Exercise 1

Question 1. What is the IP address of gaia.cs.umass.edu? On what port number is it sending and receiving TCP segments for this connection? 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 of gaia.cs.umass.edu is 128.119.245.12.

The port number is it sending and receiving TCP segments for this connection is 80.

The IP address and TCP port number used by the client computer is 192.168.1.102 and 1161

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Question 2. What is the sequence number of the TCP segment containing the HTTP POST command? Note that in order to find the POST command, you’ll need to dig into the packet content field at the bottom of the Wireshark window, looking for a segment with a “POST” within its DATA field.

The sequence number of the TCP segment containing the HTTP POST command is 232129013.

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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 | Time sent | ACK received time | RTT | EstimatedRTT |
| 232129013 | 0.026477 | 0.053937 | 0.027460 | 0.027460 |
| 232129578 | 0.041737 | 0.077294 | 0.035557 | 0.028472 |
| 232131038 | 0.054026 | 0.124085 | 0.070059 | 0.033670 |
| 232132498 | 0.054690 | 0.169118 | 0.114428 | 0.043765 |
| 232133958 | 0.077405 | 0.217299 | 0.139894 | 0.055781 |
| 232135418 | 0.078157 | 0.267802 | 0.189645 | 0.072514 |

Question 4. What is the length of each of the first six TCP segments?

|  |  |
| --- | --- |
| Sequence number | Length |
| 232129013 | 565 |
| 232129578 | 1460 |
| 232131038 | 1460 |
| 232132498 | 1460 |
| 232133958 | 1460 |
| 232135418 | 1460 |

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 space advertised at the receiver for the entire trace is 5840bytes.

There is no lack of receiver buffer space because the window sizes are bigger than the segment sizes at any time.

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?

There is no retransmitted segments in the trace ﬁle.

Because we can see that the sequence number kept increasing as the time goes by after connection established. If there is a retransmitted segment, the sequence number will keep the same in different times.

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*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).

The size of one segment is usually 1460 bytes and the receiver acknowledge onr segment in one ACK.

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As the picture we can see that the receiver ACK the segment 149737 at line 186 which ack=151197, it means the befored 151198 bytes has be received. When the next segments arrived which numbers are 151197 and 152657 and the len are 1460 the receiver will ack 156469 and it means that the data before 156469 bytes has be received.

*Question 8.*What is the throughput (bytes transferred per unit time) for the TCP connection? Explain how you calculated this value.

Exercise 2

*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 of the SYNACK segment sent by the server to the client computer in reply to the SYN is 1247095790. The value is 2818463619.

The server just adds 1 to the to the sequence number of the SYN segment because there is no data.

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 is 2818463619.

The value is 1247095791.

Yes, it contain 33 Bytes data.(2818463652 – 2818463619 = 33)

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?

Both of client and server done the active close.

Because they simultaneous sent FINACK to other at NO.304 and NO.305. And the reponsed ACK at NO.306 and NO.307.

It indicates that this is a 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?

|  |  |  |
| --- | --- | --- |
|  | data bytes have been transferred | final ACK received-  Initial Sequence Number |
| client to the server | 33 Bytes | 35 Bytes |
| server to the client | 40 Bytes | 42 Bytes |

final ACK received - Initial Sequence Number =

data bytes have been transferred

+ 1 Bytes (used for indicating state as initial three way handshake bytes (SYN, SYNACK, ACK) which do not contain any data)

+ 1 Bytes (used for indicating state as ﬁnishing bytes (FIN) which do not contain any data)