COMP 431 Internet Protocols & Services

Spring 2017  
Kevin Jeffay

Worksheet 10, February 21

1. Consider the cross-country example from slide 6 in the lecture notes on pipelined protocols. How big would the window size have to be for the channel utilization to be greater than 98 percent? Assume that the size of a packet is 1,500 bytes, including both header fields and data.

2451 packets in flight => 0.98 = (n \* 0.012ms )/ 30.012ms

2) Consider the GBN protocol with a sender window size of 4 and a sequence number range of 1,024. Suppose that at time *t*, the next in-order packet that the receiver is expecting has a sequence number of *k*. Assume that the medium does not reorder messages.

*a*. What are the possible sets of sequence numbers inside the sender’s window at time *t*?

Received all ACKS:

(k mod 1024, k+1 mod 1024, k+2 mod 1024, k+3 mod 1024)

Received no ACKS:

(k-1 mod 1024, k-2 mod 1024, k-3 mod 1024, k-4 mod 1024)

**All ACKS union No ACKS**

*b*. What are all possible values of the ACK field in all possible messages currently propagating back to the sender at time *t*?

(k-1 mod 1024, k-2 mod 1024, k-3 mod 1024, k-4 mod 1024)

3) Consider the GBN and SR protocols. Suppose the sequence number space is of size *k*. What is the largest allowable sender window that will avoid the occurrence of window state ambiguity problems for each of these protocols?

SR and GBN both have a maximum window size of k/2 because the receivers would need to be able to tell the difference between duplicate packets and new packets in case every single ACK is lost for a window of packets. This would be a conceptually similar to an alternating-bit protocol, but with two sets of sequence numbers instead of two bits.