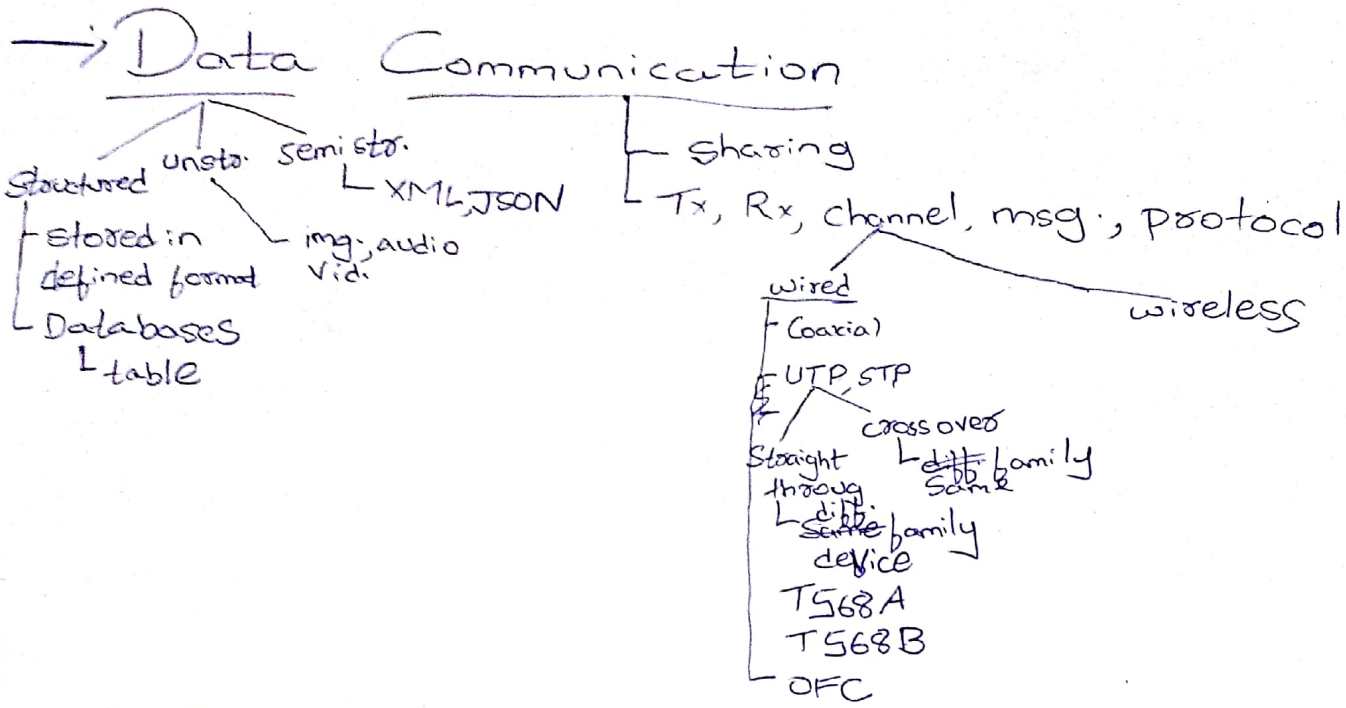
12/03/2021

EC622

- Data comm. & N/w? - 4th & 5th ed. - Forouzan
- ~~Data comm~~

→ Data Communication



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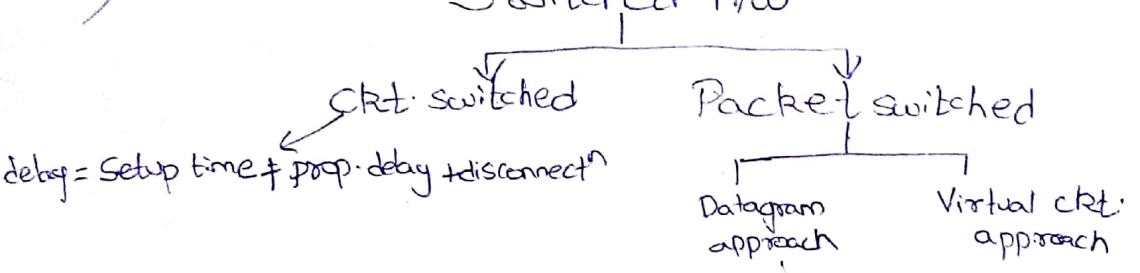
→

