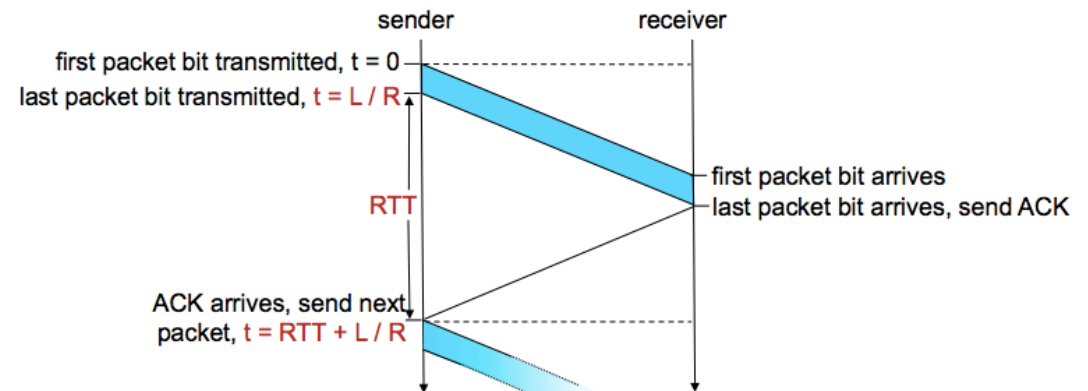# Quiz: Sliding Window Protocols

❖ Consider a path of bottleneck capacity R, round-trip time T, and maximum segment size L. What is the greatest throughput improvement factor that an ideal pipelined protocol (assuming corruptions and loss are negligible) can provide compared to a stop-and-wait protocol?

A. $2L/(RT+L)$

B. $(L/R)/(T+L/R)$

C. $(RT+L)/L$

D. $(TR/L)^2$

rdt3.0: stop-and-wait operation

sender   receiver

first packet bit transmitted, t = 0

last packet bit transmitted, t = L / R

first packet bit arrives

RTT

last packet bit arrives, send ACK

ACK arrives, send next packet, t = RTT + L / R

$$U = \frac{L/R}{RTT + L/R} = \frac{.008}{30.008} = 0.00027$$