

Homework Questions – Week2

Q1) Why is SMTP not used for transferring e-mail messages from the recipient's mail server to the recipient's personal computer?

Q2) Why do you think DNS uses UDP, instead of TCP, for its query and response messages?

Q3) Suppose you are sending an email from your Hotmail account to your friend, who reads his/her e-mail from his/her mail server using IMAP. Briefly describe how your email travels from your host to your friend's host. Also, what are the application-layer protocols involved?

Q4) How can iterated DNS queries improve the overall performance?

Q5) Suppose within your Web browser you click on a link to obtain a web page. The IP address for the associated URL is not cached in your local host, so a DNS look-up is necessary to obtain the IP address. Suppose that n DNS servers are visited before your host receives the IP address from DNS; the successive visits incur an RTT of RTT_1, \dots, RTT_n . Further suppose that the web page associated with the link contains exactly one object, consisting of a small amount of HTML text. Let RTT_0 denote the RTT between the local host and the server containing the object. Assuming zero transmission time of the object, how much time elapses from when the client clicks on the link until the client receives the *object*?

Q6) Which protocol – Go-Back-N or Selective-Repeat - makes more efficient use of network bandwidth? Why?

Q7) Consider a reliable data transfer protocol that uses only negative acknowledgements. Suppose the sender sends data only infrequently. Would a NAK-only protocol be preferable to a protocol that uses ACKs? Why? Now suppose the sender has a lot of data to send and the end-to-end connection experiences few losses. In this second case, would a NAK-only protocol be preferable to a protocol that uses ACKs? Why?

Q8) If the RTT from London to Cape Sydney is 120ms and all links in the network have a 155 Mbits/second data-rate, how much data can fit in the “pipe”? Hint: Bandwidth Delay Product. Express your answer in bytes.

Q9) Is it possible for an application to enjoy reliable data transfer even when the application runs over UDP? If so, how?

Q10) Consider a TCP connection between Host A and Host B. Suppose that the TCP segments travelling from Host A to Host B have source port number x and destination port number y . What are the source and destination port numbers for the segments travelling from Host B to Host A?

Q11) Suppose that the UDP receiver computes the Internet checksum for the received UDP segment and finds that it matches the value carried in the checksum field. Can the receiver be absolutely sure that no bit errors have occurred? Explain. Would things be different with TCP?

Q12) In protocol rdt3.0, the ACK packets flowing from the receiver to the sender do not have sequence numbers (although they do have an ACK field that contains the sequence numbers of the packet they are acknowledging). Why is that the ACK packets do not require sequence numbers?