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Subject : Computer Networks
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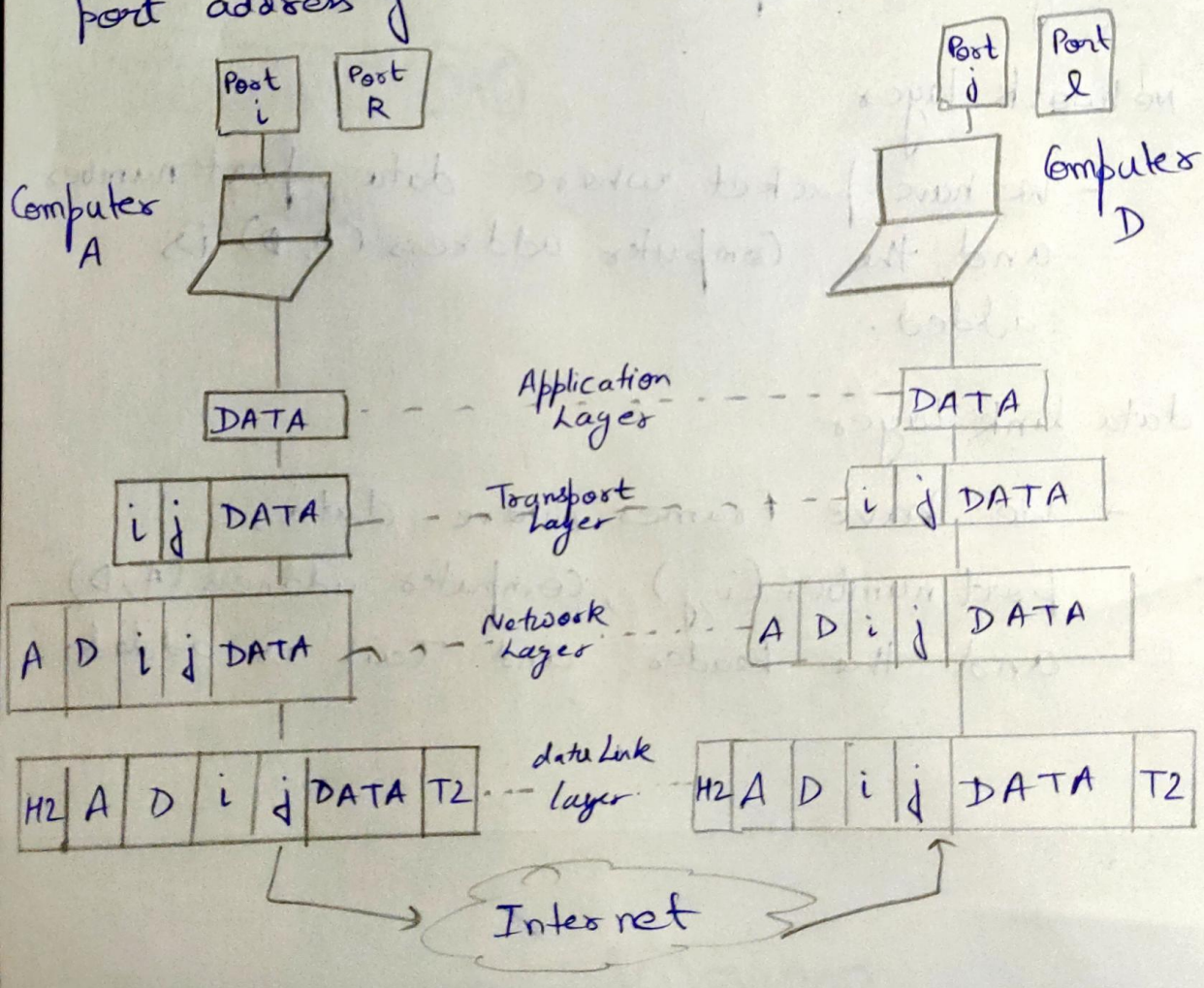
Slot : A11 + A12 + A13

Midterm Examination.

Q2]

Connection running at A computer with at port address i. Another connection running at B computer at port address j.



Equipments

Explanation.

At Application Layer.

- We have data

In transport layer

- We have Segment where port number(i,j) of both Computers are added.

In Network layer.

- We have packet where data, port number and the Computer address (A, B) is added.

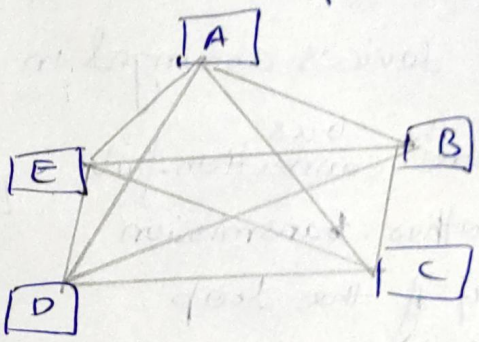
In data link Layer

- We have Frames where data, port number (i,j), computer address (A,D) and the header and Tail is added.

