CS & IT ENGINEERING

COMPUTER NETWORKS

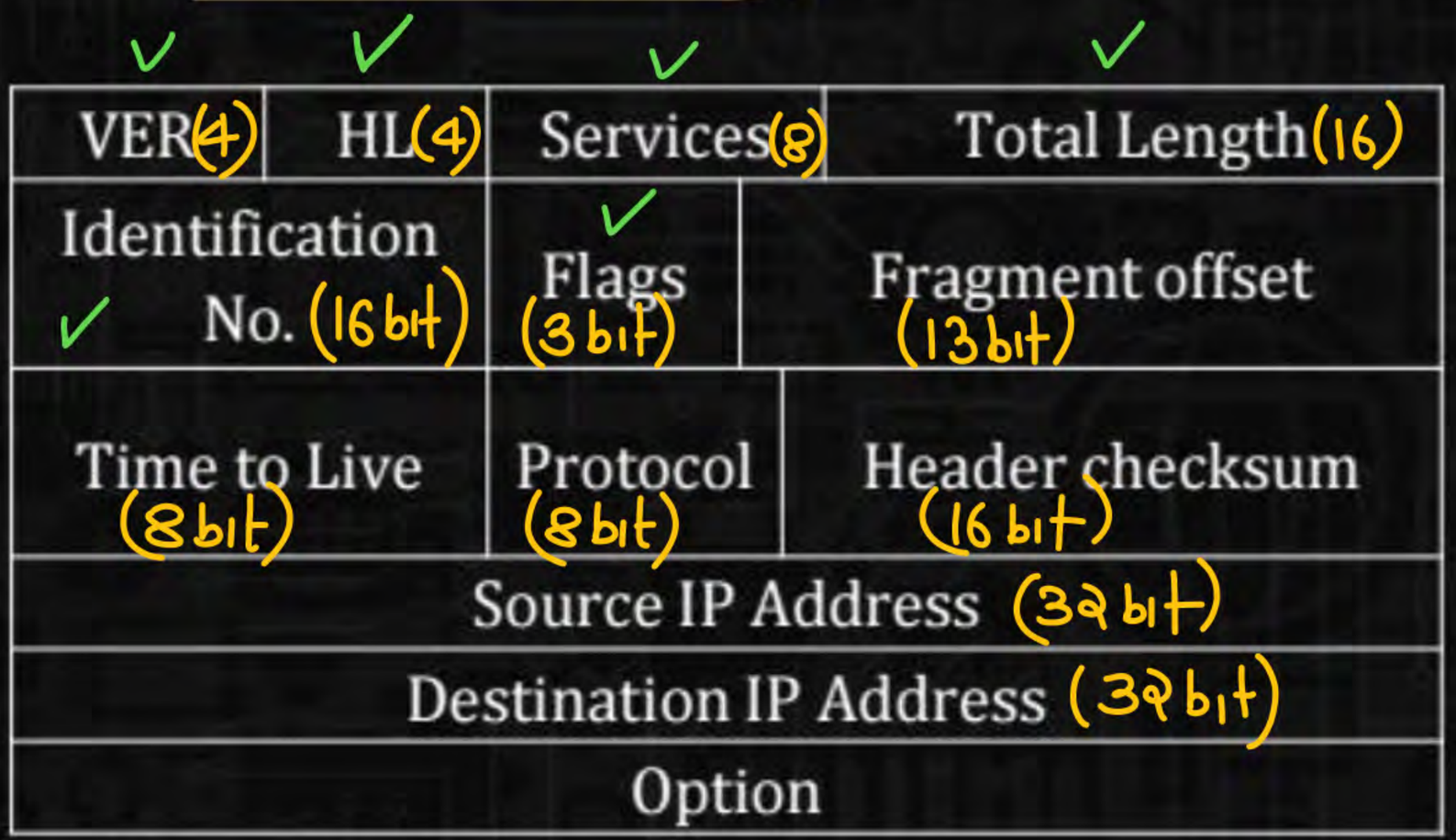
IPv4 Header & Fragmentation

Lecture No- 2

By- Ankit Doyla Sir

IPv4 Header

IPv4 Header


VER (4)
HL (4)
Services (8)
Total Length (16)
Identification No. (16 bit)
Flags (3 bit)
Fragment offset (13 bit)
Time to Live (8 bit)
Protocol (8 bit)
Header checksum (16 bit)
Source IP Address (32 bit)
Destination IP Address (32 bit)
Option

