

2010 Paper 7 Question 9

Digital Communication II

(a) Packet size has a marked influence on network performance.

(i) What is the motivation for the minimum packet size on Ethernet?
[3 marks]

(ii) What is the rationale for the maximum packet size on Ethernet?
[2 marks]

(b) The max–min fair share criterion for allocation m_n of resources to a set of N flows, with respective demands x_n , for a resource of capacity C , can be computed using the following equations:

$$m_n = \min(x_n, M_n), \text{ for } 1 \leq n \leq N$$

and

$$M_n = \frac{C - \sum_{i=1}^{n-1} m_i}{N - n + 1}$$

Explain, perhaps with the use of an example, how this criterion operates to mitigate between over- and under-demands.
[5 marks]

(c) Packet Schedulers in switches and routers provide isolation, and fairness, but are subject to implementation efficiency considerations which lead to inaccuracy in how fair they are. Discuss the impact of packet sizes on the accuracy of resource allocation compared with an idealised scheduler, making reference to a typical practical example such as Weighted Round Robin, or Deficit Round Robin.
[10 marks]