

PRINCE OF SONGKLA UNIVERSITY  
FACULTY OF ENGINEERING

**Final Examination:** Semester 2

**Academic Year:** 2007-2008

**Date:** February 26, 2008

**Time:** 13:30 – 16:30

**Subject Number:** 240-642

**Room:** R200

**Subject Title:** Multicast Protocol & Applications

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**Exam Duration:** 3 hours

**This paper has 4 pages** (including this page).

- Write answers in the answer book provided.
- Start the answer to each question on a new page.
- There are 60 marks total for this exam.  
This will contribute 30% of the course total.

**Authorised Materials:**

- Anything the student can carry (except mobile/cell phones.)

**Instructions to Students:**

- Attempt all 7 questions.
- **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 60 marks total for this examination.
- *Answer questions in English.* Good English is **not** required.

**Question 1.***(5 marks)*

Explain why it is never correct for a router forwarding a multicast packet to transmit the packet back through the same interface from which it was received (in contrast to a router forwarding a unicast packet which sometimes needs to do that.)

**Question 2.***(10 marks)*

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

Why is this a difficult problem in general?

Explain the suggested IPv6 multicast address allocation mechanism, including in your answer an explanation why it is simple, and reliable.

**Question 3.***(15 marks)*

- A) 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?

[10 marks]

- B) Two nodes (**A** and **B**) are both delaying before sending a Negative Acknowledge (NAK) for the same missing packet, one (**A**) selecting a random delay in the interval [0..2] seconds, and the other (**B**) in the interval [0..5] seconds.

From this information, what, if anything, might you be able to conclude about the relationship between **A**, **B** and **S** (the sender of the multicast packets) ?

[5 marks]

**Question 4.***(10 marks)*

An organisation with several branch offices, connected to the main (head) office over regular Internet links, desires to use the Internet to conduct a video/audio conference of members of a management team, distributed amongst all the offices.

Topics for discussion include matters which are private to the organisation, and should not be known to outsiders, or even to other employees of the organisation.

It has been suggested that a multicast group be created to transmit the data (audio and video frames). You can assume that all the appropriate bandwidth calculations have been done, and the network has plenty of bandwidth for the conference, and that performance will be adequate.

What else needs to be done to make this conference successful?

Do you agree that multicast is the correct method? If your answer would depend upon data not given here, indicate what other information you would need to obtain.

**Question 5.***(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 6.***(8 marks)*

Multicast sessions are often advertised using the Session Description Protocol (SDP).

SDP data is most commonly carried as the payload of Session Advertisement Protocol (SAP) packets.

Give an example (or examples) of other ways of distributing SDP data, explain how that way works, (or those ways work,) and give any advantages or disadvantages of using an alternative to SAP.

**Question 7.**

*(7 marks)*

Explain the purpose of the Real Time Control Protocol (RTCP) when used in conjunction with the Real Time Protocol (RTP).

Include in your answer an indication what information is available to RTCP participants in a multicast session that would not be available without it.

There are three main RTCP packet types (Receiver Reports, Sender Reports, and Source Description.) Indicate which types of nodes send, and which types of nodes receive, each of those packet types.