TCP

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201EE138

2. 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 alice.txt file to gaia.cs.umass.edu? To answer this question, it's probably easiest to select an HTTP message and explore the details of the TCP packet used to carry this HTTP message, using the "details of the selected packet header window" (refer to Figure 2 in the "Getting Started with Wireshark" Lab if you're uncertain about the Wireshark windows).

A:Clinet IP address=192.168.86.68 , TCP port number=55639. (From Figure 1)

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?

A:IP address of gaia.cs.umass.edu=128.119.245.12 , Sending port=80 , Receiving port=55639. (From Figure 1)

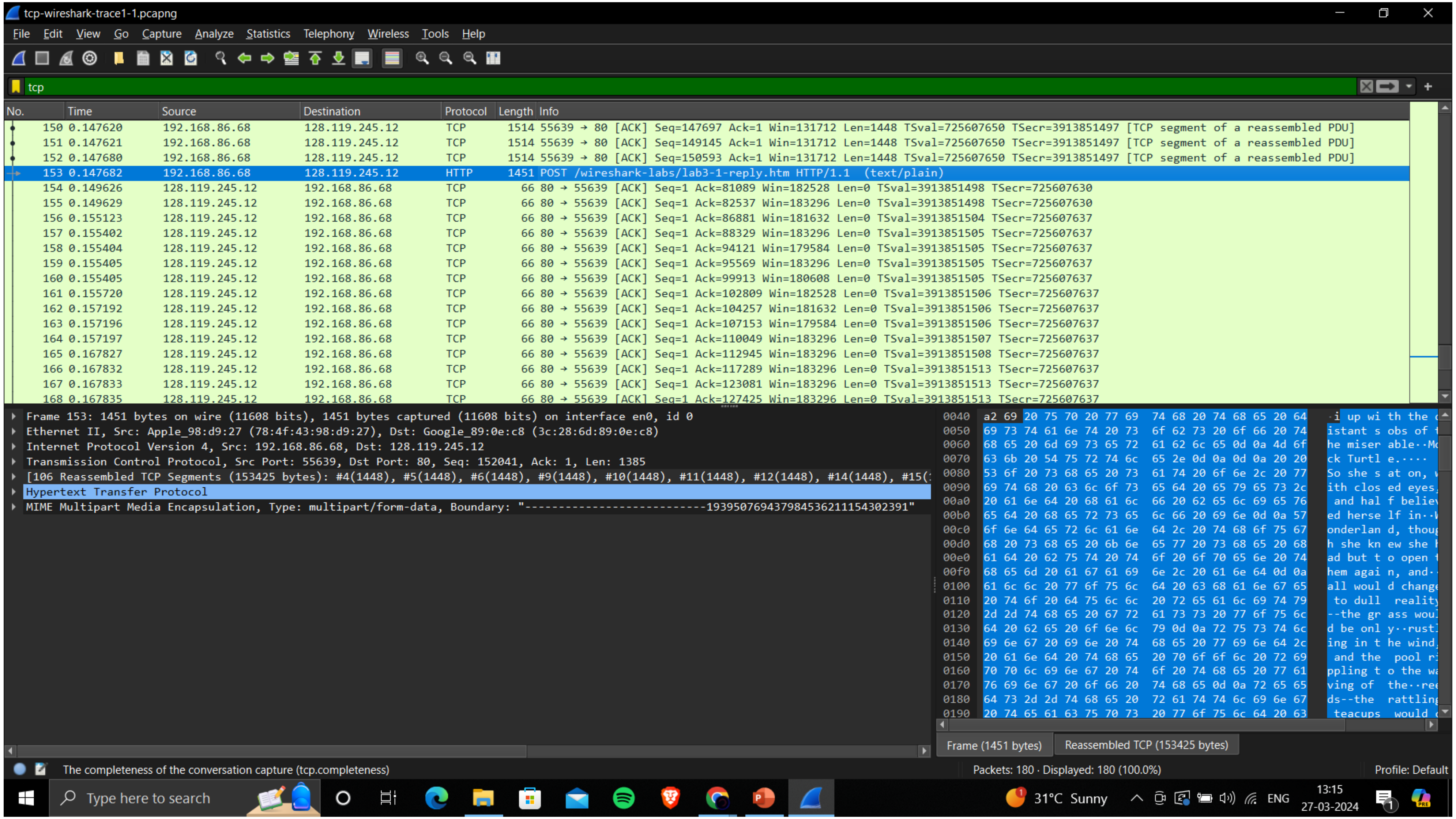


Figure 1 (TCP segments involved in sending the HTTP POST message)

3. TCP Basics

3. 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? (Note: this is the “raw” sequence number carried in the TCP segment itself; it is NOT the packet # in the “No.” column in the Wireshark window. Remember there is no such thing as a “packet number” in TCP or UDP; as you know, there are sequence numbers in TCP and that’s what we’re after here. Also note that this is not the relative sequence number with respect to the starting sequence number of this TCP session.). What is it in this TCP segment that identifies the segment as a SYN segment? Will the TCP receiver in this session be able to use Selective Acknowledgments (allowing TCP to function a bit more like a “selective repeat” receiver, see section 3.4.5 in the text)?

A: Raw sequence number: 4236649187 , Flags: 0x002 (SYN) , Yes (From Figure 2)

4.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 it in the segment that identifies the segment as a SYNACK segment? What is the value of the Acknowledgement field in the SYNACK segment? How did gaia.cs.umass.edu determine that value?

A: Sequence number= 1068969752 , Flags: 0x012 (SYN, ACK) - The SYN,ACK flag is set to 1 and it indicates that this segment is a SYN, ACK segment., Acknowledgment number (raw): 4236649188 , The value of the ACKnowledgement field in the SYNACK segment is 1. The value of the ACKnowledgement field in the SYNACK segment is determined by gaia.cs.umass.edu by adding 1 to the initial sequence number of SYN segment from the client computer (i.e. the sequence number of the SYN segment initiated by the client computer is 0.). (From Figure 3)

5. What is the sequence number of the TCP segment containing the header of the HTTP POST command? Note that in order to find the POST message header, you’ll need to dig into the packet content field at the bottom of the Wireshark window, looking for a segment with the ASCII text “POST” within its DATA field4,5 . How many bytes of data are contained in the payload (data) field of this TCP segment? Did all of the data in the transferred file alice.txt fit into this single segment?

A: Sequence Number (raw): 4236649188 , TCP payload (1448 bytes) , No (From Figure 4)

