HACETTEPE UNIVERSITY

DEPARTMENT OF
COMPUTER ENGINEERING

BBM453: Computer Networks Laboratory
Lab 6: TCP

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Group 14
Source IP : 192.168.0.27

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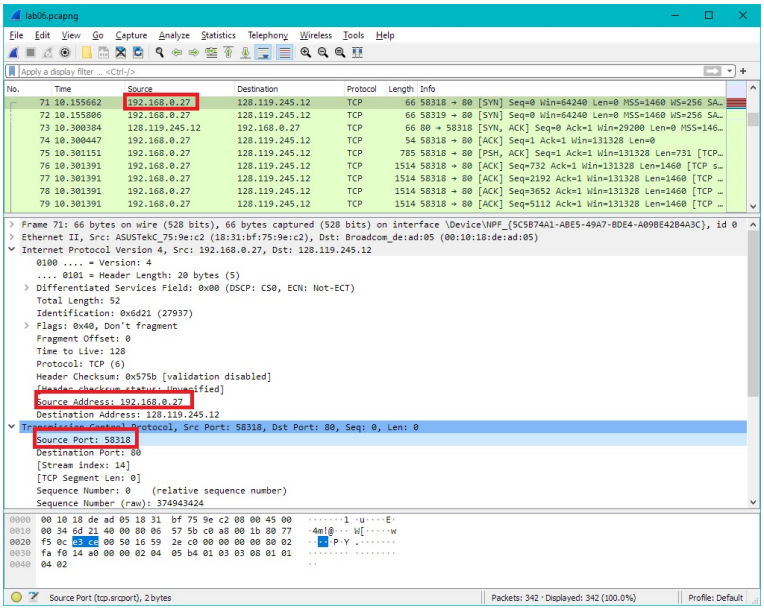
SOLUTIONS

A first look at the captured trace

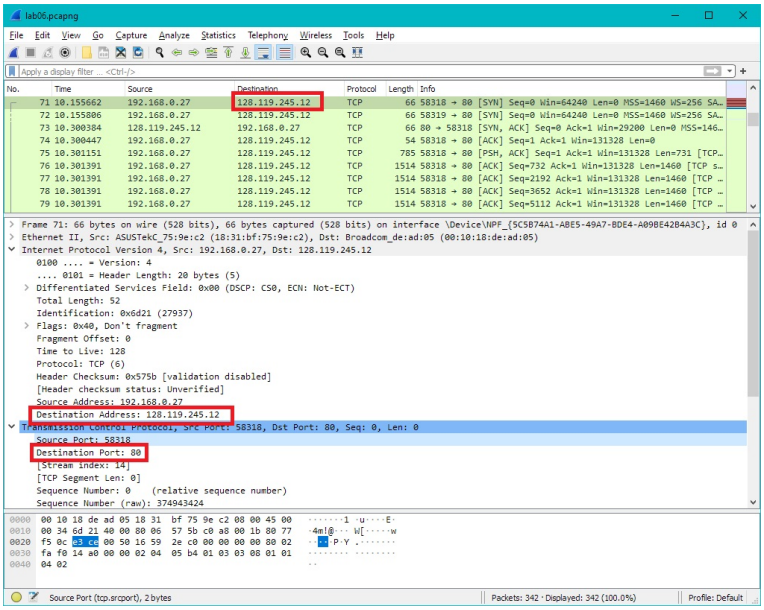
1.What is the IP address and TCP port number used by the client computer (source) that is transferring the file to gaia.cs.umass.edu?

