CS & IT ENGINEERING

COMPUTER NETWORKS

TCP & UDP

Lecture No- 12

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- TCP timer managment Part-2

Basic Algorithm

Disadvantage

T.O = 2*RTT

Jacobson's Algorithm

$$TO = 4 * ID + RTT$$

Pkt-1

$IRTT = 10sec, \quad ID = 5$

$\alpha = \frac{1}{2} = 0.5$

$TO = 4 * ID + RTT$

$= 4 * 5 + 10$

$TO = 30sec$

$ARTT = 20sec$

$AD = |IRTT - ARTT|$

$= |10 - 20| = 10$

$NRTT = \alpha(IRTT) + (1-\alpha)ARTT$

$= 0.5 * 10 + 0.5 * 20$

$= 5 + 10 = 15sec$

$ND = \alpha(ID) + (1-\alpha)AD$

$= 0.5 * 5 + 0.5 * 10$

$= 2.5 + 5 = 7.5$

Pkt-2

IRTT = 15 sec

ID = 7.5

T.O = 4 * ID + RTT

= 4 * 7.5 + 15 = 45 sec

ARTT = 30 sec

AD = |IRTT - ARTT|

= |15 - 30| = 15

NRTT = α(IRTT) + (1 - α) ARTT

= 0.5 * 15 + 0.5 * 30

= 7.5 + 15 = 22.5 sec

