

Computer Networks

TCP Ack Clocking (§6.5.10)



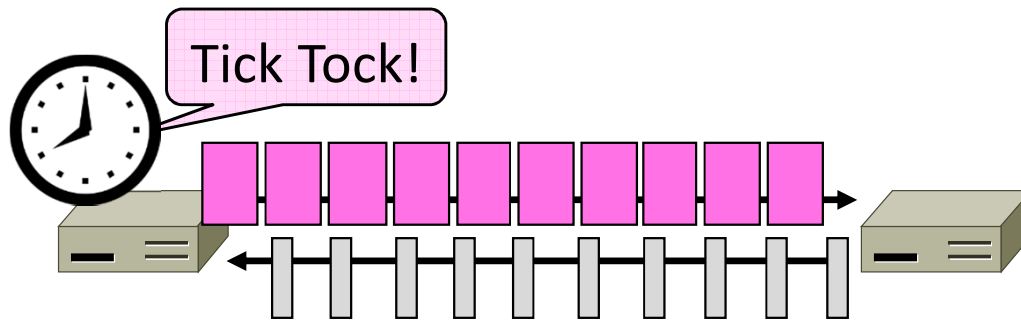
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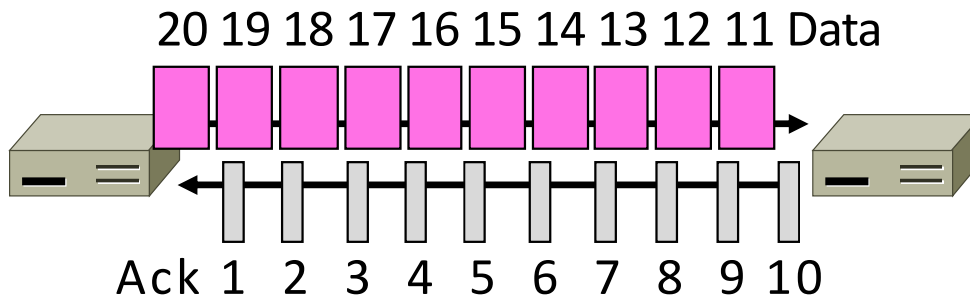
Topic

- The **self-clocking** behavior of sliding windows, and how it is used by TCP
 - The “**ACK clock**”



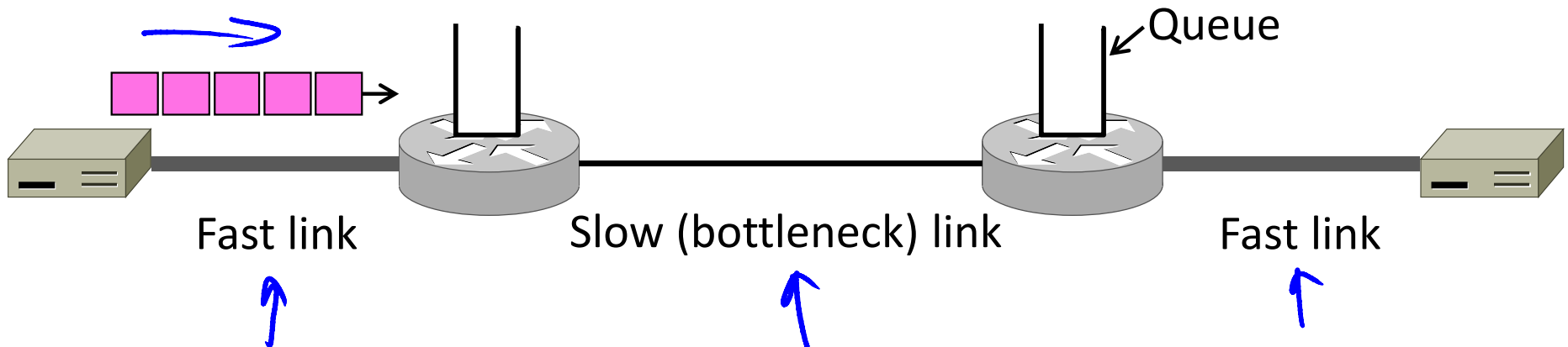
Sliding Window ACK Clock

- Each in-order ACK advances the sliding window and lets a new segment enter the network
 - ACKs “clock” data segments



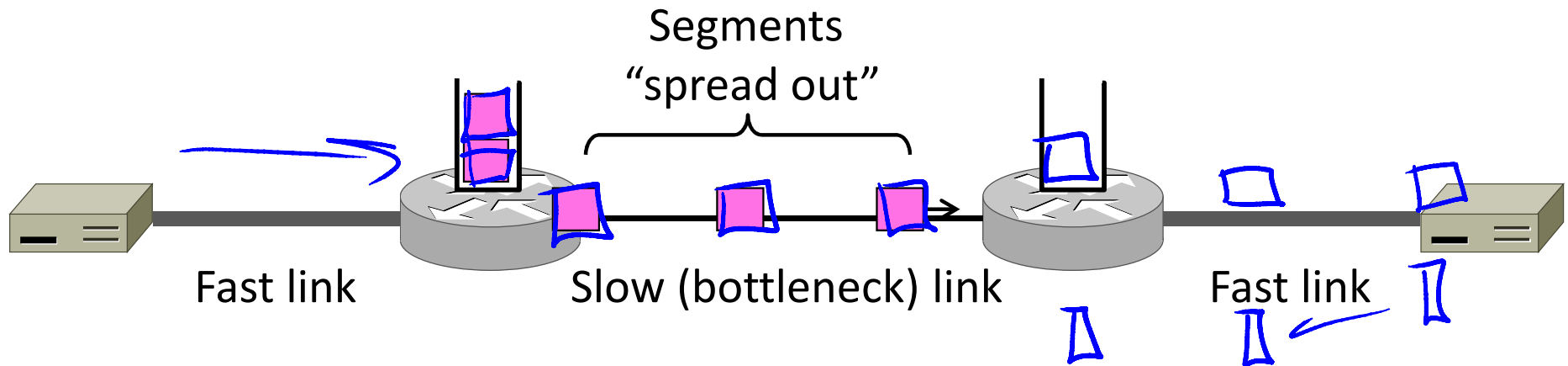
Benefit of ACK Clocking

- Consider what happens when sender injects a burst of segments into the network



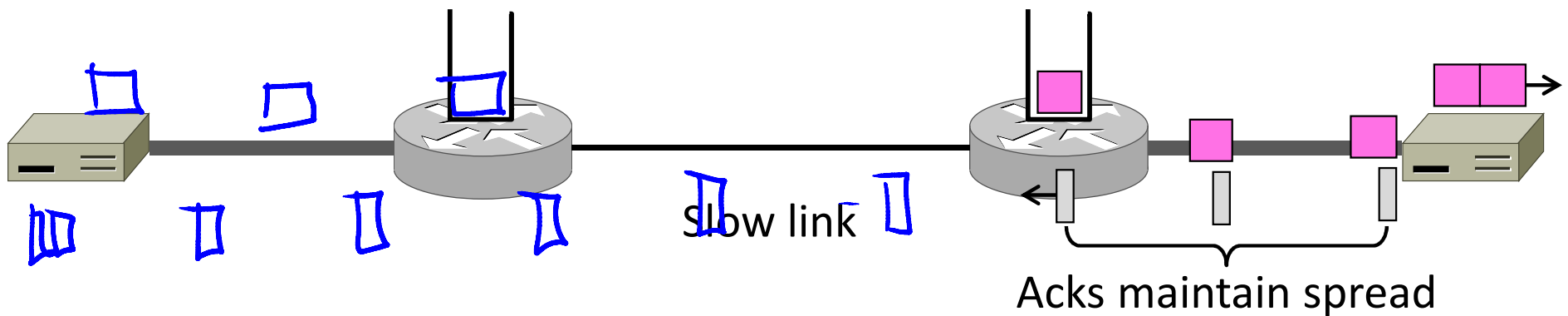
Benefit of ACK Clocking (2)

- Segments are buffered and spread out on slow link



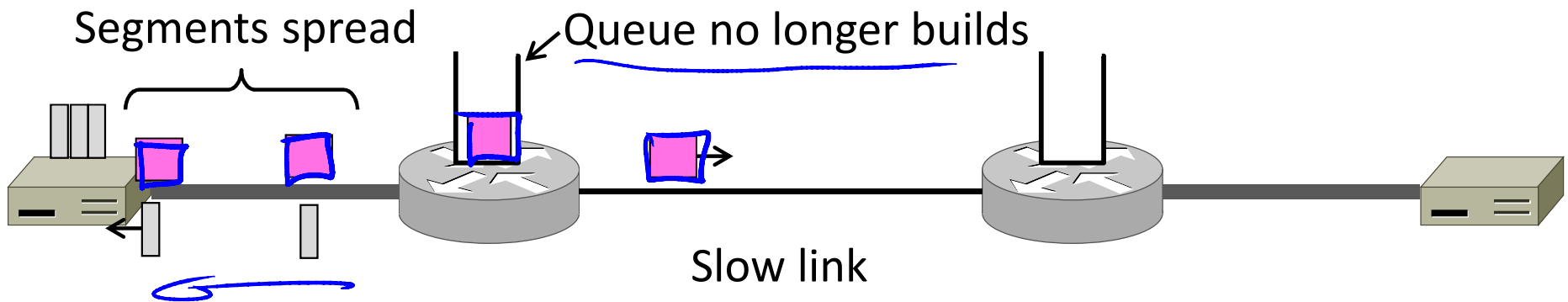
Benefit of ACK Clocking (3)

- ACKs maintain the spread back to the original sender



Benefit of ACK Clocking (4)

- Sender clocks new segments with the spread
 - Now sending at the bottleneck link without queuing!



Benefit of ACK Clocking (4)

- Helps the network run with low levels of loss and delay!
- The network has smoothed out the burst of data segments
- ACK clock transfers this smooth timing back to the sender
- Subsequent data segments are not sent in bursts so do not queue up in the network

TCP Uses ACK Clocking

- TCP uses a sliding window because of the value of ACK clocking
- Sliding window controls how many segments are inside the network
 - Called the congestion window, or cwnd
 - Rate is roughly cwnd/RTT
- TCP only sends small bursts of segments to let the network keep the traffic smooth

END

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