UNIVERSITY OF EDINBURGH

FACULTY OF SCIENCE AND ENGINEERING

COMPUTER SCIENCE FOUR

COMPUTER NETWORKING

Friday 26 April 2002

14:00 to 15:30

Examiners:

Prof. K. Turner (External)

Prof. C. Stirling (Chairman)

INSTRUCTIONS TO CANDIDATES

Answer any TWO questions.

All questions carry equal weight.

1. (a) Describe the main goals associated with the provision of *Quality of Service* in networking, giving examples of current and future applications that require (or will require) such goals to be met. [*8 marks*]

   (b) Compare and contrast the Differentiated Services (DiffServ) and Integrated Services (IntServ) models for provision of quality of service guarantees in the Internet. [*8 marks*]

   (c) Discuss the contribution of Asynchronous Transfer Mode (ATM) as a present, and future, networking technology, in particular its potential value for the provision of quality of service guarantees. [*9 marks*]

2. (a) Explain clearly the difference between the concepts of *mobility* and of *wirelessness* in present-day computer networking. [*4 marks*]

   (b) A wireless LAN may be described as an *open* broadcast network, in contrast to, say, an ethernet LAN, which is a *closed* broadcast network. Explain the main differences in characteristics between open and closed broadcast networks. Use the IEEE 802.11 and 802.3 LAN standards as examples to illustrate variations in medium access control (MAC) protocols to deal with these differing characteristics. [*10 marks*]

   (c) In wired networking, there is now an apparent '10 gigabit per second' convergence between technologies such as ethernet, SONET and Fibre Channel. Discuss the question of when (or whether) there may be a future convergence in wireless networking, between technologies such as wireless LANs, personal area networking and mobile telephony. Make clear the current differences that would have to be bridged to reach such a convergence. [*11 marks*]

3. (a) Outline the main differences between version 4 of the Internet Protocol (IPv4) and version 6 (IPv6). Explain the rationale behind the changes made in IPv6, and the intended migration strategy from IPv4 to IPv6. [*9 marks*]

   (b) Describe the shortfalls of conventional computer processors for packet handling in high speed networking, and discuss alternative, improved architectures for specialised network packet processors. [*8 marks*]

   (c) The Simple Network Management Protocol (SNMP) is implemented using the User Datagram Protocol (UDP) over IP. By considering the main functions of SNMP, discuss the advantages and disadvantages of using UDP rather than the Transmission Control Protocol (TCP). [*8 marks*]