UNIVERSITY *of* LIMERICK

OLLSCOIL LUIMNIGH

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:	Telecommunication Networks Architectures	Module Code:	CS4218
Duration of Exam:	2½ Hours	Percent of Total Marks:	100
Lecturer(s):	Dr Seamus O'Shea	Paper marked out of :	100

Instructions to Candidates:

- Answer any THREE Questions

Q1

(a) Consider the shared bus arrangement corresponding to Basic Rate Access in ISDN. If 16384 physical layer frames are necessary to transport an LAPD frame from TE to NT1, what is the size, in bits, of the LAPD frame? (8 marks)

(b) What is the purpose of the SAPI and TEI fields in the LAPD frame header? Give an example of why a given physical device may have more than one TEI assigned to it. (8 marks)

(c) Why is it necessary for all connected devices to monitor the D channel both in the downlink and uplink directions? (8 marks)

(d) Discuss how a priority system operates on the D channel to give signalling traffic precedence over other types of traffic. (9 marks)

Q2

(a) Draw a diagram to show the structure of a digital Time Switch Module. (TSM). Briefly explain how it operates. Distinguish between blocking and non blocking switches. (10 marks)

(b) Explain the role of Time Switch Modules and Space Switch Modules in the provision of flexible capacity in commercial switches. (11 marks)

(c) If a TSM is able to switch as many as 16 PCM trunks, what is the maximum time allowed to switch an individual sample? (12 marks)

Q3.

(a) Describe the core activities performed in network nodes within a Frame Relay network and also describe the transport-related activities performed in edge nodes. Draw a diagram to show the nature of the protocol stack both in a network node and in an edge node. (10 marks)

(b) Draw a diagram to show the structure of an LAPF frame. Differentiate between frame relaying and frame switching, and describe the features of the LAPF protocol both in the case of relaying and switching. (11 marks)

(c) Explain how congestion may be avoided in a Frame Relay network. Allude especially to the role of signalling at set up time. (12 marks)

Q4

(a) Outline the security-related functions typically provided by a firewall. Also, write a brief note on the security features of IPsec. (10 marks)

(b) Briefly compare the features of private key versus public key security services. Describe how the Diffie-Hellman algorithm can be used in key distribution. What are its weaknesses? (12 marks)

(c) What is a Security Association?. In client server interactions, where authentication of the respective parties is required, describe the role of Certification Authorities. Describe how a client and server can use the SSL protocols to set up a security association, and outline the features of the SSL protocols. (12 marks)

Q5.

(a) Explain the disadvantages of the PDH hierarchy, and the advantages of the SDH hierarchy, in fibre-based networks. (11 marks)

(b) Describe how SDH is designed to inter work with older PDH equipment and how it can accommodate the multiple existing PDH standards. Draw a diagram to illustrate the meaning of the following terms (i)Section (ii)Line and (ii) Path. (11 marks)

(c) Compare the approaches of PDH and SDH with regard to locating and adding/dropping lower tributaries to/from higher order tributaries. Briefly, set out the functions performed by both Digital Crossconnects and ADM Multiplexors in SDH based networks. (11 marks)