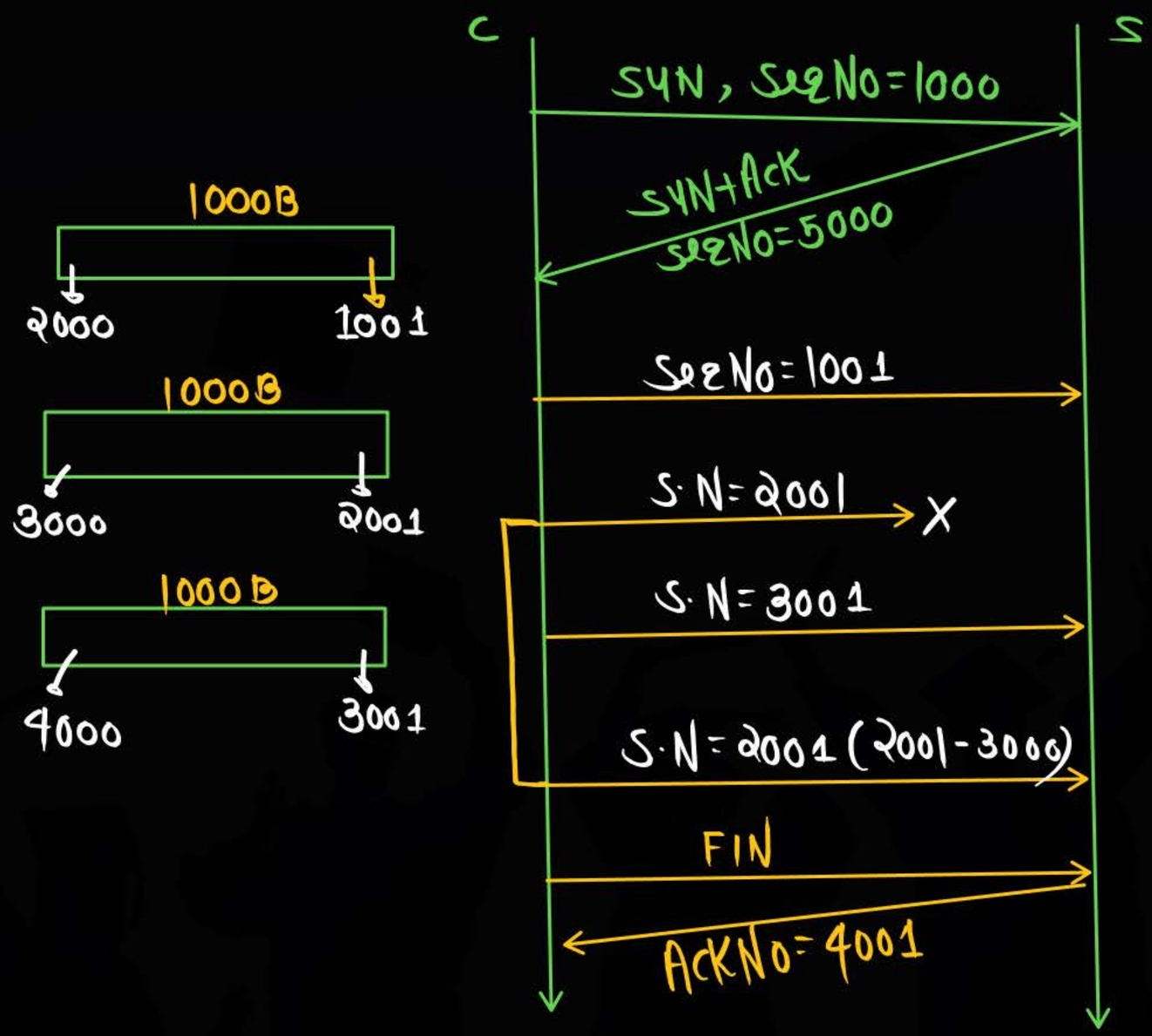
(A, C, D)

[NAT]

You establish a single TCP connection to a web server with a SYN segment having an initial sequence number of 1000. The web server responds hack with a SYN-ACK segment having an initial sequence number of 5000. During the time this connection is open, you have to transmit a total of 3 segments of data each segment has a 1000 bytes payload. The web server also has to transmit a total of 20 segments worth of data each segment has a 1000 bytes payload. One of your 3 segments has to be retransmitted because it is lost, effectively causing you to make 4 segment transmissions. When the connection terminates, what is the sequence number in the ACK field of the segment you receive from the server in response to your transmission of the FIN segment? _____ (Assume that the last segment of data contains FIN also)

