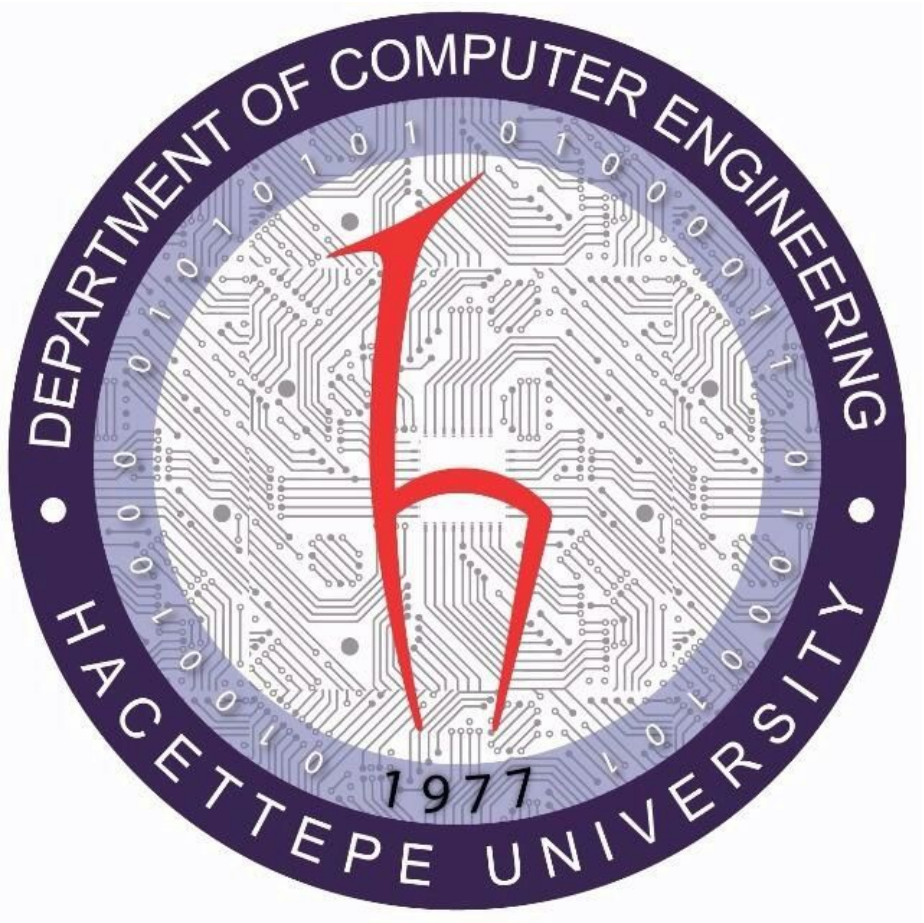
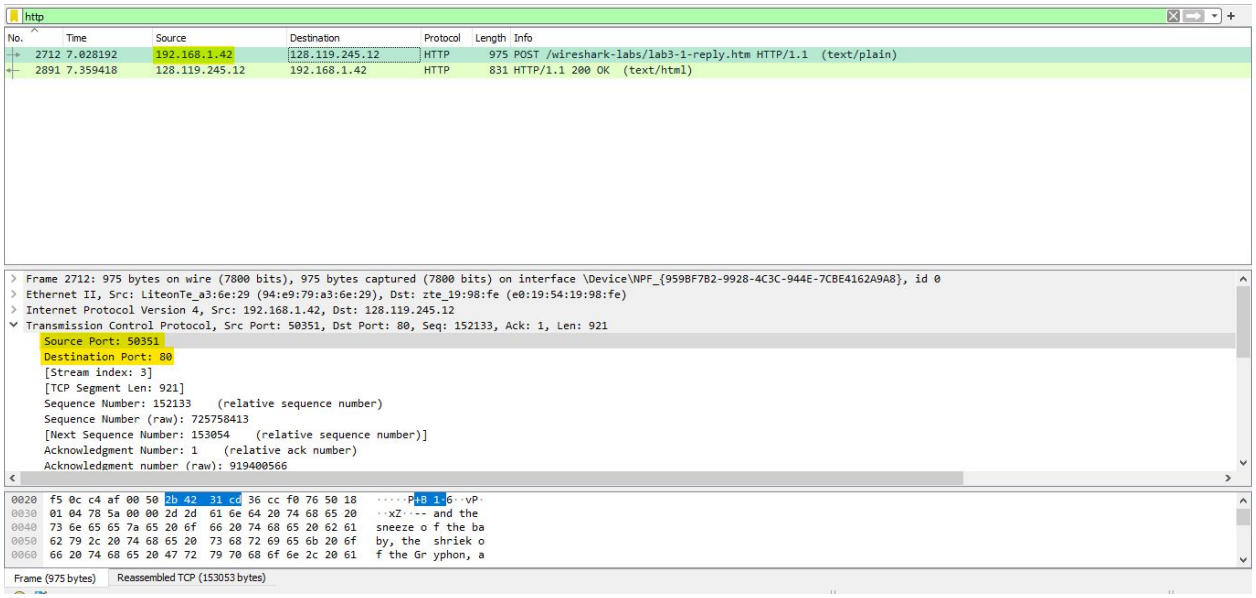


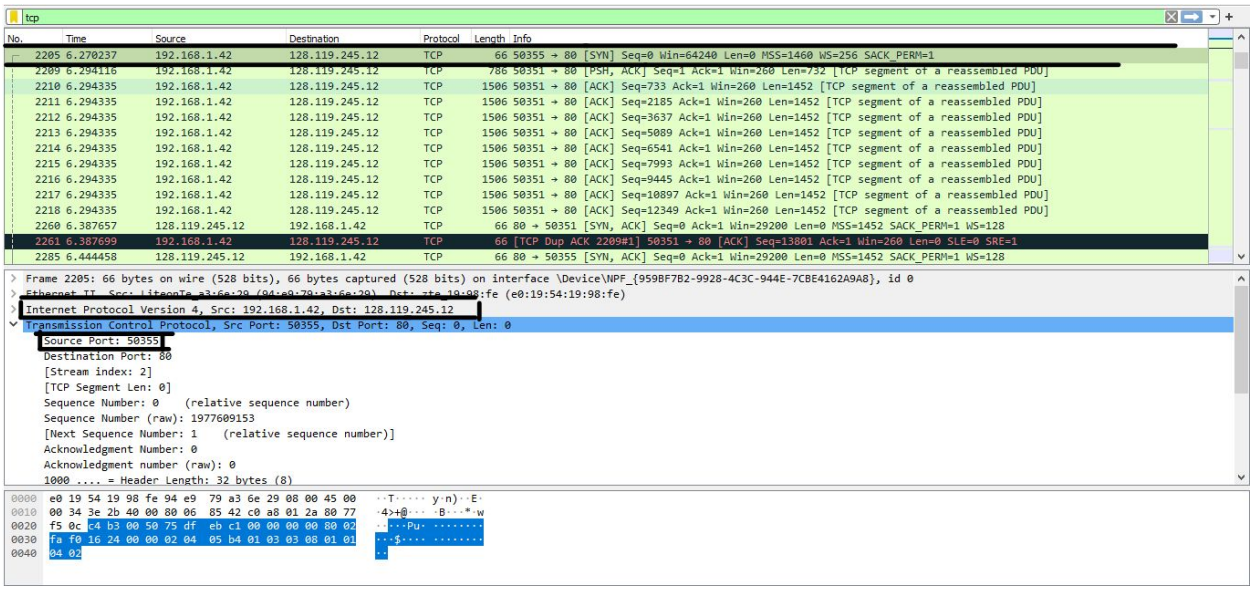

**Gökhan Özeloğlu - 21627557**
**Burak Yılmaz - 21627868**

**BBM 453 Computer Networks Lab - TCP Lab Assignment**
**Group ID: 1**

1. 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? To answer this question, it's probably easiest to select an HTTP message and explore the details of the TCP packet used to carry this HTTP message, using the "details of the selected packet header window" (refer to Figure 2 in the "Getting Started with Wireshark" Lab if you're uncertain about the Wireshark windows

