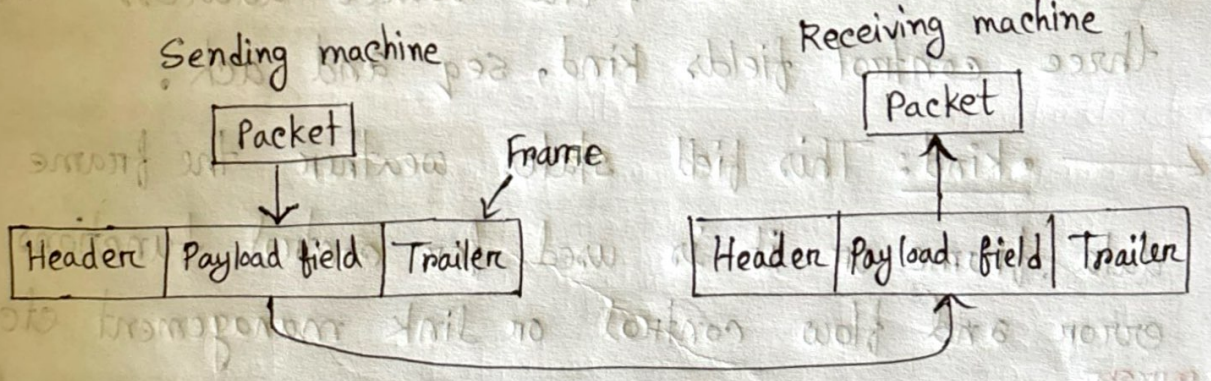
Data Link Layer

Basic functions of Data link layer:

- Framing
- Flow control
- MAC Addressing
- Error detection
- Controls how data is placed on the media and received from the media using media access control (MAC)

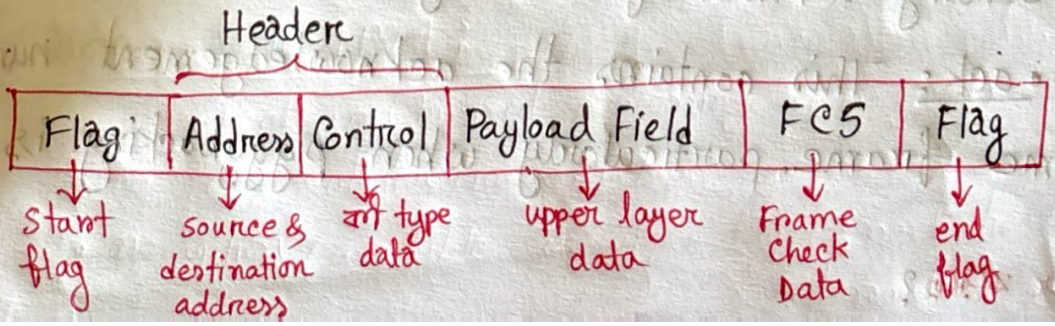
Framing: The data link layer ~~ta~~ receives packets from network layer and encapsulates them into frames for transmission. Each frame consists of —

1. Frame header → Contains control information like source & destination address, error detection code
2. Payload field → Holds actual network layer packet
3. Frame trailer → Includes error detection and control informatio



Fields of a Data Link Layer Frame:-

A data link layer frame has the following parts:-



P.T.O

• Frame Header : It contains the source and the destination addresses of the frame and the control bytes.

• Payload field : It contains the message to be delivered.

• Trailer : It contains the error detection and error detection bits. It is also called a Frame Check Sequence (FCS).

• Flag : Two flag at the two ends mark the beginning and the end of the frame.

Frame Header : A frame header contains the destination address, the source address and three control fields kind, seq and ack.

কী type data?

• kind : This field states weather the frame is data frame or it is used for control functions like error and flow control or link management etc.

কোনটা আগের data, কোনটা পরের data? out of data frame কে rearrange করে।

• seq : This contains the sequence number of the frame for rearrangement of out-of-sequence frames and sending acknowledgement by the receiver.

কত data receive করেছে এবং কোন data transfer করেছে?

• ack : This contains the acknowledgement number of some frame, particularly when piggybacking is used.

Stuffing: The data frames can be of fixed length or variable length. In variable-length framing, the size of each frame to be transmitted may be different. So, a pattern of bits is used as a delimiter to mark the end of one frame and the beginning of the next frame. However, if the pattern occurs in the message, then mechanisms needs to be incorporated so that this situation is avoided.

Byte Stuffing: ESC flag → ESC ESC
Destuffing: flag → ESC

(1) Byte stuffing: In byte stuffing, a special byte called the escape character (ESC) before every byte in the message with the same pattern as the flag byte. If the ESC seqence is found in the message byte, then another ESC byte is stuffed before it.

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(i) data মাঝে flag পেলে তার আগে ESC যোগ করবো
(ii) Destuffing এর সময় একাধিক ESC থাকলে প্রথম ESC বাদ দিতে হবে

(2) Bit Stuffing: Bit stuffing is the process of adding one extra 0 whenever five consecutive 1s follow a 0 in the data, so that the receiver does not mistake the 0111110 for a flag.

beginning and end কে mark করার জন্য

fixed bit pattern (01111110) as a flag.

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পরপর consecutive ৫ টা 1 থাকলে এর পরেই 0 বসাতে হবে