ND = α(ID) + (1 - α) AD

= 0.5 * 7.5 + 0.5 * 15

= 3.75 + 7.5 = 11.25

Pkt-3

IRTT = 22.5 sec

ID = 11.25

T.O = 4 * ID + RTT

= 4 * 11.25 + 22.5

= 45 + 22.5 = 67.5

ARTT = 10 sec

$AD = |IRTT - ARTT|$

$= |22.5 - 10|$

$= 12.5$ sec

$NRTT = \alpha(IRTT) + (1-\alpha)ARTT$

$= 0.5 * 22.5 + 0.5 * 10$

$= 11.25 + 5 = 16.25$ sec

$ND = \alpha(ID) + (1-\alpha)AD$

$= 0.5 * 11.25 + 0.5 * 12.5$

$= 5.625 + 6.25 = 11.875$

Pkt-4

$IRTT = 16.25$

$ID = 11.875$

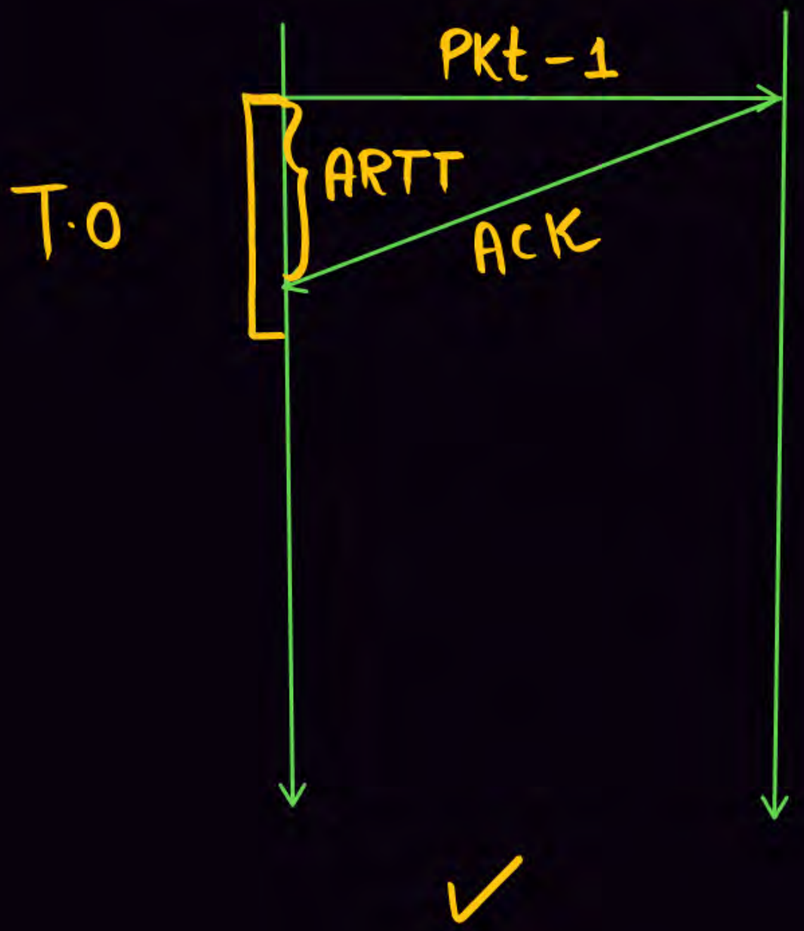
$T·O = 4 * ID + RTT$

$= 4 * 11.875 + 16.25$

$= 47.5 + 16.25$

$T·O = 63.75$

Problem in Basic and Jacobson's Algorithm



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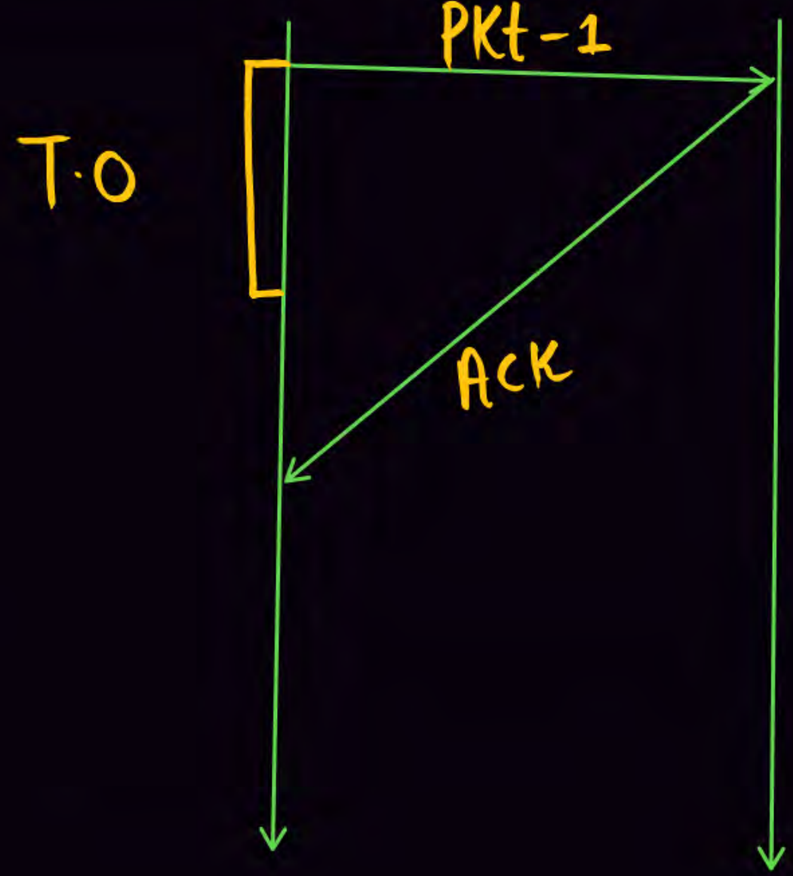
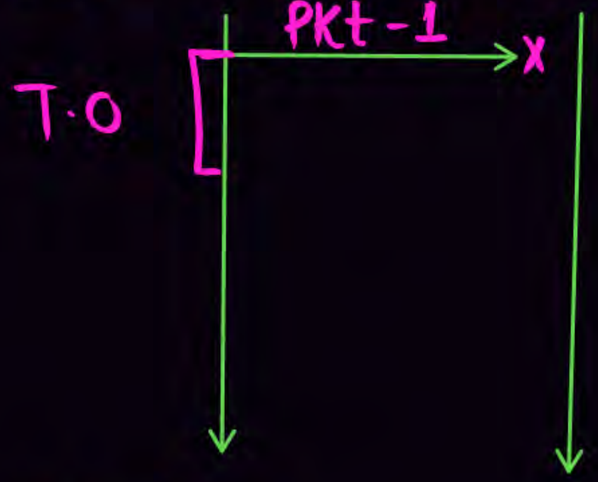
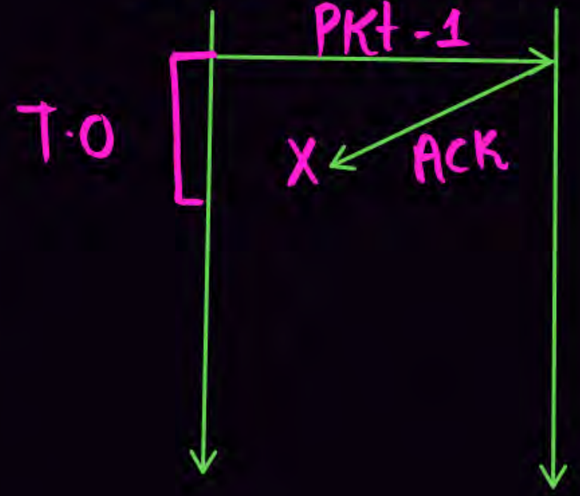


