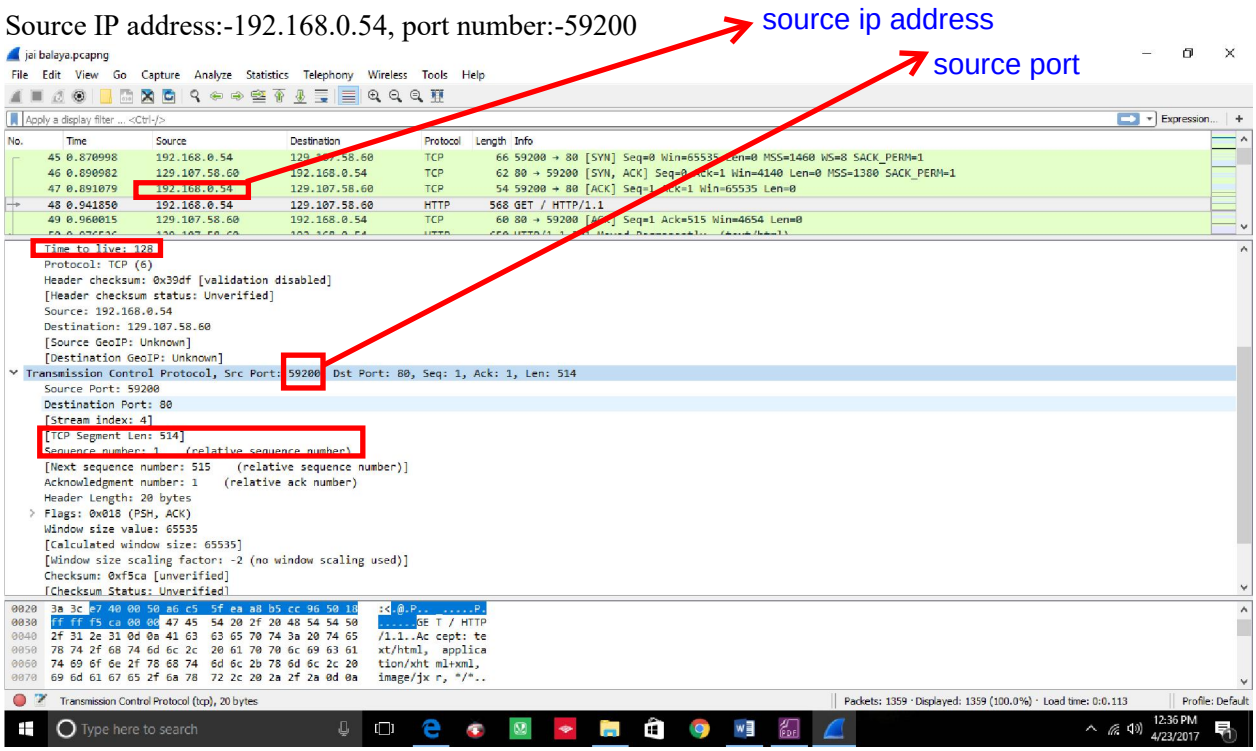
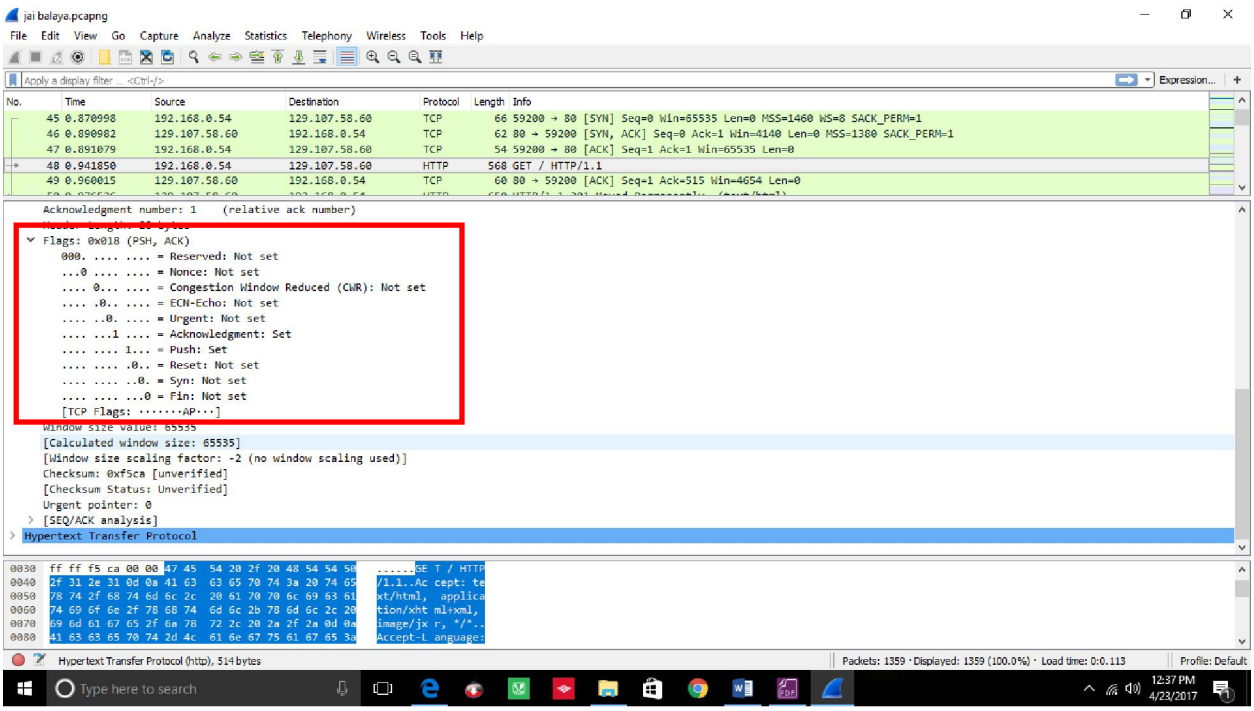
Naga Sri Rama Yashwanth Thota