VERSION (4 bit):

It is used to indicate IPv4 or IPv6

IPv1 ✗

IPv2 ✗

IPv3 ✗

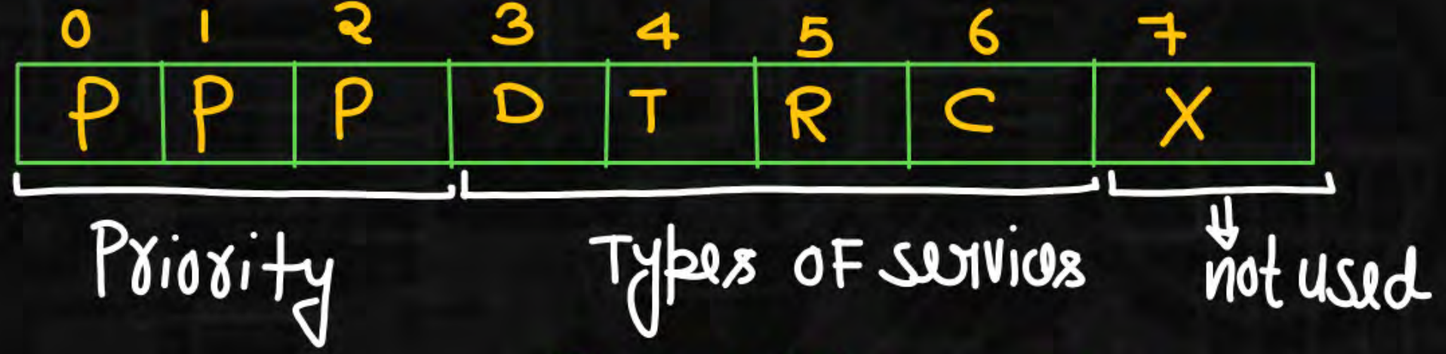
IPv4 → (0100)

IPv5 ✗

IPv6 → (0110)

Services :

In this Interpretation the first 3 bit are called precedence bit (Priority bit) and Next 4 bit are called types of services bits and last bit is Not used.



D → minimum delay
T → maximum Throughput
R → High Reliability
C → minimum cost

Priority :

It is a 3 bit subfield ranging from 0 to 7 (000 to 111 in binary). Priority field is needed if a router is congested need to discard some datagram , those datagram which have the lowest priority are discarded first

Types of Services :

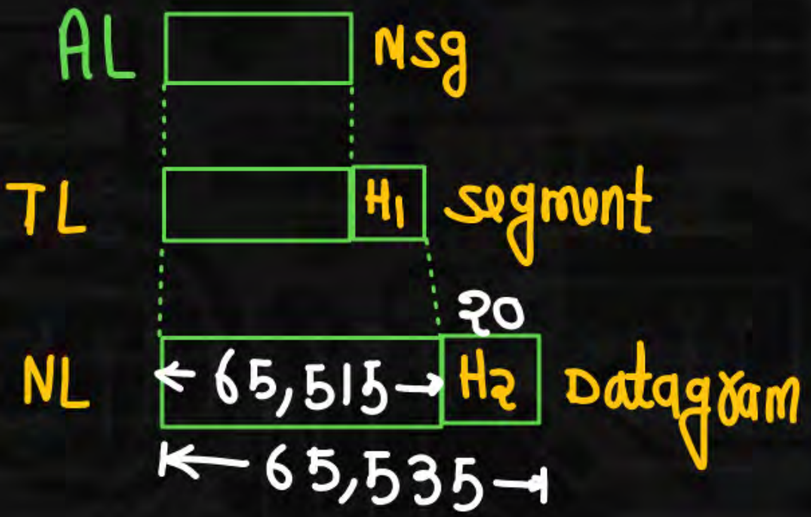
It is a 4 bit subfield . Each bit having a special meaning .although a bit can be 0 or 1 . One and only one of the bits can have the value 1 in each datagram.

