CS372-400
11/5/2019

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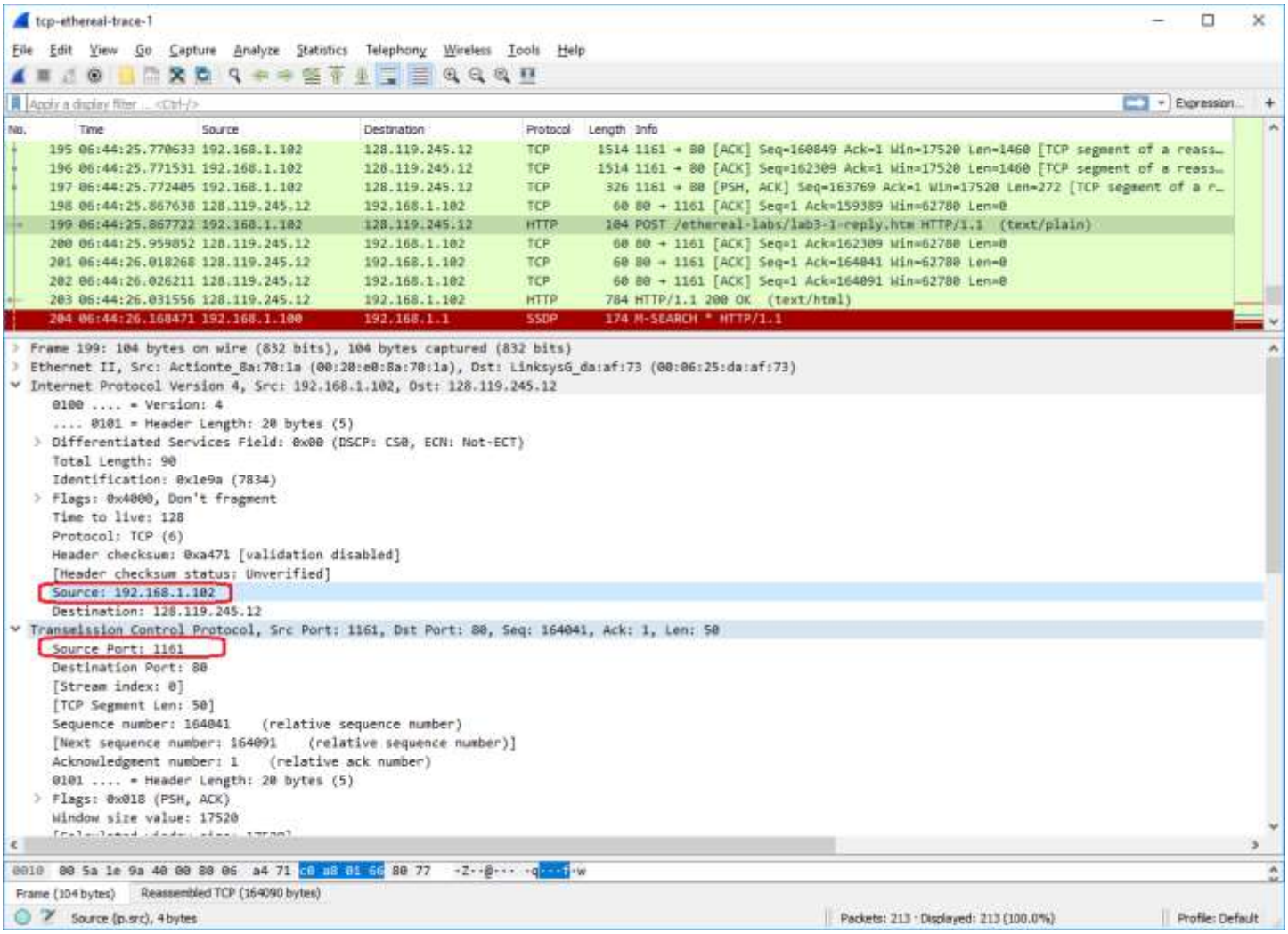
Lab 3: Wireshark

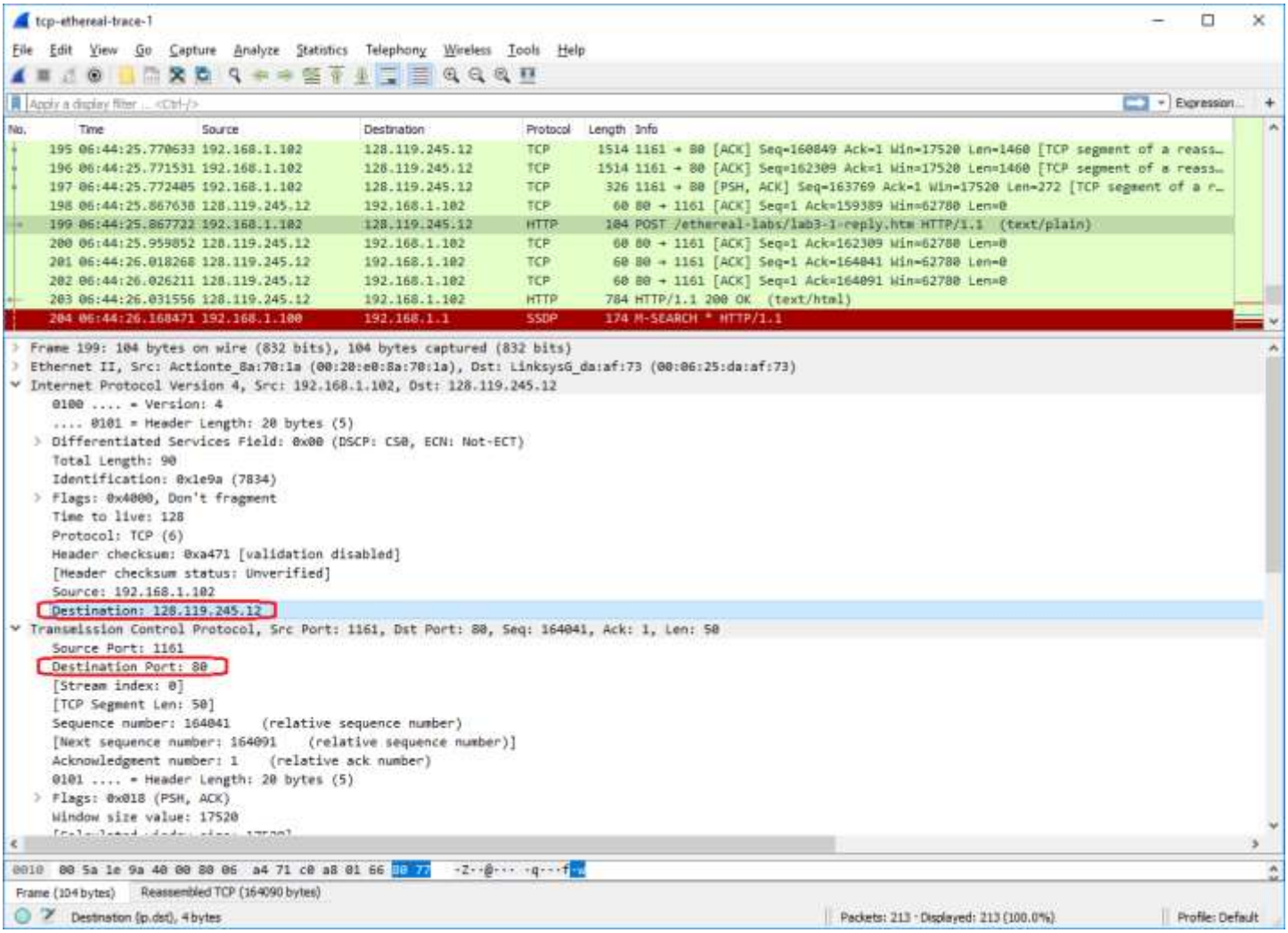
1) What is the IP address and TCP port number used by the client computer (source) that is transferring the file to gaia.cs.umass.edu? To answer this question, it's probably easiest to select an HTTP message and explore the details of the TCP packet used to carry this HTTP message, using the "details 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.

   The source IP address for the client computer is 192.168.1.102 and the source TCP port is 1161.



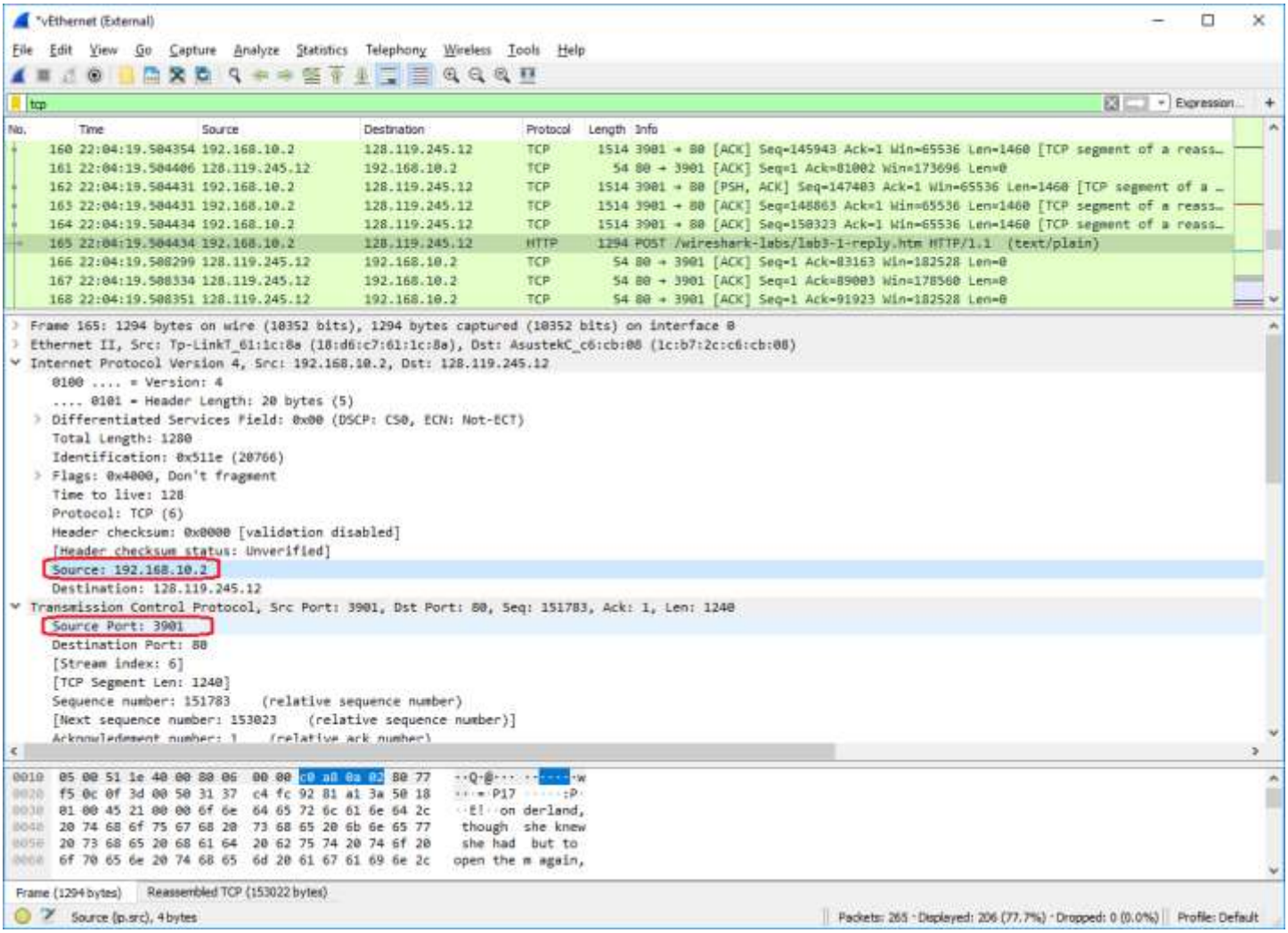
2) What is the IP address of gaia.cs.umass.edu? On what port number is it sending and receiving TCP segments for this connection?

   The destination IP address for gaia.cs.umass.edu is 128.119.245.12 and the destination TCP port is 80.



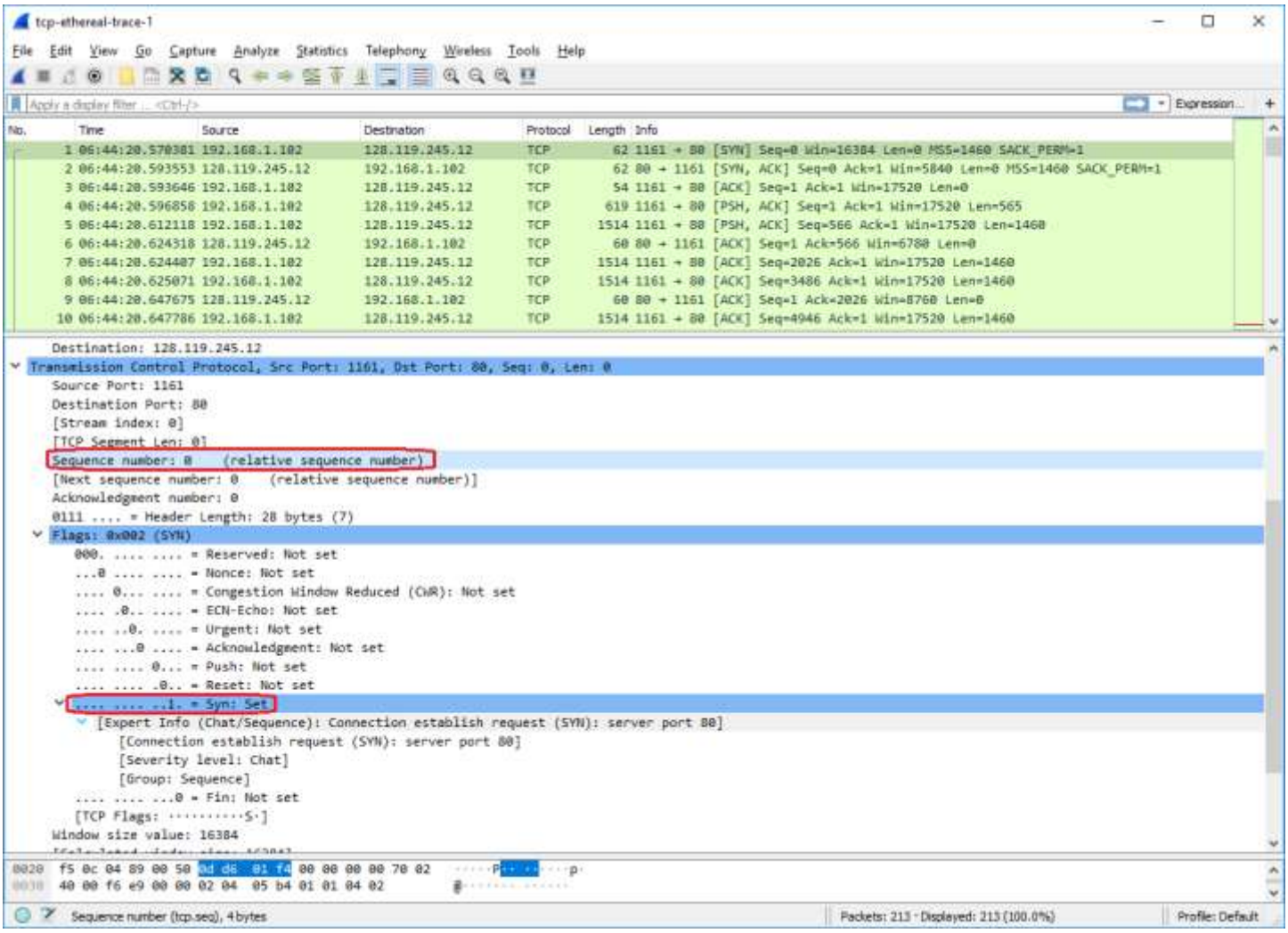
3) If you have been able to create your own trace, answer the following question: What is the IP address and TCP port number used by your client computer (source) to transfer the file to gaia.cs.umass.edu?

   The source IP address for my client computer is 192.168.10.2 and the source TCP port is 3901.



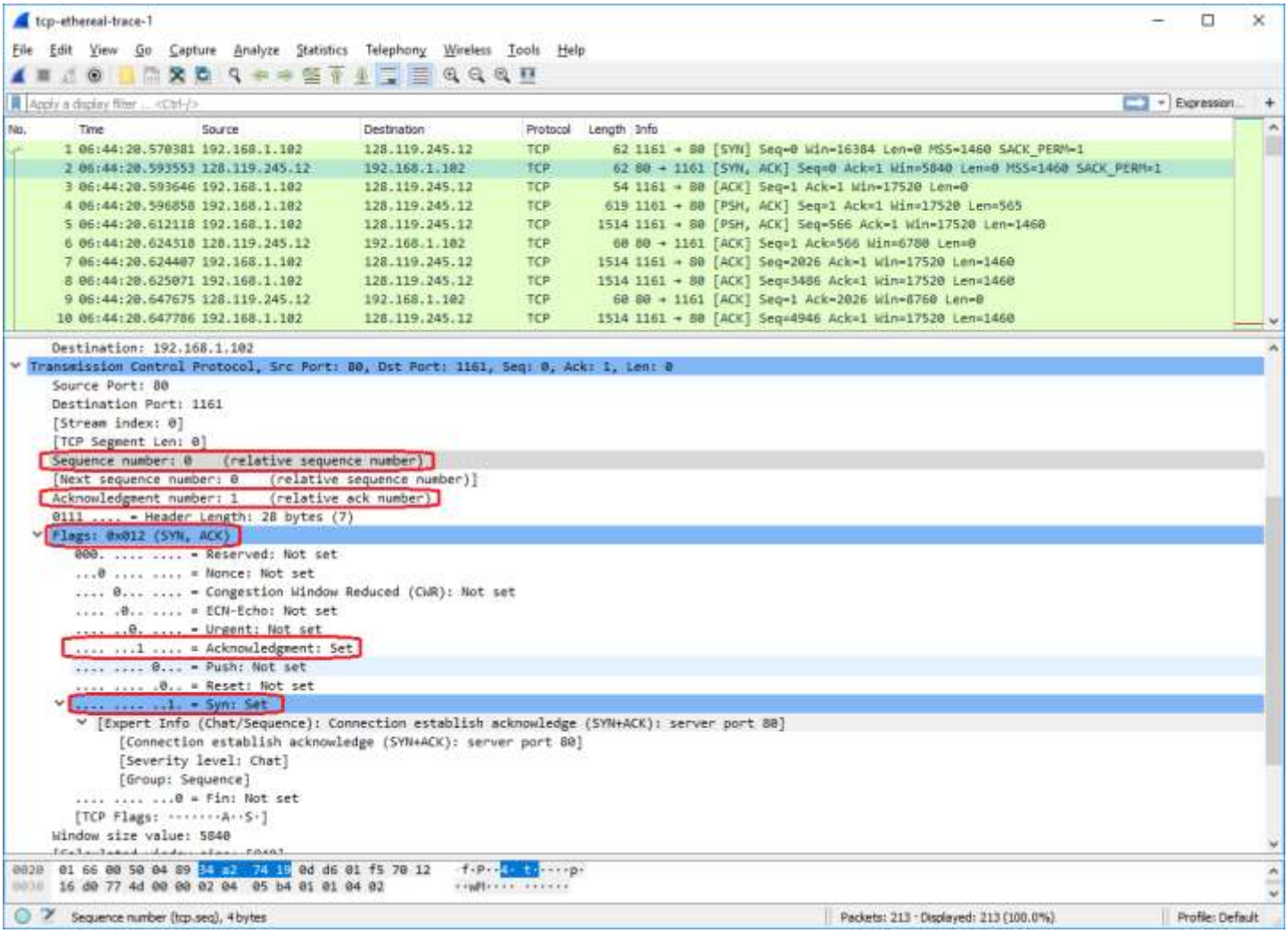
4) What is the sequence number of the TCP SYN segment that is used to initiate the TCP connection between the client computer and gaia.cs.umass.edu? What is it in the segment that identifies the segment as a SYN segment?

   The sequence number of the TCP SYN segment used to initiate the TCP connection is 0. The flags field in the TCP SYN segment has the SYN bit set to 1, which identifies the segment as a SYN segment.



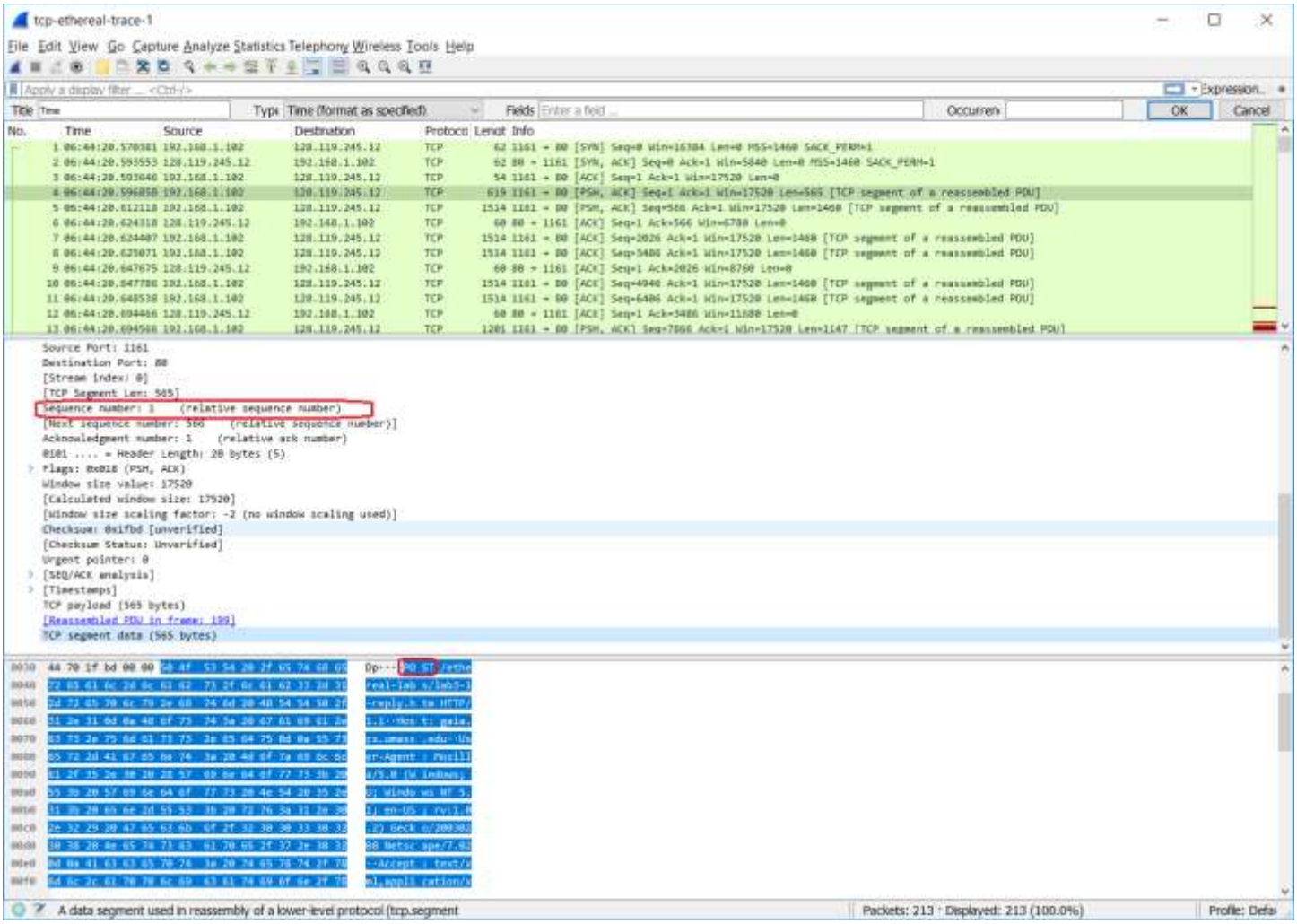
5) What is the sequence number of the SYNACK segment sent by gaia.cs.umass.edu to the client computer in reply to the SYN? What is the value of the Acknowledgement field in the SYNACK segment? How did gaia.cs.umass.edu determine that value? What is it in the segment that identifies the segment as a SYNACK segment?

