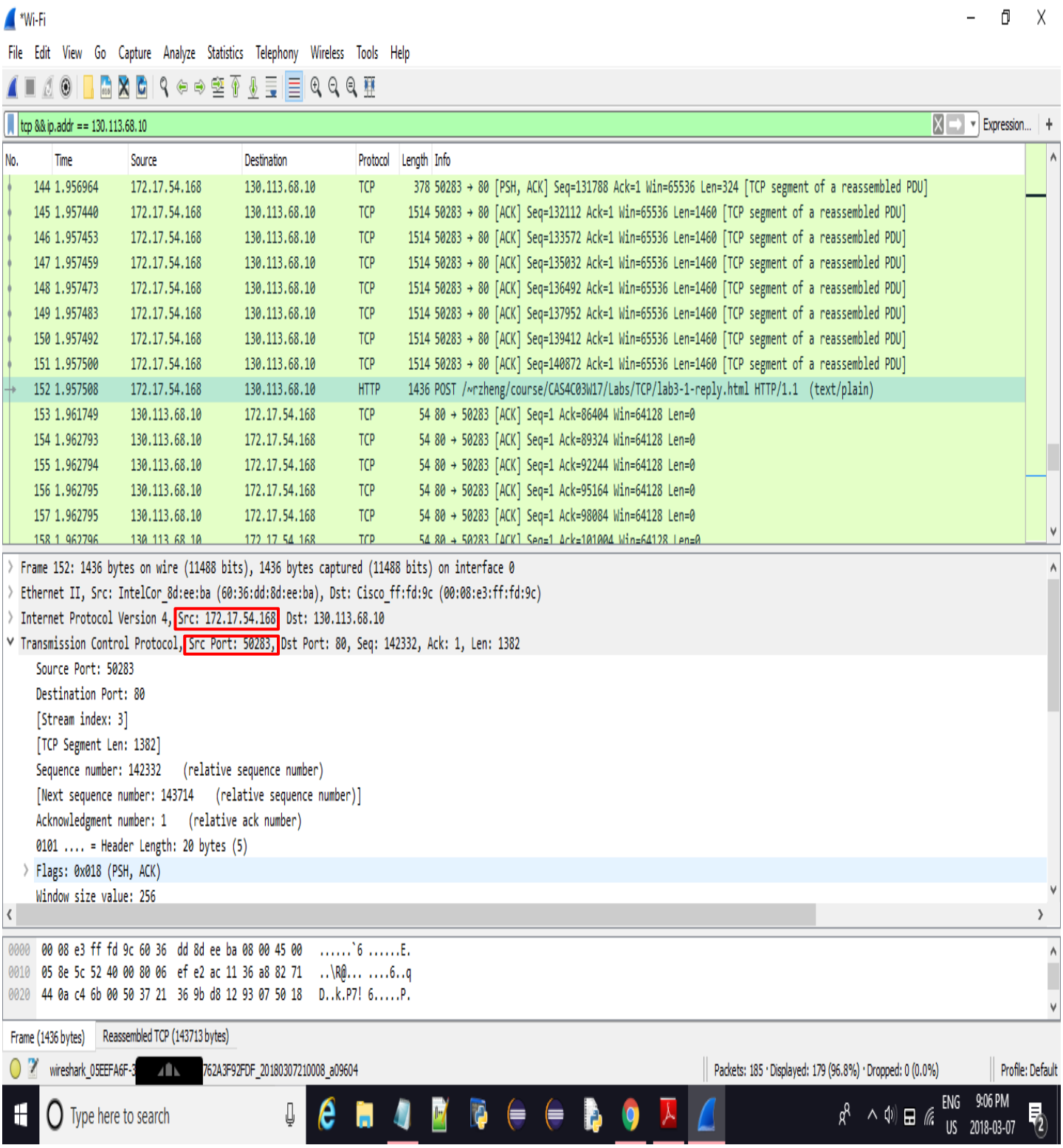
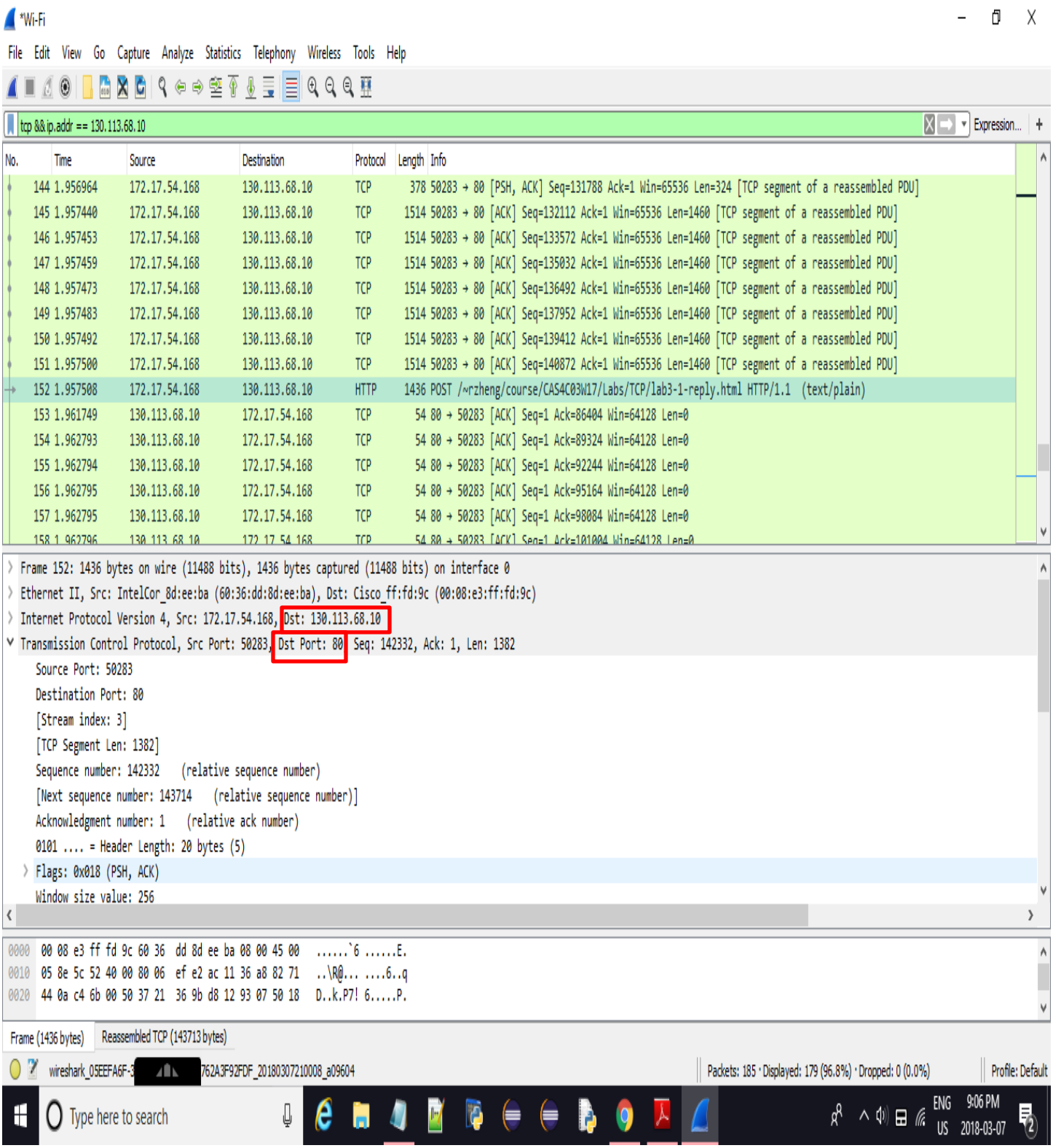
1.


*Wi-Fi
File Edit View Go Capture Analyze Statistics Telephony Wireless Tools Help
tcp && ip.addr == 130.113.68.10
Expression...
