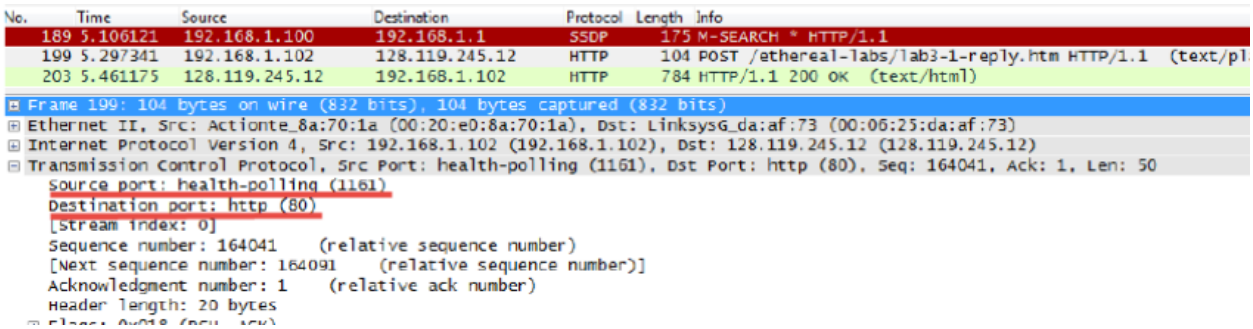
COMPUTER NETWORKS ASSIGNMENT 1

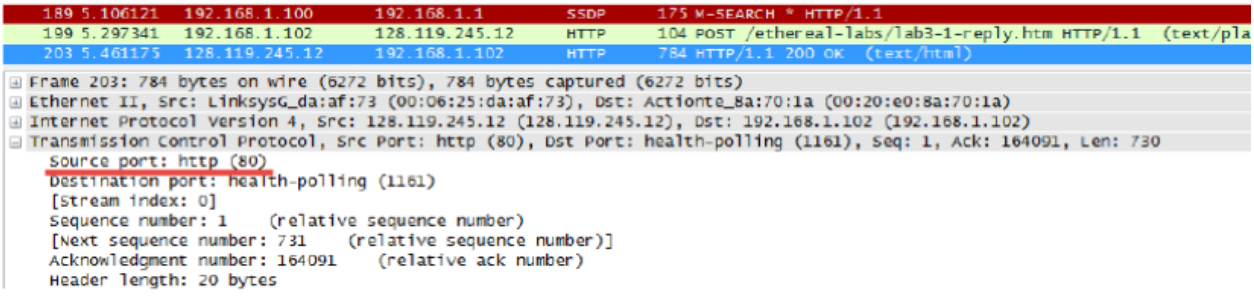
Made By:
Aniket Singh
2101091CS

1) What is the IP address and TCP port number used by the client computer (source) that is transferring the alice.txt 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"(refertoFigure 2 in the "Getting Started with Wireshark" Lab if you're uncertain about the Wireshark windows).



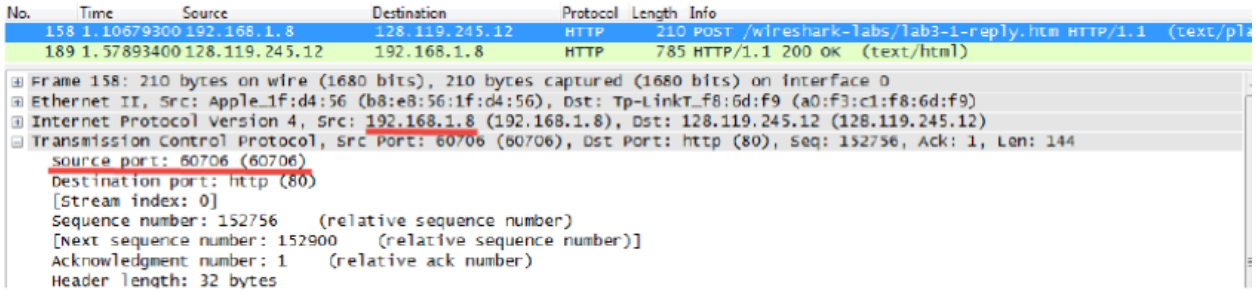
According to above figure, the client computer (source)'s IP address is 192.168.1.102 and the TPC port number is 1161.

