

PRINCE OF SONGKLA UNIVERSITY
FACULTY OF ENGINEERING

Final Examination Semester I : Academic Year : 2006
Date : 3 October 2006 Time : 9.00 – 12.00 Room : R200
Subject : 240 – 641 Differentiated Services in the Internet

Instruction:

- Make sure that there are 5 problems (70 points) in your exam paper.
- This is closed book exam and you have 3 hours to complete it.
- All of your answers can be written either in Thai or English.
- Dictionary and calculator are allowed, but computer is not.

Problem 1 True or False

(10 points)

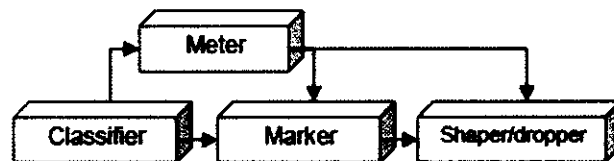
- MPLS is capable of aggregating traffic within an MPLS domain to provide a Virtual Private Network class of service.
- In MPLS, label swapping occurs only at the edges of the network, i.e., in the Label Edge Routers (LERs).
- LDP uses UDP for reliable transmission of signaling information between LSRs.
- In the differentiated services (Diffserv) architecture, a packet's mark is carried within the so-called Differentiated Services (DS) field in the IPv4 or IPv6 packet header.
- Per-hop-behaviors (PHBs) standardized by the IETF specify scheduling and queue management mechanisms that must be implemented for each service class defined by the DiffServ architecture.
- The Expedited Forwarding (EF) PHB implies some form of isolation among service classes, since this guarantee is made independently of the traffic intensity of any arriving flows with other DSCPs.
- In a typical differentiated services (Diffserv) scenario, routers at the ingress to a Diffserv network would be configured to perform multi-field classification on packets and mark these packets with one of a number of DSCPs.

- h) ----- The effectiveness of congestion control in Random Exponential Marking (REM) routers does not rely on cooperation of users.
- i) ----- Random Exponential Marking (REM) mechanism in routers can be set to drop packets, instead of marking packets, during congestion.
- j) ----- SIP protocol is a major protocol for transferring digitized voices in VoIP applications.

Problem 2 Internet Enhancement Models

- 2.1 Discuss the tradeoffs between stateful and stateless architectures (eg: Intserv, Diffserv, Edge-based Closed-loop architectures). *(10 points)*
- 2.2 In DiffServ, there are four functions that characterize a router’s functionality: The Classifier, the Meter, the Marker and the Shaper/dropper. Explain how they work together and what functionality they implement! Show how they can enforce that the traffic leaving the router complies with the service level agreement (SLA)? How can traffic that is “out of profile” be handled?

(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

- 4.1 Compare packet marking (or dropping) policy for congestion control used in Random Early Detection (RED) and Random Exponential Marking (REM) router mechanisms. *(5 points)*

4.2 Regarding the global optimization problem for solving the congestion control problem in the Internet as shown in Figure1 below,

- Explain why this problem is not practicable to use in the real networks, (5 points)
- Explain how this problem is modified in such a way that the source and link models of Random Exponential Marking (REM) mechanism are developed. (5 points)
- 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. (5 points)

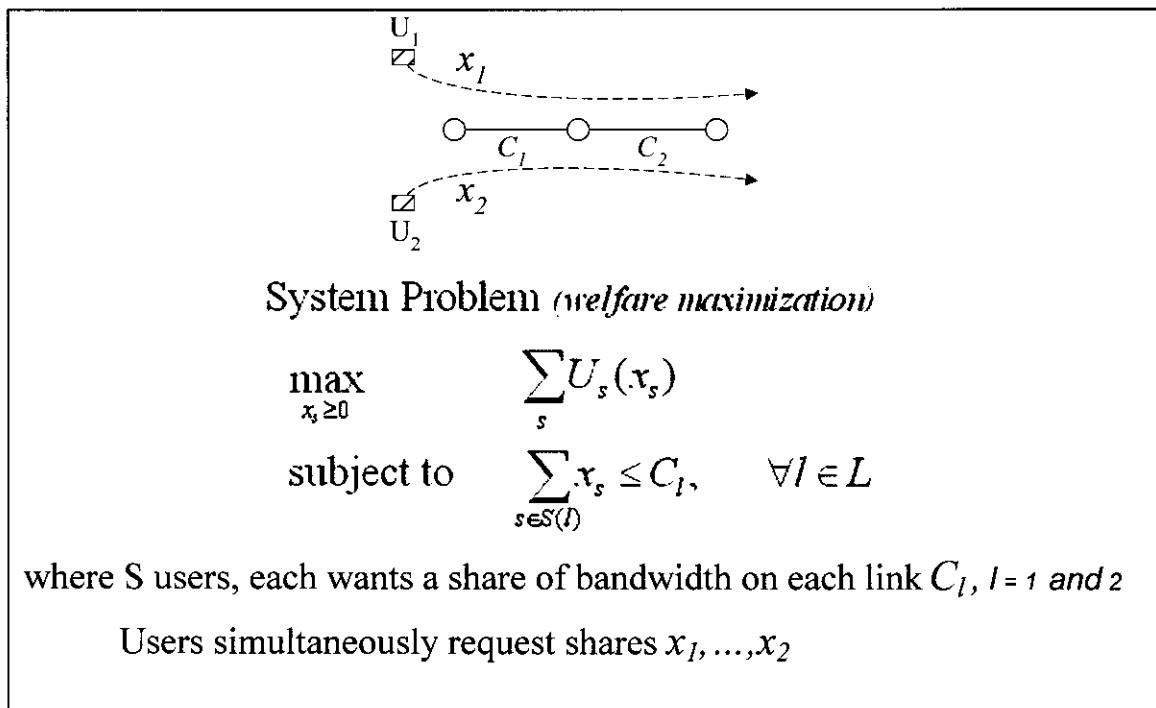


Figure 1: For problem 4

Problem 5 QoS Provisioning Mechanisms in the Internet

Describe only 2 issues from the following list related to QoS provisioning mechanisms in the Internet:

2.1 IntServ and DiffServ Integration. (5 points)

Problem(s) to solve:

Solution approach:

2.2 QoS Routing mechanisms (5 points)

Problem(s) to solve:

Solution approach:

2.3 VoIP mechanisms *(5 points)*

Problem(s) to solve:

Solution approach:

2.4 Wireless LAN mechanisms *(5 points)*

Problem(s) to solve:

Solution approach:

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