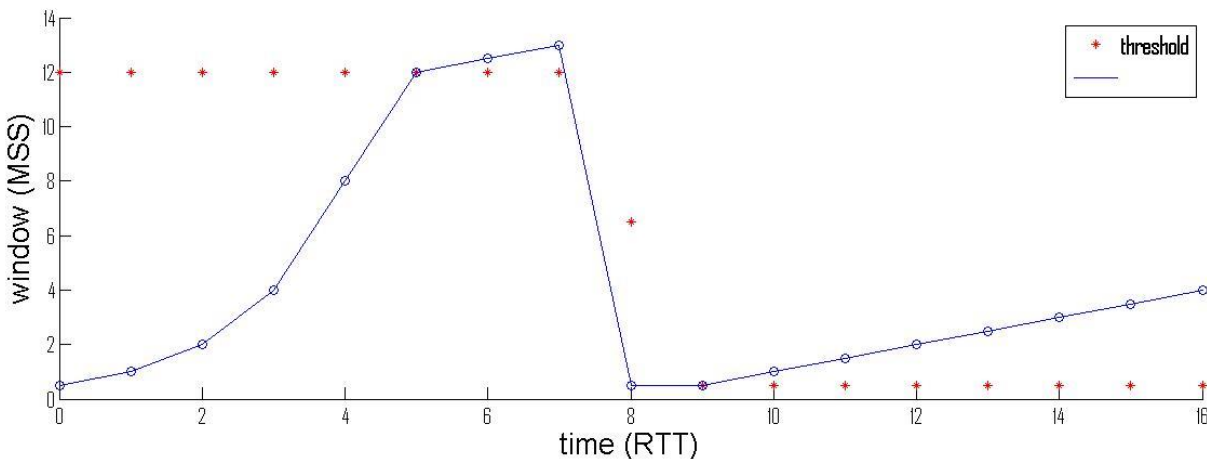


- 1 If slow start algorithm is used with initial MSS = 512 bytes and initial threshold of 12K, draw a diagram illustrating the TCP congestion windows size at transmissions 0 through 16 if timeout occurs at transmissions #7 and #8.

Solution

a)

Time	0	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.
Congestion Window	0.5	1	2	4	8	12	12.5	13	0.5	0.5	1	1.5	2	2.5	3	3.5	4
Threshold	12	12	12	12	12	12	12	12	6.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5



- 2- Slow start can cause large delays in reaching a link full capacity or recovering from congestion. Given a link with a round-trip delay of 60 msec and 1 Gbps capacity, determine the TCP window size needed to keep the link full and Calculate the time it will take the TCP congestion window to reach that size if the MSS is 1 Kbytes and the initial threshold value is 2 Mbytes.

Solution

$$\begin{aligned} \text{Window size} &= \text{link capacity} * \text{round trip delay} \\ &= 10^9 * 0.06 = 6 * 10^7 \text{ bits} = 7.5 * 10^6 \text{ bytes} \end{aligned}$$

$$\begin{aligned} \text{Time needed} &= \text{time of exponential growth} + \text{Time of linear growth} \\ &= T_1 + T_2 \end{aligned}$$

$$T_1 = 0.06 * \log_2 2 * 1024 = 11 * 0.06 = 0.66 \text{ sec}$$

$$T_2 = (7.5 * 10^6 - 2 * 1024) * 0.06 = 4.498 * 10^5 \text{ sec}$$

$$T = 4.4987778 * 10^5 \text{ sec}$$