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: 05/06   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

Instructions to Candidates:

Answer any 3 questions. Questions are equally weighted.

1. (a) Explain how an analog signal can be modulated to carry binary data. (6 marks)
(b) Define the baud rate of a signal. Show how phase modulation can be used so that an analog signal can carry several bits per baud.   (9 marks)
(c) What characteristics of a communication channel determine the maximum bit rate that can be transmitted over it?   (9 marks)
(d) Briefly outline the advantages and disadvantages of (i) copper   (ii) radio (iii) optical fibre, as regards data communication. (9 marks)

2.(a) If the loss experienced by a signal in travelling over a communication line is (i) 3dB (ii) 10dB, what fraction of the original signal strength does this loss represent in both cases?   (11 marks)
(b) State some of the most desirable properties of a line code. Describe, via a diagram, the line code used in Ethernet. What are the advantages and disadvantages of this line code?   (11 marks)
(c) Draw a diagram to show the structure of an Ethernet frame. How does the receiver of a frame decide what process should receive the contents of the frame? (11 marks)

3. (a) Discuss the benefits attaching to CIDR in the context of IP address allocation.   (8 marks)
(b) A network interface on a user's PC is allocated the IP address 192.168.4.17 with a corresponding mask of 255.255.255.192. How many bits does the *hostid* part of the address contain?   (8 marks)
(c) How many bits are in the *hostid* part of the address block 132.45.96.0/17 ?   (8 marks)
(d) The user's PC has a default Gateway configuration of 192.168.4.45. The PC user *pings* the interface 192.168.8.11. Explain the results.   (10 marks)

4.

(a) Describe the role of a bridge in the interconnection of several Ethernet segments. How does a bridge differ from a Hub?   (6 Marks)

(b) Compare   the properties of a bridge and a switch in the context of Ethernet segment interconnection.   (8 marks)

(c) Differentiate between a store-and-forward switch and a cut-through switch.   (8 marks)

(d) State some attractive properties of a VLAN. Describe some possibilities regarding how interconnected switches can be kept informed of VLAN membership.   (11 marks)

5. (a) Describe the main features of connection oriented and connection less communication. Does the IP layer on a host machine ensure that packets, received over the network, are in the right order before presenting them to the transport layer? (10 marks)

(b) The Internet can be described as a collection of subnets interconnected via IP routers. Describe the process by which IP routers co-operate to deliver packets over the various subnets to their eventual destination(s). What kind of information is typically held in the routing tables of Routers? How do Routers keep this information up to date? (11 marks)

(c) Briefly describe the purpose of the RIP and OSPF protocols within IP routed networks. What communication mode do those protocols use? In the case of sparse and sporadic traffic between Remote Routers, dial up lines are often used, over which the SLIP or PPP protocols are used. Describe the main features of these protocols. (12 marks)