UNIVERSITI SAINS MALAYSIA

First Semester Examination
Academic Session 2002/2003

September 2002

CCS522 – Advanced Data Communication & Computer Network

Duration : 3 hours

INSTRUCTION TO CANDIDATE:

- Please ensure that this examination paper contains **SIX** questions in **THREE** printed pages before you start the examination.

- Answer all **SIX (6)** questions.

- You can choose to answer either in Bahasa Malaysia or English.

ENGLISH VERSION OF THE QUESTION PAPER

1. In Figure 1, frames are generated at node A and sent to node C through node B. Determine the minimum data rate required between nodes B and C so that the buffers of node B are not flooded, based on the following:

    • The data rate between A and B is 1 Mbps.
    • The propagation delay is 10 μs/km for both links.
    • There are full-duplex lines between the nodes.
    • All data frames are 1500 bits long; ACK frames are separate frames of negligible length.
    • Between A and B, a sliding-window protocol with a window size of 5 is used.
    • Between B and C, stop-and-wait is used.
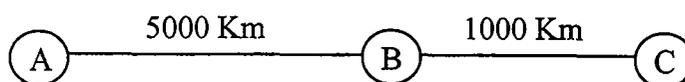   • There are no errors.

Figure 1

(15 marks)

2. TCP logical connections have just been opened between a web server and your office PC. The web server has been granted an initial window of 1700 bytes, and will be transmitting 300 byte packets to the PC. Assume that all ACK's are successfully transmitted by the PC and received by the server, except ACK#2 which gets corrupted and discarded by the servers NIC. Assume further that:

    • All ACKs grant the server permission to transmit an additional 300 bytes of traffic.
    • The Network Propagation Delay of the link between the PC and Server is 1.00.
    • There is no other traffic on the network during the entire time of this exchange.

    Calculate the time it will take the web server to successfully transmit a 10-packet web page to your office PC. [Note: Provide a time line and plenty of comments so that your train of thought can be understood.]

(15 marks)

3. A proposed congestion control technique is known as *isarithmic* control.

    (a) Describe how this technique works.

    (b) List **two (2)** potential problems with the technique.

(15 marks)

4. Answer the following questions on DHCP and NAT servers:

   (a) List and briefly describe the **three (3)** advantages of a DHCP server.

   (b) How do you make a local server be available to the internet assuming you are using a NAT to access the Internet?

   (15 marks)

5. Briefly describe what a proxy server is and at what layer/layers of the OSI 7 layer model does a proxy server work? If more than one local client tries to connect to the same web server outside the LAN in the Internet, how does the proxy handle this? Explain using ports and IP addresses. Also, use diagrams to help explain your answer.

   (20 marks)

6. Answer the following questions on IPV6:

   (a) What is the biggest pusher (reason) for the implementation of IPv6?

   (b) Draw both the IPv4 and IPv6 header formats and provide a brief comparison of each of the fields.

   (c) Describe the "tunneling" technique which is used to send IPv6 packets via a IPv4 network. Describe at least **two (2)** setbacks with this technique.

   (20 marks)

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