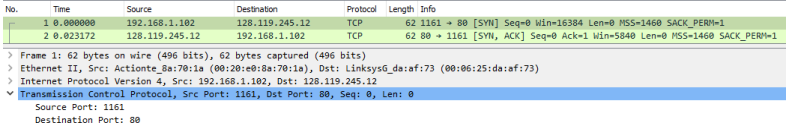
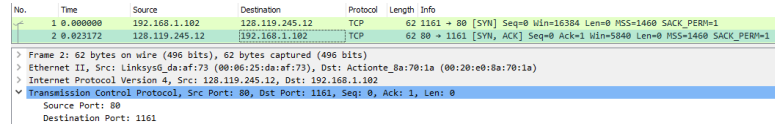
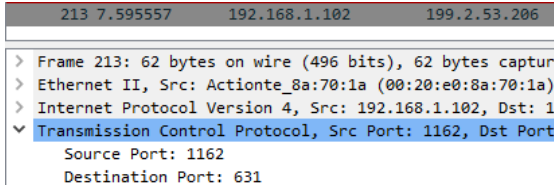
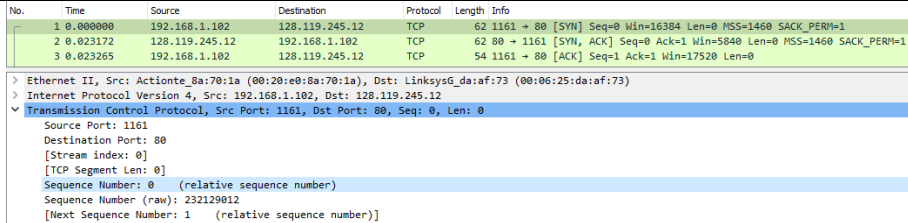


Wireshark Lab 3: TCP

Group 31 Details: Bikramjit Narwal (1005242300), Chao Glen Xu (1004274634)