(3 min)

(4001)

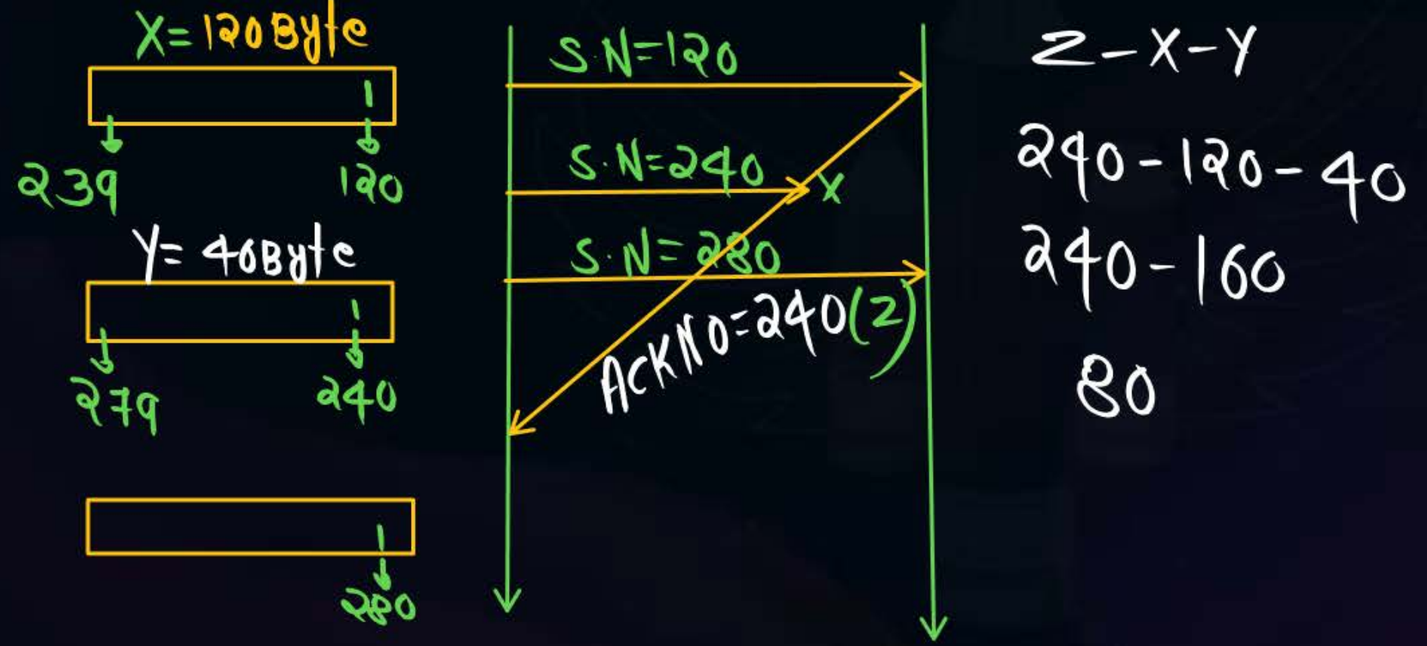

C
S
SYN, SeqNo=1000
SYN+Ack
SeqNo=5000
1000B
2000
1001
SeqNo=1001
1000B
3000
2001
S.N=2001
X
S.N=3001
1000B
4000
3001
S.N=2001 (2001-3000)
FIN
AckNo=4001

[NAT]

#Q. Consider an instance of TCP connection where all the previous transferred packets got ACK. The sender sends three segments with sequence number 120, 240, 280 respectively. The first and third segment received correctly but the second segment get lost.

Let X be the amount of data carried in the first segment (in bytes) and Y be the data carried in the second segment (in bytes) and Z be the ACK value after this instance.

Then Z-X-Y = (80) .



[MSQ]

#Q. Which of the following statement is/are correct?

