Lecture-2
SDe

classmate
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Page

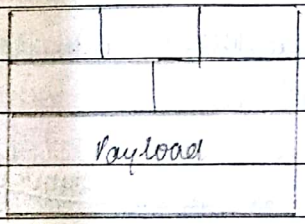
Protocol architecture -

Network
Communication n/w
Computer n/w
Protocols
Functionalities of n/w

→ Protocols are implemented both using h/w and s/w.
→ Protocols are used for providing basic functionalities.

Functionalities of n/w -

- Transmission system utilization
- Interfacing
- Signal correction
- Synchronization — for ex, parts of torrent file
- Error detection and correction
- Addressing and routing — → Addressing — identifying the node
  → Reaching the dest^{n} node with least cost
- Recovery → of packets that get lost during transmission (data or link).
- Message formatting
- Security
- Network management.



→ header

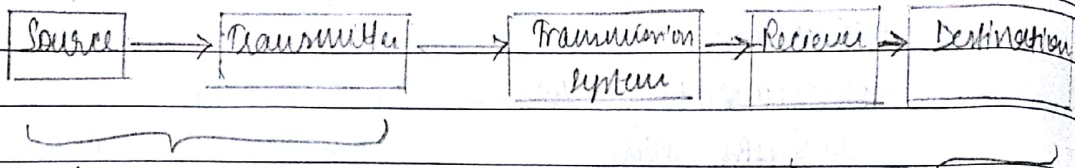
→ In a protocol like UDP

- can't be very fast
- can't be error free
- supports large msgs

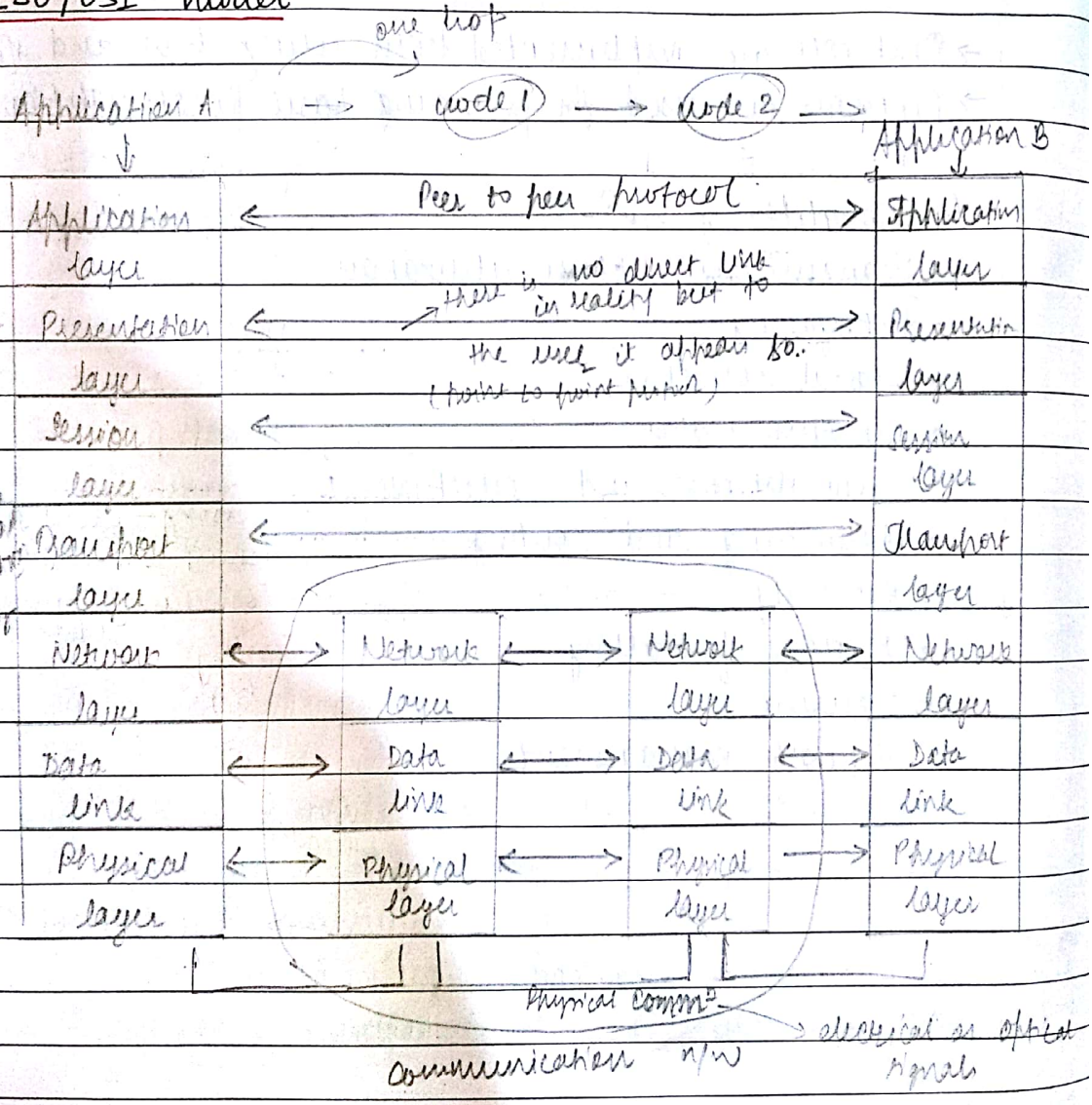
Reliable protocols - Being error free is critical. ex, TCP.
Unreliable protocols - Quality is not an issue ex. UDP
Hand shaking protocol - when the id of communicating parties is known to each other to re-establish broken connection. Helps with recovery of transmission link.