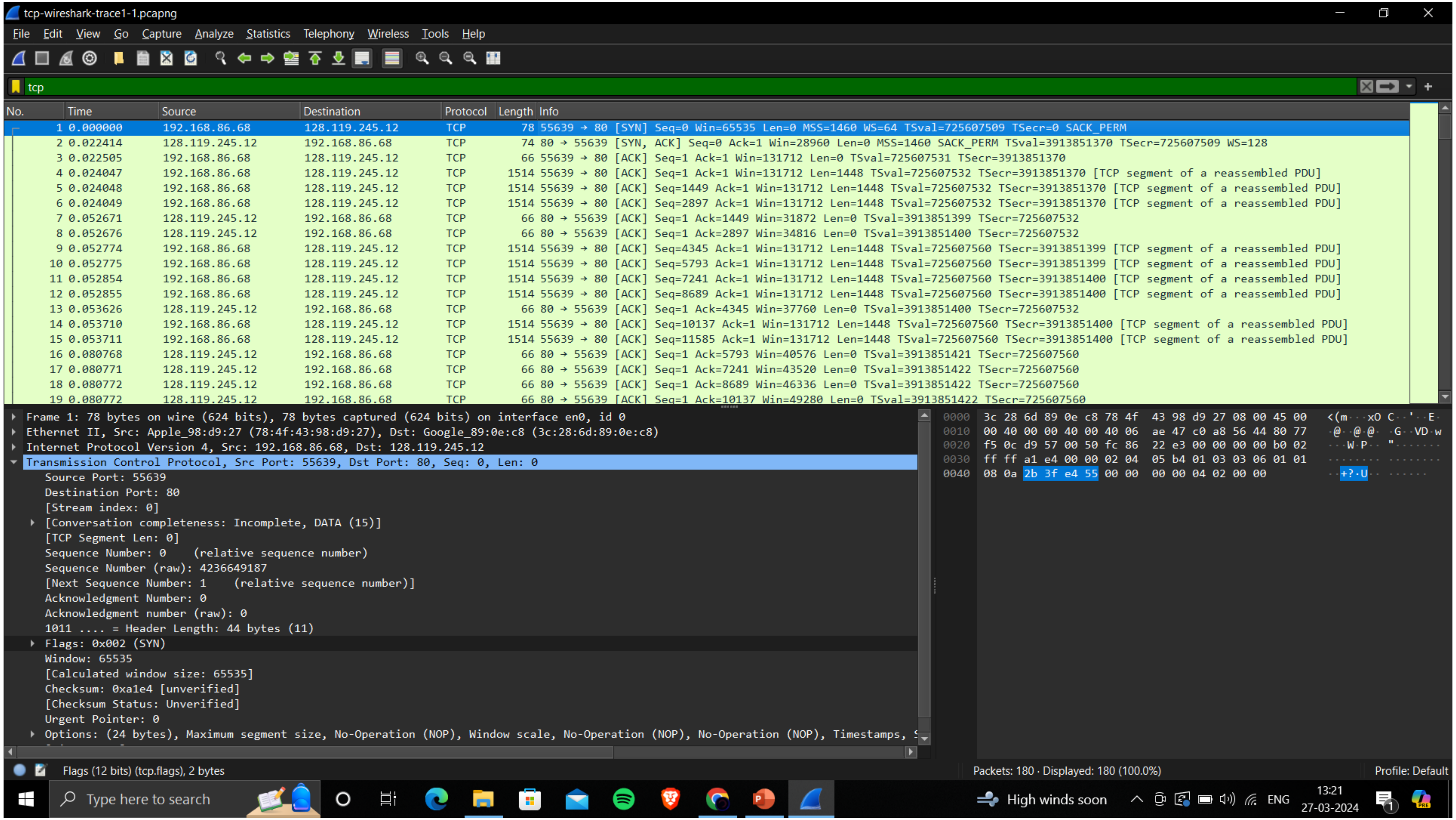


Figure 2 (TCP SYN)

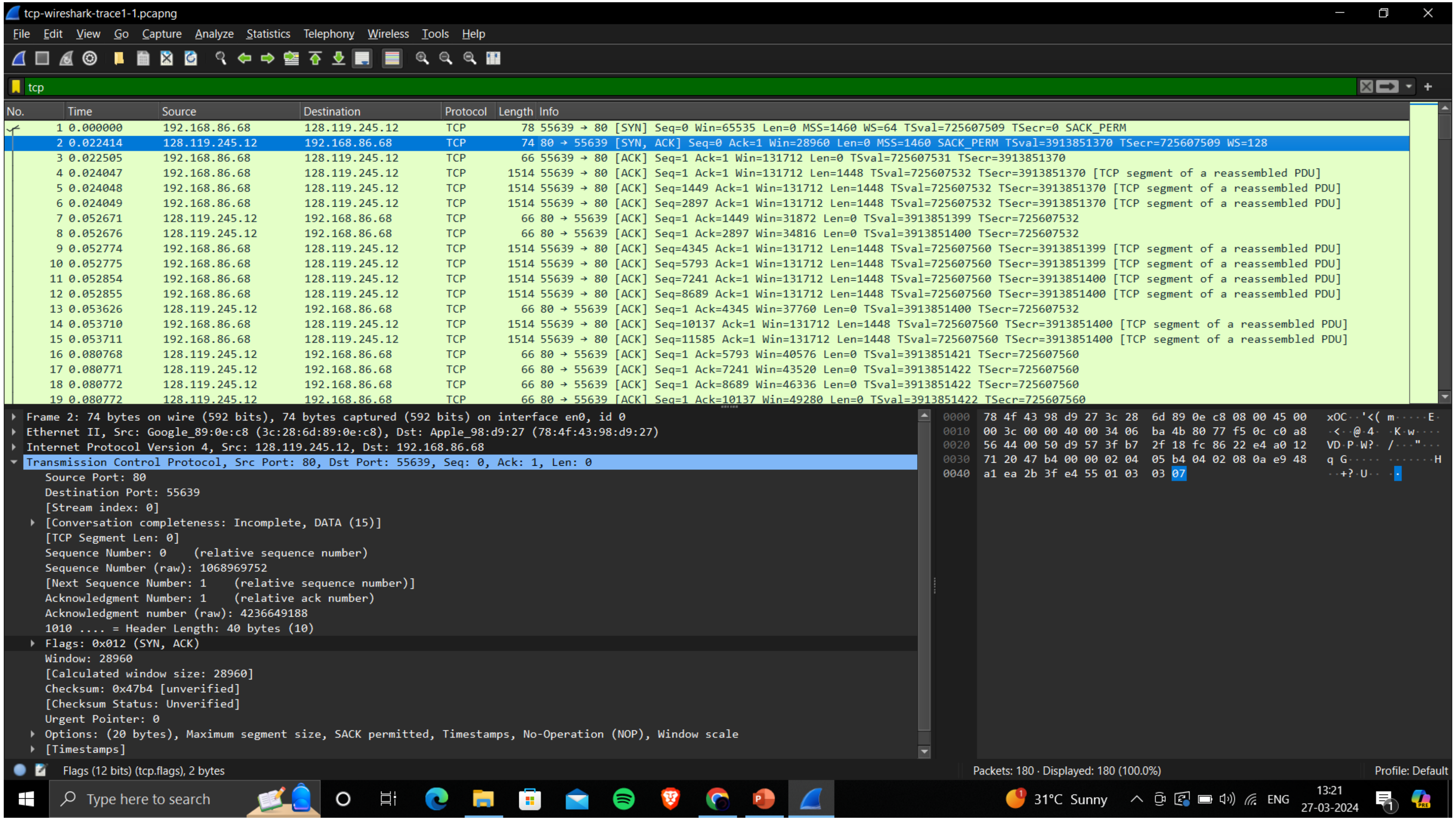


Figure 3 (SYN ACK)

