

**PRINCE OF SONGKLA UNIVERSITY**  
**FACULTY OF ENGINEERING**

Final Examination Semester I :

Academic Year : 2005

Date : 13 October 2005

Time : 9.00 – 12.00

Room : หอประชุม

Subject : 240 – 575 Special Topics in Information Network Engineering II  
(Differentiated Services in the Internet)

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**Instruction:**

- Make sure that there are 4 problems (75 points) in your exam paper.
- This exam is closed book and you have 3 hours to complete your exam.
- All of your answers can be written either in Thai or English.
- Dictionary and Calculator are allowed.
- No palm pilots or other hand held computers are allowed.

**Problem 1 Core Stateless Fair Queuing (CSFQ)**

Explain how the CSFQ mechanisms can be achieved per-flow QoS provisioning without requiring the core router to maintain any flow states as in the Integrated Service (IntServ) model. Also, draw the diagram or block diagram of CSFQ functionalities to support your explanation. *(15 points)*

**Problem 2 Advanced Topics in Research Papers** (Answer only 2 sub-problems of your choices from the following sub-problems)

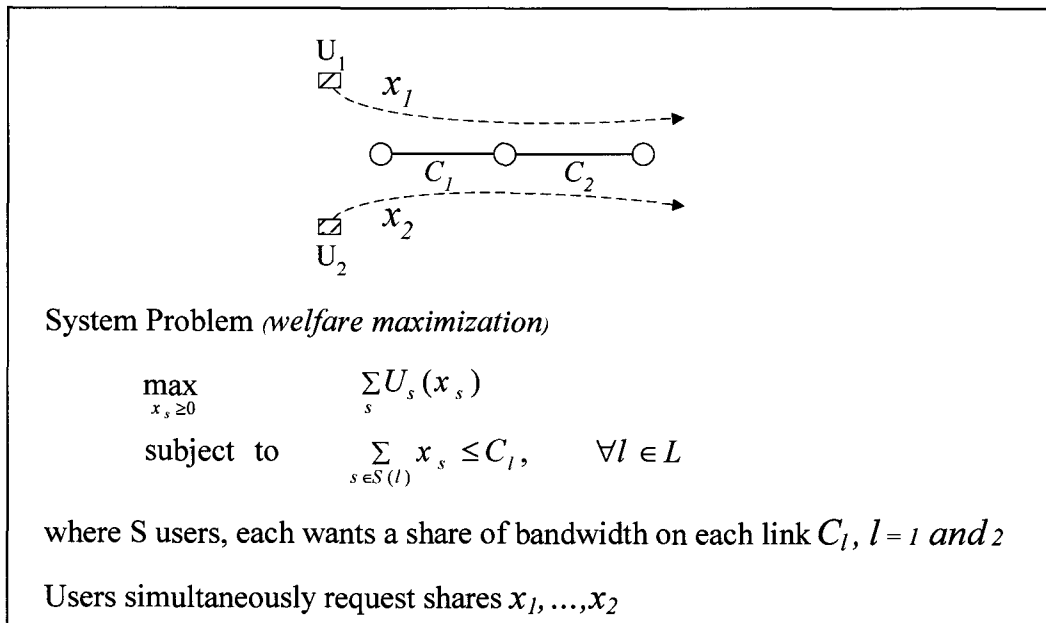
- 2.1 Explain how the SSP (State Setup Protocol), a state management protocol proposed to work for IntServ, DiffServ and Label Switching networks, can avoid the complexities of reservation state keeping at routers, which is found in typical resource reservation protocol like RSVP. *(10 points)*
- 2.2 According to the paper “A Transparent QoS Mechanism to Support IntServ/DiffServ Networks” studied in the class, explain the QoS deployment problem for diverse QoS-enabled applications working in IntServ and DiffServ Network, which could potentially decrease the utility of QoS provisioning. Also, suggest a possible approach to handle this problem *(10 points)*
- 2.3 According to the paper “A Policy Based QoS Management System for the IntServ/DiffServ Based Internet” studied in the class, explain how the policy-based networking can be used to handle the QoS deployment problem for IntServ and DiffServ Network *(10 points)*

**Problem 3 MPLS**

*Why MPLS is suitable to support Quality of Service (QoS) provisioning for adaptive real-time multimedia applications in the Internet?* *(10 points)*

**Problem 4 Optimization Flow Control (30 points)**

- 4.1 Compare packet marking (or dropping) policy for congestion control used in Random Early Detection (RED) and Random Exponential Marking (REM) router mechanisms. (10 points)
- 4.2 Regarding the global optimization problem for solving the congestion control problem in the Internet as shown in Figure 1 below, (20 points)
- Explain why this problem is not practicable to use in the real networks,
  - Explain how this problem is modified in such a way that the source and link models of Random Exponential Marking (REM) mechanism are developed.
  - Explain how the REM algorithms in both link (router) and users can work cooperatively towards achieving the optimal fair of bandwidth sharing among contending users after several iterations.



**Figure1**