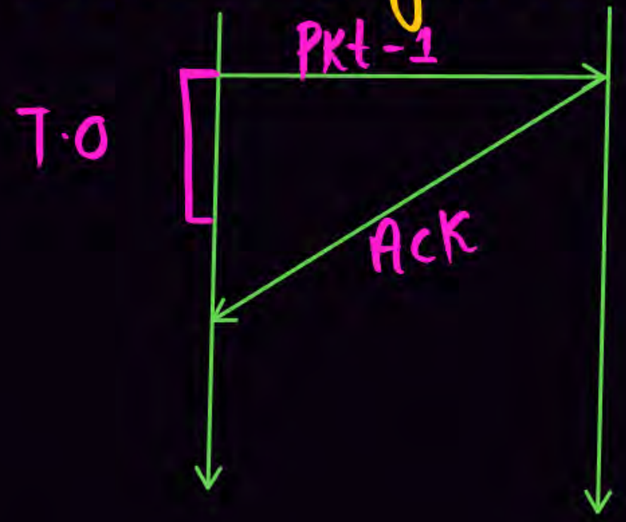
Case I : Lost data Pkt



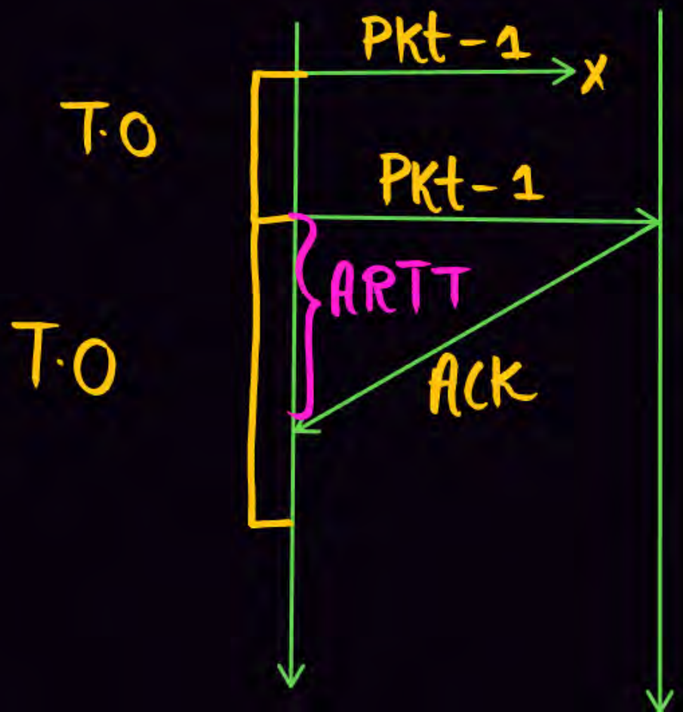
Case II : Lost Ack

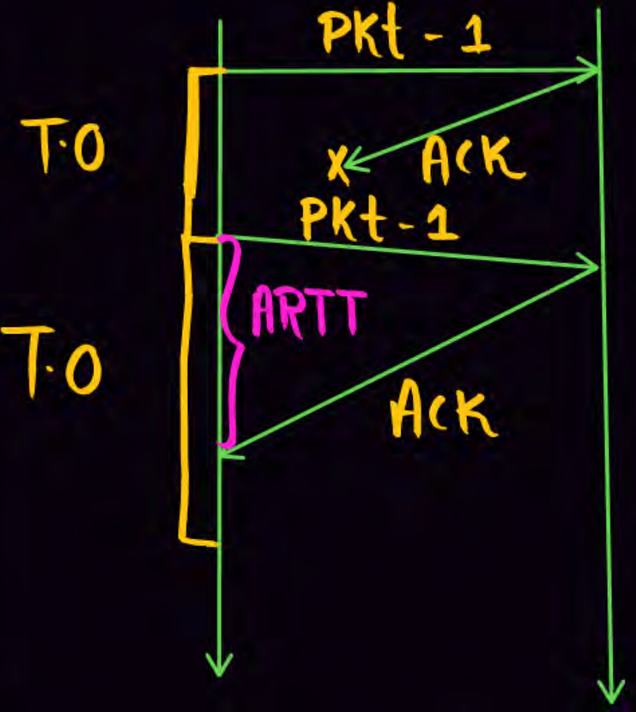


