

EL6383 High Speed Networks Project

Traffic Analysis

(Spring 2014)

Name:

ID:

1. Provided Traffic Trace

A traffic trace file is provided. The file is text-based and can be opened using any text editor. Each row represents a recorded packet with the following fields:

timestamp, (renumbered) source host, (renumbered) destination host, source TCP port, destination TCP port, and number of data bytes (zero for "pure-ack" packets).

All the packets are based on the TCP protocol.

2. Task 1: Traffic Characteristics

Please write a program to analyze the given traffic traces to study the following traffic characteristics.

- A) What is the average bit rate for the entire duration? (Please note that both the IP packet header and payload have to be counted.)

Average bit rate = _____

- B) Find the average bit rate for each 5-minute window, please add more rows to complete the following table.

Window	Average bit rate (kb/second)
0-299 second	
300-599 second	
....	

- C) Find the distribution of packets based on the payload sizes

Payload size (byte)	Percentage based on the number of packets
0	
1-127	
128-255	
256-383	
384-511	
512	

- D) Sort the source IP addresses according to their traffic volume, list the top 3 source IP addresses and the corresponding traffic volume and the percentage in the total traffic volume

	Source IP	Traffic (bytes)	Traffic Percentage (%)
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No. 1			
No. 2			
No. 3			

- E) Sort the destination ports according to their traffic volume, list the top 3 destination ports and the corresponding traffic volume and the percentage in the total traffic volume

	Destination Port	Traffic (bytes)	Traffic Percentage (%)
No. 1			
No. 2			
No. 3			

3. Load Balancing

Load balancing is used in multipath routing. If a router maintains multiple paths p1, p2, p3.. pk to a destination, it could use a certain algorithm to split traffic among the k paths.

One simple method is packet-based load balancing. In this case, the router randomly picks a path for each individual packet. It is possible that this approach causes out-of-order delivery because packets belonging to the same TCP flow may take different paths.

Now suppose the packets from the traffic traces are the input traffic, and there are 4 output ports [p1, p2, p3, p4] to split the traffic for load balancing purpose.

- A) If we use round robin to balance the traffic on the output ports, the method then works by sending the 1st packet to p1, 2nd packet to p2, 3rd packet to p3, 4th packet to p4,

Find the average bit rate on the four ports using 5-min window, fill the following table with your results. You need to add more rows to complete the table. The “Max diff” indicates the maximum difference among the ports:

Max diff=Max(P1,P2,P3,P4)-Min(P1,P2,P3,P4)

Window	P1 (kb/s)	P2 (kb/s)	P3 (kb/s)	P4 (kb/s)	Max diff
0-299 second					
300-599 second					
...					
...					

- B) Design a method to perform load balancing without causing out-of-order delivery. You can also find such a method by researching the literature. Briefly describe the method in the report. And then test the method using the traffic trace and the above 4-port setup. Fill the following table with your results.

C)

Window	P1 (kb/s)	P2 (kb/s)	P3 (kb/s)	P4 (kb/s)	Max diff
0-299 second					
300-599 second					
...					
...					