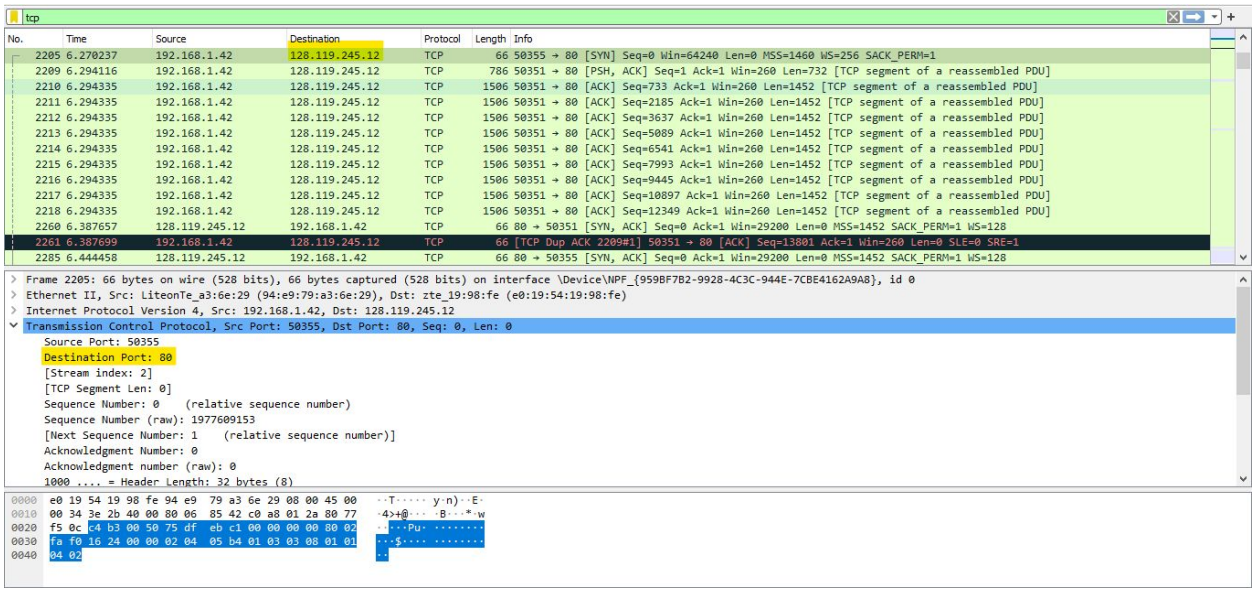
ANS: My computer(Source) is at 192.168.1.42 (IP address). The source port is 50355





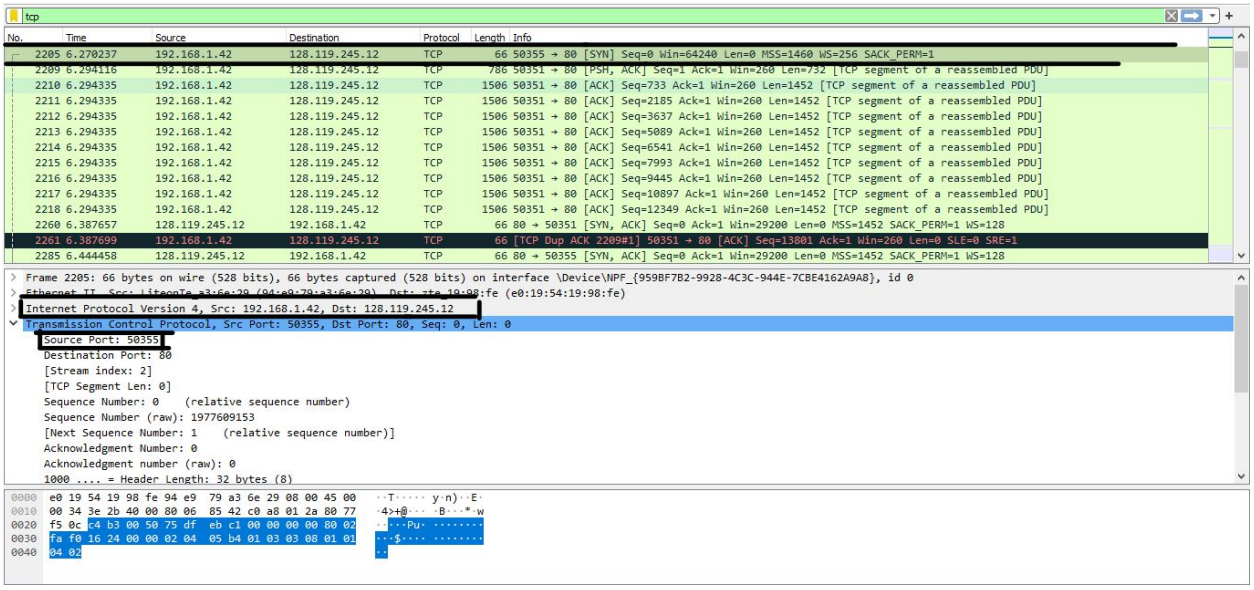

2. What is the IP address of gaia.cs.umass.edu? On what port number is it sending and receiving TCP segments for this connection?

ANS: gaia.cs.umass.edu(destination) is at 128.119.245.12 (IP address)
TCP port number: 80



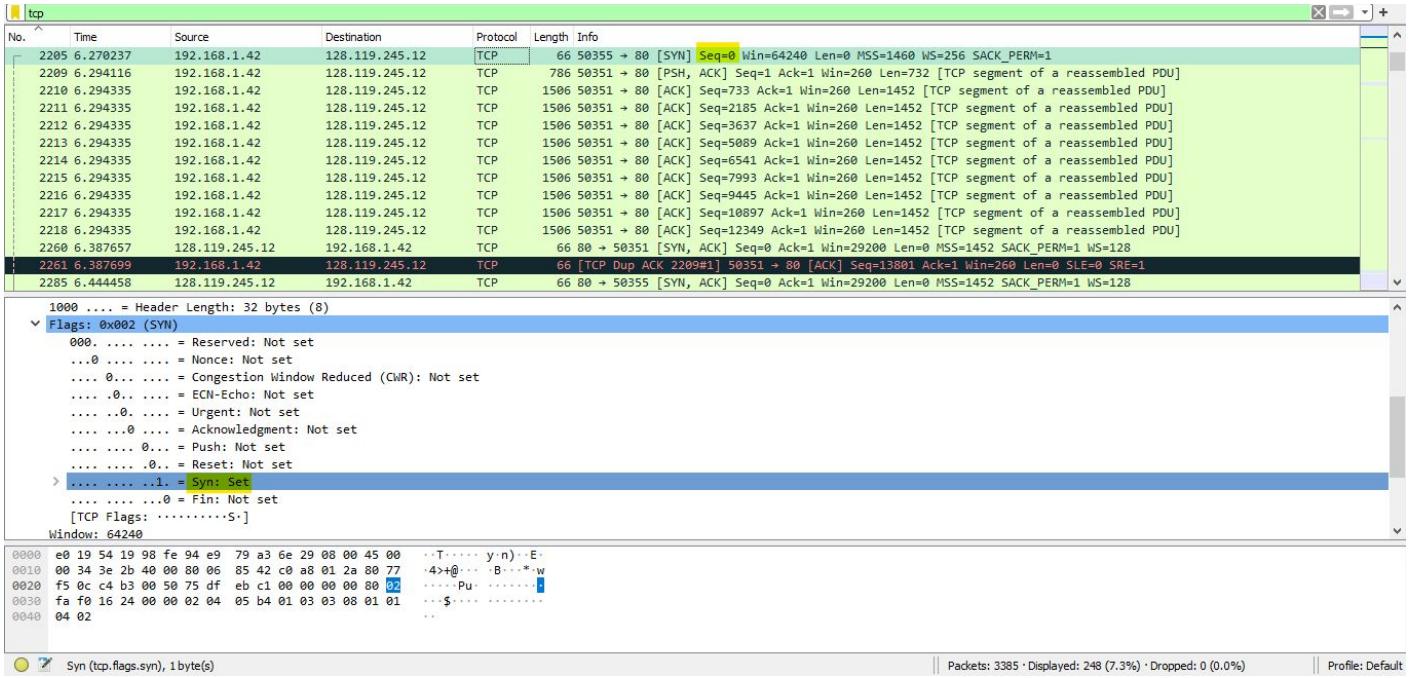
3. What is the IP address and TCP port number used by your client computer (source) to transfer the file to gaia.cs.umass.edu?