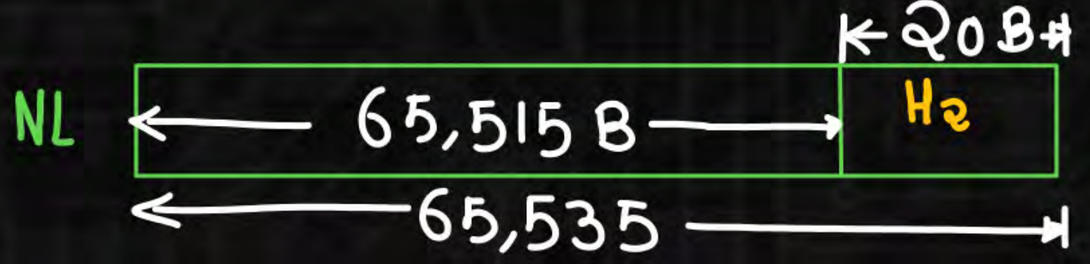
D	T	R	C	
0	0	0	0	Default
1	0	0	0	minimum Delay
0	1	0	0	Max. Throughput.
0	0	1	0	High Reliability
0	0	0	1	min. cost

Total Length: (16 bit)

Total length = Data + Header

Total length = 16 bit $\xrightarrow{\text{Max. No.}}$ $2^{16} - 1 = 65,535$

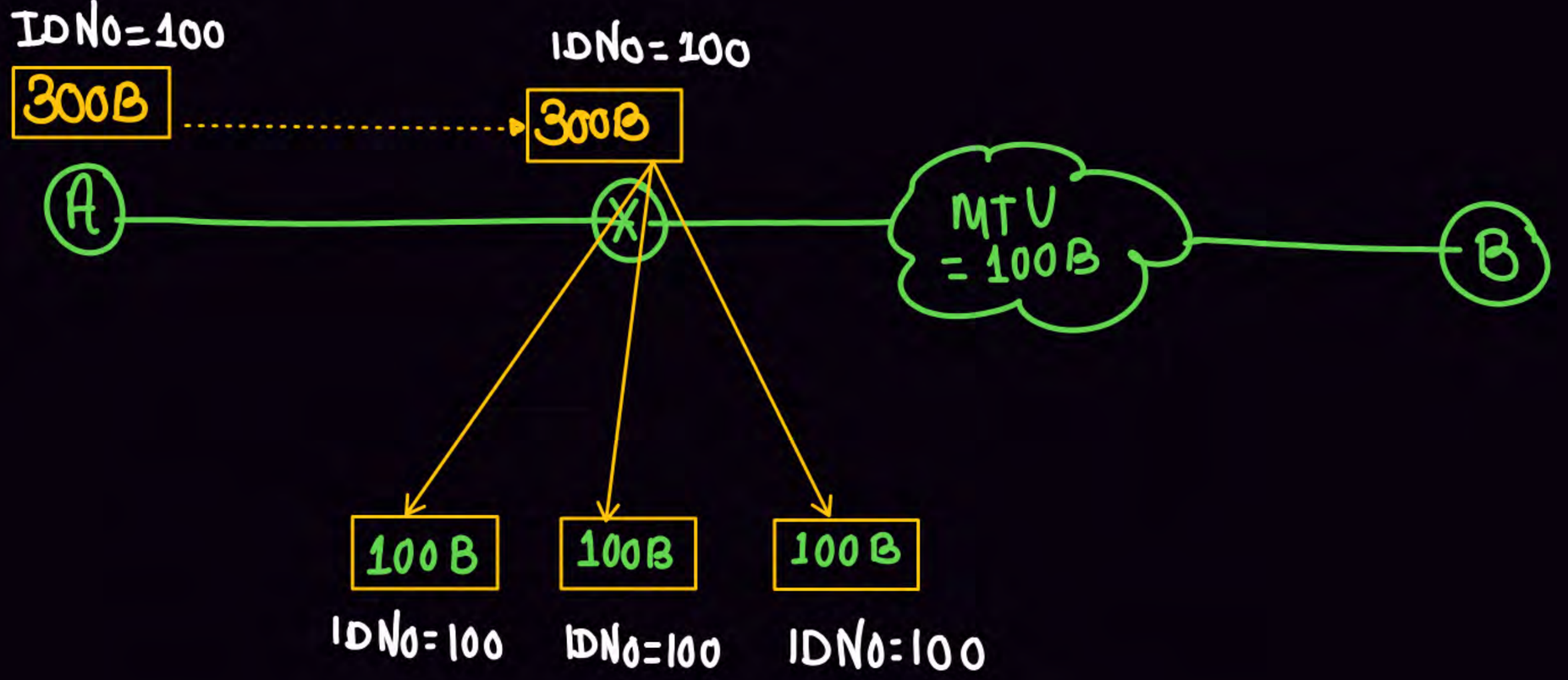




Maximum data size at NL = 65,515 Byte

Identification Number OR Datagram Number (16 bit)

1. Each datagram is associated with a sequence no. is called as datagram no. or identification no.
2. It is used to identify all the fragment of same datagram.
3. All the fragment of same datagram will have the same identification no.


IDNo=100
300B
IDNo=100
300B
A
X
MTU
=100B
B
100B
100B
100B
IDNo=100
IDNo=100
IDNo=100

Flags :

It is the 3 bit Field or shown in the figure.

