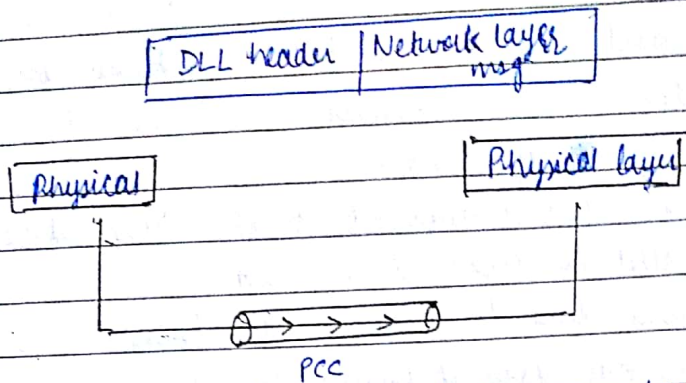


## # Data link layer

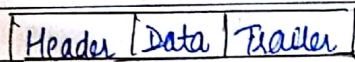


(Physical comm<sup>n</sup> channel) - data is transmitted bit by bit

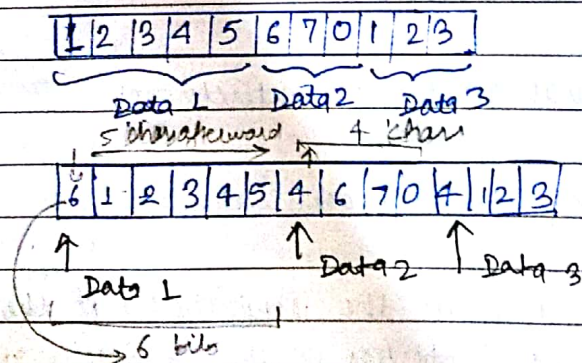
### Framing technique -

- used by data link layer

Frame: Structure of the message that consists of a starting part and an ending part of msg, thus creating boundary to the msg.

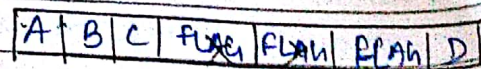
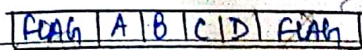


① Character count - message starts with <sup>characters</sup> bit counts for the message



\* Problem with this method is synchronization.

### ② Flag bits with byte stuffing



Problem: It will become a single msg.

extra flag bytes are appended, which are later removed by receiver.

③ Starting & ending flags with bit stuffing

Sender scans the msg bit by bit, and if 5 consecutive 1's are found, he appends a 0 there.

01111110

111110

The receiver removes that extra 0.

Lecture 12  
SDE

14/02/18

Multi-stage switches

- First stage -  $N/n$   $n \times k$  switches
- Intermediate -  $k$   $N/n \times N/n$  "
- Final stage -  $N/n$   $k \times n$  switches