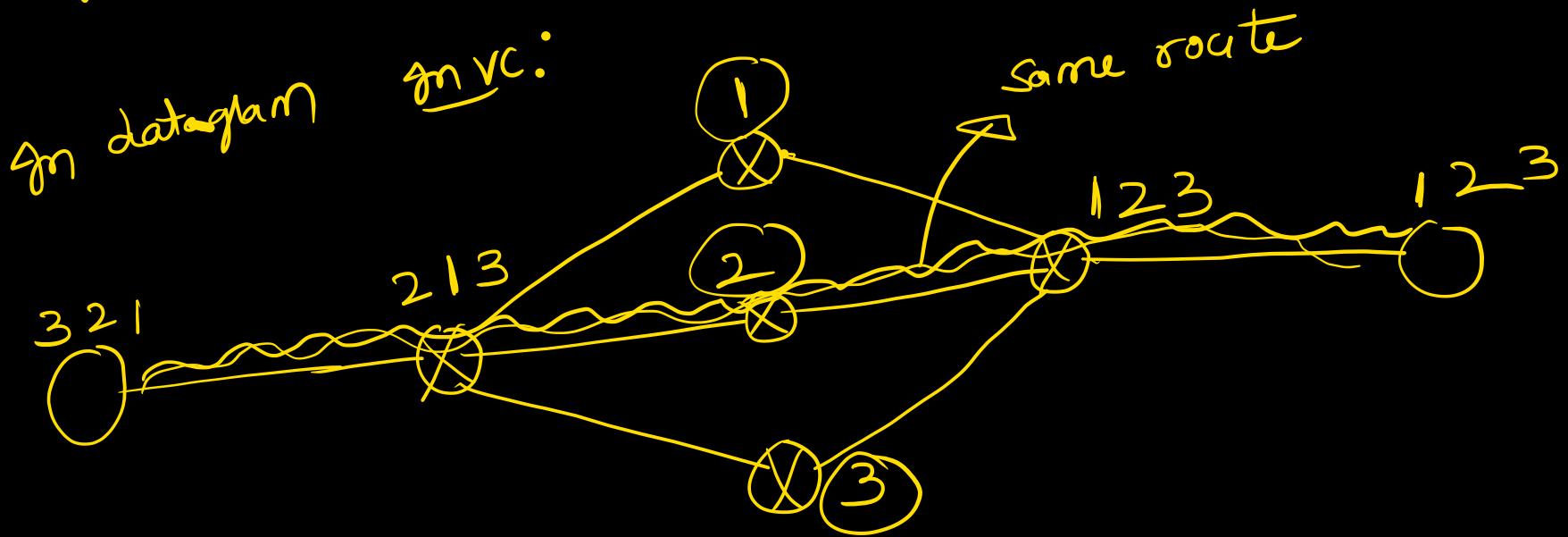


Virtual Circuit and datagrams



packets may take diff routes

Virtual Circuit

- 1) all packets follow 1 packet.
so same route is followed
- i Ex: Calling (phone calls)
- 2) only 1 packet needs header.
no need of header for remaining
packets because they follow
1 packet

Datagram

- 2) all packets go independently
- Ex: Data calls
- 2) every packet should contain
header because all packets go
independently

VC

- 3) VC is connection oriented.
- Reservations
(BW
Buffer
CPU)
- 4) Entire data follows same path

3)

DG

connectionless \rightarrow no reservation

\times BW

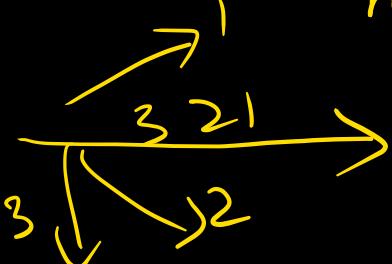
\times Buff

\times CPU

4)

Same path followed

may not be
may & may not



VC

5) Highly reliable

6) High cost \rightarrow Rent for resources
 B_0, B_1, CRU

5) NOT DG reliable
There can be packet loss
 \downarrow
Because of no reservation