Problem set-1

1. Source IP address:-192.168.0.54, port number:-59200

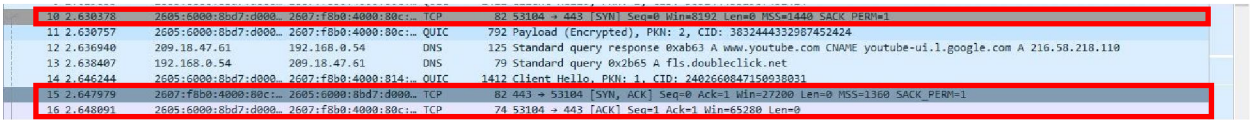



2. 128
3. IPv4
4. No information is present.
5. No, the packet is not fragmented.
6. TCP segment length: 514
7. Sequence number:1
8. Acknowledgement number:515
9. Reserved, Nonce, Congestion Window Reduced(CWR), ECN-Echo, Urgent, Acknowledgement, Push, Reset, Syn, Fin.



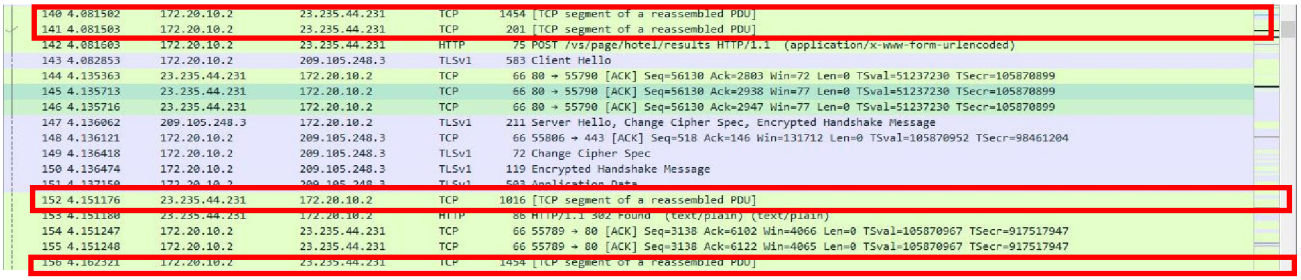

10. Destination IP address:- 129.107.58.60 destination port number:-80

Problem set-2




1. The sequence number is 0.
2. the SYN flag for this segment has been set to 1, implying that this segment is a SYN segment.
3. The sequence number is 0, Acknowledgement number is 1.
4. The SYNACK packet is acknowledging the previously received SYN packet with the sequence number 0 and since this SYN segment does not contain any data, the TCP receiver on the web server simply increments this value by 1 and copies it to the acknowledgement field. The server is thus indicating to the client that the next segment, which it expects from the client, should contain the sequence number 1. The ACK flag is set to 1 indicating that this is an ACK segment.

