

ECE361 – Computer Networks

Wireshark Lab 3: TCP

First Name: Tianyi (Nora) Last Name: Xu

First Name: Yanyi (Will) Last Name: Zhang

Group Details:

Student #: 1003130809

Student #: 1003327517

Mark:

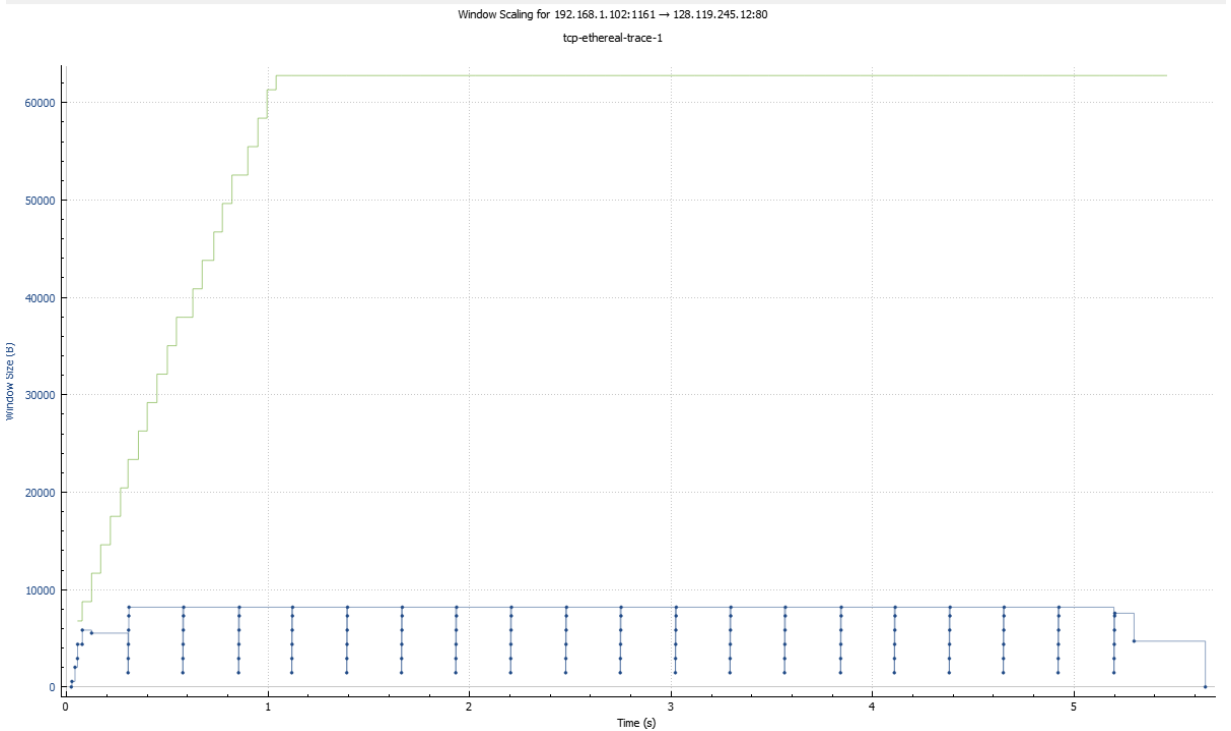
	Question	Answer																																																																								
1	What is the IP address and TCP port number used by the client computer (source) that is transferring the file to gaia.cs.umass.edu?	IP address: 192.168.1.102 Port number: 1161																																																																								
<table><tr><th>Source</th><th>Destination</th><th>Protocol</th><th>Length</th><th>Info</th></tr><tr><td>192.168.1.102</td><td>128.119.245.12</td><td>TCP</td><td>62</td><td>1161 → 80 [SYN] Seq=0 Win=16384 Len=0 MSS=1460 SACK_PERM=1</td></tr><tr><td>128.119.245.12</td><td>192.168.1.102</td><td>TCP</td><td>62</td><td>80 → 1161 [SYN, ACK] Seq=0 Ack=1 Win=5840 Len=0 MSS=1460 SACK_PERM=1</td></tr><tr><td>192.168.1.102</td><td>128.119.245.12</td><td>TCP</td><td>54</td><td>1161 → 80 [ACK] Seq=1 Ack=1 Win=17520 Len=0</td></tr><tr><td>192.168.1.102</td><td>128.119.245.12</td><td>TCP</td><td>62</td><td>1161 → 80 [ACK] Seq=1 Ack=1 Win=17520 Len=0 MSS=1460 SACK_PERM=1</td></tr></table>			Source	Destination	Protocol	Length	Info	192.168.1.102	128.119.245.12	TCP	62	1161 → 80 [SYN] Seq=0 Win=16384 Len=0 MSS=1460 SACK_PERM=1	128.119.245.12	192.168.1.102	TCP	62	80 → 1161 [SYN, ACK] Seq=0 Ack=1 Win=5840 Len=0 MSS=1460 SACK_PERM=1	192.168.1.102	128.119.245.12	TCP	54	1161 → 80 [ACK] Seq=1 Ack=1 Win=17520 Len=0	192.168.1.102	128.119.245.12	TCP	62	1161 → 80 [ACK] Seq=1 Ack=1 Win=17520 Len=0 MSS=1460 SACK_PERM=1																																															
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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 address: 128.119.245.12 Port number: 80																																																																								
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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?	IP address: 192.168.0.15 Port number: 63744																																																																								
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4	<p>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?</p>	<p>Sequence number: 232129012 SYN Flag is set to 1.</p>
<pre> [TCP segment Len: 0] Sequence Number: 0 (relative sequence number) Sequence Number (raw): 232129012 [Next Sequence Number: 1 (relative sequence number)] Acknowledgment Number: 0 Acknowledgment number (raw): 0 0111 = Header Length: 28 bytes (7) > Flags: 0x002 (SYN) Window: 16384 </pre>		
5	<p>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 identified the segment as a SYNACK segment?</p>	<p>Sequence number: 883061785 ACKnowledgement field: 232129013 Gaia.cs.umass.edu determined ACKnowledgement field by taking the sequence number of the SYN packet of the sender and adding 1 to it. It is identified as a SYNACK segment because the SYN and ACK flags are set to 1 in the Flags field (Flags = 0x012)</p>
<pre> [TCP segment Len: 0] Sequence Number: 0 (relative sequence number) Sequence Number (raw): 883061785 [Next Sequence Number: 1 (relative sequence number)] Acknowledgment Number: 1 (relative ack number) Acknowledgment number (raw): 232129013 0111 = Header Length: 28 bytes (7) > Flags: 0x012 (SYN, ACK) Window: 5840 </pre>		

