5 Computer Networking (AWM)

(*a*) Below is an excerpt from the DNS record for a fictitious corporation, Lemon:

Name	Type	Value	TTL (seconds)
`lemon.co.uk`	A	91.45.20.24	86400
`lemon.co.uk`	NS	`grove.lemon.co.uk`	86400
`lemon.co.uk`	NS	`tree.lemon.co.uk`	86400
`lemon.co.uk`	MX	`stem.lemon.co.uk`	60
`grove.lemon.co.uk`	A	91.45.23.22	86400
`tree.lemon.co.uk`	A	91.45.23.23	86400
`orchard.lemon.co.uk`	A	91.45.23.82	86400
`stem.lemon.co.uk`	A	91.45.23.85	86400
`www.lemon.co.uk`	CNAME	`orchard.lemon.co.uk`	86400

(*i*) If you type `http://www.lemon.co.uk` into your web browser, to which IP address will your web browser connect? [1 mark]

(*ii*) If you send email to `support@lemon.co.uk`, to which IP address will the message get delivered? [1 mark]

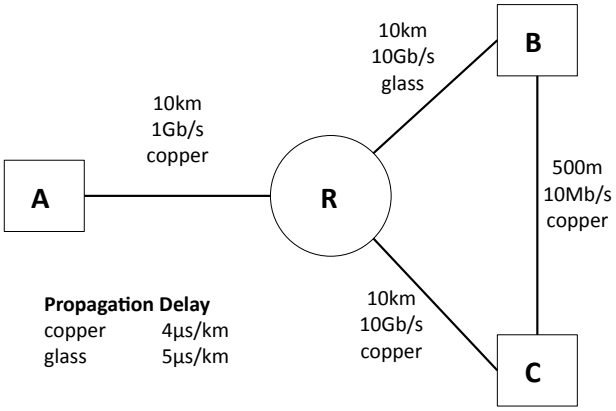
(*iii*) The TTL field refers to the maximum amount of time a DNS server can cache the record. Most of the TTLs in this record were chosen to be 86400 seconds (1 day). What is the trade-off between choosing a shorter or a longer time? Why was the MX record specifically chosen to have a 60 second TTL? [4 marks]

(*iv*) Explain why the Internet DNS uses caching. [2 marks]

(*v*) Comment on how the provision of name servers for `lemon.co.uk` affects the availabilty of the name service. [2 marks]

(*vi*) Outline two strategies to improve availability of the DNS server for the `lemon.co.uk` domain. [2 marks]

[continued ...]



(*b*) Consider the scenario shown above. Host A is sending tiny packets to hosts B and C. R is a store-and-forward switch with an average arrival rate of 10Gb/s and a buffer that contains, on average, 8MBytes of packet data. Delays due to the packet size and packet-processing are negligible.

Little's Law tells us that the average amount of buffered data equals the product of the arrival rate and the average delay experienced.

(*i*) What is the average delay that packets will incur going through the switch? [3 marks]

(*ii*) Compute the latency of the shortest path between each pair of end-nodes: A to B, A to C, and C to B. [3 marks]

(*iii*) Without changing the network propose a solution to decrease the delay between A and B. [2 marks]