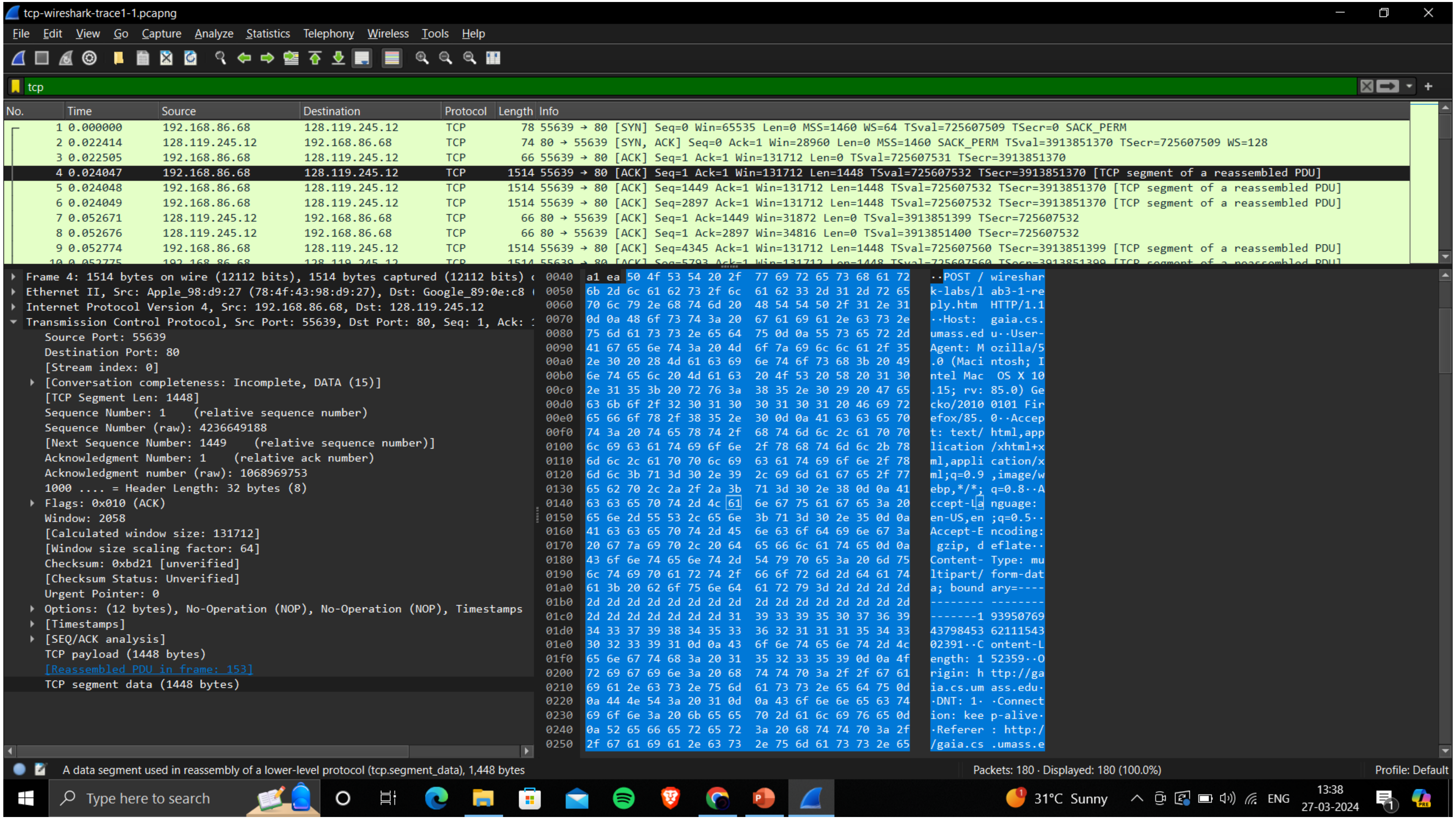


Figure 4 (TCP packet with HTTP POST Header

6. Consider the TCP segment containing the HTTP “POST” as the first segment in the data transfer part of the TCP connection.

● At what time was the first segment (the one containing the HTTP POST) in the data-transfer part of the TCP connection sent?

A: 0.024047 sec

● At what time was the ACK for this first data-containing segment received?

A: 0.052671

● What is the RTT for this first data-containing segment?

A: 0.052671- 0.024047 = 0.028624

● What is the RTT value of the second data-carrying TCP segment and its ACK?

A: The second segment is packet number 5 and it’s corresponding response is pocket number 8 so RTT value is 0.052676- 0.024048 = 0.028628

● What is the EstimatedRTT value (see Section 3.5.3, in the text) after the ACK for the second data-carrying segment is received? Assume that in making this calculation after the received of the ACK for the second segment, that the initial value of EstimatedRTT is equal to the measured RTT for the first segment, and then is computed using the EstimatedRTT equation on page 242, and a value of $\alpha = 0.125$.

A:The EstimatedRTT is 0.0286245 seconds.