6	What is the sequence number of the TCP segment containing the HTTP POST command?	Sequence number: 232129013
<p>[TCP Segment Len: 565]</p> <p>Sequence Number: 1 (relative sequence number)</p> <p>Sequence Number (raw): 232129013</p> <p>[Next Sequence Number: 566 (relative sequence number)]</p> <p>Acknowledgment Number: 1 (relative ack number)</p> <p>Acknowledgment number (raw): 883061786</p> <pre> 030 44 70 1f bd 00 00 50 4f 53 54 20 2f 65 74 68 65 Dp...PO ST /ethe 040 72 65 61 6c 2d 6c 61 62 73 2f 6c 61 62 33 2d 31 real-lab s/lab3-1 050 2d 72 65 70 6c 79 2e 68 74 6d 20 48 54 54 50 2f -reply.htm HTTP/ 060 31 2e 31 0d 0a 48 6f 73 74 3a 20 67 61 69 61 2e 1.1..Host: gaia. 070 63 73 2e 75 6d 61 73 73 2e 65 64 75 0d 0a 55 73 cs.umass .edu..Us 080 65 72 2d 41 67 65 6e 74 3a 20 4d 6f 7a 69 6c 6c er-Agent : Mozill 090 61 2f 35 2e 30 20 28 57 69 6e 64 6f 77 73 3b 20 a/5.0 (Windows; 0a0 55 3b 20 57 69 6e 64 6f 77 73 20 4e 54 20 35 2e U; Windo ws NT 5. 0b0 31 3b 20 65 6e 2d 55 53 3b 20 72 76 3a 31 2e 30 1; en-US ; rv:1.0 0c0 31 3b 20 65 6e 2d 55 53 3b 20 72 76 3a 31 2e 30 1; en-US ; rv:1.0 </pre>		
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 after the receipt of each ACK?	<p>sequence numbers of the first six segments:</p> <p>232129013, 232129578, 232131038, 232132498, 232133958, 232135418</p> <p>Time that each segment sent: 0.026477, 0.041737, 0.054026, 0.054690, 0.077405, 0.078157</p> <p>Time that ACK for each segment was received: 0.053937, 0.077294, 0.124085, 0.169118, 0.217299, 0.267802</p> <p>RTT value for each of the six segments: 0.02746s, 0.035557s, 0.070059s, 0.114428s, 0.139894s, 0.189645s</p>