(A, B, C, D)

A. The minimum size of UDP datagram is 8 byte at the transport layer and 28 byte at IP layer

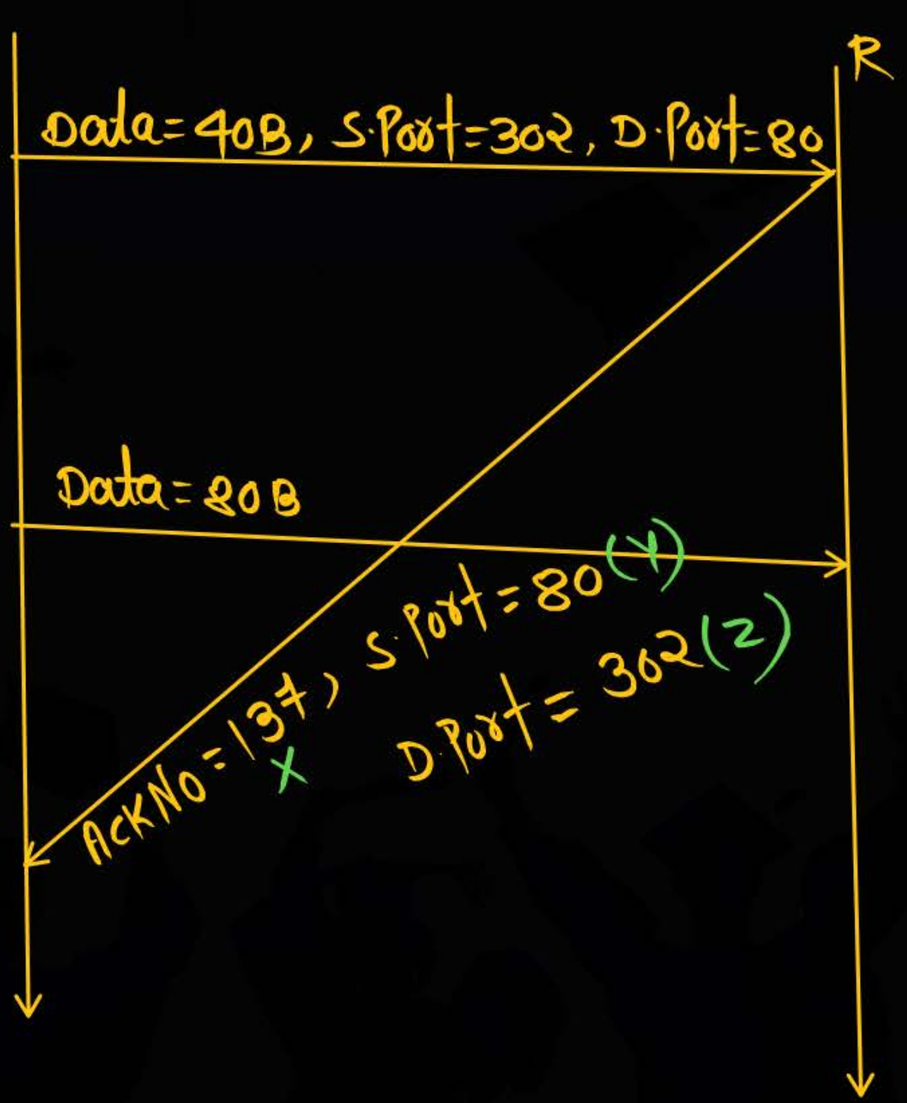
B. Maximum size of UDP datagram is 65,535 byte

C. The minimum size of the process data that can be encapsulated in the UDP datagram is 0 byte

D. The maximum size of the process data that can be encapsulated in the UDP datagram is 65, 507 byte

[NAT]

#Q. Host A and B are communicating over a TCP connection, and Host B has already received from A all bytes up through byte 96. Suppose Host A then sends two segments to Host B back-to-back. The first and second segments contain 40 and 80 bytes of data, respectively. In the first segment, the sequence number is 97, the source port number is 302, and the destination port number is 80. Host B sends an acknowledgment whenever it receives a segment from Host A. If the first segment arrives before the second segment, in the acknowledgment of the first arriving segment, what is the acknowledgment number(X), the source port number(Y), and the destination port number(Z) then the value of X+Z–Y is (395)



upto 96th Byte Already Received

$X+Z-Y$

$= 137 + 302 - 80$

$= 359$

2 mins Summary

TCP

- Topic One
- Topic Two
- Topic Three
- Topic Four
- Topic Five

THANK - YOU