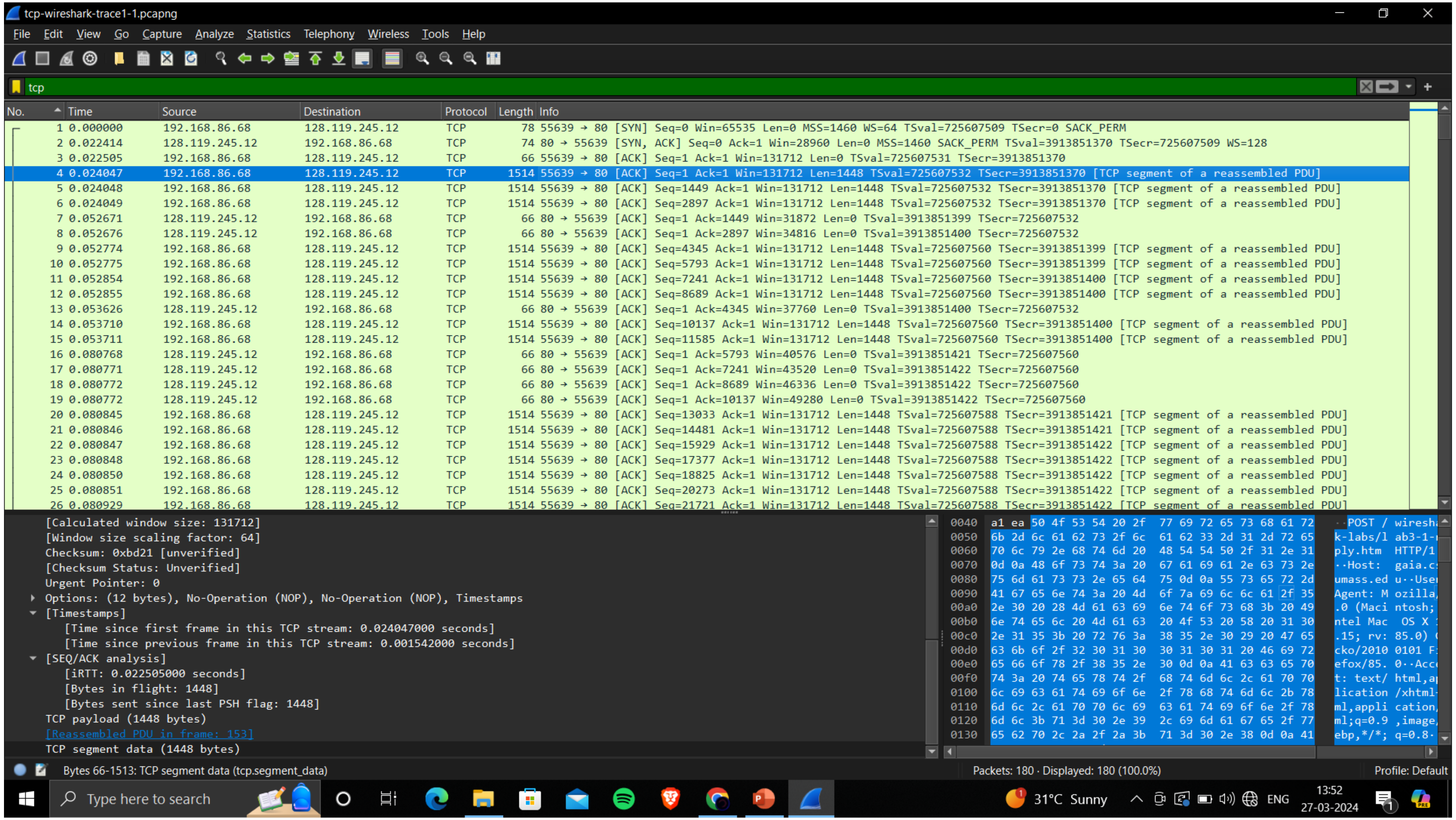


Figure 5

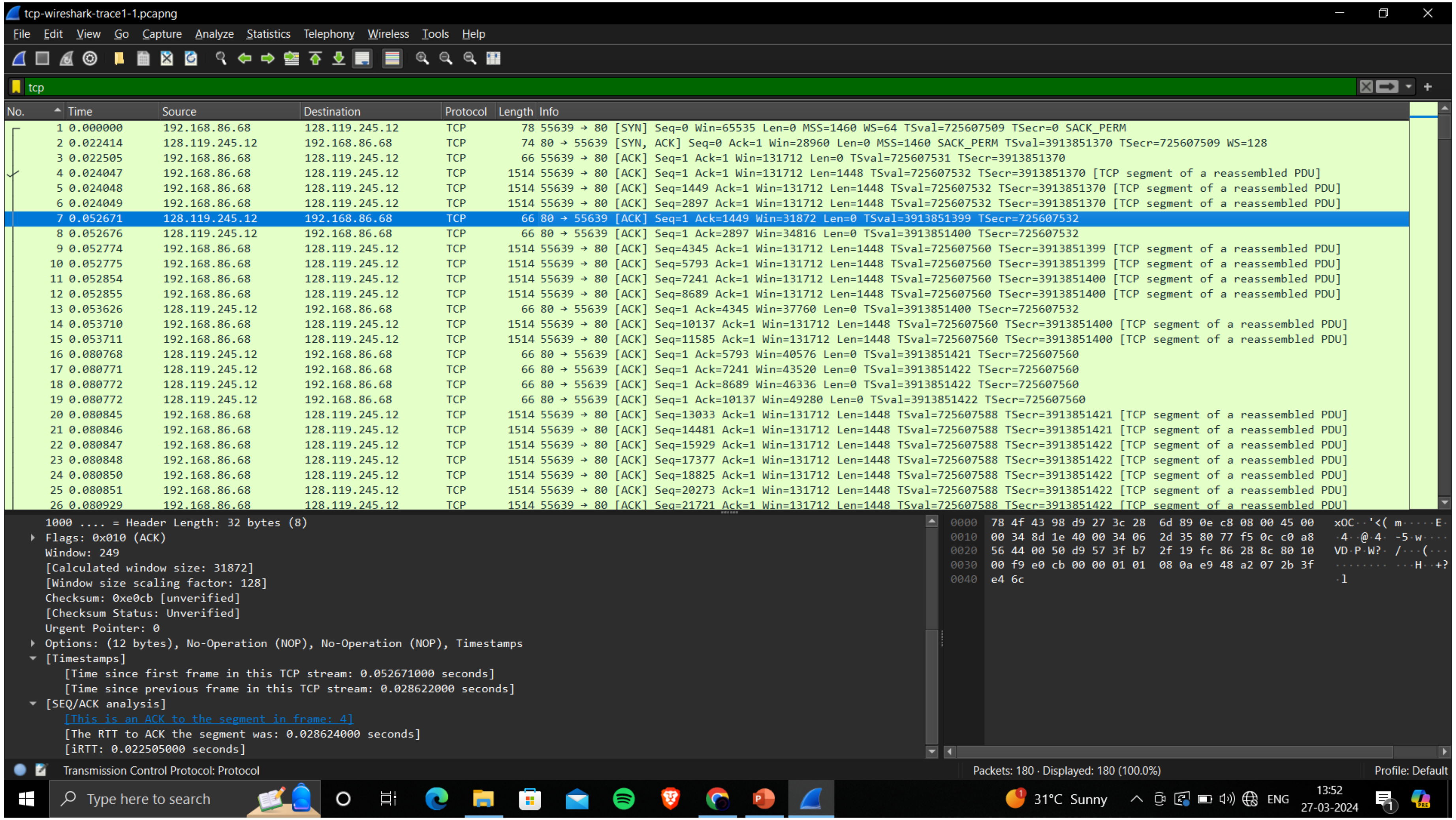
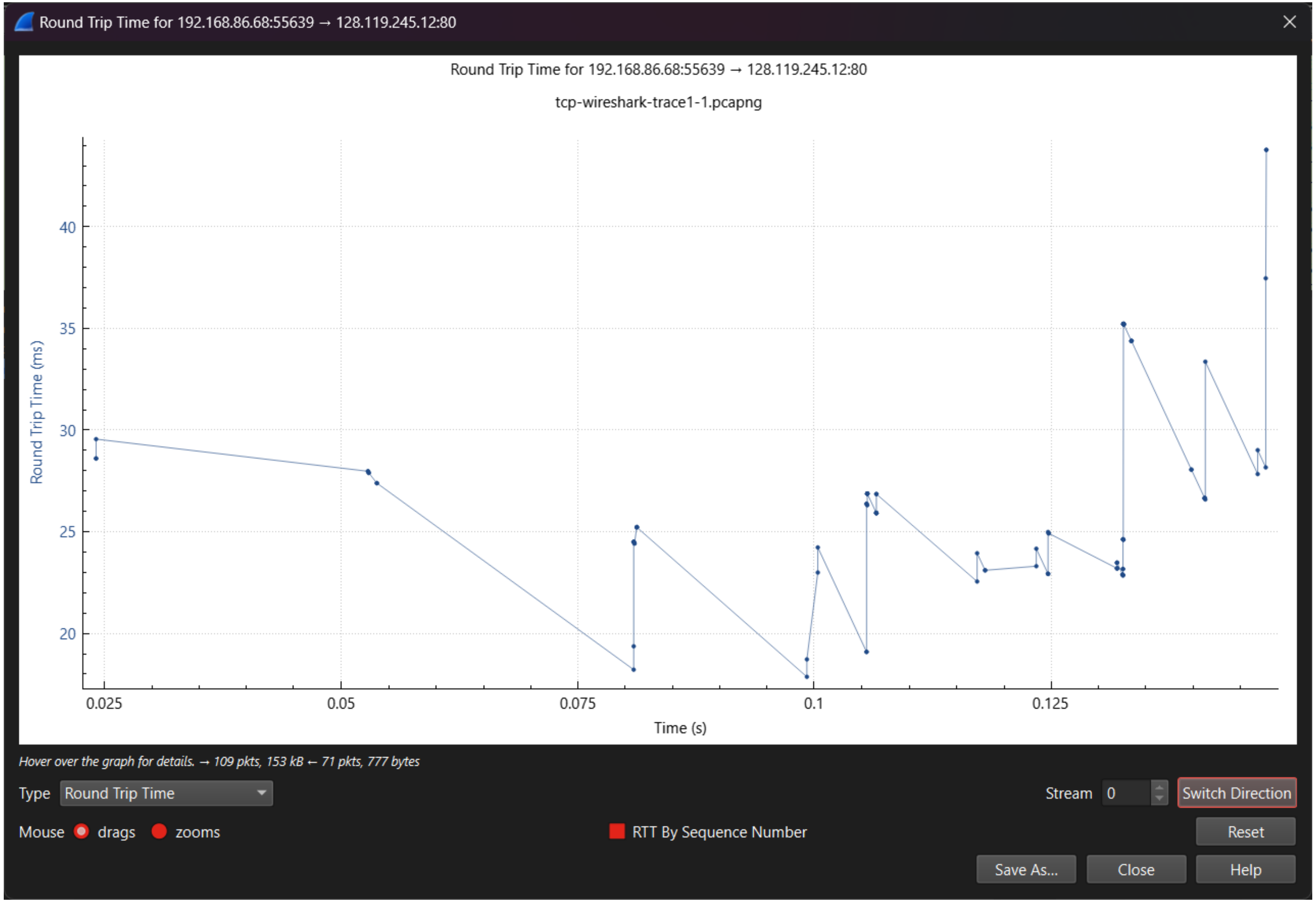