   The sequence number of the SYNACK segment sent by gaia.cs.umass.edu to the client computer in reply to the SYN is 0. The value of the ACK field in the SYNACK segment is 1. gaia.cs.umass.edu determined the ACK value in the SYNACK segment by incrementing sequence number 0 that was received from the client computer to the ACK value 1. The 10-bit flags field in the TCP SYNACK segment has bit 0 set, which indicates that this is a SYN segment, and bit 3 set, which indicates that this is an ACK segment as well.



6) What is the sequence number of the TCP segment containing the HTTP POST command? Note that in order to find the POST command, you'll need to dig into the packet content field at the bottom of the Wireshark window, looking for a segment with a "POST" within its DATA field.

   The sequence number of the TCP segment containing the HTTP POST command is 1.



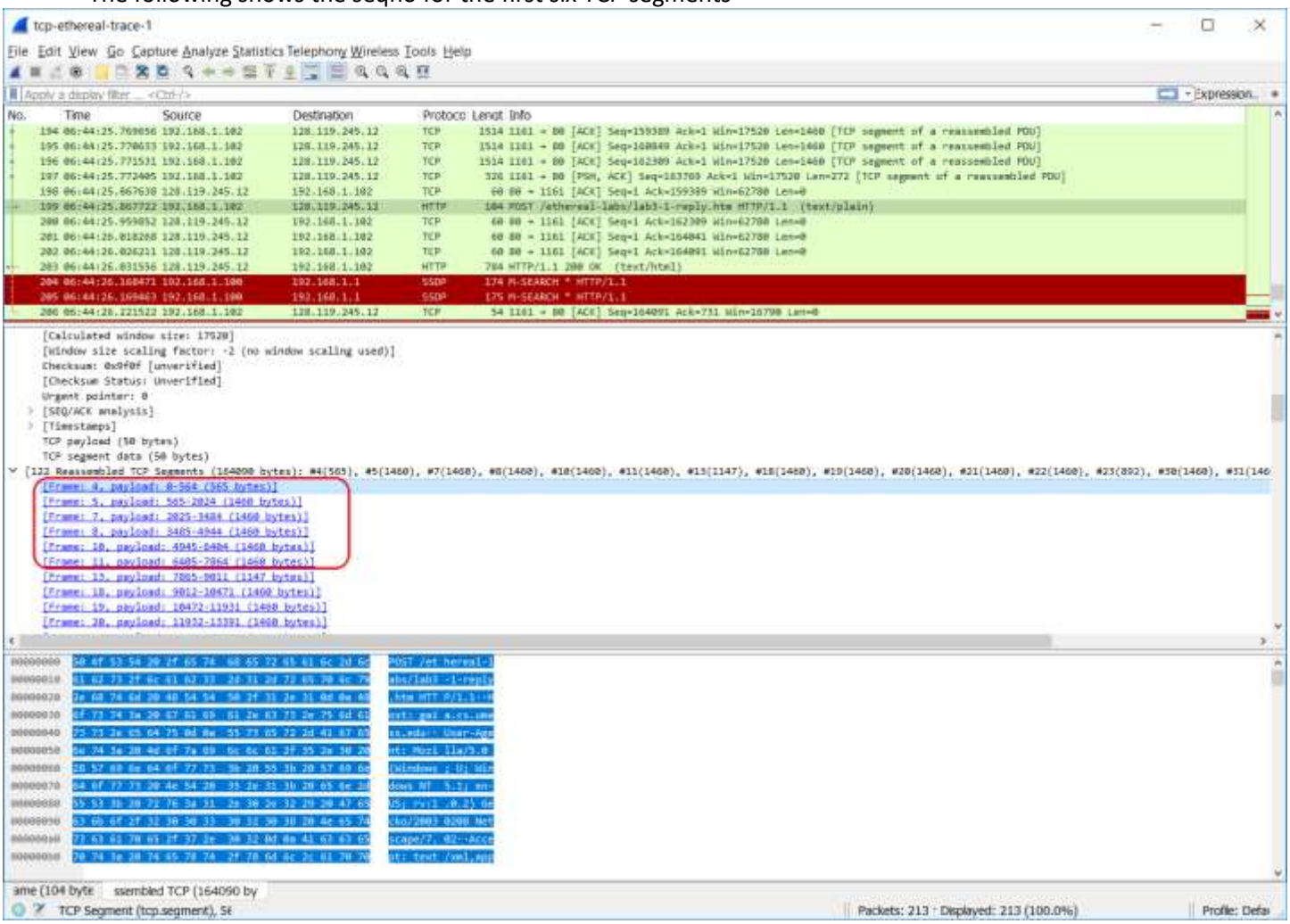
7) Consider the TCP segment containing the HTTP POST as the first segment in the TCP connection. What are the sequence numbers of the first six segments in the TCP connection (including the segment containing the HTTP POST)? At what time was each segment sent? When was the ACK for each segment received? 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 (see Section 3.5.3, page 242 in text) after the receipt of each ACK? Assume that the value of the EstimatedRTT is equal to the measured RTT for the first segment, and then is computed using the EstimatedRTT equation on page 242 for all subsequent segments. You should have a table that looks like this.

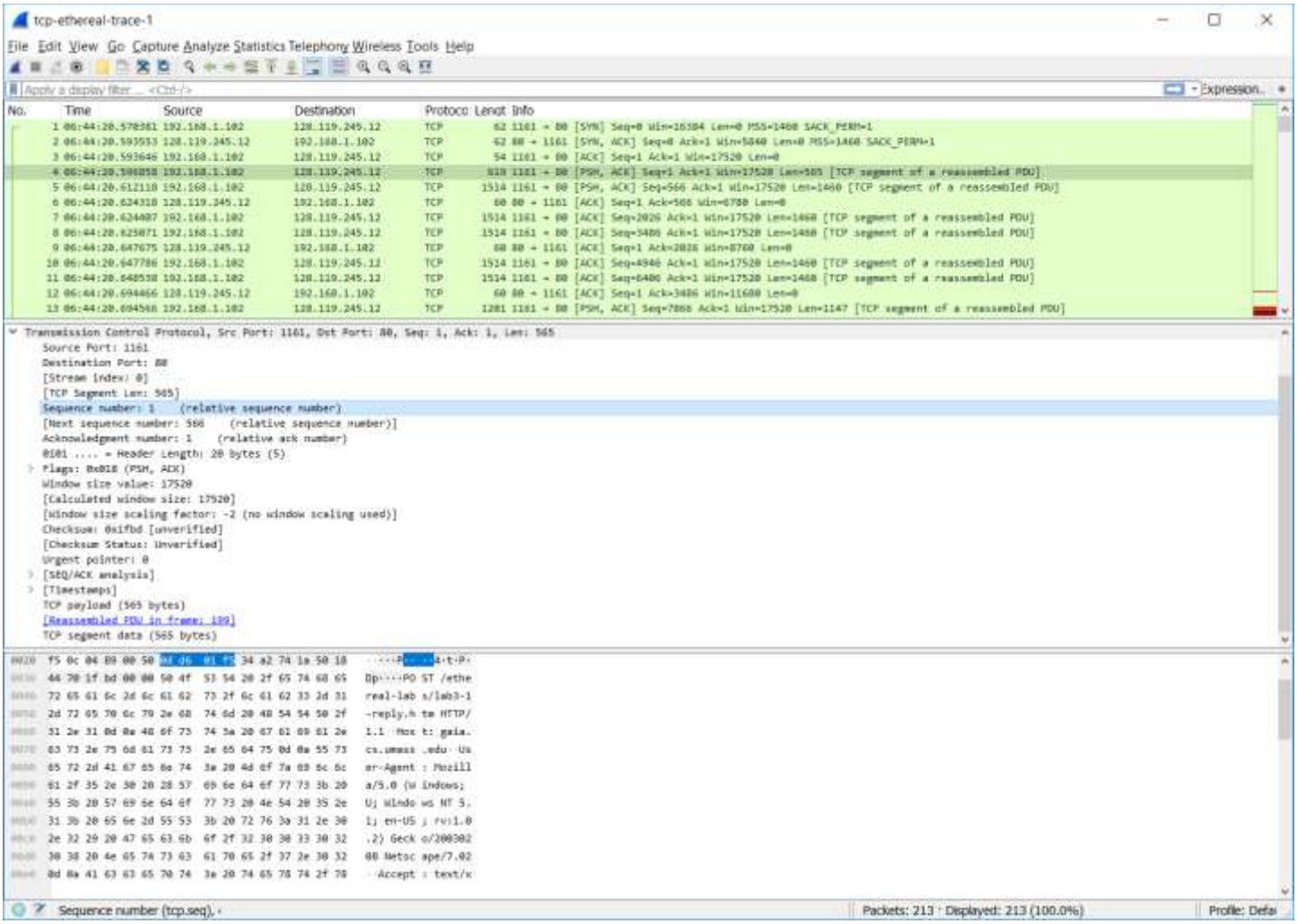
The frame numbers for the first 6 segments in the TCP connection are 4, 5, 7, 8, 10, 11, and the respective sequence numbers of the first six segments in the TCP connection are 1, 566, 2026, 3486, 4946, and 6406. The time for each segment since the capture started, when ACK was received, RTT value, and EstimatedRTT value after ACK receipt is:

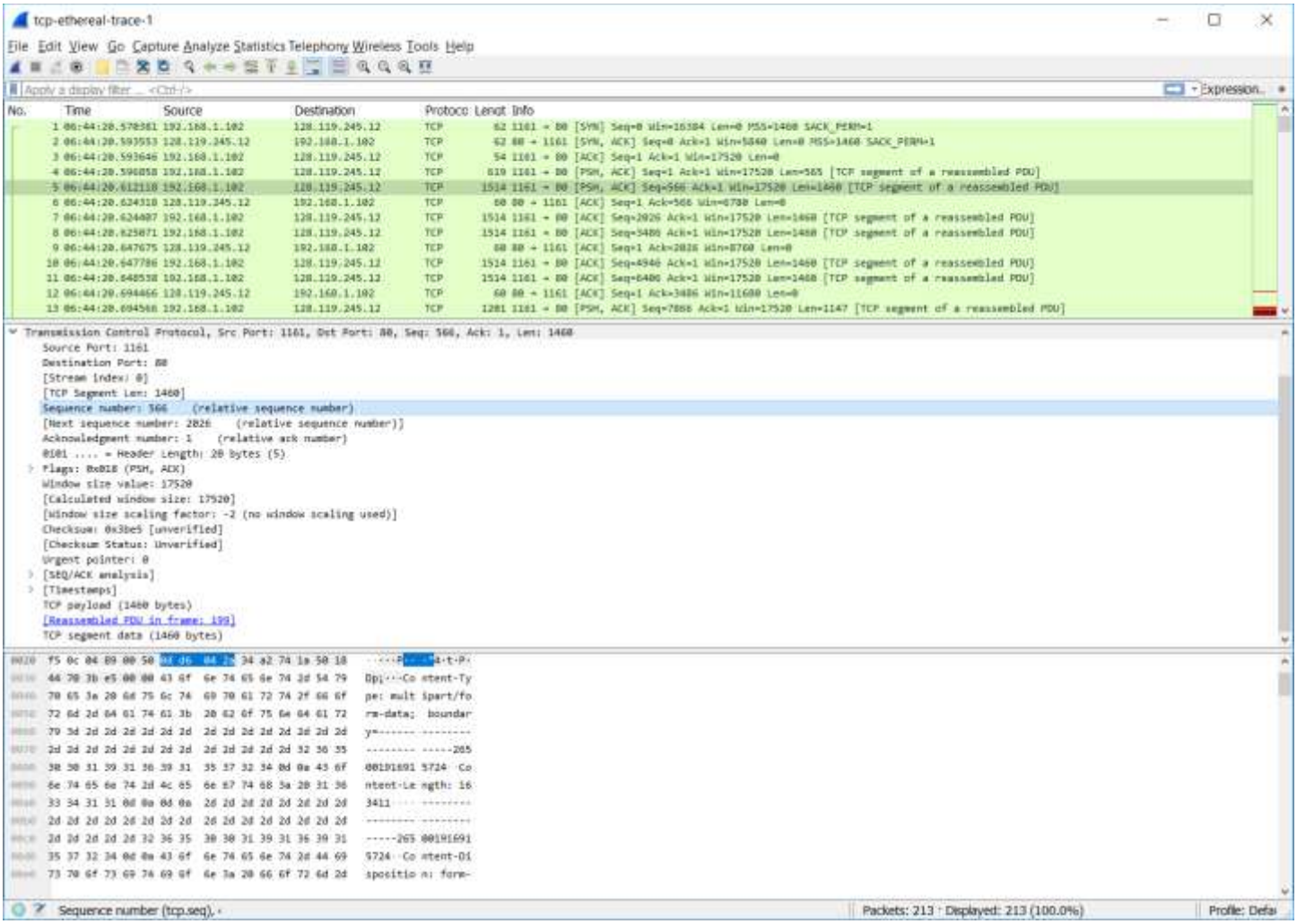
Packet Number #	1	2	3	4	5	6
Time Sent	0.026477	0.041737	0.054026	0.05469	0.077405	0.078157
Time The Ack Received	0.053937	0.077294	0.124085	0.169118	0.217299	0.267802
SampleRTT	0.02746	0.035557	0.070059	0.114428	0.139894	0.189645
EstimatedRTT	0.02746	0.028472	0.03367	0.043765	0.055781	0.072514

$$\text{EstimatedRTT} = (1 - \alpha) \cdot \text{EstimatedRTT} + \alpha \cdot \text{SampleRTT}$$

The following shows the seqno for the first six TCP segments -




tcp-ethereal-trace-1
File Edit View Go Capture Analyze Statistics Telephony Wireless Tools Help
Apply a display filter ... <Ctrl-/>
Expression...
No. Time Source Destination Protoco Lengt Info
1 06:44:20.570361 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 06:44:20.593553 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 06:44:20.593646 192.168.1.102 128.119.245.12 TCP 54 1161 → 80 [ACK] Seq=1 Ack=1 Win=17520 Len=0
4 06:44:20.596858 192.168.1.102 128.119.245.12 TCP 619 1161 → 80 [PSH, ACK] Seq=1 Ack=1 Win=17520 Len=565 [TCP segment of a reassembled PDU]
5 06:44:20.612118 192.168.1.102 128.119.245.12 TCP 1514 1161 → 80 [PSH, ACK] Seq=566 Ack=1 Win=17520 Len=1460 [TCP segment of a reassembled PDU]
6 06:44:20.624318 128.119.245.12 192.168.1.102 TCP 60 80 → 1161 [ACK] Seq=1 Ack=566 Win=6780 Len=0
7 06:44:20.624407 192.168.1.102 128.119.245.12 TCP 1514 1161 → 80 [ACK] Seq=2026 Ack=1 Win=17520 Len=1460 [TCP segment of a reassembled PDU]
8 06:44:20.625071 192.168.1.102 128.119.245.12 TCP 1514 1161 → 80 [ACK] Seq=3486 Ack=1 Win=17520 Len=1460 [TCP segment of a reassembled PDU]
9 06:44:20.647675 128.119.245.12 192.168.1.102 TCP 60 80 → 1161 [ACK] Seq=1 Ack=2026 Win=8760 Len=0
10 06:44:20.647786 192.168.1.102 128.119.245.12 TCP 1514 1161 → 80 [ACK] Seq=4946 Ack=1 Win=17520 Len=1460 [TCP segment of a reassembled PDU]
11 06:44:20.648538 192.168.1.102 128.119.245.12 TCP 1514 1161 → 80 [ACK] Seq=6406 Ack=1 Win=17520 Len=1460 [TCP segment of a reassembled PDU]
12 06:44:20.694466 128.119.245.12 192.168.1.102 TCP 60 80 → 1161 [ACK] Seq=1 Ack=3486 Win=11680 Len=0
13 06:44:20.694566 192.168.1.102 128.119.245.12 TCP 1201 1161 → 80 [PSH, ACK] Seq=7866 Ack=1 Win=17520 Len=1147 [TCP segment of a reassembled PDU]
Transmission Control Protocol, Src Port: 1161, Dst Port: 80, Seq: 1, Ack: 1, Len: 565
Source Port: 1161
Destination Port: 80
[Stream index: 0]
[TCP Segment Len: 565]
Sequence number: 1 (relative sequence number)
[Next sequence number: 566 (relative sequence number)]
Acknowledgment number: 1 (relative ack number)
0101 .... = Header Length: 20 bytes (5)
Flags: 0x018 (PSH, ACK)
Window size value: 17520
[Calculated window size: 17520]
[Window size scaling factor: -2 (no window scaling used)]
Checksum: 0x1fbd [unverified]
[Checksum Status: Unverified]
Urgent pointer: 0
[SEQ/ACK analysis]
[Timestamps]
TCP payload (565 bytes)
[Reassembled PDU in frame: 199]
TCP segment data (565 bytes)
Sequence number (tcp.seq), ·
Packets: 213 · Displayed: 213 (100.0%)
Profile: Defa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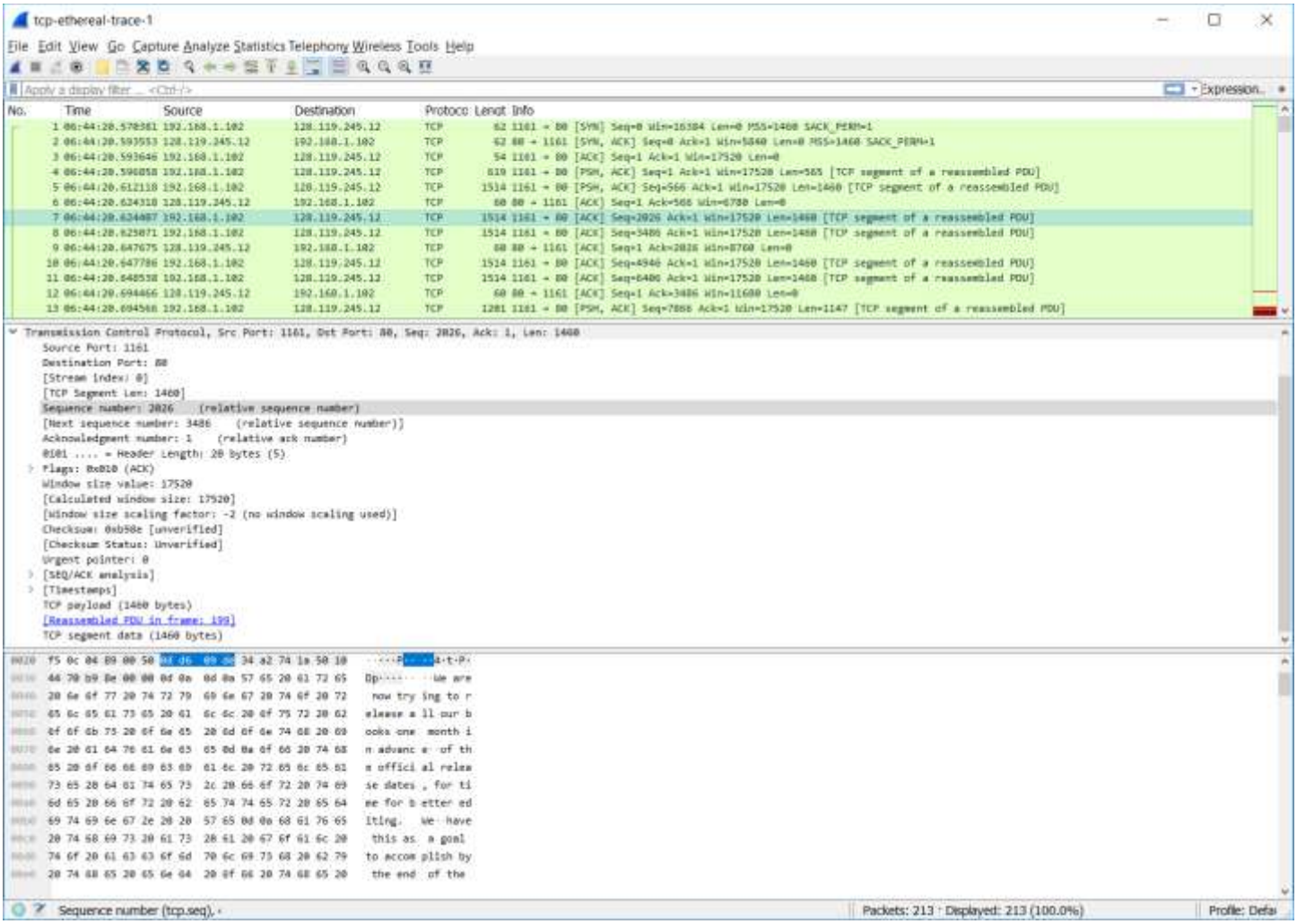
13 06:44:20.694566 192.168.1.102 128.119.245.12 TCP 1281 1161 → 80 [PSH, ACK] Seq=7866 Ack=1 Win=17520 Len=1147 [TCP segment of a reassembled PDU]
Transmission Control Protocol, Src Port: 1161, Dst Port: 80, Seq: 566, Ack: 1, Len: 1460
Source Port: 1161
Destination Port: 80
[Stream index: 0]
[TCP Segment Len: 1460]
Sequence number: 566 (relative sequence number)
[Next sequence number: 2026 (relative sequence number)]
Acknowledgment number: 1 (relative ack number)
0101 .... = Header Length: 20 bytes (5)
Flags: 0x018 (PSH, ACK)
Window size value: 17520
[Calculated window size: 17520]
[Window size scaling factor: -2 (no window scaling used)]
Checksum: 0x3be5 [unverified]
[Checksum Status: Unverified]
Urgent pointer: 0
[SEQ/ACK analysis]
[Timestamps]
TCP payload (1460 bytes)
[Reassembled PDU in frame: 199]
TCP segment data (1460 bytes)
Sequence number (tcp.seq),
Packets: 213 · Displayed: 213 (100.0%)
Profile: Defa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Expression...
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3 06:44:20.593646 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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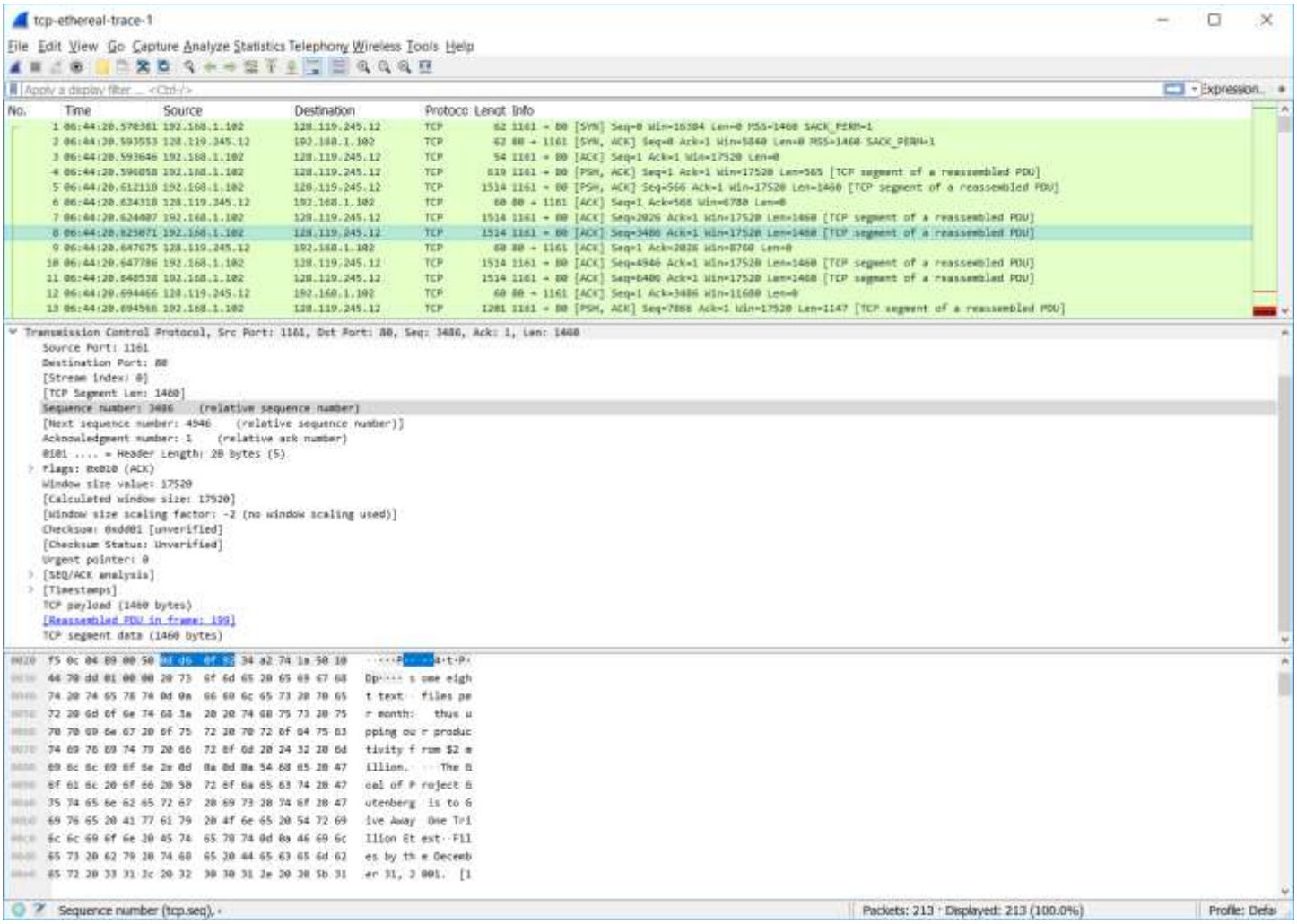
Transmission Control Protocol, Src Port: 1161, Dst Port: 80, Seq: 2026, Ack: 1, Len: 1460
Source Port: 1161
Destination Port: 80
[Stream index: 0]
[TCP Segment Len: 1460]
Sequence number: 2026 (relative sequence number)
[Next sequence number: 3486 (relative sequence number)]
Acknowledgment number: 1 (relative ack number)
0101 .... = Header Length: 20 bytes (5)
Flags: 0x010 (ACK)
Window size value: 17520
[Calculated window size: 17520]
[Window size scaling factor: -2 (no window scaling used)]
Checksum: 0xb58e [unverified]
[Checksum Status: Unverified]
Urgent pointer: 0
[SEQ/ACK analysis]
[Timestamps]
TCP payload (1460 bytes)
[Reassembled PDU in frame: 199]
TCP segment data (1460 bytes)
Sequence number (tcp.seq), ·
Packets: 213 · Displayed: 213 (100.0%)
Profile: Defa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No. Time Source Destination Protocol Length Info
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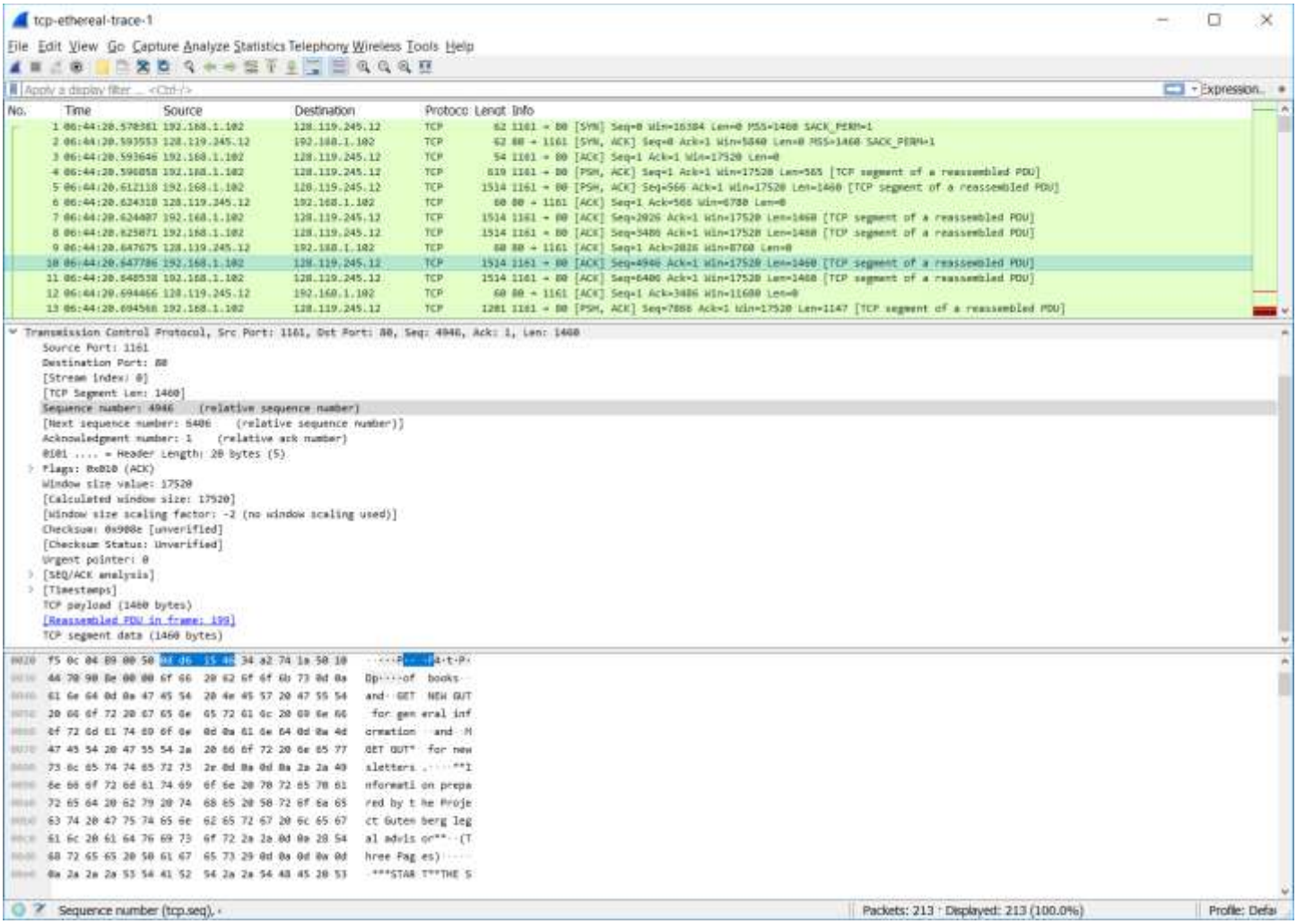
11 06:44:20.648558 192.168.1.102 128.119.245.12 TCP 1514 1161 → 80 [ACK] Seq=6406 Ack=1 Win=17520 Len=1460 [TCP segment of a reassembled PDU]
12 06:44:20.694466 128.119.245.12 192.168.1.102 TCP 60 80 → 1161 [ACK] Seq=1 Ack=3486 Win=11680 Len=0
13 06:44:20.694568 192.168.1.102 128.119.245.12 TCP 1281 1161 → 80 [PSH, ACK] Seq=7866 Ack=1 Win=17520 Len=1147 [TCP segment of a reassembled PDU]
Transmission Control Protocol, Src Port: 1161, Dst Port: 80, Seq: 3486, Ack: 1, Len: 1460
Source Port: 1161
Destination Port: 80
[Stream index: 0]
[TCP Segment Len: 1460]
Sequence number: 3486 (relative sequence number)
[Next sequence number: 4946 (relative sequence number)]
Acknowledgment number: 1 (relative ack number)
0101 .... = Header Length: 20 bytes (5)
Flags: 0x010 (ACK)
Window size value: 17520
[Calculated window size: 17520]
[Window size scaling factor: -2 (no window scaling used)]
Checksum: 0xdd01 [unverified]
[Checksum Status: Unverified]
Urgent pointer: 0
[SEQ/ACK analysis]
[Timestamps]
TCP payload (1460 bytes)
[Reassembled PDU in frame: 199]
TCP segment data (1460 bytes)
Sequence number (tcp.seq), 4
Packets: 213 · Displayed: 213 (100.0%)
Profile: Defa


