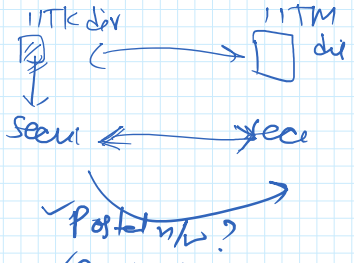
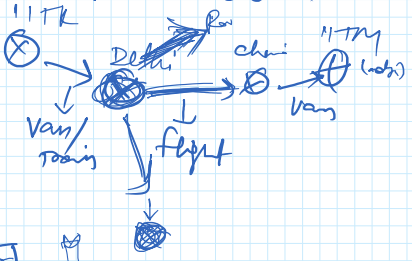
Lecture 21

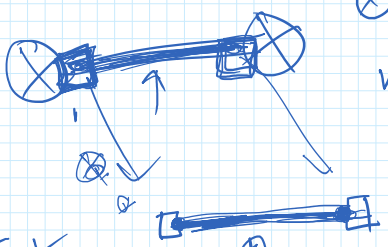
03 November 2021 18:03

- Recap → RIP ✓, OSPF ✓ } Intra-AS routing protocols (DV, LS)
  → BGP → Inter-AS routing protocol
- Introduce Link layer.
- Services → Reliability & Error control
  → Multiple access.

App → http, DNS, SMTP
Trans →
N/w →
Link
Phy



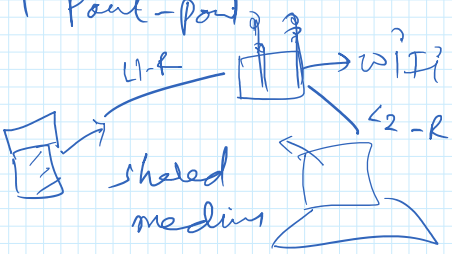




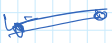
2 kinds

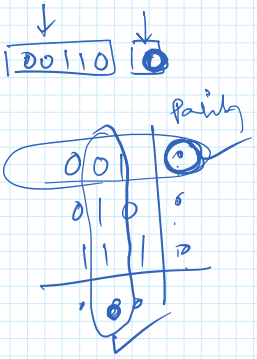
① Point-to-point link ✓

② Broadcast link ✓
→ Multiple Access ✓ (MAC) ✓



Reliability
- Error detection capability ✓
- Error correction capability ✓





Internet Checksum.
- Cyclic Redundancy code ✓

Medium Access (Broadcast link)

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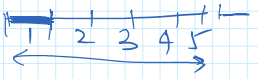
① Partitioning → TDM → R/N → N, R
→ FDM → R/N → N, R
→ CDMA → R/N → N, R



Adv :- Collisions are avoided

Dis Adv :- When there are less num of users, resources gets wasted

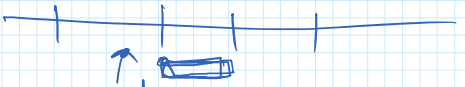
② Random Access

- Allow all the users to use full BW. 'R'
- Collisions can occur.
- Whenever a collision, the packet has to be retransmitted.

ALOHA

Slotted Aloha → ① slots
Pure Aloha ② Slot duration is taken such that 1 Packet can be transmitted
③ L → length of packet
④ L/R →

Protocol



- Transmit a packet only beginning of time slot
- If no collision is seen, the pckt is successful
- If it sees collision, retransmit the pckt in the next slot with probability 'p'.

"N" users who are sharing the Channel

$P(\text{succ utilization of slot}) = NP \cdot (1-P)^{N-1}$

$P^* = \arg\max_P NP(1-P)^{N-1}$

utilization = $NP(1-P)^{N-1}$ ✓
of slot)

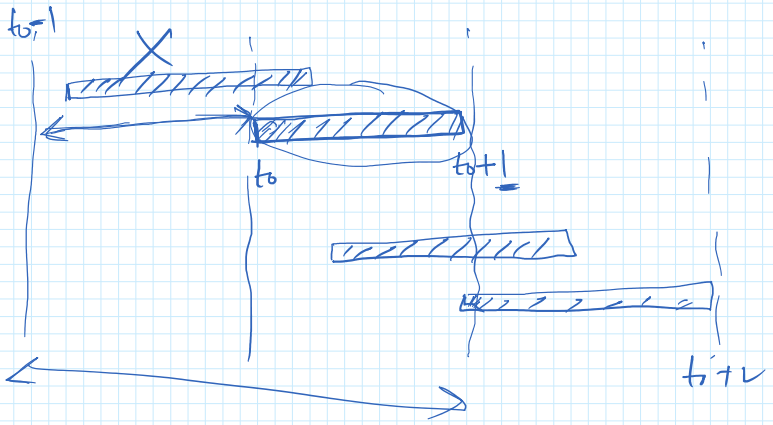
$P^* = \arg\max_P NP(1-P)^{N-1}$

$\Rightarrow P = 1/N$

→ when $N \to \infty$, Efficiency of Aloha = $1/e$ = 0.37

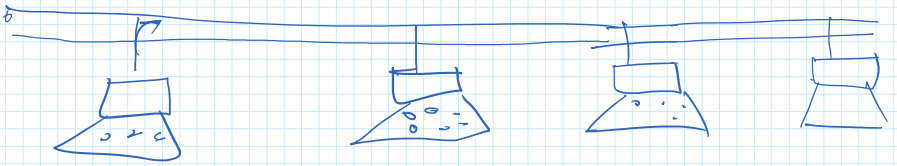
Disadv: Time Syn.

Pure Aloha



$\approx 1/2e$

CSMA → Carrier Sense Multiple Access



"n" Collisions

exponential backoff

$\sim \{0, 1, 2, 3, \ldots, 2^n\}$ ✓

T → $\sim \{0, 1, \ldots, 1024\}$

$n=10$
$n=11$

"Talking turn"

{ TDM / FDM "R/N" → low data req.

Random Acc ✓ →

Polling based

Master node

Polling based