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



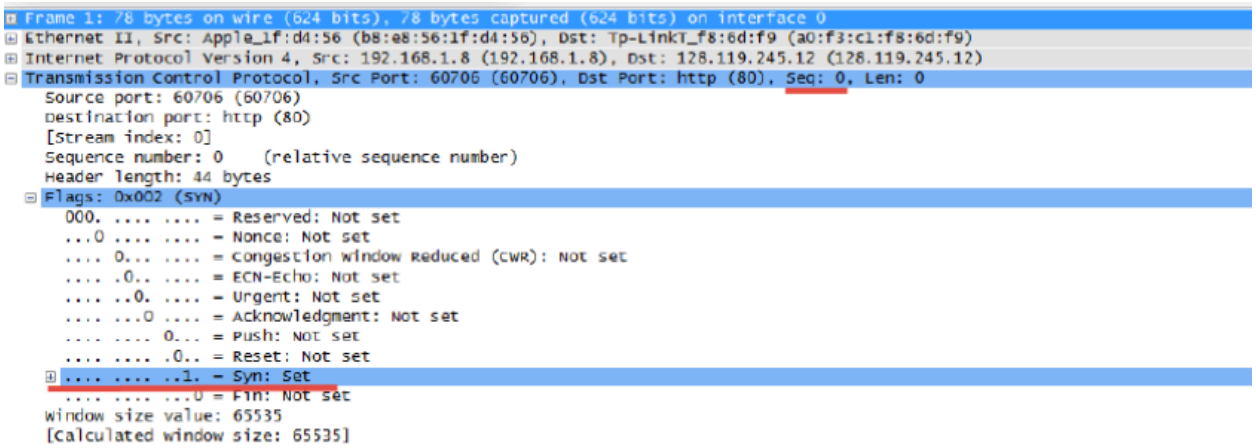
the IP address of gaia.cs.umass.edu is 128.119.245.12 and the TCP port number is 80

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



client computer's IP address is 192.168.1.8 and the TCP port is 60706

What is the sequence number of the TCP SYN segment that is used to initiate the TCPconnection between the client computer and gaia.cs.umass.edu? What is it in the segmentthat identifies the segment as a SYN segment?

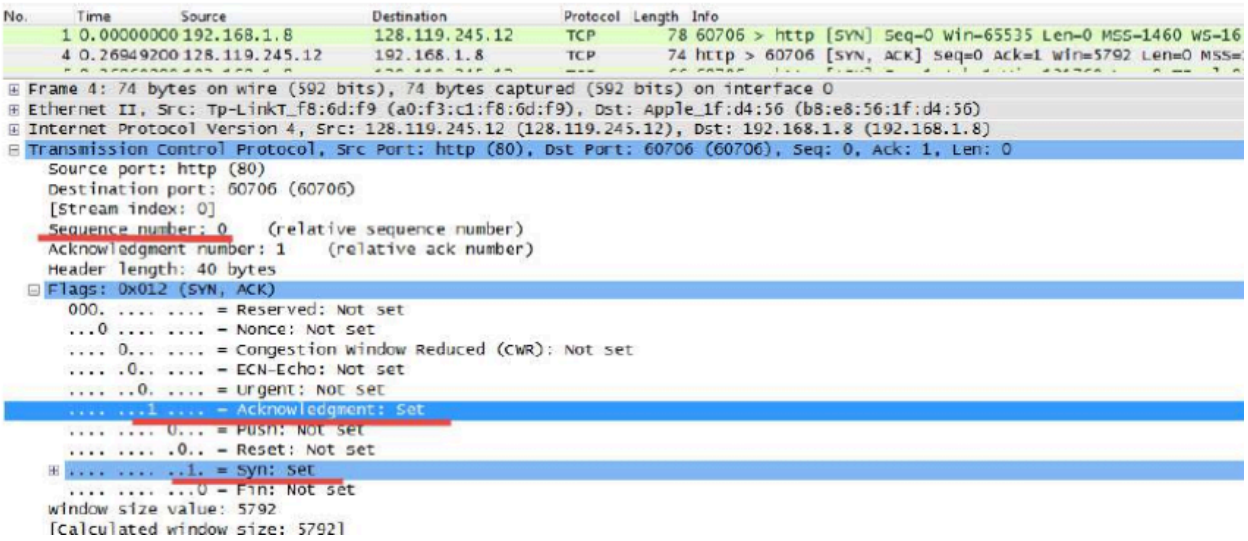


sequence number of the TCP SYN segment is 0

in the Flags section, the Syn flag is set to 1 which indicates that this segment is a SYN segment