tcp-ethereal-trace-1
File Edit View Go Capture Analyze Statistics Telephony Wireless Tools Help
Apply a display filter ... <Ctrl-/>
Expression...
No. Time Source Destination Protocol Length Info
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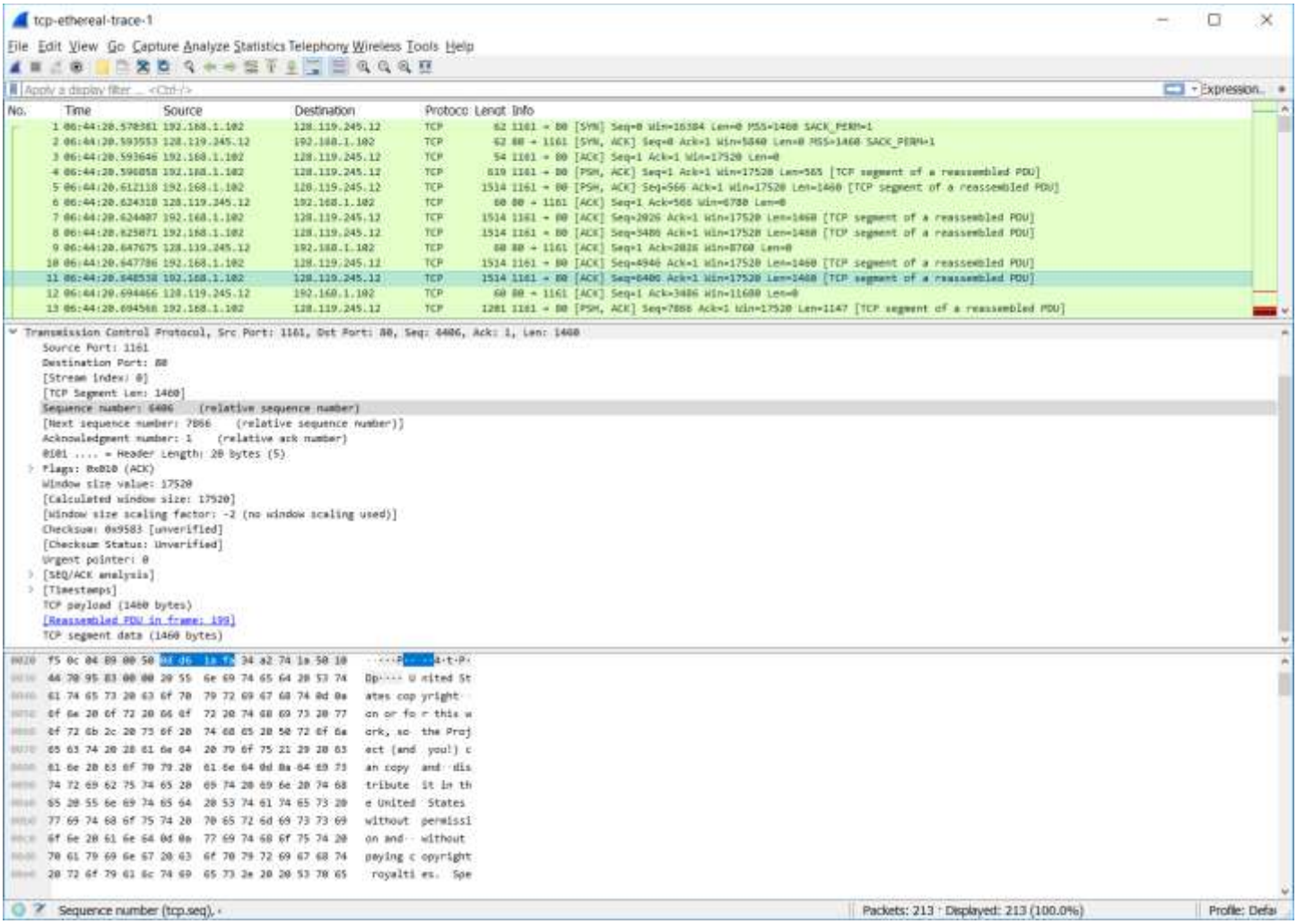
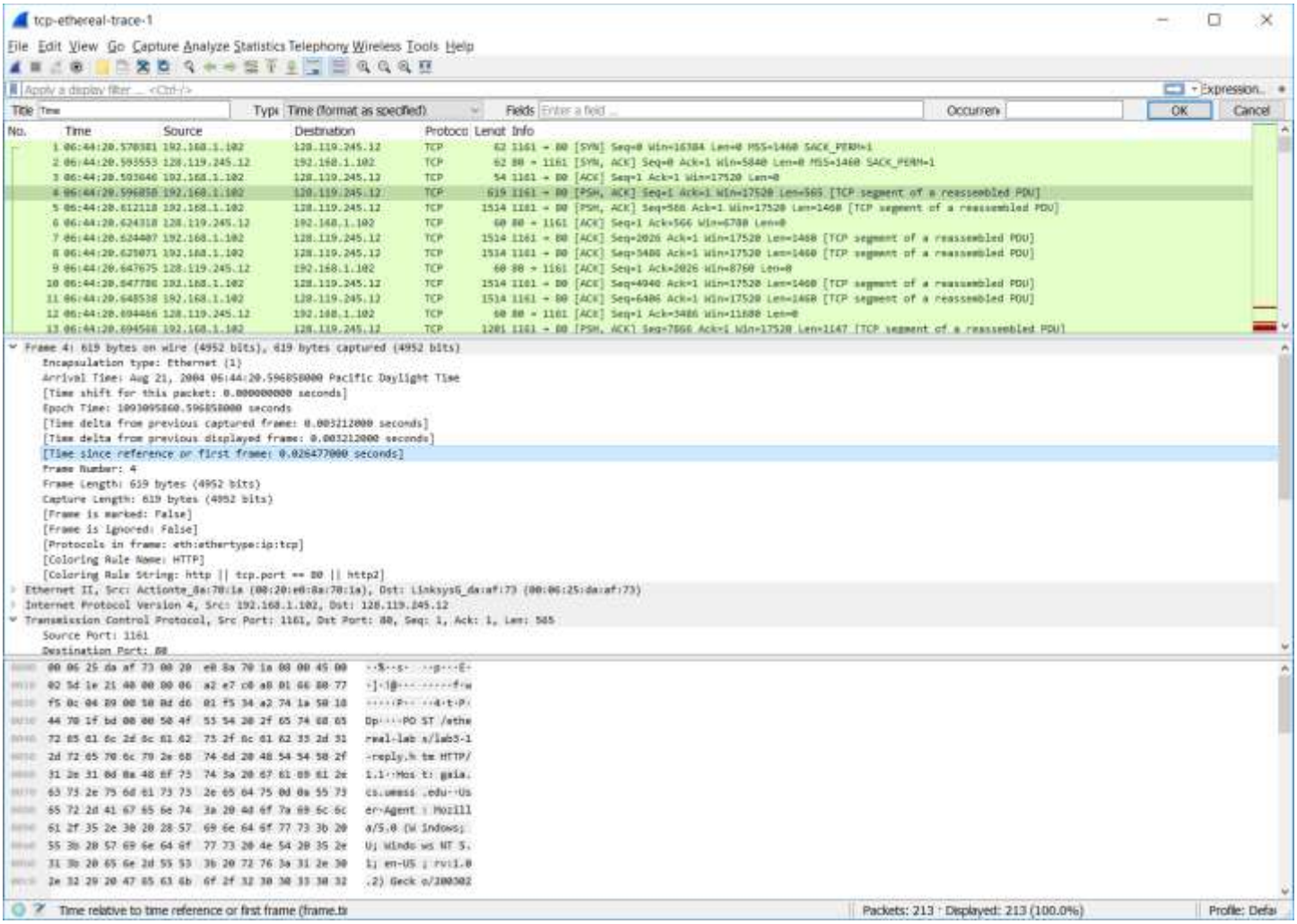
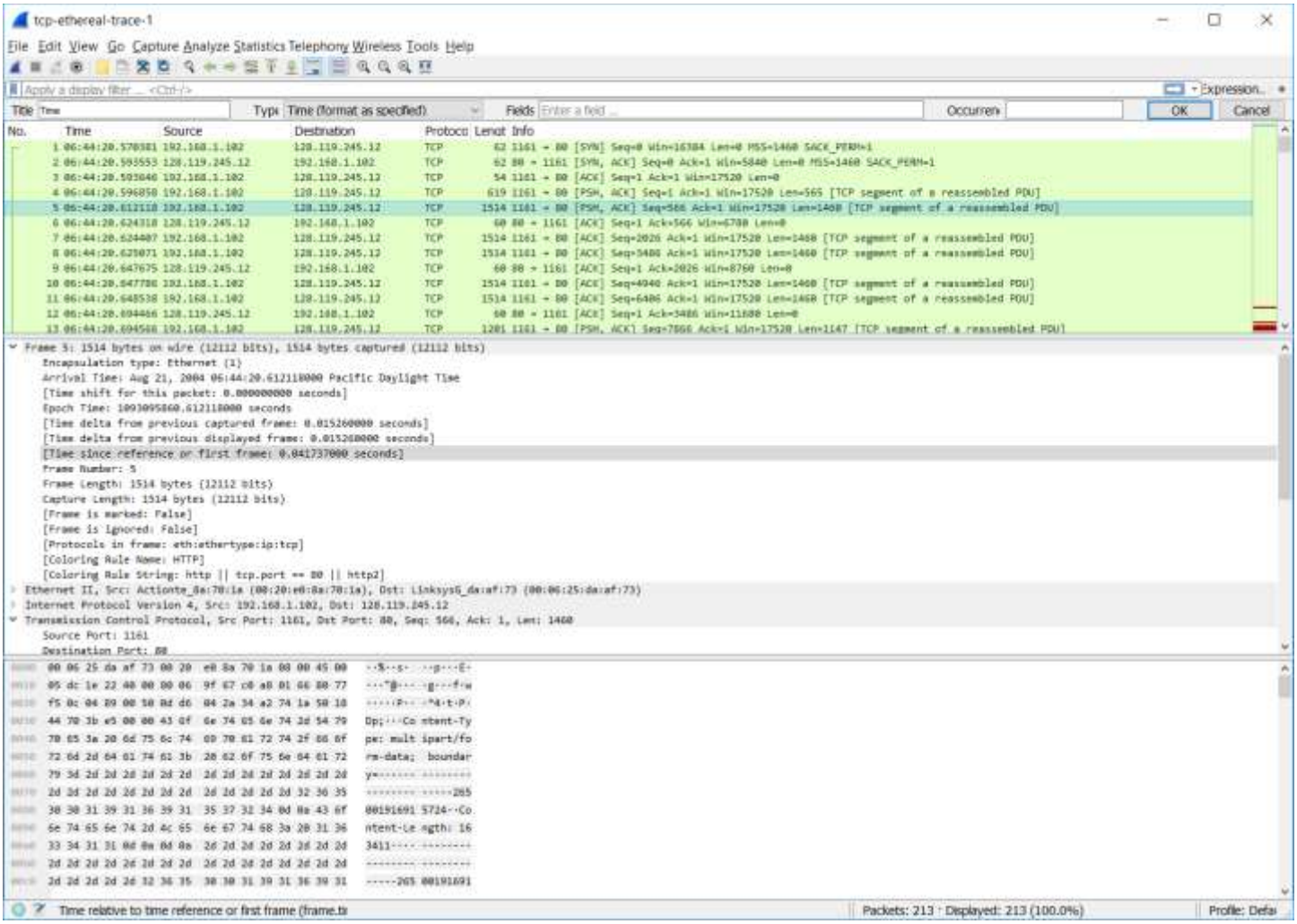
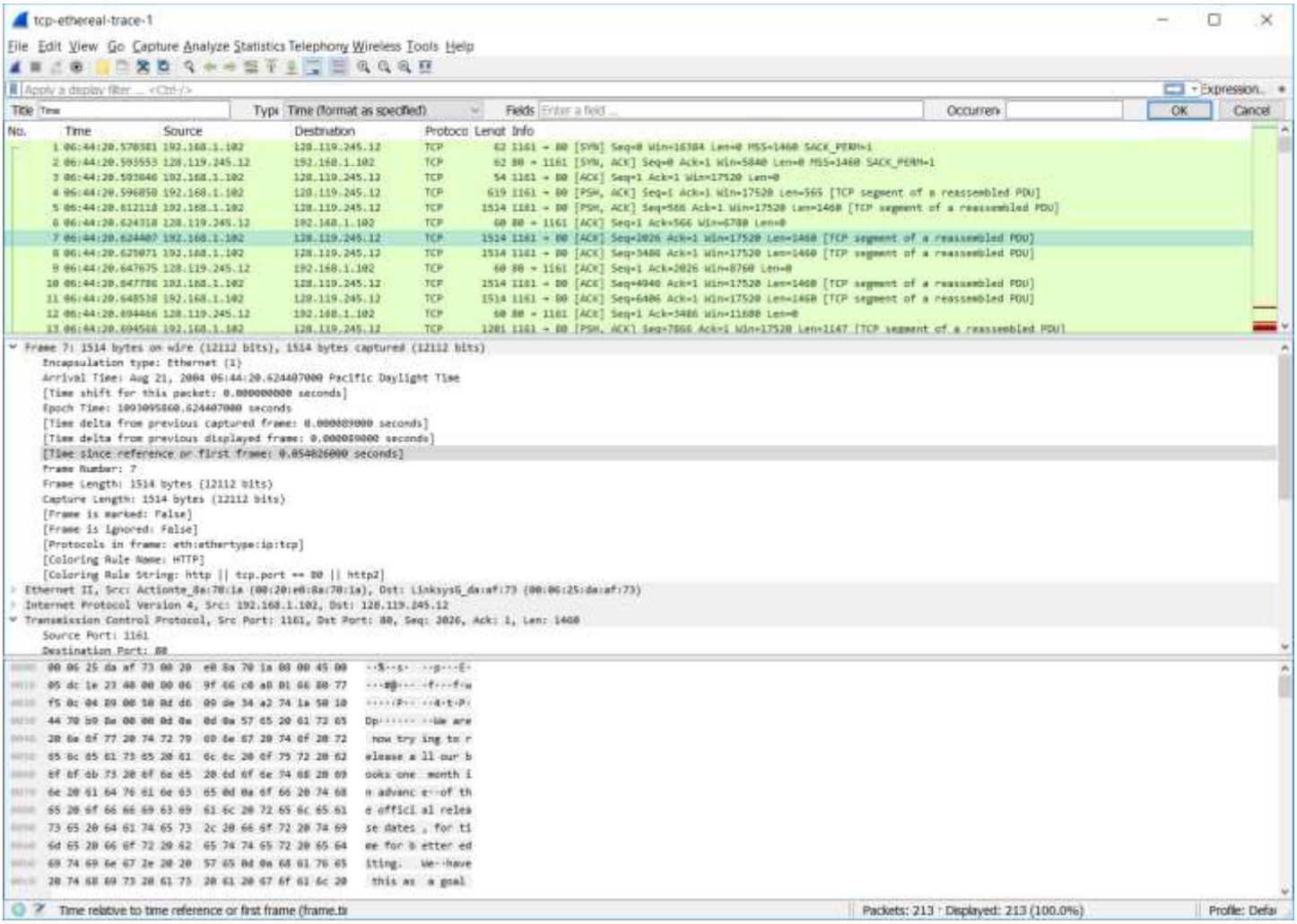
12 06:44:20.694466 128.119.245.12 192.168.1.102 TCP 60 80 → 1161 [ACK] Seq=1 Ack=3486 Win=11680 Len=0
13 06:44:20.694568 192.168.1.102 128.119.245.12 TCP 1281 1161 → 80 [PSH, ACK] Seq=7866 Ack=1 Win=17520 Len=1147 [TCP segment of a reassembled PDU]
Transmission Control Protocol, Src Port: 1161, Dst Port: 80, Seq: 4946, Ack: 1, Len: 1460
Source Port: 1161
Destination Port: 80
[Stream index: 0]
[TCP Segment Len: 1460]
Sequence number: 4946 (relative sequence number)
[Next sequence number: 6406 (relative sequence number)]
Acknowledgment number: 1 (relative ack number)
0101 .... = Header Length: 20 bytes (5)
Flags: 0x010 (ACK)
Window size value: 17520
[Calculated window size: 17520]
[Window size scaling factor: -2 (no window scaling used)]
Checksum: 0x988e [unverified]
[Checksum Status: Unverified]
Urgent pointer: 0
[SEQ/ACK analysis]
[Timestamps]
TCP payload (1460 bytes)
[Reassembled PDU in frame: 199]
TCP segment data (1460 bytes)
Sequence number (tcp.seq), 4
Packets: 213 · Displayed: 213 (100.0%)
Profile: Defa

