Department of Computer Science, Virtual University of Pakistan

CS716: Advanced Computer Networks

Assignment 1 **MS(CS), Spring 2012** **Maximum Points: 100**

Due Date: 23rd May 2012

Instructions

The purpose of this assignment is to give you hands on practice. It is expected that students will solve the assignments themselves. Following rules will apply during the evaluation of assignment.

- Cheating from any source will result in zero marks in the assignment.
- Any student found cheating in any of the two assignments submitted will be awarded "F" grade in the course.
- No assignment after due date will be accepted

Question No. 1 (15 Points)

a) Consider a point-to-point link 2 km in length. At what bandwidth would propagation delay (at a speed of 2×10^8 m/s) equal transmit delay for 100-byte packets? What about 512-byte packets?

b) How long does it take to transmit x KB over a y-Mbps link? Give your answer as a ratio of x and y.

c) Suppose that a certain communications protocol involves a per-packet overhead of 100 bytes for headers and framing. We send 1 million bytes of data using this protocol; however, one data byte is corrupted and the entire packet containing it is thus lost. Give the total number of overhead + loss bytes for packet data sizes of 1000, 5000, 10,000, and 20,000 bytes. Which size is optimal?

Question No. 2 (15 Points)

a) Calculate the latency (from first bit sent to last bit received) for the following:

a. 10-Mbps Ethernet with a single store-and-forward switch in the path, and a packet size of 5000 bits. Assume that each link introduces propagation delay of 10 μs and that the switch begins retransmitting immediately after it has finished receiving the packet.

b. Same as (a) but with three switches.

b) The 10 Mbps Ethernet segment can be as long as 2500 meters. If the 10 Mbps Ethernet frame specifications stay the same, how does in increase in supported bandwidth affect the segment length?

Question No. 4 (30 Points)

Read Beej's guide to Network Programming and modify the talker/listener (talker.c and listener.c) according to the following specifications (Listener and talker are communicating using UDP socket):

Listener :

1. The listener should run in continous mode, i.e., it should handle one talker after another (Make listener iterative server)
2. The listener will bind on port # 4500
3. The listener should maintain a log named "TalkerMsgLog.txt" of all the talkers and their messages. The log should contain the following information
    a. IP address of the talker
    b. Port number of the talker
    c. Message sent by the talker

4. When a listener receives a message from a talker, it save the talkers message in the log and also sends a reply top the talker containing the follwoinng well message:

    "Welcom: TALKER-IP-ADDRESS, TALKER-PORTNO"

5. When a listener receives a message from a talker, it saves the talker's message in the log "FirstDataMsg: TALKER-IP-ADDRESS, TALKER-PORTNO: this is first formal data message from Talker" and also sends a reply to the talker containing the following message:
    "IDMsg: Your First Data Message is received, please send your name and ID No"
6. When the listener receives a message from the talker, it saves the talker's message in the log "IDMsgReply: TALKER-IP-ADDRESS, TALKER-PORTNO: I am Muhammad – MS090400001" and also sends a reply to the talker containing the following message:
    "TermMsg: Your Name and ID is logged on Listener, communication terminated"
7. Listener then waits for some new talker and does not terminate.

Talker :

1. A talker takes the following command line argument from the user:
    a. IP address of the listener
    b. Port No. of Listener
2. The command line arguments entered by the user will be : ./talker 127.0.0.1 4500
3. Create a log file "ListernerMsgLog.txt"
4. Talker formats a message and sends to the listener on a IP address and port taken as a command line argument.
5. When the talker receives the welcome message as a reply from the listener, it displays the message on the screen and writes it in the log file.
6. Talker formats a message and sends to the listener: I am "Your Name – MS**04000**"(ID).
7. When the talker receives the TermMsg message from the listener, it displays the message on the screen and writes in the log file, terminates the communication and exit.

Question No. 5 (15 points)

Read the attached research paper entitled **"Design and Development of a UDP-Based Connection-Oriented Multi-Stream One-to-Many Communication Protocol"** with this assignment very carefully. Summarize the research paper into your own words (450-500) in the following headings:

1. Proposed technique
2. Advantages / Benefits
3. Disadvantages / Drawbacks
4. Suggestions & Recommendations

While evaluating your answer, following rules will apply.

1) Copied answer will result in 0 marks
2) Any student found cheating in any of the two research papers summary submitted will be awarded "F" grade in the course.
3) Avoid using same wording from the research paper.

Useful Web Resources

Some useful resources are available on the Internet that can guide you about: how to read, write, evaluate, and summarize research papers.

1) http://www.ruf.rice.edu/~bioslabs/tools/report/reportform.html
2) http://helios.hampshire.edu/~apmNS/design/RESOURCES/HOW_READ.html

3) http://www.library.dal.ca/how/termpaper.htm
4) http://www.studygs.net/wrtstr8.htm

Question No. 6 (15 points)

Read the attached research paper entitled **"A Survey of Packet Loss Recovery Techniques for Streaming Audio"** with this assignment very carefully, and answer the following questions:

1. Classify the recovery techniques discussed in this paper and write a brief note.
2. Give the comparison of the Forward Error Correction Techniques to repair losses of data during transmission, discussed in this paper.
3. Give the comparison of the Error Concealment Techniques, discussed in this paper.

Question No. 7 (10 points)

Explore Network Simulator (NS 2).

1. Installation & Configurations
2. Show screen shots of installation and configuration on your system which must show your identity with your system.
3. Write a brief summary about installations and configurations on your system.
4. Use simulation files exist in NS 2 library and show also its NAM interface.

NOTE: Students can use installations guide available on the Internet.

Useful Web Resources.

1) www.isi.edu/nsnam/ns/
2) www.perform.wpi.edu/NS/
3) http://en.wikipedia.org/wiki/Ns_(simulator)
4) http://www.nsnam.org/