tcp-wireshark-trace1-1.pcapng
File Edit View Go Capture Analyze Statistics Telephony Wireless Tools Help
tcp
No. Time Source Destination Protocol Length Info
1 0.000000 192.168.86.68 128.119.245.12 TCP 78 55639 → 80 [SYN] Seq=0 Win=65535 Len=0 MSS=1460 WS=64 TSval=725607509 TSecr=0 SACK_PERM
2 0.022414 128.119.245.12 192.168.86.68 TCP 74 80 → 55639 [SYN, ACK] Seq=0 Ack=1 Win=28960 Len=0 MSS=1460 SACK_PERM TSval=3913851370 TSecr=725607509 WS=128
3 0.022505 192.168.86.68 128.119.245.12 TCP 66 55639 → 80 [ACK] Seq=1 Ack=1 Win=131712 Len=0 TSval=725607531 TSecr=3913851370
4 0.024047 192.168.86.68 128.119.245.12 TCP 1514 55639 → 80 [ACK] Seq=1 Ack=1 Win=131712 Len=1448 TSval=725607532 TSecr=3913851370 [TCP segment of a reassembled PDU]
5 0.024048 192.168.86.68 128.119.245.12 TCP 1514 55639 → 80 [ACK] Seq=1449 Ack=1 Win=131712 Len=1448 TSval=725607532 TSecr=3913851370 [TCP segment of a reassembled PDU]
6 0.024049 192.168.86.68 128.119.245.12 TCP 1514 55639 → 80 [ACK] Seq=2897 Ack=1 Win=131712 Len=1448 TSval=725607532 TSecr=3913851370 [TCP segment of a reassembled PDU]
7 0.052671 128.119.245.12 192.168.86.68 TCP 66 80 → 55639 [ACK] Seq=1 Ack=1449 Win=31872 Len=0 TSval=3913851399 TSecr=725607532
8 0.052676 128.119.245.12 192.168.86.68 TCP 66 80 → 55639 [ACK] Seq=1 Ack=2897 Win=34816 Len=0 TSval=3913851400 TSecr=725607532
9 0.052774 192.168.86.68 128.119.245.12 TCP 1514 55639 → 80 [ACK] Seq=4345 Ack=1 Win=131712 Len=1448 TSval=725607560 TSecr=3913851399 [TCP segment of a reassembled PDU]
10 0.052775 192.168.86.68 128.119.245.12 TCP 1514 55639 → 80 [ACK] Seq=5793 Ack=1 Win=131712 Len=1448 TSval=725607560 TSecr=3913851399 [TCP segment of a reassembled PDU]
11 0.052854 192.168.86.68 128.119.245.12 TCP 1514 55639 → 80 [ACK] Seq=7241 Ack=1 Win=131712 Len=1448 TSval=725607560 TSecr=3913851400 [TCP segment of a reassembled PDU]
12 0.052855 192.168.86.68 128.119.245.12 TCP 1514 55639 → 80 [ACK] Seq=8689 Ack=1 Win=131712 Len=1448 TSval=725607560 TSecr=3913851400 [TCP segment of a reassembled PDU]
13 0.053626 128.119.245.12 192.168.86.68 TCP 66 80 → 55639 [ACK] Seq=1 Ack=4345 Win=37760 Len=0 TSval=3913851400 TSecr=725607532
14 0.053710 192.168.86.68 128.119.245.12 TCP 1514 55639 → 80 [ACK] Seq=10137 Ack=1 Win=131712 Len=1448 TSval=725607560 TSecr=3913851400 [TCP segment of a reassembled PDU]
15 0.053711 192.168.86.68 128.119.245.12 TCP 1514 55639 → 80 [ACK] Seq=11585 Ack=1 Win=131712 Len=1448 TSval=725607560 TSecr=3913851400 [TCP segment of a reassembled PDU]
16 0.080768 128.119.245.12 192.168.86.68 TCP 66 80 → 55639 [ACK] Seq=1 Ack=5793 Win=40576 Len=0 TSval=3913851421 TSecr=725607560
17 0.080771 128.119.245.12 192.168.86.68 TCP 66 80 → 55639 [ACK] Seq=1 Ack=7241 Win=43520 Len=0 TSval=3913851422 TSecr=725607560
18 0.080772 128.119.245.12 192.168.86.68 TCP 66 80 → 55639 [ACK] Seq=1 Ack=8689 Win=46336 Len=0 TSval=3913851422 TSecr=725607560
19 0.080772 128.119.245.12 192.168.86.68 TCP 66 80 → 55639 [ACK] Seq=1 Ack=10137 Win=49280 Len=0 TSval=3913851422 TSecr=725607560
20 0.080845 192.168.86.68 128.119.245.12 TCP 1514 55639 → 80 [ACK] Seq=13033 Ack=1 Win=131712 Len=1448 TSval=725607588 TSecr=3913851421 [TCP segment of a reassembled PDU]
21 0.080846 192.168.86.68 128.119.245.12 TCP 1514 55639 → 80 [ACK] Seq=14481 Ack=1 Win=131712 Len=1448 TSval=725607588 TSecr=3913851421 [TCP segment of a reassembled PDU]
22 0.080847 192.168.86.68 128.119.245.12 TCP 1514 55639 → 80 [ACK] Seq=15929 Ack=1 Win=131712 Len=1448 TSval=725607588 TSecr=3913851422 [TCP segment of a reassembled PDU]
23 0.080848 192.168.86.68 128.119.245.12 TCP 1514 55639 → 80 [ACK] Seq=17377 Ack=1 Win=131712 Len=1448 TSval=725607588 TSecr=3913851422 [TCP segment of a reassembled PDU]
24 0.080850 192.168.86.68 128.119.245.12 TCP 1514 55639 → 80 [ACK] Seq=18825 Ack=1 Win=131712 Len=1448 TSval=725607588 TSecr=3913851422 [TCP segment of a reassembled PDU]
25 0.080851 192.168.86.68 128.119.245.12 TCP 1514 55639 → 80 [ACK] Seq=20273 Ack=1 Win=131712 Len=1448 TSval=725607588 TSecr=3913851422 [TCP segment of a reassembled PDU]
26 0.080929 192.168.86.68 128.119.245.12 TCP 1514 55639 → 80 [ACK] Seq=21721 Ack=1 Win=131712 Len=1448 TSval=725607588 TSecr=3913851422 [TCP segment of a reassembled PDU]
1000 .... = Header Length: 32 bytes (8)
Flags: 0x010 (ACK)
Window: 249
[Calculated window size: 31872]
[Window size scaling factor: 128]
Checksum: 0xe0cb [unverified]
[Checksum Status: Unverified]
Urgent Pointer: 0
Options: (12 bytes), No-Operation (NOP), No-Operation (NOP), Timestamps
[Timestamps]
[Time since first frame in this TCP stream: 0.052671000 seconds]
[Time since previous frame in this TCP stream: 0.028622000 seconds]
[SEQ/ACK analysis]
[This is an ACK to the segment in frame: 4]
[The RTT to ACK the segment was: 0.028624000 seconds]
[iRTT: 0.022505000 seconds]
0000 78 4f 43 98 d9 27 3c 28 6d 89 0e c8 08 00 45 00
0010 00 34 8d 1e 40 00 34 06 2d 35 80 77 f5 0c c0 a8
0020 56 44 00 50 d9 57 3f b7 2f 19 fc 86 28 8c 80 10
0030 00 f9 e0 cb 00 00 01 01 08 0a e9 48 a2 07 2b 3f
0040 e4 6c
Transmission Control Protocol: Protocol
Packets: 180 · Displayed: 180 (100.0%)
Profile: Default
Type here to search
31°C Sunny
ENG
13:52
27-03-2024

Figure 6



Round Trip Time for 192.168.86.68:55639 → 128.119.245.12:80
Round Trip Time for 192.168.86.68:55639 → 128.119.245.12:80
tcp-wireshark-trace1-1.pcapng
Round Trip Time (ms)
40
35
30
25
20
0.025
0.05
0.075
0.1
0.125
Time (s)
Hover over the graph for details. → 109 pkts, 153 kB ← 71 pkts, 777 bytes
Type
Round Trip Time
Stream
0
Switch Direction
Mouse
drags
zooms
RTT By Sequence Number
Reset
Save As...
Close
Help

Figure 7

7. What is the length (header plus payload) of each of the first four data-carrying TCP segments?

A: 1448 bytes

8. What is the minimum amount of available buffer space advertised to the client by gaia.cs.umass.edu among these first four data-carrying TCP segments ? Does the lack of receiver buffer space ever throttle the sender for these first four datacarrying segments?

A:28960 (window size) is the minimum buffer space, which grows gradually. The sender is never throttled due to lacking of receiver buffer space by inspecting this trace, which shows in the first acknowledgement from the server. This receiver window grows steadily until a maximum receiver buffer size of 62780 bytes. The sender is never throttled due to lacking of receiver buffer space by inspecting this trace.

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

A: There are no retransmitted segments in the trace file. We can verify this by checking the sequence numbers of the TCP segments in the trace file. In the TimeSequence-Graph (Stevens) of this trace, all sequence numbers from the source (192.168.1.102) to the destination (128.119.245.12) are increasing monotonically with respect to time.

10. How much data does the receiver typically acknowledge in an ACK among the first ten data-carrying segments sent from the client to gaia.cs.umass.edu? Can you identify cases where the receiver is ACKing every other received segment (see Table 3.2 in the text) among these first ten data-carrying segments?