No. Time Source Destination Protocol Length Info
144 1.956964 172.17.54.168 130.113.68.10 TCP 378 50283 → 80 [PSH, ACK] Seq=131788 Ack=1 Win=65536 Len=324 [TCP segment of a reassembled PDU]
145 1.957440 172.17.54.168 130.113.68.10 TCP 1514 50283 → 80 [ACK] Seq=132112 Ack=1 Win=65536 Len=1460 [TCP segment of a reassembled PDU]
146 1.957453 172.17.54.168 130.113.68.10 TCP 1514 50283 → 80 [ACK] Seq=133572 Ack=1 Win=65536 Len=1460 [TCP segment of a reassembled PDU]
147 1.957459 172.17.54.168 130.113.68.10 TCP 1514 50283 → 80 [ACK] Seq=135032 Ack=1 Win=65536 Len=1460 [TCP segment of a reassembled PDU]
148 1.957473 172.17.54.168 130.113.68.10 TCP 1514 50283 → 80 [ACK] Seq=136492 Ack=1 Win=65536 Len=1460 [TCP segment of a reassembled PDU]
149 1.957483 172.17.54.168 130.113.68.10 TCP 1514 50283 → 80 [ACK] Seq=137952 Ack=1 Win=65536 Len=1460 [TCP segment of a reassembled PDU]
150 1.957492 172.17.54.168 130.113.68.10 TCP 1514 50283 → 80 [ACK] Seq=139412 Ack=1 Win=65536 Len=1460 [TCP segment of a reassembled PDU]
151 1.957500 172.17.54.168 130.113.68.10 TCP 1514 50283 → 80 [ACK] Seq=140872 Ack=1 Win=65536 Len=1460 [TCP segment of a reassembled PDU]
152 1.957508 172.17.54.168 130.113.68.10 HTTP 1436 POST /~rzheng/course/CAS4C03W17/Labs/TCP/lab3-1-reply.html HTTP/1.1 (text/plain)
153 1.961749 130.113.68.10 172.17.54.168 TCP 54 80 → 50283 [ACK] Seq=1 Ack=86404 Win=64128 Len=0
154 1.962793 130.113.68.10 172.17.54.168 TCP 54 80 → 50283 [ACK] Seq=1 Ack=89324 Win=64128 Len=0
155 1.962794 130.113.68.10 172.17.54.168 TCP 54 80 → 50283 [ACK] Seq=1 Ack=92244 Win=64128 Len=0
156 1.962795 130.113.68.10 172.17.54.168 TCP 54 80 → 50283 [ACK] Seq=1 Ack=95164 Win=64128 Len=0
157 1.962795 130.113.68.10 172.17.54.168 TCP 54 80 → 50283 [ACK] Seq=1 Ack=98084 Win=64128 Len=0
Frame 152: 1436 bytes on wire (11488 bits), 1436 bytes captured (11488 bits) on interface 0
Ethernet II, Src: IntelCor_8d:ee:ba (60:36:dd:8d:ee:ba), Dst: Cisco_ff:fd:9c (00:08:e3:ff:fd:9c)
Internet Protocol Version 4, Src: 172.17.54.168 Dst: 130.113.68.10
Transmission Control Protocol, Src Port: 50283, Dst Port: 80, Seq: 142332, Ack: 1, Len: 1382
Source Port: 50283
Destination Port: 80
[Stream index: 3]
[TCP Segment Len: 1382]
Sequence number: 142332 (relative sequence number)
[Next sequence number: 143714 (relative sequence number)]
Acknowledgment number: 1 (relative ack number)
0101 .... = Header Length: 20 bytes (5)
Flags: 0x018 (PSH, ACK)
Window size value: 256
0000 00 08 e3 ff fd 9c 60 36 dd 8d ee ba 08 00 45 00 ......`6 ......E.
0010 05 8e 5c 52 40 00 80 06 ef e2 ac 11 36 a8 82 71 ..\R@... ....6..q
0020 44 0a c4 6b 00 50 37 21 36 9b d8 12 93 07 50 18 D..k.P7! 6.....P.
Frame (1436 bytes)
Reassembled TCP (143713 bytes)
wireshark_05EEFA6F-3
762A3F92FDF_20180307210008_a09604
Packets: 185 · Displayed: 179 (96.8%) · Dropped: 0 (0.0%)
Profile: Default
Type here to search
ENG
US
9:06 PM
2018-03-07

2.


*Wi-Fi
File Edit View Go Capture Analyze Statistics Telephony Wireless Tools Help
tcp && ip.addr == 130.113.68.10
Expression...
