Q1. Suppose Host A want to send a large file to Host B. The Path from Host A to Host B has three links, of Rates $R_1 = 500$ KBPS, $R_2 = 2$ MbPS, and $R_3 = 1$ MbPS.

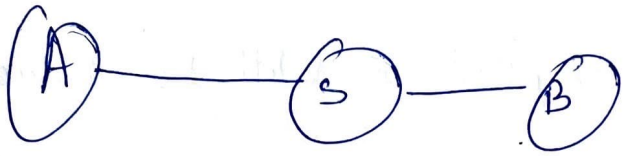
a) Assuming no other traffic in the network, what is the throughput for the file transfer?

b) Suppose the file in 4 million bytes. Dividing the file size by the throughput, roughly how long will it take to transfer the file to Host B?

c) Repeat (a) & (b), but now with R_2 reduced to 100 Kbps.

Q.2 Calculate the total time required to transfer a 1.5 MB file in the following cases, assuming RTT of 80ms, a packet size of 1KB and an initial 2*RTT of "handshaking" before it is sent. a) The b/w is 10MbPs, and the data packets can be sent continuously. b) The b/w is 10MbPs, but after we finish sending each data packet, we must wait one RTT before sending the next.

(Q.3) Host A & B are each connected to a Switch S via 10-Mbps link as shown above. The propagation delay on each link is 20μs. S is a store-and-forward device that can send and receive bit simultaneously; it begins retransmitting a received packet 35μs after it has finished receiving it (if it can). Calculate the total time in millisecands required to transmit 12,000 bits from host A to host B



Sol

Q3 $20\mu s + \frac{12 * 10^3}{10 * 10^6}$ sec. $= 0.02 + 1.2$ msec
$= 1.22$ msec.

Total time:
$2 * 1.22 + 0.035$ msec $= 2.475$ msec.

Q.1) a = 500 kbs.

b) $\frac{4 \times 10^6 \times 8}{500 \times 10^3}$ (bps)

c) $\frac{4 \times 10^6 \times 8}{100 \times 10^3}$

b) $2RTT + 1499\left(RTT + \frac{1 * 10^3}{10 \times 10^6}\right) + \frac{1 * 10^3}{10 * 10^6} + \frac{RTT}{2}$

Q.2 L = 1 KB
RTT = 80 ms
No. of packets $= \frac{1.5 * 10^6}{10^3} = 1500$

a) R = 10 Mb
$2 \cdot RTT + 1500 \times \left(\frac{1 * 10^3}{10 * 10^6}\right) + \frac{RTT}{2}$