CprE 489
Lecture 14

Fall Semester 1997

Sliding Window Principles

- Receiver always requests the first buffer in its window for which it does not have data.

  - Such requests are made either when the window slides to reveal an empty buffer or by the arrival of some frame or by a timeout.

- Sender always sends frames which are in its window that it believes the receiver does not have yet or will not get soon.

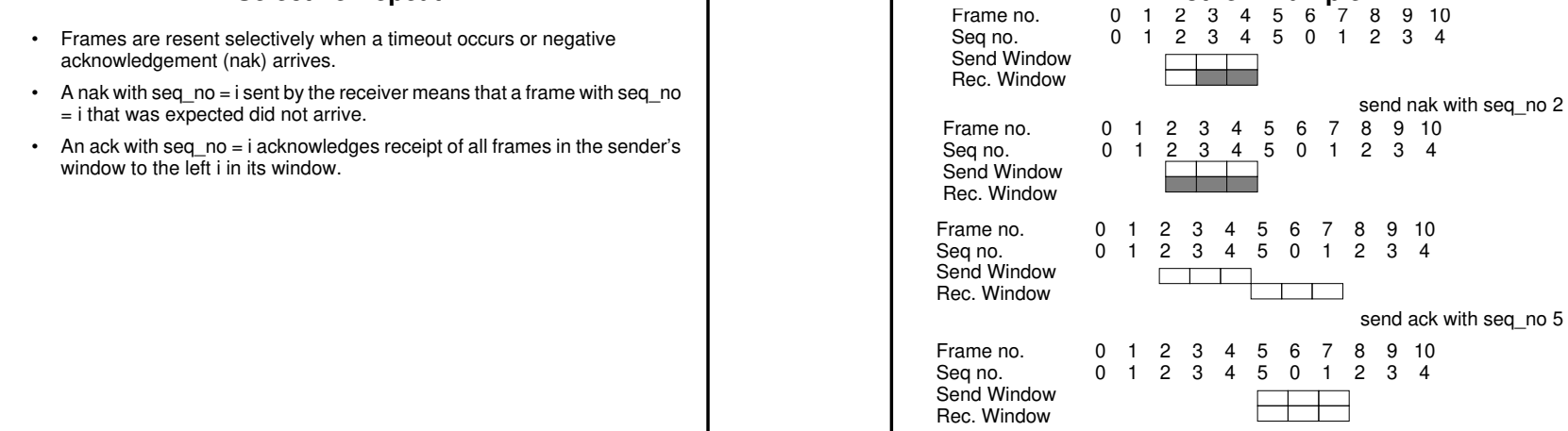
  - Such a send is made when the window slides (ack) or when prompted by a nak or timeout.

  Note: Protocol 5 (Tanenbaum's go-back-N), as can be seen in figure 3-14 (a), violates the first principle above. Hence it can fail.

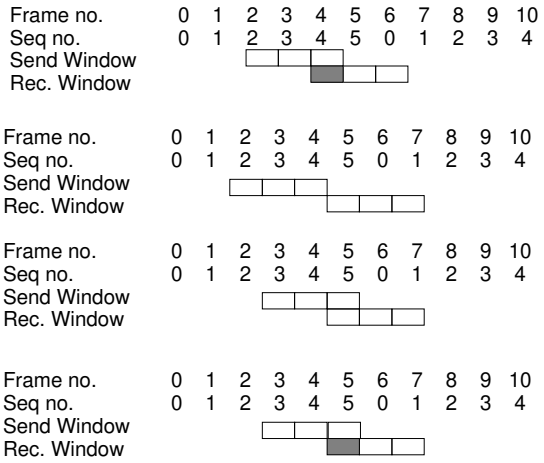
Selective Repeat

- Frames are resent selectively when a timeout occurs or negative acknowledgement (nak) arrives.
- A nak with seq_no = i sent by the receiver means that a frame with seq_no = i that was expected did not arrive.
- An ack with seq_no = i acknowledges receipt of all frames in the sender's window to the left i in its window.

Another Example



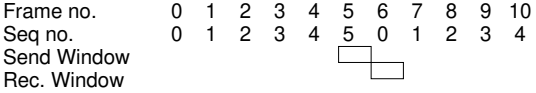
Normal Operation Example



Failure Scenario

- Suppose the receiver in a protocol only sends requests or acks when a frame arrives in its window as in protocol 5. What can happen?

  - Sender repeatedly tries to send frame with sequence number 5 while receiver is waiting for sequence number 0. If the receiver ignors these frames then the protocol hangs.

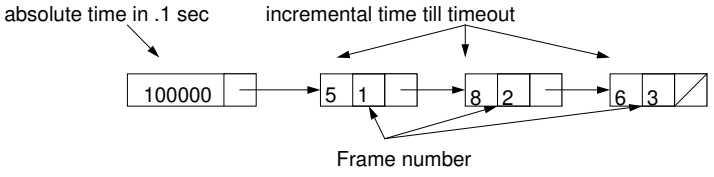
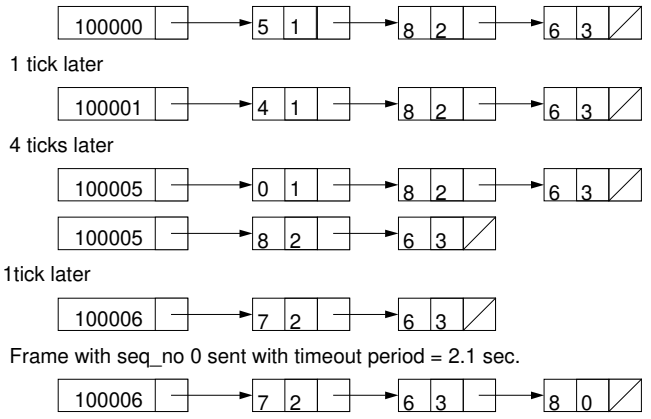


- Remedy - Receiver must periodically request frame it is waiting for.

  1. request frame on arrival of any frame not expected.
  2. have receiver timeout.
  3. piggyback request on frame to be sent to other party (protocol 5).

Implementing Timeouts

- We assume that there is a local clock which can have interrupt the protocol periodically.
- Each interrupt should be handled very quickly, so as not to slow down the protocol.
- Each frame sent has it own timeout record.
- Example data structure. Suppose frame 1 has .5 sec before timing out and frame 2 has 1.3 sec, and frame 3 has 1.9 sec.



Timeout Example