No. Time Source Destination Protocol Length Info
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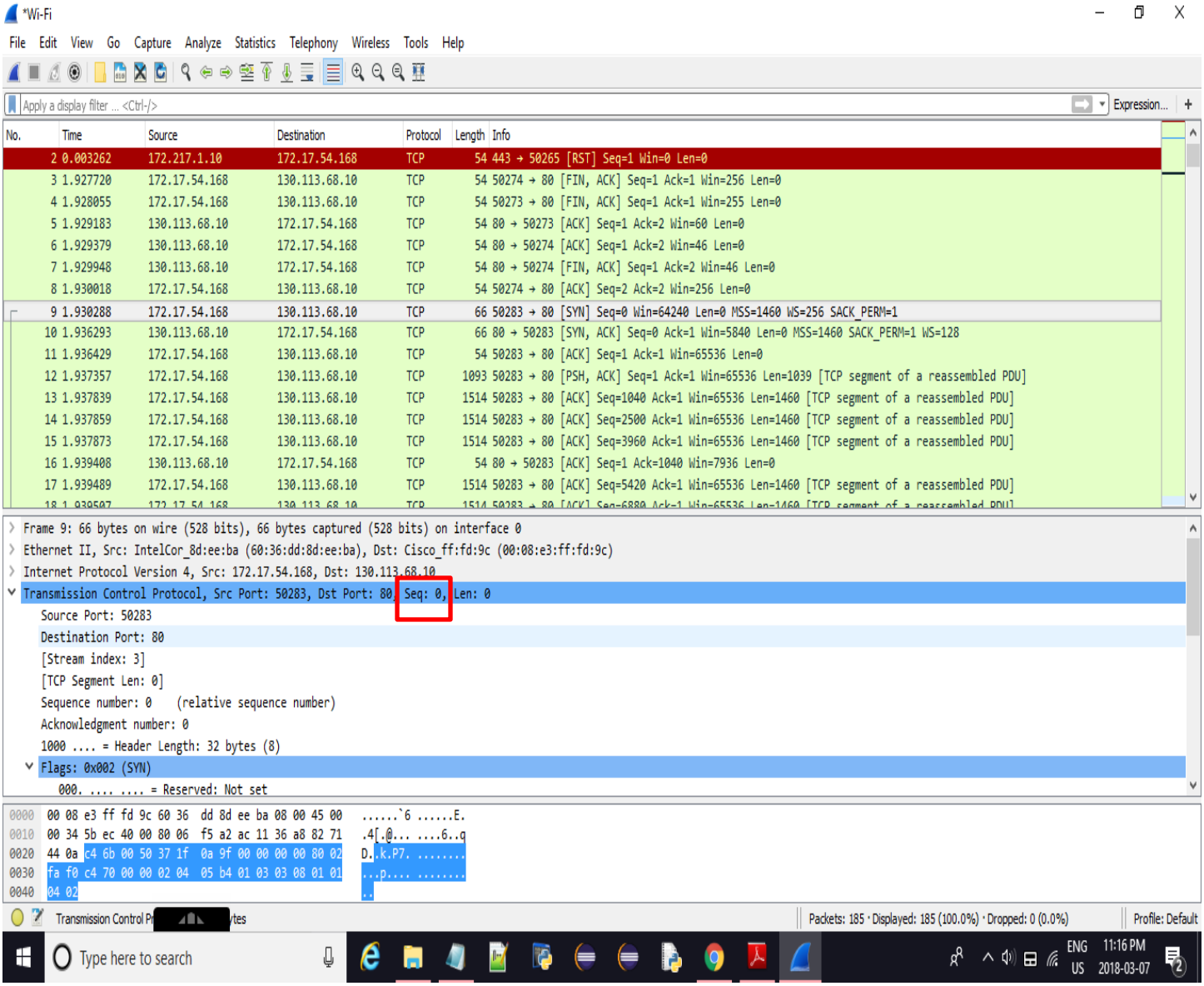
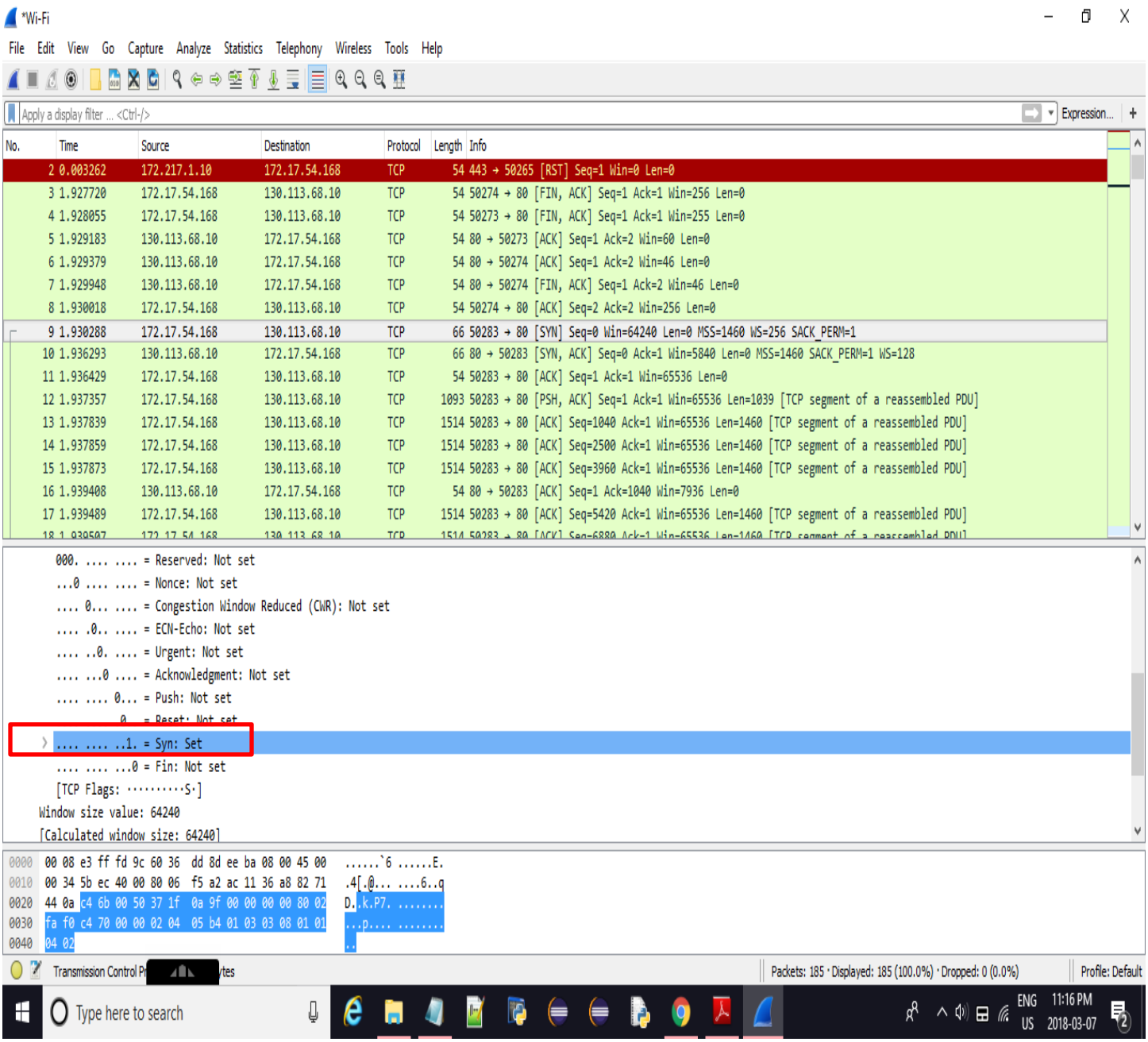
154 1.962793 130.113.68.10 172.17.54.168 TCP 54 80 → 50283 [ACK] Seq=1 Ack=89324 Win=64128 Len=0
155 1.962794 130.113.68.10 172.17.54.168 TCP 54 80 → 50283 [ACK] Seq=1 Ack=92244 Win=64128 Len=0
156 1.962795 130.113.68.10 172.17.54.168 TCP 54 80 → 50283 [ACK] Seq=1 Ack=95164 Win=64128 Len=0
157 1.962795 130.113.68.10 172.17.54.168 TCP 54 80 → 50283 [ACK] Seq=1 Ack=98084 Win=64128 Len=0
Frame 152: 1436 bytes on wire (11488 bits), 1436 bytes captured (11488 bits) on interface 0
Ethernet II, Src: IntelCor_8d:ee:ba (60:36:dd:8d:ee:ba), Dst: Cisco_ff:fd:9c (00:08:e3:ff:fd:9c)
Internet Protocol Version 4, Src: 172.17.54.168, Dst: 130.113.68.10
Transmission Control Protocol, Src Port: 50283, Dst Port: 80, Seq: 142332, Ack: 1, Len: 1382
Source Port: 50283
Destination Port: 80
[Stream index: 3]
[TCP Segment Len: 1382]
Sequence number: 142332 (relative sequence number)
[Next sequence number: 143714 (relative sequence number)]
Acknowledgment number: 1 (relative ack number)
0101 .... = Header Length: 20 bytes (5)
Flags: 0x018 (PSH, ACK)
Window size value: 256
0000 00 08 e3 ff fd 9c 60 36 dd 8d ee ba 08 00 45 00 ......`6 ......E.
