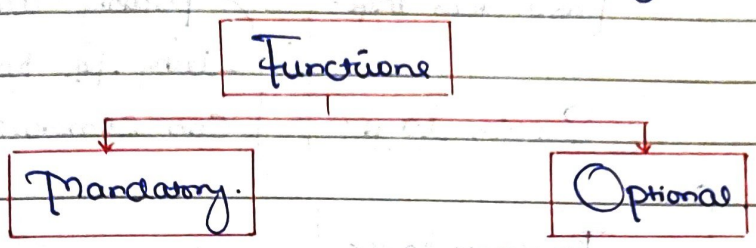
classmate
Date 17/1/24
Page

OSI AND TCP/IP PROTOCOL STACK

→ Computer Network is implemented by 7 functions.



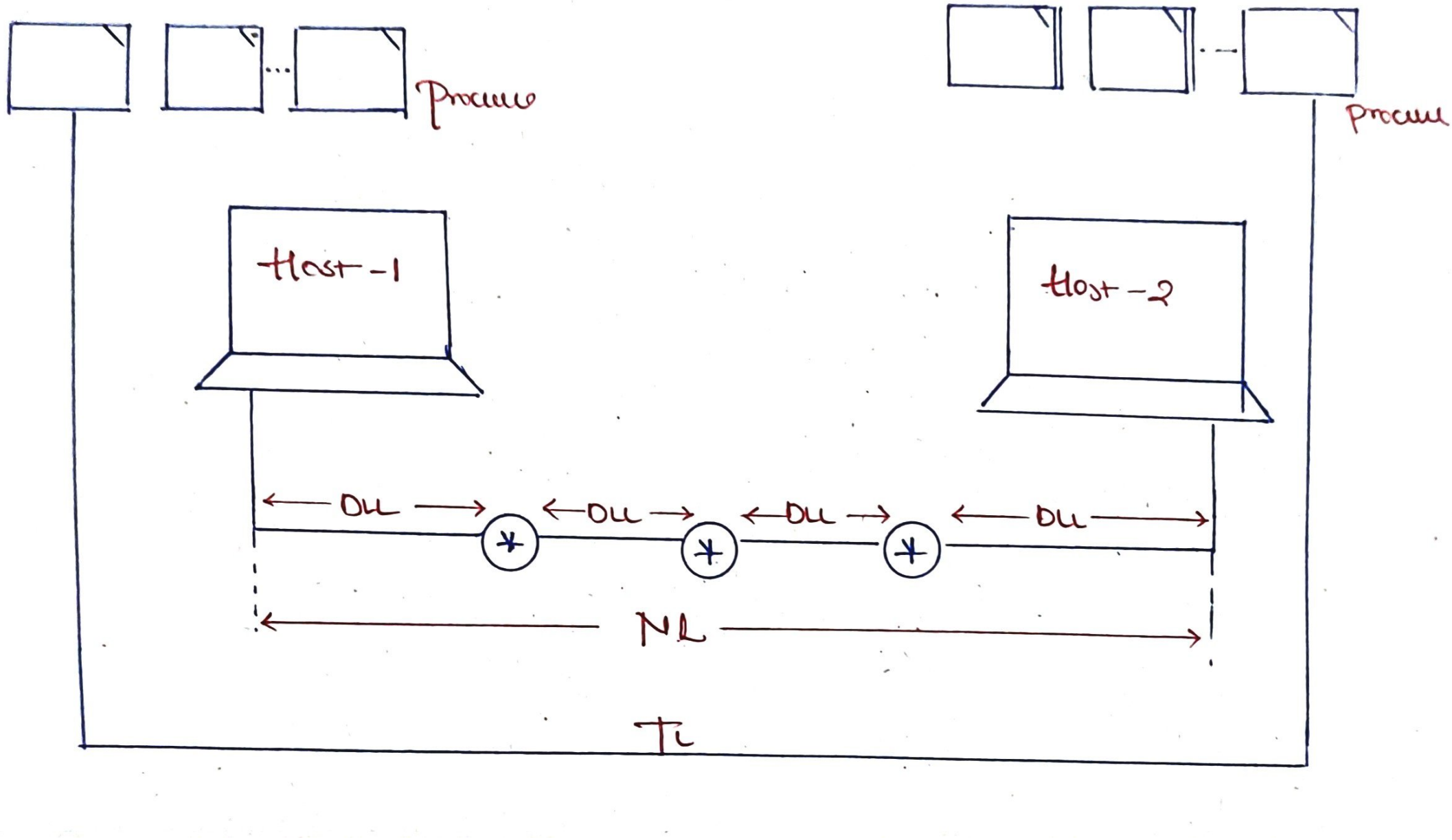
- Error Control
- Flow Control
- Access Control
- multiplexing & Demultiplexing.
- Encryption and Decryption
- Check pointing
- Routing.