TCP: Transmission control protocol UDP: User datagram protocol

Communication model



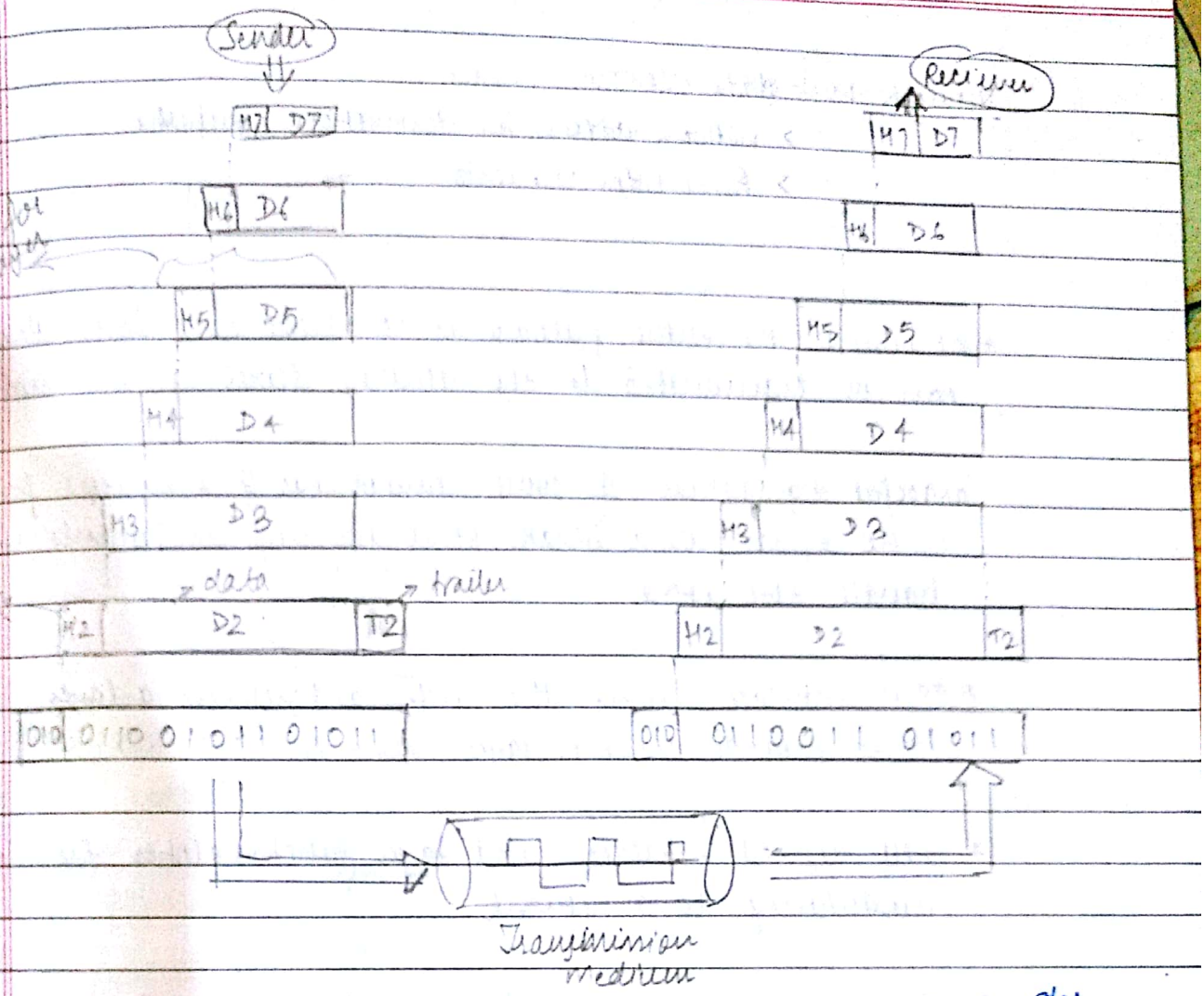
ISO/OSI model



* There are interfaces b/w different layers to communicate.

- PDU - Protocol data unit.
  Data unit being sent out by source protocol.

* OSI model is a theoretical model implemented by both s/w and h/w.



* Exchange using OSI model → S/W interfaces or HW nodes
  → Peer to peer processes → diff. layers in a node

PDU - Protocols are used to communicate at each layer by adding control information to the user data at each layer.

ISO - International standard organization
OSI - Open systems interconnections

SAP - Service access point (the destination - in header of transport layer)

Add the header at each layer. The header and data of the previous layer becomes data of the next layer.