0010 05 8e 5c 52 40 00 80 06 ef e2 ac 11 36 a8 82 71 ..\R@... ....6..q
0020 44 0a c4 6b 00 50 37 21 36 9b d8 12 93 07 50 18 D..k.P7! 6.....P.
Frame (1436 bytes)
Reassembled TCP (143713 bytes)
Packets: 185 · Displayed: 179 (96.8%) · Dropped: 0 (0.0%)
Profile: Default
Type here to search
ENG US
9:06 PM
2018-03-07

3.

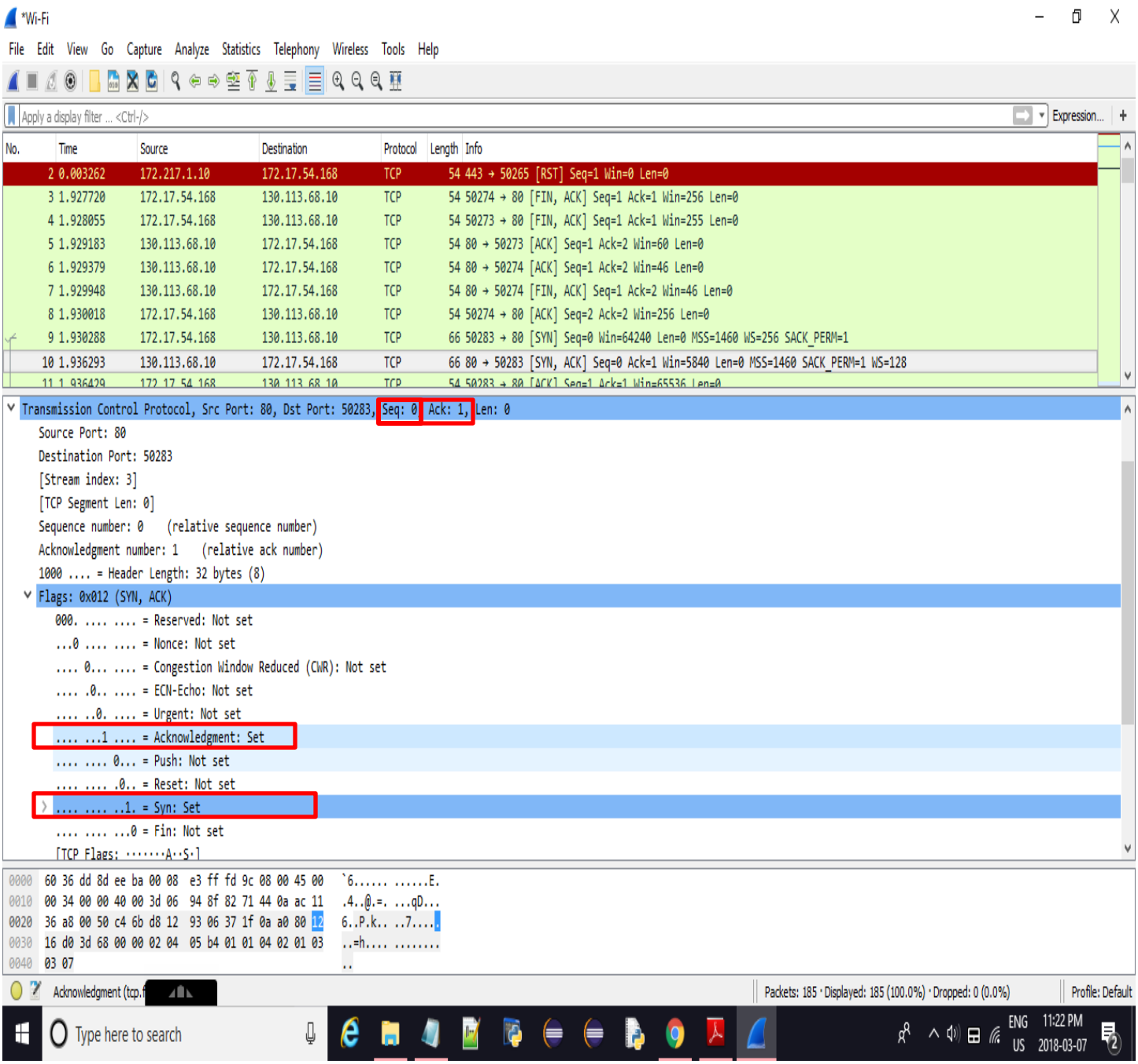


The Sequence number is 0.



