

Computer Networks

Retransmission Timeouts (§6.5.9)



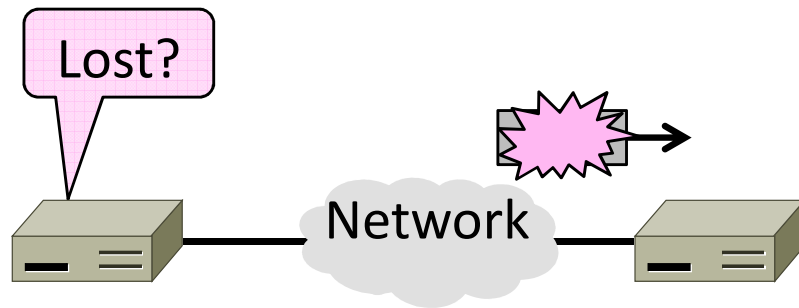
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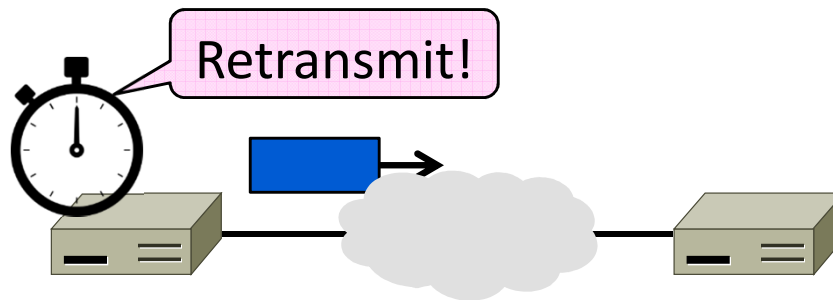
Topic

- How to set the timeout for sending a retransmission
 - Adapting to the network path



Retransmissions

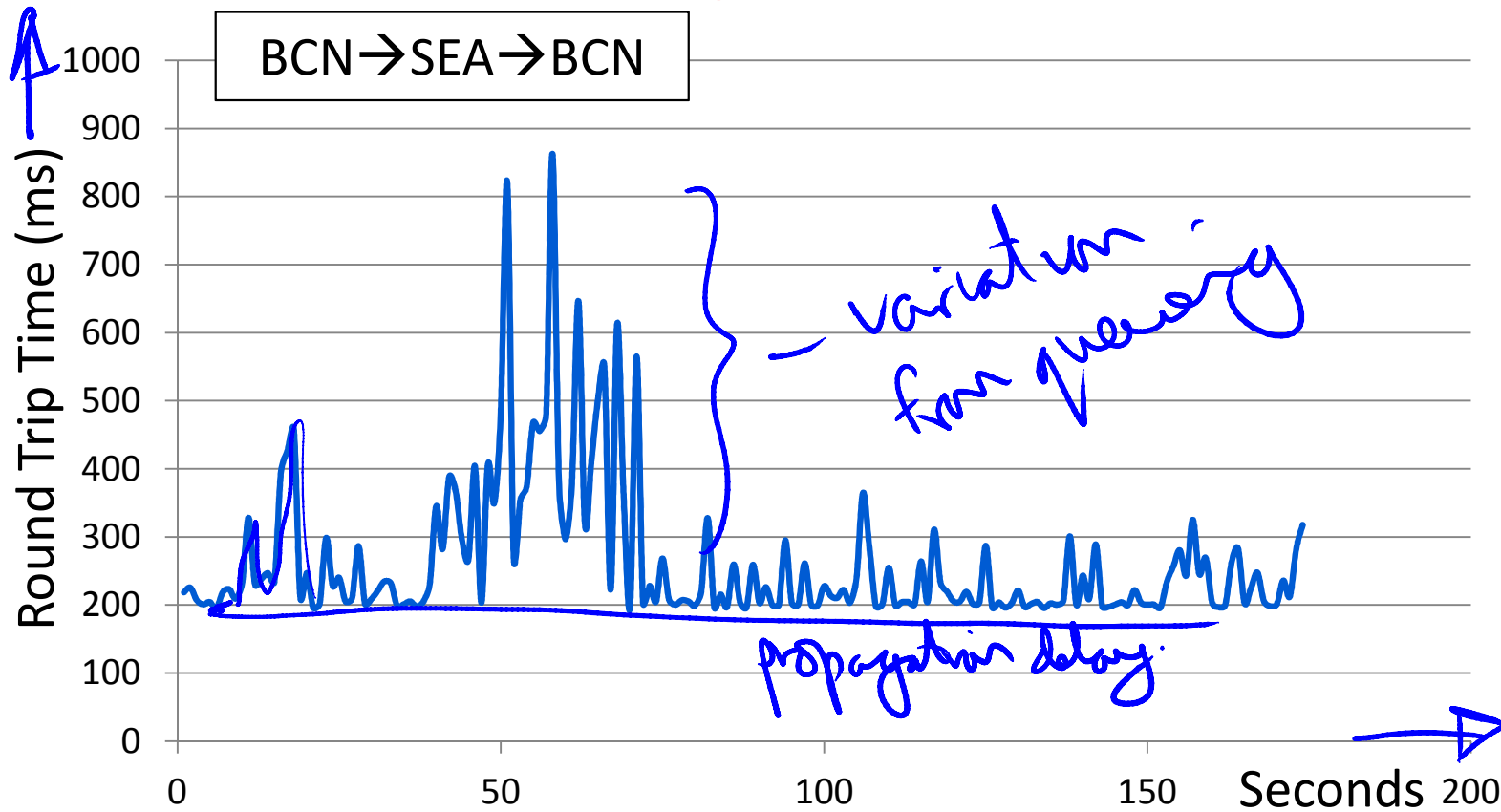
- With sliding window, the strategy for detecting loss is the timeout
 - Set timer when a segment is sent
 - Cancel timer when ack is received
 - If timer fires, retransmit data as lost



