KLEF

B.Tech Even Sem: Semester In Exam-1 P_1

Academic Year: 2020-21.

19CS2109A – Computer Networks + Security

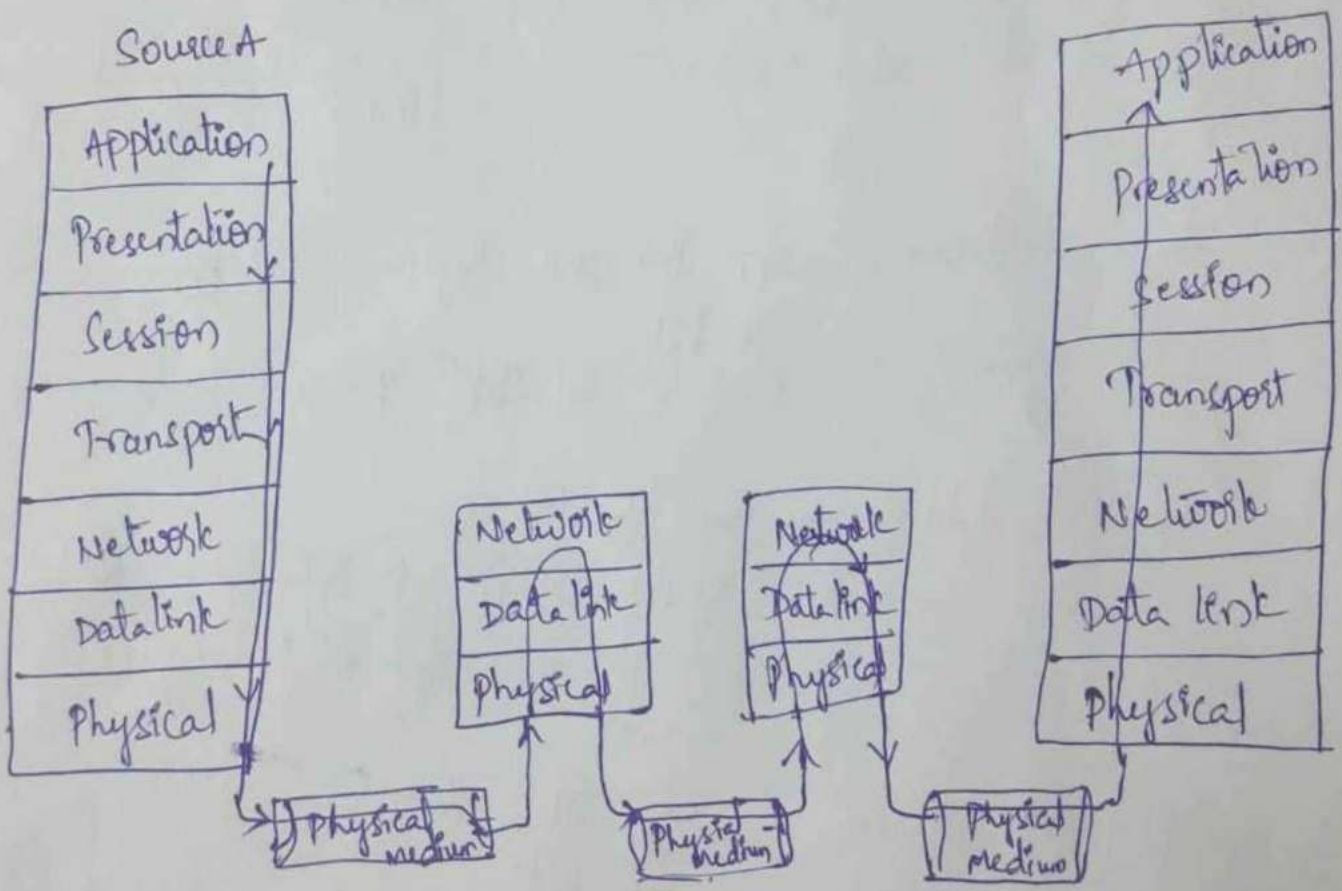
Set-3 Key + Scheme Max Marks: 50m.

① Given Source = A
Destination = B

Diagram (2.5 M)
Explanation (2 M)

Intermediate Nodes = X + Y

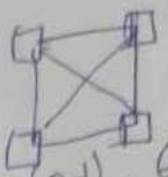
How the data flow happens is as follows.



Flow of data through various layers in various nodes.

(2) List the number of cables required for connecting a set of nodes when the node follow (4)

(a) Mesh – Diagram + explanation $n=4$.

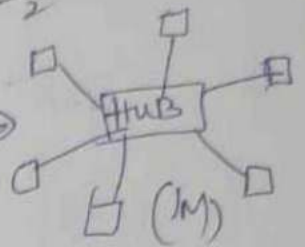


(1.5M)

$\frac{n(n-1)}{2}$ where n – nodes. $\therefore \frac{n(n-1)}{2} = 6$.

(b) Star – Single hub at center

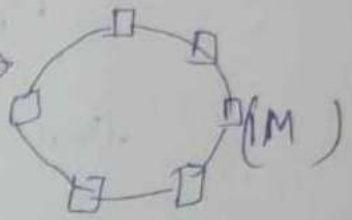
diagram with explanation ⇒



(1M)

(c) Ring – 2 nodes connecting cable.

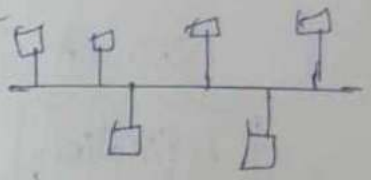
⇒



(1M)

(d) Bus – Backbone failure leads to entire n/w failure

(1M)



Port Address – In transport layer (2M)

16 bit

Used to identify process in a node.

Logical Address – In n/w layer

32 bit if IPv4 is followed (2M)

Used to identify Node uniquely in Internet

physical Address – In DLL layer

48 bit (2M)

Identify node within the network

Data link layer Responsibility → Framing, Error control Flow control

Network layer Responsibility → Routing, congestion, Ip addressing.

Simple Parity

→ Used for Error detection done.

– Noof parity bits are less in number

(2M)

2D parity / Multi 2-dimentional Parity

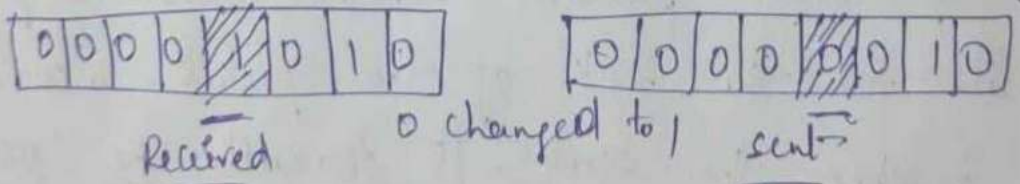
– Used for Error detection + also for Single bit error correction

– No of parity bits are more in number than simple parity. (2M)

Single Bit Error

Is when only one bit in the data unit has changed

(2M)



Burst Errors

– Means that two or more consecutive bits in the data unit have changed.

(2M)

(5) Go Back N + selective Repeat

Go Back N	selective Repeat
(1) In Go back N protocol if the sent frame are find Suspected then all the frames are retransmitted from the lost pkt.	(1) In selective Repeat, only those frames are retransmitted which are found Suspected.
(2) Less Complex	(2) More complex
(3) Ack type is Cummulative	(3) Ack type is individual
(4) Order of pkts is ensured	(4) No order for packet arriving.
(5) More retransmissions	(5) Reduces retransmissions unnecessarily.

(5×2=10M)

- In Stop + wait protocol sender sends the packet & waits for the ACK of the packet. Once the Ack reaches the sender, it transmits the next Packet in row. If the Ack is not received, it retransmits the previous pkt again. Maximum no. of sequence numbers are '2' (0 or 1). ⇒(2.5M)

To speed up pkts transmission rate pipelined transmissions are adopted in Go back N + selective Repeat.

(6) (i) Given Code word is 221

Convert to binary 0010 0010 0001

After stuffing 01111110 0010 0010 0001 01111110

* Each character can be converted into 3bits/8bits instead of 4 bits as above

* 221 can be converted (two hundred + twenty one) into binary + then perform bit stuffing (4M)

(ii) D_p = 0110 1111 1111 0011 1111 0111 1111 1111 0000.

Flag = 01111110 (4M)

Stuffed data

01111110 0110 1111 10 11 0011 1111 00 1111 10 1111 1 00000 01111110.

(iii) Flag - DLE

Data - IDLE

Stuffed data DLE IDLE DLE DLE (4.5)

Disadv: Wastage of Bandwidth by more unnecessary stuffed data transmission.

(7) Given 4 bits for representing sequence number =>1.5M

Possible no. of sequence numbers are $2^4 = 16$.

Sequence numbers are 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16.

- Sequence Number need Explanation → 3M.

(8) Pipelined transmission. -(4.5M)

- Frames will be transmitted one by one
- Before receiving the acknowledgement of previous frame, next frame can be transmitted.

Eg:- Go-Back N protocol
Selective Repeat protocol } explanation

(9) In Go back N, if we don't receive Ack of a pkt whole window (from lost pkt) is sent again.

Assume window size = 3.
Initially window have 1,2,3 As Ack of '1' receives window slides to 4,5,6 is transmitted. Now when 4th packet ack received 7th pkt is sent & when 5th packet ack is received 8th packet is sent

Now Ack of '6' is not received so window of '6' i.e 6,7,8 packets are retransmitted. Now 6th pkt from there is 9, so 9, 10 will be retransmitted.

∴ These are the serial transmissions of packets:

1, 2, 3, 4, 5, [6], 7, 8, 6, 7, 8 [9] 10 9 10

Total no. of transmissions = 15.

Goback N Explanation -(5M)

(10) Pure Aloha & Slotted Aloha Explanation (2M.)
Derivation —(6M)

Pure Aloha: α – Station's number
N – New frames generation meantime
$0 < N < 1$

If $N > 1 \Rightarrow$ overloading the Channel.
Then $G \Rightarrow$ Mean for frames (new) + Retransmission frames

$N = 0$ then $G \approx N$ S – throughput
$N > 1$ then $G > N$.
$S = G * P_0$ $*P_0$ is the probability of frames transmitted without collision.

$$P_r[k] = \frac{G^k \cdot e^{-G}}{k!} \Rightarrow P_0 = \frac{G^0 * e^{-G}}{0!} \Rightarrow P_0 = \frac{1 \times e^{-G}}{1}$$

$P_0 = e^{-G}$ - substitute in $S = GP^0 \Rightarrow S = G \cdot e^{-G}$.

Vulnerable time – $2T_r$ ∵ G becomes 2G.

$S = G \cdot e^{-2G} \Rightarrow S = \frac{1}{2} * e^{-2 * \frac{1}{2}}$ $\boxed{G = 0.5}$ for pure Aloha

$\Rightarrow S = \frac{1}{2} * e^{-1} \Rightarrow \frac{1}{2e} \Rightarrow S = 0.183 \Rightarrow 18\%$

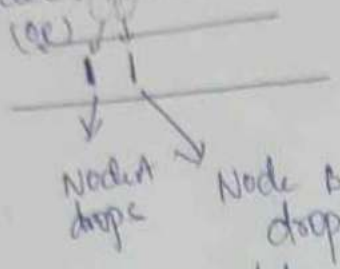
Slotted Aloha

Vulnerable time is T_R ∵ $S = G \cdot e^{-G}$.
$G = 1$ for Slotted Aloha

$S = 1 * e^{-1} \Rightarrow S = \frac{1}{e} \Rightarrow 0.378 = 38\%$

∵ slotted Aloha gives more throughput than Pure Aloha.

(11) (a) Node A : 01110
Node B : 10011
Node C : 11111



Explanation - 3M
Example problem - 3½ M.
Disadvantage — 6M.

∴ winning station is node-C
∴ channel is conquered by 'C'.

Disadv of Bit map over binary count down -
- Floats contention slots + asks all the stations to reserve the slots, allocated the channel as per the reservations.

Eg:- If a station received data from its n/w layer after completing the contention slots. That station has and floats contention slots again.

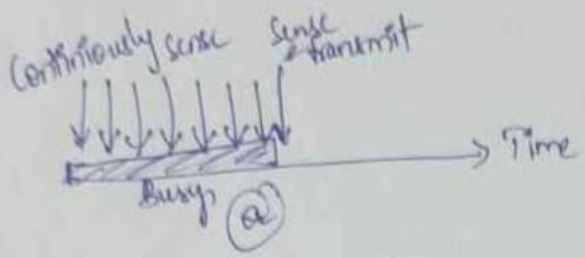
∴ waiting time may be more for few stations sometimes.

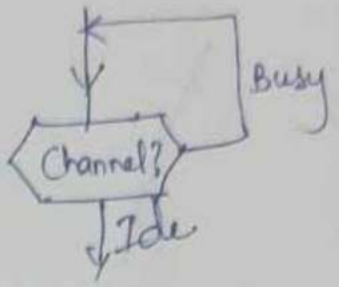
- In Binary count down a station waits only until any one other station completes its transmission waiting time may be decreased.

(12) Persistent methods — 1 persistent
P Persistant
N - persistant.

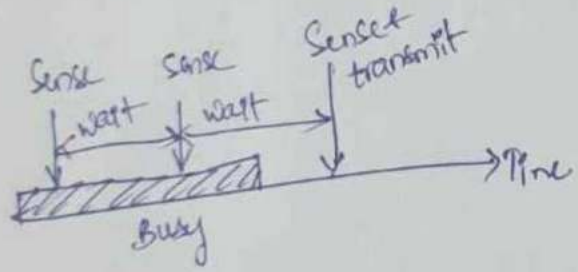
1-Persistent Explanation + flowchart - (4M)

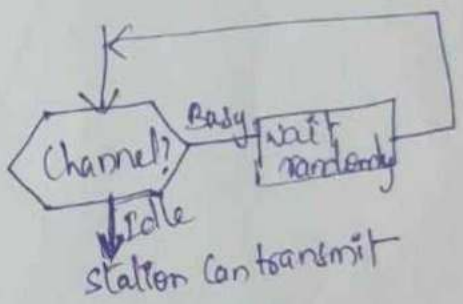
Diagram with explanation





N-Persistent Explanation + flowchart - (4M)





p-Persistent Explanation + flowchart - (4.5M)