2009 Paper 5 Question 7

Digital Communication I

(*a*) Compare *flow control* with *congestion control*.   [2 marks]

(*b*) Describe what is meant by *sliding-window protocol*.   [2 marks]

(*c*) Describe how a sliding-window protocol may be used to implement flow control.
                                                                            [2 marks]

(*d*) Explain why implementing flow control in this manner is not a good idea.
                                                                            [2 marks]

(*e*) Provide an alternative to a sliding-window protocol for the implementation of
       flow control.   [2 marks]

(*f*) Consider a sliding-window protocol for a point-to-point link from the surface
       of the earth to a geostationary satellite. The link speed is 1Gbps and the
       one-way latency is 125ms.

   (*i*)   Assuming each packet of data is fixed to 1KByte in length, what is the
           minimum number of bits you need for the sequence number?   [2 marks]

   You have been asked to construct an emulation of the satellite link, replicating
   the behaviour (delay and speed), allowing others to test their applications
   without using the satellite system. A simple way to do this is to provide an
   artificial delay of packets, emulating their flight to and from the satellite.

   (*ii*) For a simple packet length of 1KByte, how much memory is required to
           emulate the satellite link alone? Comment on other sources of memory
           utilisation.   [2 marks]

   (*iii*) What capabilities must a standard computer have to emulate a link with
           1Gbps capacity? Consider the speed and delays in the CPU, memory, and
           PCI interconnect. Comment on the suitability of a standard PC platform
           for such a task.   [6 marks]