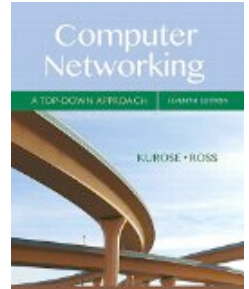


COMP 375: Lecture 19



- **News & Notes:**

- Quiz #4 in class today
- CS faculty candidate open meeting tomorrow @ 2:50PM (Loma 101)
- Project #3 due Friday
- Project #2 demos put on hold...

- **Reading (Wed, March 14)**

- Sections 3.5.{0-4} (TCP)

Quiz #4

- Closed book and notes.
- *Happy National Napping Day!*



Sections 3.4.{3-4}

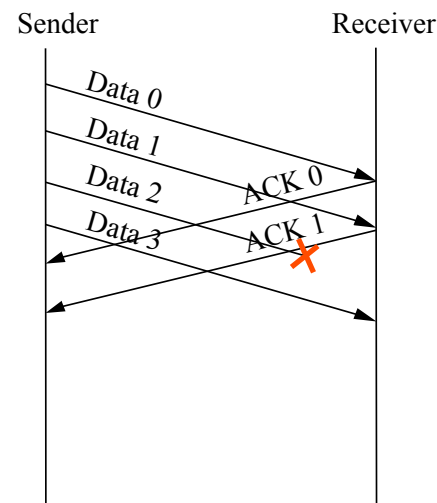
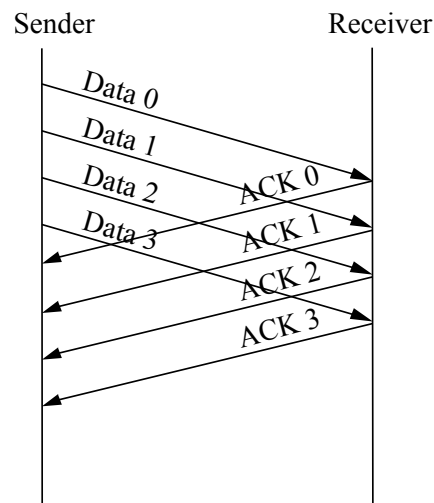
PIPELINED RELIABLE TRANSPORT

Bandwidth-delay product (BDP) calls for a better approach than stop-and-wait.



$$\text{BDP} = \text{Bandwidth} * \text{RTT}$$

In pipelined transmission, the sender keeps multiple segments “in flight.”



Now what?

Go-Back-N (GBN) and Selective Repeat differ in what ACK means.

- **GBN:**

- ACK indicates that all segments up to that one have been received.
- Doesn't ACK out-of-order segments.

- **SR:**

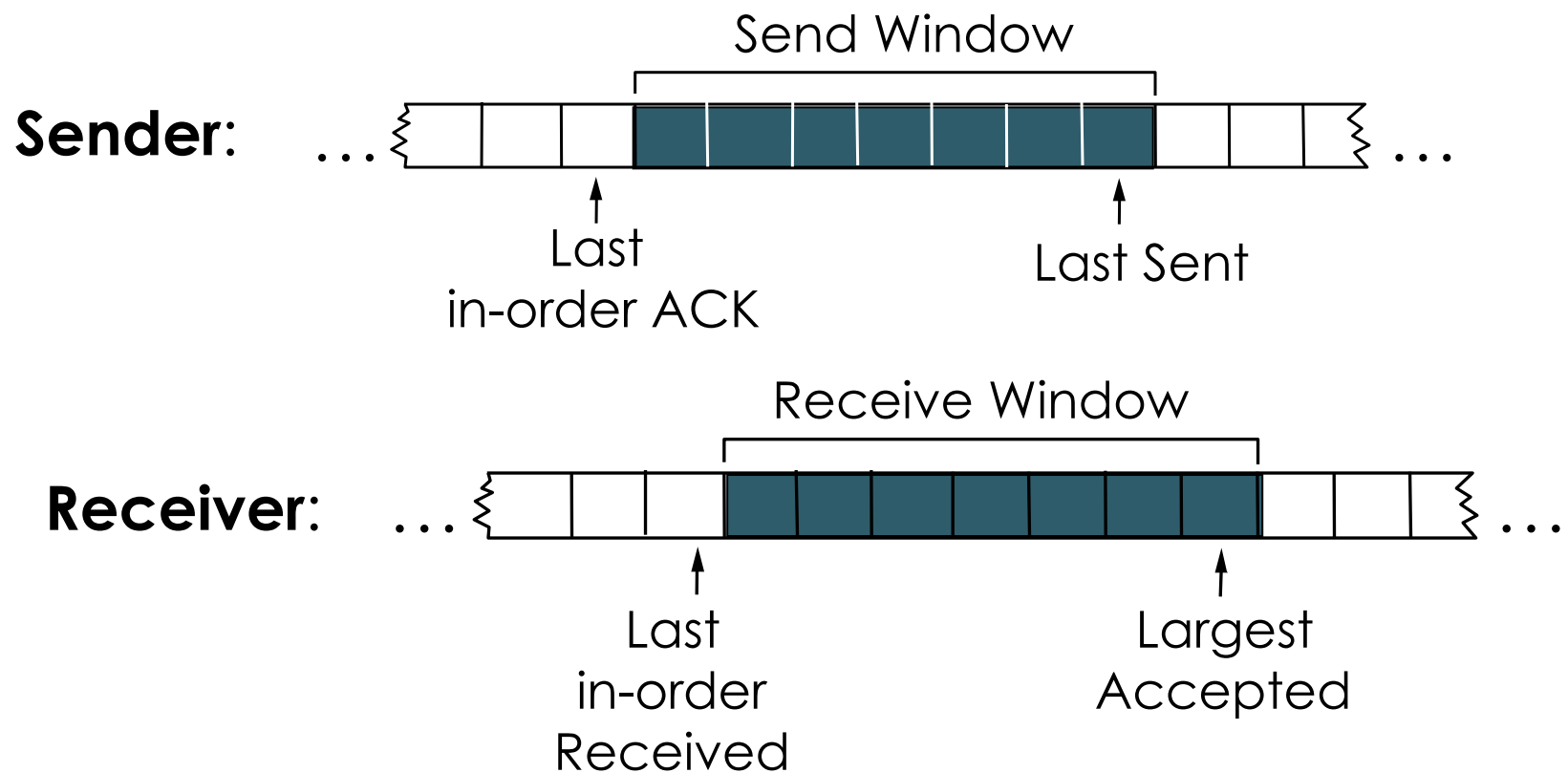
- ACK only means we received a specific segment.
- Can ACK out-of-order segments.

