

Transport Layer Contd.

→ Reliability from 1st principles

→ No error

→ Bit error

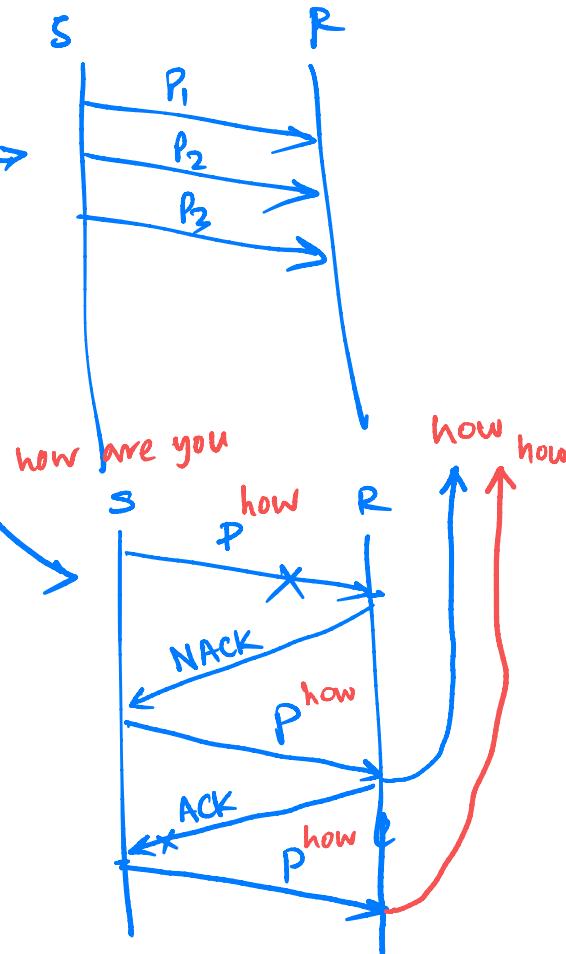
→ Bit error + pkt loss

→ Bit error + pkt loss + delay

→ Performance of Stop and go

→ Pipelined transmission

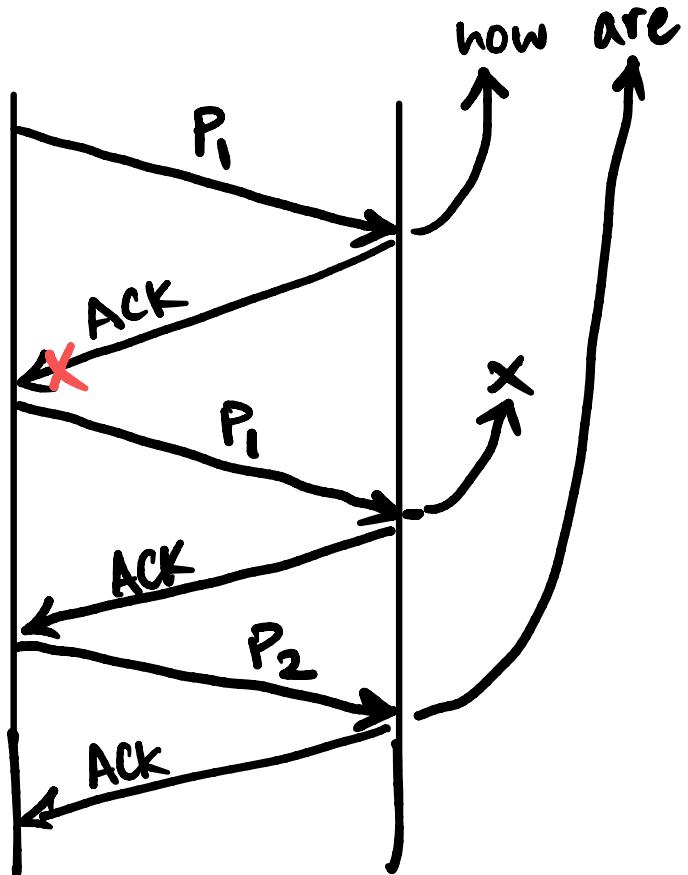
