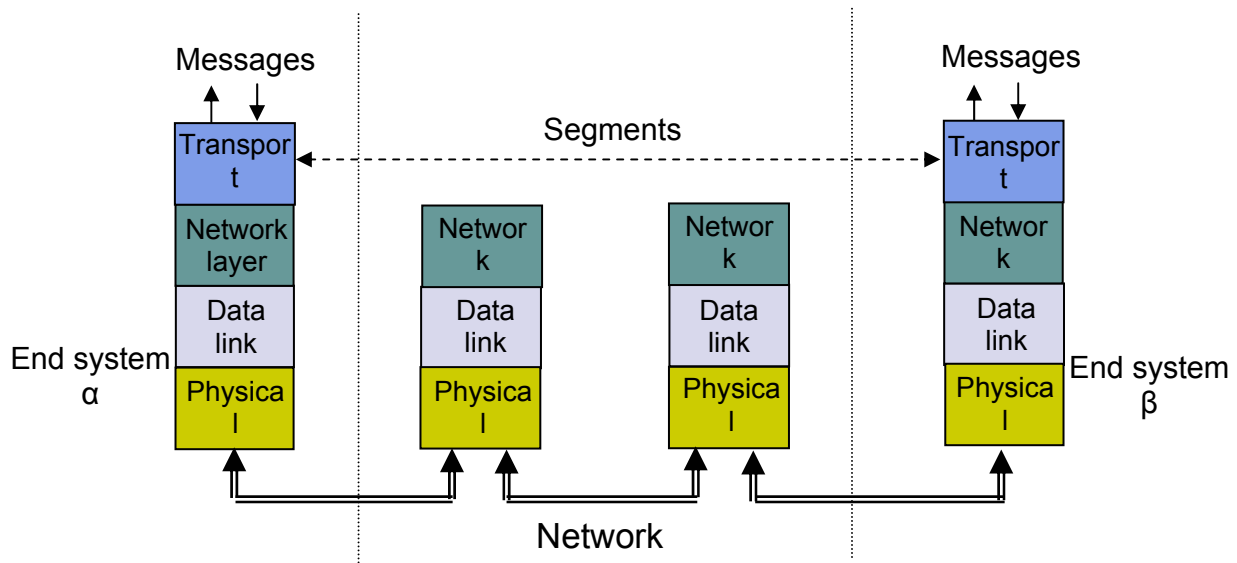




Suppose that the two end systems α and β above communicate over a connection-oriented packet network. Suppose that station α sends a 10-kilobyte message to station β and that all packets are restricted to 1000 bytes (neglect headers); assume that each packet can be accommodated in a data link frame. For each of the links, let 0.1 be the probability that a frame incurs errors during transmission.

Suppose that error recovery is carried out end to end and that if there are any errors, the entire message is retransmitted. How many times does the message have to be transmitted on average?

Message length = 10000 bytes

Max. packet size = 1000 bytes

Number of packets for transmission = 10, i.e., 10 frames needed

The probability of a packet (frame) arriving error free at end system is $(1-p)^3$. The probability that all packets (frames) arrive error free at end system b is $[(1-p)^3]^{10} = (1-p)^{30} = e^{-30p}$

The average number of required transmissions = $1/(e^{-30p}) = e^{30p} = e^3$