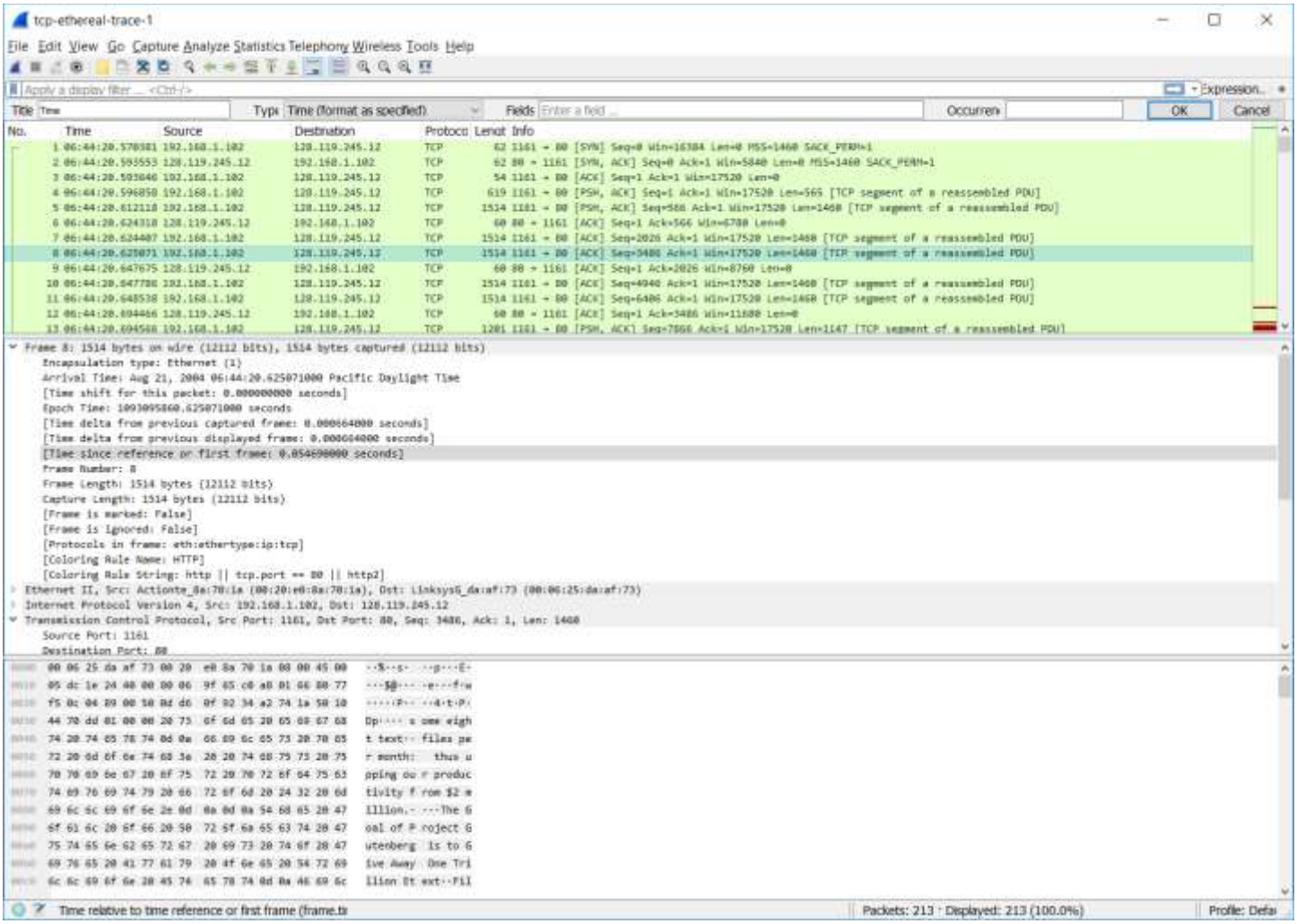


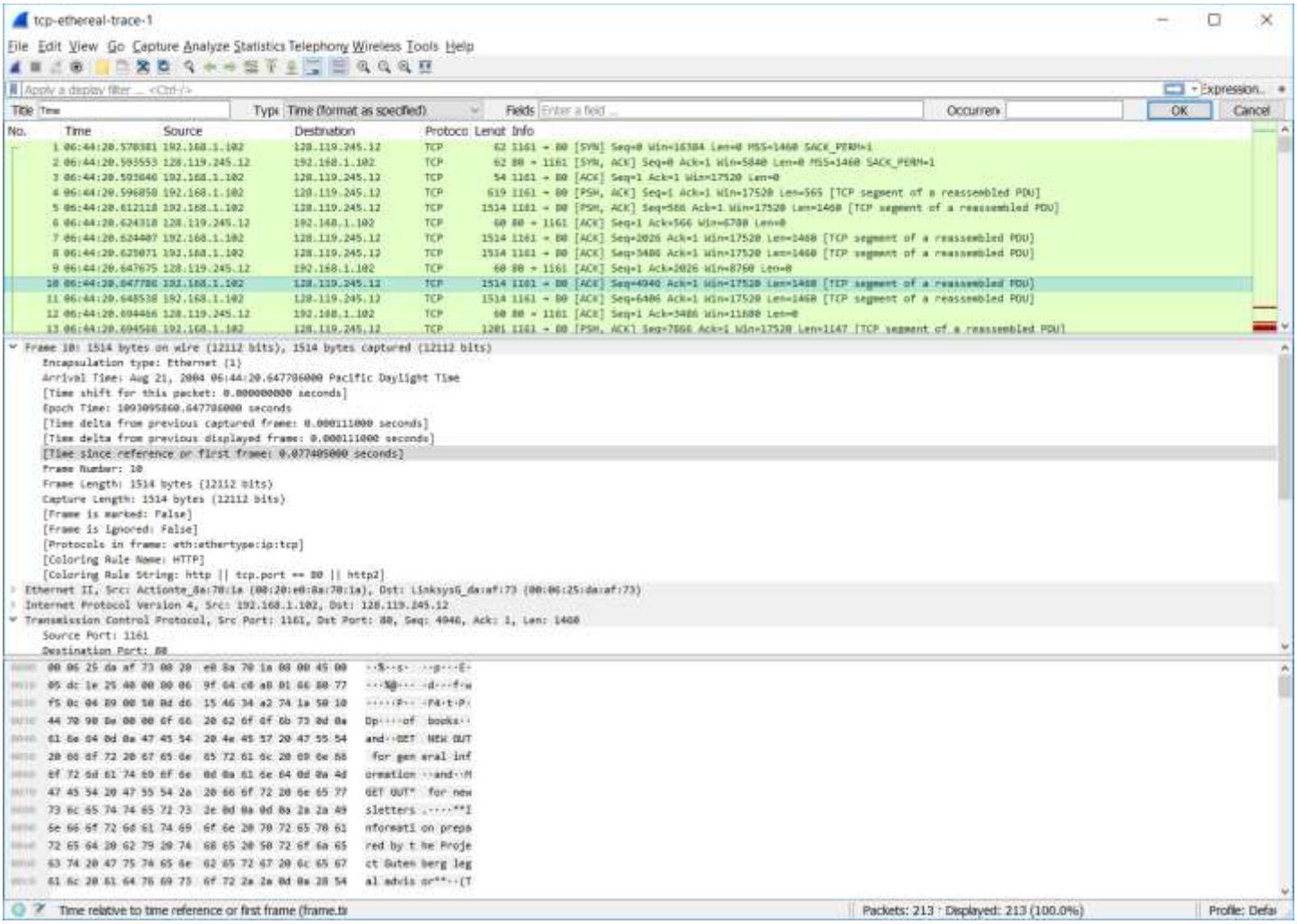
The following shows the time delta since the capture started for the first 6 TCP segments –

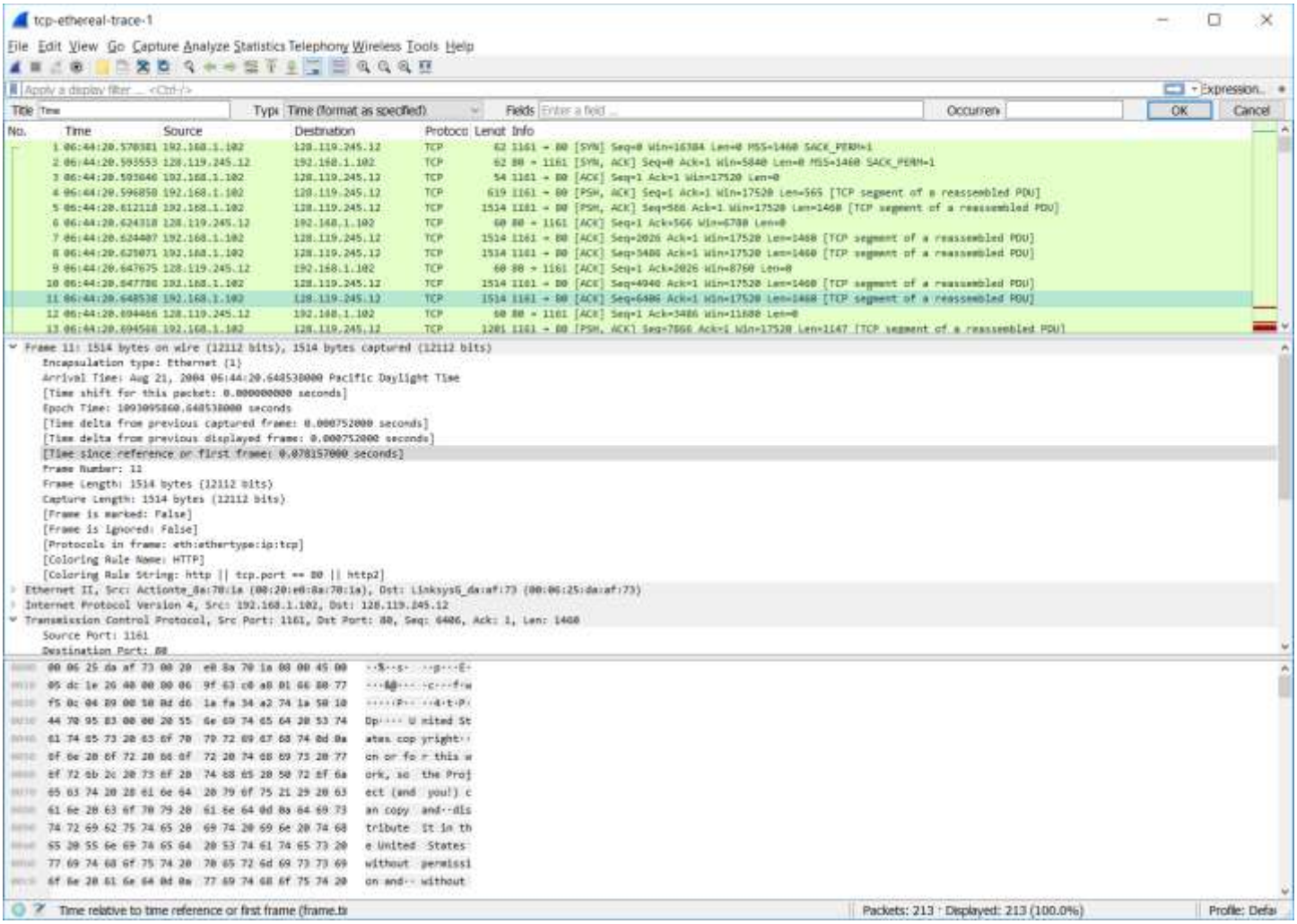

tcp-ethereal-trace-1
File Edit View Go Capture Analyze Statistics Telephony Wireless Tools Help
Apply a display filter ... <Ctrl-/>
Expression...
Title Time
Type Time (format as specified)
Fields Enter a field ...
Occurrence
OK
Cancel
No. Time Source Destination Protocol Length Info
1 06:44:20.570381 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 06:44:20.593553 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 06:44:20.593646 192.168.1.102 128.119.245.12 TCP 54 1161 → 80 [ACK] Seq=1 Ack=1 Win=17520 Len=0
4 06:44:20.596858 192.168.1.102 128.119.245.12 TCP 619 1161 → 80 [PSH, ACK] Seq=1 Ack=1 Win=17520 Len=565 [TCP segment of a reassembled PDU]
5 06:44:20.612118 192.168.1.102 128.119.245.12 TCP 1514 1161 → 80 [PSH, ACK] Seq=566 Ack=1 Win=17520 Len=1460 [TCP segment of a reassembled PDU]
6 06:44:20.624318 128.119.245.12 192.168.1.102 TCP 60 80 → 1161 [ACK] Seq=1 Ack=566 Win=6780 Len=0
7 06:44:20.624407 192.168.1.102 128.119.245.12 TCP 1514 1161 → 80 [ACK] Seq=2026 Ack=1 Win=17520 Len=1460 [TCP segment of a reassembled PDU]
8 06:44:20.625071 192.168.1.102 128.119.245.12 TCP 1514 1161 → 80 [ACK] Seq=3486 Ack=1 Win=17520 Len=1460 [TCP segment of a reassembled PDU]
9 06:44:20.647675 128.119.245.12 192.168.1.102 TCP 60 80 → 1161 [ACK] Seq=1 Ack=2026 Win=8760 Len=0
10 06:44:20.647786 192.168.1.102 128.119.245.12 TCP 1514 1161 → 80 [ACK] Seq=4946 Ack=1 Win=17520 Len=1460 [TCP segment of a reassembled PDU]
11 06:44:20.648538 192.168.1.102 128.119.245.12 TCP 1514 1161 → 80 [ACK] Seq=6406 Ack=1 Win=17520 Len=1460 [TCP segment of a reassembled PDU]
12 06:44:20.694466 128.119.245.12 192.168.1.102 TCP 60 80 → 1161 [ACK] Seq=1 Ack=3486 Win=11680 Len=0
13 06:44:20.694568 192.168.1.102 128.119.245.12 TCP 1201 1161 → 80 [PSH, ACK] Seq=7866 Ack=1 Win=17520 Len=1147 [TCP segment of a reassembled PDU]
Frame 4: 619 bytes on wire (4952 bits), 619 bytes captured (4952 bits)
Encapsulation type: Ethernet (1)
Arrival Time: Aug 21, 2004 06:44:20.596858000 Pacific Daylight Time
[Time shift for this packet: 0.000000000 seconds]
Epoch Time: 1093095860.596858000 seconds
[Time delta from previous captured frame: 0.003212000 seconds]
[Time delta from previous displayed frame: 0.003212000 seconds]
[Time since reference or first frame: 0.026477000 seconds]
Frame Number: 4
Frame Length: 619 bytes (4952 bits)
Capture Length: 619 bytes (4952 bits)
[Frame is marked: False]
[Frame is ignored: False]
[Protocols in frame: eth:ethertype:ip:tcp]
[Coloring Rule Name: HTTP]
[Coloring Rule String: http || tcp.port == 80 || http2]
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: 1, Ack: 1, Len: 565
Source Port: 1161
Destination Port: 80
00 06 25 da af 73 00 20 e0 8a 70 1a 08 00 45 00 ··%··s· ··p···E·
02 5d 1e 21 40 00 80 06 a2 e7 c0 a8 01 66 80 77 ·]·!@··· ·····f·w
f5 0c 04 29 00 50 8d d6 01 f5 34 a2 74 1a 50 18 ···)·P·· ··4·t·P·
44 70 1f bd 00 00 50 4f 53 54 20 2f 65 74 68 65 Dp····PO ST /ethe
72 65 61 6c 2d 8c 61 62 73 2f 8c 61 62 35 2d 31 real-lab s/lab5-1
2d 72 65 70 6c 79 2e 68 74 6d 20 48 54 54 50 2f -reply.h tm HTTP/
31 2e 31 0d 0a 48 6f 73 74 3a 20 67 61 69 61 2e 1.1··Hos t: gaia.
63 73 2e 75 6d 61 73 73 2e 65 64 75 0d 0a 55 73 cs.umass .edu··Us
65 72 2d 41 67 65 6e 74 3a 20 4d 6f 7a 69 6c 6c er-Agent : Mozill
61 2f 35 2e 30 20 28 57 69 6e 64 6f 77 73 3b 20 a/5.0 (W indows;
55 3b 20 57 69 6e 64 6f 77 73 20 4e 54 20 35 2e U; Windo ws NT 5.
31 3b 20 65 6e 2d 55 53 3b 20 72 76 3a 31 2e 30 1; en-US ; rv:1.0
2e 32 29 20 47 65 63 6b 6f 2f 32 30 30 33 30 32 .2) Geck o/200302
Time relative to time reference or first frame (frame.ti
Packets: 213 · Displayed: 213 (100.0%)
Profile: Defa


tcp-ethereal-trace-1
File Edit View Go Capture Analyze Statistics Telephony Wireless Tools Help
Apply a display filter ... <Ctrl-/>
Expression...
Title Time
Type Time (format as specified)
Fields Enter a field ...
Occurrence
OK
Cancel
No. Time Source Destination Protocol Length Info
1 06:44:20.570381 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 06:44:20.593553 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 06:44:20.593646 192.168.1.102 128.119.245.12 TCP 54 1161 → 80 [ACK] Seq=1 Ack=1 Win=17520 Len=0
4 06:44:20.596850 192.168.1.102 128.119.245.12 TCP 619 1161 → 80 [PSH, ACK] Seq=1 Ack=1 Win=17520 Len=565 [TCP segment of a reassembled PDU]
5 06:44:20.612118 192.168.1.102 128.119.245.12 TCP 1514 1161 → 80 [PSH, ACK] Seq=566 Ack=1 Win=17520 Len=1460 [TCP segment of a reassembled PDU]
6 06:44:20.624318 128.119.245.12 192.168.1.102 TCP 60 80 → 1161 [ACK] Seq=1 Ack=566 Win=6780 Len=0
7 06:44:20.624407 192.168.1.102 128.119.245.12 TCP 1514 1161 → 80 [ACK] Seq=2026 Ack=1 Win=17520 Len=1460 [TCP segment of a reassembled PDU]
8 06:44:20.625071 192.168.1.102 128.119.245.12 TCP 1514 1161 → 80 [ACK] Seq=3486 Ack=1 Win=17520 Len=1460 [TCP segment of a reassembled PDU]
9 06:44:20.647675 128.119.245.12 192.168.1.102 TCP 60 80 → 1161 [ACK] Seq=1 Ack=2026 Win=8760 Len=0
10 06:44:20.647786 192.168.1.102 128.119.245.12 TCP 1514 1161 → 80 [ACK] Seq=4946 Ack=1 Win=17520 Len=1460 [TCP segment of a reassembled PDU]
11 06:44:20.648538 192.168.1.102 128.119.245.12 TCP 1514 1161 → 80 [ACK] Seq=6406 Ack=1 Win=17520 Len=1460 [TCP segment of a reassembled PDU]
12 06:44:20.694466 128.119.245.12 192.168.1.102 TCP 60 80 → 1161 [ACK] Seq=1 Ack=3486 Win=11680 Len=0
13 06:44:20.694568 192.168.1.102 128.119.245.12 TCP 1201 1161 → 80 [PSH, ACK] Seq=7866 Ack=1 Win=17520 Len=1147 [TCP segment of a reassembled PDU]
Frame 5: 1514 bytes on wire (12112 bits), 1514 bytes captured (12112 bits)
Encapsulation type: Ethernet (1)
Arrival Time: Aug 21, 2004 06:44:20.612118000 Pacific Daylight Time
[Time shift for this packet: 0.000000000 seconds]
Epoch Time: 1093095860.612118000 seconds
[Time delta from previous captured frame: 0.015260000 seconds]
[Time delta from previous displayed frame: 0.015260000 seconds]
[Time since reference or first frame: 0.041737000 seconds]
Frame Number: 5
Frame Length: 1514 bytes (12112 bits)
Capture Length: 1514 bytes (12112 bits)
[Frame is marked: False]
[Frame is ignored: False]
[Protocols in frame: eth:ethertype:ip:tcp]
[Coloring Rule Name: HTTP]
[Coloring Rule String: http || tcp.port == 80 || http2]
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: 566, Ack: 1, Len: 1460
Source Port: 1161
Destination Port: 80
00 06 25 da af 73 00 20 e0 8a 70 1a 08 00 45 00 ··%··s· ··p···E·
05 dc 1e 22 40 00 80 06 9f 67 c0 a8 01 66 80 77 ···"@···· ·g···f·w
f5 0c 04 89 00 50 8d d6 04 2a 34 a2 74 1a 50 10 ·····P·· ·*4·t·P·
44 70 3b e5 00 00 43 6f 6e 74 65 6e 74 2d 54 79 Dp;···Co ntent-Ty
70 65 3a 20 6d 75 6c 74 69 70 61 72 74 2f 66 6f pe: mult ipart/fo
72 6d 2d 64 61 74 61 3b 20 62 6f 75 6e 64 61 72 rm-data; boundar
79 3d 2d 2d 2d 2d 2d 2d 2d 2d 2d 2d 2d 2d 2d 2d y=------ --------
2d 2d 2d 2d 2d 2d 2d 2d 2d 2d 2d 2d 32 36 35 -------- -----265
30 30 31 39 31 36 39 31 35 37 32 34 0d 0a 43 6f 00191691 5724··Co
6e 74 65 6e 74 2d 4c 65 6e 67 74 68 3a 20 31 36 ntent-Le ngth: 16
33 34 31 31 0d 0a 0d 0a 2d 2d 2d 2d 2d 2d 2d 2d 3411···· --------
2d 2d 2d 2d 2d 2d 2d 2d 2d 2d 2d 2d 2d 2d 2d 2d -------- --------
2d 2d 2d 2d 2d 32 36 35 30 30 31 39 31 36 39 31 -----265 00191691
Time relative to time reference or first frame (frame.ti
Packets: 213 · Displayed: 213 (100.0%)
Profile: Defa