Q1]

Consequences if the connection fails

(a) Five devices arranged in Mesh topology.

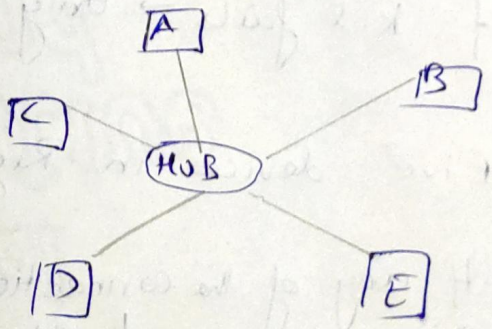


If one connection fails, the other connections will still be working.

which means if A fails, it will not affect the working of B, C, D or D.

b) Five devices arranged in Star topology (No Hub)

If one connection fails, the other devices will still be able to send data through the Hub; there will be no access to the device which has failed connection to hub.

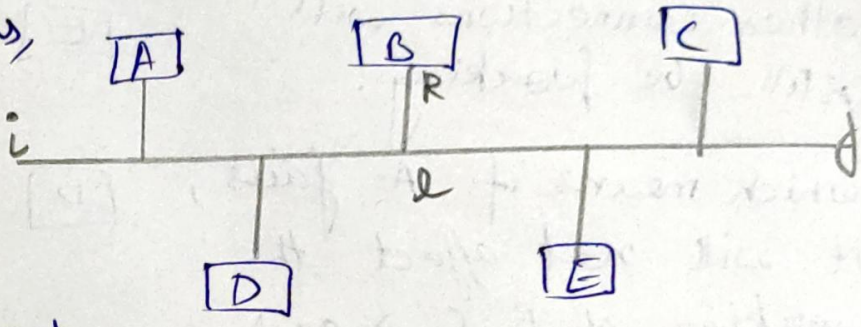


(Diagram with Hub)

If A fails, system will remain unaffected.

c) Five devices arranged in Bus Topology

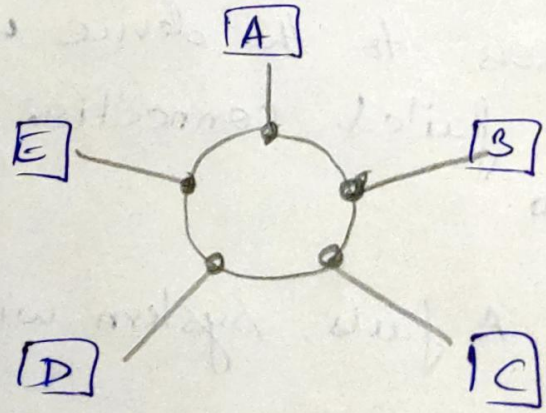
If the bus connection fails, all the other transmission stops. If the drop line fails, only the corresponding device cannot operate.



If i-j fails → All transmission will stop.
if k-l fails → only B will stop operating.

d) Five devices in Ring topology.

If any of the connection fails, it may disable the whole network.



Prevention:-
→ Use dual ring
→ By-pass Mechanism.

Q3]

