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:	07/08	Semester:	Autumn
Module Title:	Telecommunication Networks Architectures	Module Code:	CS4218
Duration of Exam:	2½ Hours	Percent of Total Marks:	85
Lecturer(s):	Dr Séamus O'Shea	Paper marked out of :	100

Instructions to Candidates:

- Answer any THREE Questions

Q1
(a) Differentiate between IP routing and IP switching and set out briefly the design objectives for MPLS. (8 marks)

(b) Draw a diagram to show the relationship of MPLS to the rest of the TCP/IP protocol stack of an LSR. (6 marks)

(c) Explain the term: 'Forwarding Equivalence Class' (FEC) and give examples. What typical events which would lead to the binding of a label to a FEC? (6 marks)

(d) Briefly describe the processing that takes place within an LSR when a label-bearing packet arrives at an incoming interface. (6 marks)

(e) State why a routing protocol like RIP may not be suitable to support an MPLS network. (8 marks)

Q2.
(a) In the context of network routing, give examples of typical criteria which serve to define an Autonomous System.(AS). (8 marks)

(b) Briefly compare the salient properties of 'Distance Vector' and 'Link State' routing protocols and discuss the advantages and disadvantages of each type. (9 marks)

(c) In the event of a given network becoming unreachable following either a router or link failure, discuss the slow convergence aspect of RIP based routers after the failure, and give examples of mechanisms designed to counter or avoid the slow convergence problem. (9 marks)

(d) In the case where there are frequent router or link failures within an AS, what is the impact on OSPF? (7 marks)

Q3.

   (a) Differentiate between flow control and congestion control in the context of computer networking. (7 marks)

   (b) What flow control capability, if any, do IPv4 routers have? Describe how the Van Jacobson congestion control operates in traditional TCP/IP protocol stacks. (9 marks)

   (c) Compare the congestion control features of both FR and ATM networks with that of TCP/IP based networks. (9 marks)

   (d) Briefly explain how the 'leaky bucket' algorithm may be used as a congestion control mechanism. (8 marks)

Q4.

   (a) Briefly set out the design objectives of ATM cell switching networks. Give examples of typical physical networks over which ATM operates. (8 marks)

   (b) Give plausible reasons why the need for Quality of Service (QoS) guarantees, on the part of network users, has emerged in recent years. (7 marks)

   (c) Give examples of parameters which can be used to measure Quality of Service (QoS) in an ATM network. (10 marks)

   (d) Briefly describe the purpose of 'Connection Admission Control (CAC)' and 'Usage Parameter Control (UPC)' in ATM networks. (8 marks)

Q5.

   (a) Give examples of how the SDH multiplexing hierarchy is more suited to the fabric of modern telecommunication networks than its predecessor PDH. (8 marks)

   (b) How is SDH designed to achieve backwards compatibility with the various disparate PDH standards? (9 marks)

   (c) Give examples of how support for automated network management is embedded in the SDH architecture. How has this been exploited in terms of fast service provision to network users? Give examples. (9 marks)

   (d) How many telephone calls (i.e 64kbps channels) approximately are contained in a 2.5 Gbps SDH structured optical link. ? How can the risk of link failures be minimised? (7 marks)