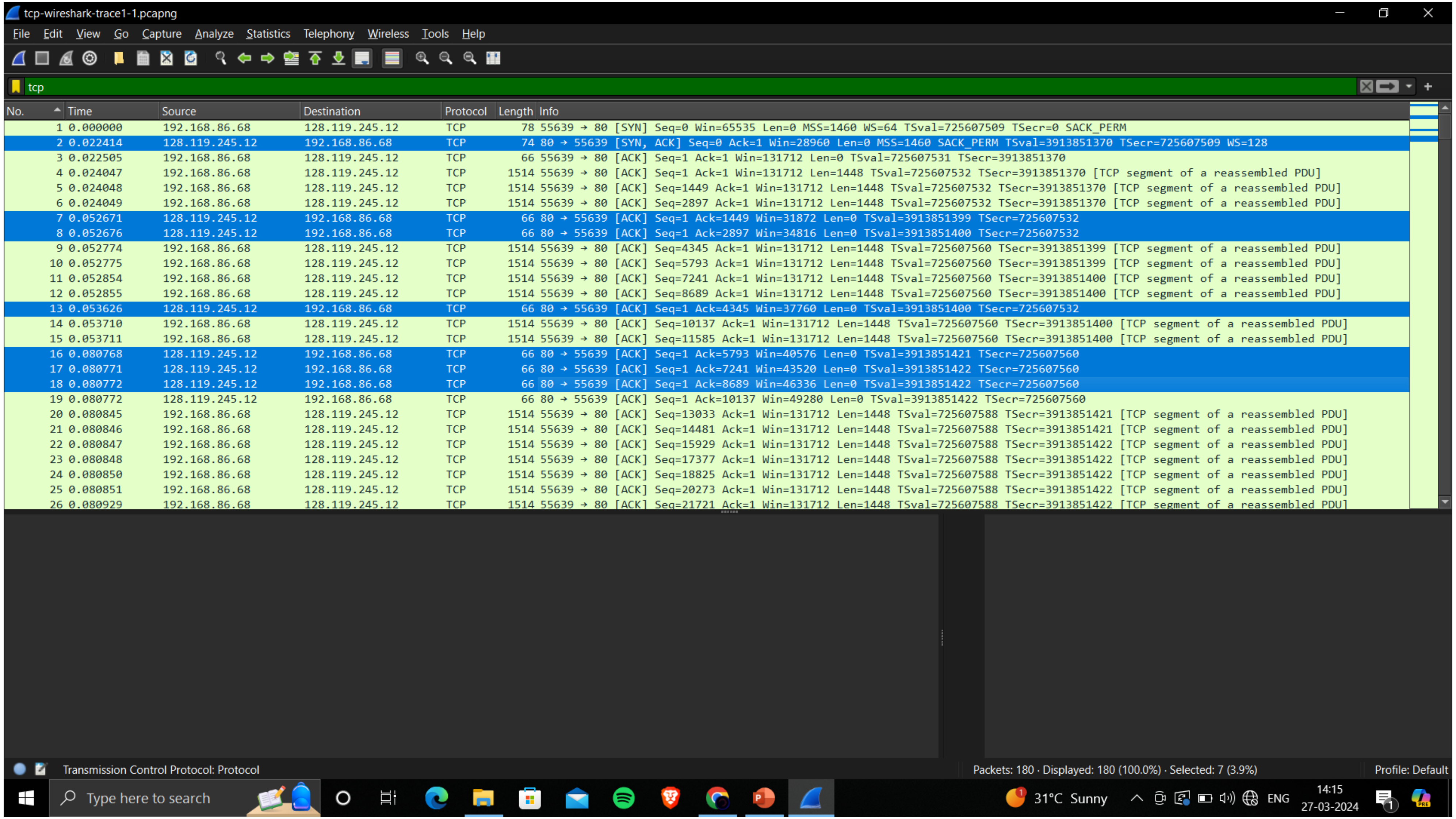
A.Typically it receives 1448 bytes but it also receives every other segment of 2896 bytes as seen in Figure 10.

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

A. The computation of TCP throughput largely depends on the selection of averaging time period. As a common throughput computation, in this question, we select the average time period as the whole connection time. Then, the average throughput for this TCP connection is computed as the ratio between the total amount data and the total transmission time. The total amount data transmitted can be computed by the difference between the sequence number of the first TCP segment (i.e. 1 byte for No. 4 segment) and the acknowledged sequence number of the last ACK (153426 bytes for No. 178 segment). Therefore, the total data are 153426 - 1 = 153425 bytes. The whole transmission time is the difference of the time instant of the first TCP segment (i.e., 0.022505000 seconds for No.4 segment) and the time instant of the last ACK (i.e., 5.455830 second for No. 202 segment). Therefore,

the total transmission time is 5.455830 - 0.026477 = 5.4294 seconds. Hence, the throughput for the TCP connection is computed

as 164090/5.4294 = 30.222 KByte/sec


tcp-wireshark-trace1-1.pcapng
File Edit View Go Capture Analyze Statistics Telephony Wireless Tools Help
tcp
No. Time Source Destination Protocol Length Info
1 0.000000 192.168.86.68 128.119.245.12 TCP 78 55639 → 80 [SYN] Seq=0 Win=65535 Len=0 MSS=1460 WS=64 TSval=725607509 TSecr=0 SACK_PERM
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3 0.022505 192.168.86.68 128.119.245.12 TCP 66 55639 → 80 [ACK] Seq=1 Ack=1 Win=131712 Len=0 TSval=725607531 TSecr=3913851370
4 0.024047 192.168.86.68 128.119.245.12 TCP 1514 55639 → 80 [ACK] Seq=1 Ack=1 Win=131712 Len=1448 TSval=725607532 TSecr=3913851370 [TCP segment of a reassembled PDU]
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6 0.024049 192.168.86.68 128.119.245.12 TCP 1514 55639 → 80 [ACK] Seq=2897 Ack=1 Win=131712 Len=1448 TSval=725607532 TSecr=3913851370 [TCP segment of a reassembled PDU]
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9 0.052774 192.168.86.68 128.119.245.12 TCP 1514 55639 → 80 [ACK] Seq=4345 Ack=1 Win=131712 Len=1448 TSval=725607560 TSecr=3913851399 [TCP segment of a reassembled PDU]
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12 0.052855 192.168.86.68 128.119.245.12 TCP 1514 55639 → 80 [ACK] Seq=8689 Ack=1 Win=131712 Len=1448 TSval=725607560 TSecr=3913851400 [TCP segment of a reassembled PDU]
13 0.053626 128.119.245.12 192.168.86.68 TCP 66 80 → 55639 [ACK] Seq=1 Ack=4345 Win=37760 Len=0 TSval=3913851400 TSecr=725607532
14 0.053710 192.168.86.68 128.119.245.12 TCP 1514 55639 → 80 [ACK] Seq=10137 Ack=1 Win=131712 Len=1448 TSval=725607560 TSecr=3913851400 [TCP segment of a reassembled PDU]
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17 0.080771 128.119.245.12 192.168.86.68 TCP 66 80 → 55639 [ACK] Seq=1 Ack=7241 Win=43520 Len=0 TSval=3913851422 TSecr=725607560
18 0.080772 128.119.245.12 192.168.86.68 TCP 66 80 → 55639 [ACK] Seq=1 Ack=8689 Win=46336 Len=0 TSval=3913851422 TSecr=725607560
19 0.080772 128.119.245.12 192.168.86.68 TCP 66 80 → 55639 [ACK] Seq=1 Ack=10137 Win=49280 Len=0 TSval=3913851422 TSecr=725607560
20 0.080845 192.168.86.68 128.119.245.12 TCP 1514 55639 → 80 [ACK] Seq=13033 Ack=1 Win=131712 Len=1448 TSval=725607588 TSecr=3913851421 [TCP segment of a reassembled PDU]
21 0.080846 192.168.86.68 128.119.245.12 TCP 1514 55639 → 80 [ACK] Seq=14481 Ack=1 Win=131712 Len=1448 TSval=725607588 TSecr=3913851421 [TCP segment of a reassembled PDU]
22 0.080847 192.168.86.68 128.119.245.12 TCP 1514 55639 → 80 [ACK] Seq=15929 Ack=1 Win=131712 Len=1448 TSval=725607588 TSecr=3913851422 [TCP segment of a reassembled PDU]
23 0.080848 192.168.86.68 128.119.245.12 TCP 1514 55639 → 80 [ACK] Seq=17377 Ack=1 Win=131712 Len=1448 TSval=725607588 TSecr=3913851422 [TCP segment of a reassembled PDU]
24 0.080850 192.168.86.68 128.119.245.12 TCP 1514 55639 → 80 [ACK] Seq=18825 Ack=1 Win=131712 Len=1448 TSval=725607588 TSecr=3913851422 [TCP segment of a reassembled PDU]
25 0.080851 192.168.86.68 128.119.245.12 TCP 1514 55639 → 80 [ACK] Seq=20273 Ack=1 Win=131712 Len=1448 TSval=725607588 TSecr=3913851422 [TCP segment of a reassembled PDU]
26 0.080929 192.168.86.68 128.119.245.12 TCP 1514 55639 → 80 [ACK] Seq=21721 Ack=1 Win=131712 Len=1448 TSval=725607588 TSecr=3913851422 [TCP segment of a reassembled PDU]
Transmission Control Protocol: Protocol
Packets: 180 · Displayed: 180 (100.0%) · Selected: 7 (3.9%)
Profile: Default
Type here to search
31°C Sunny
ENG
14:15
27-03-2024