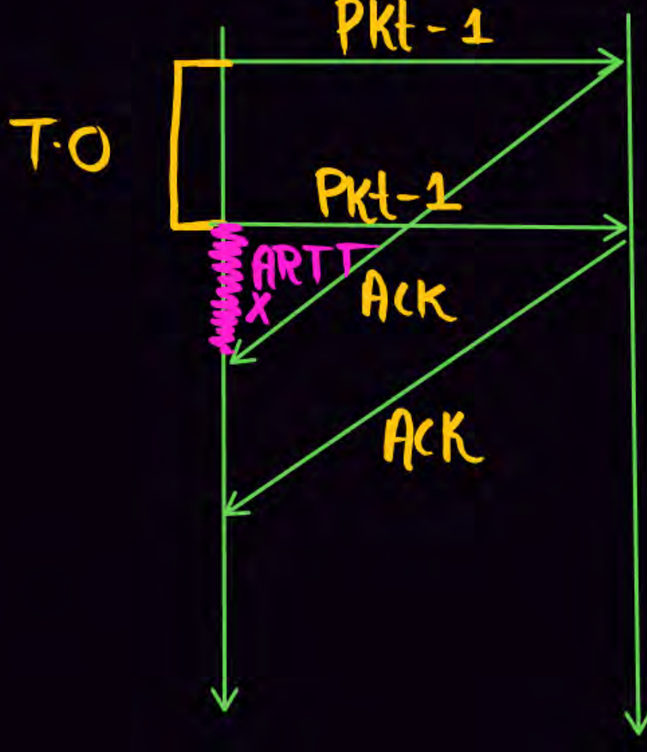
Case III : Delay Ack



Solutions:







Note: If there is a time out timer then there is a possibility to Receive two Acknowledgement.