OSI : Open Systems Interconnected model.

Iso : International Standards Organisation. It is a multinational body dedicated to worldwide agreement on international standard.

OSI Model:

- This model has been proposed by Iso.
- An open system is a set of protocols that allows any two different systems to communicate regardless of their underlying architecture (Hardware and Software).
- The purpose is to show how to facilitate communications between different systems without requiring changes to the logic of underlying hardware and software.
- This model has got 7 seperate but related layers.
- The 7 layers are :
  1. Application layer
  2. Presentation layer
  3. Session layer
  4. Transport layer
  5. Network layer
  6. Data link layer
  7. Physical layer


Process
Process
Host-1
Host-2
DLL
DLL
DLL
DLL
NL
TL

Application layer
Presentation layer
Session layer
→ User Support Layer
→ Mainly deal with interoperability i.e. two different system can communicate.

Interface
Transport layer
Network layer
Data link layer
Physical layer
→ Complex → Complex Algorithm → Routing Algorithm
Link two subgroup i.e. network support layer and user support layer.
→ Network Support Layer
→ Mainly deal with physical aspect of moving data from device to another.

* Network layer is also called as "Complex layer"

(I.) Physical Layer: Physical layer is responsible for movement of individual bit from one hop to next hop.

Functions of Physical layer:

1) It is used to define electrical, mechanical, functional and procedural characteristics of physical link.
   - Copper → Electrical Signal
   - Fiber → Light signal
   - Wireless Communication → Electromagnetic signal.
2) It identifies transmission mode:
   a. Simplex
   b. Half duplex
   c. Full duplex
3) It identifies topology configuration:
   * Bus topology.

* Star topology
* Mesh topology
* Tree topology

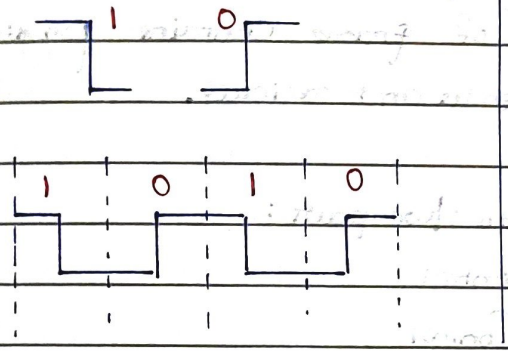
4.) It is totally hardware layer

5.) It defines link configuration: (i) Point to point link
(ii) Broadcast link.

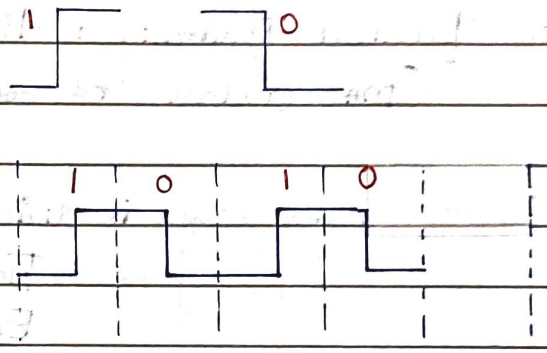
6.) It defines encoding:

(i) Manchester Encoding: Two opposing conventions of representing data

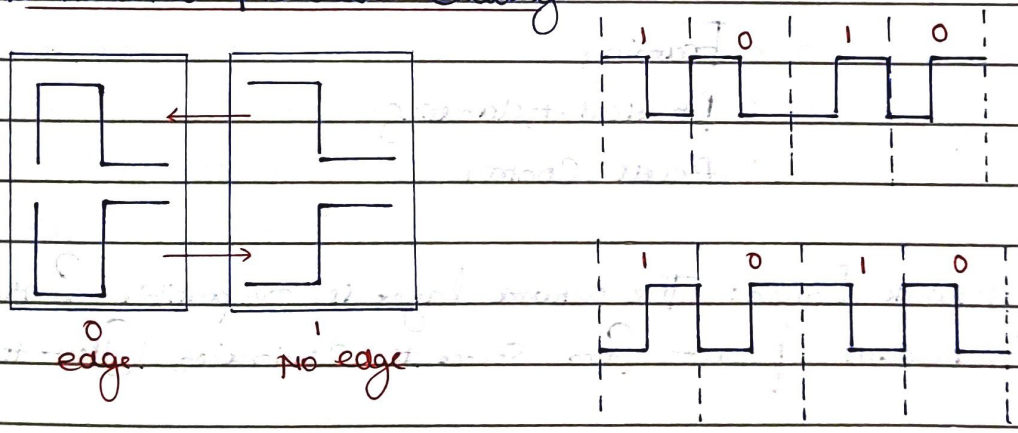
① Dr. G.E Thomas



② IEEE 802.3.



