COMPUTER SCIENCE TRIPOS Part IB – 2014 – Paper 5

6 Computer Networking (AWM)

(a) Consider an unreliable message service where messages of a fixed size are sent between known endpoints. Outline the *minimum* set of additional features offered by a reliable byte-stream delivery service. [3 marks]

(b) A researcher notes that the message service, *fritter*, resembles a datagram service. It is prone to delivery delays of up to 1 second, message re-ordering and message loss. *Fritter* permits a 140-byte message to be relayed between any two users and each message is delivered without data-corruption.

You are asked to implement a *Stop-and-wait ARQ* to provide a unidirectional reliable byte-stream delivery service between two fritter users. Assume this is the only service between the two fritter users.

   (i) Provide a labelled diagram illustrating the format for a *fritter* message that could be used by a reliable, byte-stream, delivery service. Justify your answer. [3 marks]

   (ii) Draw and label the Finite State Machine that implements the sender portion of the Stop-and-wait ARQ. Your function will be called as *reliable_send()* while the fritter message receive and message send functions are *fritter_rcv()* and *fritter_send()* respectively. You may assume that the argument to the *reliable_send()* function does not exceed 100 bytes per function call. [8 marks]

   (iii) Users assert that the performance using your Stop-and-wait ARQ is terrible for large transfers. Explain why they are correct. [2 marks]

   (iv) Describe an appropriate enhancement to the ARQ that will improve performance. Given the constraints of a small *fritter* message size, justify why your particular ARQ enhancement is best suited to the *fritter* application. [4 marks]