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Function of OSI and TCP/IP Layers Part1

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Function of OSI and TCP/IP Layer Part -1

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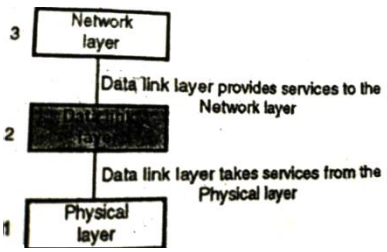
DLL:

- The physical layer deals with the transmission of signals over different transmission media
- For achieving reliable , efficient communication between two adjacent machines the data link layer plays an important role .
- This layer basically deals with frame formatting , flow , control , error control , addressing and link management
- While sending data from source to destination the communication circuits make errors. Further more they have only a finite data rate and there is non-zero propagation delay between the time a bit is sent and the time it is received .
- These limitations affect the efficiency of data transfer. The data link protocol used for communication take care of all these problems
- DLL is the second layer in OSI reference model. It is above the physical layer

Position of Data Link Layer :-

- Below figure shows the position of data link layer in the five layer internet model It is second layer



- It receive services from the physical layer and provides services to the network layer

Data Link Layer Design Issues :

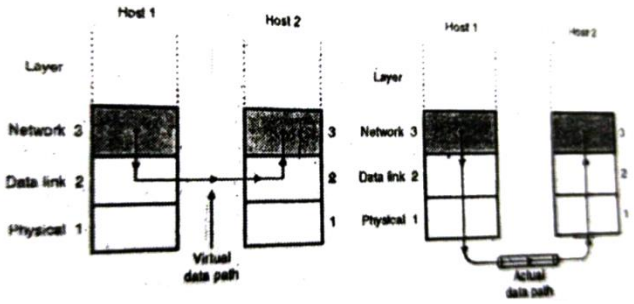
- The data link layer is supposed to carry out many specified functions
- For effective data communication between two directly connected transmitting and receiving stations the DLL has to carry out a number of specific functions as follows:

1. Service provided to the network layer : A well defined service interface to the network layer . The principle service is transferring data from the network layer on source machine to the network layer on the destination machine.
2. Frame synchronization: The source machine sends data frames at a rate frames at a rate faster than the destination machine can accept them .
3. Flow control : The source machine must not send data frames at a rate faster than the destination machine can accept them .
4. Error control : The error made in bits during transmission from source to destination machine must be detected and corrected
5. Addressing : On a multiple line such as many machines connected together (LAN) , the identity of the individual machines must be specified while transmitted the data frames.
6. Control the data on some link : The data and control information is combined in a frame and transmitted from the source to destination machine. The destination machine must be able to recognize control information from the data being transmitted.
7. Link management : The initiation , maintenance and termination of the link between the source and destination is required for effective exchange of data.

Services Provided to Network Layer:

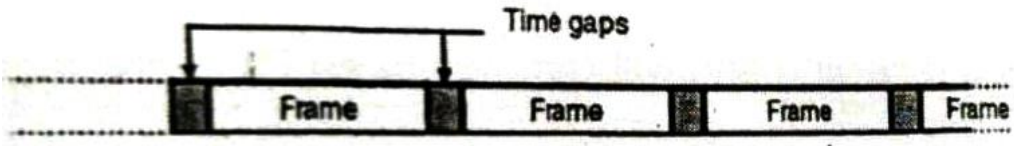
- Network layer is the layer above the DLL in OSI model. So it is supposed to provide service to the network layer
- The main service to be provided is to transfer data from the network layer on the sending machine to the network layer of the receiving machine.

- The virtual path followed for such communication is as shown in the diagram . . It is not the actual path .
- The actual path followed by the data from sending machine to destination.



Framing :

- The bit to transmitted is first broken into discrete frames at the data link layer
- In order to guarantee that the bit stream is error free , the checksum of each frame is computed
- When a frame is received , the data link there , re-computes the checksum . If it different from the checksum present in the frame , then the data link layer knows that an error has occurred
- It then discard the bad frame and sends back a request for retransmission
- Braking the bit stream into frames is called as frame. One way of doing it is by inserting time gaps between the frames as shown in the diagram given below :



- But practically this frame technique does not work satisfactorily because network generally do not make any guarantee about the timing .