1st bit is not used

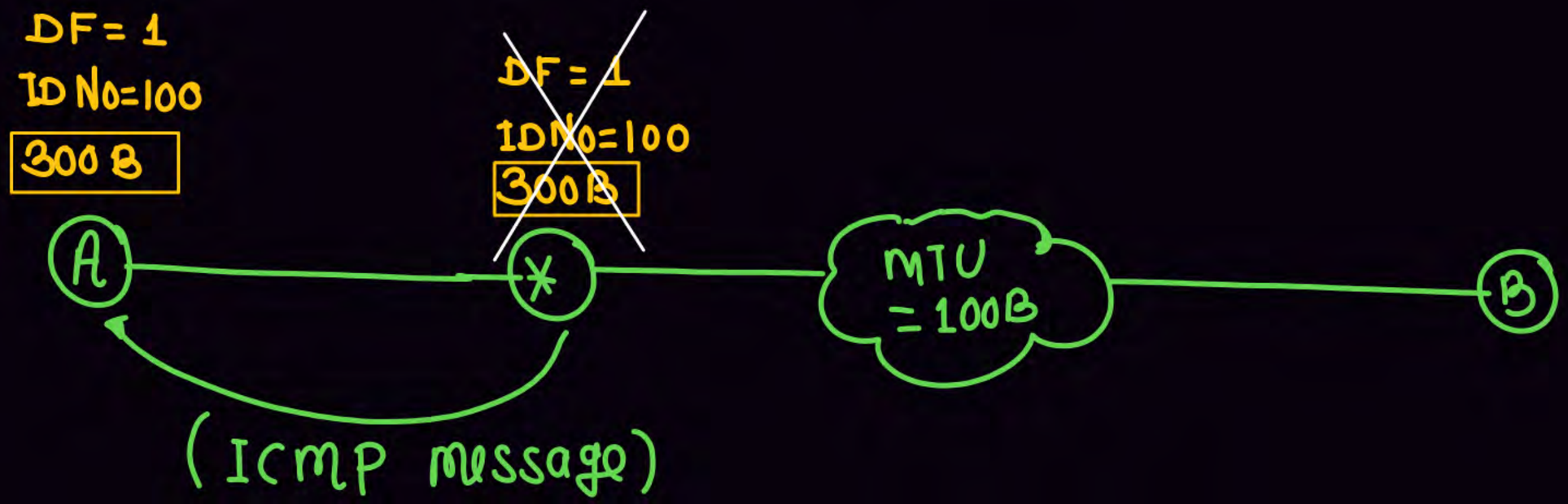
2nd bit is called as Don't Fragment