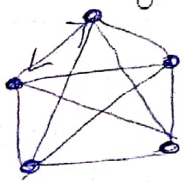


- Packet: Header + Data
  - Source & dest. adds
- Data is divided into smaller packets
  - ∵ to utilise BW properly
  - ∵ if entire data is sent together; any loss ⇒ again from initial state
- Dis. is measured interms of hop (device to device excluding host & Rx)
- Linked list is used to rearrange the received msg.
- Router decides the path to send the packets based on load balance

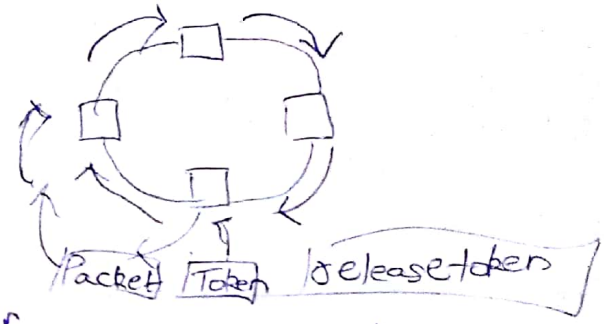
- Virt. ckt approach:
- A virt. tunnel is built after the Datagram approach from source to dest^n. & every succesive data will follow same path
- MPLS → each packet is assigned label (VCI)

→ Topologies :

1. Mesh : every node is connected to every other node. → Full mesh
   - each node has n-1 edges for a total of n edges
   - ~~2(n-2)~~ $\frac{n(n-1)}{2}$ connectn
   - Bidirectional
   - Adv. : fault tolerance
   - Disadv. : managing / maintainance diff.
     - diff. to replace a node
     - ↑ cost
   - Telephone n/w CBS)
   - Partial mesh : some node connections can be elimin
     connectn $\leq \frac{n(n-1)}{2}$



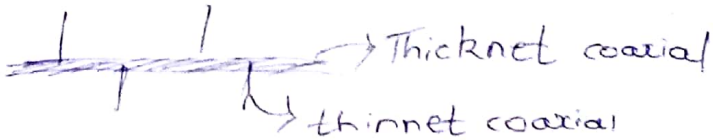
2. Ring :
   - unidirectional
   - Token passing



3. Star : n nodes => n connectn
   - Ethernet LAN n/w
   - one common hub all hosts connected

Adv. : easy main -taina
Deadv : if central node is lost

4. Bus :
   - coaxial
   - bw is shared.



5. Hybrid :
   - mixture of any 4.

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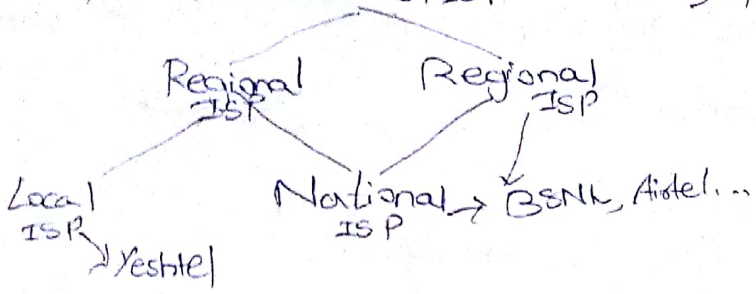
→ N/w Type

- LAN - small size, ~~sam~~ private n/w
- WAN - ISP - large
- MAN - big - local ISP within a city
- PAN - mobile Pairing, I
- Adhoc n/w - w/o infrastructure, laptops connected → animal tracking disaster

→ Internetworking & Intranet:

↳ International ISP → AT&T, Sprintline



— Protocol & Std:

- Syntax : grouping of data
- Semantic : how the grp. of data should be presented/interpret
- Timing : when to communicate data.
- Standardisat^n : defacto : to all organisat^n
  dejure : within organisat^n