PDU must contain the following data
- SAP
- Sequence number
- Error detection code

Network PDU - Adds network header
> network address for destination computer
> Facilitates requests

* At layer 1 the entire package is converted to a form that can be transmitted to the receiving device in OSI model.

Graceful degradation - If some components of a system fails, whole system won't break, other working components will handle the load.

* Each interface defines the info and services a layer must provide for the layer above it.

* Well defined interfaces and layer functionalities provide modularity to a network.

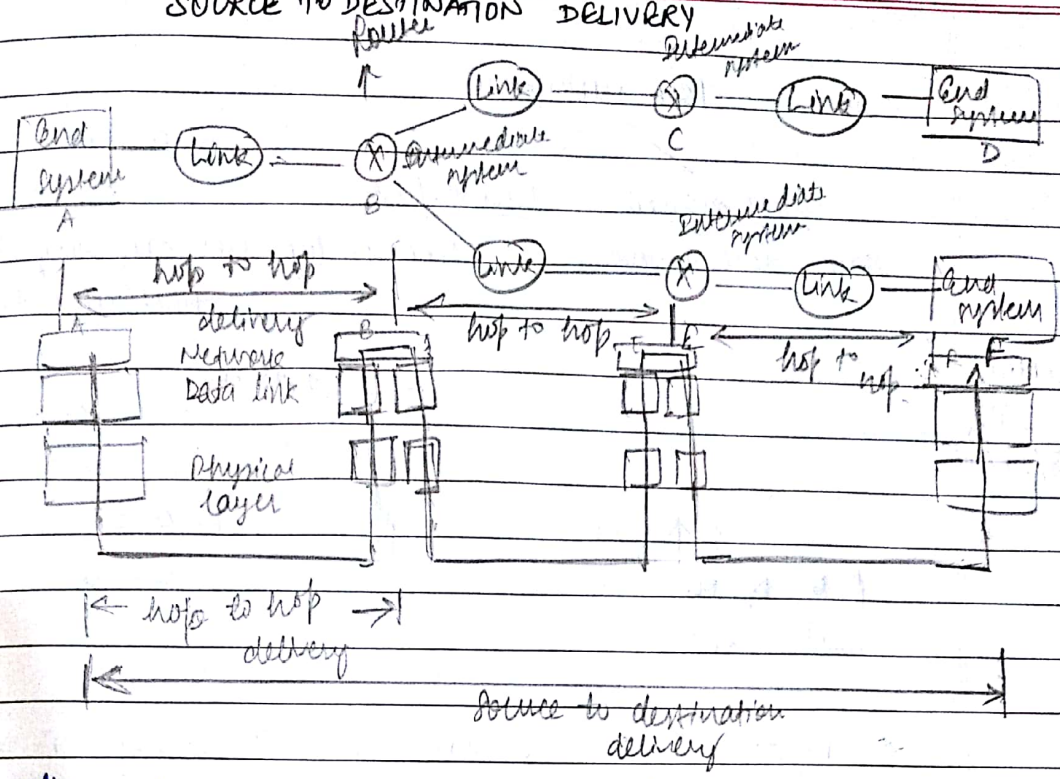
* IPV4 is one type of add technology used for network layer for addressing. Since interfaces and layer functionalities make a network modular, it could be replaced by newer IPV6.

→ Service primitives - Different layers communicate among themselves to let them know of functionalities available. The way of interaction have their own primitives for their language, sort of
under the layers to understand each other.

→ Hop - Jump from one node to another.
For eg, 'ping' checks upto 5 or 6 hops to see the other entity is alive, if no response received then it returns

* The data link layer is responsible for moving frames from one hop to the next.

SOURCE TO DESTINATION DELIVERY

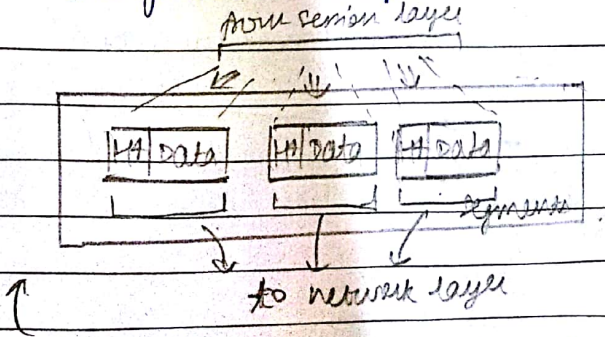


* The network layer is responsible for the delivery of individual packets from the source host to the destination host.

Routing — Dynamic – Mostly used
Routing — Static

- Hop to hop delivery - needs the physical address of intermediate systems.
- Source to destination - - direct transfer
  - logical address.

* Physical layer is responsible for transmission of individual bits from one hop to another.



* The transport layer is responsible for the delivery of a message from the process to another.

Socket address : IP address + port number

classmate
Date
Page

Port number

Well defined
Stays same universally

User defined
Chosen by user, can vary b/w a particular range.

Lecture-15
SDe
18/01/18

Process

Process