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?	<p>IP: 192.168.1.102 Port: 1161</p> 
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?	<p>IP: 128.119.245.12 Port: 80</p> 
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?	<p>IP: 192.168.1.102 Port: 1162</p> 
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?	<div>▼ Flags: 0x002 (SYN)</div> <div>000. = Reserved: Not set ...0 = Nonce: Not set 0... = Congestion Window Reduced (CWR): Not set0.. = ECN-Echo: Not set0. = Urgent: Not set0 = Acknowledgment: Not set 0... = Push: Not set0.. = Reset: Not set >1. = Syn: Set</div> <div>Seq #: 0 The SYN flag is set to 1 as seen at the end of the 2nd screenshot.</div>																												
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?	<div>Seq #: 883061785 ACK #: 232129013 For the SYN-ACK packets, the seq # is set to the seq # of SYN-packet + 1. Both the SYN and the ACK flags are then set to 1.</div> <div><table><tr><th>No.</th><th>Time</th><th>Source</th><th>Destination</th><th>Protocol</th><th>Length</th><th>Info</th></tr><tr><td>1</td><td>0.000000</td><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>2</td><td>0.023172</td><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>3</td><td>0.023265</td><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></table><div>[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: 20 bytes (7) ▼ Flags: 0x012 (SYN, ACK) 000. = Reserved: Not set ...0 = Nonce: Not set 0... = Congestion Window Reduced (CWR): Not set0.. = ECN-Echo: Not set0. = Urgent: Not set1 = Acknowledgment: Set 0... = Push: Not set0.. = Reset: Not set >1. = Syn: Set0 = Fin: Not set [TCP Flags:A..S..]</div></div>	No.	Time	Source	Destination	Protocol	Length	Info	1	0.000000	192.168.1.102	128.119.245.12	TCP	62	1161 → 80 [SYN] Seq=0 Win=16384 Len=0 MSS=1460 SACK_PERM=1	2	0.023172	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	3	0.023265	192.168.1.102	128.119.245.12	TCP	54	1161 → 80 [ACK] Seq=1 Ack=1 Win=17520 Len=0
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3	0.023265	192.168.1.102	128.119.245.12	TCP	54	1161 → 80 [ACK] Seq=1 Ack=1 Win=17520 Len=0																								
6	What is the sequence number of the TCP segment containing the HTTP POST command?	<div>Seq #: 164041</div> <div><table><tr><th>No.</th><th>Time</th><th>Source</th><th>Destination</th><th>Protocol</th><th>Length</th><th>Info</th></tr><tr><td>199</td><td>5.297341</td><td>192.168.1.102</td><td>128.119.245.12</td><td>HTTP</td><td>104</td><td>POST /etherbase-labs/lab3-1-reply.htm HTTP/1.1 (text/plain)</td></tr><tr><td>203</td><td>5.461175</td><td>128.119.245.12</td><td>192.168.1.102</td><td>HTTP</td><td>784</td><td>HTTP/1.1 200 OK (text/html)</td></tr></table><div>> Frame 199: 104 bytes on wire (832 bits), 104 bytes captured (832 bits) > Ethernet II, Src: Actionte_8a:70:1a (00:20:e0:8a:70:1a), Dst: LinksysG_da:af:73 (00:06:25:da:af:73) > Internet Protocol Version 4, Src: 192.168.1.102, Dst: 128.119.245.12 ▼ Transmission Control Protocol, Src Port: 1161, Dst Port: 80, Seq: 164041, Ack: 1, Len: 50 Source Port: 1161 Destination Port: 80 [Stream index: 0] [TCP Segment Len: 50] Sequence Number: 164041 (relative sequence number) Sequence Number (raw): 232293053 [Next Sequence Number: 164091 (relative sequence number)] Acknowledgment Number: 1 (relative ack number) Acknowledgment number (raw): 883061786</div></div>	No.	Time	Source	Destination	Protocol	Length	Info	199	5.297341	192.168.1.102	128.119.245.12	HTTP	104	POST /etherbase-labs/lab3-1-reply.htm HTTP/1.1 (text/plain)	203	5.461175	128.119.245.12	192.168.1.102	HTTP	784	HTTP/1.1 200 OK (text/html)							
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203	5.461175	128.119.245.12	192.168.1.102	HTTP	784	HTTP/1.1 200 OK (text/html)																								
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																													

	<p>segments in the TCP connection (including the segment containing the HTTP POST)?</p> <p>At what time was each segment sent?</p> <p>When was the ACK for each segment received?</p> <p>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>	
8	What is the length of each of the first six TCP segments?	0, 0, 0, 565, 1460, 0
Annotated Screenshots (if needed)	<p>Transmission Control Protocol, Src Port: 1161, Dst Port: 80, Seq: 0, Len: 0</p> <p>Transmission Control Protocol, Src Port: 80, Dst Port: 1161, Seq: 0, Ack: 1, Len: 0</p> <p>Transmission Control Protocol, Src Port: 1161, Dst Port: 80, Seq: 1, Ack: 1, Len: 0</p> <p>Transmission Control Protocol, Src Port: 1161, Dst Port: 80, Seq: 1, Ack: 1, Len: 565</p> <p>Transmission Control Protocol, Src Port: 1161, Dst Port: 80, Seq: 566, Ack: 1, Len: 1460</p> <p>Transmission Control Protocol, Src Port: 80, Dst Port: 1161, Seq: 1, Ack: 566, Len: 0</p>	
9	<p>What is the minimum amount of available buffer space advertised at the received for the entire trace?</p> <p>Does the lack of receiver buffer space ever throttle the sender?</p>	<p>The minimum amount of available buffer space is 16384. This is indicated by the win = 16384 in the screenshot below. The lack of receiver buffer space does not ever throttle the sender.</p>