Figure 8

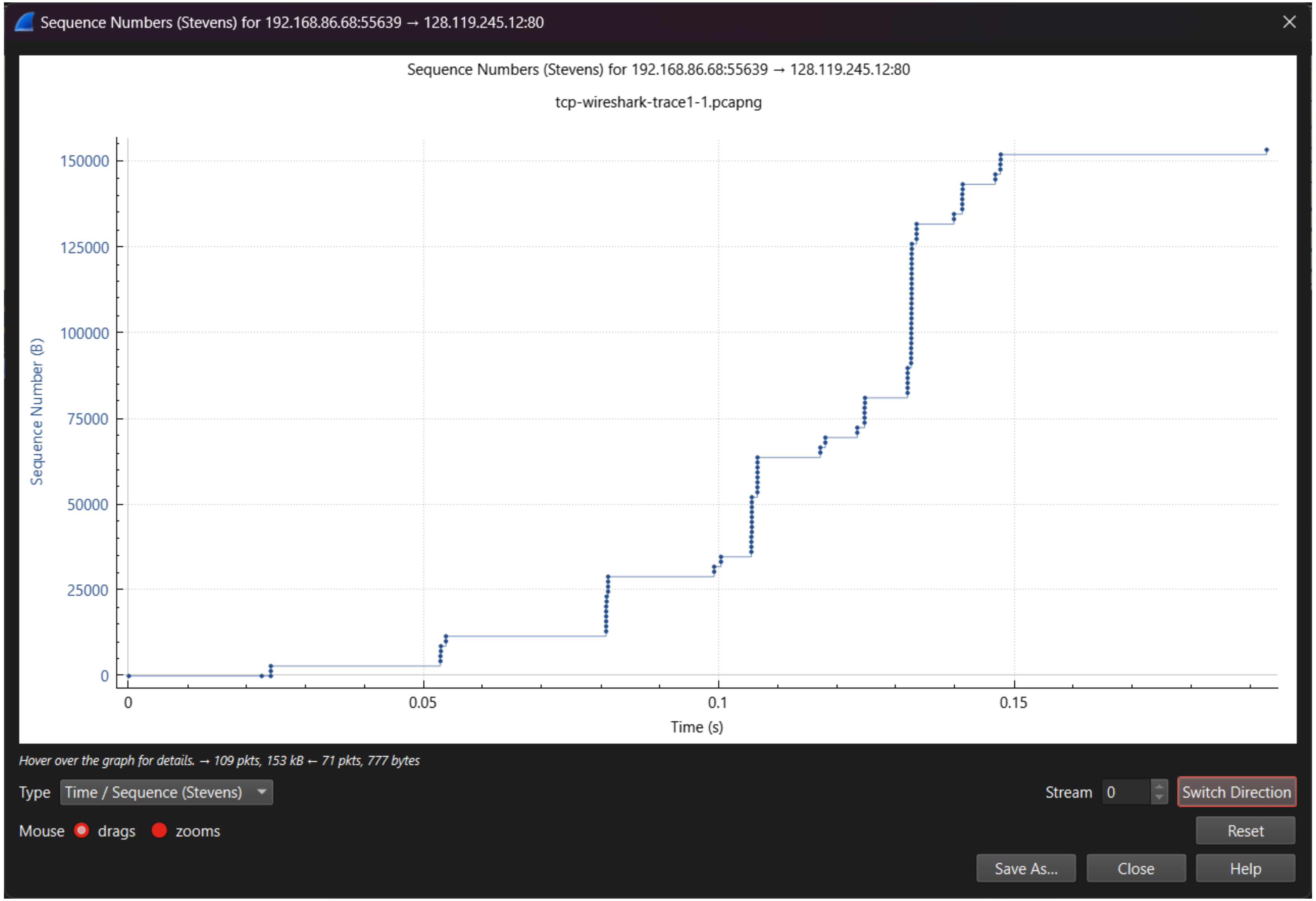

Figure 9 (Time-Sequence Graph)