Client computer IP address is: 192.168.0.27 , Port 58318



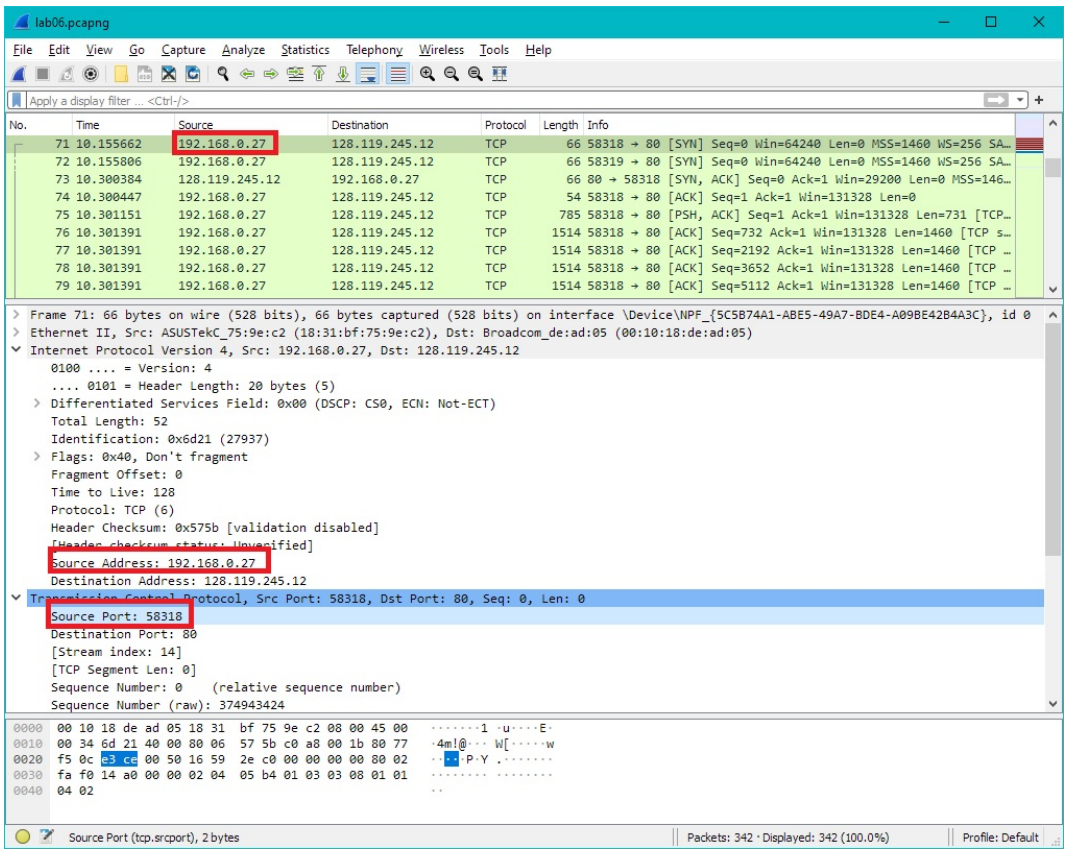
2. What is the IP address of gaia.cs.umass.edu? On what port number is it sending and receiving TCP segments for this connection?

IP adress of gaia.cs.umass.edu is: 128.119.245.12 , used port is: 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?

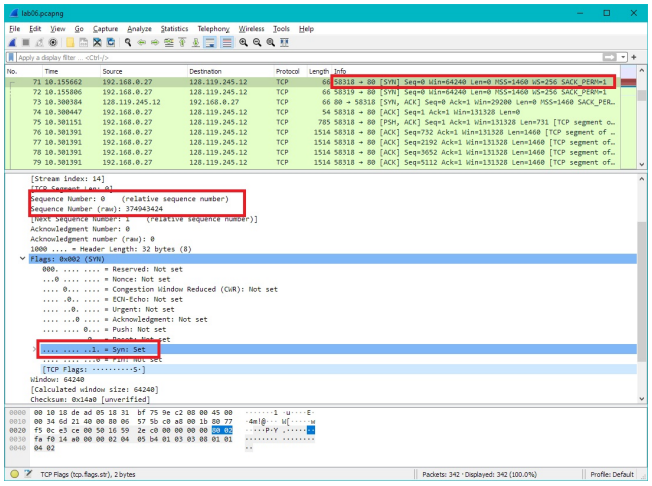
Client computer IP address is: 192.168.0.27 , Port 58318.



