



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:	Summer
Module Title:	Telecommunication Networks Architectures	Module Code:	CS4218
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 THREE Questions

Q1

- Differentiate between IP routing and IP switching. In the case of MPLS, in what sense is it applicable to several link technologies? (7 marks)
- Set out the advantages and disadvantages of MPLS by comparing it with straight IP routing.. (7 marks)
- Draw a diagram to show the relationship of MPLS to the rest of the TCP/IP protocol stack of an LSR. (6 marks)
- 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)
- Briefly describe the processing that takes place within an LSR when a label-bearing packet arrives at an incoming interface when this is a path-terminating LSR for the packet. (7 marks)

Q2.

- Compare the features of 'Distance Vector' and 'Link State' routing protocols and discuss the advantages and disadvantages of each type. (8 marks)
- Define the term 'Autonomous System' (AS) and give examples. Given that some ASs can be quite large, what provisions does OSPF provide in terms of structuring the AS in more manageable units? (8 marks)
- 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 the slow convergence problem. (9 marks)
- Discuss the suitability of both RIP and OSPF in a network that provides MPLS service. (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 4096 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 salient characteristics of a Frame Relay (FR) network. Draw a diagram to show the structure of the protocol stack both in a network node and in an edge device. 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)
- (b) Discuss the vulnerability of both X.25 and FR networks to congestion. What defensive mechanisms does a frame relay network have to alleviate congestion, and what are the associated overheads? (8 marks)
- (c) Suppose a collection of Ethernet LANs are interconnected via a FR WAN network. Each LAN is connected to the FR network through a suitable Frame Relay Access Device (FRAD). Discuss the role of the FRADs in this configuration. (8 marks)
- (d) In the case where user devices in each LAN belong to their own IP subnet, discuss how address resolution, between FR and IP addresses, could be achieved in this configuration. (10 marks)

Q5.

- (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)