How does the **bandwidth utilization** of GBN compare with that of SR?

Recall that GBN uses cumulative ACKs, while SR uses individualized ACKs.

- | | |
|-------------------------------------|--|
| A. | GBN has better utilization. |
| <input checked="" type="radio"/> B. | GBN has worse utilization. |
| C. | GBN's utilization is <i>roughly the same</i> as SR. |

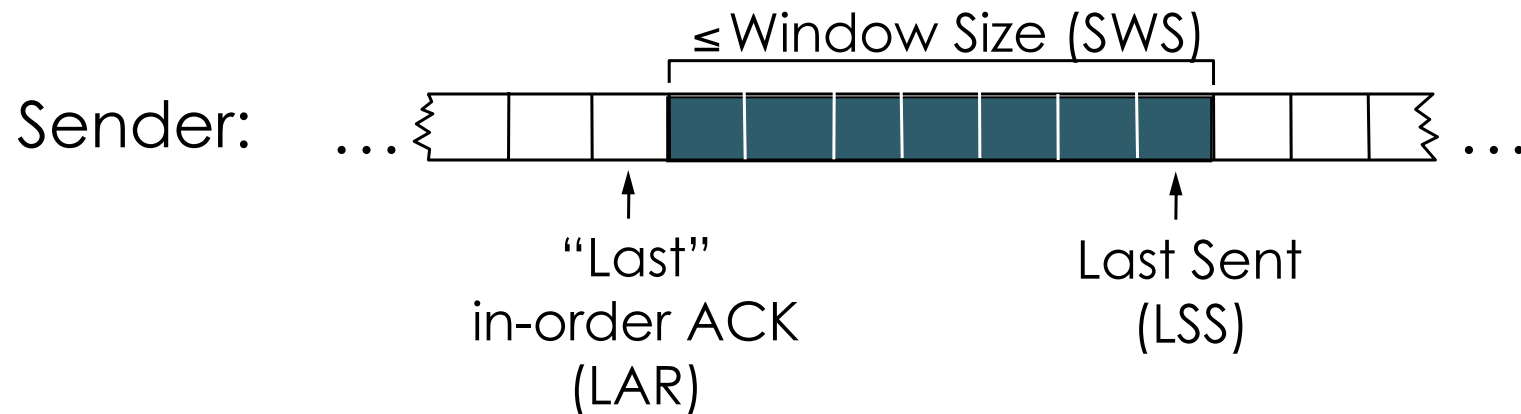
Sliding window allows pipelined, reliable, in-order delivery with flow control.



In which of these scenarios is the window size one?

- | | |
|-------------------------------------|-----------------------------|
| A. | GBN Sender |
| <input checked="" type="radio"/> B. | GBN Receiver |
| C. | SR Sender |
| D. | SR Receiver |
| E. | More than one of the above. |

The Sender's window size bounds the amount of outstanding, unACK'd data.



What does the sender do when there is a timeout? Consider SR and GBN separately.