Problem set-3




1. 1415
2. i) sequence number of packet 1: 1415

sequence number of packet 2: 2803
sequence number of packet 3: 5152
sequence number of packet 4: 3138.

ii) Time for the packet 1: 4.081502
Time for the packet 2: 4.081503
Time for the packet 3: 4.151176
Time for the packet 4: 4.162321.

iii) Acknowledge time for packet 1: 4.135363
Acknowledge time for packet 2: 4.135713
Acknowledge time for packet 3: 4.151247
Acknowledge time for packet 4: 4.210628.

iv) 0.053861, 0.54210, 0.00071, 0.048307.

v) RTT of packet 1: 0.053861
RTT of packet 2: 0.054210
RTT of packet 3: 0.000071
RTT of packet 4: 0.048307.

vi) EstimatedRTT = 0.875 * EstimatedRTT + 0.125 * SampleRTT

vii) Estimated RTT of packet 1: 0.053861
Estimated RTT of packet 2: 0.17212838
Estimated RTT of packet 3: 0.27561233
Estimated RTT of packet 4: 0.36616079

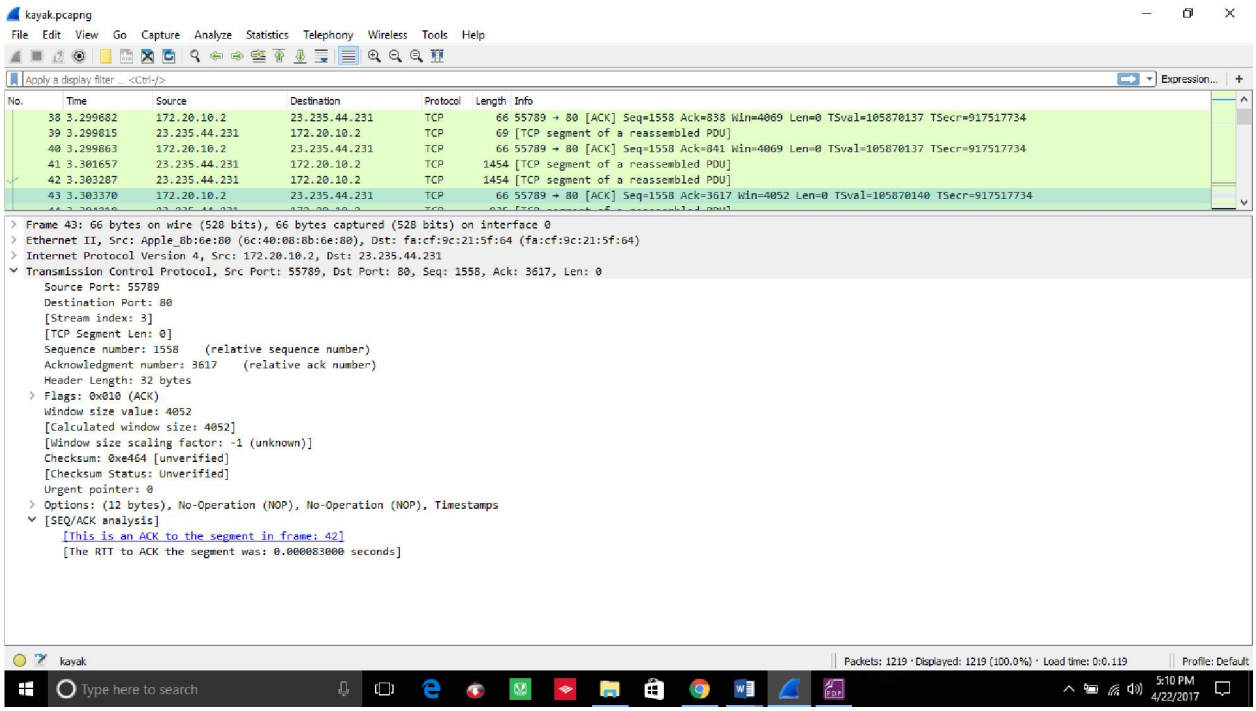
3. the length of the segment 1 is: 1388 bytes.
the length of the segment 2 is: 135 bytes.
the length of the segment 3 is: 950 bytes.
the length of the segment 4 is: 1388 bytes.