→ N/W Model (OSI) - Layerd task
TCP/IP ref. model

7. Application
6. Presentation } Softwarebye → Applicat^n
5. Session
4. Transport - intermediate → TCP, UDP, SCTP
3. Network → IP
2. Data link } Hardware
1. Physical

Sender side ↓ Received side ↑

— Application:

- Provides user interface to access the n/w resources
- HTTP, DNS, FTAM, DHCP, SMTP, SNMP
  web browsing, file transfer (Filezilla), mail

- Applicat^n → H_7 D_7 → msg → Presentat^n

- Presentat^n
  - Translat^n
  - Compression
  - Encryption

Source dependent format → common format → Receiver dependent format

Presentat^n → H6 | P6 → (Session)

To Presentat^n layer

H6

From session layer

Receiver side

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- Session
  - Responsible for establish & maintain & terminate the session blw source & destinat^n
  - Dialog control
  - Synch check point

From Presentat^n layer

H5

Check point Transport

- Transport
  - Responsible for end to end delivary (process to process)
  - specific process address (port addr) → 16 bit → HTTP - 80, DNS - 53, DHCP - 68, Telnet - 22, SSH - 23
  - Segmentat^n & reassembly
  - Connect^n Control
  - Flow control
  - Error control

0-65535

0-1024 → well defined service

1025-49169 → registered

rest → unregistered

→ msg. is divided into segment.
  - each segment → 0-65535 bytes

→ Types:
  1. Connect^n oriented : ack. is received for every (TCP)
  2. Connect^nless : (UDP)

→ SW, SR, CBN

→ Redundancy, CRC, checksum, Parity

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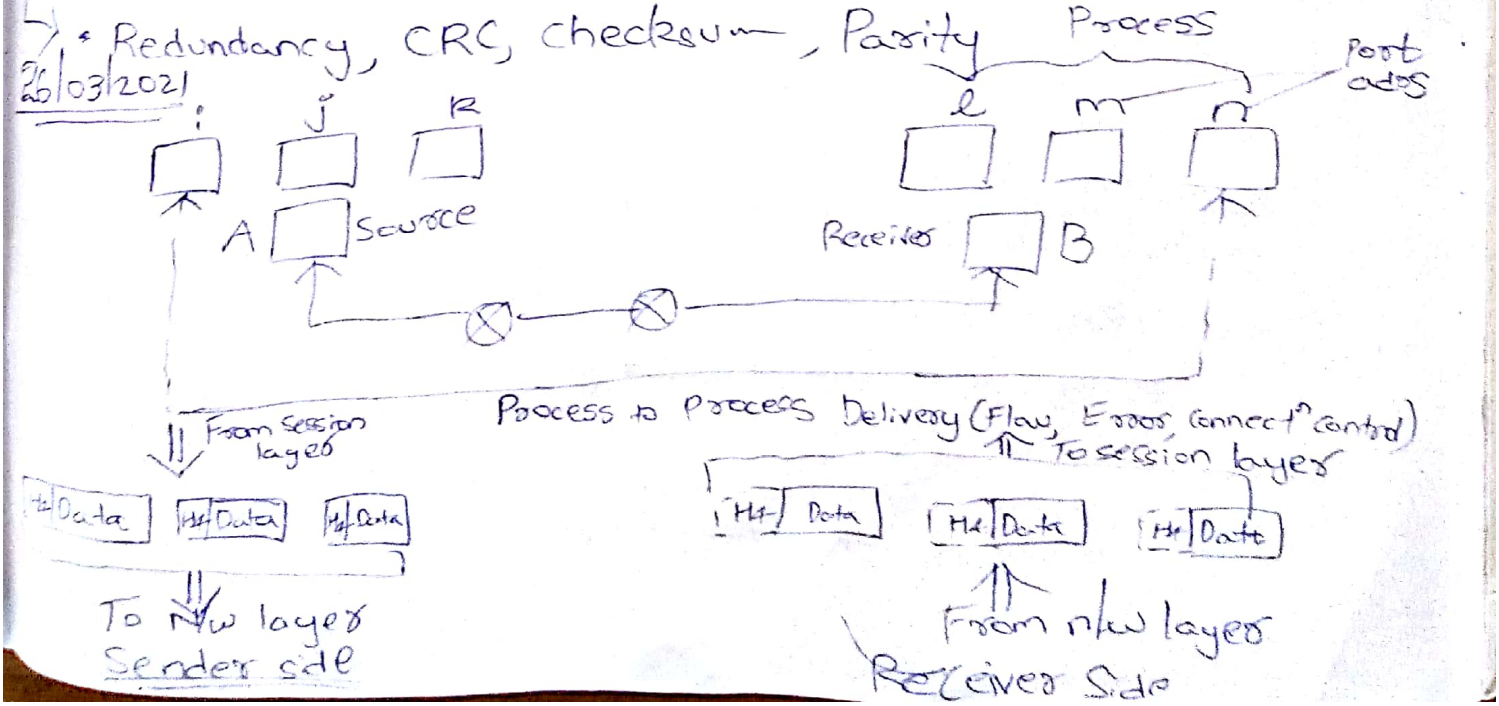