What is the sequence number of the SYNACK segment sent by gaia.cs.umass.edu to theclient computer in reply to the SYN? What is the value of the Acknowledgement field in theSYNACK segment? How did

gaia.cs.umass.edu determine that value? What is it in the segmentthat identifies the segment as a SYNACK segment



the sequence number of the SYNACK segment sent bygaia.cs.umass.edu to the client computer in reply to the SYN is 0

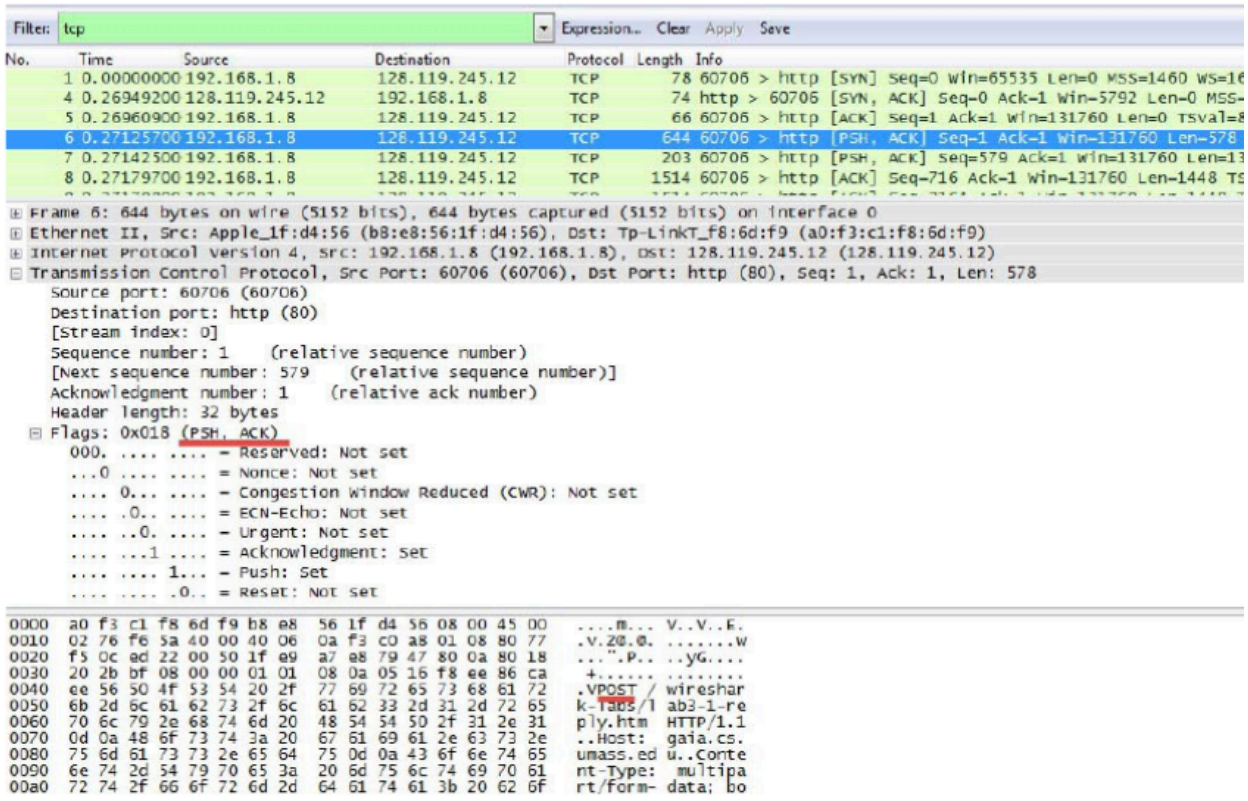
The value of the acknowledgement field in the SYNACK segment is 1.

value of theACKnowledgement field in the SYNACK segment = 1 + initial sequence number of SYN segment form the client computer.

For this case, the initial sequence number of SYN segment from the client computer is 0, thus thevalue of the ACKnowledgement field in the SYNACK segment is 1.