TCP Basics

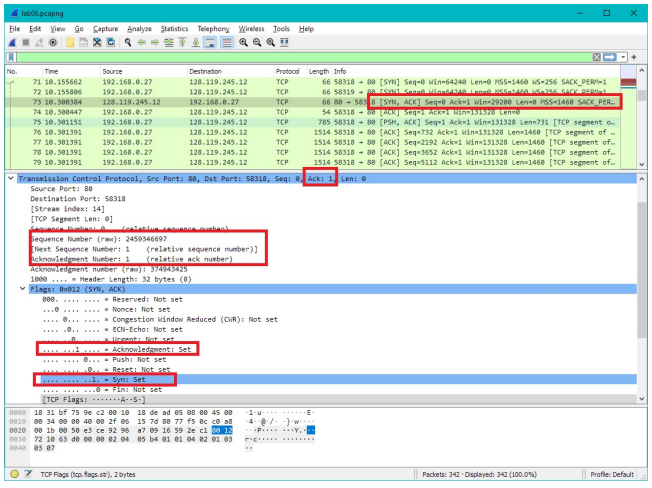
4. What is the sequence number of the TCP SYN segment that is used to initiate the TCP connection between the client computer and gaia.cs.umass.edu? What is it in the segment that identifies the segment as a SYN segment?

Sequence number is 0. We can the SYN flag is set to 1 inside the flags.



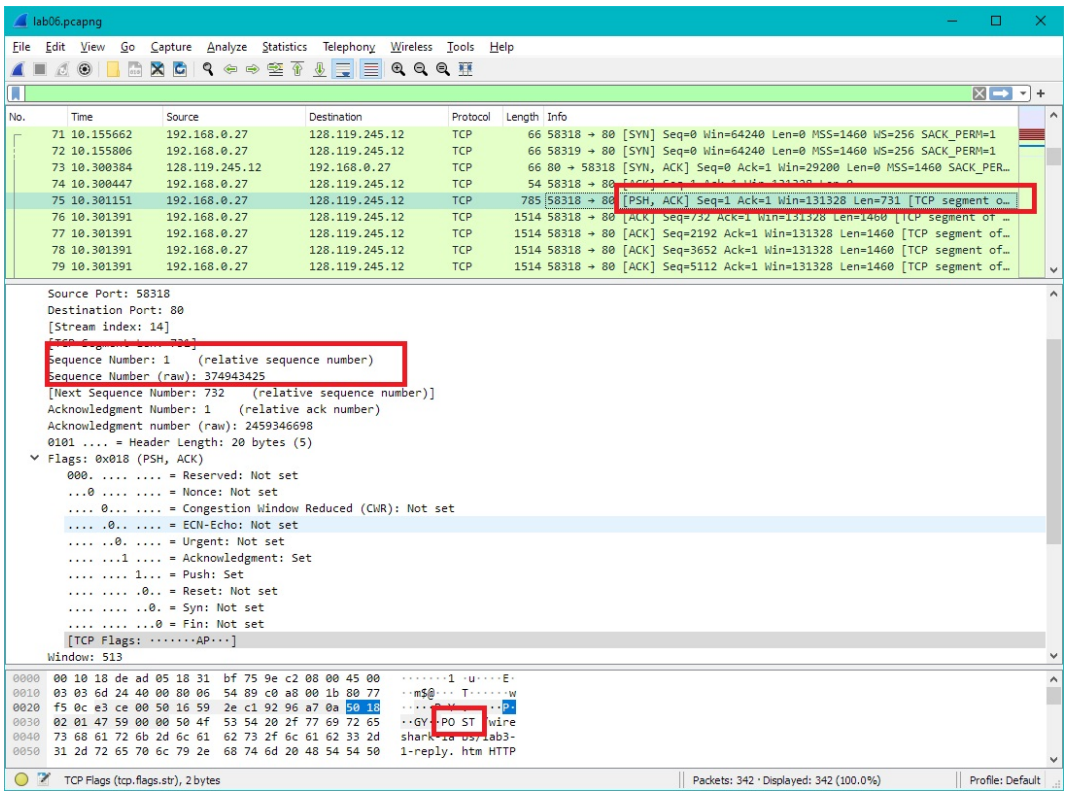
5. What is the sequence number of the SYNACK segment sent by gaia.cs.umass.edu to the client computer in reply to the SYN? What is the value of the Acknowledgement field in the SYNACK segment? How did gaia.cs.umass.edu determine that value? What is it in the segment that identifies the segment as a SYNACK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

Sequence number is 0, Acknowledgement number is 1. It is determined by incrementing sequence number send by client by one. We can see Acknowledgement flag and syn flag are set to 1.



