PRINCE OF SONGKLA UNIVERSITY
FACULTY OF ENGINEERING

Final Examination: Semester 2   **Academic Year:** 2003-2004

Date: February 17, 2004   **Time:** 09:00 – 12:00

Subject Number: 240-575   **Room:** R300

Subject Title: Special Topics in Information Network Engineering II
(Multicast Protocols and Applications)

Exam Duration: 3 hours

This paper has 4 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 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 100 marks total for this examination. This will contribute 40% of the course total.

Question 1.   *(15 marks)*

The diagram shows a host directly connected to 2 networks, Network A, and
Network B. Its addresses on those 2 networks are *A.host* and *B.host*. A
router is also connected to both networks, a third interface from the router
connects to all destinations relevant to this question.

Network A

A.host

Host

Router

To all destinations

B.host
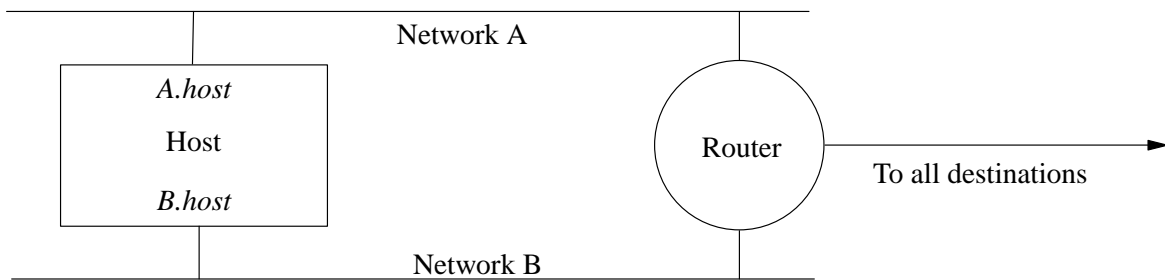
Network B

Using unicast, if a remote node, **X**, connects to the host in the diagram, using
its address *A.host*, then packets from the host back to **X** need to use *A.host* as
the source address. However, the host can send its packets to X via
whichever network it chooses (A or B) – usually using whichever interface
that the host has set as its *default route*.

If the host is to send multicast packets, which are eventually to be received
by **X** explain the relationship between the interface used to transmit the
packets, and the source address the host includes in its packets. If there is
any reason for a particular choice, give that reason.

Question 2.   *(15 marks)*

Explain why the multicast routing protocol **PIM** (Protocol Independent
Multicast) has two modes.
What are they?
When is each appropriate?
What are the differences between the two modes?

Question 3. *(10 marks)*

Explain the purpose of the *Log Server* in **Log Based Reliable Multicast**.
What are the primary disadvantages of this approach to reliable multicast?
What can be done to lessen the impact of some of the problems caused by
the use of the log server?

Question 4. *(20 marks)*

Indicate what you believe is the major problem, or difficulty, with
implementing multicast networking.

Give some examples of where this problem occurs.

Indicate any aspects of any specific multicast protocols designed to help
alleviate (reduce, or overcome) this major problem.

Question 5. *(25 marks)*

Give the sequence of events that might occur if an organisation decides to
make available some audio and video event as a multicast transmission over
the internet.

You can assume that a multicast capable IP network exists, and is correctly
operating, and reaches the entire intended audience of the event.

Explain what needs to be done to establish the multicast session, and how
each of the necessary steps may be accomplished.

Include all major steps from the initial decision to broadcast the event using
multicast over the internet, until the event has concluded.

In the explanations, you need mention only one recipient, it can be assumed
that any others perform similar acts in any ways.

Question 6.   *(15 marks)*

Scalable Reliable Multicast (**SRM**) uses an unusual approach to error recovery (repair) compared to other reliable multicast protocols.

Explain how SRM recovers from lost packets.

Indicate any problems that this approach causes.