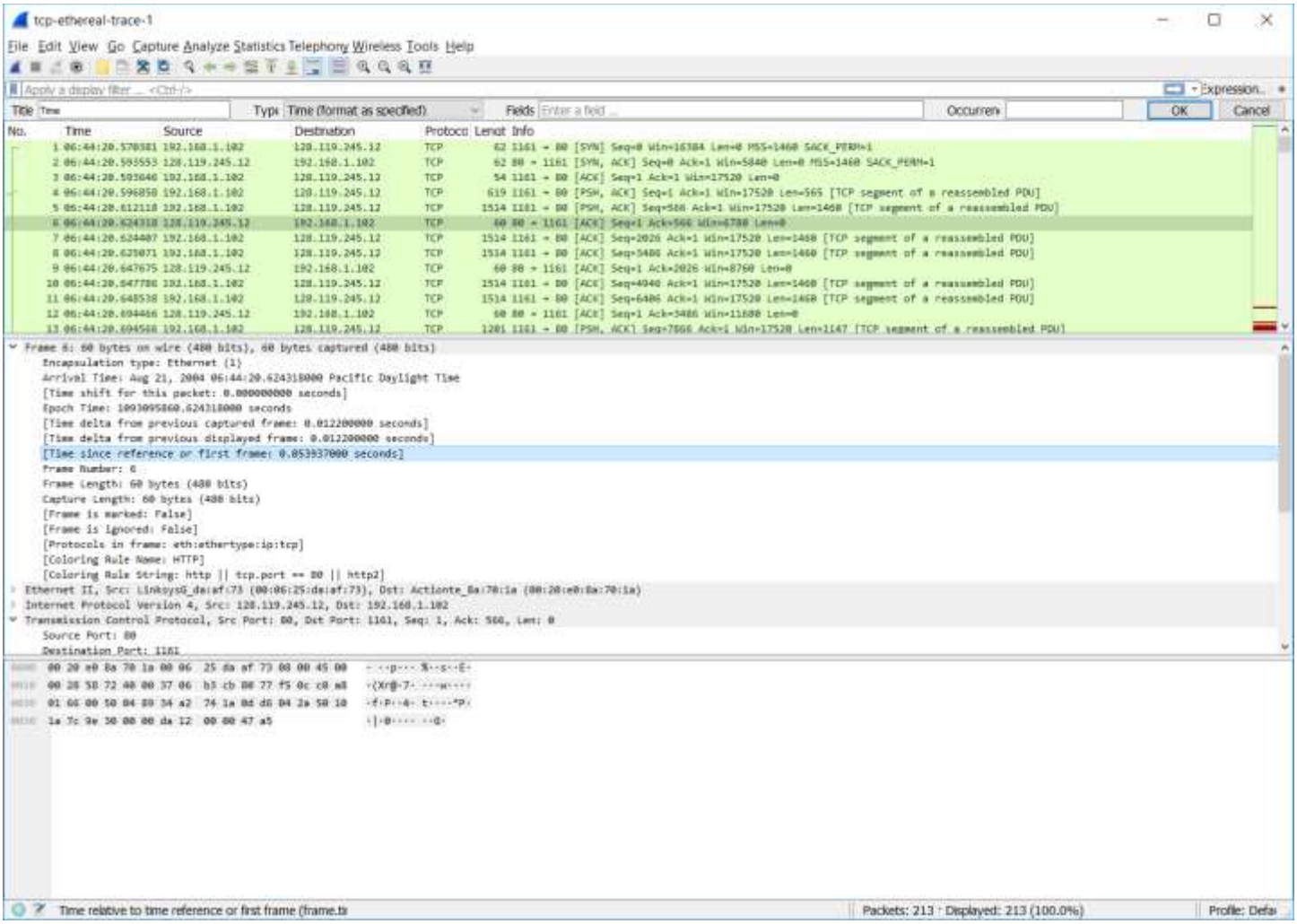

tcp-ethereal-trace-1
File Edit View Go Capture Analyze Statistics Telephony Wireless Tools Help
Apply a display filter ... <Ctrl-/>
Expression...
Title Time
Type Time (format as specified)
Fields Enter a field ...
Occurrence
OK
Cancel
No. Time Source Destination Protocol Length Info
1 06:44:20.570381 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 06:44:20.593553 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 06:44:20.593646 192.168.1.102 128.119.245.12 TCP 54 1161 → 80 [ACK] Seq=1 Ack=1 Win=17520 Len=0
4 06:44:20.596858 192.168.1.102 128.119.245.12 TCP 619 1161 → 80 [PSH, ACK] Seq=1 Ack=1 Win=17520 Len=565 [TCP segment of a reassembled PDU]
5 06:44:20.612118 192.168.1.102 128.119.245.12 TCP 1514 1161 → 80 [PSH, ACK] Seq=566 Ack=1 Win=17520 Len=1460 [TCP segment of a reassembled PDU]
6 06:44:20.624318 128.119.245.12 192.168.1.102 TCP 60 80 → 1161 [ACK] Seq=1 Ack=566 Win=6780 Len=0
7 06:44:20.624407 192.168.1.102 128.119.245.12 TCP 1514 1161 → 80 [ACK] Seq=2026 Ack=1 Win=17520 Len=1460 [TCP segment of a reassembled PDU]
8 06:44:20.625071 192.168.1.102 128.119.245.12 TCP 1514 1161 → 80 [ACK] Seq=3486 Ack=1 Win=17520 Len=1460 [TCP segment of a reassembled PDU]
9 06:44:20.647675 128.119.245.12 192.168.1.102 TCP 60 80 → 1161 [ACK] Seq=1 Ack=2026 Win=8760 Len=0
10 06:44:20.647786 192.168.1.102 128.119.245.12 TCP 1514 1161 → 80 [ACK] Seq=4946 Ack=1 Win=17520 Len=1460 [TCP segment of a reassembled PDU]
11 06:44:20.648538 192.168.1.102 128.119.245.12 TCP 1514 1161 → 80 [ACK] Seq=6406 Ack=1 Win=17520 Len=1460 [TCP segment of a reassembled PDU]
12 06:44:20.694466 128.119.245.12 192.168.1.102 TCP 60 80 → 1161 [ACK] Seq=1 Ack=3486 Win=11680 Len=0
13 06:44:20.694568 192.168.1.102 128.119.245.12 TCP 1201 1161 → 80 [PSH, ACK] Seq=7866 Ack=1 Win=17520 Len=1147 [TCP segment of a reassembled PDU]
Frame 7: 1514 bytes on wire (12112 bits), 1514 bytes captured (12112 bits)
Encapsulation type: Ethernet (1)
Arrival Time: Aug 21, 2004 06:44:20.624407000 Pacific Daylight Time
[Time shift for this packet: 0.000000000 seconds]
Epoch Time: 1093095860.624407000 seconds
[Time delta from previous captured frame: 0.000089000 seconds]
[Time delta from previous displayed frame: 0.000089000 seconds]
[Time since reference or first frame: 0.054026000 seconds]
Frame Number: 7
Frame Length: 1514 bytes (12112 bits)
Capture Length: 1514 bytes (12112 bits)
[Frame is marked: False]
[Frame is ignored: False]
[Protocols in frame: eth:ethertype:ip:tcp]
[Coloring Rule Name: HTTP]
[Coloring Rule String: http || tcp.port == 80 || http2]
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: 3026, Ack: 1, Len: 1460
Source Port: 1161
Destination Port: 80
0000 00 06 25 da af 73 00 20 e0 8a 70 1a 08 00 45 00 ··%··s· ··p···E·
0010 05 dc 1e 23 40 00 80 06 9f 66 c0 a8 01 66 80 77 ···#@···· ·f···f·w
0020 f5 0c 04 89 00 50 8d d6 09 9e 34 a2 74 1a 50 10 ·····P·· ··4·t·P·
0030 44 70 b9 8e 00 00 0d 0a 0d 0a 57 65 20 61 72 65 Dp····· ··We are
0040 20 6e 6f 77 20 74 72 79 69 6e 67 20 74 6f 20 72 now try ing to r
0050 65 6c 65 61 73 65 20 61 6c 6c 20 6f 75 72 20 62 elease a ll our b
0060 6f 6f 6b 73 20 6f 6e 65 20 6d 6f 6e 74 68 20 69 ooks one month i
0070 6e 20 61 64 76 61 6e 63 65 0d 0a 6f 66 20 74 68 n advanc e··of th
0080 65 20 6f 66 66 69 63 69 61 6c 20 72 65 6c 65 61 e offici al relea
0090 73 65 20 64 61 74 65 73 2c 20 66 6f 72 20 74 69 se dates , for ti
00a0 6d 65 20 66 6f 72 20 62 65 74 74 65 72 20 65 64 me for b etter ed
00b0 69 74 69 6e 67 2e 20 20 57 65 0d 0a 68 61 76 65 iting. We··have
00c0 20 74 68 69 73 20 61 73 20 61 20 67 6f 61 6c 20 this as a goal
Time relative to time reference or first frame (frame.ti
Packets: 213 · Displayed: 213 (100.0%)
Profile: Defa

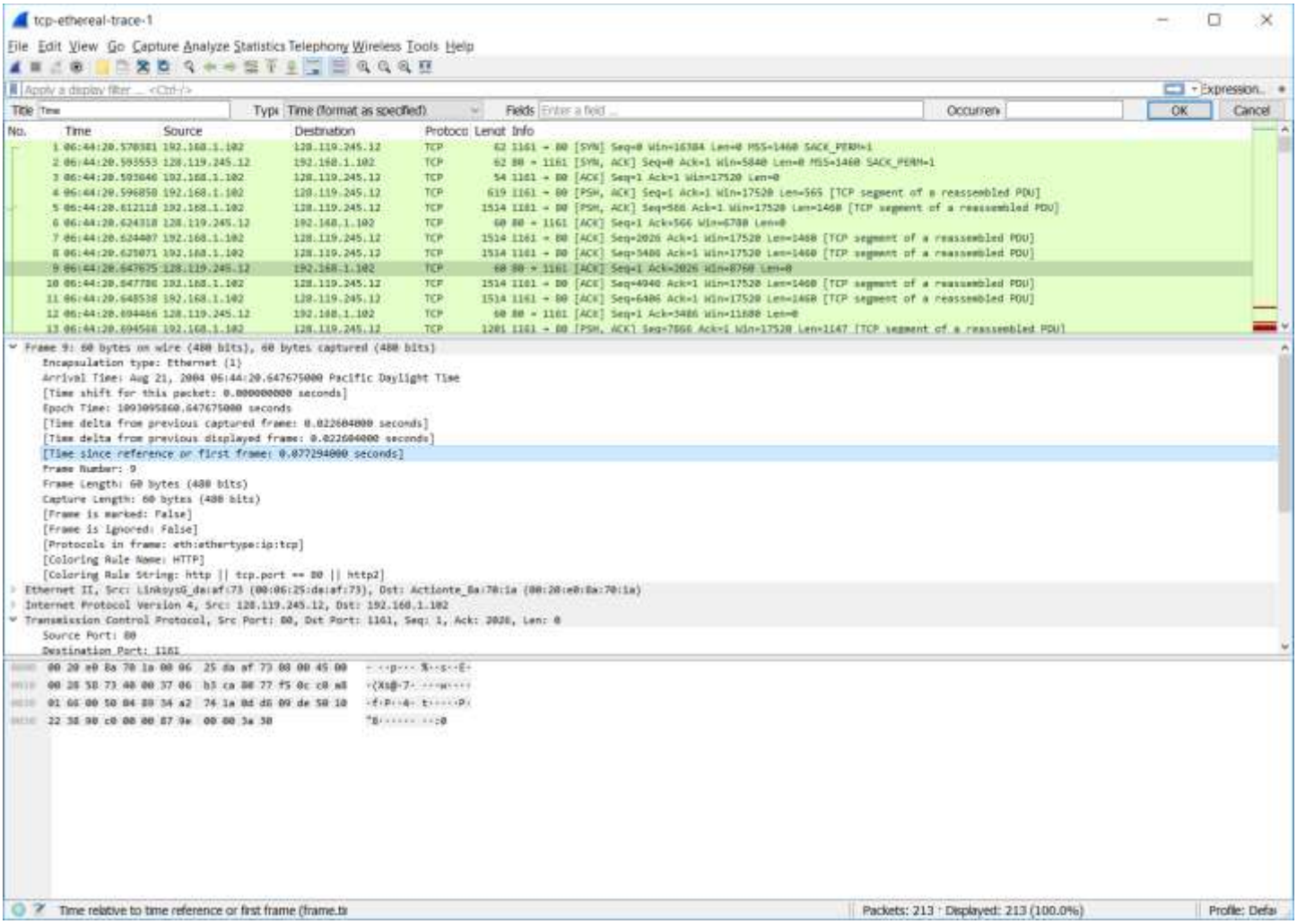

tcp-ethereal-trace-1
File Edit View Go Capture Analyze Statistics Telephony Wireless Tools Help
Apply a display filter ... <Ctrl-/>
Expression...
Title Time
Type Time (format as specified)
Fields Enter a field ...
Occurrence
OK
Cancel
No. Time Source Destination Protocol Length Info
1 06:44:20.570381 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 06:44:20.593553 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 06:44:20.593646 192.168.1.102 128.119.245.12 TCP 54 1161 → 80 [ACK] Seq=1 Ack=1 Win=17520 Len=0
4 06:44:20.596858 192.168.1.102 128.119.245.12 TCP 619 1161 → 80 [PSH, ACK] Seq=1 Ack=1 Win=17520 Len=565 [TCP segment of a reassembled PDU]
5 06:44:20.612118 192.168.1.102 128.119.245.12 TCP 1514 1161 → 80 [PSH, ACK] Seq=566 Ack=1 Win=17520 Len=1460 [TCP segment of a reassembled PDU]
6 06:44:20.624318 128.119.245.12 192.168.1.102 TCP 60 80 → 1161 [ACK] Seq=1 Ack=566 Win=6780 Len=0
7 06:44:20.624407 192.168.1.102 128.119.245.12 TCP 1514 1161 → 80 [ACK] Seq=2026 Ack=1 Win=17520 Len=1460 [TCP segment of a reassembled PDU]
8 06:44:20.625071 192.168.1.102 128.119.245.12 TCP 1514 1161 → 80 [ACK] Seq=3486 Ack=1 Win=17520 Len=1460 [TCP segment of a reassembled PDU]
9 06:44:20.647675 128.119.245.12 192.168.1.102 TCP 60 80 → 1161 [ACK] Seq=1 Ack=2026 Win=8760 Len=0
10 06:44:20.647786 192.168.1.102 128.119.245.12 TCP 1514 1161 → 80 [ACK] Seq=4946 Ack=1 Win=17520 Len=1460 [TCP segment of a reassembled PDU]
11 06:44:20.648538 192.168.1.102 128.119.245.12 TCP 1514 1161 → 80 [ACK] Seq=6406 Ack=1 Win=17520 Len=1460 [TCP segment of a reassembled PDU]
12 06:44:20.694466 128.119.245.12 192.168.1.102 TCP 60 80 → 1161 [ACK] Seq=1 Ack=3486 Win=11680 Len=0
13 06:44:20.694568 192.168.1.102 128.119.245.12 TCP 1201 1161 → 80 [PSH, ACK] Seq=7866 Ack=1 Win=17520 Len=1147 [TCP segment of a reassembled PDU]
Frame 8: 1514 bytes on wire (12112 bits), 1514 bytes captured (12112 bits)
Encapsulation type: Ethernet (1)
Arrival Time: Aug 21, 2004 06:44:20.625071000 Pacific Daylight Time
[Time shift for this packet: 0.000000000 seconds]
Epoch Time: 1093095860.625071000 seconds
[Time delta from previous captured frame: 0.000664000 seconds]
[Time delta from previous displayed frame: 0.000664000 seconds]
[Time since reference or first frame: 0.054690000 seconds]
Frame Number: 8
Frame Length: 1514 bytes (12112 bits)
Capture Length: 1514 bytes (12112 bits)
[Frame is marked: False]
[Frame is ignored: False]
[Protocols in frame: eth:ethertype:ip:tcp]
[Coloring Rule Name: HTTP]
[Coloring Rule String: http || tcp.port == 80 || http2]
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: 3486, Ack: 1, Len: 1460
Source Port: 1161
Destination Port: 80
Time relative to time reference or first frame (frame.ti
Packets: 213 · Displayed: 213 (100.0%)
Profile: Defa

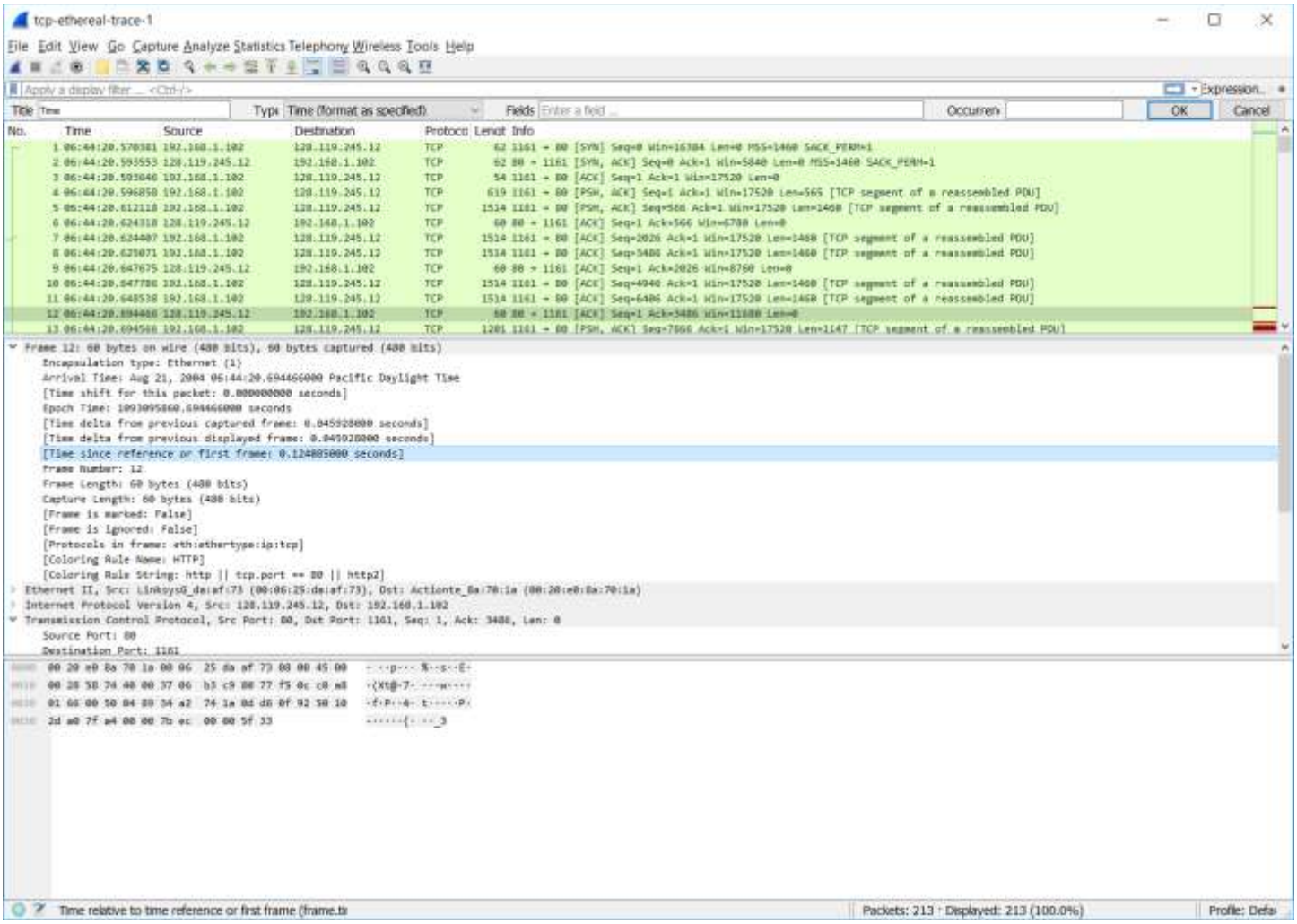

tcp-ethereal-trace-1
File Edit View Go Capture Analyze Statistics Telephony Wireless Tools Help
Apply a display filter ... <Ctrl-/>
Expression...
Title Time
Type Time (format as specified)
Fields Enter a field ...
Occurrence
OK
Cancel
No. Time Source Destination Protocol Length Info
1 06:44:20.570381 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 06:44:20.593553 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 06:44:20.593646 192.168.1.102 128.119.245.12 TCP 54 1161 → 80 [ACK] Seq=1 Ack=1 Win=17520 Len=0
4 06:44:20.596858 192.168.1.102 128.119.245.12 TCP 619 1161 → 80 [PSH, ACK] Seq=1 Ack=1 Win=17520 Len=565 [TCP segment of a reassembled PDU]
5 06:44:20.612118 192.168.1.102 128.119.245.12 TCP 1514 1161 → 80 [PSH, ACK] Seq=566 Ack=1 Win=17520 Len=1460 [TCP segment of a reassembled PDU]
6 06:44:20.624318 128.119.245.12 192.168.1.102 TCP 60 80 → 1161 [ACK] Seq=1 Ack=566 Win=6780 Len=0
7 06:44:20.624407 192.168.1.102 128.119.245.12 TCP 1514 1161 → 80 [ACK] Seq=2026 Ack=1 Win=17520 Len=1460 [TCP segment of a reassembled PDU]
8 06:44:20.625071 192.168.1.102 128.119.245.12 TCP 1514 1161 → 80 [ACK] Seq=3486 Ack=1 Win=17520 Len=1460 [TCP segment of a reassembled PDU]
9 06:44:20.647675 128.119.245.12 192.168.1.102 TCP 60 80 → 1161 [ACK] Seq=1 Ack=2026 Win=8760 Len=0
10 06:44:20.647786 192.168.1.102 128.119.245.12 TCP 1514 1161 → 80 [ACK] Seq=4946 Ack=1 Win=17520 Len=1460 [TCP segment of a reassembled PDU]
11 06:44:20.648538 192.168.1.102 128.119.245.12 TCP 1514 1161 → 80 [ACK] Seq=6406 Ack=1 Win=17520 Len=1460 [TCP segment of a reassembled PDU]
12 06:44:20.694466 128.119.245.12 192.168.1.102 TCP 60 80 → 1161 [ACK] Seq=1 Ack=3486 Win=11680 Len=0
13 06:44:20.694568 192.168.1.102 128.119.245.12 TCP 1201 1161 → 80 [PSH, ACK] Seq=7866 Ack=1 Win=17520 Len=1147 [TCP segment of a reassembled PDU]
Frame 10: 1514 bytes on wire (12112 bits), 1514 bytes captured (12112 bits)
Encapsulation type: Ethernet (1)
Arrival Time: Aug 21, 2004 06:44:20.647786000 Pacific Daylight Time
[Time shift for this packet: 0.000000000 seconds]
Epoch Time: 1093095860.647786000 seconds
[Time delta from previous captured frame: 0.000111000 seconds]
[Time delta from previous displayed frame: 0.000111000 seconds]
[Time since reference or first frame: 0.077405000 seconds]
Frame Number: 10
Frame Length: 1514 bytes (12112 bits)
Capture Length: 1514 bytes (12112 bits)
[Frame is marked: False]
[Frame is ignored: False]
[Protocols in frame: eth:ethertype:ip:tcp]
[Coloring Rule Name: HTTP]
[Coloring Rule String: http || tcp.port == 80 || http2]
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: 4946, Ack: 1, Len: 1460
Source Port: 1161
Destination Port: 80
00 06 25 da af 73 00 20 e0 8a 70 1a 08 00 45 00 ··%··s· ··p···E·
05 dc 1e 25 40 00 80 06 9f 64 c0 a8 01 66 80 77 ···%@···· ·d···f·w
f5 0c 04 89 00 50 8d d6 15 46 34 a2 74 1a 50 10 ·····P·· ·F4·t·P·
44 70 98 8e 00 00 6f 6f 20 62 6f 6f 6b 73 0d 0a Dp····oo books··
61 6e 64 0d 0a 47 45 54 20 4e 45 57 20 47 55 54 and··GET NEW GUT
20 66 6f 72 20 67 65 6e 65 72 61 6c 20 69 6e 66 for gen eral inf
6f 72 6d 61 74 69 6f 6e 0d 0a 61 6e 64 0d 0a 4d ormation ··and··M
47 45 54 20 47 55 54 2a 20 66 6f 72 20 6e 65 77 GET GUT* for new
73 6c 65 74 74 65 72 73 2e 0d 0a 0d 0a 2a 2a 49 sletters .····**I
6e 66 6f 72 6d 61 74 69 6f 6e 20 70 72 65 70 61 nformati on prepa
72 65 64 20 62 79 20 74 68 65 20 50 72 6f 6a 65 red by t he Proje
63 74 20 47 75 74 65 6e 62 65 72 67 20 6c 65 67 ct Guten berg leg
61 6c 20 61 64 76 69 73 6f 72 2a 2a 0d 0a 28 54 al advis or**··(T
Time relative to time reference or first frame (frame.ti
Packets: 213 · Displayed: 213 (100.0%)
Profile: Defa