(ii) Differential Manchester Encoding.



Both Encoding: Baud rate = 2 x Bit rate

7.) Bit Synchronisation.

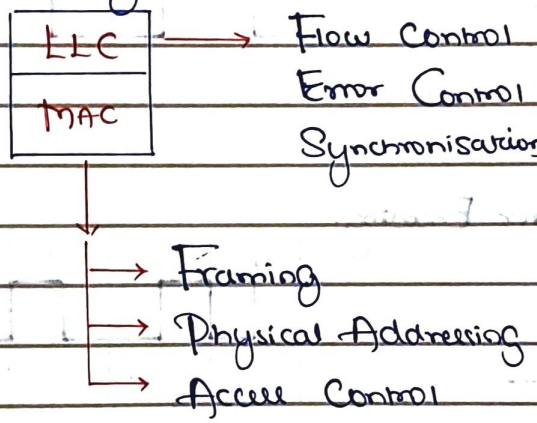
8.) Bit rate control: The physical layer also define the transmission rate i.e no of bits per second.

II. Data link layer: Data link layer is responsible for moving frames from one hop (node) to next hop (node).

Functions of Data link layer:

1.) Flow Control.
2.) Error Control
3.) Access Control
4.) Framing: DLL add header and trailer of datagram recieved from network layer and resulting packet is called frame.
5.) Physical Addressing: Header of frame contains physical address (MAC address) of both sender and reciever.

* Data link layer is divided into two part:



III. Network Layer: The network layer is responsible for the delivery of individual packet from source to destination (Host to Host)

Functions of Network Layer:

1.) Host to Host Connectivity.
2.) Logical addressing: header of network layer contains logical address (IP address) of sender and reciever
3.) Switching
4.) Routing
5.) Fragmentation
6.) Congestion Control: If no. of packets present in the ~~packet~~ network

is greater than the no. of packet it can handle. Then we can say congestion has occured

(IV) Transport Layer: Transport layer is responsible for process to process delivery. A process is an application program running on a host.

Functions of Transport layer:

1) End to end connectivity.
2) Service point addressing: Computers run several program at the same time. For this reason end to end delivery means, delivery not only done from one computer to another computer but also from specific process (running program) on one computer to a specific process (running program) on the other computer. So the transport header must include a type of address called service point address (or port number).
3) Flow Control
4) Error Control
5) Segmentation and Reassembly: Transport layer recieves the message from session layer, breaks the message into small packet called Segment. Each Segment has Segment number which help the transport layer at reciever side to reassemble them.
6) Congestion Control
7) Connection Control: Transport layer can be Connection oriented or connection less.
8) Multiplexing and demultiplexing.

(V) Session Layer: Session layer is also known as network dialog controller. It establish, maintain, Synchronise and terminate the interaction between Sender and reciever.

Functions of Session layer:

1) Authentication and authorization.

2.) Check point or Synchronization: Session Layer adds Checkpoints or Synchronization points when transmitting the data in sequence. For Example - if System is sending a file of 2000 pages. It is advisable to insert Checkpoint after every 100 page to ensure that each 100 unit is recieved and acknoledged independently. In this case if crash happens during the transmission of page 523, the only page that need to be resend after System recovery are Pages 501 to 523, previous to 501 need not be resent.

3.) Dialog control: The Session layer allows two system to start communication with each other either in half duplex or full duplex.

(VI) Presentation Layer: This layer takes care of Syntax and Semantics of the information exchanged between two communicating Systems.

Functions of Presentation Layer:

1.) Character translation: If architecture of Sender and reciever is different then still they can communicate. Eg: ASCII.

2.) Encryption and Decryption: Encryption and decryption is needed to maintain privacy. Transforming plain to cipher text is called as encryption and vice versa is called decryption.

3.) Compressing: Reduce the no. of bits that needed to be transmitted on the network.

(VII) Application Layer: Application layer is responsible for providing Services to users. Such as:

1. Mail Service
2. File Sharing
3. File transfer and many more.