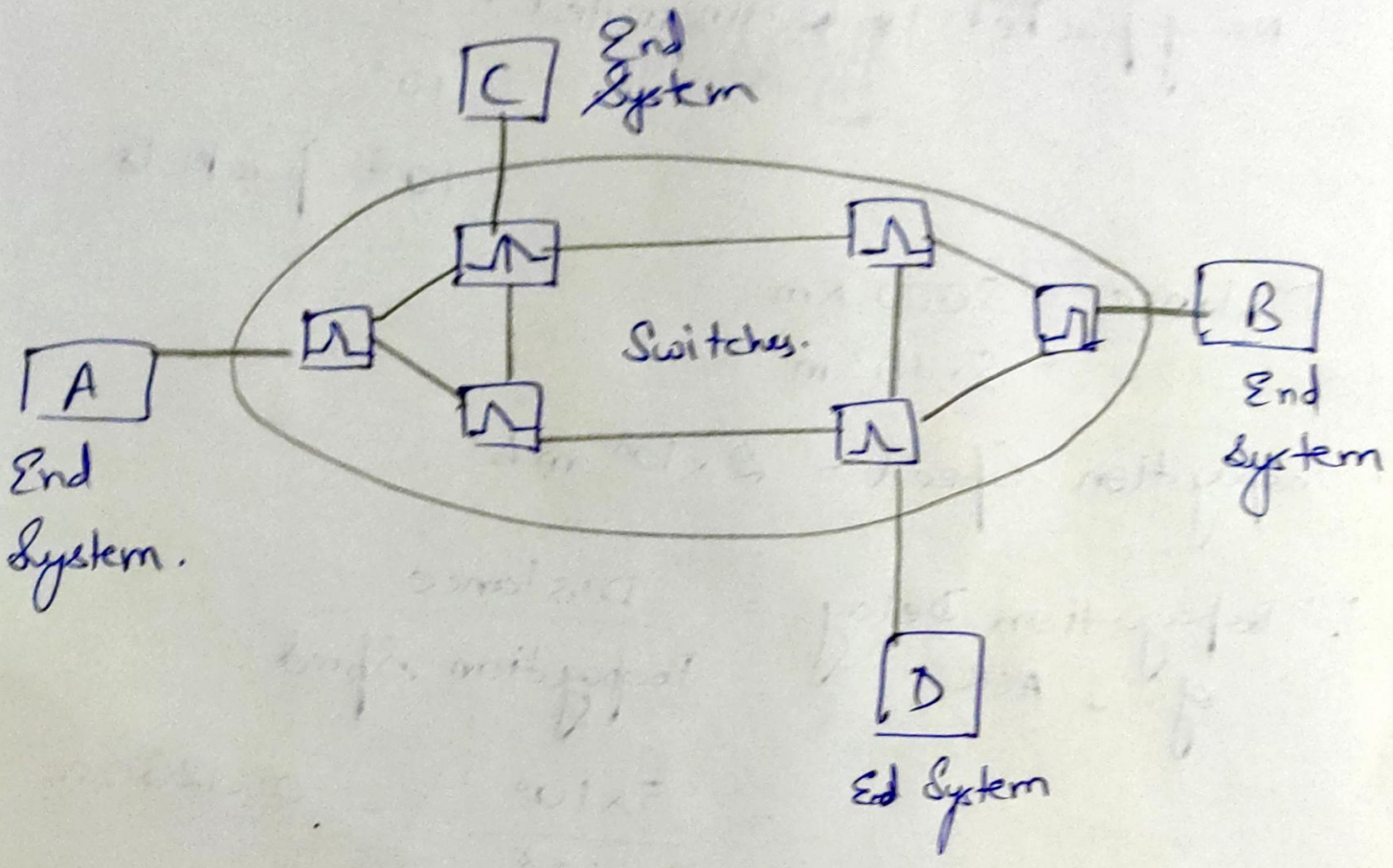
(a) A circuit switched network needs end-to-end addressing during the setup and teardown phases to create a connection for the entire data transfer phase.

Once a connection is made, the data flow through the resources which are reserved. The duration of entire data transfer, the switches remain connected. There is no necessity for further addressing.

(b) Virtual switching network is a category of packet switching network, there a virtual path is established between the source and the destination system for data communication to occur.

Virtual circuit network needs addressing in three phases (setup phase, Data transfer, teardown phase). It is needed to make entry in the switching table. The entry is made for each request for connection. During the data transfer phase, each packet needs to carry a virtual-circuit identifier to show which virtual circuit that particular packet flows.

VIRTUAL CIRCUIT NETWORK



Q4]

Given

Total data to be transmitted = 10^6 bits

Packet size = 10^3 bits

∴ No. of packet to be transmitted = $\frac{10^6}{10^3}$

= 10^3 packets

Distance = 5000 Km

= 5×10^6 m

Propagation Speed = 2×10^8 m/s

∴ Propagation Delay of 1 ACK = $\frac{\text{Distance}}{\text{Propagation Speed}}$

= $\frac{5 \times 10^6}{2 \times 10^8}$ = 0.025 sec.

Transmission Delay = 10 sec.

Processing Delay = 10 sec

Waiting delay = 10 sec.

Total Time = 1000 * (No. of packet) * (2 × propagation delay) + Transmission delay + processing delay + Waiting time.

= 1000 × (2 × 0.025) + 10 + 10 + 10

= (1000 × 0.05) + 30 = 50 + 30

= 80 sec.

05] CRC Method

Given:-

Bit Stream = 11011110

Polynomial Generator = $x^4 + 1$

≈ 10001 $\approx [x^4 \times 1 + x^3 \times 0 + x^2 \times 0 + x^1 \times 0 + x^0 \times 1]$

We will use division method, add add 3 0's at end of Bit Stream.

```
10001 | 11011110000
```

XOR 10001

```
 10101
```

XOR 10001

```
 00100100
```

XOR 10001

```
 00011000
```

XOR 10001

```
 10010
```

XOR 10001

```
 X11
```

CRC ⟶

XOR table

0,0	→ 0
1,1	→ 1
0,1	→ 1
1,0	→ 1

CRC → 0011

The last 4 bit we appended, will be replaced by CRC → 0011

Actual bit string transferred
= 11011110 0011

Let us suppose, third bit from left is inverted.

Received Bit string = 11111110 0011

Error Detection: Dividing again by 1001, if it leaves 0 as remainder, means there is no error.