→ Go Back N protocol



Bit errors

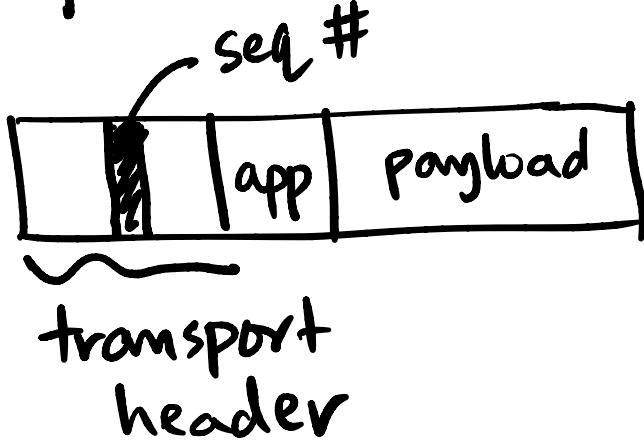


NACK error not a problem but
ACK error causes duplication



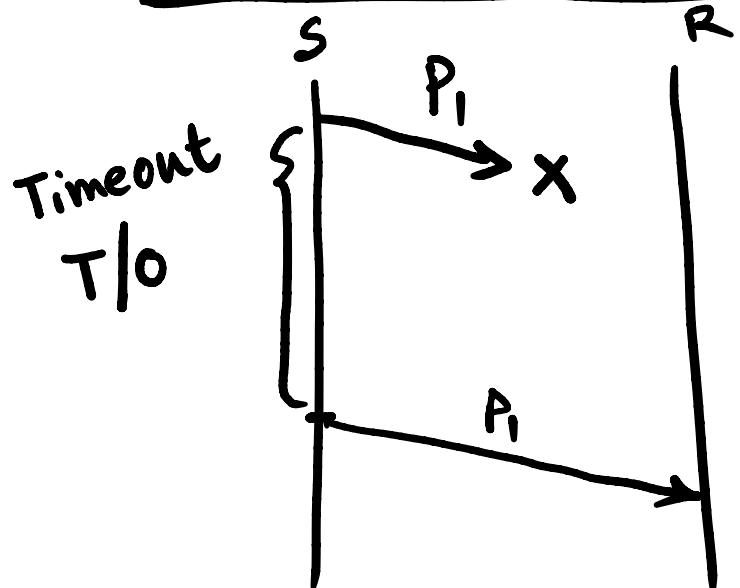
solution

Introduce seq. # in
packets.



* 2 seq # enough for the above protocol to be reliable under bit errors.

