

**OLLSCOIL NA hÉIREANN**  
**THE NATIONAL UNIVERSITY OF IRELAND, GALWAY**

**SEMESTER II EXAMINATIONS 2000/01**

**CT425**

**Advanced Communications**

**Professor D. Bell**  
**Prof. G. Lyons**  
**Dr. A. Shearer**

**Time Allowed: Two Hours**

**Answer 3 Questions**

1. A video-hire company wants to offer videos over the Internet. They have a massive database containing the videos which are then streamed to subscribers. Describe the system for users having the following internet access capabilities.
  - i) 56 kbaud modem attached to a normal telephone connection
  - ii) 128 kbaud ISDN modem
  - iii) 384 kbaud video conferencing connection

What are the bandwidth and switching limitations of this system?

2. Write a short essay on two of the following:
  - i) Bluetooth
  - ii) Globus
  - iii) The Future of Broadband
  - iv) IP Security
  - v) IP v 6
  - vi) The Iridium Project
  - vii) Will 3G Mobile phones be successful?

Finally, compare the impact your two systems will have on the developing area of electronic and computer assisted commerce.

3. What are the strengths and weaknesses of the DES algorithm?

In order to protect its main customer base a stockbroker, *con.com*, uses a Certification Authority to authenticate its main customers. *con.com*'s customers buy and sell shares looking for short term fluctuations in a share price to make a profit. What authentication procure would you recommend bearing in mind the short term nature of some of the transactions?

*con.com*'s security manager proposed the following sequence to authenticate and secure transactions – what is wrong with his scheme and how would you improve it?

Client-Side

Data From Customer → Authentication → Encryption → Compression → Tx

Server-Side

Rx → Decompression → Decryption → Authentication → Database Request

4. As the system manager for a County Council you have been asked to install a web-based information system that will allow a number of different groups of users to have access. These will range from administrators who can have access to personnel and accounting records but not confidential information (such as planning applications memos) to planning staff who can have access to confidential records, but not personnel and accounting information. The general public can have access to the system for public warnings and notices as well as access to their own planning application files. Access to the system can be made through the Internet and through dedicated terminals that are geographically spread. What security systems would you put in place to ensure that this system can run with both bespoke and commercial software?

Given that the planning information will contain maps what bandwidth problems do you envisage?

5. The IT Department's computer systems are vulnerable to hackers. Contrast measures that can be taken to restrict access to both the Unix and NT systems. If you suspect that a hacker has gained entrance to the system what techniques could you use to detect both the presence and location of the intruder. Both staff and students require the ability to log into the University's systems from within College and from anywhere in the world. As part of the research effort of the department a certain amount of information is shared with other scientists throughout the world.