COMPUTER SCIENCE TRIPOS Part IB – 2012 – Paper 5

4 Computer Networking (AWM)

(a) In a data-center context, describe a *straggler* using two examples.   [2 marks]

(b) (i)   Describe the *TCP incast* problem.   [2 marks]

   (ii) Outline and critique a solution to the *TCP incast* problem.   [3 marks]

(c) (i)   Show that to achieve a steady-state throughput of 10 Gbps, a TCP session with a Round-Trip-Time (RTT) of 100 ms and a Maximum-Segment-Size (MSS) of 1500 bytes can tolerate a packet loss probability of less than 2×10^{-10}.   [4 marks]

   (ii) Compute the potential packet-memory requirement of either end-system implementing Selective-Acknowledgements (SACK).   [3 marks]

   (iii) What is the tolerable packet loss probability if this same network (same MSS and RTT) operated at 100 Gbps?   [2 marks]

(d) Some experts say: *"Many TCP transactions in the Internet never enter congestion-avoidance."* Discuss this claim.
   [*Hint:* It has been measured that greater than 90% of web objects are less than 10 Kbytes.]   [4 marks]