i) **From original Packet**

ii) **From retransmitted packet**

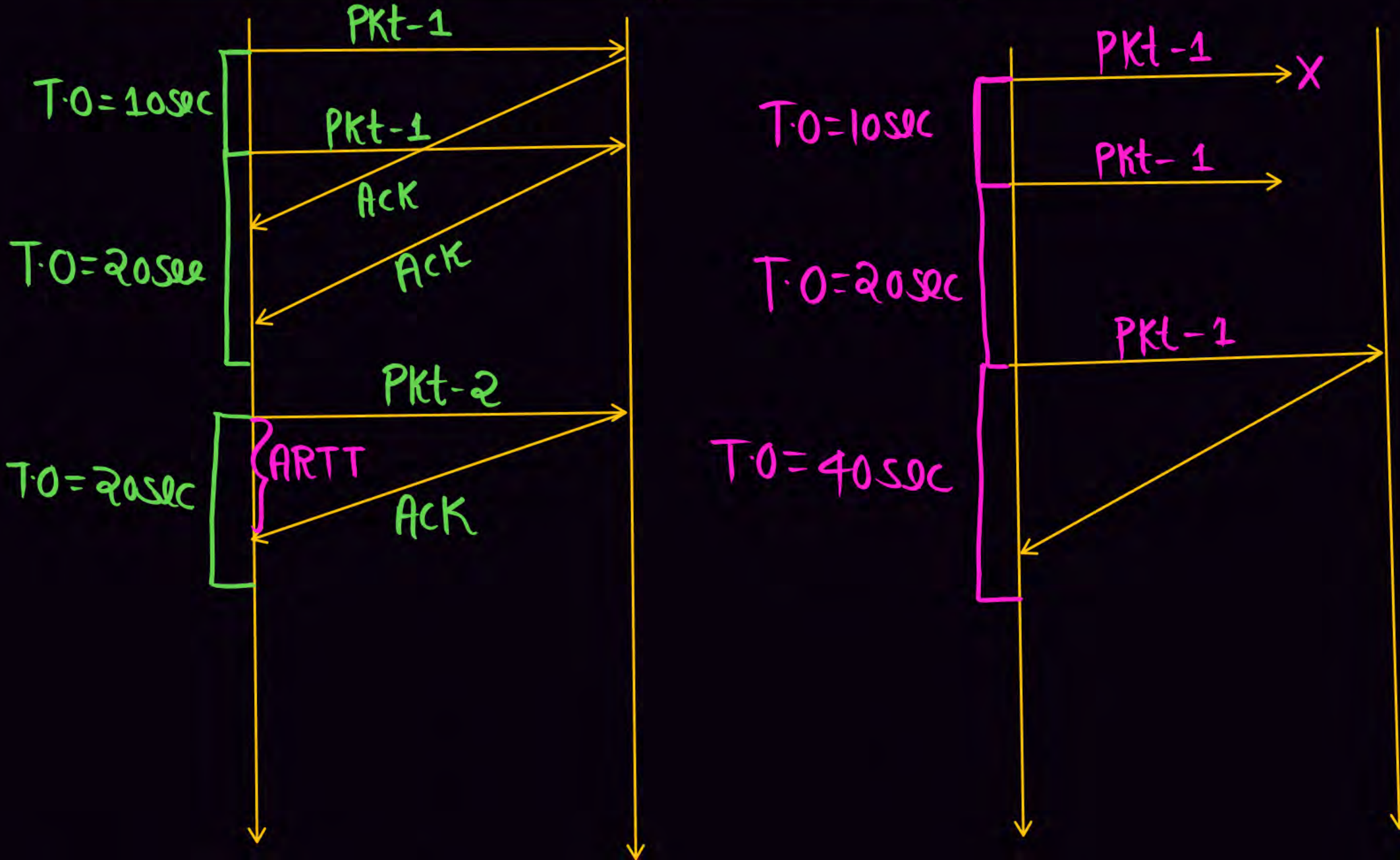
Then there is an Ambiguity that which acknowledgement must be considered for Next calculation and what must be the time out timer for retransmitted packet. Therefore Karn's has solved this problem by proposing the following strategy :

Karn's Modification :

Do not consider the round trip time of a retransmitted packet in the calculation. Do not update the value of RTT until you send a segment and receive an Acknowledgement without need of retransmission.

If retransmission occurs value of time out timer is doubled for each retransmission.

Case III : Solution (According to Karn's Algorithm)



1. If the TCP round-trip time, RTT, is currently 30 msec and the following acknowledgement come in after 26, 32 and 24 msec, respectively, the new RTT estimate will be _____ ms.

