UNIVERSITY *of* LIMERICK

OLLSCOIL LUIMNIGH

COLLEGE *of* INFORMATICS *and* ELECTRONICS

Department of Computer Science
and Information Systems

End-of-Semester Assessment Paper

Academic Year:	**2006/07**	Semester:	**Summer**
Module Title:	**Computer Networks**	Module Code:	**CS4225**
Duration of Exam:	**2½ Hours**	Percent of Total Marks:	**100**
Lecturer(s):	**Dr Séamus O'Shea**	Paper marked out of :	**100**

Instructions to Candidates:

Answer 3 Questions

Q1.

(a) What are the primary issues that data link protocols are concerned with? (8 marks)

(b) Describe the features of both the 'Go back n' and the 'selective repeat' types of data link protocols. What typical link operating conditions would favour the use of one type over the other? (8 marks)

(c) Draw a diagram to show how the control field of an HDLC information frame is structured, and explain the purpose of each field. (9 marks)

(d) In the case of both HDLC and TCP, how does the sender become aware that a retransmission of a corrupt frame is necessary? Compare the flow control mechanisms in both HDLC and in TCP. (8 marks)

Q2.

(a) Draw a diagram to show how the sockets API relates to the TCP/IP protocol stack. Differentiate between stream and datagram sockets. (9 marks)

(b) Show, via a diagram, the sequence of function calls an application makes in order to set itself up as a server. Describe also the function calls a client must invoke in order to access a server. (10 marks)

(c) Suppose you have 20 PCs plus a router connected into the same Ethernet switch. 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. (14 marks)

Q3.

(a) Briefly describe the services which TCP provides in the protocol stack. (8 marks)
(b) Suppose that TCP messages m_k, m_{k+2}, m_{k+3}, m_{k+4} are received. Discuss how the receiving TCP software behaves in response to the missing message. (k= 1, 2….) (5 marks)
(c) In relation to (b) above, what acknowledgement is returned to the sender when the missing message is received? (5 marks)
(d) Discuss how the Round Trip Time (RTT) affects the operation of a TCP connection and how TCP tries to track the RTT. (8 marks)
(e) What are the consequences of a retransmission timer which is (i) too short? (ii) too long? (8 marks)

Q4.

(a) Draw a diagram to show the header fields of an IPv4 packet. Explain the purpose of the 'protocol' field. (8 marks)
(b) Given an address block with an associated mask of 255.255.255.224, how many valid machine addresses are in this block? (8 marks)
(c) Draw a diagram to show the relationship of ICMP to the rest of the TCP/IP protocol stack (8 marks)
(d) A user's PC, with an IP address of 192.168.10.66/26, is configured with a default gateway address of 192.168.10.81/26. Will remote networks be accessible? Explain. (9 marks)

Q5.

(a) Briefly describe the purpose of the MAC procedure in Ethernet LANs. (6 marks)
(b) How does the problem of medium access in wireless LANs (e.g IEEE 802.11) differ from that in fixed wired LANs? (8 marks)
(c) Compare the role of Hubs, Bridges and switches in Ethernet LANs. (8 marks)
(d) Differentiate between a store-and-forward switch and a cut-through switch. (6 marks)
(e) State some attractive properties of a VLAN. Give examples of typical criteria which are used to decide membership of VLANs.. (5 marks)