



UNIVERSITY of LIMERICK

O L L S C O I L L U I M N I G H

COLLEGE of INFORMATICS and ELECTRONICS

Department of Computer Science
and Information Systems

End-of-Semester Assessment Paper

Academic Year:	2007/08	Semester:	Spring
Module Title:	Computer Networks	Module Code:	CS4225/CS5222
Duration of Exam:	2½ Hours	Percent of Total Marks:	80
Lecturer(s):	Dr Séamus O'Shea	Paper marked out of :	100

Instructions to Candidates:

Answer 3 Questions

Q1.

- (a) If the bit rate on a communication link is 5 Mbps, what is the bit time? (5 marks)
- (b) If the propagation speed on a link is taken to be 200 m/μsec, what distance separates the leading and trailing edges of a pulse which represents a single binary digit when the transmission rate is 5 Mbps? How many bits will fit on a 100 km length link? (8 marks)
- (c) If a data signal suffers attenuation of 5dB in travelling over a link, what fraction of the original power is the final power? (4 marks).
- (d) How long will the transmission of a 64KB file take on a 64 kbps link.? (4 marks)
- (e) Compare the features of Ethernet hubs and Ethernet switches (7 marks)
- (f) Draw a diagram of an Ethernet frame. What is the maximum payload size? (5 marks)

Q2.

- (a) Suppose you are a network manager and you have been allocated the address block 200.11.64.0 with a corresponding mask of 255.255.224.0. How many valid addresses are in this block? (5 marks)
- (b) Suppose you wish to create 12 equal sized subnets using this block, to be interconnected via a 'classful' router. How many valid addresses will be available in each subnet? (5 marks)
- (c) What will be the appropriate mask for each subnet? (6 marks)
- (d) List the first 3 address blocks in dot decimal notation. (6 marks)
- (e) What are the starting and final addresses in the first block? (6 marks)
- (f) What is the broadcast address on the subnet 200.11.80.0? (5 marks)

Q3.

- (a) What are the primary issues that data link protocols are concerned with? (4 marks)
- (b) Draw a diagram to show the typical header fields of a 'Go Back n' protocol type message, and explain the purpose of each field. If the sender's sequence number field is 7 bits in size, what is the maximum number of unacknowledged frames that can exist at any given time? Why? (6 marks)
- (c) With reference to (b) above, suppose that frame # 44 is corrupt when it arrives at the receiver, while all previous and the next few succeeding frames are all fine. Describe how the receiver reacts to the corrupt frame alluding especially to how the succeeding frames are handled. (6 marks)
- (d) With reference to (c) above, suppose frame retransmissions are governed by a timer. Describe how the sender reacts to the timer expiration. (6 marks)
- (e) Discuss how a 'selective repeat' type of protocol would handle the corruption of frame # 44, alluding especially to the receiver's actions and also to the sender's retransmission. (7 marks)
- (f) If a communications link is prone to errors, state which protocol type is most suitable and explain why. (5 marks)

Q4.

- (a) How many bits does the 'hostid' part of the IP address 192.168.6.19 contain if the corresponding mask is 255.255.255.192? (3 marks)
- (b) Which of the address blocks, 132.45.96.0/19 and 132.45.96.0/22, is the smaller? How many of the smaller blocks are contained in the larger block? (4 marks)
- (c) Show, via examples, how classfull IP address allocation is wasteful, and how CIDR reduces such waste. (6 marks)
- (d) In a packet switched network, what are the advantages and disadvantages of 'small' packets. (6 marks)
- (e) A user's PC has an IP address of 192.168.6.3/26 and a default gateway configuration of 192.168.6.65/26. Examine if the default gateway is properly configured to allow access to remote networks. (7 marks)
- (f) Suppose you have 20 PCs plus a router connected into the same Ethernet hub. Suppose that you wish to arrange the PCs into 5 separate interconnected networks of the same size at the IP level, using addresses from the block 192.168.10.0/24. Show how this could be done, assuming CIDR addressing policy. (7 marks)

Q5.

- (a) Draw a diagram to show how the sockets API relates to the TCP/IP protocol stack. Show, using your project's programming language, the function call used to create a stream socket. How can you check if the call succeeded? (5 marks)
- (b) In relation to your project, describe the data structure which contains the IP address and port number of the server and which is supplied in the client's 'connect' call. What is the returned value from this call? (6 marks)
- (c) Suppose that when a TCP client sends a group of 8 messages to a TCP server, all except the 5th message arrive. Describe how the server reacts in view of the missing message. (6 marks)
- (d) Discuss how TCP tries to track the Round Trip Time (RTT) on a connection. (5 marks)
- (e) What are the consequences of a retransmission timer which is (i) too short? (ii) too long? (6 marks)
- (f) How is flow control achieved between two communicating TCP entities? (5 marks)