Note: (Use $\alpha = 0.9$.)

Solution : (Basic Algorithm)

Pkt-1

RTT = 30 msec

T.O = 2 * RTT

= 2 * 30 = 60 msec

ARTT = 26 msec

NRTT = α(IRTT) + (1-α) ARTT

= 0.9 * 30 + 0.1 * 26

= 27 + 2.6 = 29.6 msec

Pkt-2

IRTT = 29.6 msec

T.O = 2 * RTT

= 2 * 29.6 msec

= 59.2 msec

ARTT = 32 msec

NRTT = α(IRTT) + (1-α) ARTT

= 0.9 * 29.6 * 0.1 * 32

= 26.64 + 3.2

= 29.84 msec

Pkt-3

IRTT = 29.84 msec

T.O = 2 * RTT

= 2 * 29.84

= 59.68 msec

ARTT = 24 msec

NRTT = α(IRTT) + (1-α) ARTT

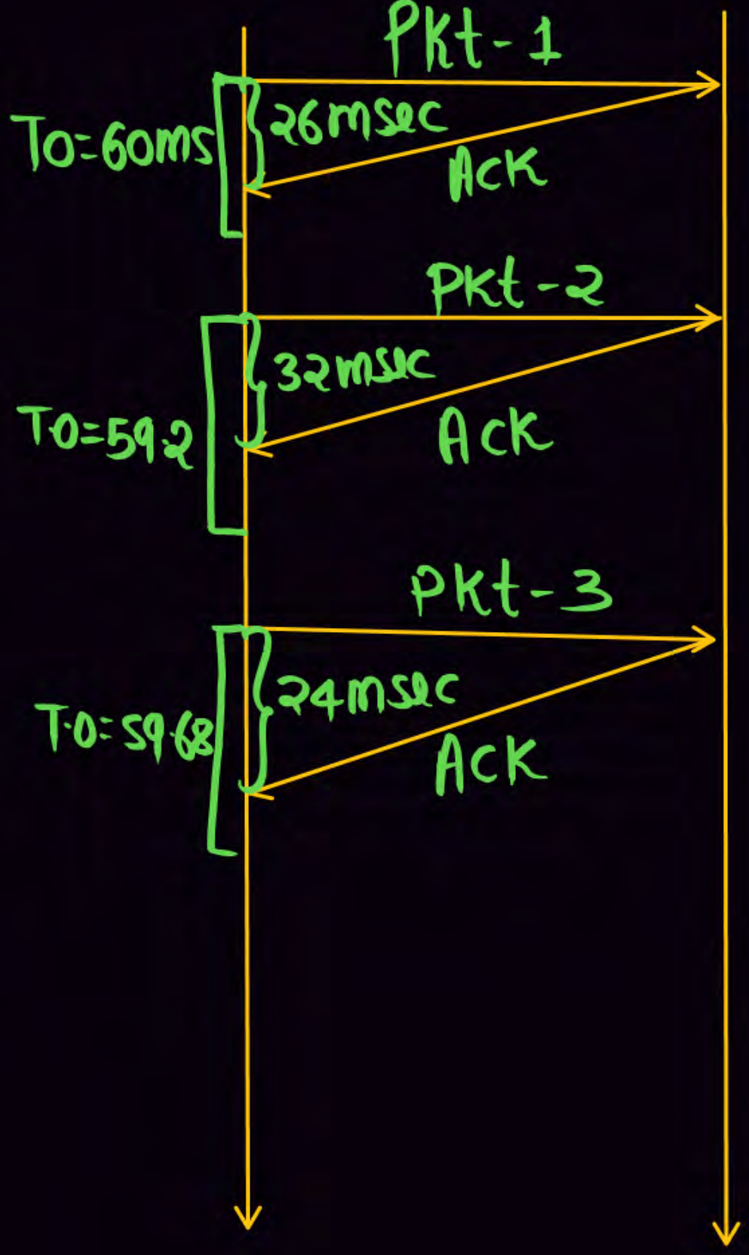
= 0.9 * 29.8 + 0.1 * 24

= 26.856 + 2.4

= 29.256 msec

Pkt-4

IRTT = 29.256


Pkt-1
TO=60ms
26msec
Ack
Pkt-2
32msec
TO=59.2
Ack
Pkt-3
TO=59.68
24msec
Ack

2. In TCP, the current Round trip time is 20 m sec and Acknowledgements come after 32 m sec. use $\alpha = 0.5$ and initial deviation as 4. Find the estimated round trip time & time out in Jacobson's Algorithm.