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

Sequence number of the TCP segment containing the HTTP POST command is 1.

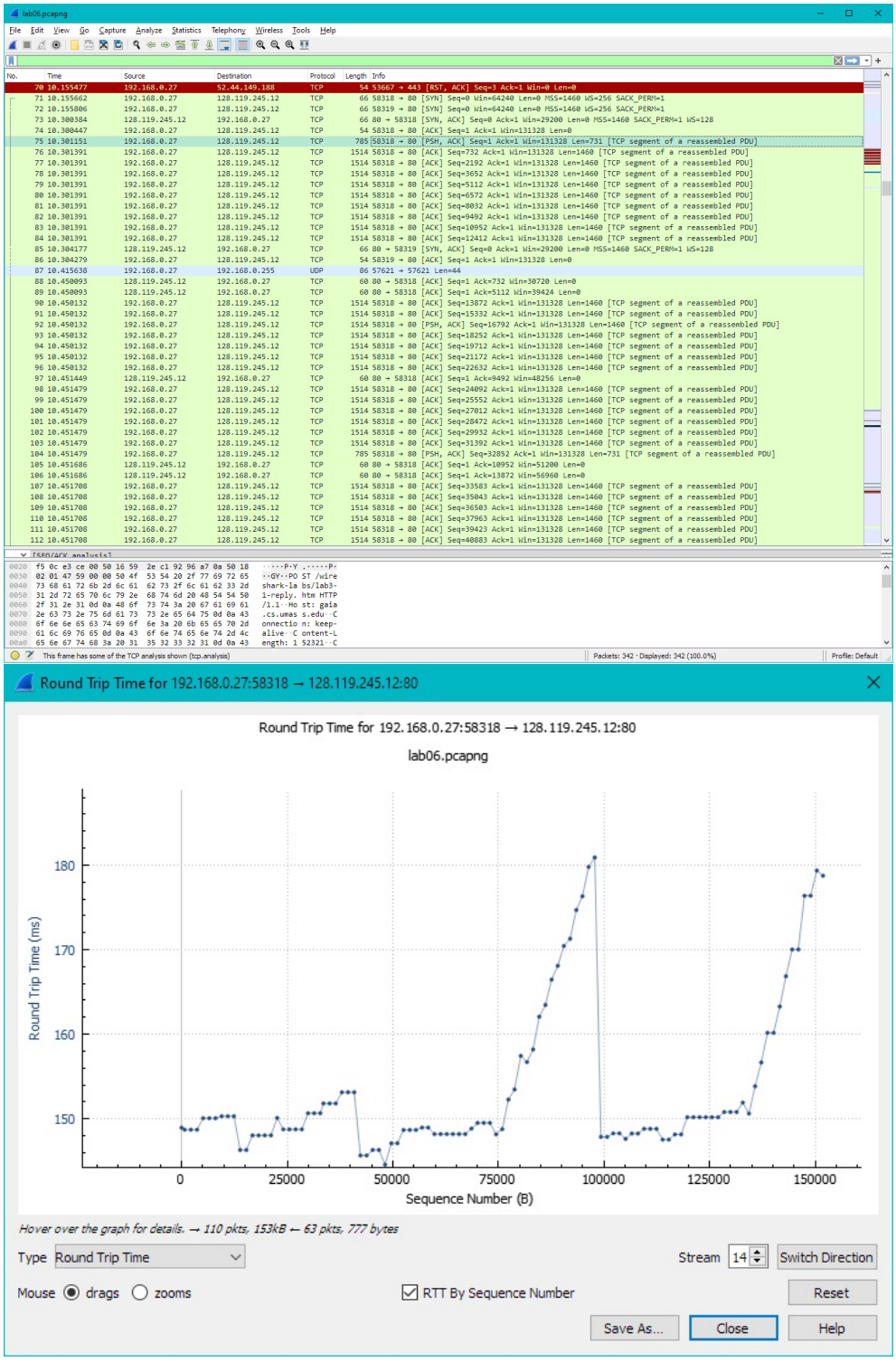


7. What are the sequence numbers of the first six segments in the TCP connection? At what time was each segment sent? When was the ACK for each segment received? Given the difference between when each TCP segment was sent, and when its acknowledgement was received, what is the RTT value for each of the six segments? What is the EstimatedRTT value after the receipt of each ACK?

In the below tables you can see our calculated values. One weird situation we encountered is that our send TCP's are send at the same time as well as most ACK TCP's are received at the same time. Also the whole process is done way quicker than the shared example documents. We chose to provide calculations