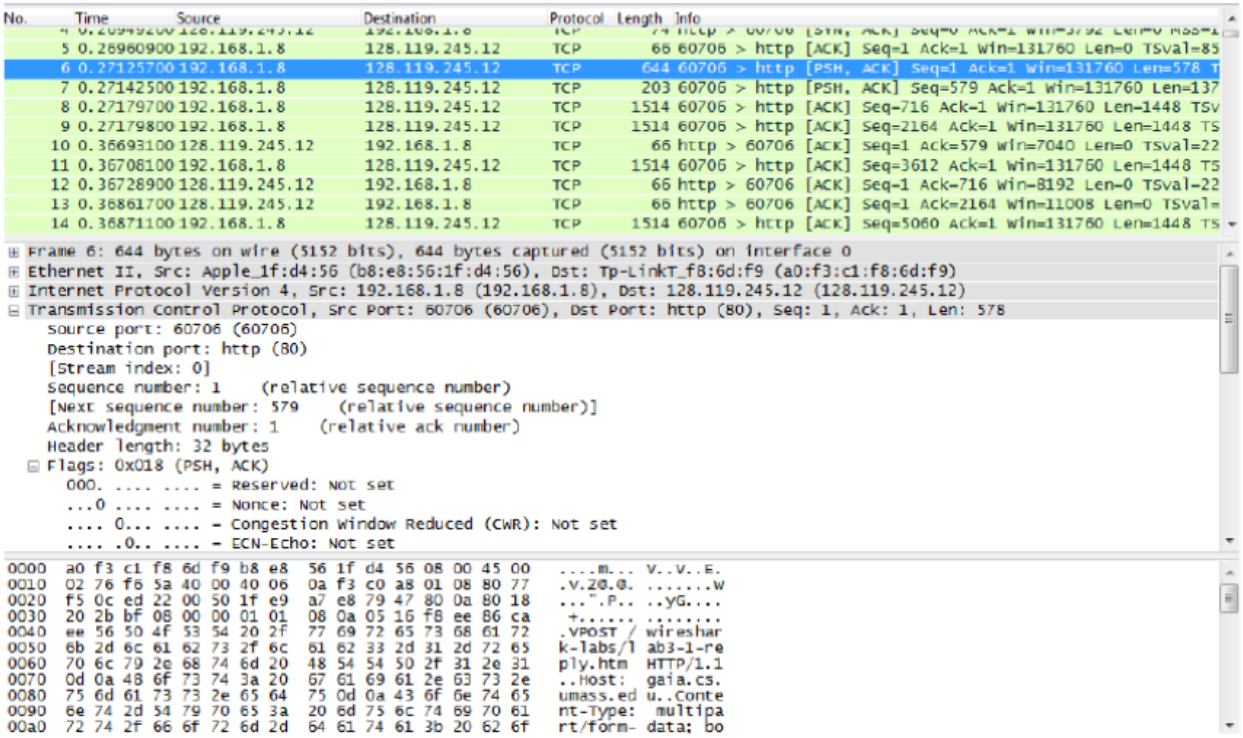
A segment will be identified as a SYNACK segment if both SYN flag and Acknowledgement in thesegment are set to 1

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 fieldat the bottom of the Wireshark window, looking for a segment with a "POST" within its DATAfield