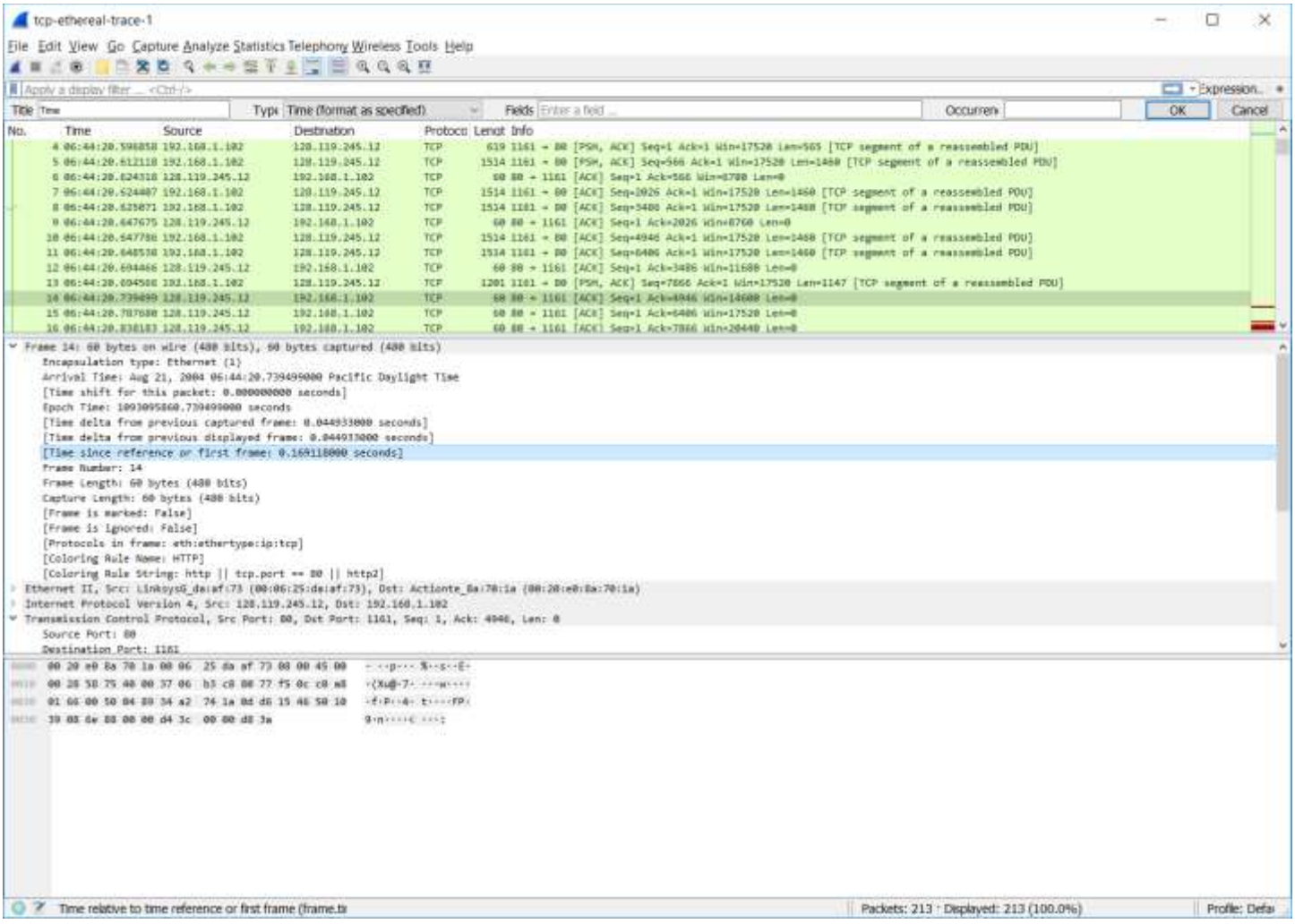


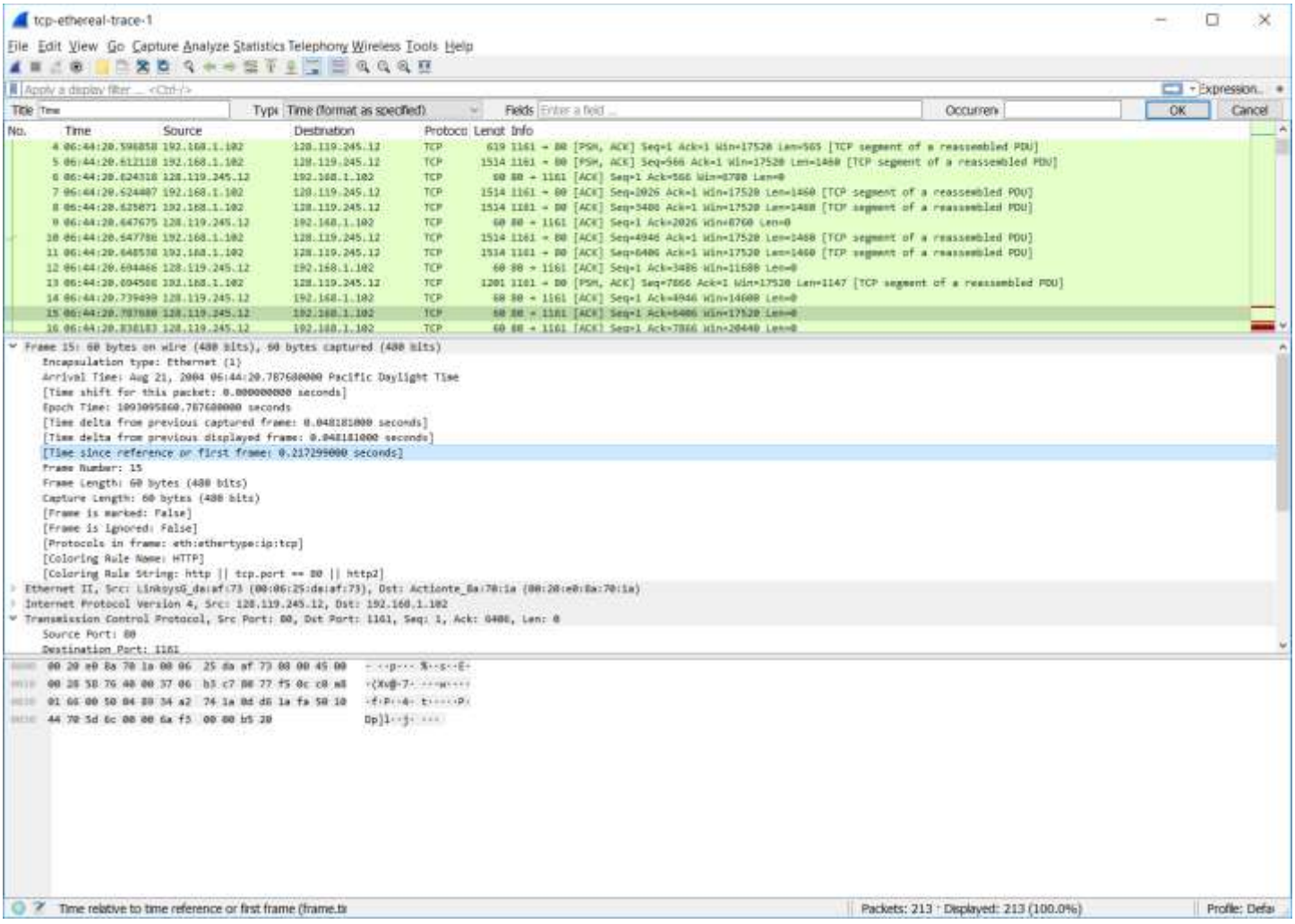
The following shows the time when the ACK was received from the server to client for the first 6 segments -

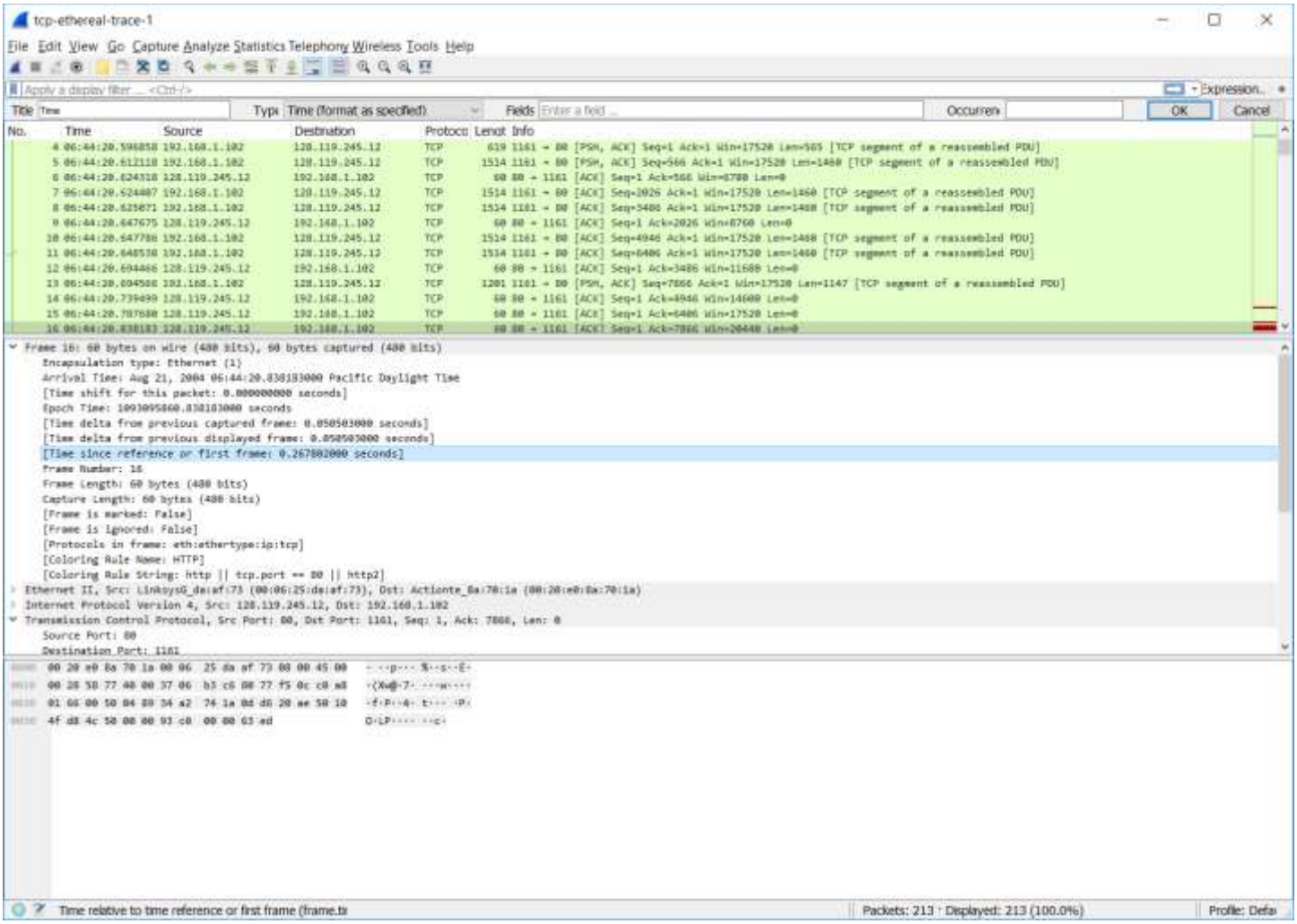

tcp-ethereal-trace-1
File Edit View Go Capture Analyze Statistics Telephony Wireless Tools Help
Apply a display filter ... <Ctrl-/>
Expression...
Title Time
Type Time (format as specified)
Fields Enter a field ...
Occurrence
OK
Cancel
No. Time Source Destination Protocol Length Info
1 06:44:20.570381 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 06:44:20.593553 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 06:44:20.593646 192.168.1.102 128.119.245.12 TCP 54 1161 → 80 [ACK] Seq=1 Ack=1 Win=17520 Len=0
4 06:44:20.596858 192.168.1.102 128.119.245.12 TCP 619 1161 → 80 [PSH, ACK] Seq=1 Ack=1 Win=17520 Len=565 [TCP segment of a reassembled PDU]
5 06:44:20.612118 192.168.1.102 128.119.245.12 TCP 1514 1161 → 80 [PSH, ACK] Seq=566 Ack=1 Win=17520 Len=1460 [TCP segment of a reassembled PDU]
6 06:44:20.624318 128.119.245.12 192.168.1.102 TCP 60 80 → 1161 [ACK] Seq=1 Ack=566 Win=6780 Len=0
7 06:44:20.624407 192.168.1.102 128.119.245.12 TCP 1514 1161 → 80 [ACK] Seq=2026 Ack=1 Win=17520 Len=1460 [TCP segment of a reassembled PDU]
8 06:44:20.625071 192.168.1.102 128.119.245.12 TCP 1514 1161 → 80 [ACK] Seq=3486 Ack=1 Win=17520 Len=1460 [TCP segment of a reassembled PDU]
9 06:44:20.647675 128.119.245.12 192.168.1.102 TCP 60 80 → 1161 [ACK] Seq=1 Ack=2026 Win=8760 Len=0
10 06:44:20.647786 192.168.1.102 128.119.245.12 TCP 1514 1161 → 80 [ACK] Seq=4946 Ack=1 Win=17520 Len=1460 [TCP segment of a reassembled PDU]
11 06:44:20.648538 192.168.1.102 128.119.245.12 TCP 1514 1161 → 80 [ACK] Seq=6406 Ack=1 Win=17520 Len=1460 [TCP segment of a reassembled PDU]
12 06:44:20.694466 128.119.245.12 192.168.1.102 TCP 60 80 → 1161 [ACK] Seq=1 Ack=3486 Win=11680 Len=0
13 06:44:20.694568 192.168.1.102 128.119.245.12 TCP 1201 1161 → 80 [PSH, ACK] Seq=7866 Ack=1 Win=17520 Len=1147 [TCP segment of a reassembled PDU]
Frame 6: 60 bytes on wire (480 bits), 60 bytes captured (480 bits)
Encapsulation type: Ethernet (1)
Arrival Time: Aug 21, 2004 06:44:20.624318000 Pacific Daylight Time
[Time shift for this packet: 0.000000000 seconds]
Epoch Time: 1093095860.624318000 seconds
[Time delta from previous captured frame: 0.012200000 seconds]
[Time delta from previous displayed frame: 0.012200000 seconds]
[Time since reference or first frame: 0.053937000 seconds]
Frame Number: 6
Frame Length: 60 bytes (480 bits)
Capture Length: 60 bytes (480 bits)
[Frame is marked: False]
[Frame is ignored: False]
[Protocols in frame: eth:ethertype:ip:tcp]
[Coloring Rule Name: HTTP]
[Coloring Rule String: http || tcp.port == 80 || http2]
Ethernet II, Src: LinksysG_da:af:73 (00:06:25:da:af:73), Dst: Actionte_8a:70:1a (00:20:e0:8a:70:1a)
Internet Protocol Version 4, Src: 128.119.245.12, Dst: 192.168.1.102
Transmission Control Protocol, Src Port: 80, Dst Port: 1161, Seq: 1, Ack: 566, Len: 0
Source Port: 80
Destination Port: 1161
0000 00 20 e0 8a 70 1a 00 06 25 da af 73 08 00 45 00
0010 00 28 58 72 40 00 37 06 b3 cb 80 77 f5 0c c0 a8
0020 01 66 00 50 04 89 54 a2 74 1a 8d d6 04 2a 50 10
0030 1a 7c 9e 30 00 00 da 12 00 00 47 a5
Time relative to time reference or first frame (frame.ti
Packets: 213 · Displayed: 213 (100.0%)
Profile: Defa


tcp-ethereal-trace-1
File Edit View Go Capture Analyze Statistics Telephony Wireless Tools Help
Apply a display filter ... <Ctrl-/>
Expression...
Title Time
Type Time (format as specified)
Fields Enter a field ...
Occurrence
OK
Cancel
No. Time Source Destination Protocol Length Info
1 06:44:20.570381 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 06:44:20.593553 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 06:44:20.593646 192.168.1.102 128.119.245.12 TCP 54 1161 → 80 [ACK] Seq=1 Ack=1 Win=17520 Len=0
4 06:44:20.596858 192.168.1.102 128.119.245.12 TCP 619 1161 → 80 [PSH, ACK] Seq=1 Ack=1 Win=17520 Len=565 [TCP segment of a reassembled PDU]
5 06:44:20.612118 192.168.1.102 128.119.245.12 TCP 1514 1161 → 80 [PSH, ACK] Seq=566 Ack=1 Win=17520 Len=1460 [TCP segment of a reassembled PDU]
6 06:44:20.624318 128.119.245.12 192.168.1.102 TCP 60 80 → 1161 [ACK] Seq=1 Ack=566 Win=6780 Len=0
7 06:44:20.624407 192.168.1.102 128.119.245.12 TCP 1514 1161 → 80 [ACK] Seq=2026 Ack=1 Win=17520 Len=1460 [TCP segment of a reassembled PDU]
8 06:44:20.625071 192.168.1.102 128.119.245.12 TCP 1514 1161 → 80 [ACK] Seq=3486 Ack=1 Win=17520 Len=1460 [TCP segment of a reassembled PDU]
9 06:44:20.647675 128.119.245.12 192.168.1.102 TCP 60 80 → 1161 [ACK] Seq=1 Ack=2026 Win=8760 Len=0
10 06:44:20.647786 192.168.1.102 128.119.245.12 TCP 1514 1161 → 80 [ACK] Seq=4946 Ack=1 Win=17520 Len=1460 [TCP segment of a reassembled PDU]
11 06:44:20.648538 192.168.1.102 128.119.245.12 TCP 1514 1161 → 80 [ACK] Seq=6406 Ack=1 Win=17520 Len=1460 [TCP segment of a reassembled PDU]
12 06:44:20.694466 128.119.245.12 192.168.1.102 TCP 60 80 → 1161 [ACK] Seq=1 Ack=3486 Win=11680 Len=0
13 06:44:20.694568 192.168.1.102 128.119.245.12 TCP 1201 1161 → 80 [PSH, ACK] Seq=7866 Ack=1 Win=17520 Len=1147 [TCP segment of a reassembled PDU]
Frame 9: 60 bytes on wire (480 bits), 60 bytes captured (480 bits)
Encapsulation type: Ethernet (1)
Arrival Time: Aug 21, 2004 06:44:20.647675000 Pacific Daylight Time
[Time shift for this packet: 0.000000000 seconds]
Epoch Time: 1093095860.647675000 seconds
[Time delta from previous captured frame: 0.022604000 seconds]
[Time delta from previous displayed frame: 0.022604000 seconds]
[Time since reference or first frame: 0.077294000 seconds]
Frame Number: 9
Frame Length: 60 bytes (480 bits)
Capture Length: 60 bytes (480 bits)
[Frame is marked: False]
[Frame is ignored: False]
[Protocols in frame: eth:ethertype:ip:tcp]
[Coloring Rule Name: HTTP]
[Coloring Rule String: http || tcp.port == 80 || http2]
Ethernet II, Src: LinksysG_da:af:73 (00:06:25:da:af:73), Dst: Actionte_8a:70:1a (00:20:e0:8a:70:1a)
Internet Protocol Version 4, Src: 128.119.245.12, Dst: 192.168.1.102
Transmission Control Protocol, Src Port: 80, Dst Port: 1161, Seq: 1, Ack: 2026, Len: 0
Source Port: 80
Destination Port: 1161
0000 00 20 e0 8a 70 1a 00 06 25 da af 73 08 00 45 00
0010 00 28 58 73 40 00 37 06 b3 ca 80 77 f5 0c c0 a8
0020 01 66 00 50 04 89 54 a2 74 1a 8d d6 09 de 50 10
0030 22 38 90 c0 00 00 87 9e 00 00 3a 30
Time relative to time reference or first frame (frame.ti
Packets: 213 · Displayed: 213 (100.0%)
Profile: Defa


tcp-ethereal-trace-1
File Edit View Go Capture Analyze Statistics Telephony Wireless Tools Help
Apply a display filter ... <Ctrl-/>
Expression...
Title Time
Type Time (format as specified)
Fields Enter a field ...
Occurrence
OK
Cancel
No. Time Source Destination Protocol Length Info
1 06:44:20.570381 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 06:44:20.593553 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 06:44:20.593646 192.168.1.102 128.119.245.12 TCP 54 1161 → 80 [ACK] Seq=1 Ack=1 Win=17520 Len=0
4 06:44:20.596858 192.168.1.102 128.119.245.12 TCP 619 1161 → 80 [PSH, ACK] Seq=1 Ack=1 Win=17520 Len=565 [TCP segment of a reassembled PDU]
5 06:44:20.612118 192.168.1.102 128.119.245.12 TCP 1514 1161 → 80 [PSH, ACK] Seq=566 Ack=1 Win=17520 Len=1460 [TCP segment of a reassembled PDU]
6 06:44:20.624318 128.119.245.12 192.168.1.102 TCP 60 80 → 1161 [ACK] Seq=1 Ack=566 Win=6780 Len=0
7 06:44:20.624407 192.168.1.102 128.119.245.12 TCP 1514 1161 → 80 [ACK] Seq=2026 Ack=1 Win=17520 Len=1460 [TCP segment of a reassembled PDU]
8 06:44:20.625071 192.168.1.102 128.119.245.12 TCP 1514 1161 → 80 [ACK] Seq=3486 Ack=1 Win=17520 Len=1460 [TCP segment of a reassembled PDU]
9 06:44:20.647675 128.119.245.12 192.168.1.102 TCP 60 80 → 1161 [ACK] Seq=1 Ack=2026 Win=8760 Len=0
10 06:44:20.647786 192.168.1.102 128.119.245.12 TCP 1514 1161 → 80 [ACK] Seq=4946 Ack=1 Win=17520 Len=1460 [TCP segment of a reassembled PDU]
11 06:44:20.648538 192.168.1.102 128.119.245.12 TCP 1514 1161 → 80 [ACK] Seq=6406 Ack=1 Win=17520 Len=1460 [TCP segment of a reassembled PDU]
12 06:44:20.694466 128.119.245.12 192.168.1.102 TCP 60 80 → 1161 [ACK] Seq=1 Ack=3486 Win=11680 Len=0
13 06:44:20.694568 192.168.1.102 128.119.245.12 TCP 1201 1161 → 80 [PSH, ACK] Seq=7866 Ack=1 Win=17520 Len=1147 [TCP segment of a reassembled PDU]
Frame 12: 60 bytes on wire (480 bits), 60 bytes captured (480 bits)
Encapsulation type: Ethernet (1)
Arrival Time: Aug 21, 2004 06:44:20.694466000 Pacific Daylight Time
[Time shift for this packet: 0.000000000 seconds]
Epoch Time: 1093095860.694466000 seconds
[Time delta from previous captured frame: 0.045928000 seconds]
[Time delta from previous displayed frame: 0.045920000 seconds]
[Time since reference or first frame: 0.124085000 seconds]
Frame Number: 12
Frame Length: 60 bytes (480 bits)
Capture Length: 60 bytes (480 bits)
[Frame is marked: False]
[Frame is ignored: False]
[Protocols in frame: eth:ethertype:ip:tcp]
[Coloring Rule Name: HTTP]
[Coloring Rule String: http || tcp.port == 80 || http2]
Ethernet II, Src: LinksysG_da:af:73 (00:06:25:da:af:73), Dst: Actionte_8a:70:1a (00:20:e0:8a:70:1a)
Internet Protocol Version 4, Src: 128.119.245.12, Dst: 192.168.1.102
Transmission Control Protocol, Src Port: 80, Dst Port: 1161, Seq: 1, Ack: 3486, Len: 0
Source Port: 80
Destination Port: 1161
0000 00 20 e0 8a 70 1a 00 06 25 da af 73 08 00 45 00
0010 00 28 58 74 40 00 37 06 b3 c9 80 77 f5 0c c0 a8
0020 01 66 00 50 04 89 34 a2 74 1a 8d d6 0f 92 50 10
0030 2d a0 7f a4 00 00 7b ec 00 00 5f 33
Time relative to time reference or first frame (frame.ti
Packets: 213 · Displayed: 213 (100.0%)
Profile: Defa