3rd bit is called as More Fragment

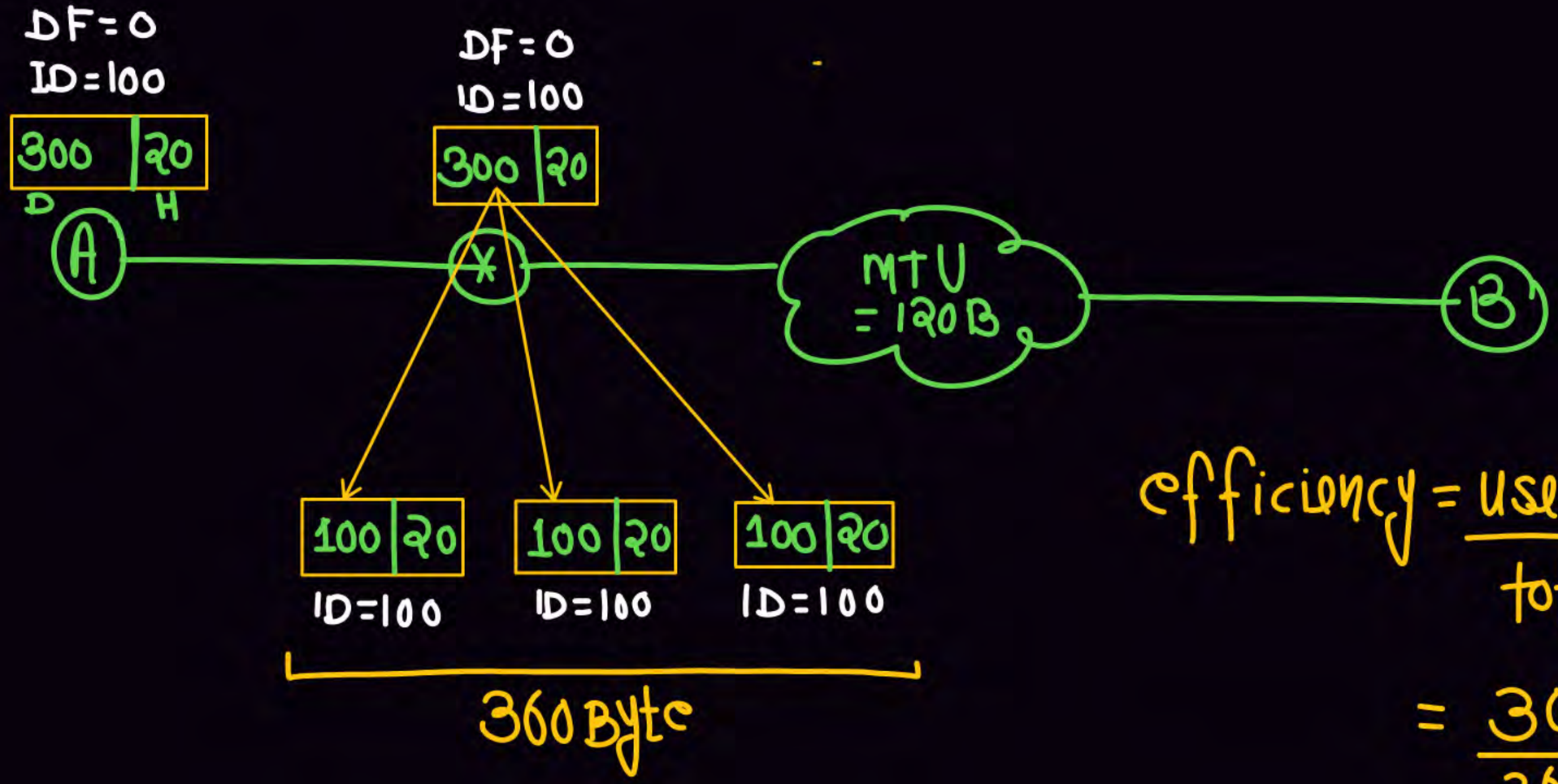
DF (Don't Fragment)

