
UNIVERSITI SAINS MALAYSIA

First Semester Examination
Academic Session 2004/2005

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CCS522 – Advanced Data Communication And Computer Network

Duration : 2 hours

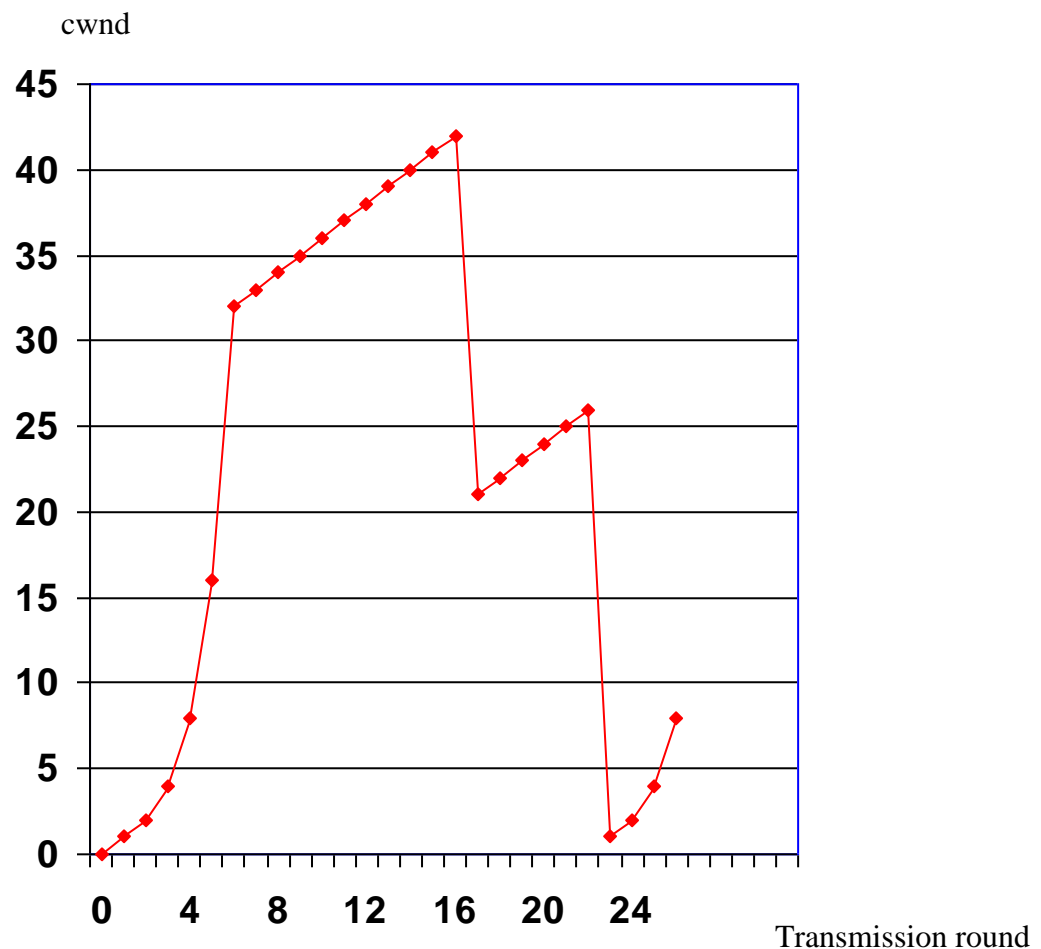
INSTRUCTION TO CANDIDATE:

- 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.
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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.



- Identify the intervals of time when TCP slow start is operating.
- Identify the intervals of time when TCP congestion avoidance is operating
- After the 16th transmission round, is segment loss detected by a triple duplicate ACK or by a time out?
- After the 22nd transmission around, is segment loss detected by a triple duplicate ACK or by a time?
- What is the initial value of Threshold at the first transmission around?
- 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)

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