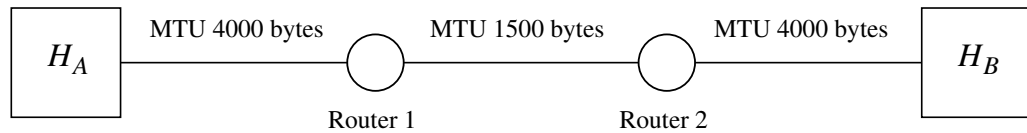


2011 Paper 5 Question 6

Computer Networking

- (a) The diagram below shows a TCP connection between Hosts H_A and H_B passing through networks with different values of Maximum Transmission Unit (MTU) shown. Version 4 of the Internet Protocol (IPv4) is in use.



H_A chooses a TCP segment size of 3000 bytes of data (TCP and IP headers are each 20 bytes in size).

- (i) Describe the way in which fragmentation takes place as H_A sends data to H_B . Include the arithmetic used to calculate fragment sizes. Explain the saving that may be made by H_A choosing an optimal TCP segment size when sending 60KBytes of data. [8 marks]
- (ii) Briefly explain how the situation described in part (i) would be handled if Internet Protocol version 6 (IPv6) were used. [2 marks]
- (b) The formulae below are used in TCP implementations to compute a value for the retransmission time-out (\mathcal{R}). R is an estimate of the round-trip time, M is the most recently measured round-trip measurement, $\alpha = 0.875$ and $h = 0.25$.

$$\begin{aligned}D &\leftarrow D + h(|M - R| - D) \\R &\leftarrow \alpha R + (1 - \alpha)M \\ \mathcal{R} &= R + 4D\end{aligned}$$

- (i) How is M measured? [2 marks]
- (ii) Explain the principles behind the design of these formulae and the values h , α and D . [8 marks]