

PRINCE OF SONGKLA UNIVERSITY
FACULTY OF ENGINEERING

Midterm Examination Semester I : Academic Year : 2002
Date : 1 August 2002 Time : 9.00 – 12.00 Room : R201
Subject : 240 – 575 Special Topics in Information Network Engineering II
(Differentiated Services in the Internet)

Instruction:

- Make sure that there are 5 problems (65 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 (15 points)

1.1 Assume you have a large network which implements reliability at the data link layer. Is it necessary to have reliability at the transport layers as well? Answer yes or no, and give a reason to support your answer. (5 points)

1.2 True or False (5 points)

----- A layer uses services provided by the layer above it to implement some new functionality and provide services to layers below it.

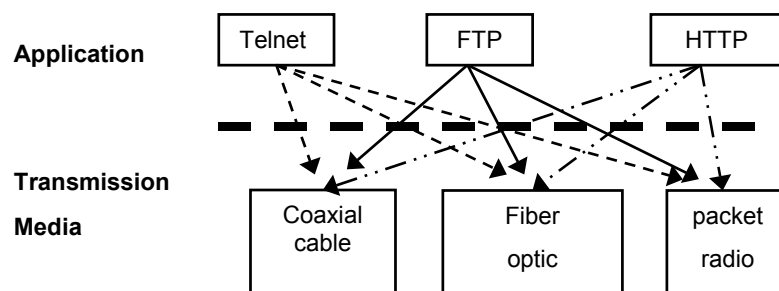
----- The data link layer must provide reliable transfer of data between two adjacent nodes.

----- Both UDP and IP provide unreliable transfer of data between two machines, therefore any application on top of UDP might run directly on top of IP.

----- When a router crashes, it is the reliable transport layer that finds a new path to the destination.

----- When a router fails, it is the reliable transport layer that makes sure that packets lost in the crash eventually are received at the destination.

1.3 Explain the benefit of “protocol layering” in handling such a complex scenario shown below. (2 points)

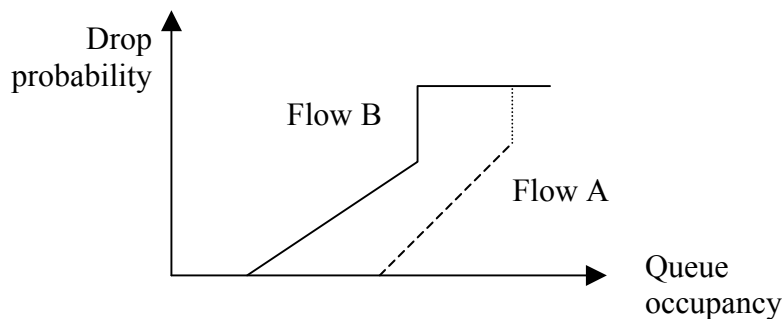


- 1.4 If an application wants to send a payload (data) of 500 bytes to the destination (using FTP protocol in Layer 5 of Internet Protocol stack) and the headers are of the sizes given in the table, what will be the size of the frame at the TCP layer at the destination? (3 points)

TCP	60 bytes
FTP	50 bytes
Data link Layer (Ethernet)	40 bytes
IP	30 bytes

Problem 2 (15 points)

- 2.1 RED (Random Early Drop) can be considered a technique for (2 points)
 Admission control Queue management Policing
 Congestion control Scheduling Shaping
- 2.2 What does the word “Early” in the acronym RED refer to? (3 points)
- 2.3 Why is the assumption of a transport protocol such as TCP important for RED to achieve its desired result? (5 points)
- 2.4 Suppose that two flows share the same queue. Flow ‘A’ is given a higher drop preference than flow ‘B’, as indicated in the figure below. Can we claim that flow ‘A’ is protected from flow ‘B’? Why or why not? (5 points)



Problem 3 (15 points)

- 3.1 What is the main problem when emulating GPS (General Processor Sharing) with (unweighted) round-robin? (2 points)
- 3.2 What are the differences between fairness and protection? (2 points)
- 3.3 What is delay jitter? Why is it important? (2 points)
- 3.4 Explain the principle of max-min fairness in network resource sharing and also give a simple network scenario (e.g. 3 flows sharing a bottleneck link) to support your explanation (5 points)
- 3.5 Explain briefly some weakness of WFQ and possible solutions. (4 points)

Problem 4 (10 points)

- 4.1 What are the differences between traffic shaper and traffic policer? (*4 points*)
- 4.2 Describe a (r, b) curve of token bucket descriptors for a source, and how does it help in selecting a traffic descriptor? (*6 points*)

Problem 5 (10 points)

- 5.1 How do two services of Integrated Services Internet (i.e. Guaranteed service and Controlled Load service) differ in principle? (*2 points*)
- 5.2 Describe RSVP operation. (*8 points*)

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