		<p>EstimatedRTT value after the receipt of each ACK:</p> <p>0.02746s, 0.02847s, 0.03367s</p> <p>0.04376s, 0.05578s, 0.07251s</p> <p>(Note: this is calculated by using EstimatedRTT = (1-a)*EstimatedRTT + a*SampleRTT, where a=0.125)</p>																																																																																											
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9	What is the minimum amount of available buffer space advertised at the receiver for the entire trace? Does the lack of receiver buffer space ever throttle the sender?	<p>The minimum window size is 6780 bytes.</p> <p>No, the lack of receiver buffer space never throttles the sender.</p>																																																																																											

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11	0.078157	192.168.1.102	128.119.245.12	TCP	1514 1161 → 80 [ACK] Seq=6406 Ack=1 Win=17520 Len=1460 [T
12	0.124085	128.119.245.12	192.168.1.102	TCP	60 80 → 1161 [ACK] Seq=1 Ack=3486 Win=11680 Len=0
13	0.124185	192.168.1.102	128.119.245.12	TCP	1201 1161 → 80 [PSH, ACK] Seq=7866 Ack=1 Win=17520 Len=114

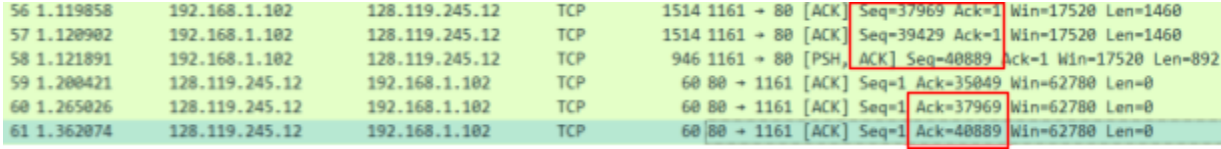


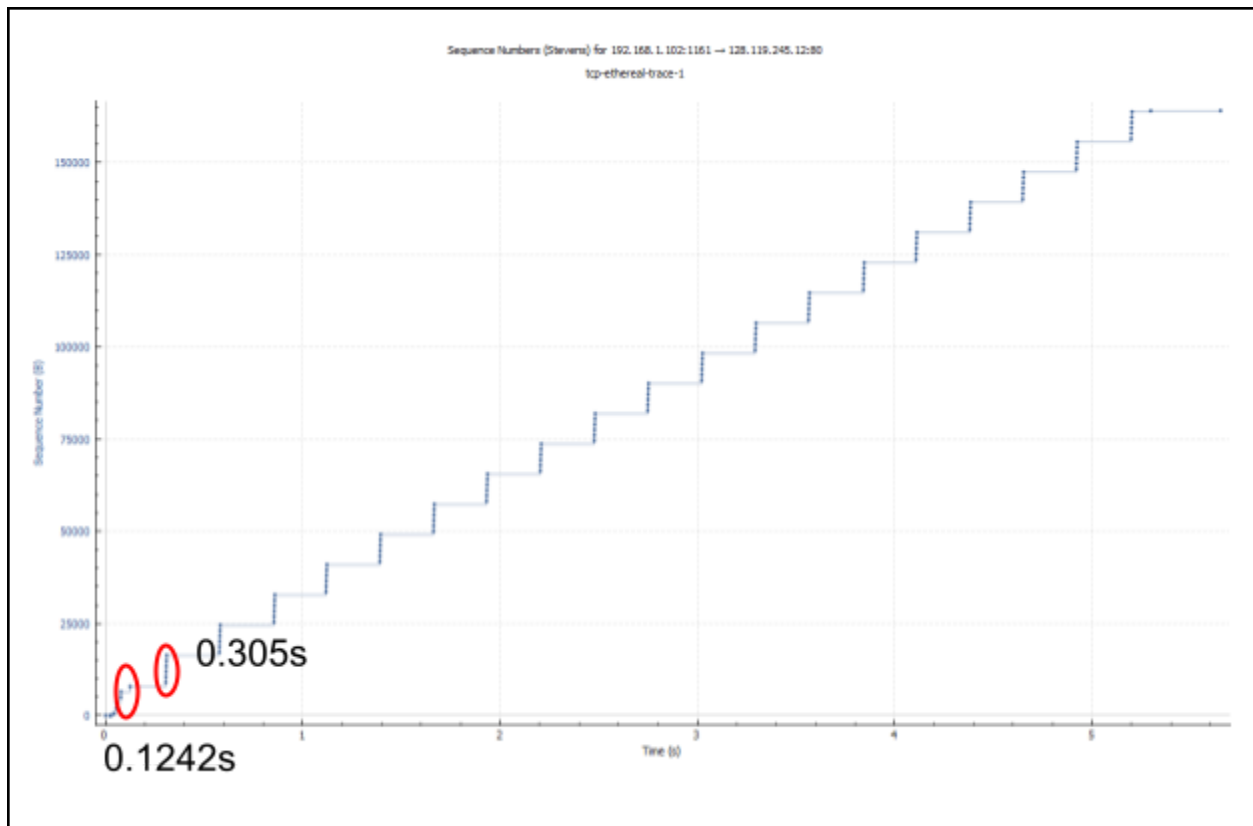
10

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

No. I checked if there are any packets with the same sequence number.

4	0.026477	192.168.1.102	128.119.245.12	TCP	619 1161 → 80 [PSH, ACK] Seq=1 Ack=1 Win=17520 Len=565
5	0.041737	192.168.1.102	128.119.245.12	TCP	1514 1161 → 80 [PSH, ACK] Seq=566 Ack=1 Win=17520 Len=1460
6	0.053937	128.119.245.12	192.168.1.102	TCP	60 80 → 1161 [ACK] Seq=1 Ack=566 Win=6780 Len=0
7	0.054026	192.168.1.102	128.119.245.12	TCP	1514 1161 → 80 [ACK] Seq=2026 Ack=1 Win=17520 Len=1460
8	0.054690	192.168.1.102	128.119.245.12	TCP	1514 1161 → 80 [ACK] Seq=3486 Ack=1 Win=17520 Len=1460
9	0.077294	128.119.245.12	192.168.1.102	TCP	60 80 → 1161 [ACK] Seq=1 Ack=2026 Win=8760 Len=0
10	0.077405	192.168.1.102	128.119.245.12	TCP	1514 1161 → 80 [ACK] Seq=4946 Ack=1 Win=17520 Len=1460
11	0.078157	192.168.1.102	128.119.245.12	TCP	1514 1161 → 80 [ACK] Seq=6406 Ack=1 Win=17520 Len=1460