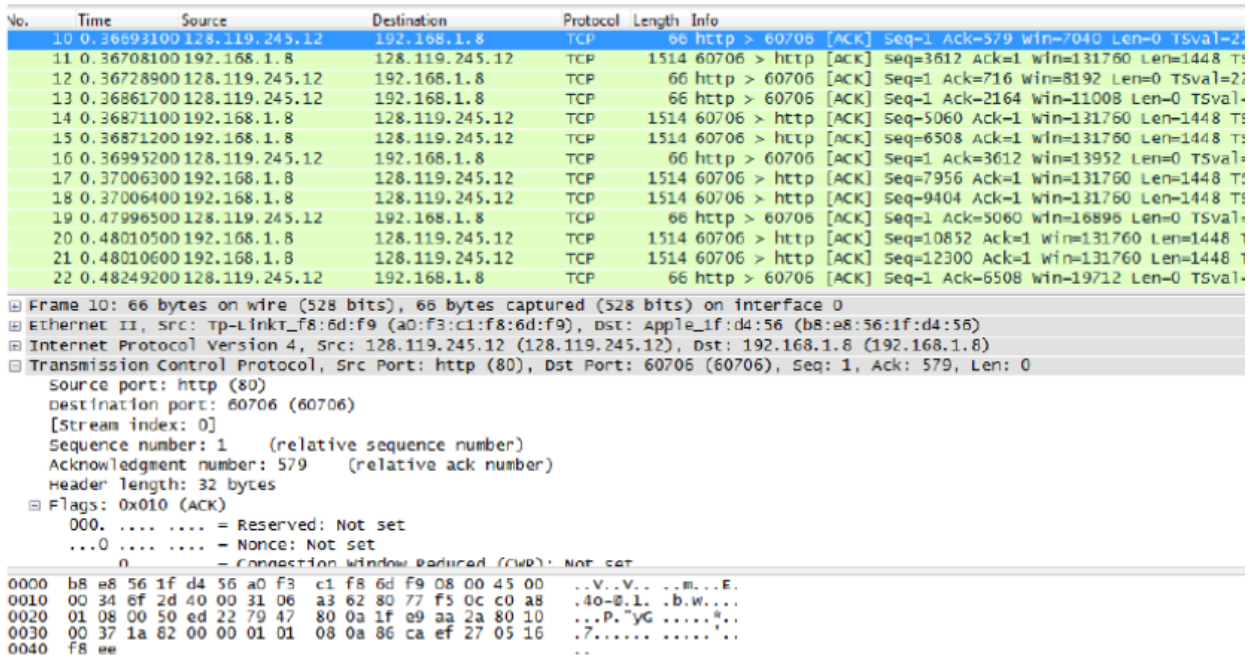


Segment 6 has http post, its sequence number is 1

Consider the TCP segment containing the HTTP POST as the first segment in theTCP 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 242 in text) after the receipt of each ACK? Assume that the value of the Estimated RTT is equal to the measured RTT for the first segment, and then is computed using the EstimatedRTT equation on page 242 for all subsequent segments.



Segment 1 to 6



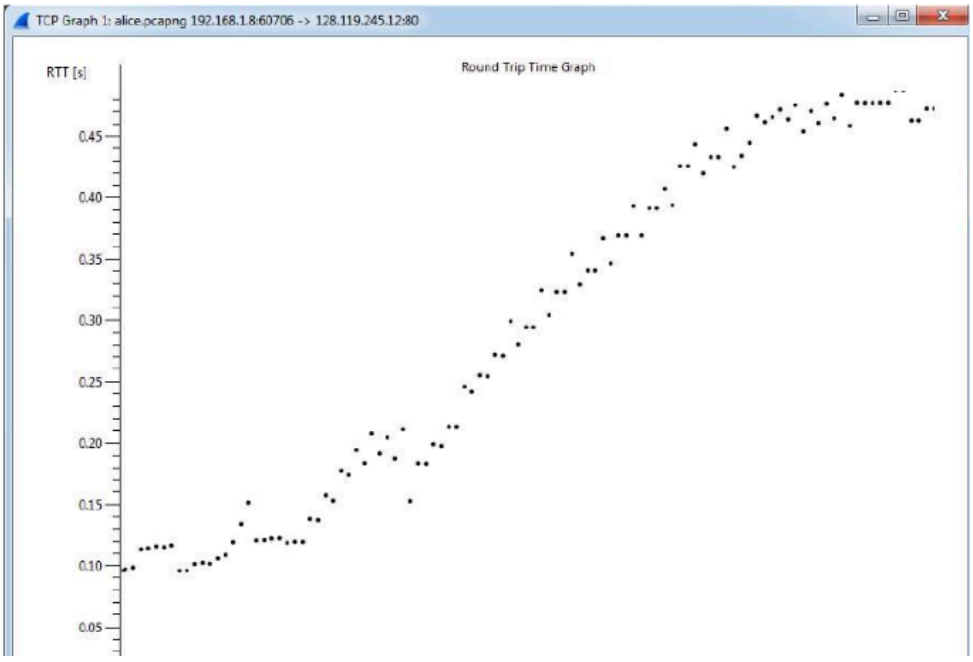
Ack of segments 1 to 6

Segments 1-6 : 6, 7, 8, 9, 11, 14
Ack of segments 1-6 : 10, 12, 13, 16, 19, 22
Segment 1 sequence number is 1
Segment 2 sequence number is 579

Segment 3 sequence number is 716
Segment 4 sequence number is 2164
Segment 5 sequence number is 3612
Segment 6 sequence number is 5060