6) less cost \rightarrow no Rent
 \downarrow
Pay per use & pay per data

VC
ATM networks

↓
Asynchronous transfer mode

not in syllabus

DG
BC: Internet protocol → very important
↓
Syllabus

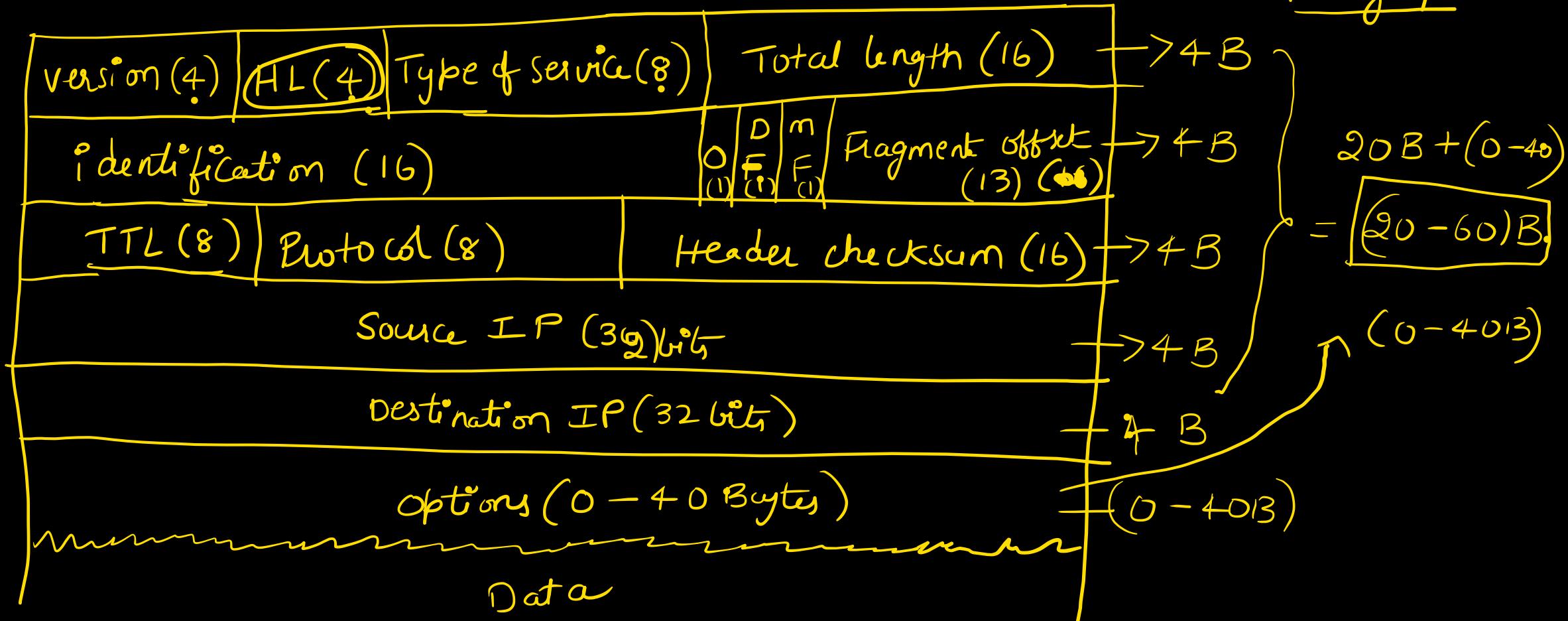
~~TP~~

message switching → not important



sending the message without dividing
into packets

IPV4 header:



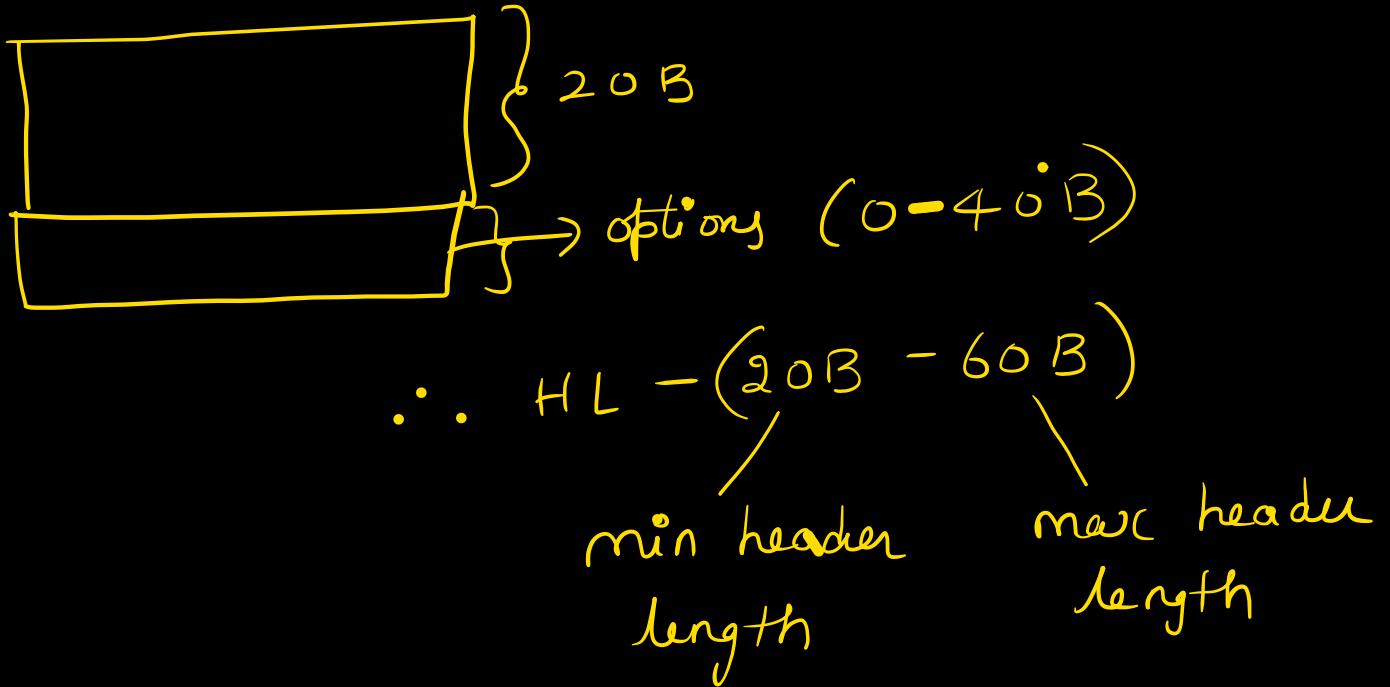
HL: Header length

DF: Do not fragment

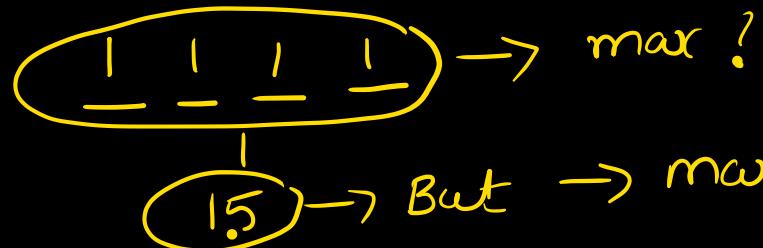
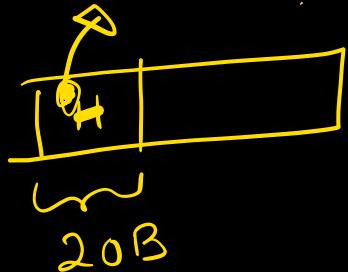
MF: more fragments

TTL: Time to live

Header length: why is it required?



b. Size of header length field : 4 bits



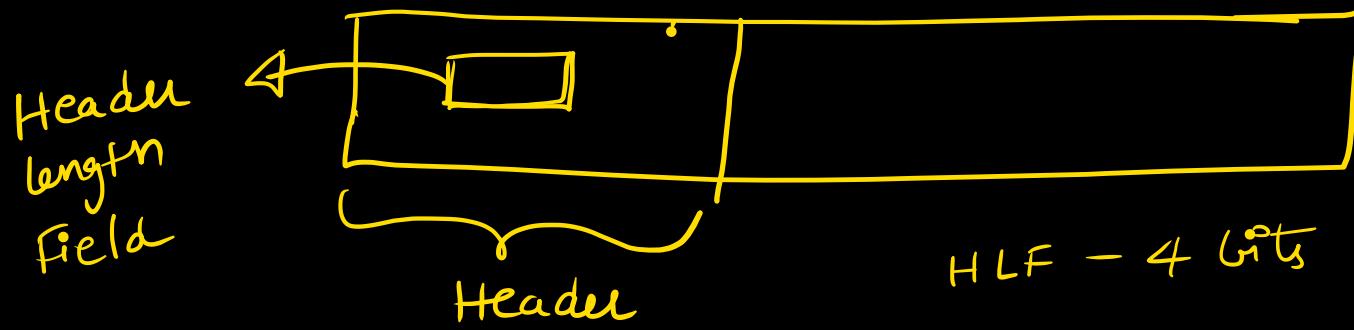
$$\frac{60}{15} = 4 \rightarrow \text{scaling factor.}$$

Scaling 4 :

$$\text{If } HL = 20B, \rightarrow HLF - \frac{20}{4} = 5 \quad \therefore \cancel{HDF}$$

$$HL - 20B - 60B \\ HLF - 5 - 15.$$

$$\text{If } HL = 60B \rightarrow HLF = \frac{60}{4} = 15$$



Header
max header size = $2^4 B$

$\overline{1111} = 15 \rightarrow$ maximum

HLF can have a max of $15 \rightarrow$ number

But max number

possible in HLF
is 15

But header size $\rightarrow (20B - 60B)$

So we have to
represent $(20-60)$

Scaling: $\frac{60}{15} = 4 \rightarrow$ scaling factor.

not ~~format~~ $\leftarrow 4$ bits

If header size = 20B then HLF = $\frac{20}{4} = 5$

If header size = 60B then HLF = $\frac{60}{4} = 15$

If header size = 30B then HLF = $\frac{30}{4} = 7.5$ *

Solution \rightarrow max header size multiple '4'

By padding \rightarrow adding dummy data

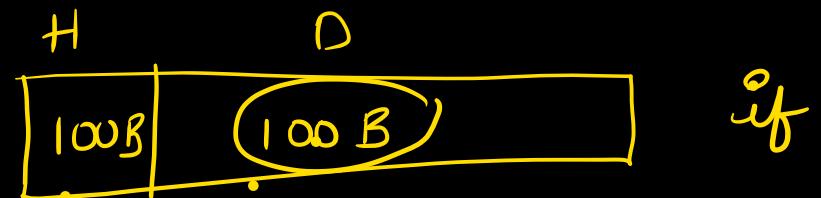
$\therefore 30B + 2B = 32B \quad HLF = \frac{32}{4} = 8$

