CENG 312 Computer Networks
Spring 2023
Assignment 2 - TCP and UDP

TCP Section
Before starting this assignment, it is recommended that you review the TCP lab provided by the author of the book.

Jim Kurose - TCP lab

Question 1: There are retransmitted segments and Dup ACKs in the trace file. What kind of problems have been experienced in this packet traffic?
NOTE: Answer the questions in this part of the assignment by examining the TCP packet traffic in the "assignment2-tcp-1" pcapng file (open on Wireshark).

Question 2: Explain step by step what happens in this packet traffic. Is there any packet loss? Are there any congestion avoidance actions?
NOTE: Answer the questions in this part of the assignment by examining the TCP packet traffic in the "assignment2-tcp-2" pcapng file (open on Wireshark).

Question 3: Please monitor all traffic, is there any situation the server is not able to receive any more data due to a lack of available buffer space? If so, how many times did it happen? What type of TCP segment would the server send back to the client in this situation, and how would this segment be identified in a packet capture?
NOTE: Answer the questions in this part of the assignment by examining the TCP packet traffic in the "assignment2-tcp-3" pcapng file (open on Wireshark).

Question 4:
part a: Using TCP Stream Graphs (specifically Time Sequence Stevens and Window Scaling):
1. Explain the congestion control behaviors you see in the traffic.
2. What is the relation between the receiving window and the bytes out in the window scaling graph?
3. Please provide screenshots for the questions.
NOTE: Answer the questions in this part of the assignment by examining the TCP packet traffic in the "assignment2-tcp-4" pcapng file (open on Wireshark).

part b:
4. Download a file that is bigger than 20MB and capture the network traffic using Wireshark. Provide screenshots from the Time Sequence Stevens and Window Scaling Graphs. Can you see the slow start behavior, please explain.
5. Transfer a file using ftp protocol and capture the network traffic using Wireshark. Provide screenshots from the Time Sequence Stevens and Window Scaling Graphs. Can you see the slow start behavior, please explain.

UDP Section

Create a scenario that causes sending and receiving UDP packets. Explain your scenario. Select a pair of UDP packets consisting of a sent packet from your host and a received packet as a reply to this packet.

Answer the following questions and provide screenshots for each question:

1. What is the destination IP address of the sent packet? Is it possible to be sure that the packet reaches the destination address? Explain your answer.
2. Which port numbers do you see as the source port and the destination port in these two UDP packets? Is there any relationship between the source and destination port numbers in the packets? Explain your answer.
3. What is the UDP header size and the UDP payload size in bytes of the packets? Explain the structure of a UDP header with details of its fields.
4. What are the checksum values in the packets? What is the purpose of the checksum value in a UDP packet?