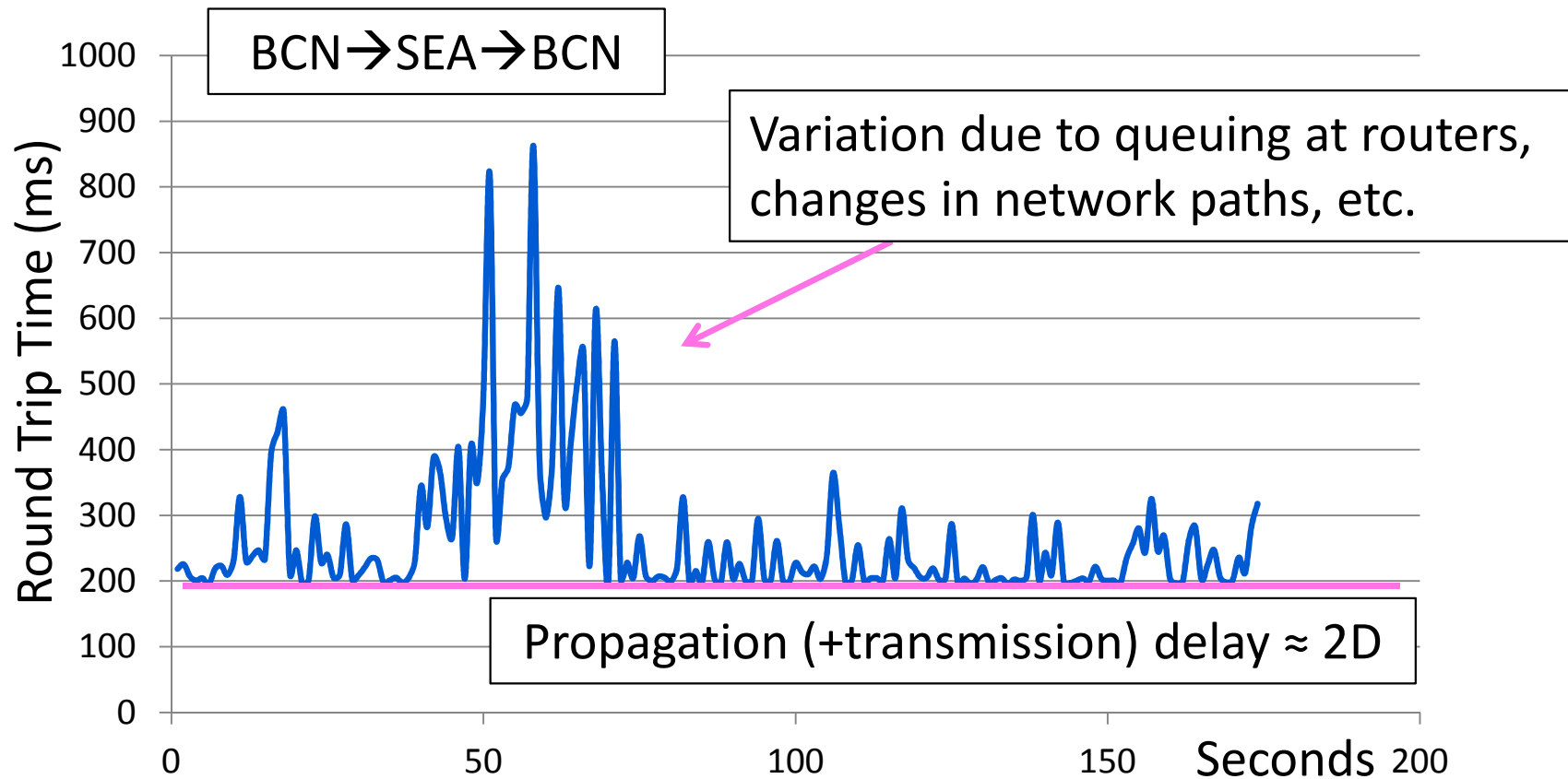
Timeout Problem

- Timeout should be “just right”
 - Too long wastes network capacity
 - Too short leads to spurious resends
 - But what is “just right”?
