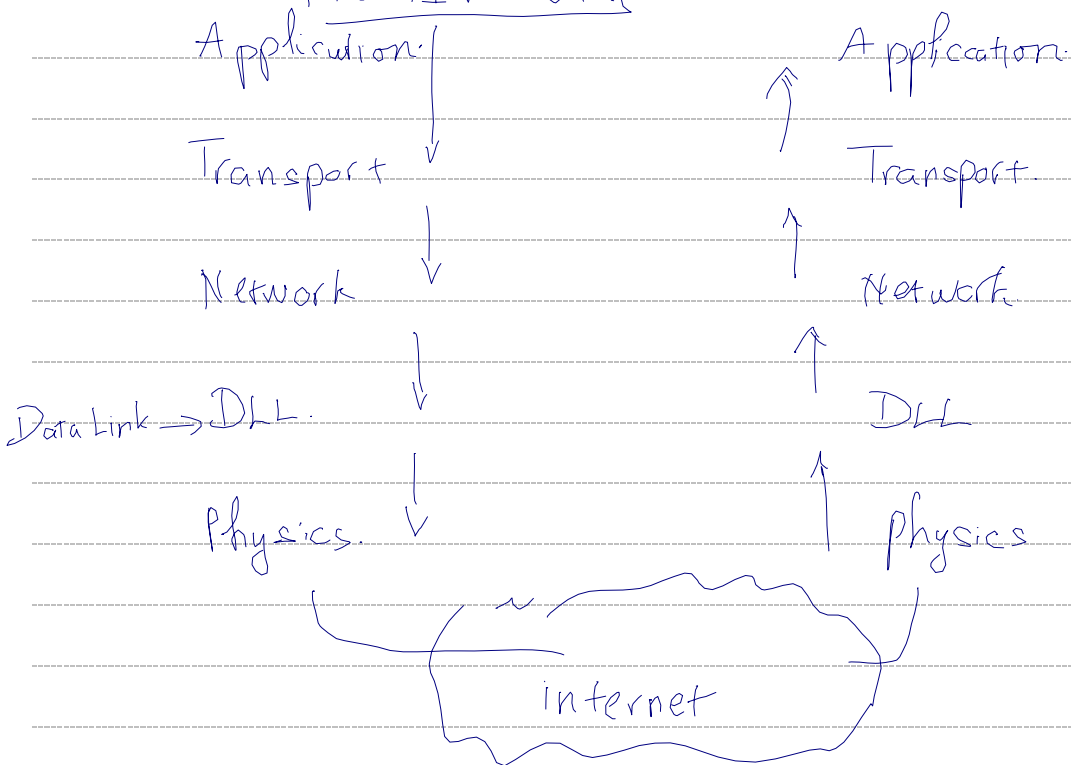


TCP/IP Model

OSS model grouping of App → Session = App layer

adding App → Presentation → Session: is not controlled by TCP/IP committee so they ignore them in their model.

Data link layer → logical link
→ Medium Access

LSAP is used for upper layer.
to control & access logical link control.

LOCAL AREA NETWORK

physical stars logical (bus) → the central node can be flatter, the central node do not receive the data but pass on to other nodes connected to it.