↓
padding

always
in all
protocols
we try
to have
small
headers

header → overhead → extra data

we need to keep
it less

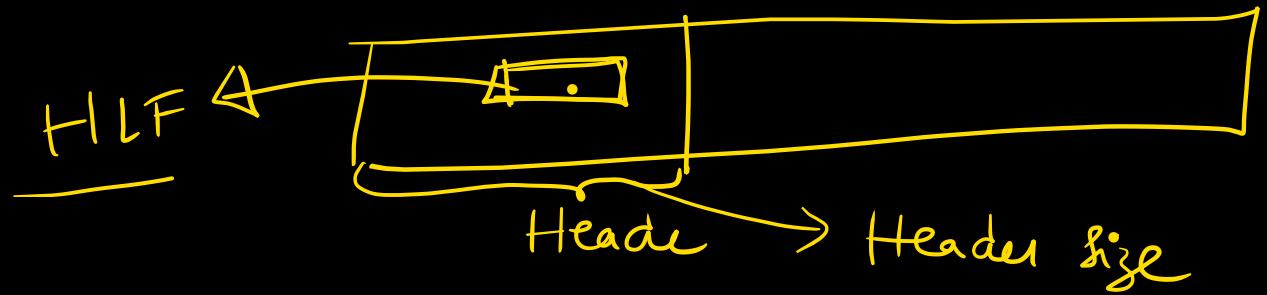


if

$$\eta = \frac{\text{useful data}}{\text{total data}} = \frac{100}{200} = 50\%$$



$$\eta = \frac{100}{150} = \frac{2}{3}$$



Break → 5 min

version - 4 bits \rightarrow (0 - 15) numbers are possible

V₁ ✓

V₂ ✓

V₃ ✓

V₄ \rightarrow going on (currently)

V₅ \rightarrow invented but failed in testing

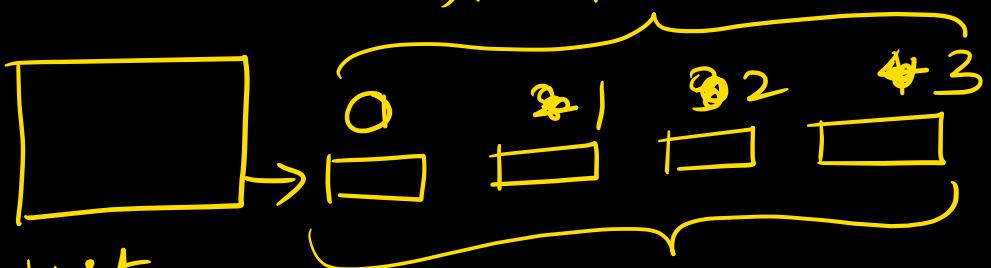
V₆ \rightarrow we are moving on to V₆.
But V₆ is not in syllabus

no need
to learn •

Identification number: (16 ~~bits~~ bits)

|
(0 - 65,535) \rightarrow numbers are possible

All packets are numbered.

