COMPSCI 314 S2C Assignment 2
2010
Flow Control

Department of Computer Science
The University of Auckland

*This assignment contributes **5%** of your overall course mark. Submit your assignment in **PDF** format to the **Assignment Drop Box**. Include all **workings** and **explanations**. Marks will be deducted for ambiguous solutions. Zero marks are awarded if the answers contain no explanation. Also, refer to the Departmental Policy on Cheating on Assignments.*

Assignment Drop Box (https://adb.ec.auckland.ac.nz/adb/).
Departmental Policy on Cheating on Assignments
(http://www.cs.auckland.ac.nz/administration/policies/CheatingPolicy.php)

[Total: 50 marks]

Q1. Stop and wait. [20 marks]

Consider a data link from Auckland to Sydney, using an undersea optical fibre. Assume the distance is 2100 km (2.1×10^6 m), and that the speed of an optical signal is 2×10^8 m/s. Assume that the transmission capacity of the link is 150 Mb/s, and that the frame size is 1500 bytes.

(*Technical note:* You might have heard of a standard link rate of 155 Mb/s; however, the useable capacity on such a link is very close to 150 Mb/s, so this is a realistic example.)

a) What is the one-way delay for a data frame to travel between Auckland and Sydney? [5 marks]

b) To get an approximate answer, do we also need to consider the time taken for a computer to output a frame at 150 Mb/s? [5 marks]

c) Calculate the bandwidth-delay product for the link, in megabytes. [5 marks]

d) Consider a stop-and-wait protocol sending 1500 byte frames and waiting for an ACK after each frame. Assuming no frames or ACKs are lost, calculate the achieved bit rate in b/s. Then calculate the efficiency of the protocol, i.e., what percentage of the transmission capacity is actually used. [5 marks]

Q2. Fixed window [15 marks]

For the same link, now assume that a "window" of N frames is allowed on the link at one time before waiting for an ACK.

a) What is the efficiency for N=10, N=100, N=1000 [10 marks]

b) For a sliding window protocol to use this link with maximum efficiency, what is a suitable window size (measured as a number of frames)? [5 marks]

Q3. Satellite link [15 marks]

Assume that the optical fibre is damaged and temporarily replaced by a satellite link of the same capacity. How will the answers to Q1 and Q2 change?