Round Robin: need manager

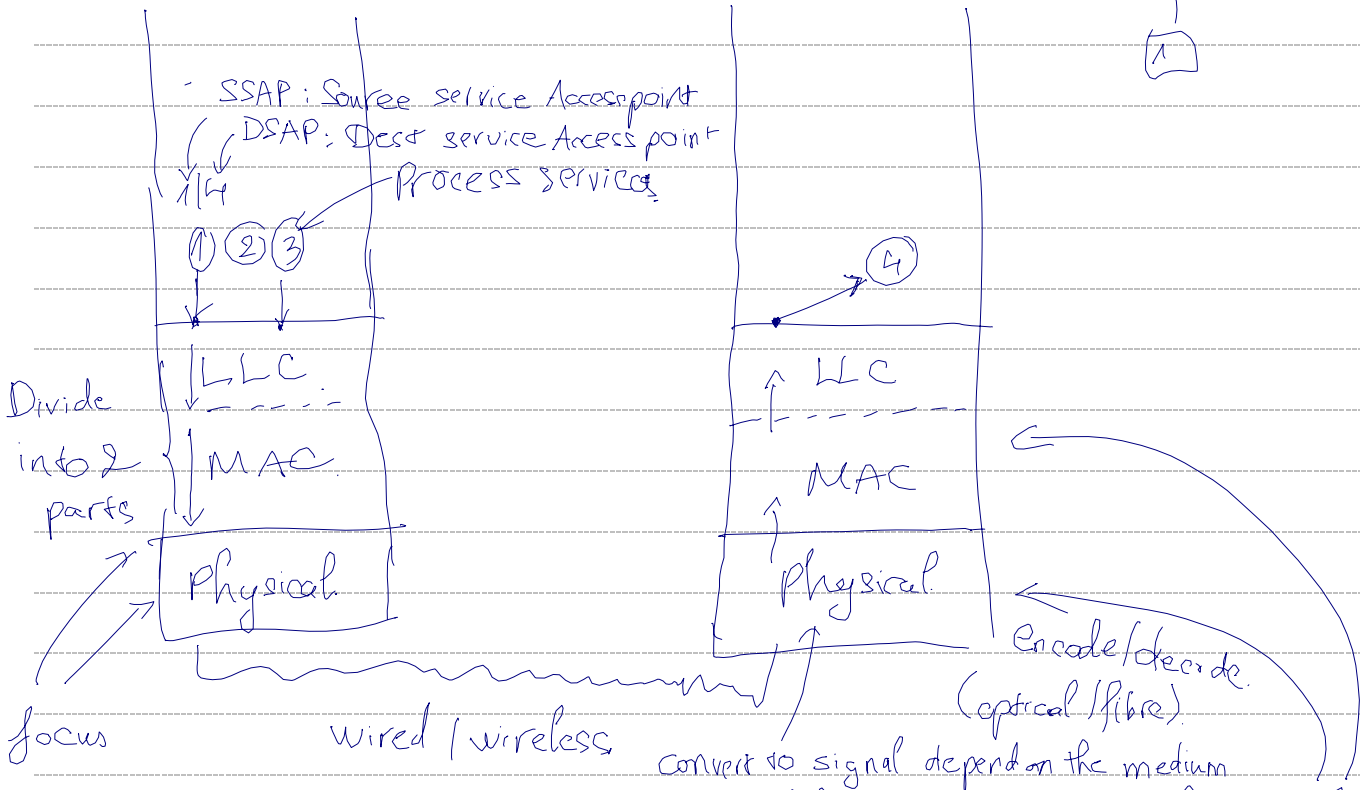
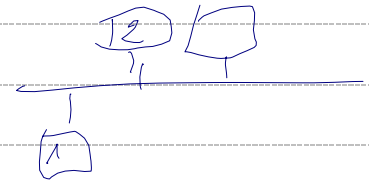
Reservation: n entities can send data at the same time, limit by time slot. no manager.

* Contention : no master, no management

Jul. 02nd

Station 1

Station 2



IEEE 802: committee defines the protocol in 2 layers

MAC layer: add the addresses to the frame from LLC:

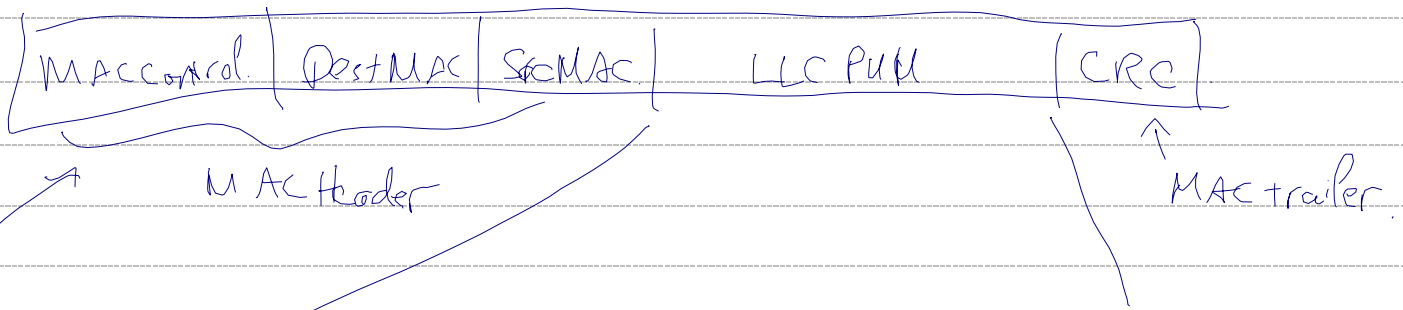
- has own addr
- the target addr

receiver focus } - check frame error
- take dest MAC addr → frame forme? }
send to LLC ←

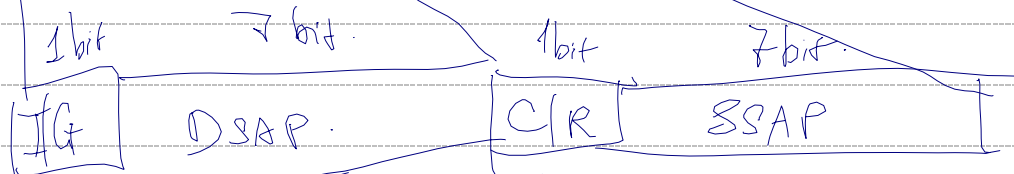
LLC: - provide interfaces to higher levels
- Flow control & error control.

if dest is ready to accept or not

if error, which scheme (REJ, SREJ) to use for recovery



1 octet
= 8 bit = 1 byte



I: want to communicate with 1 another - bit set to 1
G: 1 group 0

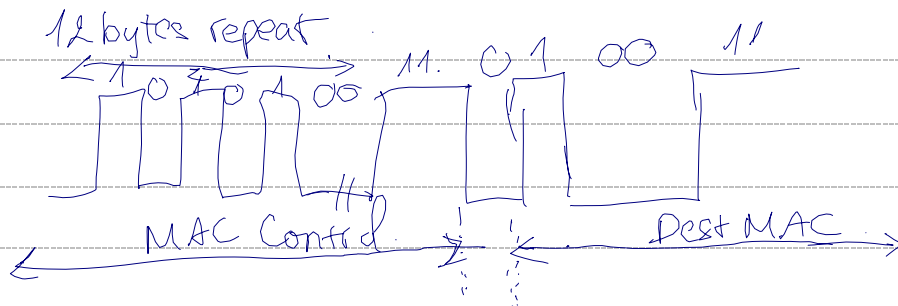
C: send a command = 1

R: responds to a command = 0

MAC control: 2 purposes

① frame size

② SOF: start of frame



MAC Trailer: for error control

$$CRC_{Tx \text{ bits}} = f(Tx \text{ frame bits})$$

↑
4 bytes are added to the frame

↑
from Dest MAC → end of LLC PUD.

on the rx, calculates $CRC_{local} = f(Rx \text{ frame bits})$

if $(CRC_{Tx \text{ bits}} = CRC_{local}) \rightarrow$ no error
 $\neq \rightarrow$ error, frame drop.

CRC: cyclic redundancy check

→ Synchronous: event happens at defined time interval

→ Asyn: sudden time

↳ 3 schemes: RR, reservation, Contention.

RR: strength: no waste bandwidth.

weakness: need a master to divide the time/mic.

if a process takes so long time → every one waits.

Reservation: strength: no master, you got your slot.

