PRINCE OF SONGKLA UNIVERSITY
FACULTY OF ENGINEERING

Final Examination: Semester 2   **Academic Year:** 2004-2005

Date: March 1, 2005   **Time:** 09:00 – 12:00

Subject Number: 240-642   **Room:** R201

Subject Title: Multicast Protocol & Applications

Exam Duration: 3 hours

This paper has 3 pages (including this page).

Authorised Materials:

- Anything the student can carry.

Instructions to Students:

- *Answer questions in English.* Good English is **not** required.

- Attempt all 6 questions.

- Write answers in an answer book.

- Start the answer to each question on a new page.

- **Clearly Number** the answers. It is **not** required that questions be answered in order.

- Anything illegible is incorrect.

- Answer briefly where possible, essays are **not** required.

- The marks allocated for each question are shown next to that question. There are 50 marks total for this examination. This will contribute 50% of the course total.

Question 1.   *(15 marks)*

Scalable Reliable Multicast uses random delays as part of the operation of the protocol. Explain the purpose of those delays, and what benefits they bring to the operation of the protocol. What are the costs of this approach?

If two nodes (A and B) are both delaying before sending a NAK, one (A) selecting a random delay in the interval [0..2] seconds, and the other (B) in the interval [0..5] seconds, what might you be able to conclude about the relationship between A, B and the sender of the multicast packets?

Question 2.   *(10 marks)*

Multicast OSPF and (normal unicast) OSPF both use the identical Shortest Path First algorithm to calculate paths to the destination(s). Yet, there is one essential difference between the way the protocol is used for the two protocols – a router would not be calculating the same path to a destination network, and to a multicast group member that is resident on that network.

Explain what the difference is, and why it is required that there be this difference.

Question 3.   *(5 marks)*

It might be said that:

>   *Multicast saves bandwidth on some network links, at the cost of consuming bandwidth on other links.*

Do you agree? Explain your answer.

Question 4.   *(10 marks)*

Explain why some standard multicast address allocation method is desirable, and what the consequences would be without one.

Why is this a difficult problem?

Explain the suggested IPv6 multicast address allocation mechanism, and how this may be adapted for IPv4.

Question 5.   *(5 marks)*

What modifications, if any, are required to a network using Differentiated services to meet Quality of Service (QoS) objectives when that network starts carrying multicast traffic.

Only modifications related to DiffServ (Differentiated Services) need be discussed here.

Explain your answer.

Question 6.   *(5 marks)*

In the Internet Group Management Protocol, version 3 (IGMPv3) (and in Multicast Listener Discovery, version 2, MLDv2, for IPv6) a host can request to receive a multicast group, but only from a particular set of senders, or only from sources not in a given set of senders.

What requirement does this place on the multicast routing protocol if it desires to maximise efficiency of the network?

Give an example of a multicast routing protocol that can take advantage of this IGMPv3 (MLDv2) feature, and one that cannot.