UNIVERSITI SAINS MALAYSIA

First Semester Examination
Academic Session 2004/2005

October 2004

CCS522 – Advanced Data Communication And Computer Network

Duration : 2 hours

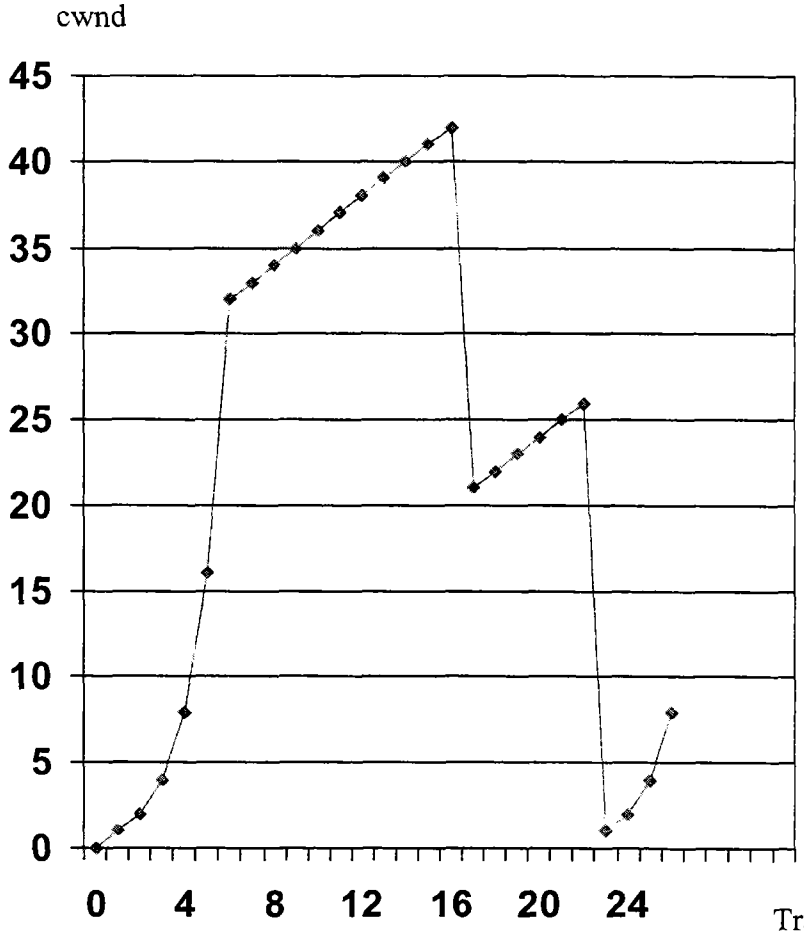
INSTRUCTION TO CANDIDATE:

- Please ensure that this examination paper contains **FIVE** questions in **FOUR** printed pages before you start the examination.
- Answer any **FOUR (4)** questions.
- You can choose to answer either in Bahasa Malaysia or English.

ENGLISH VERSION OF THE QUESTION PAPER

1. TCP

Assuming TCP New-Reno is the protocol experiencing the behavior shown in the Fig. 1, answer the following questions. In all cases, you should provide a short discussion justifying your answer.



(a) Identify the intervals of time when TCP slow start is operating.

(b) Identify the intervals of time when TCP congestion avoidance is operating

(c) After the 16th transmission round, is segment loss detected by a triple duplicate ACK or by a time out?

(d) After the 22nd transmission around, is segment loss detected by a triple duplicate ACK or by a time?

(e) What is the initial value of Threshold at the first transmission around?

(f) What is the value of Threshold at the 18th transmission around?

(g) What is the value of Threshold at the 22nd transmission around?

(h) During what transmission round is the 70th segment sent?

(i) Assuming a packet loss is detected after the 26th round by the receipt of a triple duplicate ACK, what will be the values of the congestion-window size and the Threshold?

(25/100)

2. Answer the following questions on the IPv6.

(a) Sketch the IPv6 segment structure and describe briefly, the header fields.

(b) List **three (3)** IPv4 problems and describe how IPv6 overcomes the problems.

(c) When the IPv6 protocol is introduced, does the ARP protocol have to be changed? If so, are the changes conceptual or technical?

(d) Name and describe briefly **two (2)** techniques for the public Internet, which is based on IPv4, be transitioned to IPv6.

(e) Create the link-local address of a node with the prefix fe80::/64 and an Ethernet MAC address 00-03-47-bf-b0-fa.

(25/100)

3. TCP Implementation and Active Queue Management in TCP/IP.

(a) In active queue management algorithms, average or instantaneous queue length is used as one of the indicators of network congestion.

(i) Describe the advantages and disadvantages of using the average and instantaneous queue lengths.

(ii) Give an example to illustrate the situation in which average or instantaneous queue length may fail in indicating network congestion.

(b) A physical link with a capacity of B Mbps is shared by four connections with different physical distances of ratios 1:2:4:8.

(i) What is the bandwidth that can be fairly shared by each connection?

(ii) Can this bandwidth sharing be reached with traditional queue management?

(iii) How is the fair bandwidth sharing achieved with active queue management?

(c) Discuss the protocol and implementation features in a typical TCP implementation that affect TCP performance

(25/100)

4. Answer the following questions on DHCP, NAT and Proxy 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?

(c) Briefly describe what a proxy server is and at what layer/layers of the OSI 7 layer model does a proxy server work?

(25/100)

5. Assume you are monitoring a flat network using a sniffing device.

(a) You see a lot of UDP traffic coming from one PC, but being sent to multiple other PCs. Name **two** (2) things that could cause this. Briefly describe how you would solve this problem.

(b) If you are on a switched network and are monitoring one port of a layer 3 IP (Internet Protocol) switch which is connected to server A, name the **three** (3) different kinds of IP traffic that you will be able to see. (Remember, a switch will filter traffic, for example All Unicast packets to the server). Give one example of packets that you CANNOT see.

(c) What is the meaning of "setting the network interface card (NIC)" to promiscuous mode?

(d) Name and explain briefly **four** (4) different event correlation techniques that can be used for analyzing events on the network.

(25/100)