4. The minimum amount of available buffer space advertised at the received is 72 bytes.
1) the amount of available buffer space advertised by packet 1 is: 72 bytes.
2) the amount of available buffer space advertised by packet 2 is: 77 bytes.
3) the amount of available buffer space advertised by packet 3 is: 4066 bytes.
4) the amount of available buffer space advertised by packet 4 is: 96 bytes.

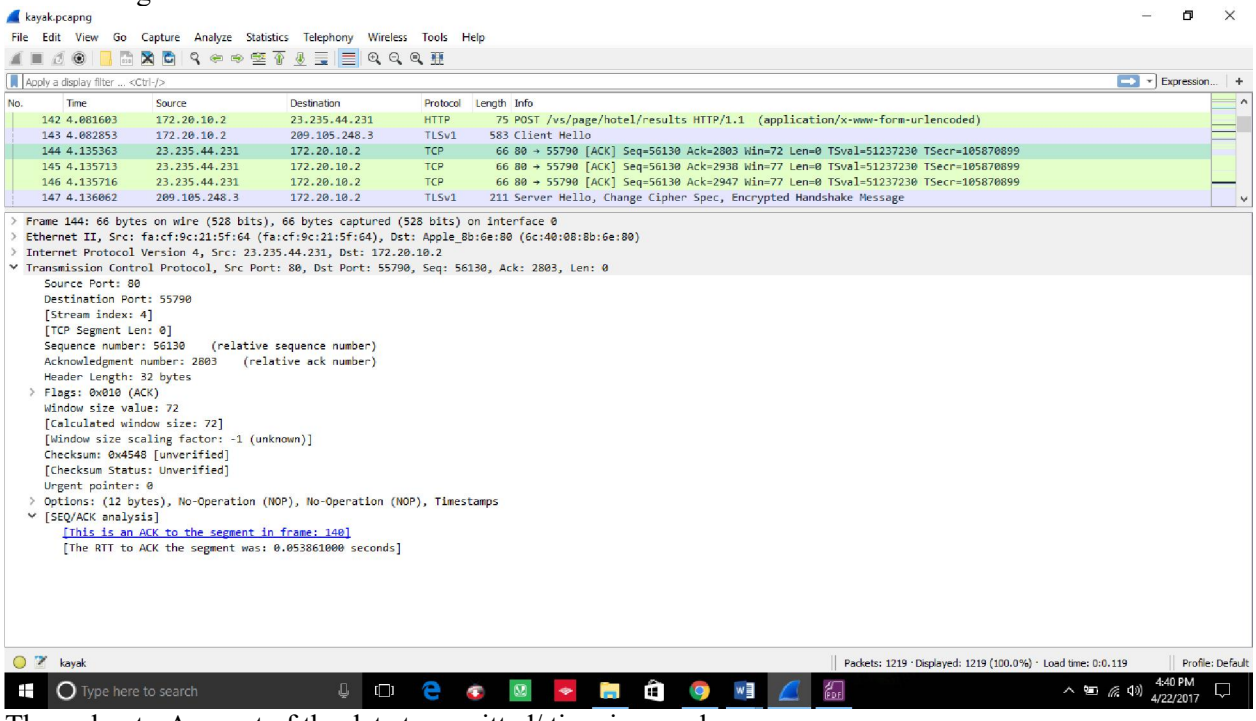
5. The sender is never throttled due to lacking of receiver buffer space by inspecting this trace.

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

7. The difference between the acknowledged sequence numbers of two consecutive ACKs indicates the data received by the server between these two ACKs. For example the difference between 841-838 = 3 and 3617-838 = 2779.




The packet number 144, 145 and 146 contains cases where the receiver is ACK-ing every other received segment.




8. Throughput= Amount of the data transmitted/ time incurred.
9. Time incurred = 3.180420-3.005854=0.174566
   Amount of data sent = 1388 bytes
   Throughput = 1388/0.174566 = 7951.14742 kbytes/sec.

