UNIVERSITY *of* LIMERICK

OLLSCOIL LUIMNIGH

COLLEGE *of* INFORMATICS *and* ELECTRONICS

Department of Computer Science
and Information Systems

End-of-Semester Assessment Paper

Academic Year:	06/07	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) Outline the security-related threats which an Internet-accessible server may be exposed to. Give examples of appropriate defences to counter such threats. (6 marks)

(b) Give examples of how a 'non repudiation' service may be useful in the context of e-business and suggest how such a service may be implemented. (5 marks)

(c) How could a client verify that a web server it logs onto, and proposes to do business with, is not a fake server? How can the client verify that messages it exchanges with the server have not been modified in transit over the intervening network? (5marks)

(d) Draw a diagram to show the location of the SSL layer in the protocol stack. What role does the TLS Record layer play in providing SSL services? (6 marks)

(e) Explain how the AH protocol of IPSec provides assurance to the receiver regarding both the origin and integrity of a packet. (5 marks)

(f) Both IPSec and SSL provide for the integrity of messages. Comment on the differences between them. (6 marks)

Q2

(a) Briefly describe how the deployment of optical fibre has led to major changes in Telecommunication networks. Also analyse the shortcomings of the PDH hierarchy in a fibre based network. (8 marks)

(b) Contrast the roles of switches versus cross-connects in a fibre based networks. Which is preferable for long haul high capacity routes? What are the trade-offs?. (9 marks)

(c) Compare the provision of semi-permanent lines in both older copper based PDH networks and in fibre-based SDH networks in terms of implementation. Describe how ease of implementation has influenced competitiveness in the provision of services. (9 marks)
(d) Briefly describe how SDH supports network management. (8 marks)

Q3

(a) Outline the features of the D channel in the ISDN BRA shared bus arrangement. Draw a diagram to show how the physical connection both between the connected TEs and the NT, and also between the NT and the ISDN network is realized. (8 marks)
(b) In what respects does LAPD on the D channel differ from the HDLC link protocol? Give plausible reasons for such differences. Draw a diagram to show the nodes at both ends of the data link over which LAPD operates in BRA. (9 marks)
(c) If an LAPD frame, of size 8192 bytes, is transferred from a TE to the local ISDN exchange at the UNI, how many physical layer frames will be involved in the actual transfer of the LAPD frame? (8 marks)
(d) In relation to (c) above, how long will it take to transfer the frame from TE to the local exchange? (8 marks)

Q4

(a) Describe the characteristics of a Frame Relay network. Draw a diagram to show the structure of the protocol stack both in a network node and in an end user terminal. (8 marks)
(b) Set out the core network functions performed at the frame level within the network, and also indicate what functions are performed end-to-end. (8 marks)
(c) Discuss the role of Frame Relay Access Devices (FRADs). Consider the situation where several mutually remote LANs (i.e Ethernet) are interconnected via a FR based Wide Area Network (WAN). Suppose that end user terminals run a TCP/IP protocol stack over the Ethernet MAC layer, and that each LAN gains access to remote locations via a FRAD. Draw a diagram to show the structure of the FRAD's protocol stack. (8 marks)
(d) With reference to part (b), analyse the task of a FRAD when it is required to deliver an IP packet which is addressed to an end user terminal at a remote LAN. Discuss the interworking aspects of the FRAD in terms of how address resolution may take place, and also how the mismatch between the connectionless LAN environment and the connection oriented WAN environment may be mediated. (Assume each LAN is a distinct IP subnet). (9 marks)

Q5.

(a) Set out the main features of an ATM based network by comparing it to other types of packet based networks. (8 marks)
(b) Set out the advantages and disadvantages of 'small' versus 'large' packets. (8 marks)
(c) Briefly, describe the complexity associated with running the IP protocol over an ATM based physical network, alluding especially to the task of address resolution. (9 marks)
(d) Explain the role of the adaptation layer in the ATM protocol stack of hosts which exchange multimedia information over an ATM network. Differentiate between the requirements of PCM uncompressed speech and compressed music.(e.g MP3 files). (8 marks)