- Easy to set on a LAN (Link)
 - Short, fixed, predictable RTT
- Hard on the Internet (Transport)
 - Wide range, variable RTT

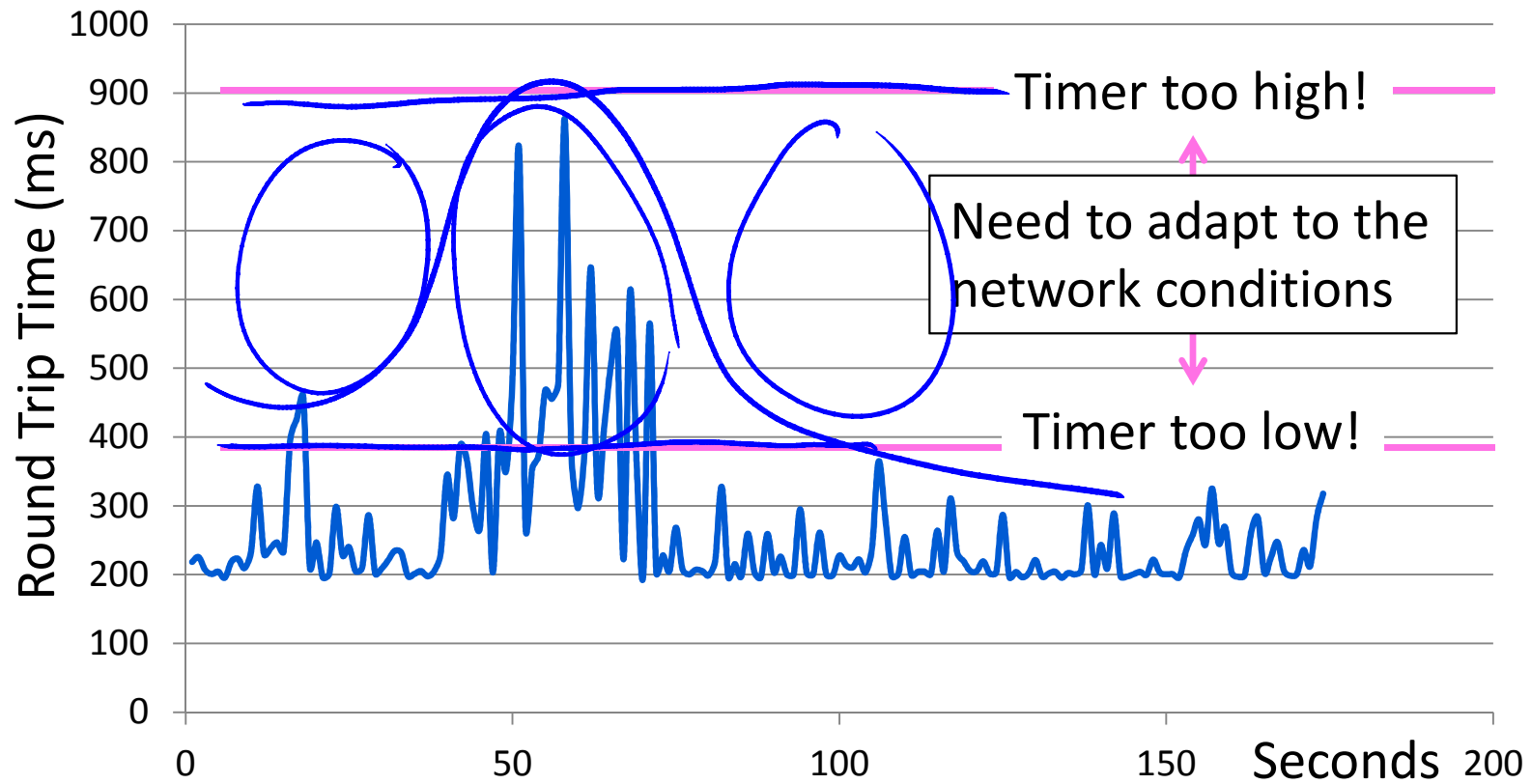
Example of RTTs



Example of RTTs (2)



Example of RTTs (3)



Adaptive Timeout

- Keep smoothed estimates of the RTT (1) and variance in RTT (2)

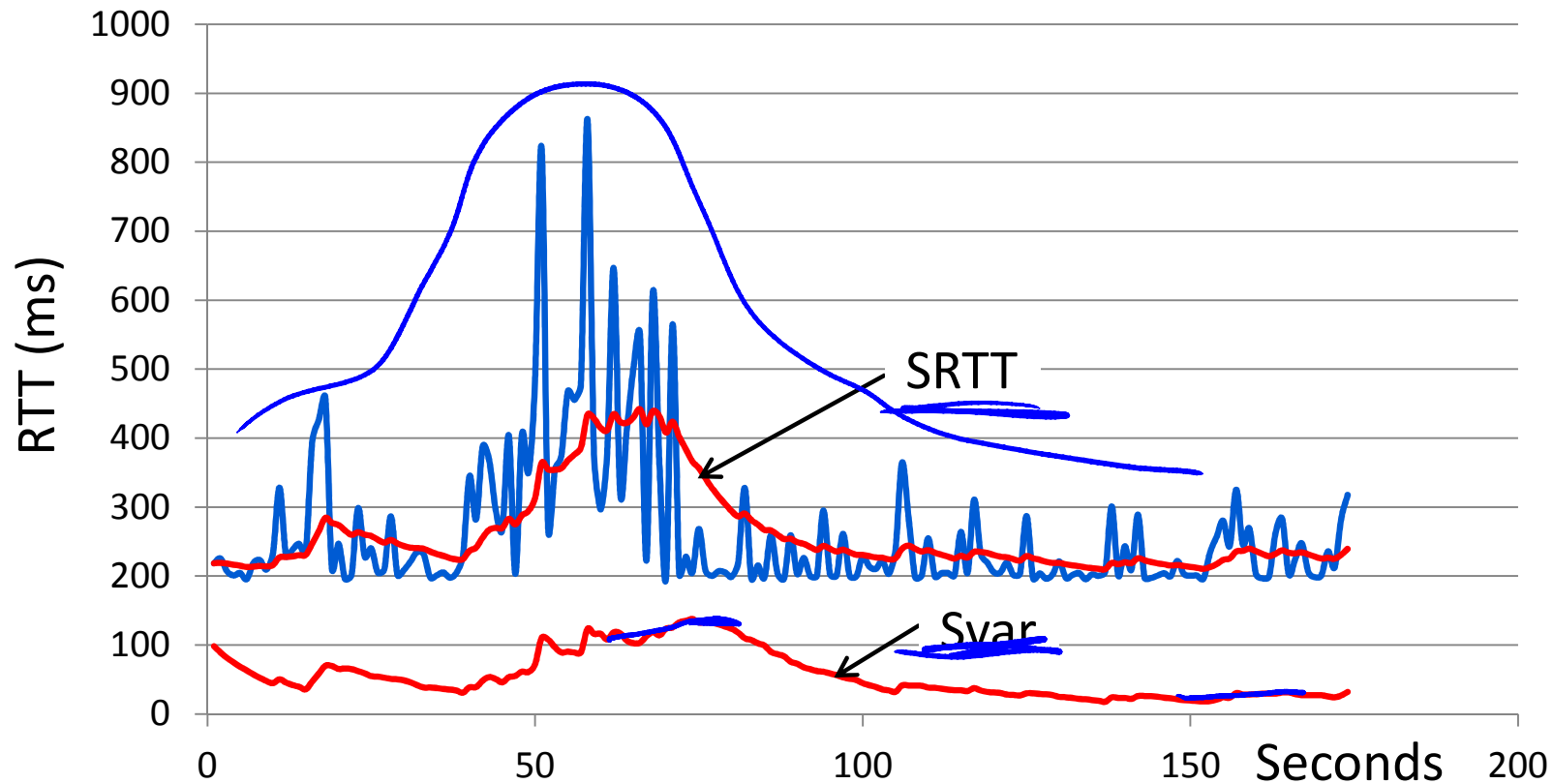
- Update estimates with a moving average

1. $SRTT_{N+1} = 0.9 * SRTT_N + 0.1 * RTT_{N+1}$

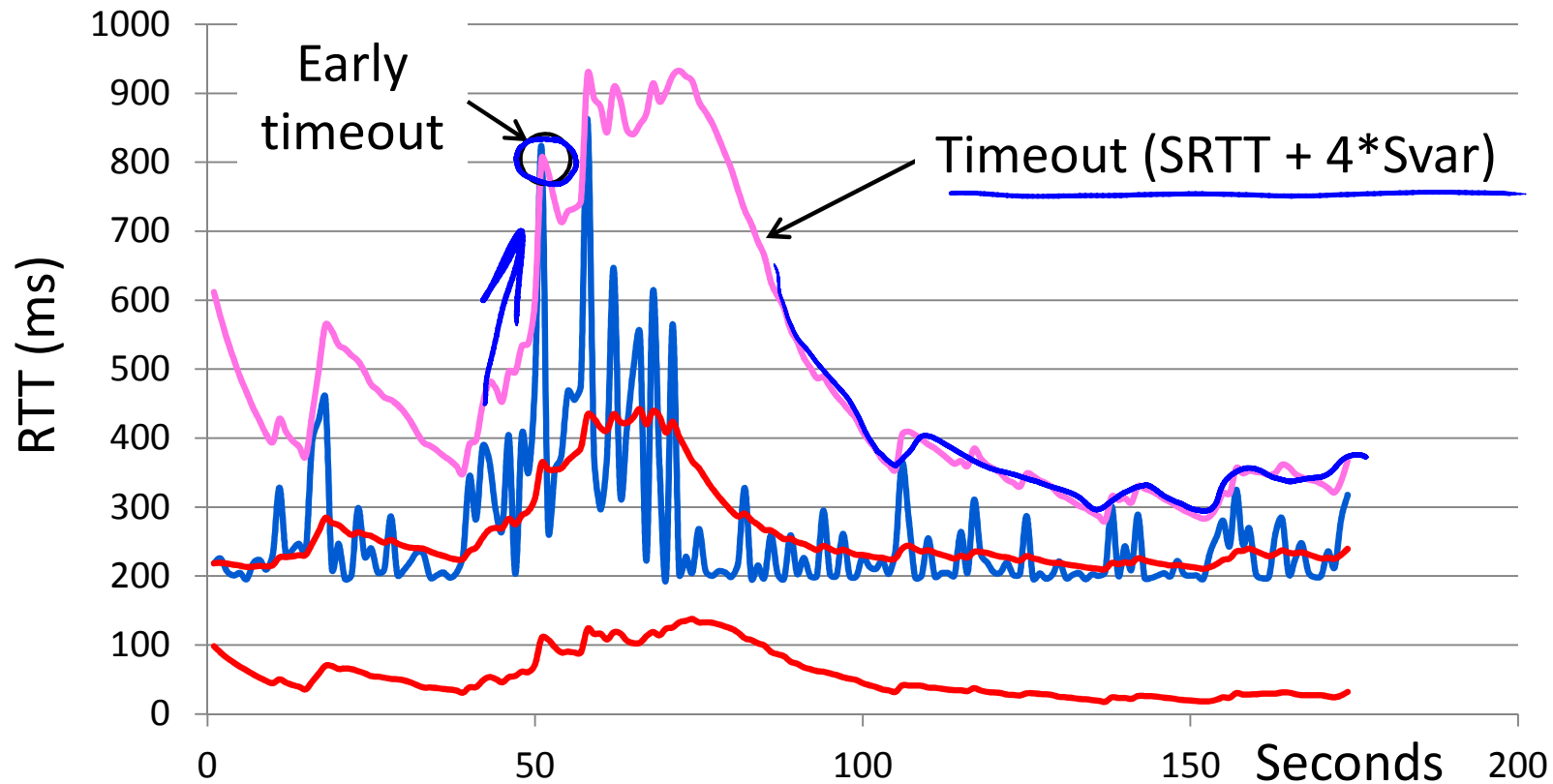
2. $Svar_{N+1} = 0.9 * Svar_N + 0.1 * |RTT_{N+1} - SRTT_{N+1}|$

- Set timeout to a multiple of estimates
 - To estimate the upper RTT in practice
 - $TCP\ Timeout_N = SRTT_N + 4 * Svar_N$

Example of Adaptive Timeout



Example of Adaptive Timeout (2)



Adaptive Timeout (2)

- Simple to compute, does a good job of tracking actual RTT
 - Little “headroom” to lower
 - Yet very few early timeouts
- Turns out to be important for good performance and robustness

END

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