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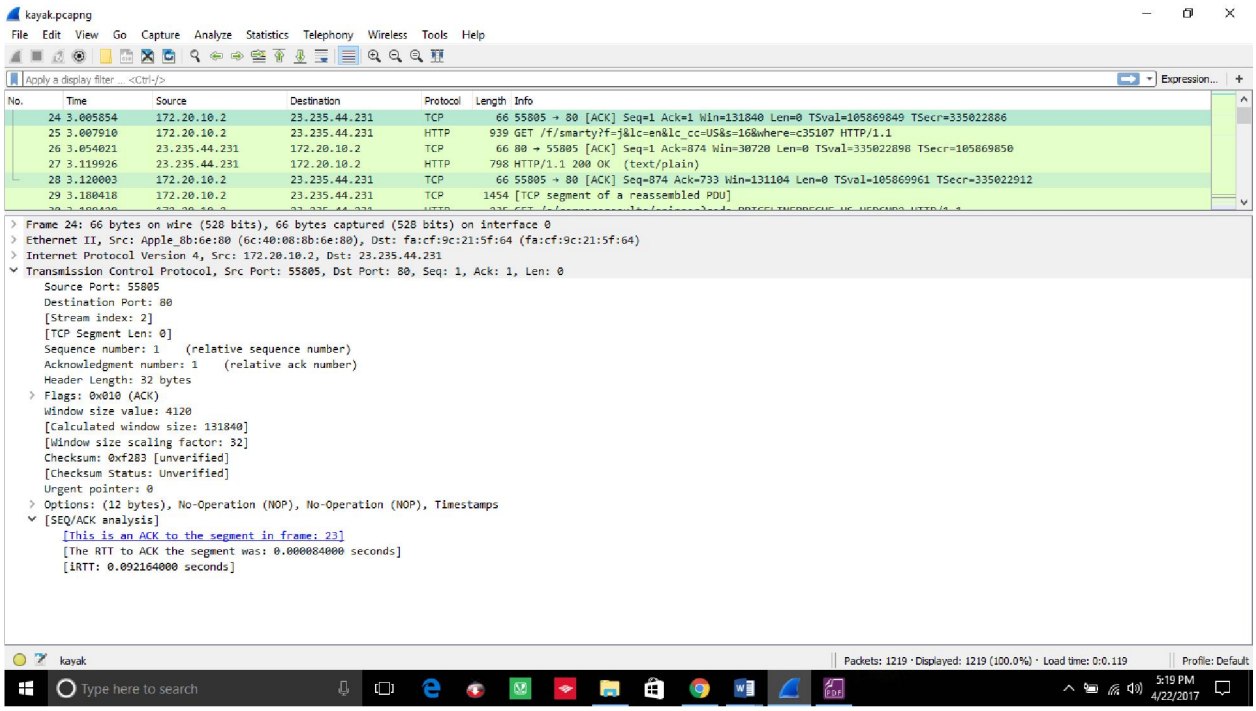