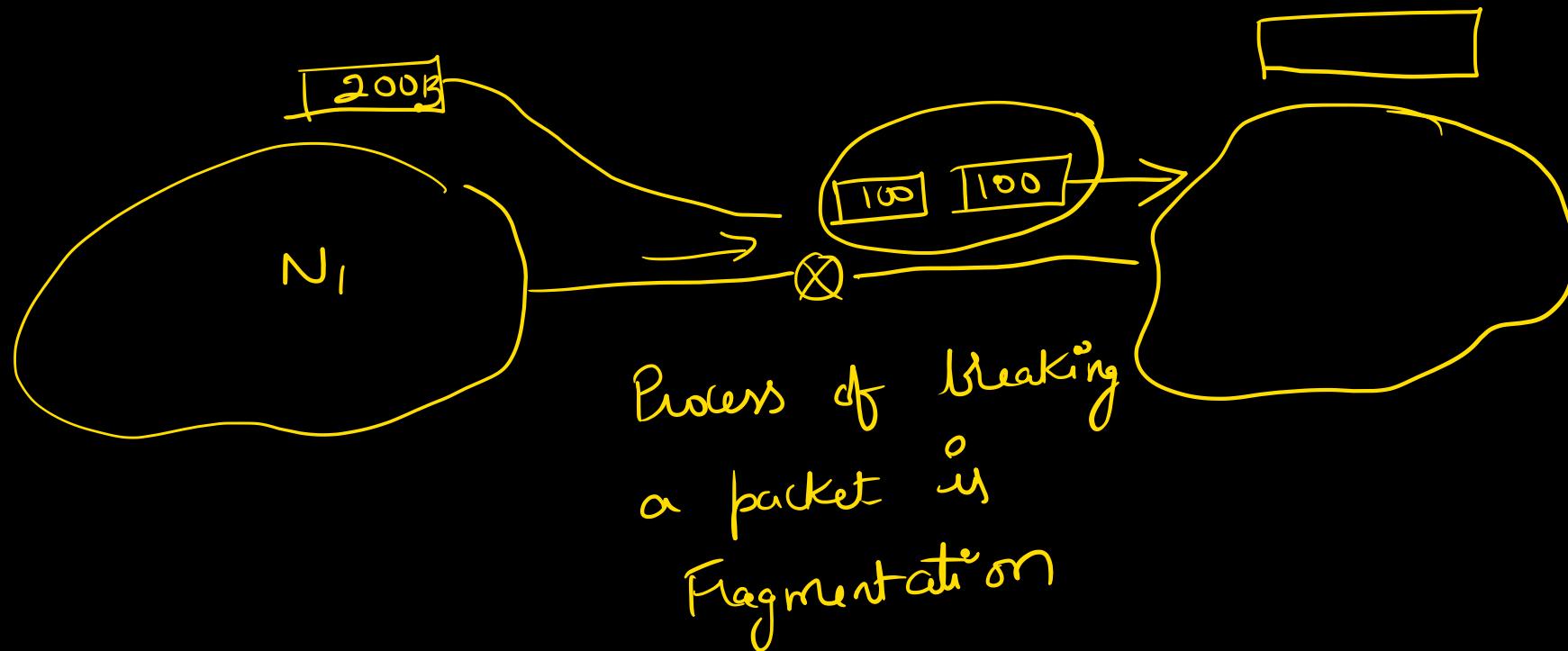


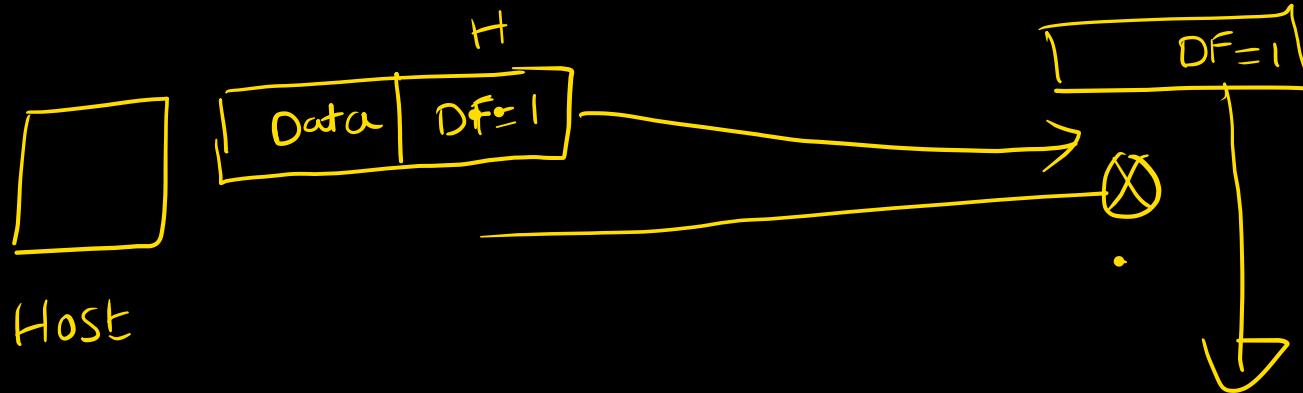
Host
Data grams
&
IP packet
going out.