- N/w Layer:

- It is responsible for the movement of indv. packets from source to destinat^n
- Logically addressing (Ip address) = 32 bit
- Routing

Packet: H_3 | H_4 | Data → P_1 (Data = H_4 + Data; Segment = H_4 + Data)

From transp → H_3 | Data → To datalink

- Data link Layer:

- It is resp. for the movement of indv. ~~process~~ frames from one hop to another or hop to hop delivery
- Physical addressing (MAC adrs.) = 48 bits (hardware adrs)
- Framing
- Flow control } hop to hop
- Error -"-
- Access -"-

From N/w → H_2 | Data | T | H_2 | Data | T → To physical sender side

$H_2 + P_1 + T$ → Division of Packet into manageable units

Ethernet: min. 46B, max: 1500B → Depends on n/w type

- Physical Layer:

- It is responsible for the movement of indv. bits from one hop to another.
- Physical characteristics of interface & medium.
- Representation of bits
- Data rate
- Synchronizat^ bits
- Line of Configuration
- Physical Topology
- Transmission Mode

From Data link → 01111110 | 11111111011111111 → To channel (medium) Sender side

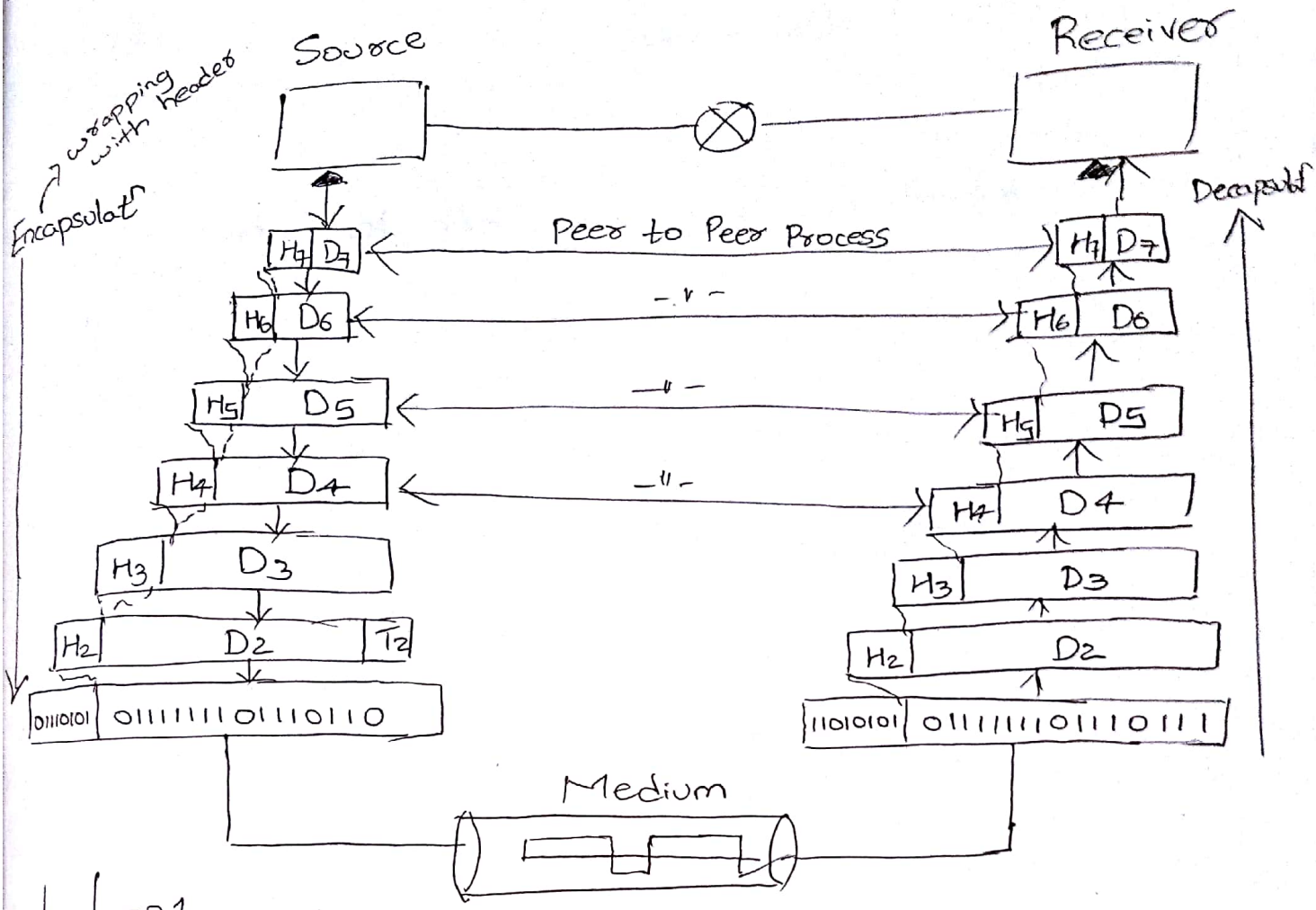
— Summary Of OSI

1. Application : Provides UI to access the n/w resource
2. Presentation : Translatⁿ, Compression, Encryption