ANS: My computer(Source) is at 192.168.1.42 (IP address). The source port is 50355



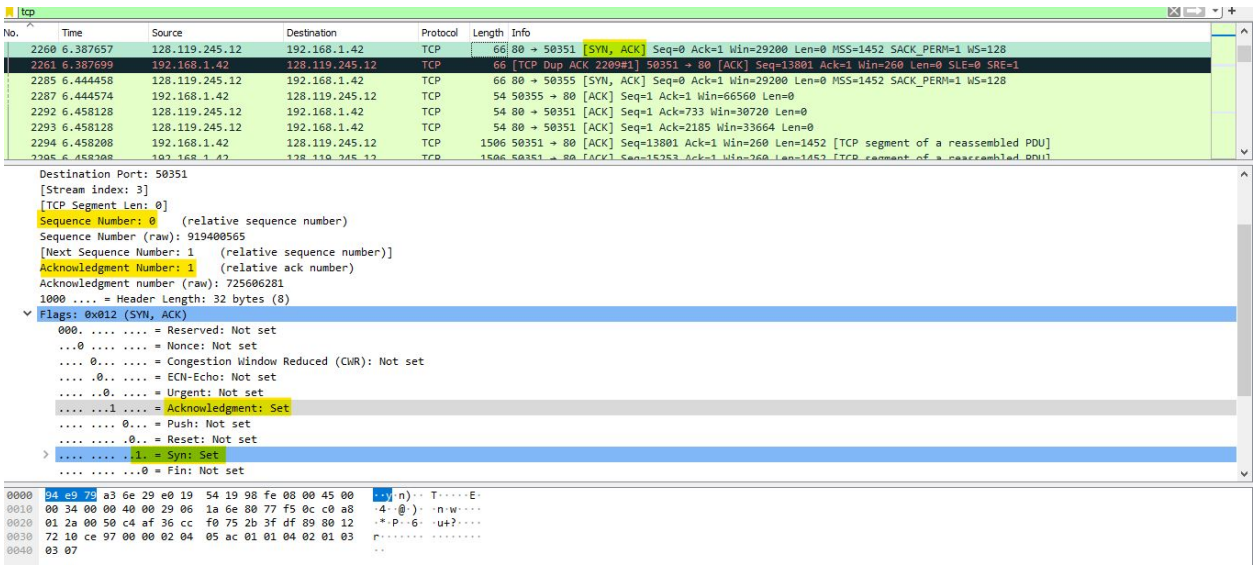

4. What is the sequence number of the TCP SYN segment that is used to initiate the TCP connection between the client computer and gaia.cs.umass.edu? What is it in the segment that identifies the segment as a SYN segment? (Hint: Look at Flags)

ANS: Sequence number of the TCP/SYN segment is used to initiate the TCP connection between the client computer and gaia.cs.umass.edu is equal to 0 in this trace.SYN flag is set to 1 and it indicates that segment is a SYN segment.



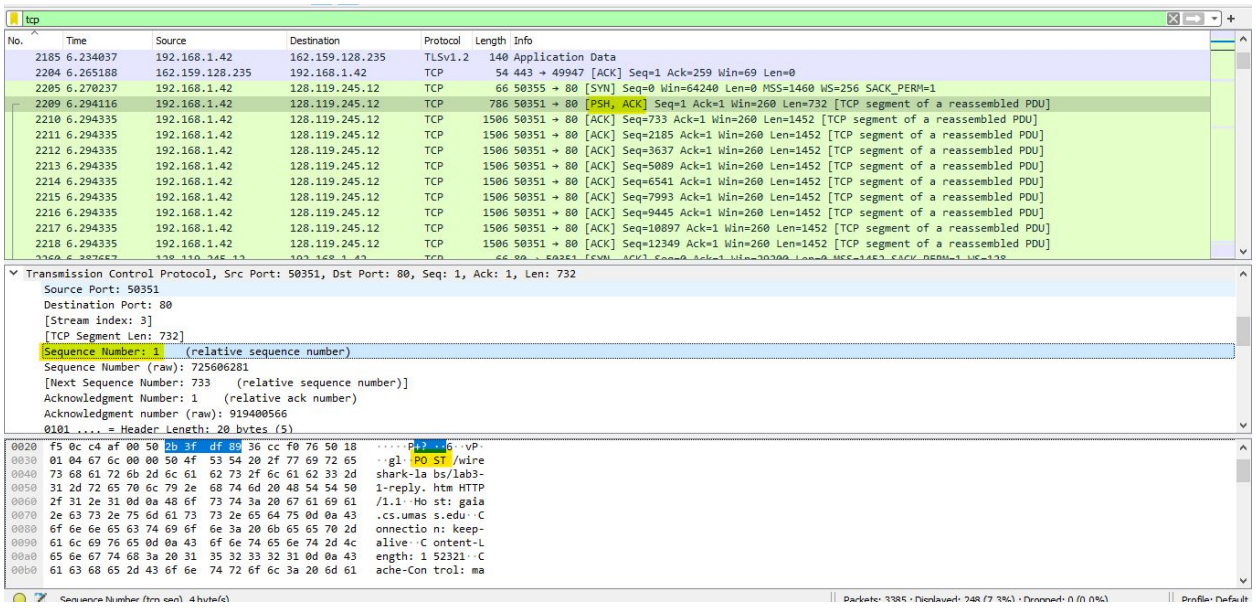

5. What is the sequence number of the SYNACK segment sent by gaia.cs.umass.edu to the client computer in reply to the SYN? What is the value of the Acknowledgement field in the SYNACK segment? How did gaia.cs.umass.edu determine that value? What is it in the segment that identifies the segment as a SYNACK segment?

ANS: Sequence number of the SYNACK segment from gaia.cs.umass.edu to the client computer in reply to the SYN has equal to 0 in this trace. The value of the Acknowledgement field in the SYNACK segment is 1. The value of the Acknowledgement field in the SYNACK segment is determined by gaia.cs.umass.edu by adding “1” to the initial sequence number of SYN segment from the client computer (because the sequence number of the SYN segment initiated by the client computer is 0). The SYN flag and Acknowledgement flag in the segment are set to 1 and they refer that this segment is a SYNACK segment.



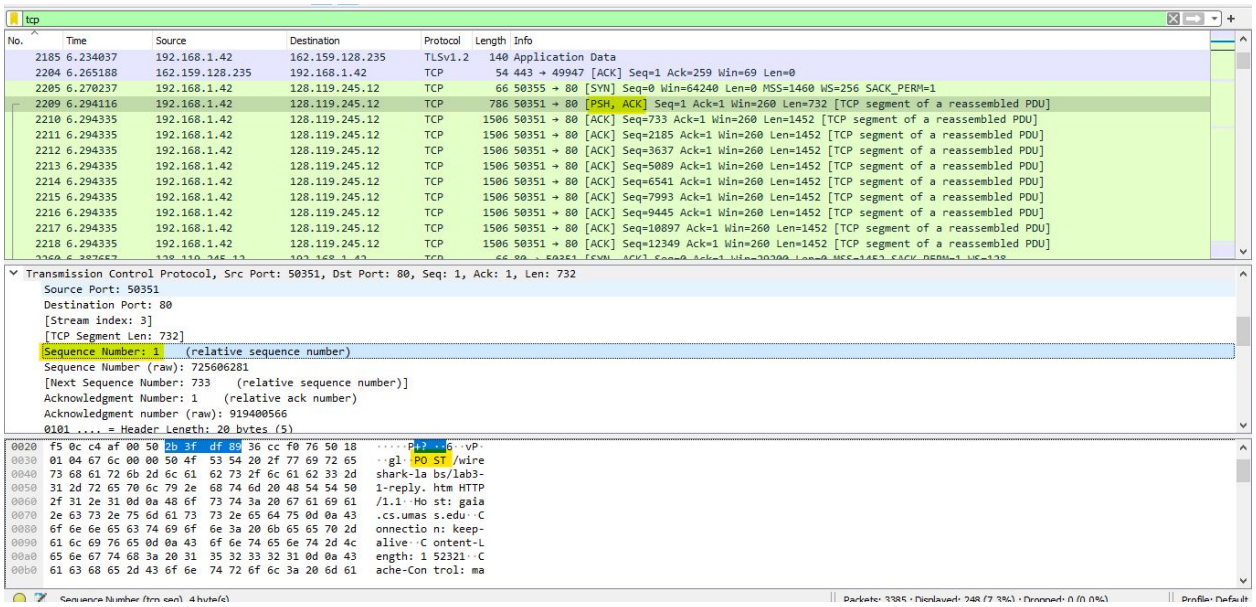

6. What is the sequence number of the TCP segment containing the HTTP POST command? Note that in order to find the POST command, you'll need to dig into the packet content field at the bottom of the Wireshark window, looking for a segment with a "POST" within its DATA field.

