CPSC 5510 Computer Networks

Written Assignments #1

Assigned: Thursday, 10/05/2017

Due: 3:45PM, Thursday, 10/12/2017

Note: Please answer the questions briefly. Do not give long, winding, irrelevant answers. 5 points in total and 1 point per question.

1. Consider two packet switches directly connected by a link of 5000 km, propagation speed 2.5×10^8 m/s, and transmission rate 1 Mbps. How long does it take to move a packet of length 1000 bytes from one packet switch to the other packet switch?
2. Suppose ***N*** packets arrive simultaneously to a link at which no packets are currently being transmitted or queued. Each packet is of length ***L*** and the link has a transmission rate ***R***. What is the average queuing delay for the ***N*** packets?
3. Indicate whether TCP or UDP (or both or neither) provide the following services to applications:
   a. Reliable data transfer between processes.
   b. Minimum data transmission rate between processes.
   c. Congestion-controlled data transfer between processes.
   d. A guarantee that data will be delivered within a specified amount of time.
   e. Guaranteed in-order delivery of data to the receiver.
4. Consider the following string of ASCII characters that were captured by Ethereal when the browser sent a HTTP GET message (this is the actual content of an HTTP GET message). The characters <cr><lf> are carriage return and line feed characters. Answer the following questions:
   a. What is the URL of the document requested by the browser? Make sure you give the hostname and the file parts of the URL.
   b. What version of HTTP is the browser running?
   c. Is a Netscape or an Internet Explorer browser making the request?
   d. Is the browser requesting a non-persistent or a persistent connection?

```
GET /cs453/index.html HTTP/1.1<cr><lf>Host: gai
a.cs.umass.edu<cr><lf>User-Agent: Mozilla/5.0 (
Windows;U; Windows NT 5.1; en-US; rv:1.7.2) Gec
ko/20040804 Netscape/7.2 (ax) <cr><lf>Accept:ex
t/xml,application/xml,application/xhtml+xml,text
/html;q=0.9,text/plain;q=0.8,image/png,*/*;q=0.5
<cr><lf>Accept-Language: en-us,en;q=0.5..Accept-
Encoding: zip,deflate<cr><lf>Accept-Charset: ISO
-8859-1,utf-8;q=0.7,*;q=0.7..Keep-Alive: 300<cr>
<lf>Connection:keep-alive<cr><lf><cr><lf>
```

5. Suppose within your Web browser you click on a link to obtain a Web page. Suppose the IP address for the associated URL is cached in your local host, so that a DNS lookup is not necessary. Denote RTT as the roundtrip time between the local host and the server containing the Web page. Assume the Web page consists of a base HTML file and three small images. Assume the transmission times

for all of the objects are negligible in comparison with the RTT. How much time elapses (in terms of RTTs) from when the user clicks on the link until the client receives the entire Web page with each of the following?

a. Non-persistent HTTP with no parallel connections.
b. Non-persistent HTTP with up to five parallel connections.
c. Persistent HTTP with pipelining.