and data on our test even tho it is weird numbers however we also examined the TA's test results for better understanding of the subject.

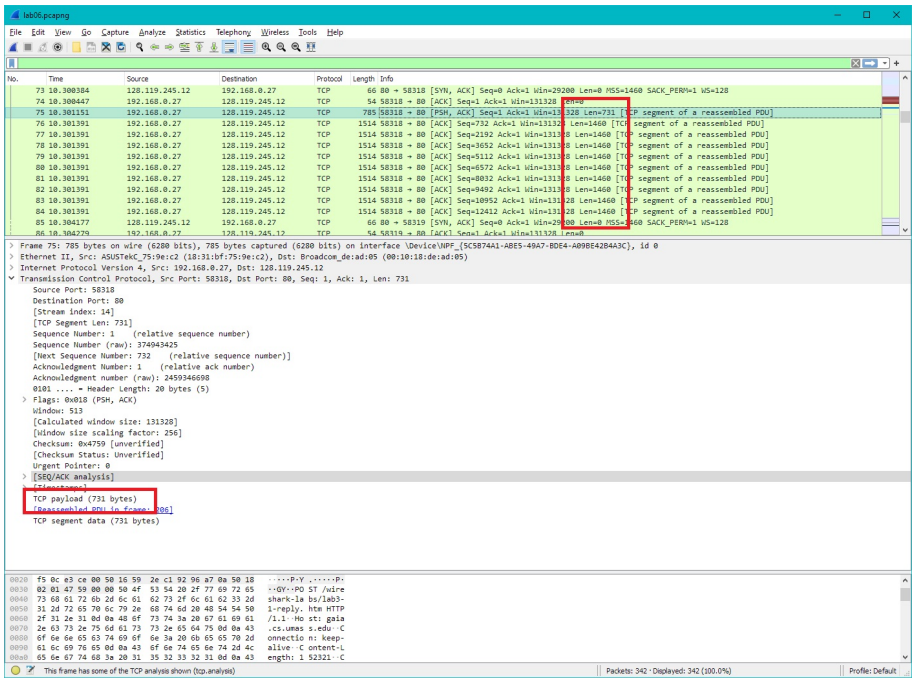
Segment	Sequence Number	Sent Time	ACK Received Time	RTT (seconds)
1	1	10.301151	10.450093	0.148942
2	732	10.301391	10.450093	0.148702
3	2192	10.301391	10.450093	0.148702
4	3652	10.301391	10.450093	0.148702
5	5112	10.301391	10.450093	0.148702
6	6572	10.301391	10.450132	0.148741

Segment	Sequence Number	Estimated RTT
1	1	First EstimatedRTT = Segment 1 RTT = 0.148942
2	732	0.875 * 0.148942 + 0.125 * 0.148702 = 0.148912
3	2192	0.875 * 0.148912 + 0.125 * 0.148702 = 0.14888575
4	3652	0.875 * 0.14888575 + 0.125 * 0.148702 = 0.14886278125
5	5112	0.875 * 0.14886278125 + 0.125 * 0.148702 = 0.148842683594
6	6572	0.875 * 0.148842683594 + 0.125 * 0.148741 = 0.148829973145