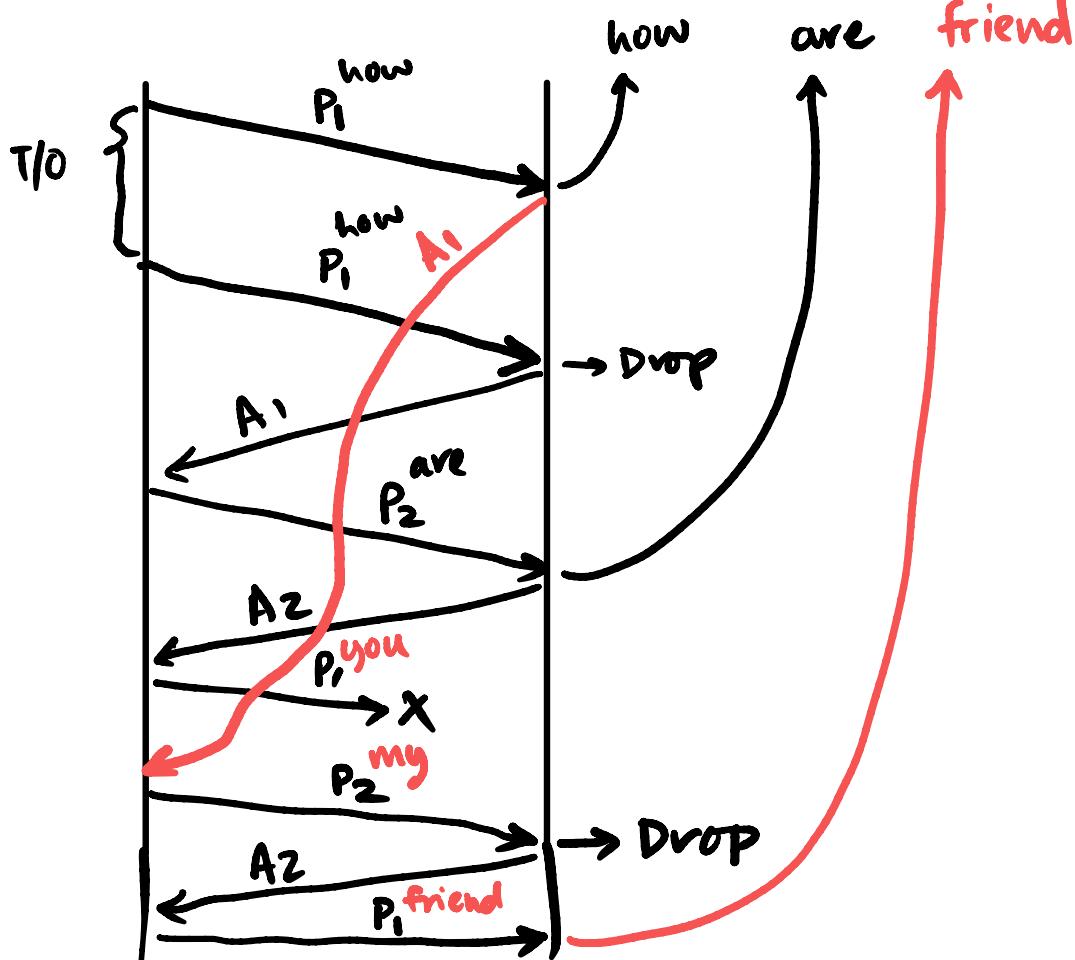
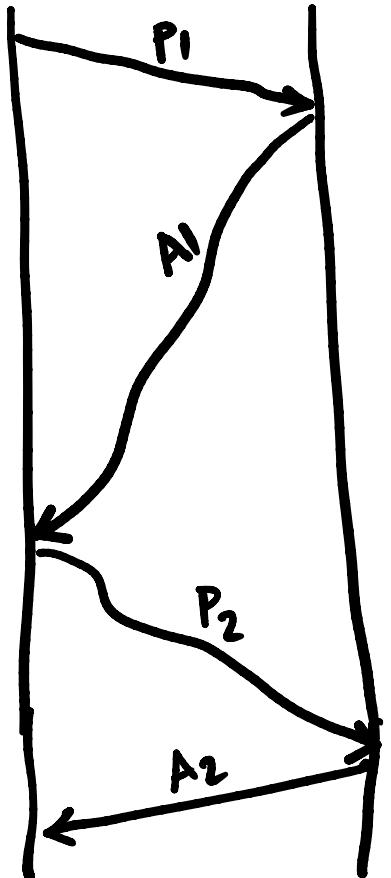
③ Bit error + pkt loss