ANS: Sequence number of this segment is 1.

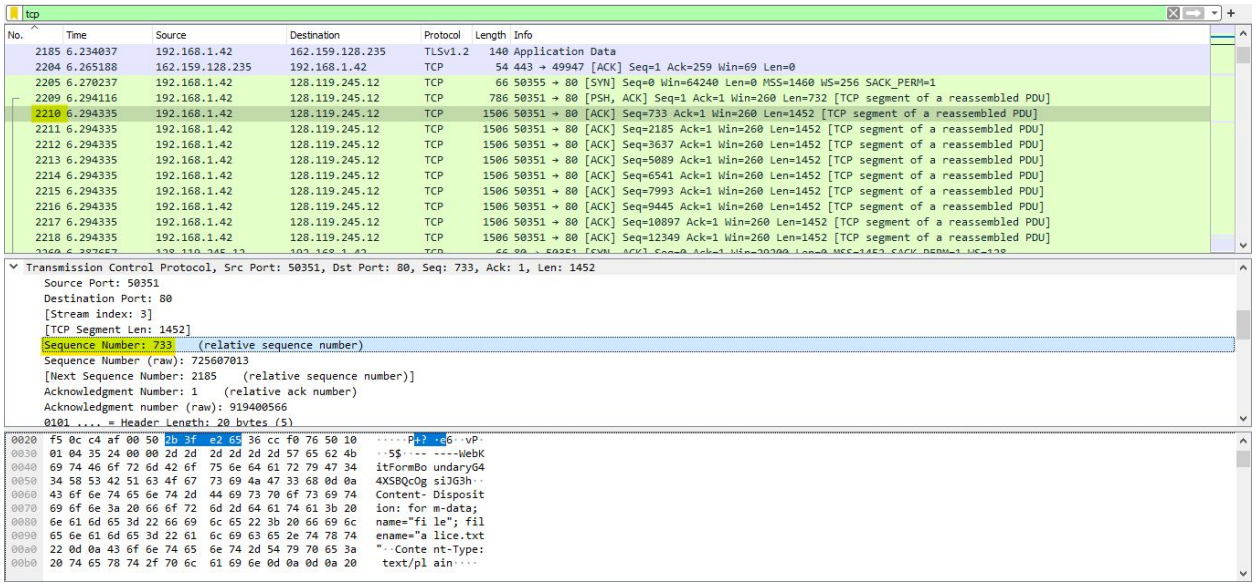


7. Consider the TCP segment containing the HTTP POST as the first segment in the TCP connection. What are the sequence numbers of the first six segments in the TCP connection (including the segment containing the HTTP POST)? At what time was each segment sent? When was the ACK for each segment received? 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 Section 3.5.3, page 239 in text) after the receipt of each ACK? Assume that the value of the EstimatedRTT is equal to the measured RTT for the first segment, and then is computed using the EstimatedRTT equation on page 239 (or described below) for all subsequent segments

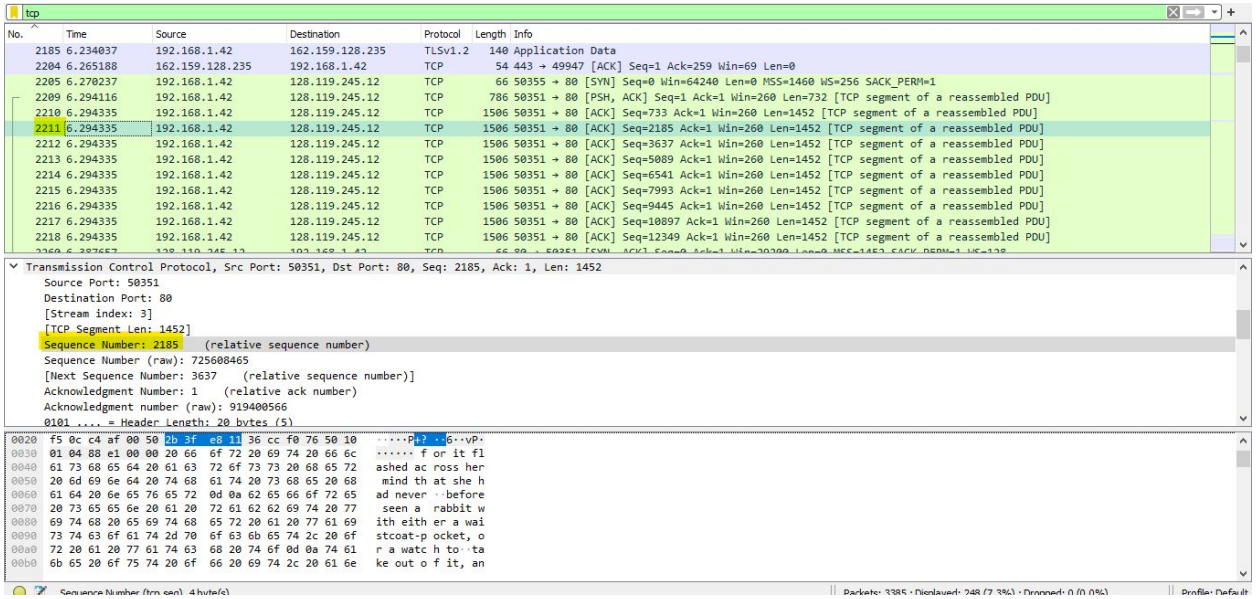
ANS: Sequence number of this segment is 1.