A. 28 m sec, 58 m sec

B. 26 m sec, 52 m sec

C. 26 m sec, 58 m sec

D. 26 m sec, 56 m sec

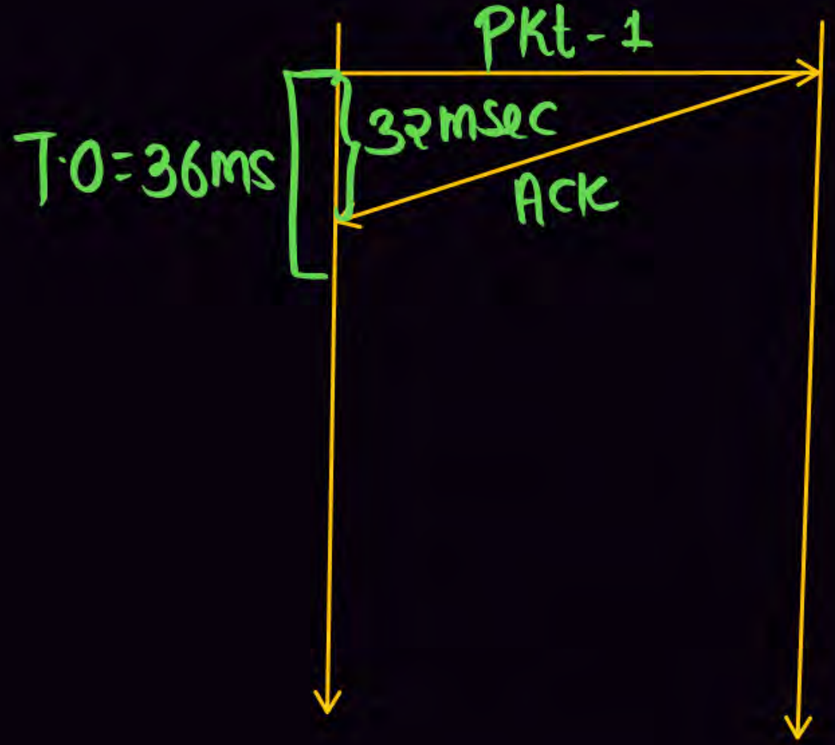
Pkt-1

IRTT = 20msec , $\alpha = 0.5$, ID = 4

T.O = 4*ID + RTT

= 4*4 + 20 = 36msec

ARTT = 32msec



$AD = |IRTT - ARTT|$

$= |20 - 32| = 12$

$NRTT = \alpha(IRTT) + (1-\alpha)ARTT$

$= 0.5 * 20 + 0.5 * 32$

$= 10 + 16 = \underline{26}$ msec

$ND = \alpha(ID) + (1-\alpha)AD$

$= 0.5 * 4 + 0.5 * 12$

$= 2 + 6 = 8$

Pkt-2

$IRTT = 26$ msec

$ID = 8$

$T.O = 4 * ID + RTT$

$= 4 * 8 + 26$

$= 32 + 26 = \underline{58}$ msec

H.W

3. The TCP round trip time is currently 35 m sec, and it takes a segment at this moment to be acknowledged in 32 m sec after which the new RTT value is to be calculated then the next Acknowledgement comes in after 40 m sec, ID = 0.9 then finally what will be new estimated RTT in m sec.

A. 34. 7 m sec

B. 35.5 m sec

C. 35.23 m sec

D. 38.4 m sec


THANK YOU
GW
SOLDIERS !