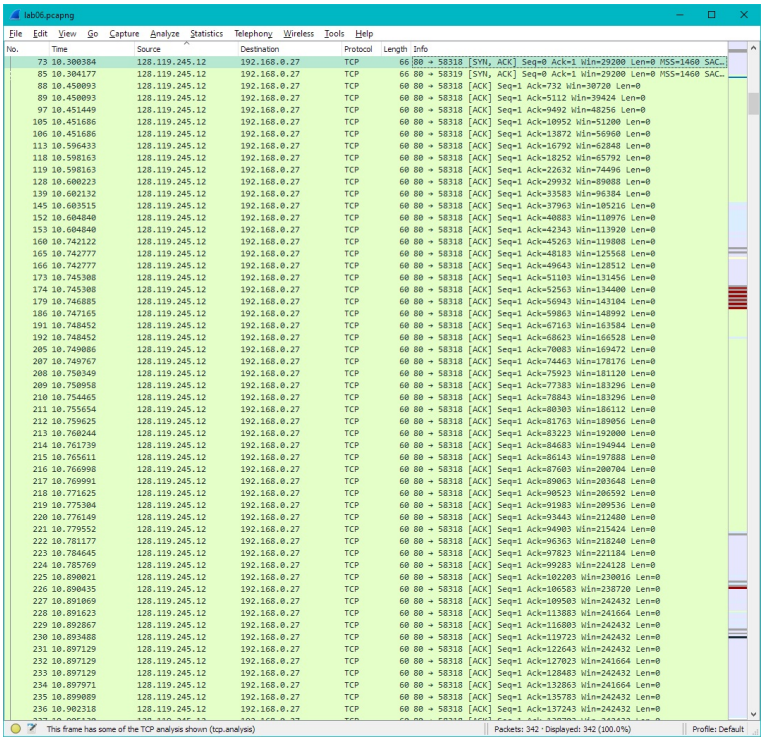
8. What is the length of each of the first six TCP segments?

As we can see in the screenshot, the first one which contains POST message is 731 bytes, other segments has 1460 bytes lengths.



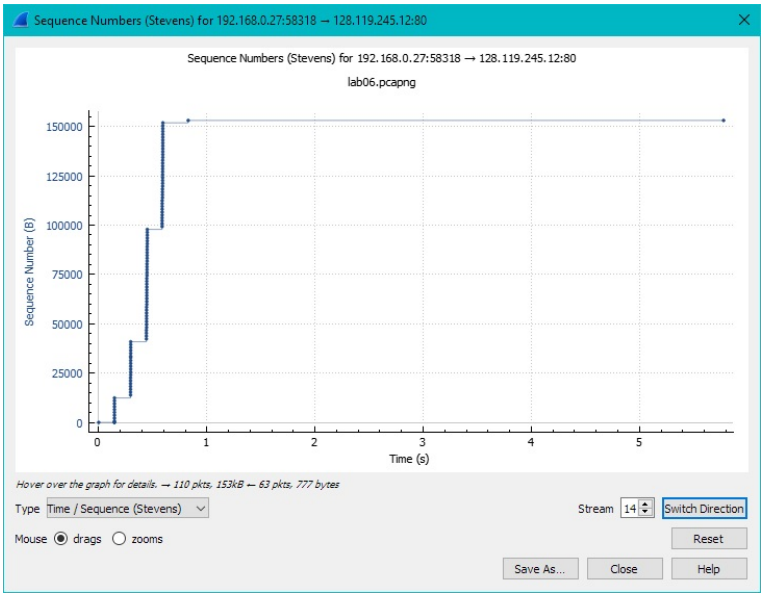
9. What is the minimum amount of available buffer space (receiver window) advertised at the received for the entire trace? Does the lack of receiver buffer space ever throttle the sender? If any, justify your reason

Our buffer space starts from 29200 and grows until 242432 which seems to be the max. There is not a lack of receiver buffer ever.