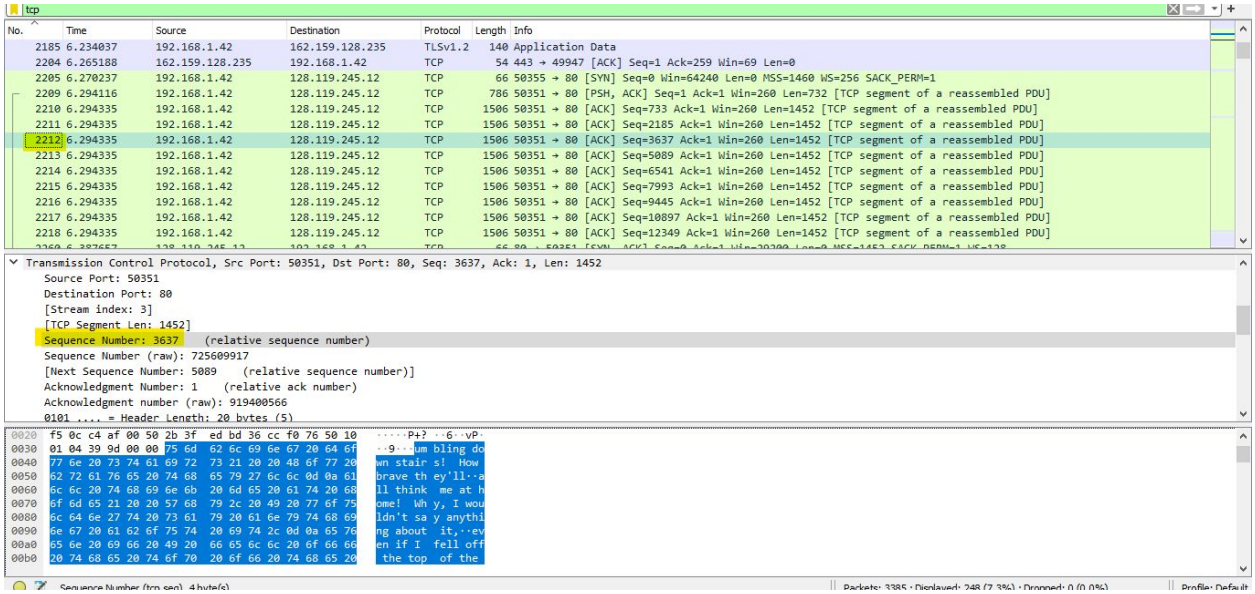
## Sequence number for segment 2 is 733



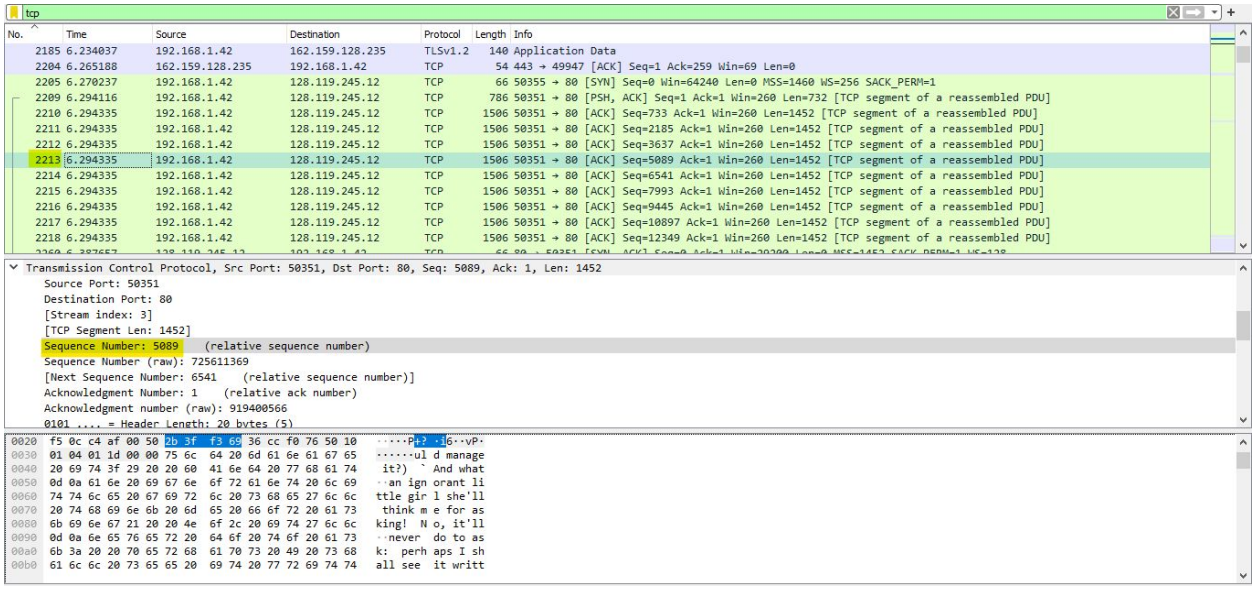

## Sequence number for segment 3 is 2185



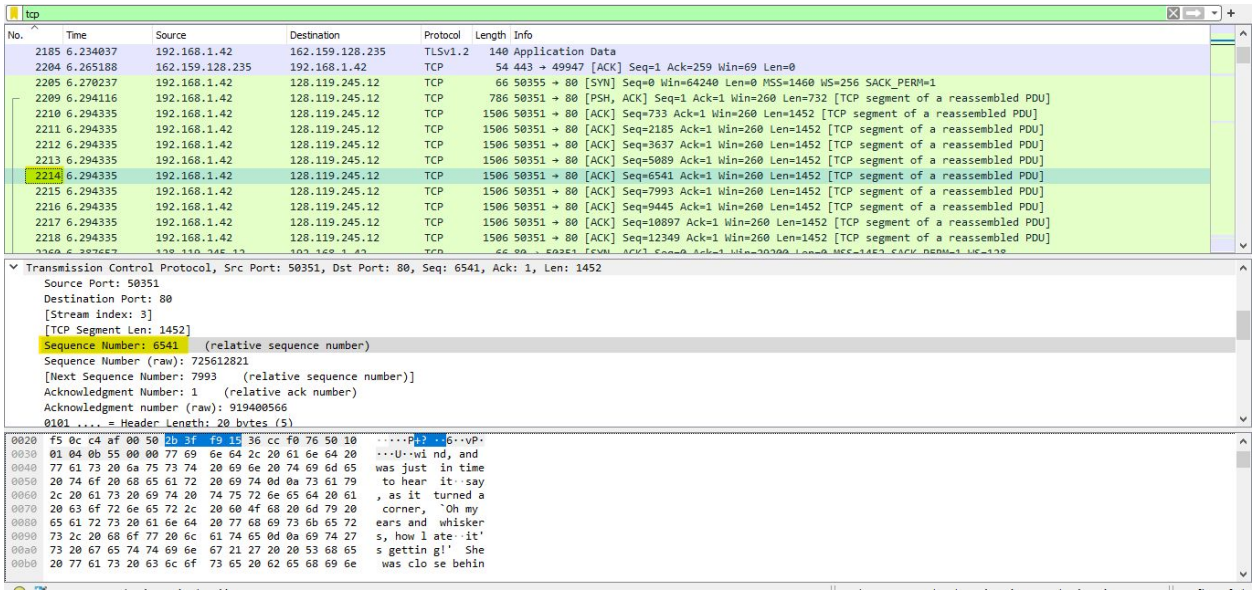
## Sequence number for segment 4 is 3637