3. Session : Establish, maintain & terminate session b/w Source & destinatⁿ
4. Transport : End to End delivery (process to process) (Segment)
5. N/w : Movement of indv. packets from source to destinatⁿ
6. Datalink : Movement of indv. frames from one hop to another (hop to hop)
7. Physical : Movement of indv. bits from one hop to another

OSI		TCP/IP
Application, Presentation, Session	→	Application → HTTP, Telnet, SSH, DNS, DHCP, SMTP, INMP, FTP
Transport	→	Transport → TCP, UDP, SCTP
N/w	→	Internet → IP, ICMP, IGMP, ARP, RARP
Data link, Physical	→	Host to N/W → IEEE802.3, 802.11, 802.15.4

- Reference
- 7 layer
- based on TCP/IP

- Practical
- 4 layer
- 1st implemented



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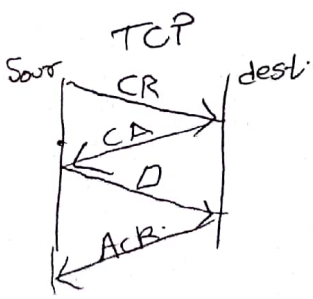
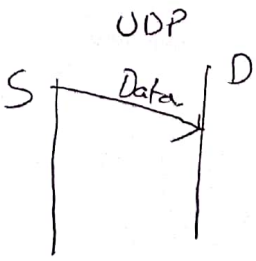
- TCP/IP Protocol Stack

Application	HTTP, DNS, DHCP, FTP, Telnet, SSH, SMTP, SNMP	- Process
Transport	TCP UDP SCTP	- Delivery
N/W (internet)	ARP, RARP IP ICMP, IGMP	
Host to N/W	Protocol defined based on underlying n/w	





- ARP : IP to MAC
- RARP : MAC to IP
- ICMP : ping
- IGMP : multicasting (connectionless)

— Addressing :

- Specific adrs. : domain adrs.
- Port adrs.
- IP adrs.
- Physical adrs. : changes from hop to hop