Framing Method :

Methods given below are used to carry out framing :

1. Character count
2. Starting and ending characters , with character stuffing
3. Starting and ending flags with bit stuffing

4. Physical layer coding violation

Character count :

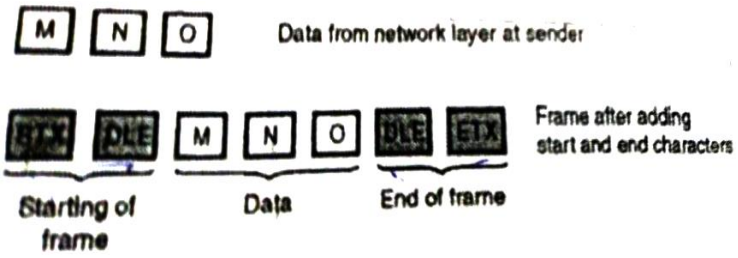
- In this method , a field in the header is used to specify the number of character in the frame
- This number helps the receiver to know the number of characters in the frame following count .

5	1	3	4	2	7	0	8	9	3	2	1

- The two frames above diagram are of 3 and 8 character respectively
- The disadvantages of this method is that , an error can be change the character count
- If the wrong character count number is received then the receiver will get out of the synchronization and will be unable to locate the start of next frame
- This method is rarely used in practice.

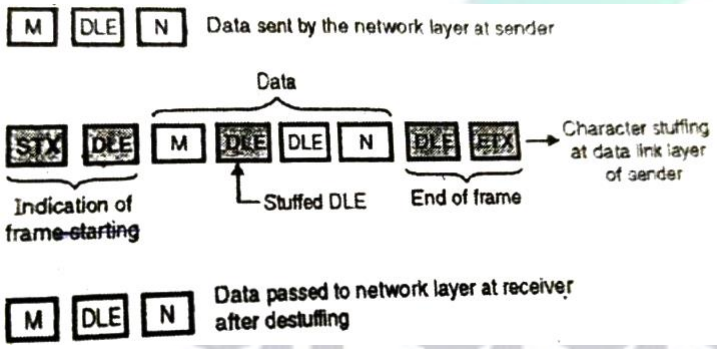
Starting and Ending character with character stuffing :

- The problem of character count method is solved in this method by using a starting character before the starting of each frame and an ending character at the end of each frame.
- Each frame is preceded by the transmission of ASCII character sequence DLE STX (DLE stands for data link escape and STX is start of TeXt)
- So if the receiver loses the synchronization , it just has to search for the DLE STX or DLE ETX character to return back on track as shown in figure given below :



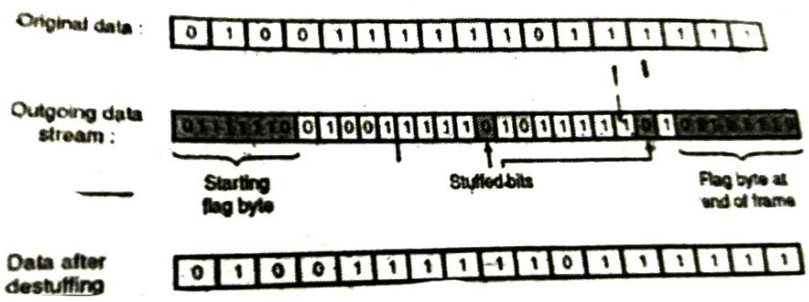
Character Stuffing :

- The problem with this system is that the characters DLX STX or DLX ETX can be part of data as well
- If so , they will be misinterpreted by the receiver as start or end of frame
- This problem is solved by using technique called character stuffing as follows :
- The DLL at the sending end inserts an ASCII DLF characters just before each accidental DLE character in the data
- The DLL at receiving end will remove these DLE characters before handling over the data to thee network layer
- Thus the framing DLE STX or DLE ETX can be distinguished from the one in data because DLE's in the data are always doubled
- This is called character stuffing and it shown in diagram given below , Note that at the receiving end the de-stuffing is essential



Bit Stuffing :

- Whenever the sender DLL detects the presence of five consecutive ones in the data , if automatically stuffs a 0 bit into outgoing stream
- This is called bit stuffing and it is illustrated below:



- When the receiver detects the presence of five consecutive ones in the received bit stream , it automatically deletes the 0 bit following the five ones .
- This is called de-stuffing .
- Due to bit stuffing , the possible if the data contains the flag byte pattern (01111110) is eliminated.

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