Note: At IP,
datagrams are
numbered
At TCP, bytes are
numbered

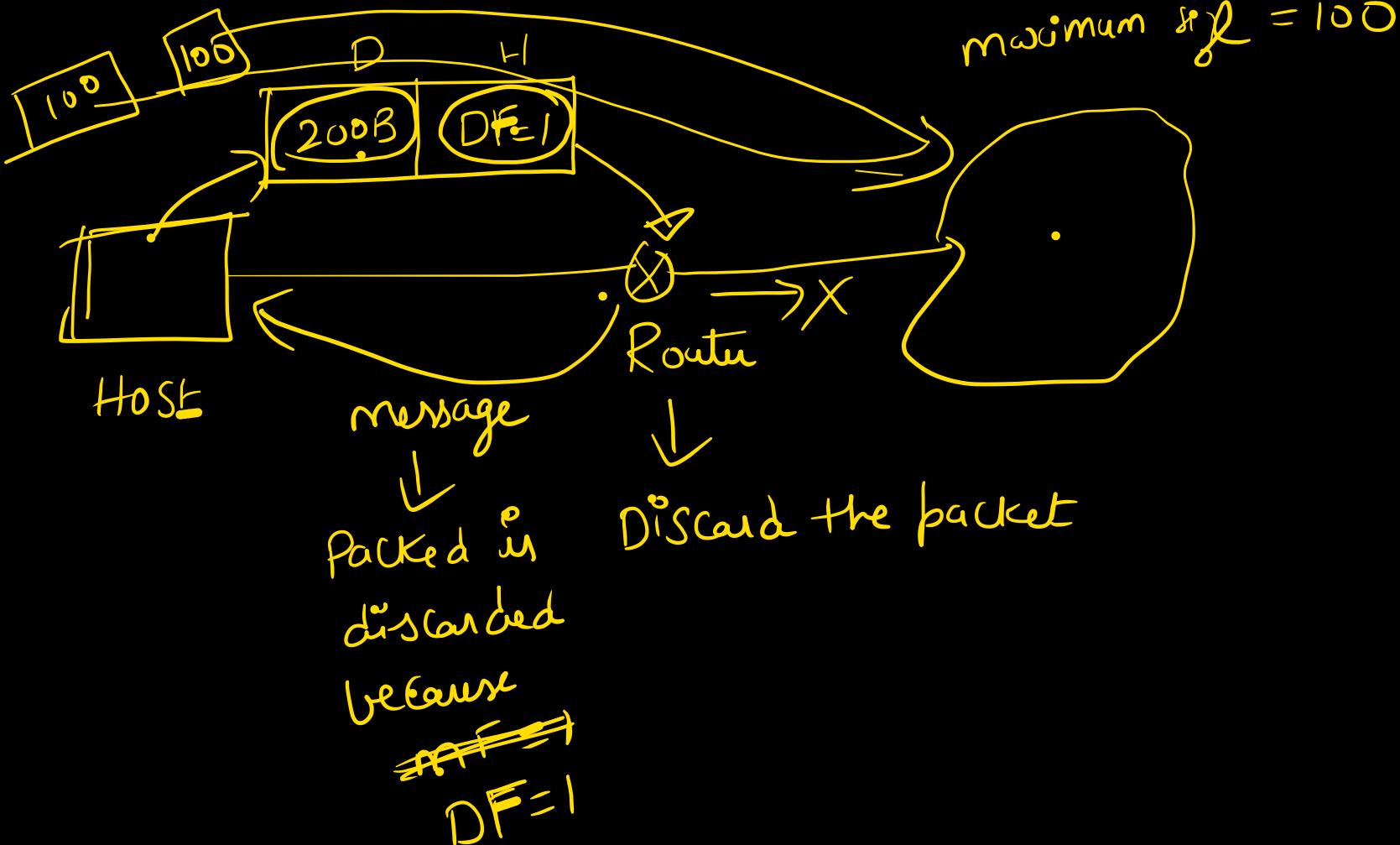
DF: (Do not fragment) \rightarrow 1 Bit.

max size allowed is 100





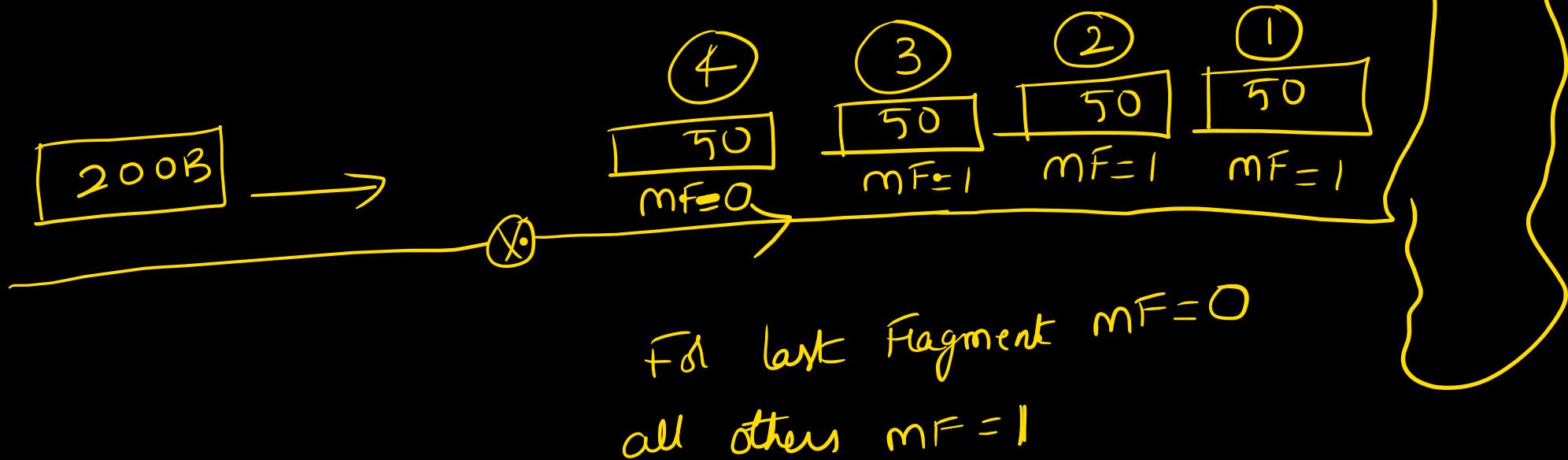
This means
Do no fragment



MF: more fragments:

MF: → are more fragments
following:

max = 50

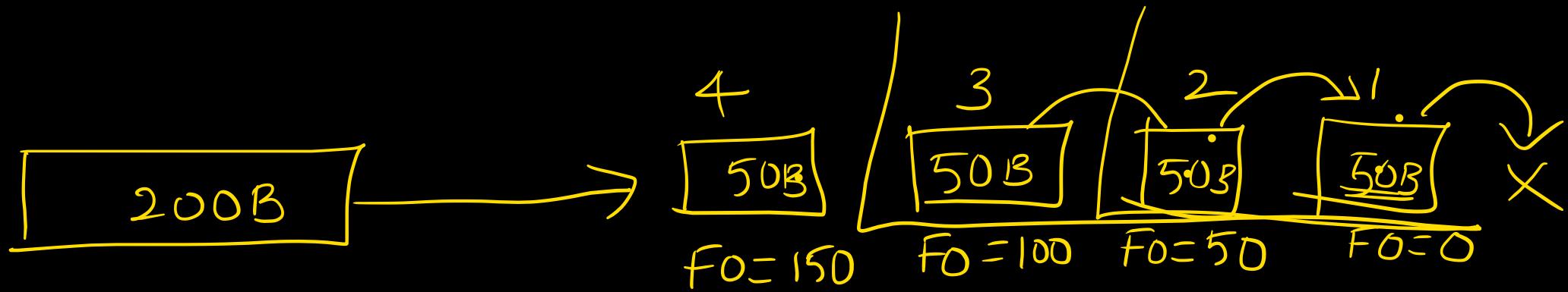


let me complete IP fully

then all yours doubts will
be cleared

we are going step by step .

Fragment offset: # bytes of data ahead of a particular Fragment



wait till tomorrow ~~to~~ class.

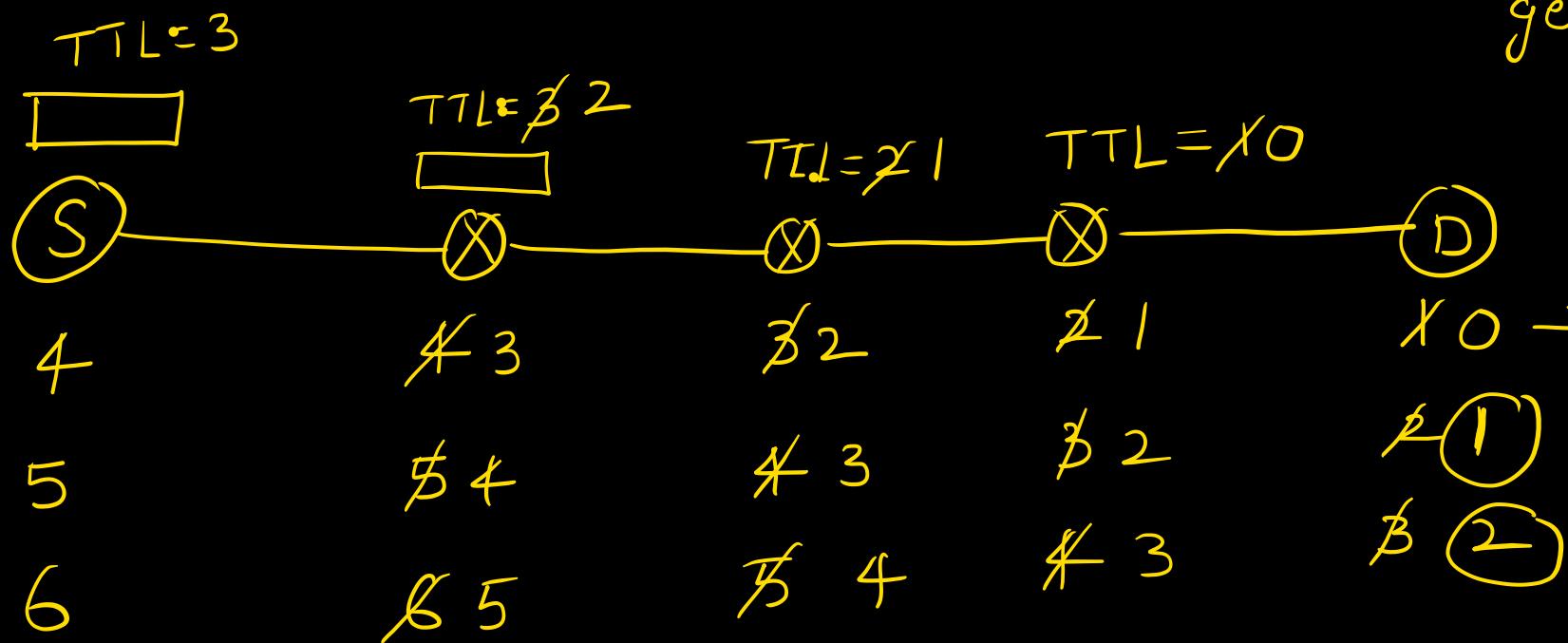
Everything will be clear.