12	0.124085	128.119.245.12	192.168.1.102	TCP	60 80 → 1161 [ACK] Seq=1 Ack=3486 Win=11680 Len=0
13	0.124185	192.168.1.102	128.119.245.12	TCP	1201 1161 → 80 [PSH, ACK] Seq=7866 Ack=1 Win=17520 Len=1147
14	0.169118	128.119.245.12	192.168.1.102	TCP	60 80 → 1161 [ACK] Seq=1 Ack=4946 Win=14600 Len=0
15	0.217299	128.119.245.12	192.168.1.102	TCP	60 80 → 1161 [ACK] Seq=1 Ack=6406 Win=17520 Len=0
16	0.267802	128.119.245.12	192.168.1.102	TCP	60 80 → 1161 [ACK] Seq=1 Ack=7866 Win=20440 Len=0

11	<p>How much data does the receiver typically acknowledge in an ACK? Can you identify cases where the receiver is ACKing every other received segment?</p>	<p>The receiver typically acknowledges 1 packet which is 1460 bytes.</p> <p>Packet #61 acknowledges 2 packets (packet #56 and #57)</p>
		
12	<p>What is the throughput (bytes transferred per unit time) for the TCP connection? Explain how you calculate this value.</p>	<p>Throughput = size of file / duration for the TCP connection = (155648 bytes) / 5.202024s = (155648 * 8 bits) / 5.202024s = 239365 bits per second</p>
13	<p>Use the Time-Sequence-Graph 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 behaviour of TCP that we've studied in the text.</p>	<p>TCP slow-start begins at 0 and ends at around 0.1242s.</p> <p>Congestion avoidance starts at 0.305s.</p> <p>The slow start region and the congestion avoidance region are distinguished by identifying the exponential and the linear region.</p> <p>The observed behavior does not seem to be the idealized behavior of TCP in congestion avoidance mode. In the lecture, the congestion window size should increment linearly, however, it stays constant at 6 in the measured data. This is probably enforced by the http server.</p>



14

Answer each of the two questions above for the trace that you have gathered when you transferred a file from your computer to gaia.cs.umass.edu

TCP remains in slow start mode throughout the entire connection. The measured behaviour is similar to the idealized behavior of TCP in slow start mode.

