



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:	2006/07	Semester:	Autumn
Module Title:	Computer Networks	Module Code:	CS4225
Duration of Exam:	2½ Hours	Percent of Total Marks:	80
Lecturer(s):	Dr Séamus O'Shea	Paper marked out of :	100

Instructions to Candidates:

- You must answer question 2. Answer two more questions.

1.

- Differentiate between the baud rate and the bit rate of a communication channel. Give examples where the bit rate: (i) equals, (ii) is more than, (iii) is less than, the baud rate. (7 marks)
- Suppose that the propagation speed on a physical link connecting two switches, which are 500 km apart, is 200 m/μsec. How many bits can be in transit at any time if the transmission rate is 5 Mbps? (7 marks)
- State the characteristics of an ideal line code. How well are those characteristics present in the Manchester encoding scheme? (6 marks)
- Suppose a data signal experiences attenuation of 2dB in transmission from A to B, and a further 1dB in transmission from B to C. Express the signal power at C as a fraction of the signal power at A. (6 marks)
- How long will it take to download a 40kB MP3 file over a 64kbps channel? (7marks)

2.

- Outline the main differences between stream sockets and datagram sockets. (4 marks)
- What function call is used to create a socket? Describe the purpose of the parameters to this function call. What is the default communication mode of a newly created socket? (5 marks)
- Describe via a diagram the steps a client takes in order to connect to a known server. (assume stream sockets) (5 marks)
- Describe the fields of the 'sockaddr_in' structure. (5 marks)
- What is the purpose of the 'bind' function? (5 marks)
- When a client calls the 'connect' function, what address is supplied to it? (5 marks)
- Describe the sequence of calls which an application typically makes in order to configure itself as a server.(blocking mode) (5 marks)

3.

- (a) Draw a diagram to show the header fields of an IPv4 packet. Explain the purpose of the Time-to-Live field. (6 marks)
- (b) How many valid addresses are contained in the block 192.168.20.0/26? (4 marks)
- (c) Are IP packets of fixed or variable size? (4 marks)
- (d) How does the IP protocol decide whether a packet's destination is on a local or a remote network? (6 marks)
- (e) When IP discovers that a packet's destination is on a remote network, outline the steps taken in routing it to its destination. (6 marks)
- (f) A user's PC, with an IP address of 192.168.20.66/26, is configured with a default gateway address of 192.168.20.5/26. Will the PC be able to access remote networks? Explain. (7 marks)

4.

- (a) Briefly describe the services which TCP provides in the protocol stack. (5 marks)
- (b) Draw a diagram to show the necessary exchange of messages to set up a TCP connection. (4 marks)
- (c) On transmission, is the IP datagram encapsulated in the TCP segment, or is the TCP segment encapsulated in the IP datagram? (3 marks)
- (d) How does TCP implement flow control? (3 marks)
- (e) If an IP packet containing a TCP message is lost in the network, how does TCP at the destination discover this? (4 marks)
- (f) How are acknowledgements conveyed to the source by the TCP protocol? (3 marks)
- (g) How are the processes that are using a TCP connection identified? (4 marks)
- (h) Describe how retransmission of messages in a TCP connection is triggered. (3 marks)
- (i) Briefly describe the slow start algorithm of TCP (4 marks)

5.

- (a) Explain the terms 'error control' and 'flow control' in the context of data link layer protocols. (6 marks)
- (b) Give examples of both error and flow control frames in HDLC (6 marks)
- (c) State how communication in asynchronous balanced mode is established between both ends of a link in HDLC (6 marks)
- (d) Compare the error and flow control capabilities in an Ethernet network with those of the HDLC protocol operating over a point-to-point link. Draw a diagram to show the contents of the control field within the header of an HDLC information frame, and explain the purpose of each field. (7 marks)
- (e) Suppose a 64 kbps channel has a round-trip propagation delay of 20 msec, and is operated in stop-and-wait mode. Suppose frames are 2048 bits in size. Calculate the link utilization. (8 marks)