Annotated Screenshots (if needed)	<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></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																				
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192.168.1.102	128.119.245.12	TCP	62	1161 → 80 [SYN] Seq=0 Win=16384 Len=0 MSS=1460 SACK_PERM=1																															
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 there are not any retransmitted segments in the trace file. I checked the sequence numbers in the TCP segments in the trace file to confirm. Each sequence number is seen at a different time.																																	
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	Below we can see the Ack value difference between the different packets is 1460 bytes.																																	
Annotated Screenshots (if needed)	<table><tr><td>128.119.245.12</td><td>192.168.1.102</td><td>TCP</td><td>60</td><td>80 → 1161 [ACK] Seq=1 Ack=10473 Win=26280 Len=0</td></tr><tr><td>128.119.245.12</td><td>192.168.1.102</td><td>TCP</td><td>60</td><td>80 → 1161 [ACK] Seq=1 Ack=11933 Win=29200 Len=0</td></tr><tr><td>128.119.245.12</td><td>192.168.1.102</td><td>TCP</td><td>60</td><td>80 → 1161 [ACK] Seq=1 Ack=13393 Win=32120 Len=0</td></tr><tr><td>128.119.245.12</td><td>192.168.1.102</td><td>TCP</td><td>60</td><td>80 → 1161 [ACK] Seq=1 Ack=14853 Win=35040 Len=0</td></tr><tr><td>128.119.245.12</td><td>192.168.1.102</td><td>TCP</td><td>60</td><td>80 → 1161 [ACK] Seq=1 Ack=16313 Win=37960 Len=0</td></tr><tr><td>128.119.245.12</td><td>192.168.1.102</td><td>TCP</td><td>60</td><td>80 → 1161 [ACK] Seq=1 Ack=17205 Win=37960 Len=0</td></tr></table>					128.119.245.12	192.168.1.102	TCP	60	80 → 1161 [ACK] Seq=1 Ack=10473 Win=26280 Len=0	128.119.245.12	192.168.1.102	TCP	60	80 → 1161 [ACK] Seq=1 Ack=11933 Win=29200 Len=0	128.119.245.12	192.168.1.102	TCP	60	80 → 1161 [ACK] Seq=1 Ack=13393 Win=32120 Len=0	128.119.245.12	192.168.1.102	TCP	60	80 → 1161 [ACK] Seq=1 Ack=14853 Win=35040 Len=0	128.119.245.12	192.168.1.102	TCP	60	80 → 1161 [ACK] Seq=1 Ack=16313 Win=37960 Len=0	128.119.245.12	192.168.1.102	TCP	60	80 → 1161 [ACK] Seq=1 Ack=17205 Win=37960 Len=0
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128.119.245.12	192.168.1.102	TCP	60	80 → 1161 [ACK] Seq=1 Ack=17205 Win=37960 Len=0																															
12	What is the throughput (bytes transferred per unit time) for the TCP connection? Explain how you calculated this value.	How to calculate: Divide size of file by the time it takes to be transmitted by TCP. 184320 / (7.595557 – 3.567324) = 45757.03 KB/s																																	
Annotated Screenshots (if needed)	<table><tr><td>3.567324</td><td>192.168.1.102</td><td>128.119.245.12</td><td>TCP</td><td>946</td><td>1161 → 80 [PSH, ACK]</td></tr></table> Start time above and end time below <table><tr><td>213 7.595557</td><td>192.168.1.102</td><td>199.2.53.206</td><td>TCP</td><td>62</td><td>1162 → 631 [SYN]</td></tr></table>					3.567324	192.168.1.102	128.119.245.12	TCP	946	1161 → 80 [PSH, ACK]	213 7.595557	192.168.1.102	199.2.53.206	TCP	62	1162 → 631 [SYN]																		
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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 slow start phase appears to begin at 0.1 s and end near 0.2 s. Congestion avoidance appears to take over 0.8 s and it continues.																																	

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.