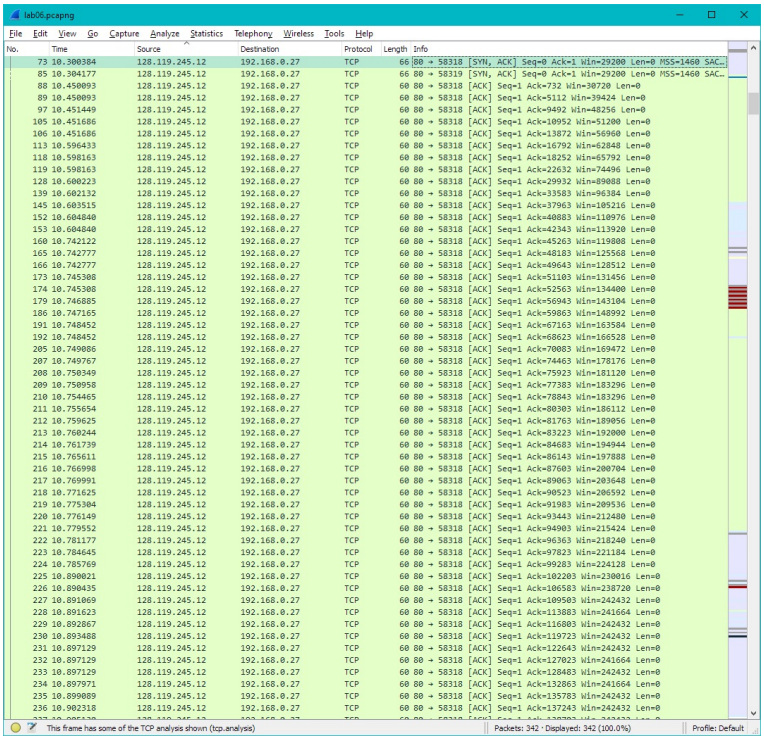
10. Are there any re-transmitted segments in the trace file? What did you check for (in the trace) in order to answer this question?

Check below screen shot for our time sequence graph (stevens). Since all sequence numbers are monotonically increasing there is no re-transmitted segments in the trace file.



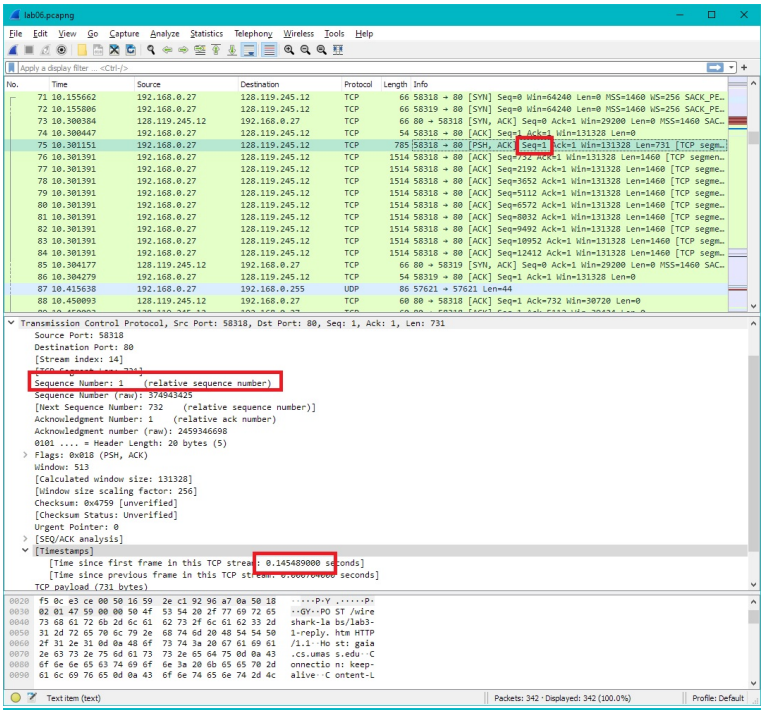
11. How much data does the receiver typically acknowledge in an ACK? Can you identify cases where the receiver is ACKing every other received segment (see Table 3.2 on page 247 in the text)?

Typically it acknowledges 4380 which is triple send data. Meaning it acknowledges in triplets. However there are rare cases where it acknowledges more than that or sometimes less.



