

COMP9331 Lab 4

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Exercise 1: Understanding TCP using Wireshark

Question 1

What is the IP address of gaia.cs.umass.edu?

- The IP address of gaia.cs.umass.edu is 128.119.245.12.

On what port number is it sending and receiving TCP segments for this connection?

- The port number is 80.

What is the IP address and TCP port number used by the client computer (source) that is transferring the file to gaia.cs.umass.edu?

- The IP address is 192.168.1.102 and TCP port number is 1161.

Question 2

What is the sequence number of the TCP segment containing the HTTP POST command?

- The sequence number is 232129013.

Question 3

Consider the TCP segment containing the HTTP POST as the first segment in the TCP connection. What are the sequence numbers of the first six segments in the TCP connection (including the segment containing the HTTP POST) sent from the client to the web server (Do not consider the ACKs received from the server as part of these six segments)? At what time was each segment sent? When was the ACK for each segment received? Given the difference between when each TCP segment was sent, and when its acknowledgement was received, what is the RTT value for each of the six segments? What is the EstimatedRTT value (see relevant parts of Section 3.5 or lecture slides) after the receipt of each ACK? Assume that the initial value of EstimatedRTT is equal to the measured RTT (SampleRTT) for the first segment, and then is computed using the EstimatedRTT equation for all subsequent segments. Set alpha to 0.125.

	Sequence Number	Sent Time	ACK received Time	RTT	EstimatedRTT
1	232129013	0.026477	0.053937	0.02746	0.02746
2	232129578	0.041737	0.077294	0.035557	0.028472
3	232131038	0.054026	0.124085	0.070059	0.03367
4	232132498	0.054690	0.169118	0.114428	0.043765
5	232133958	0.077405	0.217299	0.139894	0.055781
6	232135418	0.078157	0.267802	0.189645	0.072514

Question 4

What is the length of each of the first six TCP segments?

- The first TCP segment length is 565 bytes and the 2-6 segments are all 1460 bytes.

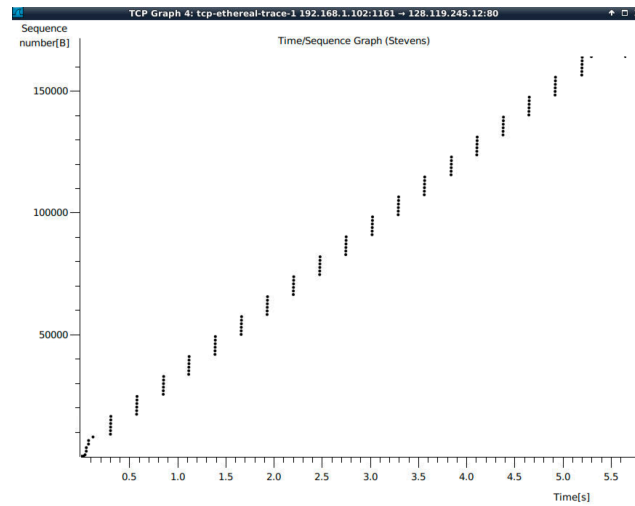
Question 5

What is the minimum amount of available buffer space advertised at the receiver for the entire trace?
Does the lack of receiver buffer space ever throttle the sender?

- The minimum amount of available buffer is 5840 bytes and finally grows to 62780 bytes. Therefore, lack of receiver buffer space won't throttle the sender.

Question 6

Are there any retransmitted segments in the trace file?
What did you check for (in the trace) in order to answer this question?



- No retransmitted file. Answer is given by checking the sequence numbers(as picture shows), it is obviously that all the sequence is increasing in right order, so no retransmitted.

Question 7

How much data does the receiver typically acknowledge in an ACK?

Can you identify cases where the receiver is ACKing every other received segment (recall the discussion about delayed acks from the lecture notes or Section 3.5 of the text).