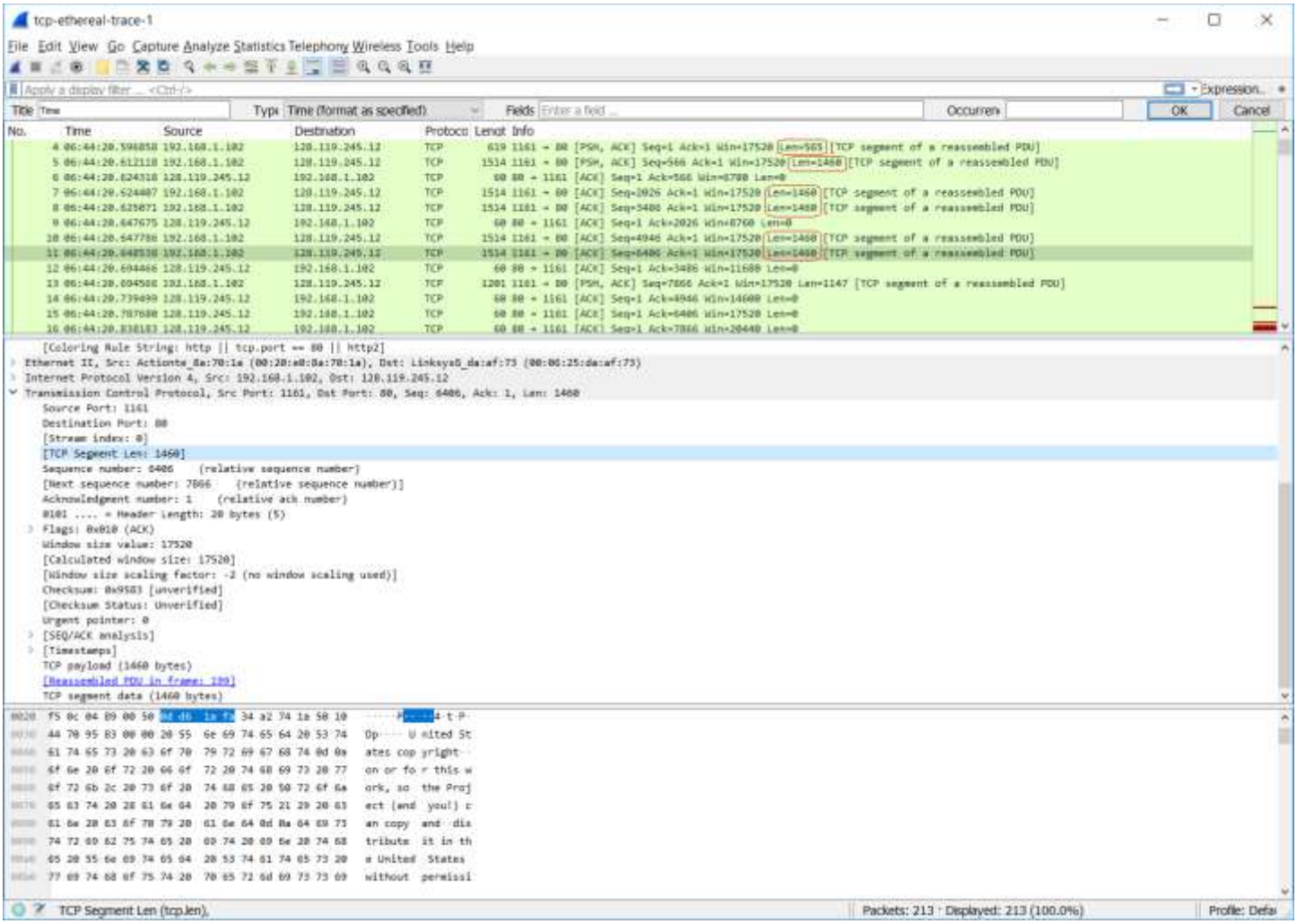

tcp-ethereal-trace-1
File Edit View Go Capture Analyze Statistics Telephony Wireless Tools Help
Apply a display filter ... <Ctrl-/>
Expression...
Title Time
Type Time (format as specified)
Fields Enter a field ...
Occurrence
OK
Cancel
No. Time Source Destination Protocol Length Info
4 06:44:20.596858 192.168.1.102 128.119.245.12 TCP 619 1161 → 80 [PSH, ACK] Seq=1 Ack=1 Win=17520 Len=565 [TCP segment of a reassembled PDU]
5 06:44:20.612110 192.168.1.102 128.119.245.12 TCP 1514 1161 → 80 [PSH, ACK] Seq=566 Ack=1 Win=17520 Len=1460 [TCP segment of a reassembled PDU]
6 06:44:20.624318 128.119.245.12 192.168.1.102 TCP 60 80 → 1161 [ACK] Seq=1 Ack=566 Win=6780 Len=0
7 06:44:20.624407 192.168.1.102 128.119.245.12 TCP 1514 1161 → 80 [ACK] Seq=2026 Ack=1 Win=17520 Len=1460 [TCP segment of a reassembled PDU]
8 06:44:20.625671 192.168.1.102 128.119.245.12 TCP 1514 1161 → 80 [ACK] Seq=3486 Ack=1 Win=17520 Len=1460 [TCP segment of a reassembled PDU]
9 06:44:20.647675 128.119.245.12 192.168.1.102 TCP 60 80 → 1161 [ACK] Seq=1 Ack=2026 Win=8760 Len=0
10 06:44:20.647786 192.168.1.102 128.119.245.12 TCP 1514 1161 → 80 [ACK] Seq=4946 Ack=1 Win=17520 Len=1460 [TCP segment of a reassembled PDU]
11 06:44:20.648538 192.168.1.102 128.119.245.12 TCP 1514 1161 → 80 [ACK] Seq=6406 Ack=1 Win=17520 Len=1460 [TCP segment of a reassembled PDU]
12 06:44:20.694466 128.119.245.12 192.168.1.102 TCP 60 80 → 1161 [ACK] Seq=1 Ack=3486 Win=11680 Len=0
13 06:44:20.694508 192.168.1.102 128.119.245.12 TCP 1201 1161 → 80 [PSH, ACK] Seq=7866 Ack=1 Win=17520 Len=1147 [TCP segment of a reassembled PDU]
14 06:44:20.739499 128.119.245.12 192.168.1.102 TCP 60 80 → 1161 [ACK] Seq=1 Ack=4946 Win=14600 Len=0
15 06:44:20.787688 128.119.245.12 192.168.1.102 TCP 60 80 → 1161 [ACK] Seq=1 Ack=6406 Win=17520 Len=0
16 06:44:20.838183 128.119.245.12 192.168.1.102 TCP 60 80 → 1161 [ACK] Seq=1 Ack=7866 Win=20440 Len=0
Frame 14: 60 bytes on wire (480 bits), 60 bytes captured (480 bits)
Encapsulation type: Ethernet (1)
Arrival Time: Aug 21, 2004 06:44:20.739499000 Pacific Daylight Time
[Time shift for this packet: 0.000000000 seconds]
Epoch Time: 1093095860.739499000 seconds
[Time delta from previous captured frame: 0.044933000 seconds]
[Time delta from previous displayed frame: 0.044933000 seconds]
[Time since reference or first frame: 0.169118000 seconds]
Frame Number: 14
Frame Length: 60 bytes (480 bits)
Capture Length: 60 bytes (480 bits)
[Frame is marked: False]
[Frame is Ignored: False]
[Protocols in frame: eth:ethertype:ip:tcp]
[Coloring Rule Name: HTTP]
[Coloring Rule String: http || tcp.port == 80 || http2]
Ethernet II, Src: LinksysG_da:af:73 (00:06:25:da:af:73), Dst: Actionte_8a:70:1a (00:20:e0:8a:70:1a)
Internet Protocol Version 4, Src: 128.119.245.12, Dst: 192.168.1.102
Transmission Control Protocol, Src Port: 80, Dst Port: 1161, Seq: 1, Ack: 4946, Len: 0
Source Port: 80
Destination Port: 1161
0000 00 20 e0 8a 70 1a 00 06 25 da af 73 08 00 45 00
0010 00 28 58 75 40 00 37 06 b3 c8 80 77 f5 0c c0 a8
0020 01 66 00 50 04 89 34 a2 74 1a 8d d6 15 46 50 10
0030 39 08 6e 88 00 00 d4 3c 00 00 d8 3a
Time relative to time reference or first frame (frame.ti
Packets: 213 · Displayed: 213 (100.0%)
Profile: Defa


tcp-ethereal-trace-1
File Edit View Go Capture Analyze Statistics Telephony Wireless Tools Help
Apply a display filter ... <Ctrl-/>
Expression...
Title Time
Type Time (format as specified)
Fields Enter a field ...
Occurrence
OK
Cancel
No. Time Source Destination Protocol Length Info
4 06:44:20.596858 192.168.1.102 128.119.245.12 TCP 619 1161 → 80 [PSH, ACK] Seq=1 Ack=1 Win=17520 Len=565 [TCP segment of a reassembled PDU]
5 06:44:20.612118 192.168.1.102 128.119.245.12 TCP 1514 1161 → 80 [PSH, ACK] Seq=566 Ack=1 Win=17520 Len=1460 [TCP segment of a reassembled PDU]
6 06:44:20.624318 128.119.245.12 192.168.1.102 TCP 60 80 → 1161 [ACK] Seq=1 Ack=566 Win=6780 Len=0
7 06:44:20.624407 192.168.1.102 128.119.245.12 TCP 1514 1161 → 80 [ACK] Seq=2026 Ack=1 Win=17520 Len=1460 [TCP segment of a reassembled PDU]
8 06:44:20.625671 192.168.1.102 128.119.245.12 TCP 1514 1161 → 80 [ACK] Seq=3486 Ack=1 Win=17520 Len=1460 [TCP segment of a reassembled PDU]
9 06:44:20.647675 128.119.245.12 192.168.1.102 TCP 60 80 → 1161 [ACK] Seq=1 Ack=2026 Win=8760 Len=0
10 06:44:20.647786 192.168.1.102 128.119.245.12 TCP 1514 1161 → 80 [ACK] Seq=4946 Ack=1 Win=17520 Len=1460 [TCP segment of a reassembled PDU]
11 06:44:20.648538 192.168.1.102 128.119.245.12 TCP 1514 1161 → 80 [ACK] Seq=6406 Ack=1 Win=17520 Len=1460 [TCP segment of a reassembled PDU]
12 06:44:20.694466 128.119.245.12 192.168.1.102 TCP 60 80 → 1161 [ACK] Seq=1 Ack=3486 Win=11680 Len=0
13 06:44:20.694508 192.168.1.102 128.119.245.12 TCP 1201 1161 → 80 [PSH, ACK] Seq=7866 Ack=1 Win=17520 Len=1147 [TCP segment of a reassembled PDU]
14 06:44:20.739499 128.119.245.12 192.168.1.102 TCP 60 80 → 1161 [ACK] Seq=1 Ack=4946 Win=14600 Len=0
15 06:44:20.787680 128.119.245.12 192.168.1.102 TCP 60 80 → 1161 [ACK] Seq=1 Ack=6406 Win=17520 Len=0
16 06:44:20.838183 128.119.245.12 192.168.1.102 TCP 60 80 → 1161 [ACK] Seq=1 Ack=7866 Win=20440 Len=0
Frame 15: 60 bytes on wire (480 bits), 60 bytes captured (480 bits)
Encapsulation type: Ethernet (1)
Arrival Time: Aug 21, 2004 06:44:20.787680000 Pacific Daylight Time
[Time shift for this packet: 0.000000000 seconds]
Epoch Time: 1093095860.787680000 seconds
[Time delta from previous captured frame: 0.048181000 seconds]
[Time delta from previous displayed frame: 0.048181000 seconds]
[Time since reference or first frame: 0.217299000 seconds]
Frame Number: 15
Frame Length: 60 bytes (480 bits)
Capture Length: 60 bytes (480 bits)
[Frame is marked: False]
[Frame is ignored: False]
[Protocols in frame: eth:ethertype:ip:tcp]
[Coloring Rule Name: HTTP]
[Coloring Rule String: http || tcp.port == 80 || http2]
Ethernet II, Src: LinksysG_da:af:73 (00:06:25:da:af:73), Dst: Actionte_8a:70:1a (00:20:e0:8a:70:1a)
Internet Protocol Version 4, Src: 128.119.245.12, Dst: 192.168.1.102
Transmission Control Protocol, Src Port: 80, Dst Port: 1161, Seq: 1, Ack: 6406, Len: 0
Source Port: 80
Destination Port: 1161
0000 00 20 e0 8a 70 1a 00 06 25 da af 73 08 00 45 00
0010 00 28 58 7c 40 00 37 06 b3 c7 80 77 f5 0c c0 a8
0020 01 66 00 50 04 89 34 a2 74 1a 8d d6 1a fa 50 10
0030 44 70 5d 6c 00 00 6a f5 00 00 b5 20
Time relative to time reference or first frame (frame.ti
Packets: 213 · Displayed: 213 (100.0%)
Profile: Defa



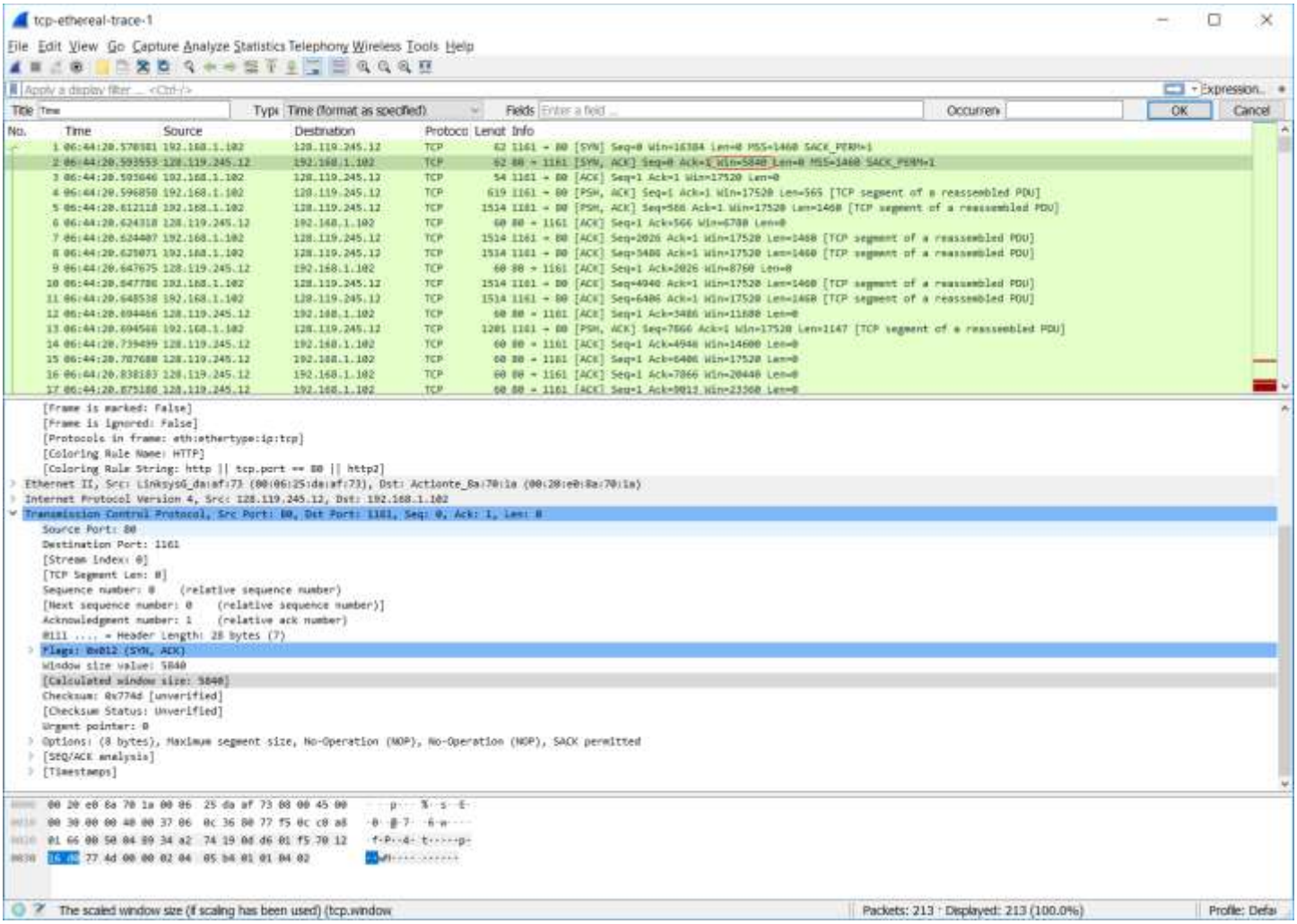
8) What is the length of each of the first six TCP segments?

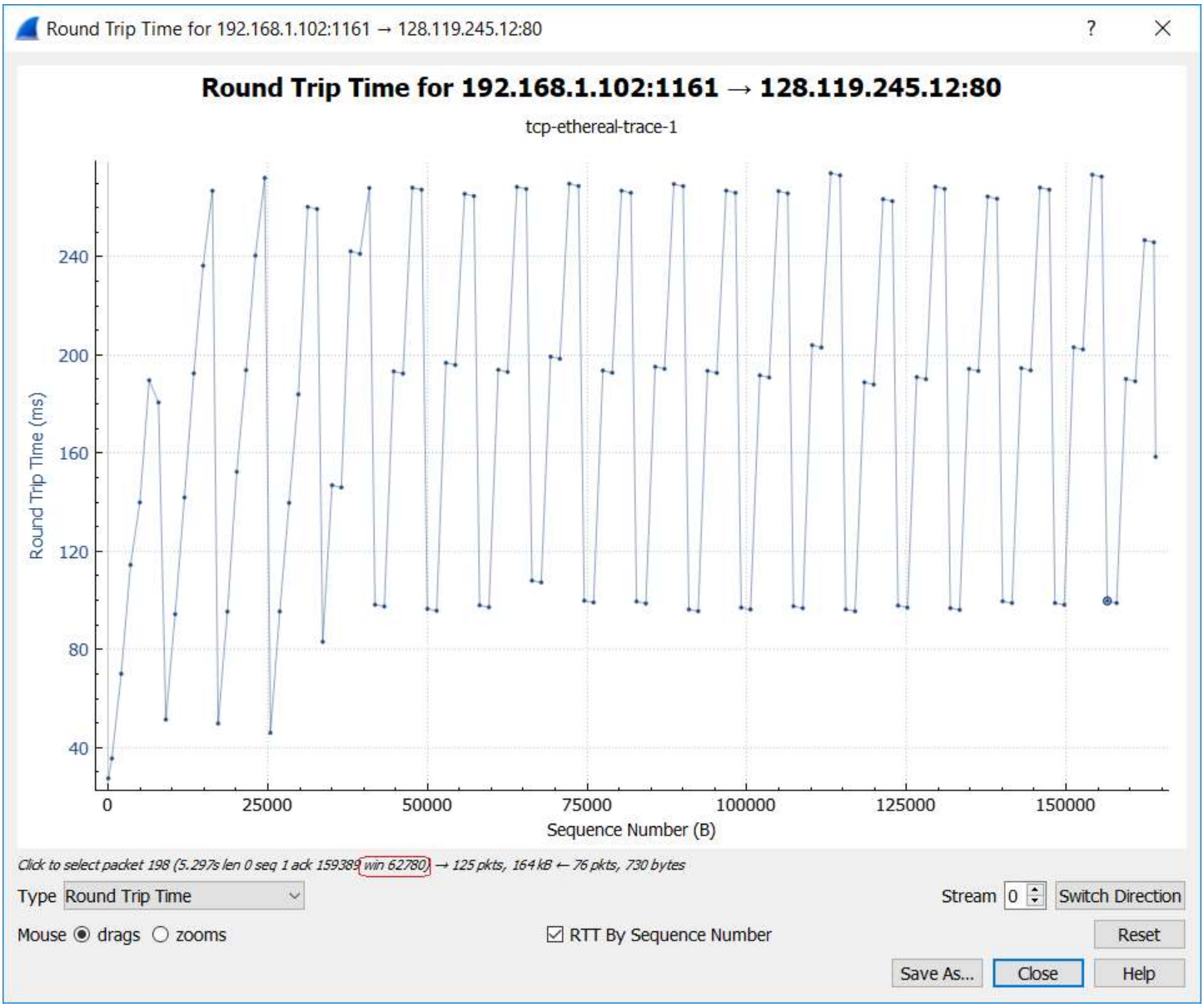
The length of each of the first six TCP segments are:
Segment 1 – 565 bytes
Segment 2 – 1460 bytes
Segment 3 – 1460 bytes
Segment 4 – 1460 bytes
Segment 5 – 1460 bytes
Segment 6 – 1460 bytes



9) What is the minimum amount of available buffer space advertised at the received for the entire trace? Does the lack of receiver buffer space ever throttle the sender?

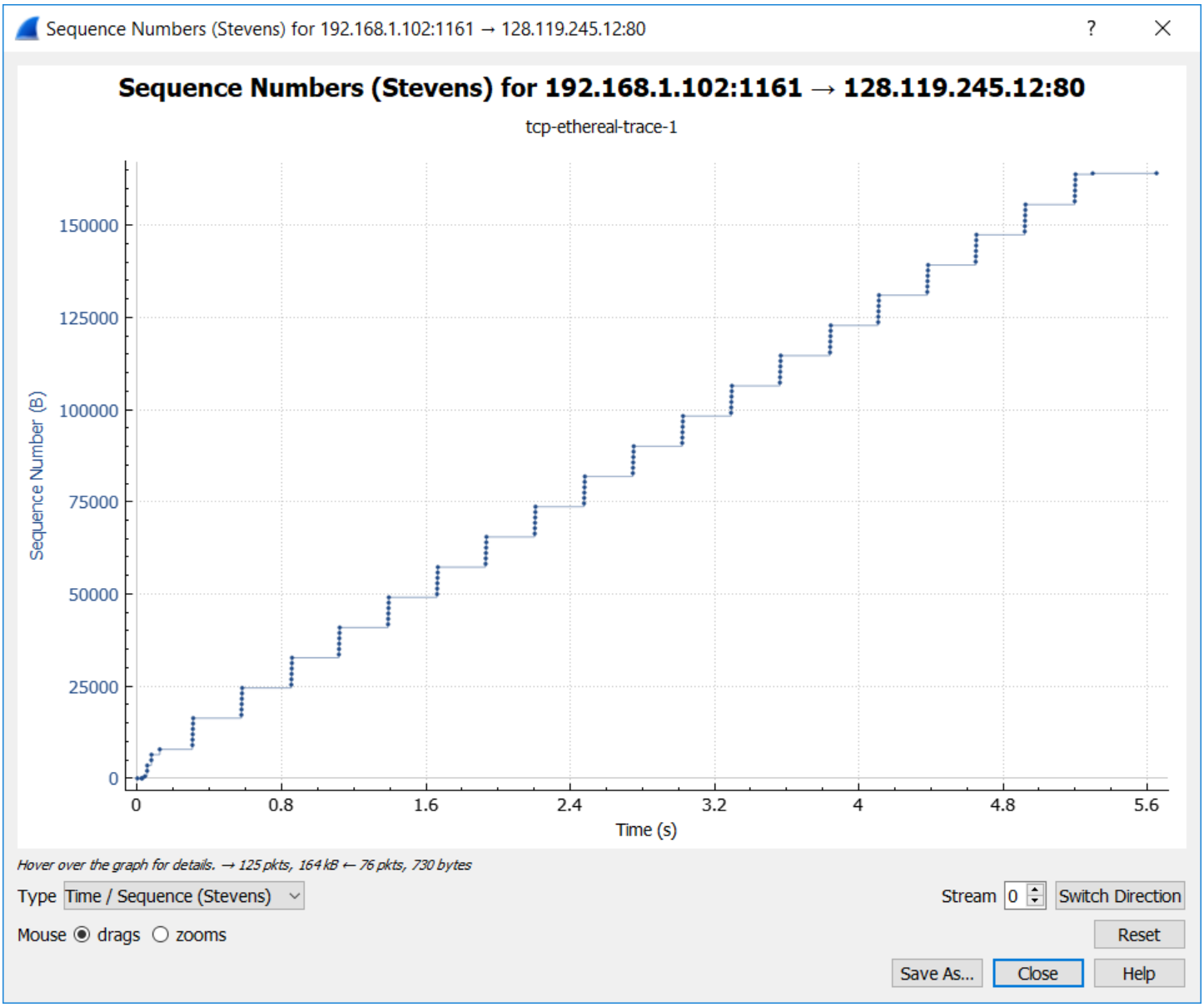
The minimum amount of available buffer space advertised at the received for the entire trace is a window size of 5840 bytes. No, the lack of receiver buffer space never throttles the sender, which can be observed by viewing the window size for each of the packets in the RTT Graph shown below. In the RTT graph below, the window size never drops after reaching a maximum window size of 62780 bytes.


