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Ques 4:

Ans → Given,

(IRTT) Initial RTT = 5 msec.

(ID) Initial deviation = 2.5 msec.

first three segment = 10msec, 15 msec, 5 msec

$\alpha = 0.5$

for 1st segment →

$IRTT_1 = 5$ msec.

$ID_1 = 2.5$ msec

time out timer value.

$= 4 \times ID_1 + IRTT_1$

$= 4 \times 2.5 + 5 = 15$ msec

Now ACK. for the 1st segment is received.

after 10 msec, so.

(ARTT) Actual RTT = 10 msec.

(AD) Actual deviation = $|IRTT - ActualRTT|$.

$= |5 - 10| = 5$ msec.

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for 2nd segment

$$IRTT_2 = \alpha \times IRTT1 + (1-\alpha) \times ARTT1$$

$$= 0.5 * 5 + (1-0.5) \times 10$$

$$= 0.5 \times 5 + 0.5 \times 10$$

$$= 2.5 + 5 = 7.5 \text{ msec.}$$

$$ID_2 =$$

$$\alpha \times ID_1 + (1-\alpha) \times AD1$$

$$= 0.5 \times 2.5 + (1-0.5) \times 5$$

$$= 0.5 \times 2.5 + 0.5 \times 5$$

$$= 1.25 + 2.5 = 3.75$$

So Time out timervalue (TOT_2)

$$= 4 \times ID_2 + IRTT2$$

$$= 4 \times 3.75 + 7.5$$

$$= 22.5$$

Now ACK. for the 2nd segment is Received after 15 msec., so.

$$ARTT_2 = 15 \text{ msec.}$$

$$AD_2 = |IRTT_2 - ARTT_2| = (7.5 - 15)$$

$$= 7.5.$$

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for 3rd segment.

IRTT3
$= \alpha \times IRTT_2 + (1-\alpha) ARTT2.$

$= 0.5 \times 7.5 + 0.5 \times 15$

$= 11.25$ msec

$ID3 = \alpha \times ID2 * (1-\alpha) \times AD2$

$= 0.5 \times 3.75 + 0.5 \times 7.5$

$= 5.625$ msec

(TOT3) Time out timer.

$= 4 \times ID3 * IRTT3.$

~~$= 4 \times 11.25 + 11.25$~~

$= 4 \times 5.625 + 11.25$

$= 33.75$ msec

Now ACK for 3rd sec = 5 msec. So,

$ARTT_3 = 5$ msec.

$AD3 = |11.25 - 5| = 6.25$ msec.

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for 4th segment :

$$IRTT_4 = \alpha \times IRTT_3 + (1-\alpha) * ARTT_3.$$

$$= 0.5 \times 11.25 + (1-0.5) * 5$$

$$= 8.125 \text{ mec.}$$

$$ID_4 = \alpha \times ID_3 + (1-\alpha) AD_3$$

$$= 0.5 \times 5.625 + 0.5 \times 6.25$$

$$= 5.9375 \text{ mec}$$

$$TOT_4 = 4 \times ID_4 + IRTT_4$$

$$= 4 \times 5.9375 + 8.125$$

$$= 31.875 \text{ mec}$$