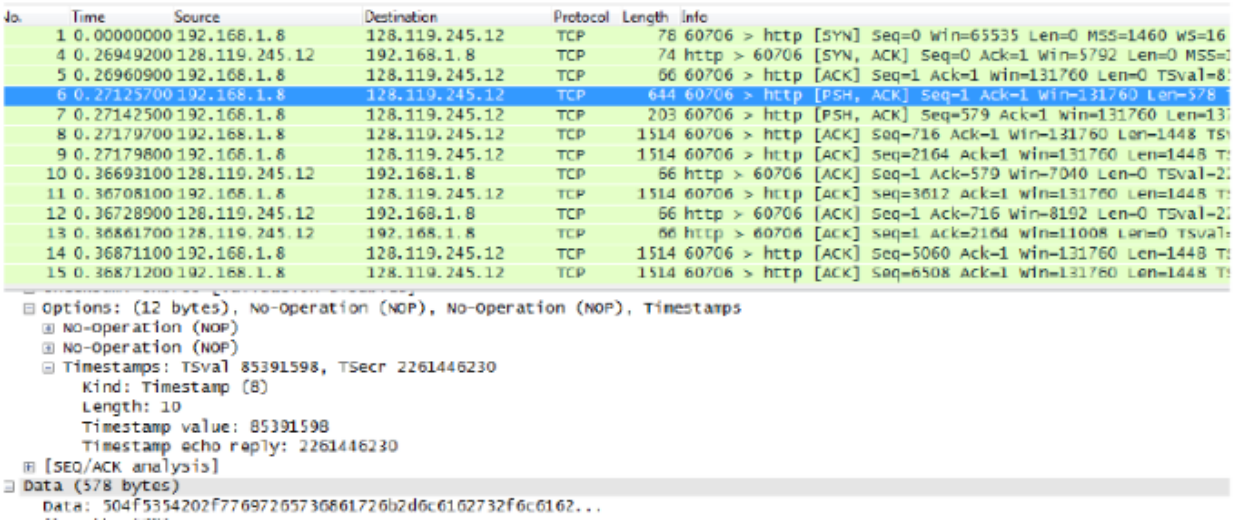
	Sent time	ACK received time	RTT
Segment 1	0.271257000	0.366931000	0.095674
Segment 2	0.271425000	0.367289000	0.095864
Segment 3	0.271797000	0.368617000	0.09682
Segment 4	0.271798000	0.369952000	0.098154
Segment 5	0.367081000	0.479965000	0.112884
Segment 6	0.368711000	0.482492000	0.113781

According to the formula:
Estimated RTT = 0.875 * Estimated RTT + 0.125 * SampleRTT
EstimatedRTT after the receipt of the ACK of segment 1:
EstimatedRTT = RTT for Segment 1 = 0.095 s
EstimatedRTT after the receipt of the ACK of segment 2:
Estimated RTT = 0.875 * 0.095 + 0.125 * 0.095 = 0.095s
Estimated RTT after the receipt of the ACK of segment 3:
Estimated RTT = 0.875 * 0.095 + 0.125 * 0.096= 0.095s
Estimated RTT after the receipt of the ACK of segment 4:
Estimated RTT = 0.875 * 0.095 + 0.125 * 0.098 = 0.09612752734 s
Estimated RTT after the receipt of the ACK of segment 5:
Estimated RTT = 0.875 * 0.096 + 0.125 * 0.11 = 0.09822208642 s



EstimatedRTT after the receipt of the ACK of segment 6:EstimatedRTT = 0.875 *0.09822208642 + 0.125 * 0.113781= 0.10016695061 sRound Trip Time

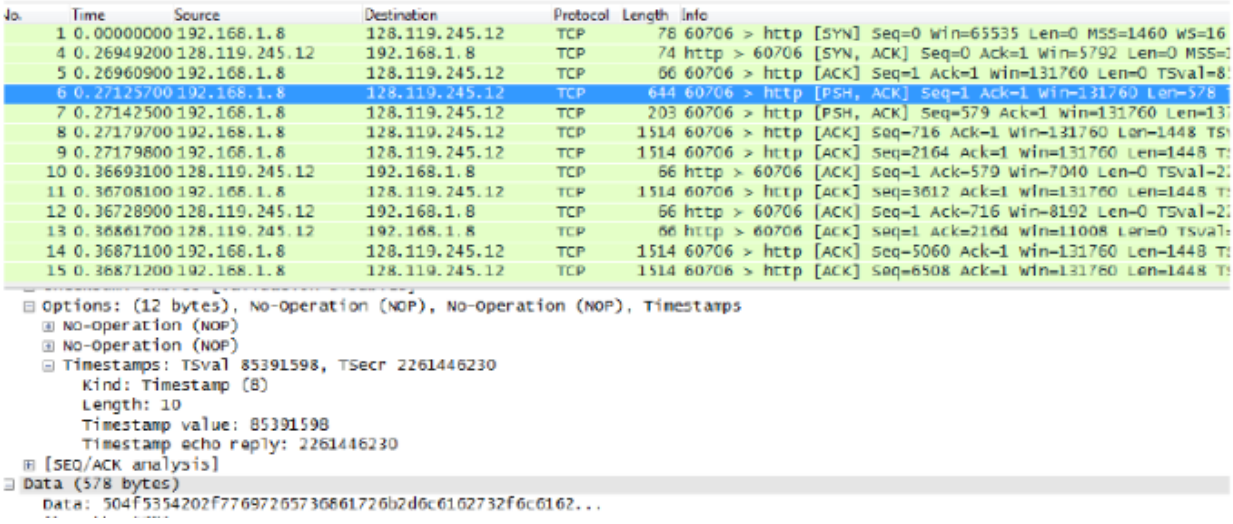
Graph7. What is the length of each of the first six TCP segments?



