CSE 461 - Module 6: Sliding Window

**Preamble: Stop and Wait**
- **Sender:**
  - Sends message marked m
  - If timeout occurs, resend
  - If receive an ACK for m, move on to message m+1

**Issue: Performance**
- **Example:**
  - 1,000 bit messages sent on a line with bit rate 10,000,000 bits/sec. and propagation delay 20 msec.
  - What is the effective transmission rate?
- **Bandwidth-delay product (BD)**

  - Idealization: try to be transmitting all the time

**Sliding Window: Basic Scheme**
- **Sender** maintains a send window of messages that it has sent but hasn't yet received ACKs for
  - Send buffer
- **Receiver** maintains a receive window
  - Buffer space for messages within the window
  - Must be able to identify an ordering of message → sequence numbers

**Sliding Window: Issues**
- **Issues:**
  - Naming
  - What kind of feedback does receiver provide?
    - ACK vs. NAK
    - Selective vs. cumulative
- When does it provide it?
  - Some regular rate
  - On each received message
  - Something else...

**Sliding Window: Operation**

- Assume positive, selective ACKs sent only when a message is received
  - Senders sends messages 1 through 6
  - Sender hears ACKs for 1, 3, and 5
    - What has happened?
    - What happens next?
- Assume positive, cumulative ACKs sent only when a message is received
  - Sender sends messages 1 through 6
  - Sender hears ACK for 1, 2, 3
    - What has happened?
    - What happens next?
- What else can we do?

**Sequence Number Space Issue**

- The sequence number is (usually) carried in some fixed-width field of the message header
  - There are only so many sequence numbers
  - They will eventually wrap
- Suppose there are N possible sequence numbers. How big can the send window be?
  - Obviously can't be bigger than N!
  - Must it be smaller?
- The overlapping windows problem

- The delayed message problem...