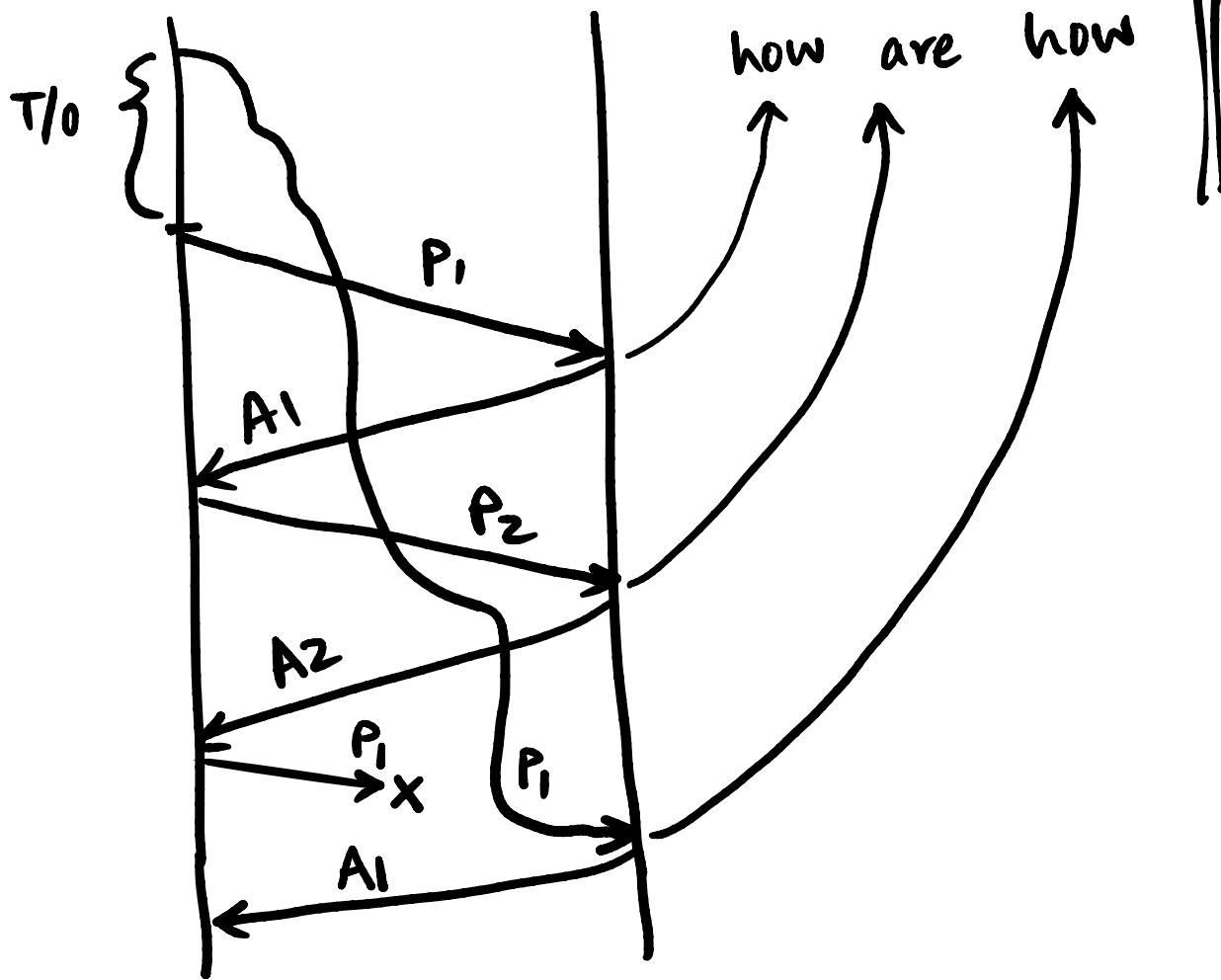


Timeout takes care of the lost packet.

Bit error + pkt loss + Delay

how are you my friend





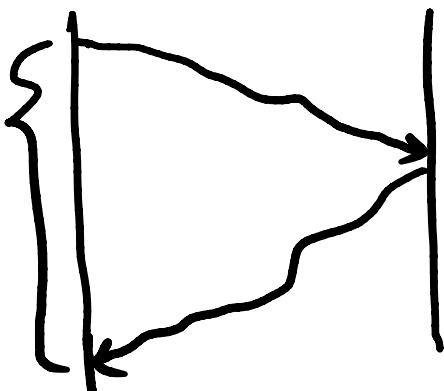
|| Duplication,
hence
unreliable

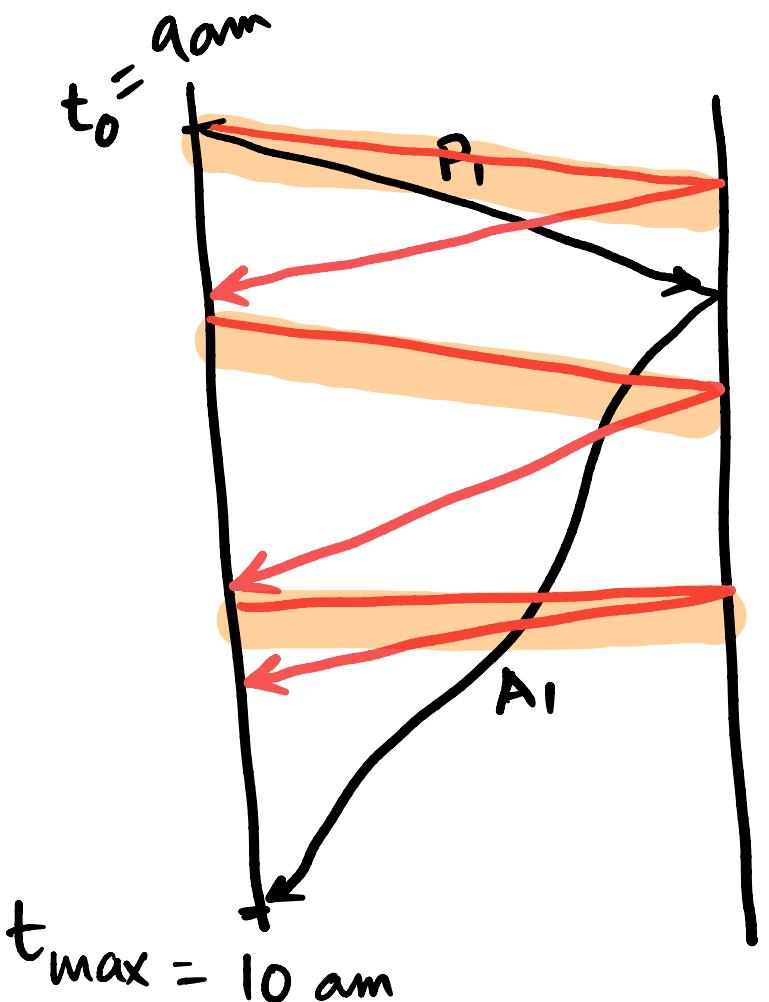
Solution : Increase seq #'s so that they don't wrap in the same sender to receiver session.

↳ But what is the max seq. # ?

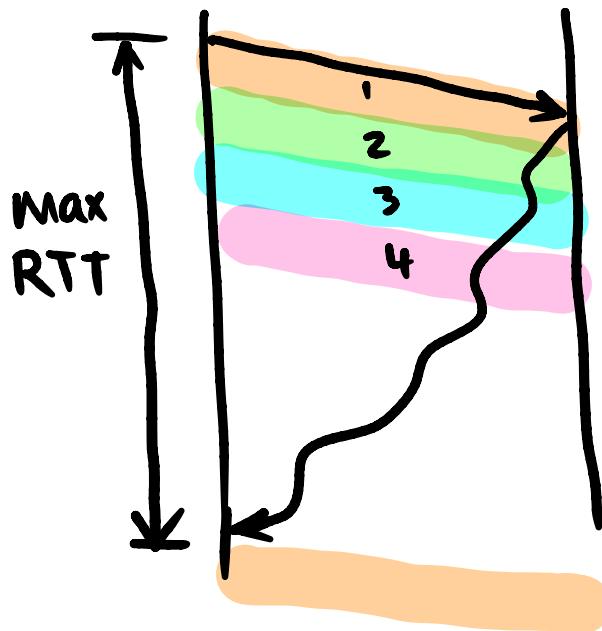
⇒ You can estimate the max "Round Trip Time" (RTT) from sender S to Receiver R.

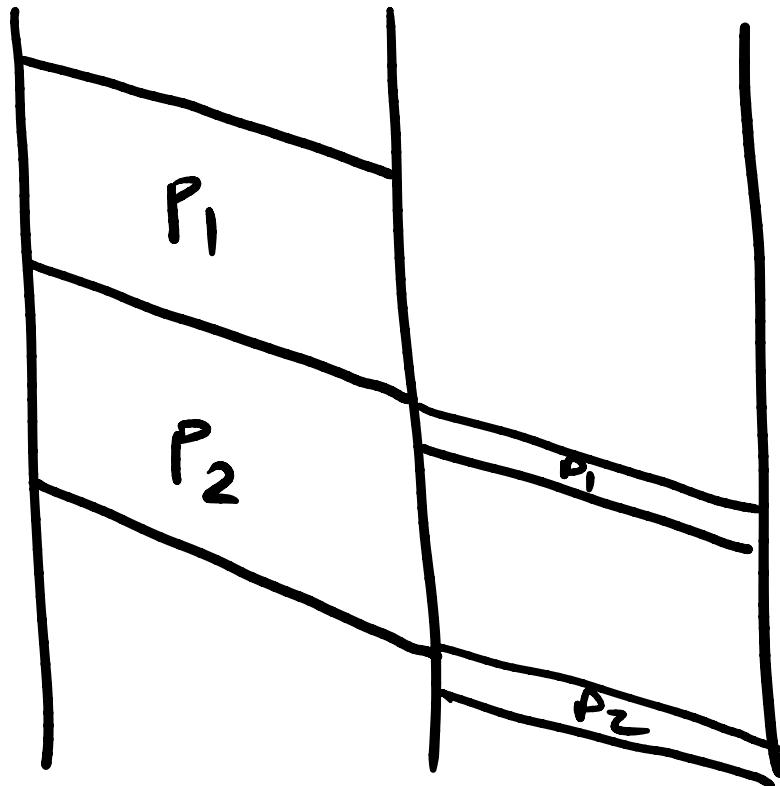
max RTT



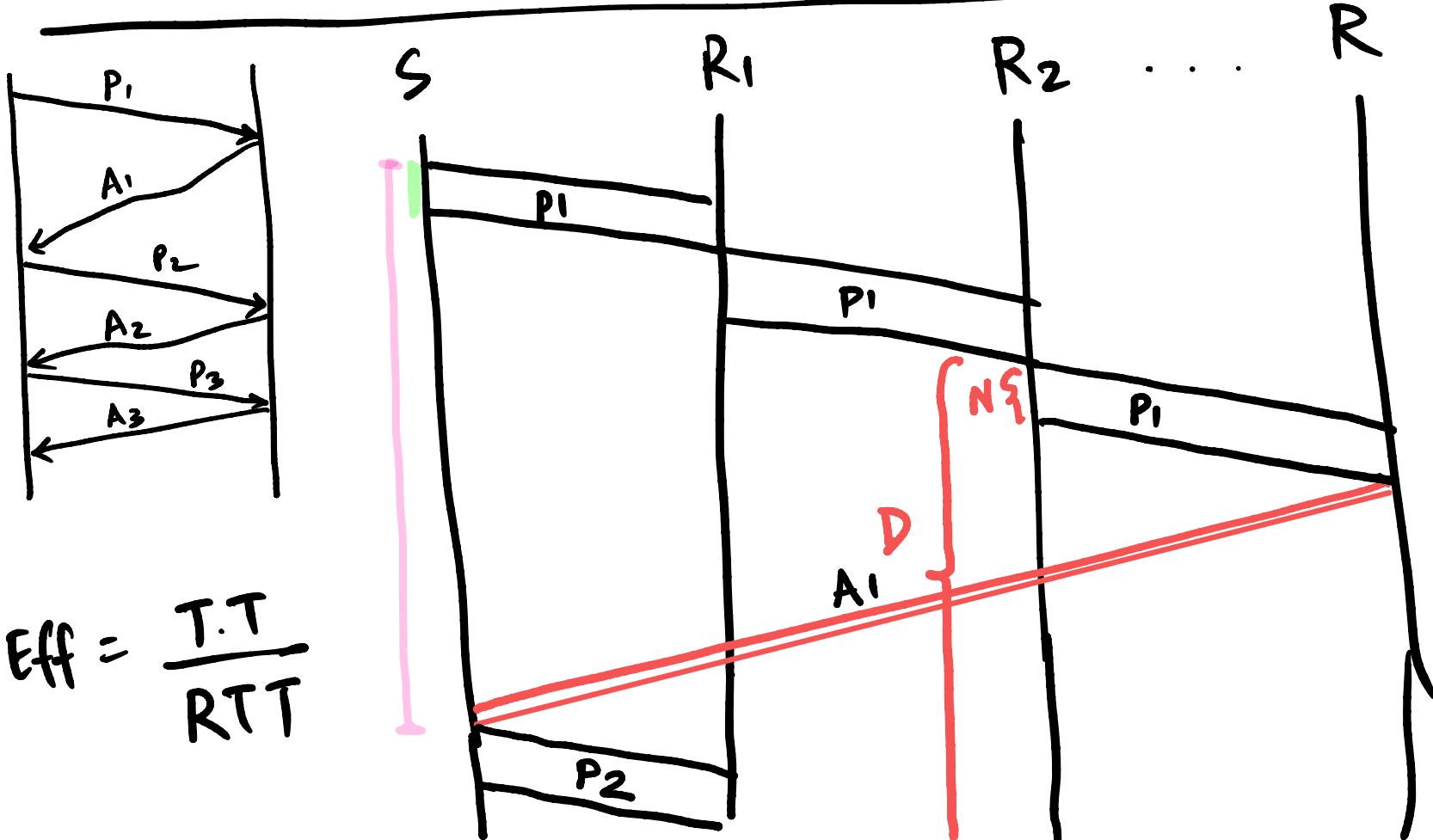


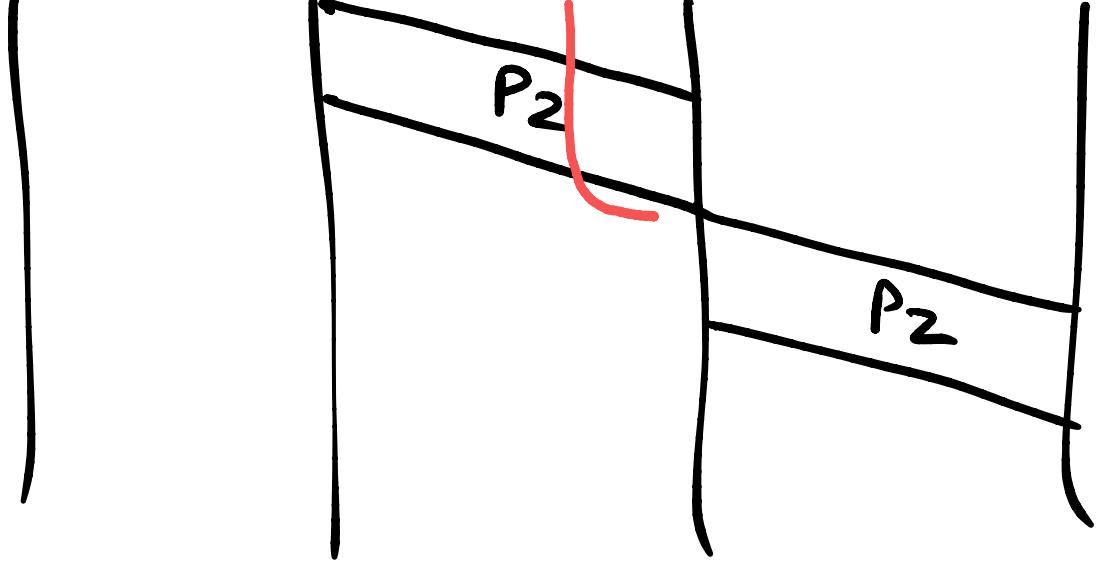
$\text{Max Seq. No.} \geq \frac{\text{Max RTT}}{\text{TT senders}}$

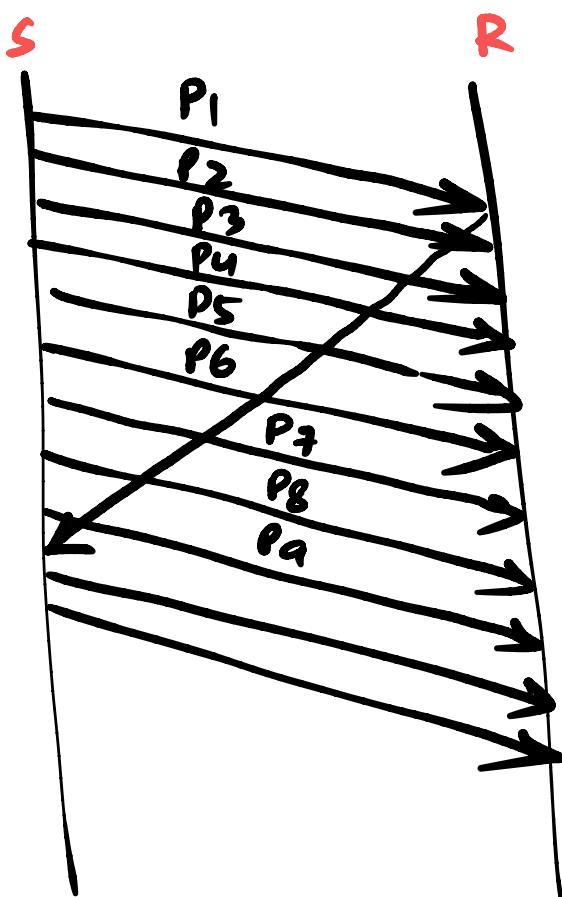




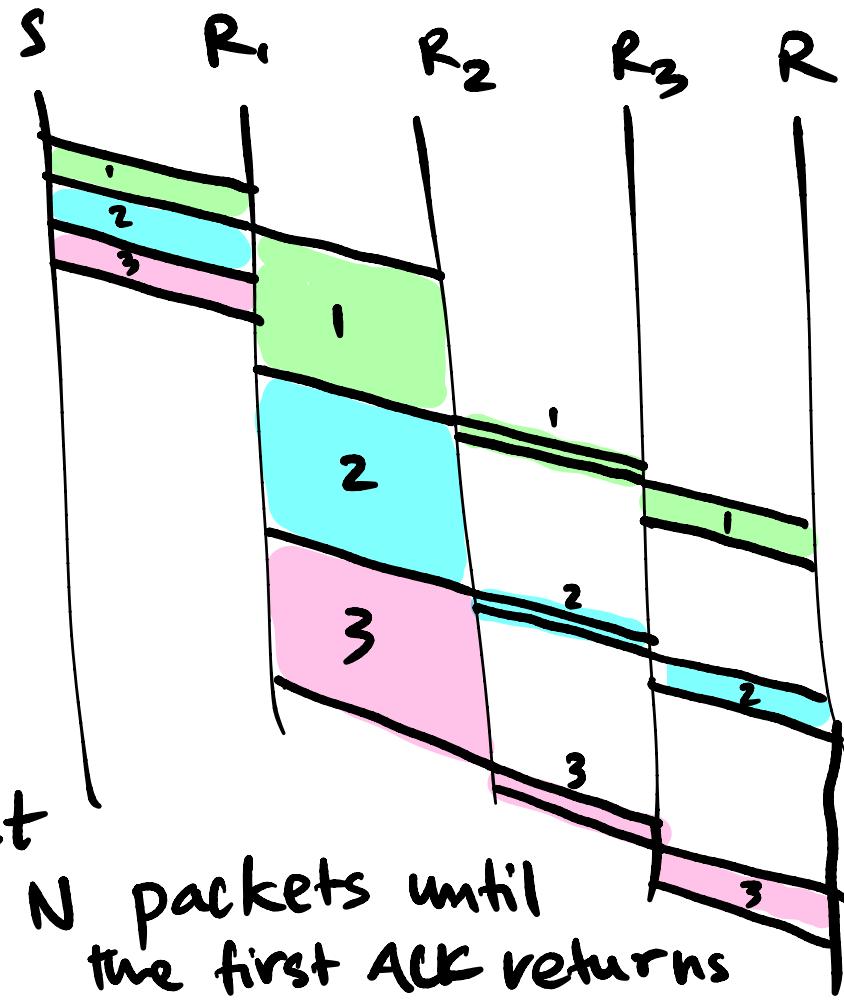
Performance of Your protocol







For max eff. sender must
Send no more than N packets until
the first ACK returns



$$N = \frac{RTT}{\text{max T.T.}}$$



T.T. of The
Slowest router
in The path to
The destination.