① DF = 1 → means Datagram can't be Fragmented

② DF = 0 → means Datagram can be Fragmented



300B
DF = 1
MTU = 100B



$$\text{efficiency} = \frac{\text{useful Byte}}{\text{total Byte}}$$

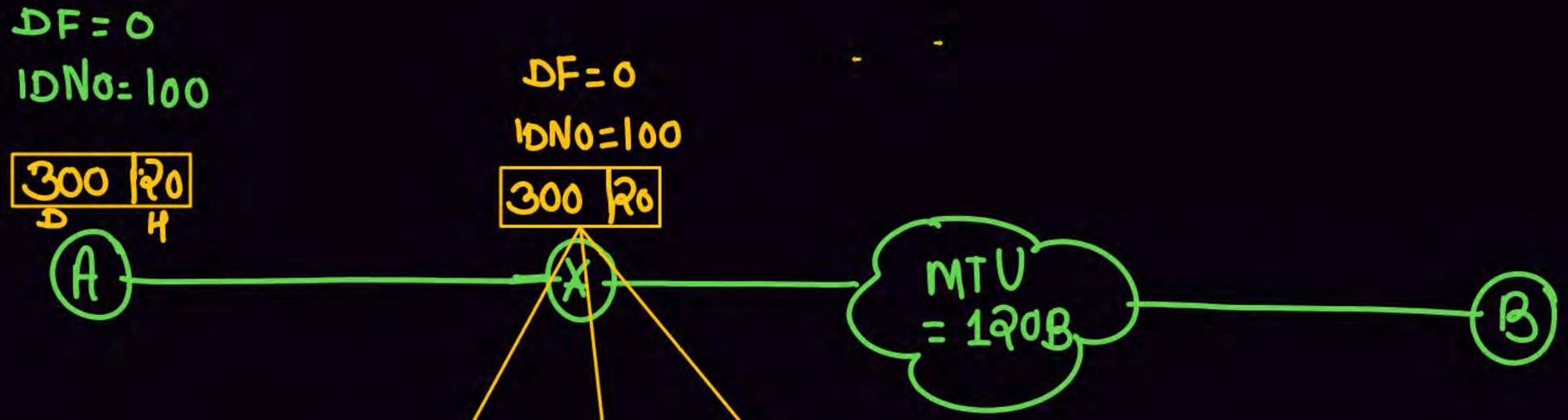
$$= \frac{300}{360} = 0.833$$

$$= 83.3\%$$

MF (More Fragment)

MF = 1 → means this is Not the Last Fragment their are more Fragmunt after this Fragment

MF = 0 → means this is the last Fragment or only Fragment



100 | 20	100 | 20	100 | 20	
100	100	100	IDNo
0	1	1	MF
200	100	0	Fragment OFFset

Fragment offset : (13bit) → Range → 0 to $2^{13}-1$ (0 to 8191)

Fragment offset indicate no of data byte ahead of this fragment in that particular packet.

Note: ① IP is a Packet stream Protocal i.e every Packet is associated with one sequence Number

② TCP is a Byte stream Protocal i.e every Byte is associated with one sequence Number


THANK YOU
GW
SOLDIERS !