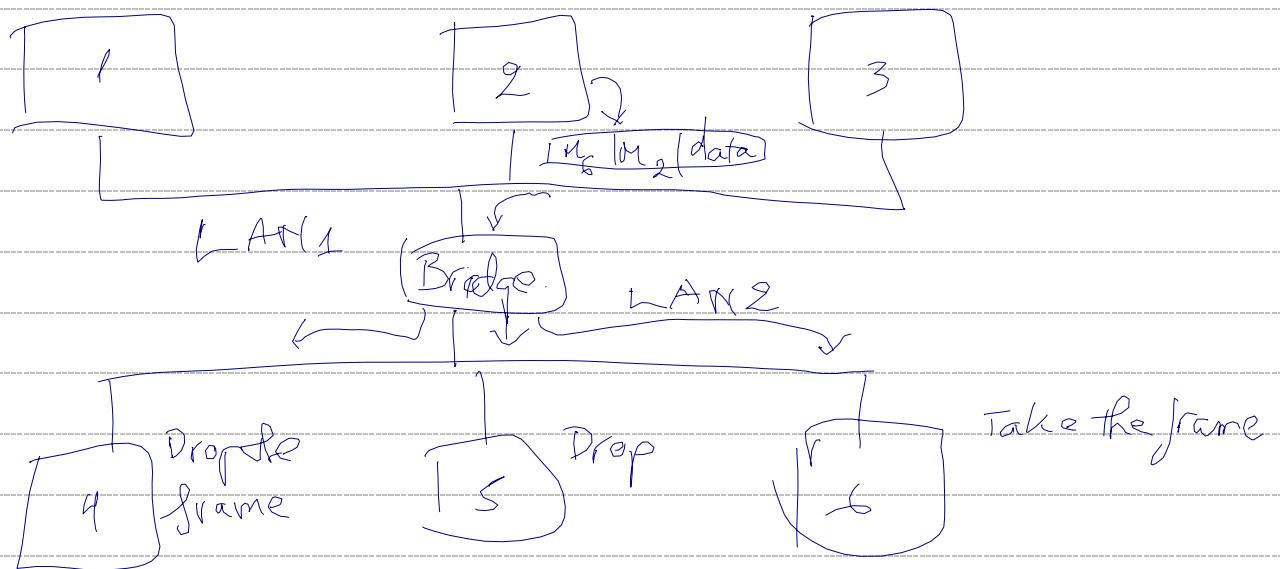
weakness: waste of time if a user has nothing to transmit.

→ underutilization of BW

Contention: Pros: - no master \rightarrow no single point of failure.
 - BW is not wasted.
 - simple to implement.

Cons: under heavy load condition, there are more than 2 processes want to talk at the same time \rightarrow chances of collision increases.

Bridges



- "identical physical & protocol" \rightarrow because bridge does not change the frame, any protocol being used will be reused by the bridge.

Why use the bridge: (why not put all in the same LAN)

- Reliability: if 1 LAN fail \rightarrow all network fail. \rightarrow bridges help protect this.
- Performance: if there are many devices \rightarrow collision \rightarrow degrade of performance. In this case if there is a bridge, the bridge can store & forward the data at later time when the LAN is free.

Performance: — when bridge rx the frame it checks the dest LAN if the target host is existed, it only sends to the targeted host (instead of sending to everyone). Only when it does not know if the targeted host exist then it will broadcast.

Security: — hide one network or host from other LAN
— allow/deny packet from/to particular hosts.

Geography: to set up network boundary for certain biz.

Bridge only implement 2 layers:

MAC
Physical

 → it does not look at packet content.

All Bridge maintains a "forwarding table". everytime it receives packet from this host

MAC	Port	Age	
source MAC M_2 ← addr receive from. M_7	LAN where it comes from interface 1 3	20 sec 20	age is also refresh! countdown after added, once 0 → remove from the table

if bridge receives $M_2 | M_4$ → it checks the table & found M_2

on interface 1 → it sends to M_2 on interface 1 instead of broadcasting. And also record M_4 from interface 2.

Fig 11.8: - so many bridge \rightarrow looping of packets \rightarrow affect the bandwidth. since data packet can go through redundant or parallel network.
 \Rightarrow To prevent this prob:

loop

Why need parallel path:

- for redundancy (if 1 node fail, reroute)

Spanning tree protocol \rightarrow remove the looping and revert the route to tree protocol.

HUB v/s SWITCH

\uparrow is a hub but do not broadcast, send directly to the host.
 a node sends a packet will be broadcasted to everyone by the HUB

SWITCH:

