

23

► 23.01.2017

MONDAY

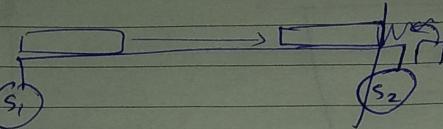
WEEK - 05 / DAY (023-342)

9.00

$$\therefore T_E > T_P$$

10:59:59

10.00

Ex:-

12.00

start time 10:am

$$T_P = 1 \text{ hr} \quad \frac{1 \text{ hr}}{1 \text{ hr}}$$

13.00

Collision

LUNCH

Signal.

at 10:59:59 S₂ start sending due to collision occurs.

14.00

 $\therefore T_E \geq 2 T_P$. ↳ worst case scenario.

15.00

$$\frac{L}{B} \geq 2 \cdot T_P$$

$$\boxed{L \geq 2 \cdot \frac{d}{v} \cdot B}$$

18.00

So, for worst case packet size (L)

19.00

must be $\geq 2 \cdot \frac{d}{v} \cdot B$ bits.

20.00

if it is not then add padding & make it of size L bits. Otherwise you can never

DECEMBER '16

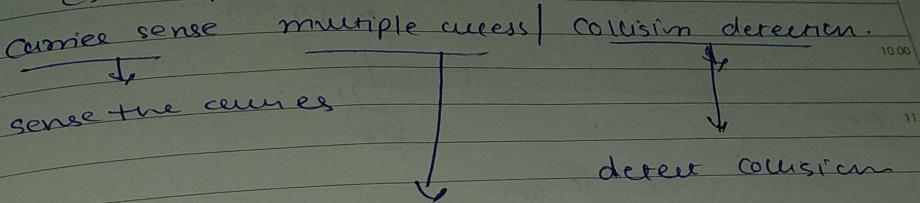
Notes

MO	TU	WE	TH	FR	SA	SU
01	02	03	04			
08	09	10	11			
15	16	17	18			
22	23	24	25			
29	30	31				

receive ~~Ack~~ collision has occurred & because of you. (because it is not with Acknowledgement).

2 JANUARY

CSMA/CD



- it continuously monitor for sensing.
- send a short jamming signal to notify that collision signal has occurred.

- any station can transmit data @ any time but condition is sense the carrier before transmission.

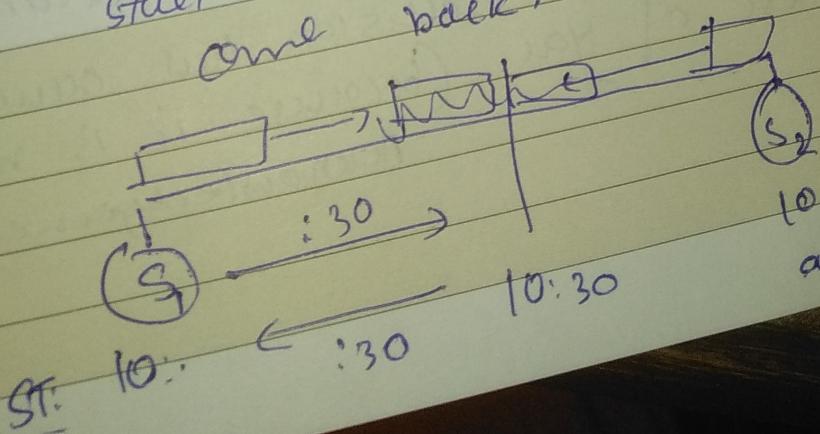
22 SUNDAY

→ CSMA/CD don't use ACK.
- because it is used in LAN.

ex:- if $T_p = 1 \text{ hr.}$

start time = 10 am.

A & B detect noise & send at the same time so at 10:30 they start colliding & collision signal will come back.



Notes

at 11:00 (Collision)

JANUARY '17

MO TU WE TH FR SA SU

30 31

02 03 04 05 06 07

09 10 11 12 13

16 17 18 19 20

23 24 25 26 27

20

► 20.01.2017

FRIDAY

WEEK - 04 / DAY (020-345)

9.00

10.00

11.00

12.00

13.00

LUNCH

14.00

15.00

16.00

17.00

18.00

19.00

0.00

$$\therefore \eta = k * e^{-k}$$

to check max η , use differentiation

$$\frac{d\eta}{dk} = 0 \Rightarrow$$

$$\Rightarrow \eta = 1 * e^{-1} = \frac{1}{e} = 0.368$$

$$= 36.8\% \eta$$

* by either pure/slotted ALOHA. efficiency is very less.

That's why carrier sensing is used.

CSMA (carrier sense multiple access)

Principle :- listen before talk.

- chance of collision can be reduced.

DECEMBER '16

WE	TH	FR	SA	SU
01	02	03	04	
07	08	09	10	11
15	16	17	18	
23	24	25		
30	31			

Notes

2017

if I substitute $\alpha = \frac{1}{2}$ in eqn ①.

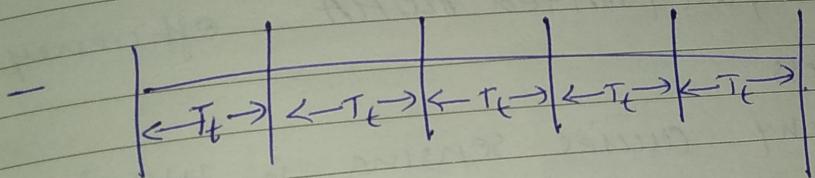
$$\eta = \frac{1}{2} * e^{-1}$$

$$= \frac{1}{2} * e$$

$$= 0.184$$

$$= 18.4\% \text{ (max. efficiency can be achieved)}$$

SLOTTED ALOHA



- make slots of T_t .
- time is divided into slots.
- any station is forced to transmit data in that slot only.
- if a station has missed that time slot, it can communicate in next time slot.
- so, if

data in that specific time slot.

it will collide & retransmit
that's why vulnerable time = T_t .

Notes

MAY

JANUARY '17

MO	TU	WE	TH	FR	SA	SU
30	31					01
02	03	04	05	06	07	
09	10	11	12	13	14	
16	17	18	19	20	21	
23	24	25	26	27		

18

► 18.01.2017

WEDNESDAY

WEEK - 04 / DAY (018-347)

9.00

- efficiency for pure ALOHA

10.00

$$\eta = G \# e^{-2G} \rightarrow ①$$

11.00

where $G = \text{no. of stations who wants to transmit during } T_t \text{ time slot}$

12.00

if you want to achieve max efficiency

13.00

so, let's differentiate it

14.00

$$\frac{d\eta}{dG} = 0 \Rightarrow G = \frac{1}{2}$$

15.00

meaning is half no. of stations who wants to communicate. if they are going to took part in comm. so, max. efficiency can be achieved.

16.00

- but if more than half, $\frac{1}{2}$ would like to took part in comm. efficiency will be decreased.

CEMBER '16						
WE	TH	FR	SA	SU	Notes	
01	02	03	04			
08	09	10	11			
15	16	17	18			
22	23	24	25			

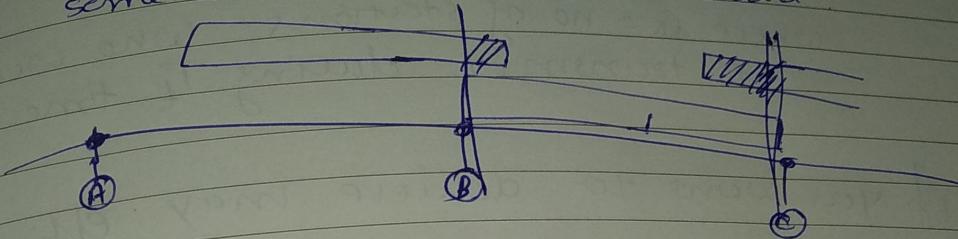
Notes

JANUARY

2017

PURE ALOHA

- before I start & after I start
some one has transmitted data



a station can detect only the point by which it is connected to the channel.

so, let us take an example where B is communicating & during that time.

A has send packet & R was also sending in channel, collision may occur.

meaning is before T_f & after T_b no one should transmit data. that's why vulnerable time = $2T_b$.

vulnerable time is the time for which no fruitful communication gets happen

Notes

WEEK - 04 / DAY (017:34B) 17.01.2017

17

TUESDAY

9.00

10.00

11.00

12.00

13.00

LUNCH

14.00

15.00

16.00

17.00

18.00

19.00

JANUA

MO TU WE

30 31

02 03 0

09 10

16 17

23 2

16

► 16.01.2017

WEEK - 04 / DAY (016-349)

MONDAY

9.00

e) Sense channel.

10.00

carrier sense no-carrier sense.

11.00

- Sense the channel
- if idle then
Send.

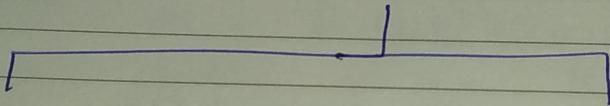
12.00

else if busy wait

LUNCH

#

ALOHA



pure ALOHA

slotted ALOHA.

In ALOHA any station can send any packeting time.

17.00
TMP - [no carrier sensing]

- when collision occurs re-transmit.

- ACK is used either +/-.

DECEMBER '16

TU WE TH FR SA SU
01 02 03 04
06 07 08 09 10 11
13 14 15 16 17 18
21 22 23 24 25

Notes

2 JANUARY

Channel Allocation

① static channel Allocation

- partition channel into pieces based on

freenency, time, code.

- if multi users are there, so share them
using time slots per T,F,C to choose other
option

- ~~10~~ 8

② Dynamic channel Allocation.

a) independent Traffic

- unique traffic

- if frame is generated but can not
transmit, is not applicable, so
Collision will occur.

assumption :- generate → send

b) single channel to transmit

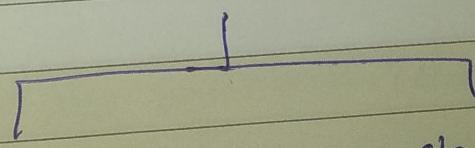
c) assume collision

d) time management.

Notes

continuous

- generate → send



slotted.

- when slot comes
send.

13

- In literature broadcast channels are sometimes referred as multiple access or random access channel.

FRIDAY

13.01.2017

WEEK - 03 / DAY (013-352)

9.00



Ideas multiple access protocol. ?

10.00

① efficient

12.00

② fair (equal time for all to share)

13.00

③ fully decentralised (not over burden on one station, all will take decision)

LUNCH

④ simple (not expensive & slow)

14.00

if single point failure occurs, everything will gone. Every station is supposed to take a decision, whether to talk or not.

15.00



channel Allocation

16.00

Static

17.00

- channel partitioning

18.00

① FDM A

19.00

② TDM A

00

③ CDMA

Dynamic.

random access

→ slotted ALOHA,

ALOHA, CSMA,

CSMA/CA,

CSMA/CD

taking turns.

- polling

- token ring.

DECEMBER '16

WE TH FR SA SU

01 02 03 04

08 09 10 11

15 16 17 18

22 23 24 25

Notes

partition channel into

pieces based

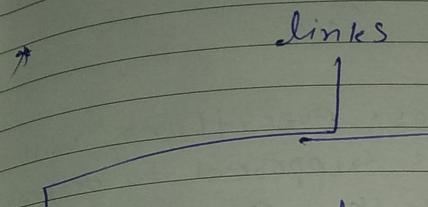
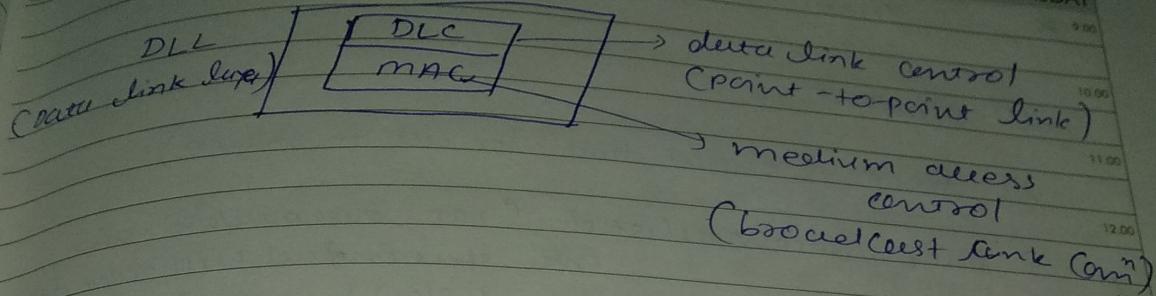
on time, frequency,

code.

2 JANUARY

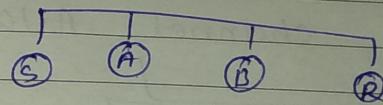
2 JANUARY 7

Concepts



point-to-point link

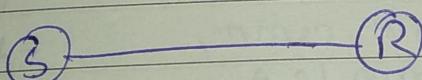
Broadcast links



- full duplex
- both can communicate.

- if all can transmit & collision may occur.
- shared wire/medium.

* Flow control:-

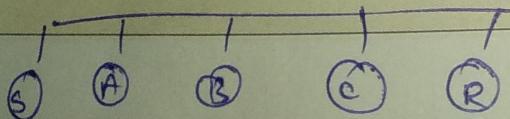


bfr.

receiver's buffer should not overflow.

* Access control.

- only I can send ⑧



same time, others have to wait
otherwise collision & retransm.