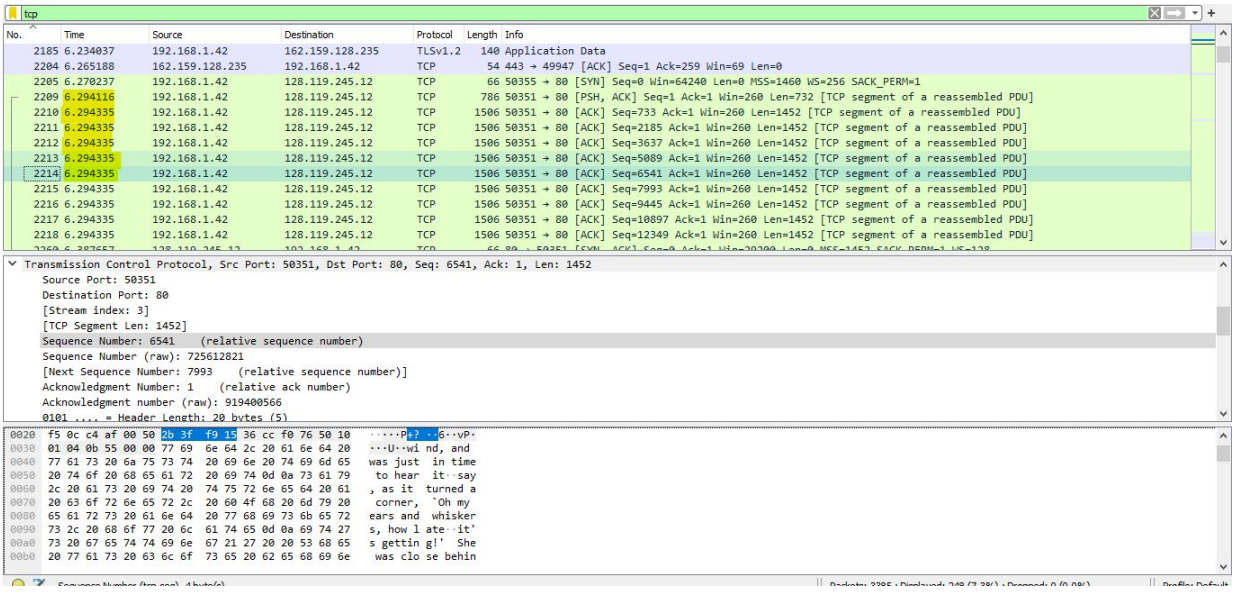

## Sequence number for segment 5 is 5089



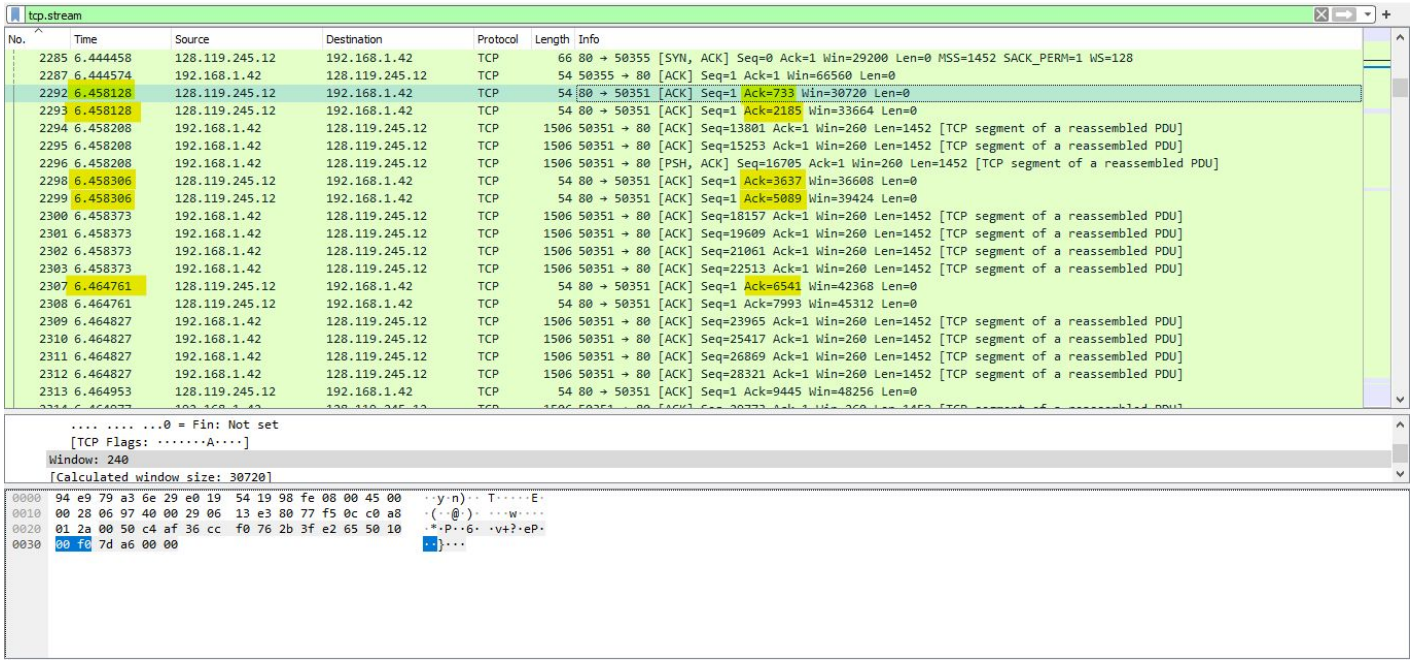
Sequence number for segment 6 is 6541




Segment 1 is sent at 6.294116 s,
Segment 2 is sent at 6.294335 s,
Segment 3 is sent at 6.294335 s,
Segment 4 is sent at 6.294335 s,
Segment 5 is sent at 6.294335 s,
Segment 6 is sent at 6.294335 s.



ACK for segment 1 is received 6.458128,
segment 2 is received 6.458128,
segment 3 is received 6.458306,
segment 4 is received 6.458306,
segment 5 is received 6.464761,
segment 6 is received 6.464761



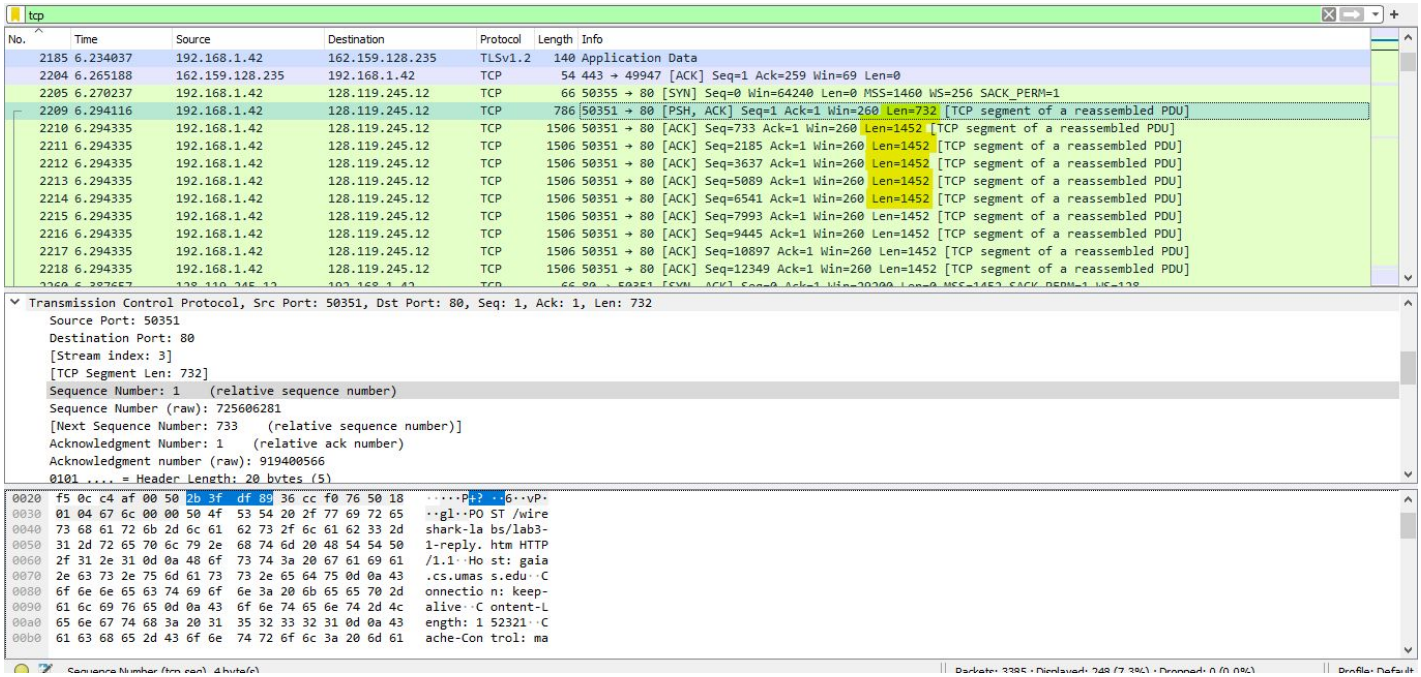

RTT for segment 1 is 0.164012 sec,
RTT for segment 2 is 0.163793 sec,
RTT for segment 3 is 0.163971 sec,
RTT for segment 4 is 0.163971 sec,
RTT for segment 5 is 0.170426 sec,
RTT for segment 6 is 0.170426 sec.

EstimatedRTT = 0.875 * EstimatedRTT + 0.125 * SampleRTT
EstimatedRTT for ACK of segment 1 = 0.164012 sec
EstimatedRTT for ACK of segment 2 = 0.163984 sec
EstimatedRTT for ACK of segment 3 = 0.163982 sec
EstimatedRTT for ACK of segment 4 = 0.163980 sec
EstimatedRTT for ACK of segment 5 = 0.164785 sec
EstimatedRTT for ACK of segment 6 = 0.165449 sec

| | Sequence Number | Sent Time | ACK received time | RTT(seconds) |
|---|---|---|---|---|
| Segment1 | 1 | 6.294116 | 6.458128 | 0.164012 |
| Segment2 | 733 | 6.294335 | 6.458128 | 0.163793 |
| Segment3 | 2185 | 6.294335 | 6.458306 | 0.163971 |
| Segment4 | 3637 | 6.294335 | 6.458306 | 0.163971 |
| Segment5 | 5089 | 6.294335 | 6.464761 | 0.170426 |
| Segment6 | 6541 | 6.294335 | 6.464761 | 0.170426 |

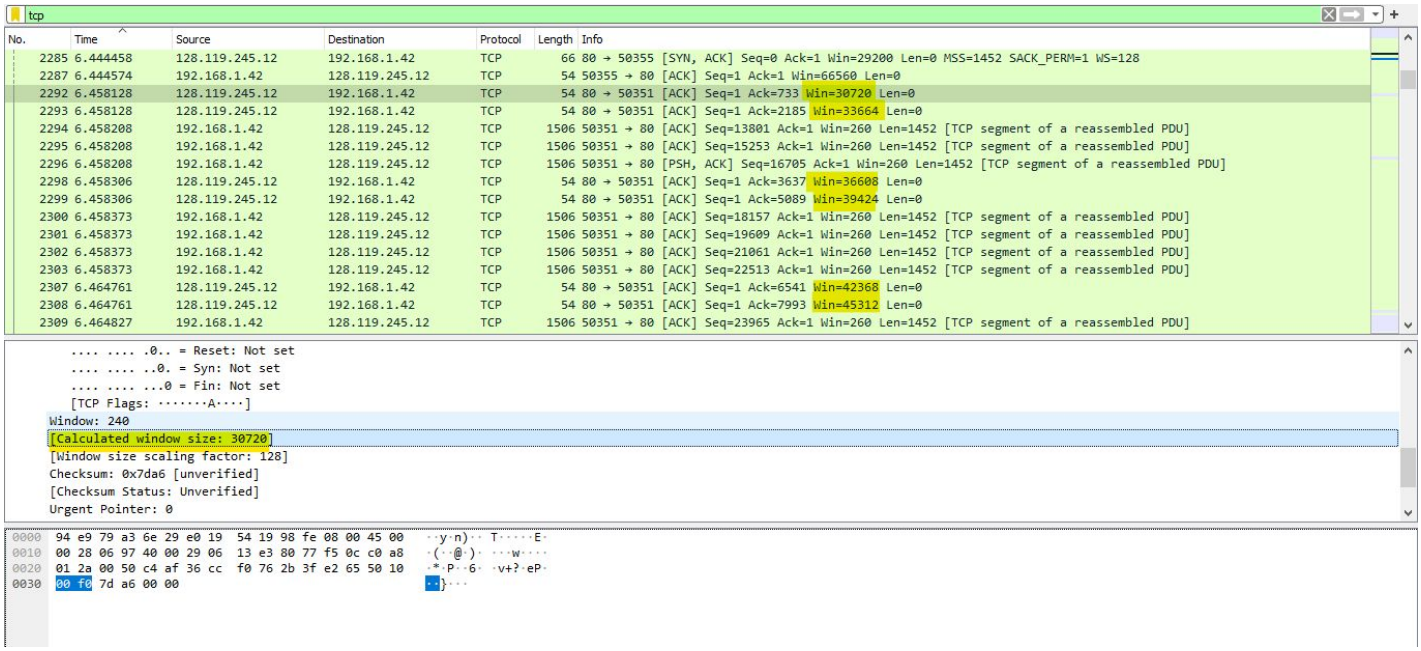
8. What is the length of each of the first six TCP segments?

