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:	2006/2007	Semester:	Summer
Module Title:	Telecommunication Networks Architectures	Module Code:	CS4228
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 any 3 questions.

Q1.

(a) Describe the services which TCAP provides, and give examples of typical uses in INAP, GSM and OMAP. (8 marks)

(b) Differentiate between structured and unstructured dialogues in TCAP. How is a structured dialogue created? Give examples of the dialogue handling and component handling primitives available at the TCAP service interface.Draw a diagram to show the relationship between TCAP, users of TCAP, and the rest of the SS7 protocol stack. (8 marks)

(c) In the context of international roaming where a foreign node interacts with a home node, state how incompatibilities between different TCAP versions may be surmounted. (9 marks)

(d) Draw a diagram to show the structure of a TCAP message. What TCAP function call is used to specify an operation that is to be performed at a remote node? How is the precise operation specified? (8 marks)

Q2.

(a) Draw a diagram to show the relationship between the main network nodes that implement a GSM PLMN. Show also the main interfaces which are defined. (8 marks)

(b) Describe how a serving GSM PLMN discovers the location/identity of a visiting user's HLR. Discuss also the process of visitor authentication, and the exchange of signalling messages that takes place during authentication. (8 marks)

(c) Define a 'location area' and a 'service area' in the context of a GSM PLMN. How does a MS discover that it has entered a new location area ? (8 marks)

(d) Draw a diagram to show the messages that are exchanged between the MS and the network in the performance of a location area update involving two MSCs. (9 marks)

1

Q3.

   (a) Explain the term 'ad-hoc' networking with particular reference to Bluetooth and Wireless LANs. Compare the characteristics of a Bluetooth piconet and an 802.11 WLAN cell.

          (9 marks)

   (b) What are the advantages of the frequency hopping mode of operation at the Bluetooth Baseband level? How many radio channels are available for hopping and what is the hop rate? How is the hopping sequence agreed between the master and a slave?   (9 marks)

   (c) Is it possible for several Bluetooth piconets to exist in the same room? Explain.   (5 marks)

   (d) Give an example of how the 'hidden station' problem arises and explain how the 802.11 WLAN MAC layer is designed to cope with this problem.   (10 marks)

Q4.

   (a) In the context of the transport of multi-media content over the Internet, give examples of applications which are delay-sensitive and loss-tolerant. Also give examples of applications which are loss-sensitive and delay-tolerant.   (8 marks)

   (b) What compensating mechanisms can be used to counteract the defects of 'best effort' transport as regards delay-sensitive applications? Refer especially to the role of RTP in the transport of audio/video content over the Internet and compare its role to that of AAL in ATM.   (8 marks)

   (c) Compare the 'Intserv' and 'Diffserv' approaches to the provision of QoS in IP based networks.   (10 marks)

   (d) Outline the purpose and main features the Session Initiation Protocol (SIP), and give examples of how the stated features are used.   (8 marks)

Q5.

   (a) Differentiate between (i) common and (ii) dedicated control channels at the air interface of a GSM network. Give one example of each channel type.   (7 marks)

   (b) Briefly describe the purpose of the BCCH, FCH, and the SCH channels   (5 marks).

   (c) Indicate how the BCCH, FCH and SCH channels may be implemented.   (7 marks)

   (d) Describe the sequence of events, associated with a call setup, which follow when an MS discovers that it is being paged. Allude especially to the use of control channels.   (6 marks)

   (e) What is the role of the SACCH at the air interface?   (8 marks)