The length of the first TCP segment is 578 bytes, the length of the second TCP segment is 137 bytes. The length of each of the following five TCP segments is 1448 bytes.

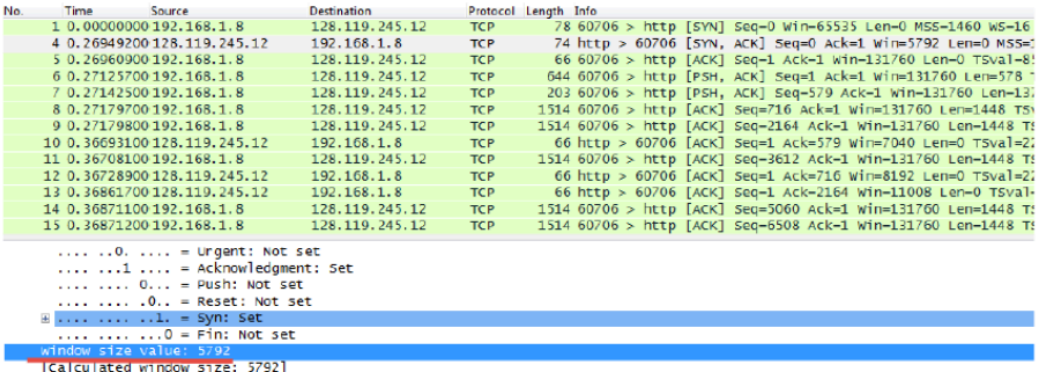
0.875 *0.09822208642 + 0.125 * 0.113781= 0.10016695061 sRound Trip Time

Graph7. What is the length of each of the first six TCP segments?



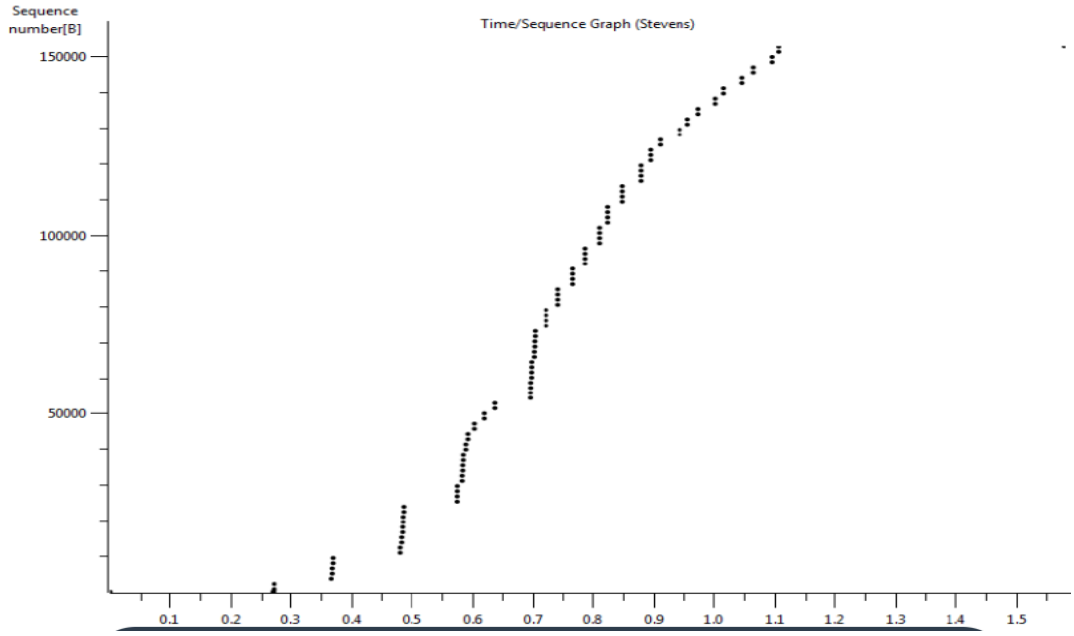
The length of the first TCP segment is 578 bytes, the length of the second TCP segment is 137 bytes. The length of each of the following five TCP segments is 1448 bytes.