ANS: Length of the segment 1 is **732 bytes.** The following segments are **1452 bytes.**



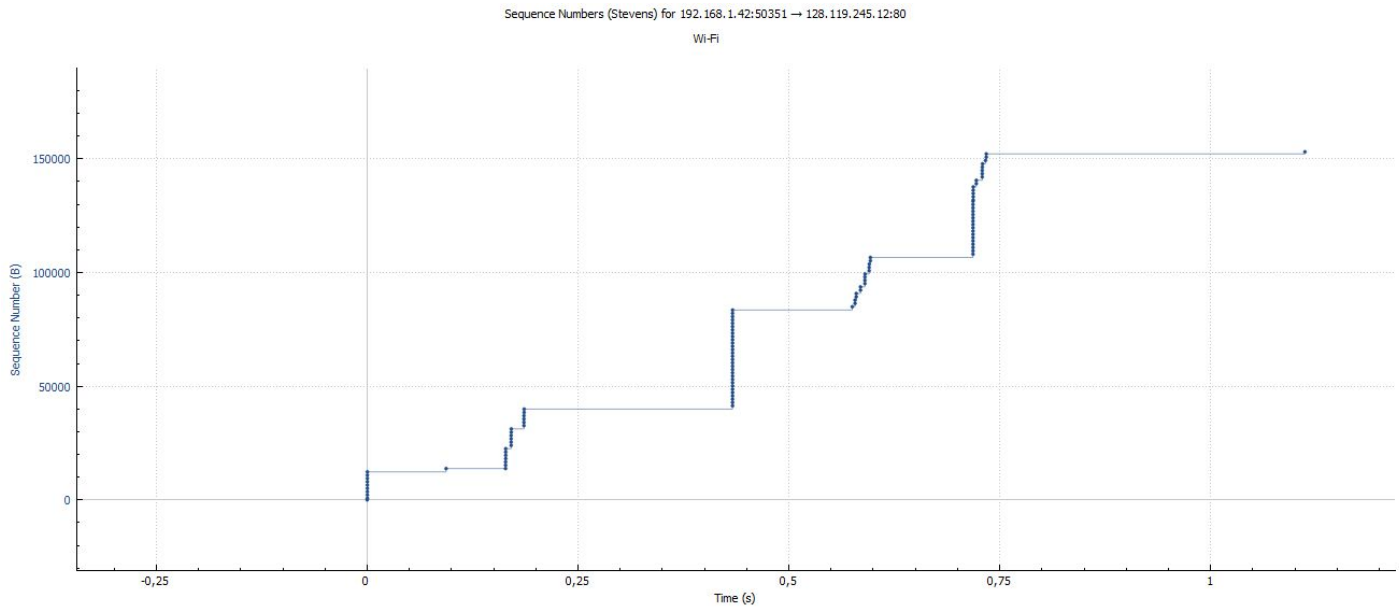
9. What is the minimum amount of available buffer space (receiver window) advertised at the received for the entire trace? Does the lack of receiver buffer space ever throttle the sender? If any, justify your reason.

ANS:  The minimum amount of available buffer space has 30720 bytes. It does not throttle the sender because in each tcp segment we can see the window size increased. If there is a throttle we should have seen that window size has to be shrunk in the trace. However it increased every time.

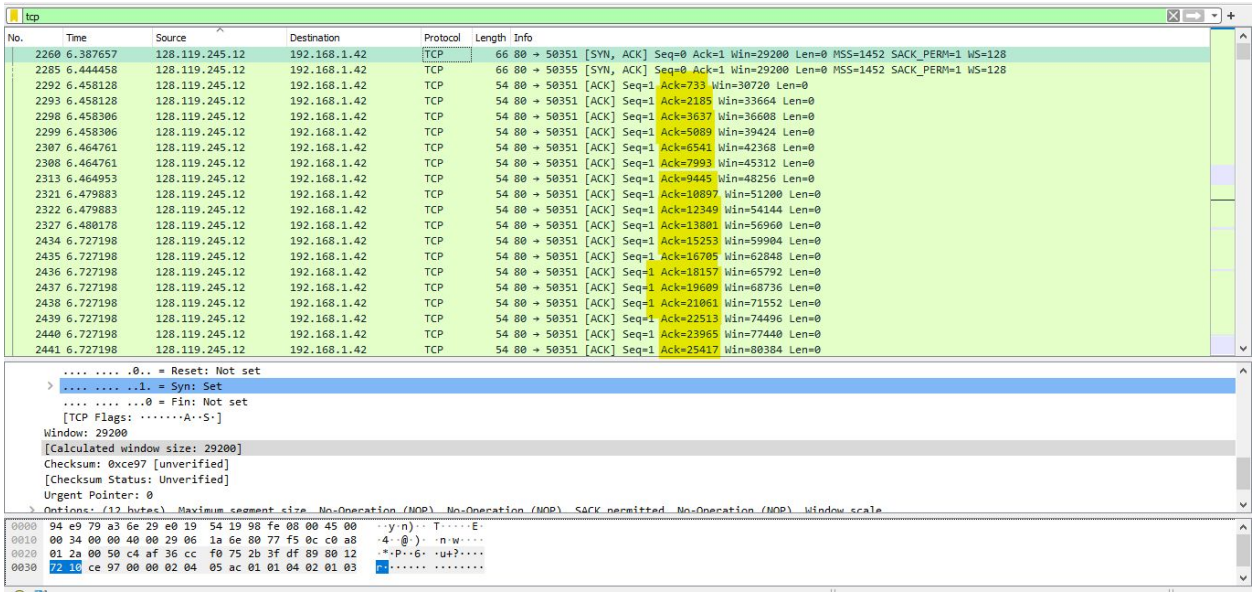



10. Are there any retransmitted segments in the trace file? What did you check for (in the trace) in order to answer this question? (You can use Statistics->TCP Stream Graph-> Time-Sequence-Graph(Stevens) of this trace from your source:client to destination:server, and look for sequence numbers are increasing monotonically with respect to time)