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▼ [122 Reassembled TCP Segments (164090 bytes): #4(565), #  
[Frame: 4, payload: 0-564 (565 bytes)]  
[Frame: 5, payload: 565-2024 (1460 bytes)]  
[Frame: 7, payload: 2025-3484 (1460 bytes)]  
[Frame: 8, payload: 3485-4944 (1460 bytes)]  
[Frame: 10, payload: 4945-6404 (1460 bytes)]  
[Frame: 11, payload: 6405-7864 (1460 bytes)]  
[Frame: 13, payload: 7865-9011 (1147 bytes)]  
[Frame: 18, payload: 9012-10471 (1460 bytes)]  
[Frame: 19, payload: 10472-11931 (1460 bytes)]  
[Frame: 20, payload: 11932-13391 (1460 bytes)]  
[Frame: 21, payload: 13392-14851 (1460 bytes)]  
[Frame: 22, payload: 14852-16311 (1460 bytes)]  
[Frame: 23, payload: 16312-17203 (892 bytes)]  
[Frame: 30, payload: 17204-18663 (1460 bytes)]  
[Frame: 31, payload: 18664-20123 (1460 bytes)]  
[Frame: 32, payload: 20124-21583 (1460 bytes)]  
[Frame: 33, payload: 21584-23043 (1460 bytes)]  
[Frame: 34, payload: 23044-24503 (1460 bytes)]  
[Frame: 35, payload: 24504-25395 (892 bytes)]  
[Frame: 42, payload: 25396-26855 (1460 bytes)]
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- Here as the picture shows, the #4 segment is 565 bytes, #5 segment is 1460 bytes and so on.

Question 8

What is the throughput (bytes transferred per unit time) for the TCP connection? Explain how you calculated this value.

$$\text{Throughput} = \frac{\# \text{ total bits sent}}{\text{total time taken}} \quad (1)$$

$$= \frac{164090(\text{see picture in Q7})}{5.455830(\text{last ack received}) - 0.026477(\text{first segment sent})} \quad (2)$$

$$= \frac{164090}{5.4294} \quad (3)$$

$$= 30.222 \text{ KBytes/sec.} \quad (4)$$

Exercise 2: TCP Connection Management

Question 1

What is the sequence number of the TCP SYN segment that is used to initiate the TCP connection between the client computer and server?

- The sequence number is 2818463618.

Question 2

What is the sequence number of the SYNACK segment sent by the server to the client computer in reply to the SYN? What is the value of the Acknowledgement field in the SYNACK segment? How did the server determine that value?

- The sequence number is 1247095790, the value of ACK field 2818463619. The SYN need 1 byte, so the ack value is one plus the initial sequence number.

Question 3

What is the sequence number of the ACK segment sent by the client computer in response to the SYNACK? What is the value of the Acknowledgment field in this ACK segment? Does this segment contain any data?

- The sequence number 2818463619, the value of the ACK field is 1247095791. It doesn't contain any data because the next segment(NO.298) has the same sequence number.

Question 4

Who has done the active close? client or the server? how you have determined this? What type of closure has been performed? 3 Segment (FIN/FINACK/ACK), 4 Segment (FIN/ACK/FIN/ACK) or Simultaneous close?

- The active close is triggered by both the client and server. According to the segment 304 and 305, they sent the FIN without receiving FIN. Hence, simultaneous close.

Question 5

How many data bytes have been transferred from the client to the server and from the server to the client during the whole duration of the connection? What relationship does this have with the Initial Sequence Number and the final ACK received from the other side?

- $\text{Total data sent} = \text{Ack sequence number} - \text{Initial sequence number} - (\text{SYN} + \text{FIN})$

1 byte for SYN and 1 byte for FIN

- $\text{Data}_{(\text{From client to server})} = 2818463653 - 2818463618 - 2 = 33 \text{ Bytes}$
- $\text{Data}_{(\text{From server to client})} = 1247095832 - 1247095790 - 2 = 40 \text{ Bytes}$