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

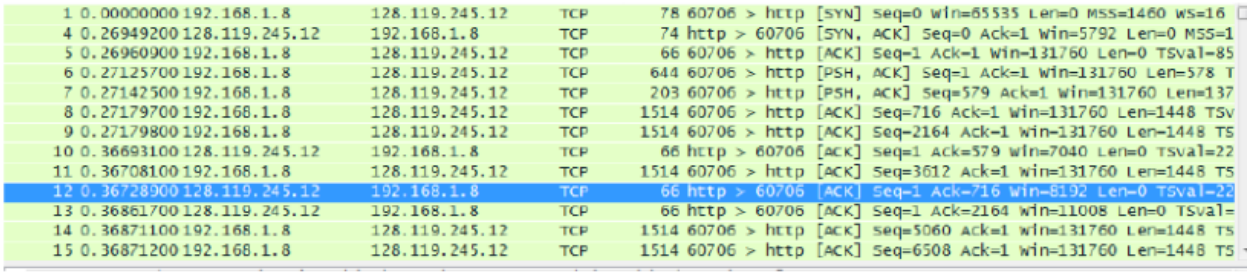


minimum amount of available buffer space advertised at the received for the entire trace is indicated first ACK from the server, its value is 5792 bytes
.This reviver window grows until it reaches the maximum receiver buffer size of 62780 bytes. According to the trace, the sender is never throttled due to lacking of receiver buffer space

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



How much data does the receiver typically acknowledge in an ACK? Can you identify caseswhere the receiver is ACKing every other received segment (see Table 3.2 on page 247 in thetext).



1	0.00000000	192.168.1.8	128.119.245.12	TCP	78 60706 > http [SYN] Seq=0 Win=65535 Len=0 MSS=1460 WS=16
4	0.26949200	128.119.245.12	192.168.1.8	TCP	74 http > 60706 [SYN, ACK] Seq=0 Ack=1 Win=5792 Len=0 MSS=1
5	0.26960900	192.168.1.8	128.119.245.12	TCP	66 60706 > http [ACK] Seq=1 Ack=1 Win=131760 Len=0 TSval=85
6	0.27125700	192.168.1.8	128.119.245.12	TCP	644 60706 > http [PSH, ACK] Seq=1 Ack=1 Win=131760 Len=578 T
7	0.27142500	192.168.1.8	128.119.245.12	TCP	203 60706 > http [PSH, ACK] Seq=579 Ack=1 Win=131760 Len=137
8	0.27179700	192.168.1.8	128.119.245.12	TCP	1514 60706 > http [ACK] Seq=716 Ack=1 Win=131760 Len=1448 TSv
9	0.27179800	192.168.1.8	128.119.245.12	TCP	1514 60706 > http [ACK] Seq=2164 Ack=1 Win=131760 Len=1448 TS
10	0.36693100	128.119.245.12	192.168.1.8	TCP	66 http > 60706 [ACK] Seq=1 Ack=579 Win=7040 Len=0 TSval=22
11	0.36708100	192.168.1.8	128.119.245.12	TCP	1514 60706 > http [ACK] Seq=3612 Ack=1 Win=131760 Len=1448 TS
12	0.36728900	128.119.245.12	192.168.1.8	TCP	66 http > 60706 [ACK] Seq=1 Ack=716 Win=8192 Len=0 TSval=22
13	0.36861700	128.119.245.12	192.168.1.8	TCP	66 http > 60706 [ACK] Seq=1 Ack=2164 Win=11008 Len=0 TSval=
14	0.36871100	192.168.1.8	128.119.245.12	TCP	1514 60706 > http [ACK] Seq=5060 Ack=1 Win=131760 Len=1448 TS
15	0.36871200	192.168.1.8	128.119.245.12	TCP	1514 60706 > http [ACK] Seq=6508 Ack=1 Win=131760 Len=1448 TS

The difference between the acknowledged sequence numbers of two consecutive ACKs indicates the data received by the server between these two ACKs.The receiver is ACKing every other segment. For example, segment of No. 13 acknowledged data with 1430 bytes

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

The alice.txt on the hard drive is 152,138 bytes, and the download time is 1.578736000 (FirstTCP segment) - 0.271257000 (last ACK) = 1.307479 second. Therefore, the throughput for theTCP connection is computed as 152,138/1.307479=116359.803867 bytes/second