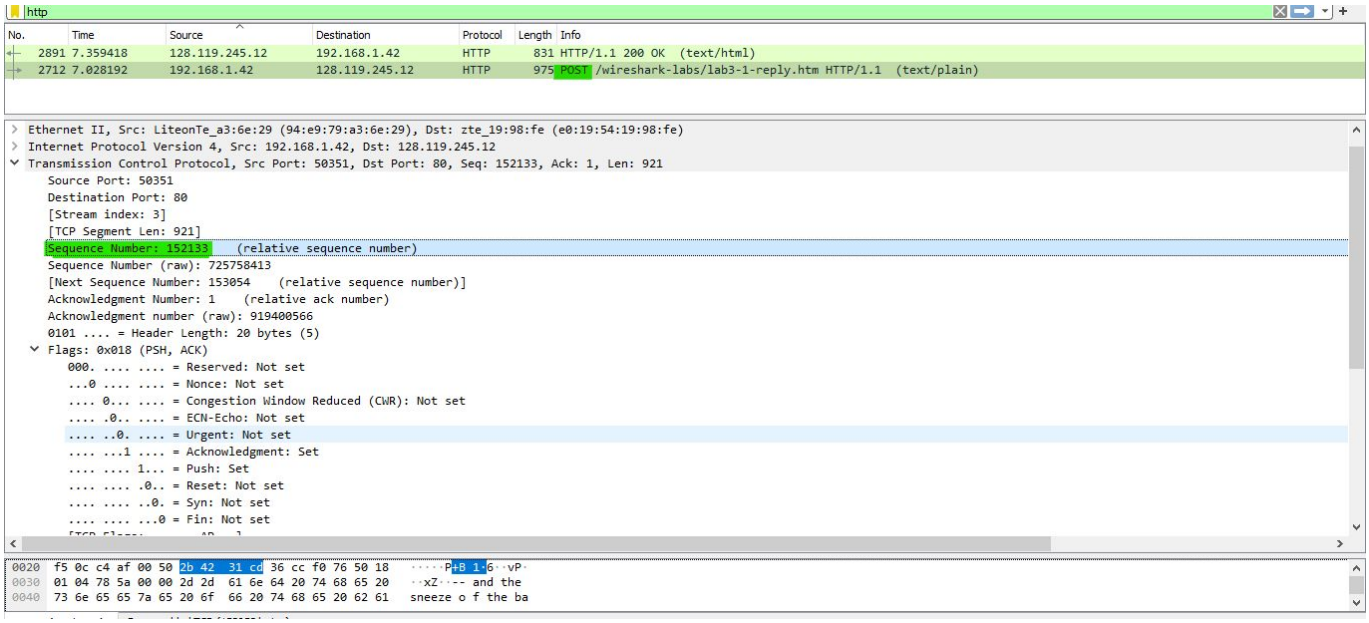
ANS: No there are no retransmitted segments in the trace file. This can be explained by packets with the same sequence number at different time is not found.



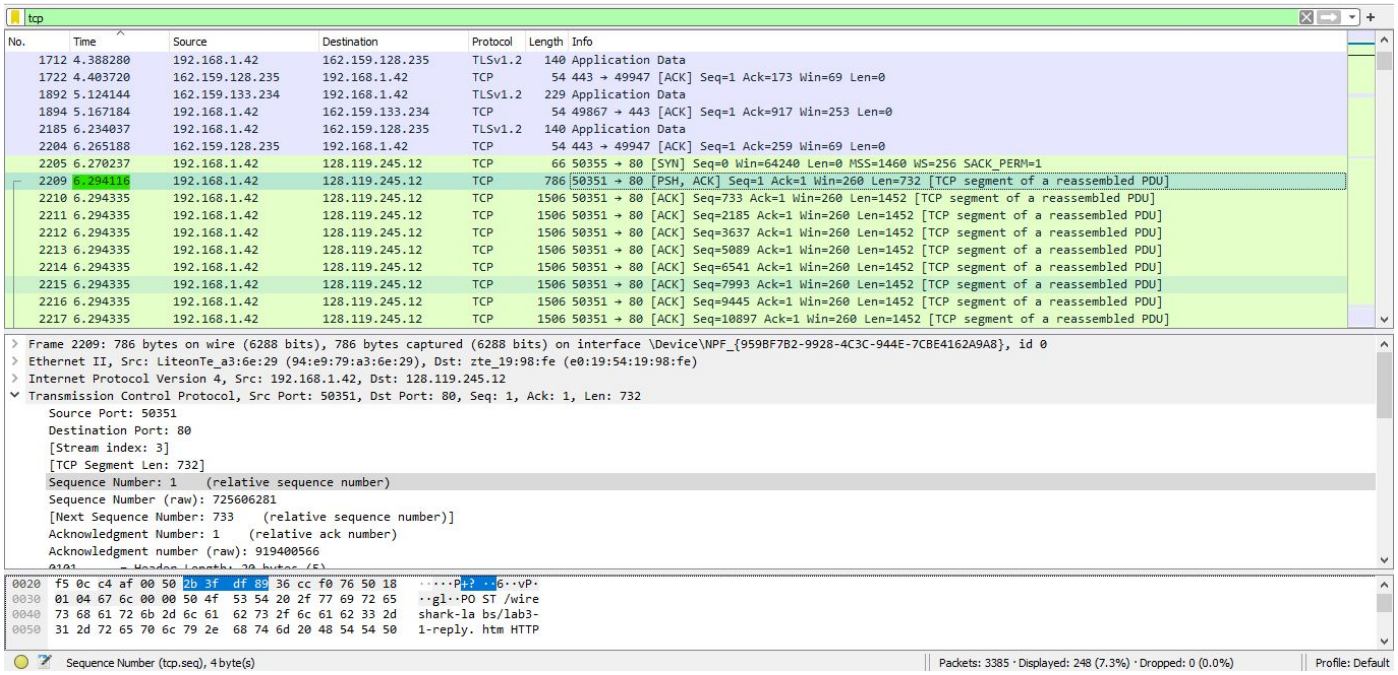

11. How much data does the receiver typically acknowledge in an ACK? Can you identify cases where the receiver is ACKing every other received segment (see Table 3.2 on page 247 in the text)?
ANS: When we examine the results, ACK values increase by 1452(ex: 3637-2185 = 1452) bytes in general for each response from the server.



12. What is the throughput (bytes transferred per unit time) for the TCP connection? Explain how you calculated this value.
ANS:If we look our http/post request we can see total data is
152133 - 1 = 152132 bytes(Sequence number - ACK number)

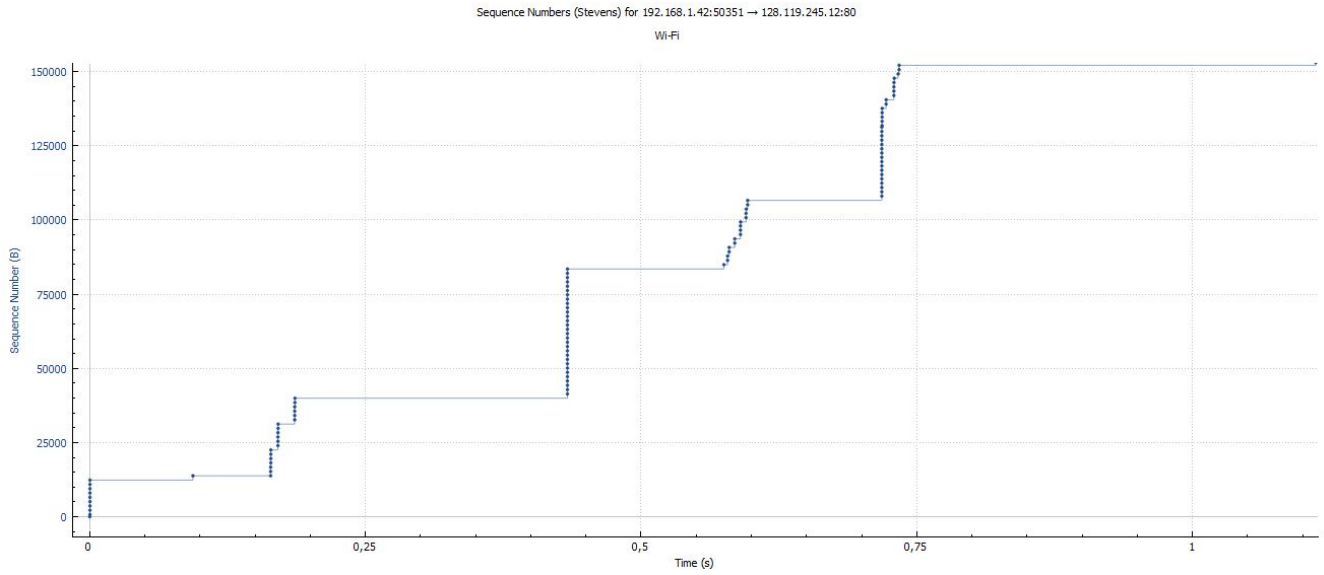



The total transmission time is 7.028192(Post request time) - 6.294116(first sending segment time) = 0.734076 seconds.



The throughput for the TCP connection is computed as:
152132 bytes / 0.734076 sec. = 207242.847 bytes/sec.

13. Use the Time-Sequence-Graph(Stevens) plotting tool to view the sequence number versus time plot of segments being sent from the client to the gaia.cs.umass.edu server. Can you identify where TCP's slow start phase begins and ends, and where congestion avoidance takes over? Comment on ways in which the measured data differs from the idealized behavior of TCP that we've studied in the text.
ANS: The slow start phase begins around zero and ends around 0.1 second. After that congestion avoidance takes over the control.




14. Answer each of two questions above for the trace that you have gathered when you transferred a file from your computer to gaia.cs.umass.edu?
ANS: The questions had been answered above .