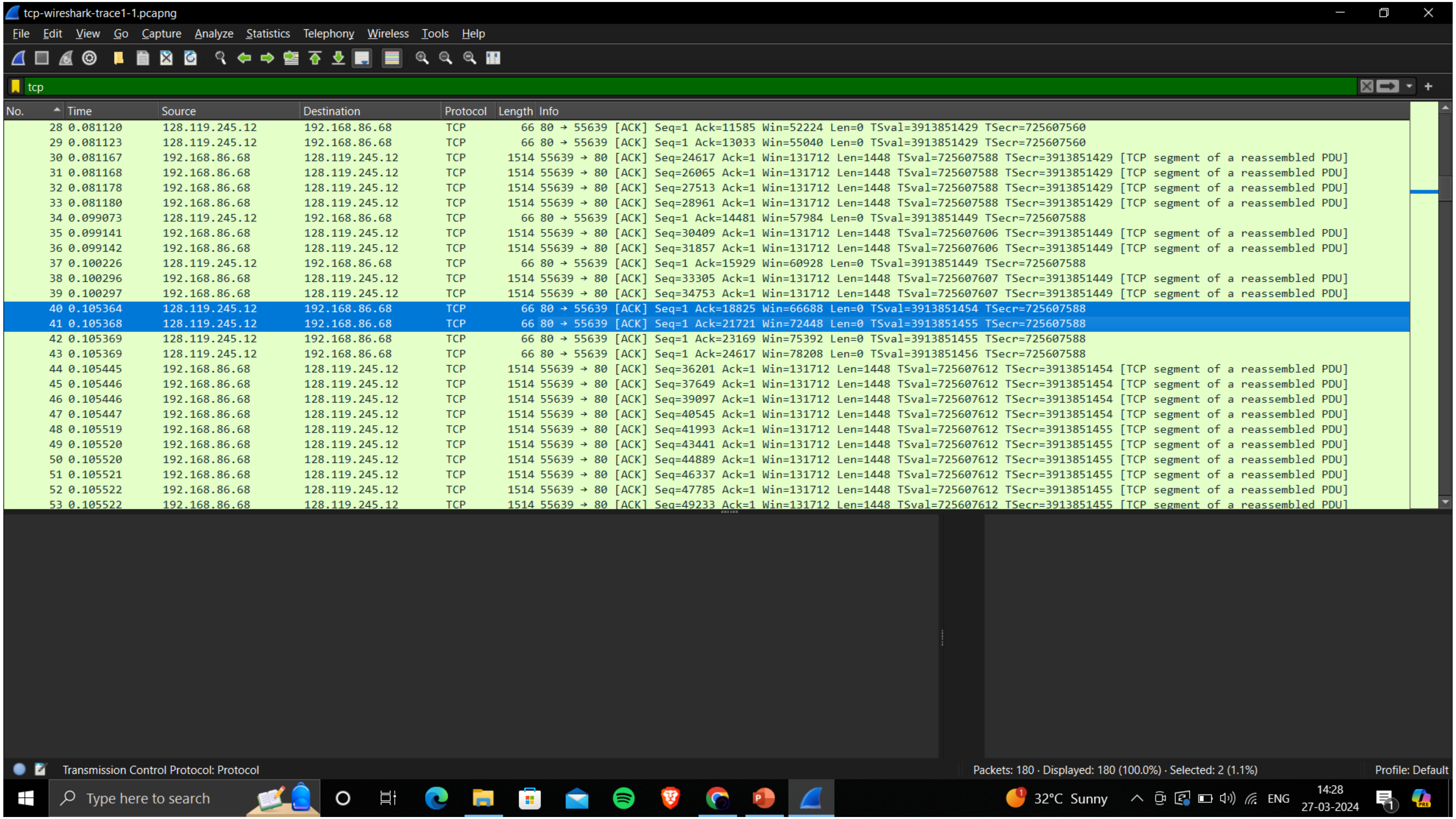
tcp-wireshark-trace1-1.pcapng
File Edit View Go Capture Analyze Statistics Telephony Wireless Tools Help
tcp
No. Time Source Destination Protocol Length Info
28 0.081120 128.119.245.12 192.168.86.68 TCP 66 80 → 55639 [ACK] Seq=1 Ack=11585 Win=52224 Len=0 TSval=3913851429 TSecr=725607560
29 0.081123 128.119.245.12 192.168.86.68 TCP 66 80 → 55639 [ACK] Seq=1 Ack=13033 Win=55040 Len=0 TSval=3913851429 TSecr=725607560
30 0.081167 192.168.86.68 128.119.245.12 TCP 1514 55639 → 80 [ACK] Seq=24617 Ack=1 Win=131712 Len=1448 TSval=725607588 TSecr=3913851429 [TCP segment of a reassembled PDU]
31 0.081168 192.168.86.68 128.119.245.12 TCP 1514 55639 → 80 [ACK] Seq=26065 Ack=1 Win=131712 Len=1448 TSval=725607588 TSecr=3913851429 [TCP segment of a reassembled PDU]
32 0.081178 192.168.86.68 128.119.245.12 TCP 1514 55639 → 80 [ACK] Seq=27513 Ack=1 Win=131712 Len=1448 TSval=725607588 TSecr=3913851429 [TCP segment of a reassembled PDU]
33 0.081180 192.168.86.68 128.119.245.12 TCP 1514 55639 → 80 [ACK] Seq=28961 Ack=1 Win=131712 Len=1448 TSval=725607588 TSecr=3913851429 [TCP segment of a reassembled PDU]
34 0.099073 128.119.245.12 192.168.86.68 TCP 66 80 → 55639 [ACK] Seq=1 Ack=14481 Win=57984 Len=0 TSval=3913851449 TSecr=725607588
35 0.099141 192.168.86.68 128.119.245.12 TCP 1514 55639 → 80 [ACK] Seq=30409 Ack=1 Win=131712 Len=1448 TSval=725607606 TSecr=3913851449 [TCP segment of a reassembled PDU]
36 0.099142 192.168.86.68 128.119.245.12 TCP 1514 55639 → 80 [ACK] Seq=31857 Ack=1 Win=131712 Len=1448 TSval=725607606 TSecr=3913851449 [TCP segment of a reassembled PDU]
37 0.100226 128.119.245.12 192.168.86.68 TCP 66 80 → 55639 [ACK] Seq=1 Ack=15929 Win=60928 Len=0 TSval=3913851449 TSecr=725607588
38 0.100296 192.168.86.68 128.119.245.12 TCP 1514 55639 → 80 [ACK] Seq=33305 Ack=1 Win=131712 Len=1448 TSval=725607607 TSecr=3913851449 [TCP segment of a reassembled PDU]
39 0.100297 192.168.86.68 128.119.245.12 TCP 1514 55639 → 80 [ACK] Seq=34753 Ack=1 Win=131712 Len=1448 TSval=725607607 TSecr=3913851449 [TCP segment of a reassembled PDU]
40 0.105364 128.119.245.12 192.168.86.68 TCP 66 80 → 55639 [ACK] Seq=1 Ack=18825 Win=66688 Len=0 TSval=3913851454 TSecr=725607588
41 0.105368 128.119.245.12 192.168.86.68 TCP 66 80 → 55639 [ACK] Seq=1 Ack=21721 Win=72448 Len=0 TSval=3913851455 TSecr=725607588
42 0.105369 128.119.245.12 192.168.86.68 TCP 66 80 → 55639 [ACK] Seq=1 Ack=23169 Win=75392 Len=0 TSval=3913851455 TSecr=725607588
43 0.105369 128.119.245.12 192.168.86.68 TCP 66 80 → 55639 [ACK] Seq=1 Ack=24617 Win=78208 Len=0 TSval=3913851456 TSecr=725607588
44 0.105445 192.168.86.68 128.119.245.12 TCP 1514 55639 → 80 [ACK] Seq=36201 Ack=1 Win=131712 Len=1448 TSval=725607612 TSecr=3913851454 [TCP segment of a reassembled PDU]
45 0.105446 192.168.86.68 128.119.245.12 TCP 1514 55639 → 80 [ACK] Seq=37649 Ack=1 Win=131712 Len=1448 TSval=725607612 TSecr=3913851454 [TCP segment of a reassembled PDU]
46 0.105446 192.168.86.68 128.119.245.12 TCP 1514 55639 → 80 [ACK] Seq=39097 Ack=1 Win=131712 Len=1448 TSval=725607612 TSecr=3913851454 [TCP segment of a reassembled PDU]
47 0.105447 192.168.86.68 128.119.245.12 TCP 1514 55639 → 80 [ACK] Seq=40545 Ack=1 Win=131712 Len=1448 TSval=725607612 TSecr=3913851454 [TCP segment of a reassembled PDU]
48 0.105519 192.168.86.68 128.119.245.12 TCP 1514 55639 → 80 [ACK] Seq=41993 Ack=1 Win=131712 Len=1448 TSval=725607612 TSecr=3913851455 [TCP segment of a reassembled PDU]
49 0.105520 192.168.86.68 128.119.245.12 TCP 1514 55639 → 80 [ACK] Seq=43441 Ack=1 Win=131712 Len=1448 TSval=725607612 TSecr=3913851455 [TCP segment of a reassembled PDU]
50 0.105520 192.168.86.68 128.119.245.12 TCP 1514 55639 → 80 [ACK] Seq=44889 Ack=1 Win=131712 Len=1448 TSval=725607612 TSecr=3913851455 [TCP segment of a reassembled PDU]
51 0.105521 192.168.86.68 128.119.245.12 TCP 1514 55639 → 80 [ACK] Seq=46337 Ack=1 Win=131712 Len=1448 TSval=725607612 TSecr=3913851455 [TCP segment of a reassembled PDU]
52 0.105522 192.168.86.68 128.119.245.12 TCP 1514 55639 → 80 [ACK] Seq=47785 Ack=1 Win=131712 Len=1448 TSval=725607612 TSecr=3913851455 [TCP segment of a reassembled PDU]
53 0.105522 192.168.86.68 128.119.245.12 TCP 1514 55639 → 80 [ACK] Seq=49233 Ack=1 Win=131712 Len=1448 TSval=725607612 TSecr=3913851455 [TCP segment of a reassembled PDU]
Transmission Control Protocol: Protocol
Packets: 180 · Displayed: 180 (100.0%) · Selected: 2 (1.1%)
Profile: Default
Type here to search
32°C Sunny
ENG
14:28
27-03-2024

Figure 10

4. TCP congestion control in action

12. 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. Consider the “fleets” of packets sent around t = 0.025, t = 0.053, t = 0.082 and t = 0.1. Comment on whether this looks as if TCP is in its slow start phase, congestion avoidance phase or some other phase. Figure 6 shows a slightly different view of this data.

A: TCP is in it’s slow start phase. There’s a fleet of 3 packets, then 6 packets, then 12 packets and then of 24 packets.

13. These “fleets” of segments appear to have some periodicity. What can you say about the period?

A: The period roughly corresponds to the RTT between the sender and receiver which we calculated earlier to be 0.028.