tcp-ethereal-trace-1
File Edit View Go Capture Analyze Statistics Telephony Wireless Tools Help
Apply a display filter ... <Ctrl-/>
Expression...
Title
Type
Time (format as specified)
Fields
Enter a field ...
Occurrence
OK
Cancel
No. Time Source Destination Protocol Length Info
1 06:44:20.570381 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 06:44:20.593553 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 06:44:20.593646 192.168.1.102 128.119.245.12 TCP 54 1161 → 80 [ACK] Seq=1 Ack=1 Win=17520 Len=0
4 06:44:20.596850 192.168.1.102 128.119.245.12 TCP 619 1161 → 80 [PSH, ACK] Seq=1 Ack=1 Win=17520 Len=565 [TCP segment of a reassembled PDU]
5 06:44:20.612118 192.168.1.102 128.119.245.12 TCP 1514 1161 → 80 [PSH, ACK] Seq=566 Ack=1 Win=17520 Len=1460 [TCP segment of a reassembled PDU]
6 06:44:20.624318 128.119.245.12 192.168.1.102 TCP 60 80 → 1161 [ACK] Seq=1 Ack=566 Win=6780 Len=0
7 06:44:20.624407 192.168.1.102 128.119.245.12 TCP 1514 1161 → 80 [ACK] Seq=2026 Ack=1 Win=17520 Len=1460 [TCP segment of a reassembled PDU]
8 06:44:20.625071 192.168.1.102 128.119.245.12 TCP 1514 1161 → 80 [ACK] Seq=3486 Ack=1 Win=17520 Len=1460 [TCP segment of a reassembled PDU]
9 06:44:20.647675 128.119.245.12 192.168.1.102 TCP 60 80 → 1161 [ACK] Seq=1 Ack=2026 Win=8760 Len=0
10 06:44:20.647786 192.168.1.102 128.119.245.12 TCP 1514 1161 → 80 [ACK] Seq=4946 Ack=1 Win=17520 Len=1460 [TCP segment of a reassembled PDU]
11 06:44:20.648538 192.168.1.102 128.119.245.12 TCP 1514 1161 → 80 [ACK] Seq=6406 Ack=1 Win=17520 Len=1460 [TCP segment of a reassembled PDU]
12 06:44:20.694466 128.119.245.12 192.168.1.102 TCP 60 80 → 1161 [ACK] Seq=1 Ack=3486 Win=11680 Len=0
13 06:44:20.694568 192.168.1.102 128.119.245.12 TCP 1201 1161 → 80 [PSH, ACK] Seq=7866 Ack=1 Win=17520 Len=1147 [TCP segment of a reassembled PDU]
14 06:44:20.739499 128.119.245.12 192.168.1.102 TCP 60 80 → 1161 [ACK] Seq=1 Ack=4946 Win=14600 Len=0
15 06:44:20.787688 128.119.245.12 192.168.1.102 TCP 60 80 → 1161 [ACK] Seq=1 Ack=6406 Win=17520 Len=0
16 06:44:20.838183 128.119.245.12 192.168.1.102 TCP 60 80 → 1161 [ACK] Seq=1 Ack=7866 Win=20440 Len=0
17 06:44:20.875188 128.119.245.12 192.168.1.102 TCP 60 80 → 1161 [ACK] Seq=1 Ack=9013 Win=23360 Len=0
[Frame is marked: False]
[Frame is ignored: False]
[Protocols in frame: eth:ethertype:ip:tcp]
[Coloring Rule Name: HTTP]
[Coloring Rule String: http || tcp.port == 80 || http2]
Ethernet II, Src: Linksys6_da:af:73 (00:06:25:da:af:73), Dst: Actionte_8a:70:1a (00:20:e0:8a:70:1a)
Internet Protocol Version 4, Src: 128.119.245.12, Dst: 192.168.1.102
Transmission Control Protocol, Src Port: 80, Dst Port: 1161, Seq: 0, Ack: 1, Len: 0
Source Port: 80
Destination Port: 1161
[Stream index: 0]
[TCP Segment Len: 0]
Sequence number: 0 (relative sequence number)
[Next sequence number: 0 (relative sequence number)]
Acknowledgment number: 1 (relative ack number)
0111 .... = Header Length: 28 bytes (7)
Flags: 0x012 (SYN, ACK)
Window size value: 5840
[Calculated window size: 5840]
Checksum: 0x774d [unverified]
[Checksum Status: Unverified]
Urgent pointer: 0
Options: (8 bytes), Maximum segment size, No-Operation (NOP), No-Operation (NOP), SACK permitted
[SEQ/ACK analysis]
[Timestamps]
0000 00 20 e0 8a 70 1a 00 06 25 da af 73 08 00 45 00
0010 00 30 00 00 40 00 37 06 0c 36 80 77 f5 0c c0 a8
0020 01 66 00 50 04 89 34 a2 74 19 0d d6 01 f5 70 12
0030 16 d0 77 4d 00 00 02 04 05 b4 01 01 04 02
The scaled window size (if scaling has been used) (tcp.window
Packets: 213 · Displayed: 213 (100.0%)
Profile: Defa



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 no retransmitted segments in the trace file. I verified this by manually viewing all of the sequence numbers in each of the TCP packets sent from the client to server. If there was a retransmission, then the client would send a TCP packet with a sequence number that is less than any previous TCP segments' sequence numbers. I also verified this by observing that the Sequence Numbers graph below never decreases, which verifies that the sequence number transmitted from client to server never decreases.



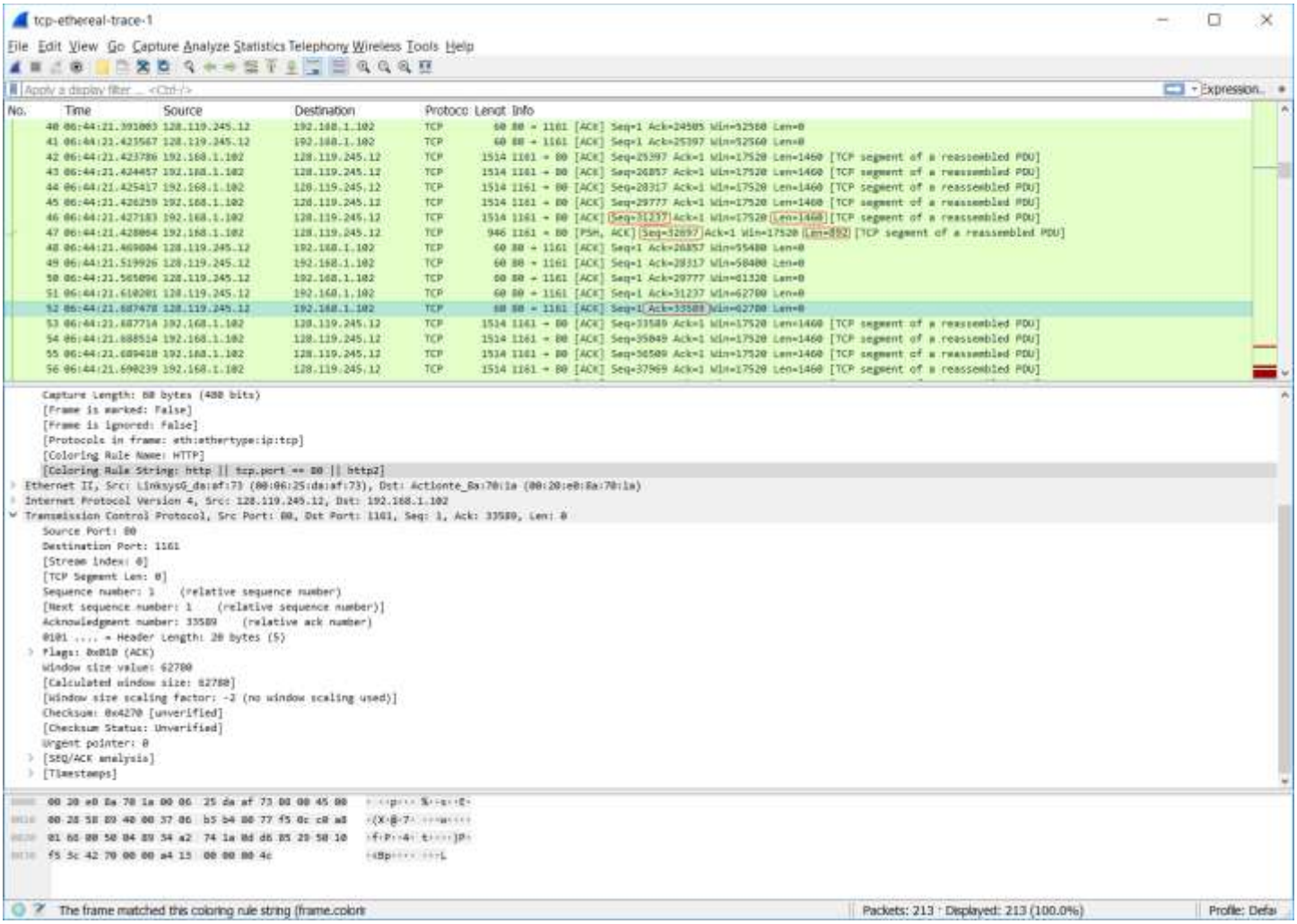
11) How much data does the receiver typically acknowledge in an ACK? Can you identify cases where the receiver is ACKing every other received segment (see Table 3.2 on page 250 in the text).

The receiver typically acknowledges 1460 bytes in an ACK. Since the ACK value is the number of bytes received since the last ACK, I determined the amount of acknowledged data by calculating the difference $ACK_n - ACK_{n-1}$, whereas the first ACK is just 1 based on a typical 3-way handshake.

One case where the receiver is ACKing every other segments is TCP Frame No 52, which acknowledges 2352 (= 1460 + 892) bytes. In this case, client sent 1460 bytes in TCP frame no 46 and 892 bytes in TCP frame no 47. When TCP frame 52 arrived, the server received an in-order segment with the expected sequence number and all data up to the expected sequence number were already acknowledged, so the server performed a delayed ACK that lasted 77.277 ms (= (1.117097000 - 1.039820000) * 1000) but could have waited up to 500 ms. TCP frame 52 is ACKing the TCP frame no 46 and 47, so TCP segment 52 is ACKing every other segment in this case.

TCP Frame No	ACK value	ACK data
3	1	1
6	566	565
9	2026	1460

12	3486	1460
14	4946	1460
15	6406	1460
16	7866	1460
17	9013	1147
24	10473	1460
25	11933	1460
26	13393	1460
27	14853	1460
28	16313	1460
29	17205	892
36	18665	1460
37	20125	1460
38	21585	1460
39	23045	1460
40	24505	1460
41	25397	892
48	26857	1460
49	28317	1460
50	29777	1460
51	31237	1460
52	33589	2352



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

If the throughput for the TCP connection is bytes transferred per unit of time, then throughput can be calculated as throughput_rate = (total_length) / (time_elapsed). Total length would be calculated as total_length = $TCP_{segmentN\_ack} - TCP_{segment1\_seqno}$, where $TCP_{segmentN\_ack}$ is the ACK value of the last TCP segment sent by the server minus the sequence number of the first TCP segment sent by the client. The time elapsed would be calculated as time_elapsed = $TCP_{segmentN\_time} - TCP_{segment1\_time}$, where $TCP_{segmentN\_time}$ is the time elapsed since the capture first started for the last TCP segment and $TCP_{segment1\_time}$ is the time elapsed since the capture first started for the first TCP segment. Therefore, the throughput is 30222.75 bytes per second.

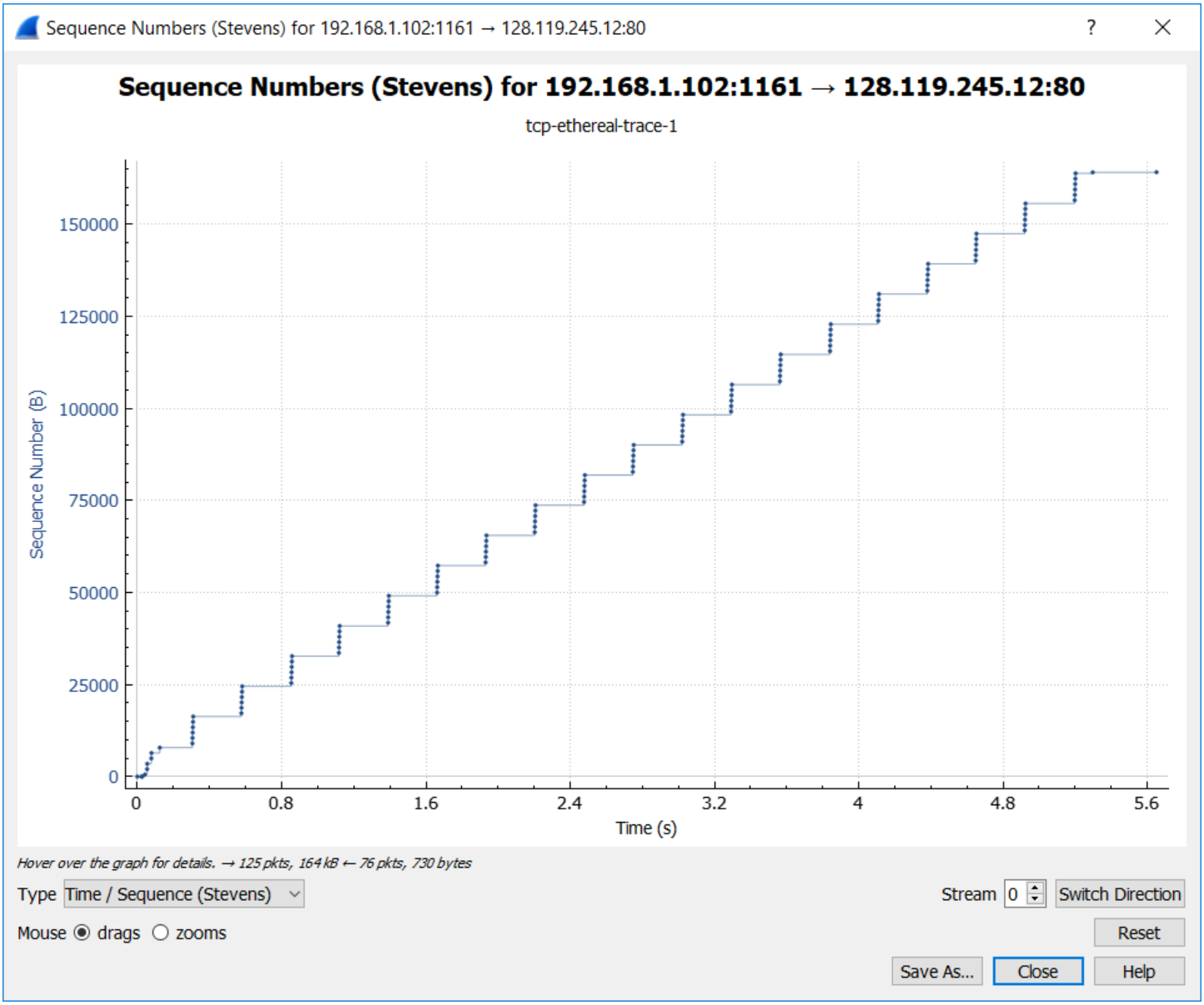
throughput_rate = $(TCP_{segmentN\_ack} - TCP_{segment1\_seqno}) / (TCP_{segmentN\_time} - TCP_{segment1\_time})$
throughput_rate = (164091 – 1) bytes / (5.455830000 – 0.026477000) seconds

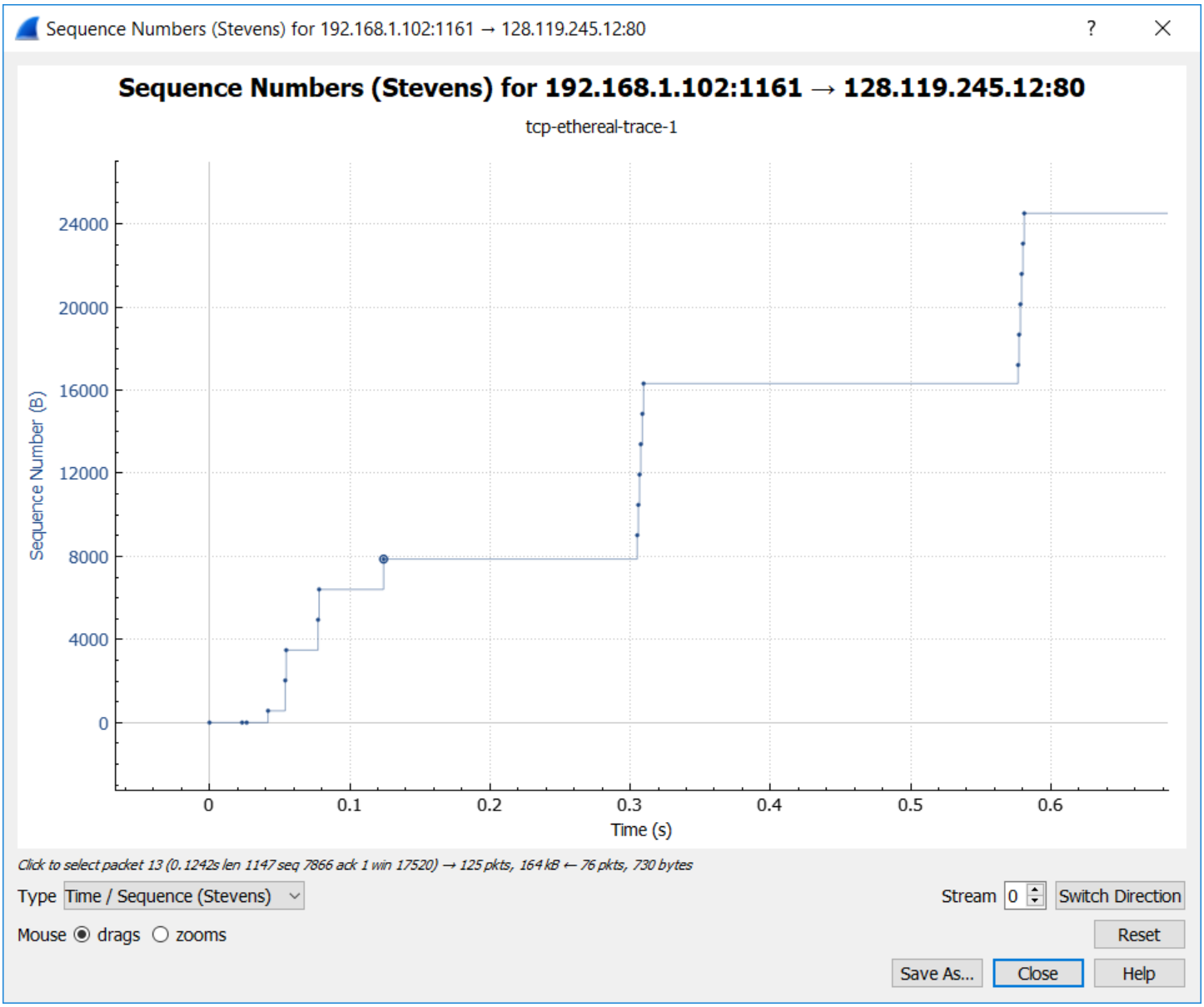
Total_length = 164090 bytes
Time_elapsed = 5.429353 seconds

throughput_rate = 164090 bits / 5.429353 s
= 30222.753981920129341378245253164 bytes per second
= 241782.03185536103473102596202531 bps
= 241.78203185536103473102596202531 Mbps

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'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.

The TCP's slowstart phase begins after sending the first TCP segment at 0.02648s and ends after sending packet 13 around 0.1242s. Congestion avoidance takes over around 0.3s where we see 5 TCP packets transmitted. The measured data differs from the ideal behavior of TCP that is in the text because we do not observe the typical exponential increase in MSS that's described in the text. The measured data transmits in batches of 6 packets even though the window size in the ACK packets are typically much greater than the number of packets transmitted, which is unlike the expected method of transmission described in the text where slow-start should transmit 1 packet, then 2 packets, then 4 packets, then 8 packets, and so on until a loss event indicated a timeout, CWND equals ssthresh, or 3 duplicate ACKs are received.

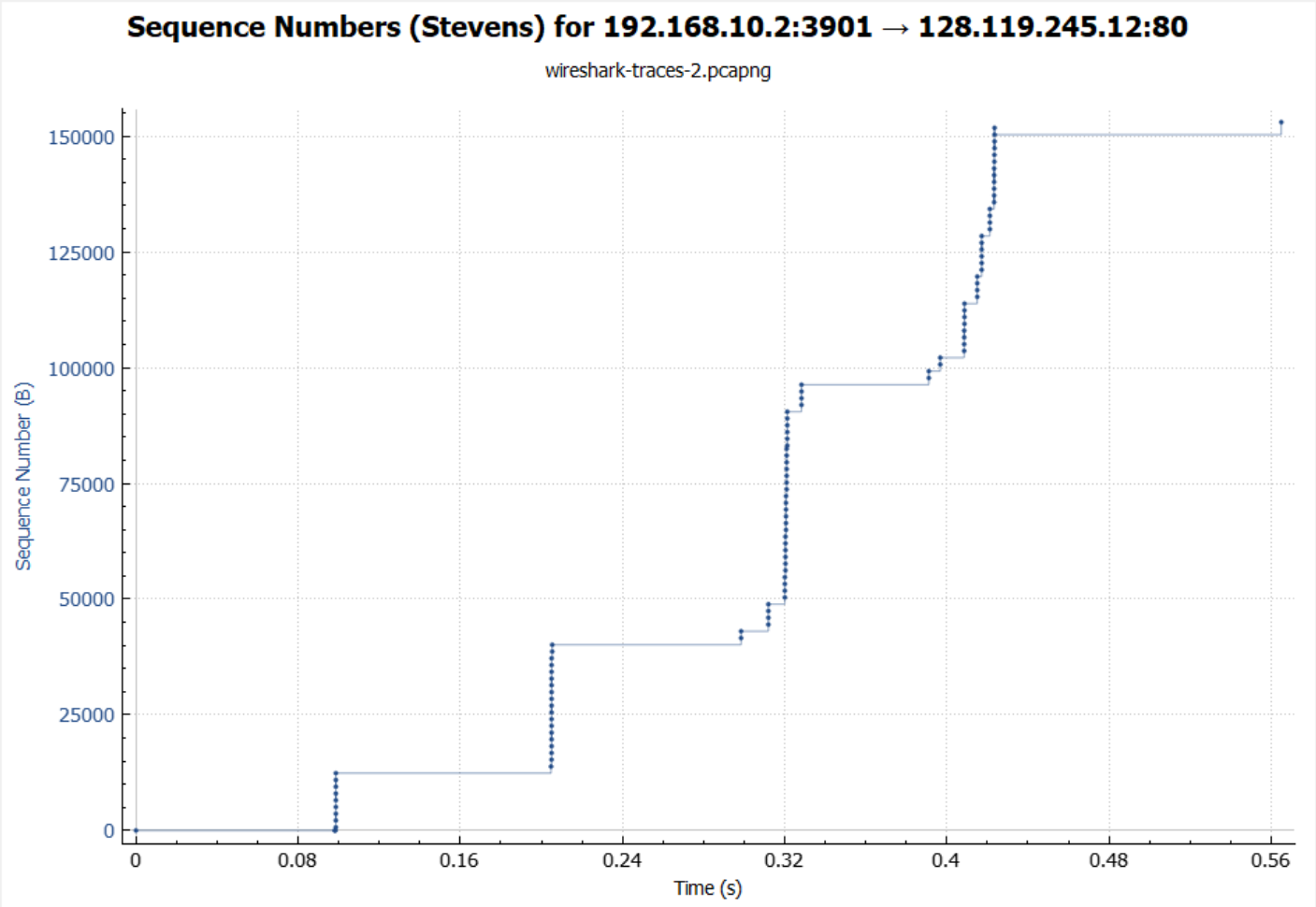




14) Answer Question 13 for the trace that you captured when you transferred a file from your ***own*** computer to gaia.cs.umass.edu.

The TCP's slowstart phase begins after sending the first TCP segment at 0.10s and ends after sending packet 13 around 0.33s. Congestion avoidance takes over at this point after 0.33s. The measured data is more in line with the ideal behavior of TCP that is in the text because we observed the exponential increase in in MSS until CWND equals the SSTHRESH around 0.33s.

Sequence Numbers (Stevens) for 192.168.10.2:3901 → 128.119.245.12:80



Hover over the graph for details. → 109 pkts, 153 kB ← 46 pkts, 777 bytes

Type Time / Sequence (Stevens)

Stream 6 Switch Direction

Mouse drags zooms

Reset

Save As... Close Help