CSE 677: Homework 2

(Due Date: Oct 24 (Monday), Total: 40 points)

1. **(3 points)** The UDP module on a machine computes the Internet checksum for a received UDP segment and finds that it matches the value carried in the checksum field. Can the receiver be absolutely certain that no bit errors have occurred. Explain.

2. **(3 points)** In Go-Back-N (GBN), suppose the window size is 3, and the sender's window is currently [501,502,503]. List all the possibilities for the receiver's next expected sequence number.

3. **(3 points)** In GBN, suppose the receiver's next expected sequence number is 501. List all the possible ranges for the sender's window assuming a window size of 3.

4. **(3 points)** In Selective Repeat, suppose the window size is 3, and the sender's window is currently [501,502,503]. List all the possible ranges for the receiver's window.

5. **(3 points)** In Selective Repeat, suppose the window size is 3, and the receiver's window is currently [501,502,503]. List all the possible ranges for the sender's window.

6. **(3 points)** Describe the purpose of shortcuts in a DHT with an example.

7. **(4 points)** Answer True or False to the following questions and briefly justify your answer:

   (a) With the SR protocol, it is possible for the sender to receive an ACK for a packet that falls outside of its current window.

   (b) With the GBN protocol, it is possible for the sender to receive an ACK for a packet that falls outside of its current window.

   (c) The alternating-bit protocol is the same as the SR protocol with a sender and a receiver window size of 1.

   (d) The alternating-bit protocol is the same as the GBN protocol with a sender and a receiver window size of 1.

8. **(4 points)** Consider a transport layer connection using Alternating Bit Protocol (ABP), where the sender is transmitting 1500 Byte packets and the Round Trip Time (RTT) is 200 ms. A packet is retransmitted if an ACK is not received when it is expected at the sender. Assuming that the data rate of the connection is infinity, data packet loss rate is 5%, ACKs are negbligible in size and ACKs are reliable, compute the throughput (useful bits received by the application per second) of the connection in bits per second?

9. **(3 points)** Define the terms torrent, seed, and leecher in the context of Bittorrent. (You may need to search outside the book for some of these terms).

10. **(5 points)** Suppose Bob joins a BitTorrent torrent, but he does not want to upload any data to any other peers (so called free-riding).

    (a) Bob claims that he can receive a complete copy of the file that is shared by the torrent. Why is Bob's claim true?

    (b) Bob further claims he can further make his "free-riding" more efficient by using a collection of multiple computers (with distinct IP addresses) in the computer lab in his department. How can he do that?

11. **(6 points)** Read the man pages for *netstat*, and *ping* to answer the following questions.

    (a) (4 points) Explain the options -a and -p for *netstat*? Start an FTP connection using the command "ftp <ftp-site-address>". You can pick any ftp site. A few publicly available ftp sites are listed at *http://www.gnu.org/prep/ftp.html*. After you login as *anonymous*, try to find information regarding the corresponding TCP connection using *netstat* in a different window. Explain the fields in the line corresponding to your ftp connection. What are the local and remote port numbers and IP addresses for that TCP connection? You do not need to submit the complete output of netstat, but you need to get a print out the line corresponding to your FTP connection. (Hint: What is the dedicated port used by FTP?)

    (b) (2 points) Try out the following options along with the -s option for *ping*: -U and -I. Explain the outputs. For this question, you don't have to submit the output of ping.