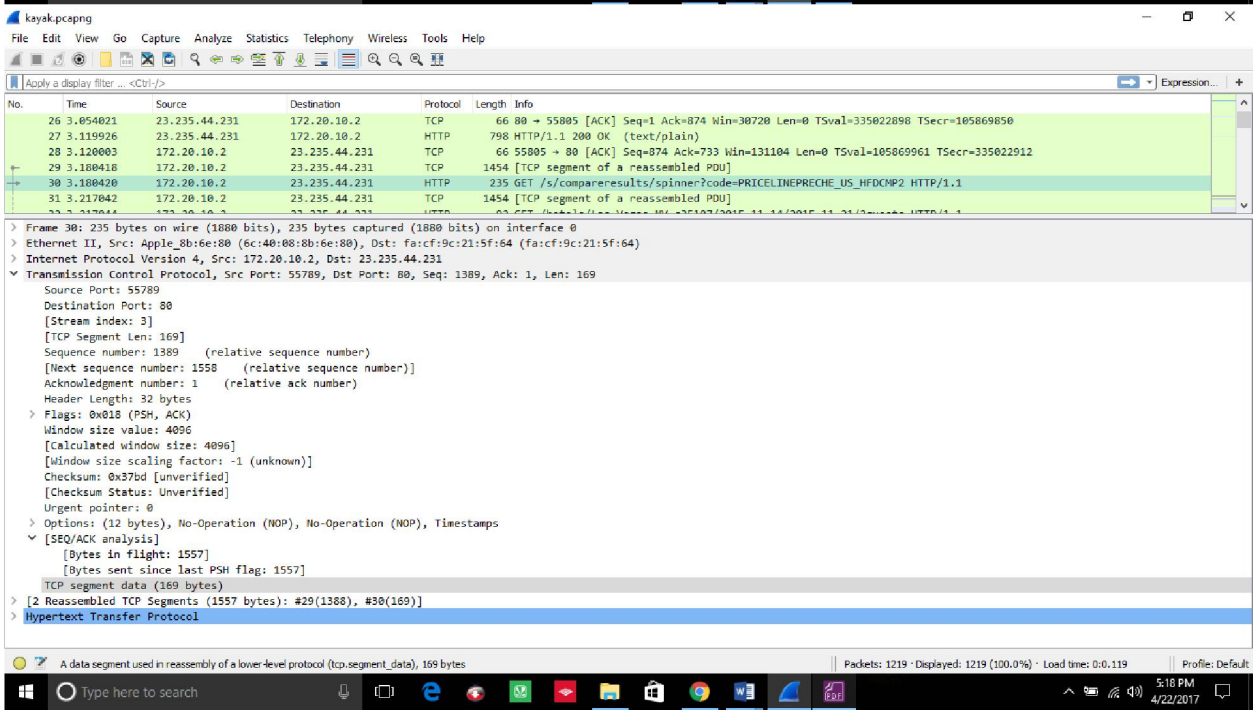

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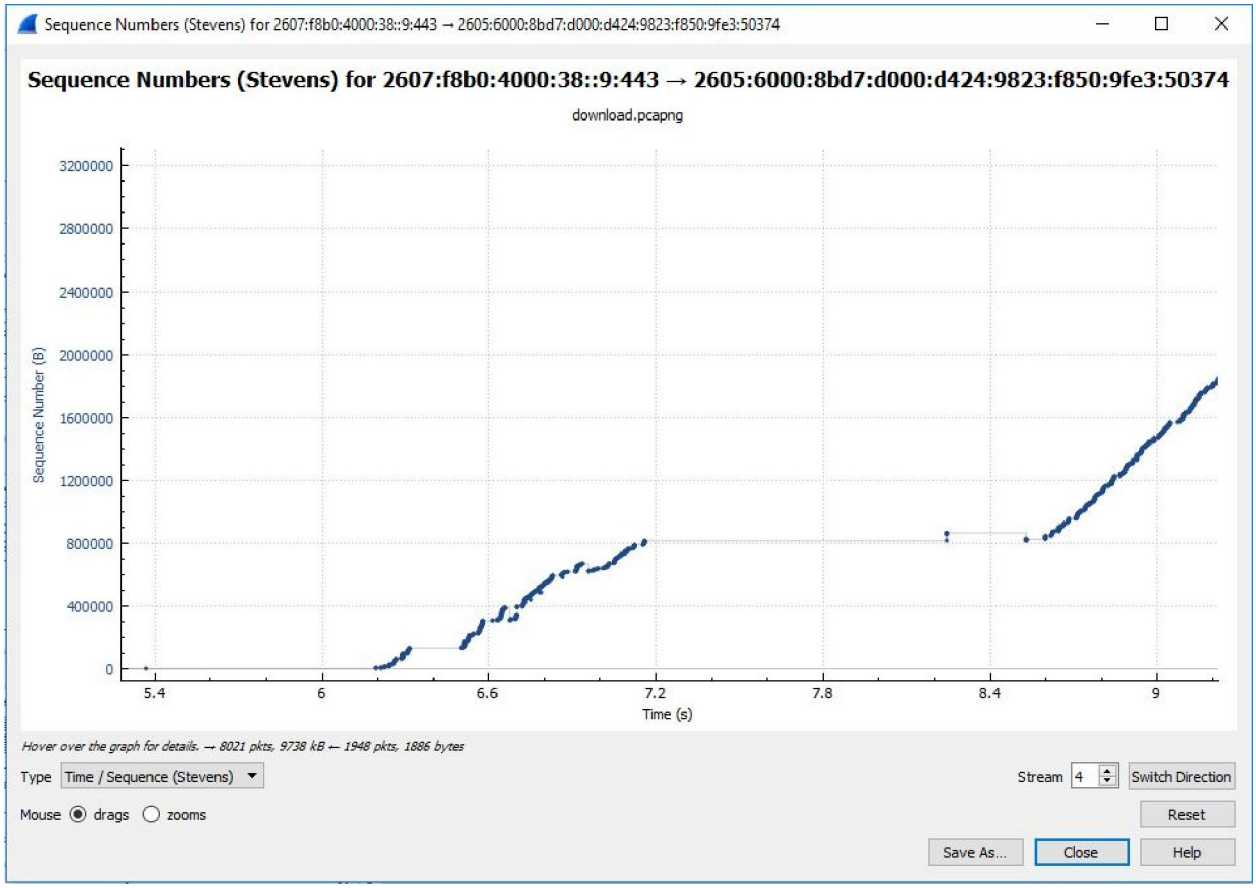
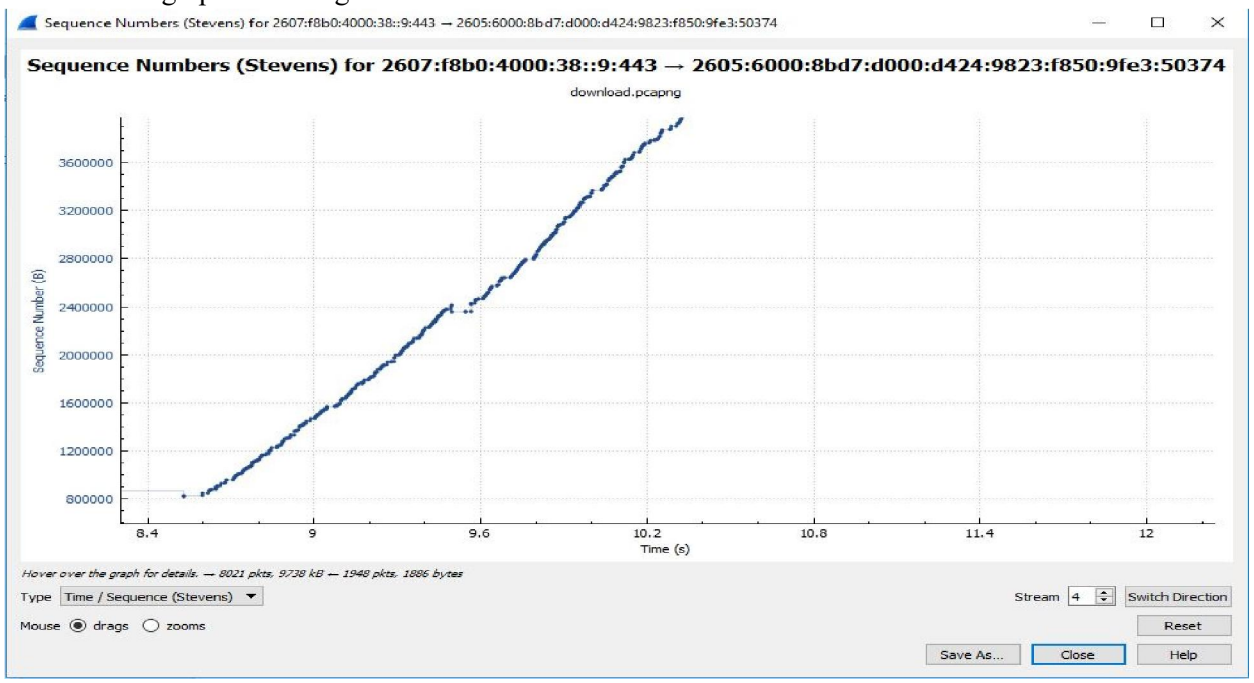
Problem set-4

1. The slow start start at 5.38 and ends at 8.6.




2. After 8.6 the graph is in congestion avoidance state.



3. According to the behavior of TCP the transmission window should increase linearly but in the graph the TCP transmit window does not grow linearly during this phase. In fact, it appears that the sender transmits packets in uneven batches with different number of packets each time.