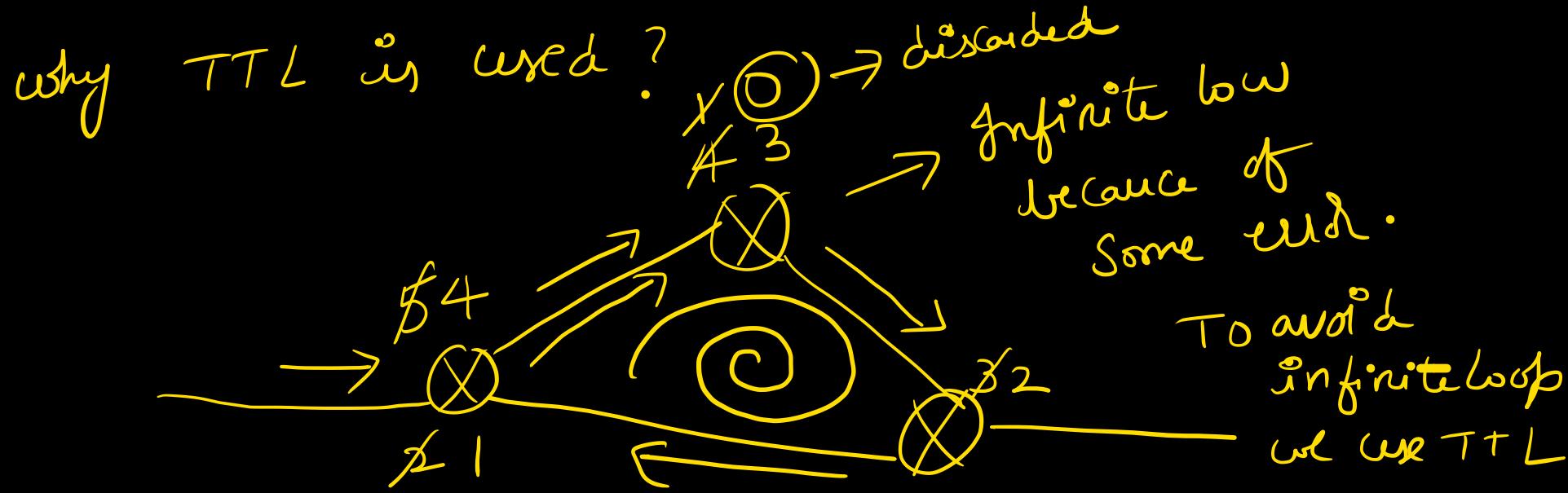
we are building the entire
picture bit by bit.

so only after the picture is
complete, you will understand
everything

TTL → Time to live → 8 bits.

TTL = 0 → packet
get discarded



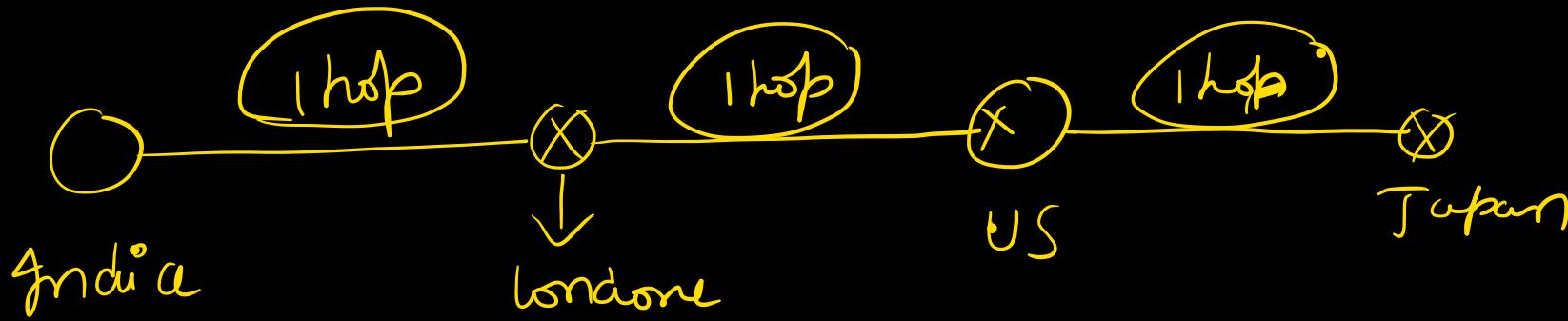


TTL → solved infinite loop problem

TTL
 $\therefore (8 \text{ to } 16)$
maximum 32

IP $\rightarrow v_1, v_2, v_3$ v_4
as we say

TTL:



which mean in 3d 4 hops,

You can cover world

next topic is very big
we will start tomorrow
because we can't stop in
middle

- at least 2 hours
- very difficult

Fragmentation:

