Communication Networks

Exercise 9

Two (simple) sliding window protocols

Introduction to this week’s exercise

Time to solve the exercise
Sliding window protocols

summary

why  reliable in-order delivery
      of arbitrary #data using fixed-size sequence numbers

receiver  maintains window for undelivered data
           window advances when receiving process consumes data

sender  maintains window for unacked data
         window advances when new data is acked
Go-Back-N (GBN) is a simple sliding window protocol using cumulative ACKs

**principle**
receiver should be as simple as possible

**receiver**
delivers packets in-order to the upper layer
for each received segment,
ACK the last in-order packet delivered (cumulative)

**sender**
uses a single timer to detect loss, resets at each new ACK
upon timeout, resends all W packets starting with the lost one
Let’s see how it works in practice visually

http://www.ccs-labs.org/teaching/rn/animations/gbn_sr/
Selective Repeat (SR) avoids unnecessary retransmissions by using per-packet ACKs

principle avoids unnecessary retransmissions

receiver acknowledges each packet, in-order or not
buffers out-of-order packets

sender uses per-packet timer to detect loss
upon loss, only resends the lost packet

see Book 3.4.3
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Task 9.1: Go-Back-N Warm-Up Questions

buffering
- which segments must the sender buffer?
- what is the advantage of buffering at the receiver?

cumulative ACKs
- do they help with lost data segments?
- with lost ACKs?

duplicate ACKs
- how can duplicate ACKs help improve performance?
**Task 9.2: Understanding Go-Back-N’s Behavior**

*Exam Style Question*

<table>
<thead>
<tr>
<th>assumptions</th>
<th>sender wants to transmit 10 data segments</th>
</tr>
</thead>
</table>
| questions   | min/max #transmissions if one segment/ACK lost?  
              | can duplicate ACKs help reduce #transmissions? |
Task 9.3: Go-Back-N (Exam Question 2017)

Fill in sequence diagrams
Task 9.4: Fairness

Are you getting a fair share?
Task 9.5: Congestion Window

What kind of network conditions is this flow seeing?
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