Exercise 1

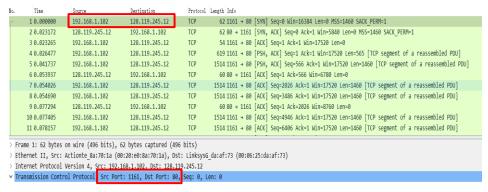
Question 1:

1) the IP address of gaia.cs.umass.edu is: 128.119.245.12

port number: 80

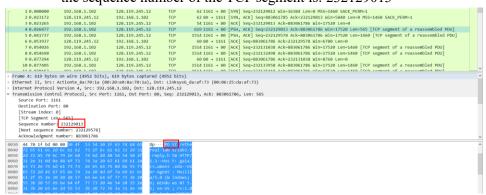
2) the IP address of client computer is: 192.168.1.102

port number: 1161



Question 2:

the sequence number of the TCP segment is: 232129013



Question 3:

NO.	Seg1	Seg2	Seg3	Seg4	Seg5	Seg6	
Sequence	232129013	232129578	232131038	232132498	232133958	232135418	
Number							
Time	0.026477	0.041737	0.054026	0.054690	0.077405	0.078157	
sent	sec	sec	sec	sec	sec	sec	
Time ACK	0.053937	0.077294	0.124085	0.169118	0.217299	0.267802	
received	sec	sec	sec	sec	sec	sec	
Sample	0.02746	0.035557	0.070059	0.11443	0.13989	0.18964	
RTT	sec	sec	sec	sec	sec	sec	
Estimated	0.02746	0.028472	0.03367	0.043765	0.055781	0.072514	
RTT	sec	sec	sec	sec	sec	sec	

Question 4:

Seg 1 = 565 bytes

Seg 2 = 1460 bytes

Seg 3 = 1460 bytes

Seg 4 = 1460 bytes

Seg 5 = 1460 bytes

Seg 6 = 1460 bytes

Question 5:

1) Min buffer: 5840 bytes

2) No, it doesn't throttle the sender.

Question 6:

There is no retransmitted segment in the trace file.

As all sequence numbers of the TCP segments are increasing with the time. If there is a retransmitted segment, the sequence number will be smaller than previous segments sequence number.

Question 7:

the receiver typically acknowledges 565, 1460, 892 bytes of data in an ACK

30 0.57667	1 192.168.1.	102 128.1	19.245.12	TCP	1514 1161 → 80	[ACK] Seq=232146	217 Ack=88306178	36 Win=1752	Len=1460 [TO	P segment	of a reassembled
31 0.57738	5 192.168.1.	102 128.1	19.245.12	TCP	1514 1161 → 80	[ACK] Seq=232147	677 Ack=88306178	36 Win=1752	Len=1460 [TO	P segment	of a reassembled
32 0.578329	9 192.168.1.	102 128.1	19.245.12	TCP	1514 1161 → 80	[ACK] Seq=232149	137 Ack=88306178	36 Win=1752	Len=1460 [TO	P segment	of a reassembled
33 0.57919	5 192.168.1.	102 128.1	19.245.12	TCP	1514 1161 → 80	[ACK] Seq=232150	597 Ack=88306178	36 Win=1752	Len=1460 [<mark>T</mark> C	P segment	of a reassembled
34 0.580149	9 192.168.1.	102 128.1	19.245.12	TCP	1514 1161 → 80	[ACK] Seq=232152	057 Ack=88306178	36 Win=1752	Len=1460 [TO	P segment	of a reassembled
0.026477	192.168.1.102	128.119.245.12	TCP	619 1161 → 80	[PSH, ACK] Seq=232129	9013 Ack=883061786 Wi	n=17520 Len=565 [To	CP segment of	a reassembled PD	U]	
0.041737	192.168.1.102	128.119.245.12	TCP	1514 1161 → 80	[PSH, ACK] Seq=232129	9578 Ack=883061786 Wi	n=17520 Len=1460 [1	TCP segment of	a reassembled P	DU]	
33 0.5/9195	192,108,1,102	128.119.245.12	ILP	1214 1101 4 88) ACK Seq=232130397	BUKENSAMPIAND WITHILA	570 I DD = 17 W I I I V	poment of a re	auccomnian pini		
34 0.580149	192.168.1.102	128.119.245.12	TCP		ACK] Seq=232152057						
35 0.581074	192.168.1.102	128.119.245.12	TCP		PSH, ACK] Seq=23215			CP segment of	a reassembled PD	וטס	
36 0.626496	128.119.245.12	192.168.1.102	TCP	60 80 → 1161	[ACK] Seq=883061786	Ack=232147677 Win=40	880 Len=0				
			w.co		F						

Question 8:

Total data transmitted

= acknowledgement seq number of last seg – seq number of first segment

= 232,293,103 - 232,129,013 bytes

=164,090 bytes

Transmission time = 5.455830 - 0.026477 = 5.429353 sec

Throughput = 164,090 bytes / 5.429353 sec = 30223 bps

Exercise 2

Question 1:

The sequence number of the TCP SYN segment is: 2818463618.

Question 2:

- 1) the sequence Number of SYNACK Segment: 1247095790.
- 2) The value is: 2818463619.
- 3) The server adds 1 on the initial serial number sent by the client.

Question 3:

- 1) The sequence number is: 2818463619.
- 2) The value is: 1247095791.
- 3) This segment contains 2818463652-2818463619=33bytes data.

Question 4:

It is the simultaneous close. Both client and server did the active close. From no. 304 & 305 the seq and ack did not increase.

Question 5:

Client to server:

Data = 2818463653 (ISN) - 2818463618 (Final ACK) - 1(SYN) - 1(FIN) = 33 Bytes Server to client:

Data = 1247095832 (ISN) - 1247095790 (Final ACK) - 1(SYN) - 1(FIN) = 40 Bytes