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

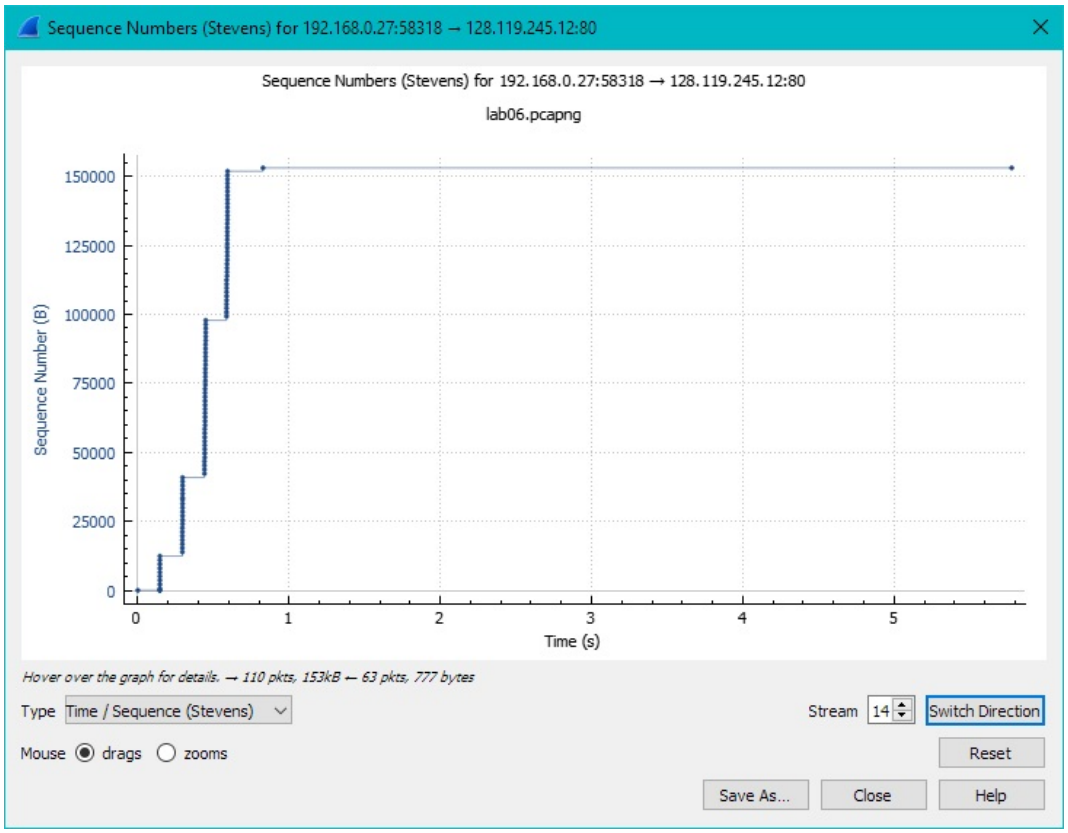
We get the size of the data of TCP connection by subtracting first segment's sequence from the last ACK's number. Last ACK's number is 153053 and first segment's sequence number is 1. So our total data throughput is 153053-1 = 153052. We get the total time of the connection similarly looking at the time instant of the first segment and last ACK and subtracting them. Last ACK's time instant is 0.772167 second and first segment's time instant is 0.145489 seconds. So total time of connection is 0.772167-0.145489 = 0.626678. Dividing the total amount of data to total transmission time 153052 / 0.626678 = 244227.498013, we get 244.23 KByte/sec.



TCP congestion control in action

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 slowstart 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.

We identify slow start by looking at the screenshot below as starting at 0.14 and lasting until 0.3 which takes around 0.15 seconds. After that rate increases greatly until congestion avoidance which seems to be around 0.58 because we observe that the data sent is cut down. This is similar to idealized behaviour we studied.



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.

We put screenshots for all the questions and all of them are from our test results.

REFERENCES

LaTex Tutorials
Assignment Paper
Wireshark FAQ
Wireshark User's Guide
Finding Throughput With Wireshark