

DCNDS Multimedia Systems, D59 Draft Exam, 1999.

Answer any 3 questions, 2.5 hours.

Question 1. Multicast

Routing & Security

- a) Outline the basic operation of Internet Multicast routing, explaining the terms *IGMP*, *Shared Tree*, and *Source Based Tree*. **[9 Marks]**
- b) How is traffic constrained to stay within a multicast region? **[6 Marks]**
- c) PIM-SM is a type of multicast routing scheme that changes the tree under traffic load. Why may this not be suitable for some multimedia applications? **[5 Marks]**
- d) Two techniques reduce load on the links in a network: *caching* and *multicasting*. Each has its place. However, each may interfere with security and pricing. Briefly Explain how. **[13 Marks]**

Question 2. Video Performance

- a) Describe the basic operation of a monochrome analog TV system. **[11 Marks]**
- b) Derive the data rate for the CCIR 601 Digitized television signal **[11 Marks]**
- c) Describe the components of the H.261 video-compression scheme (with the aid of a diagram), and give a “back of the envelope” derivation of the range of data rates supported at the output of the CODEC. **[11 Marks]**

Question 3. QoS

- a) What are the rough basic User Requirements for throughput and delay for human-human audio and visual communication, for example for video-telephony applications? Take care to distinguish the difference between delay and jitter, and that there are differences for different media types! **[11 Marks]**
- b) The Internet provides a “best effort” service today. Explain why this means that “real-time” applications must usually employ adaption techniques, and outline how these function for sender adjustment to throughput and receiver handling of variable delays. **[11 Marks]**
- c) If the Internet provided QoS guarantees, what do you think would be more important: throughput or delay? **[11 Marks]**

Question 4. Services

The world is changing fast from traditional services based around post and telephone to those based around computers and computer networks. If you were setting up a new business, outline the principle arguments for staying with legacy technologies versus starting with new ones, using the following two examples.

- Fax v. E-mail
- Analog Phone v. Internet Telephony

[33 Marks]

[Turn Over]

Question 5. Voice Service.

You work for a record company that wants to promote their own label groups to students, and have been asked to write a proposal to identify the most suitable means of music dissemination.

The methods you have been asked to consider are:

- File transfer from Web pages, compressed using MPEG-1 audio compression
- Audio streaming from web pages using a widely available player, compressed using MPEG-1 audio compression
- National radio over the Mbone, compressed using G.722 (SB-ADPCM) 7kHz speech compression

Write a proposal including:

a) An introductory section on the principles of MPEG-1 audio compression[6 marks]

b) A block diagram of the system architecture of each method

[11 marks]

c) Identification of the type of network transport protocol(s) that would be used and their main characteristics

[9 Marks]

d) A comparison of the quality of received music after transmission and how this can be improved if needed

[11 marks]

e) Which method(s) do you think will give the greatest exposure to the intended audience?

[2 marks]

[End of Paper]