you are still here

previously, on CS2105 …

techniques for reliability

1. checksum
2. timer
3. seq number
4. ack
5. nak
1. increase range of sequence numbers

2. need to buffer more packets

Pipelining

- The alternating bit protocol is not efficient. We will use a technique called pipelining to increase its efficiency. The idea is that the sender can send \( n \) packets \((n>1)\) before it receives an acknowledgement.

- A consequence of pipelining is that (1) sender and receiver may need to buffer more than one packets, and (2) we will need more than 1 bit as the sequence number. How much buffer is needed and how many bits is needed for sequence number depends on the pipelining scheme.
Go-Back-N
Send 1 Packet

Receive ACK 3
Go-Back-N
- Sender of GBN keeps a sliding window of size N on sequence numbers. Sender can send N packets without acknowledgement.
- Receiver of GBN expects packets to be delivered in order. Out-of-order packets are discarded. Because of this, acknowledgement in GBN is cumulative.

**sender**
1. call from above
2. receive ACK (ok)
3. receive ACK (err)
4. timeout

**call from above**
receiver
1. recv expected packets
2. recv unexpected or corrupted packets

recv expected

recv others
Go-Back-N

Mid-Term Test
10 March 2007
LT33
1pm – 2pm

Make-up Lecture
10 March 2007
LT33
2pm – 3pm
Selective Repeat
Selective Repeat

- GBN leads to unnecessary retransmission since out of order packets are discarded.
- Selective repeat improves of GBN by allowing receiver to buffer packets that are received out of order. Both receiver and sender maintains a window.
- Each packet must now be individually acknowledged and we need a timer per packet.
**sender**
1. call from above
2. receive ACK (ok)
3. receive ACK (err)
4. timeout

**call from above**

**recv ACK (ok)**
**recv ACK (err)**

**timeout**

**receiver**

1. recv pkts in window
2. recv pkts before window
3. recv other packets
recv pkts in windows

recv pkts before windows

Sequence Number and Window Size
Sequence Numbers

- If the window size is too large, we can lead to situation where the receiver might confuse a new transmission with a duplicate packet.

Techniques for Reliability

1. checksum
2. timer
3. seq number
4. ack
5. nak
6. window, pipeline