The SYN flag is set to 1 which indicates that this segment is a SYN segment.

4.



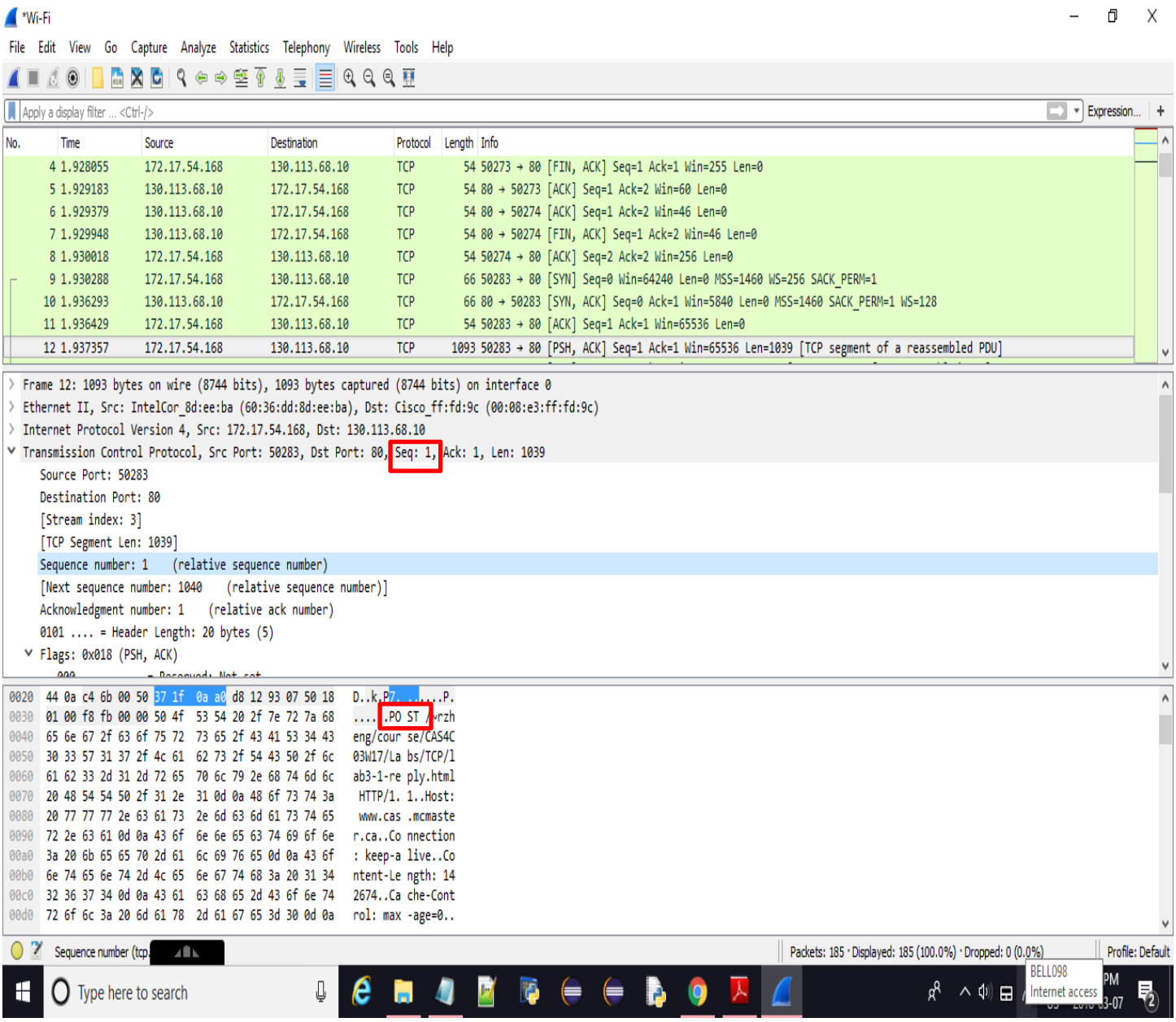
The sequence number is 0.

The value of Acknowledgement field is 1.

In this example, the initial sequence number of the SYN segment from the client computer is 0, and then the server adds 1 to the initial sequence number, therefore the value of the acknowledgement field in the SYN_ACK segment is 1.

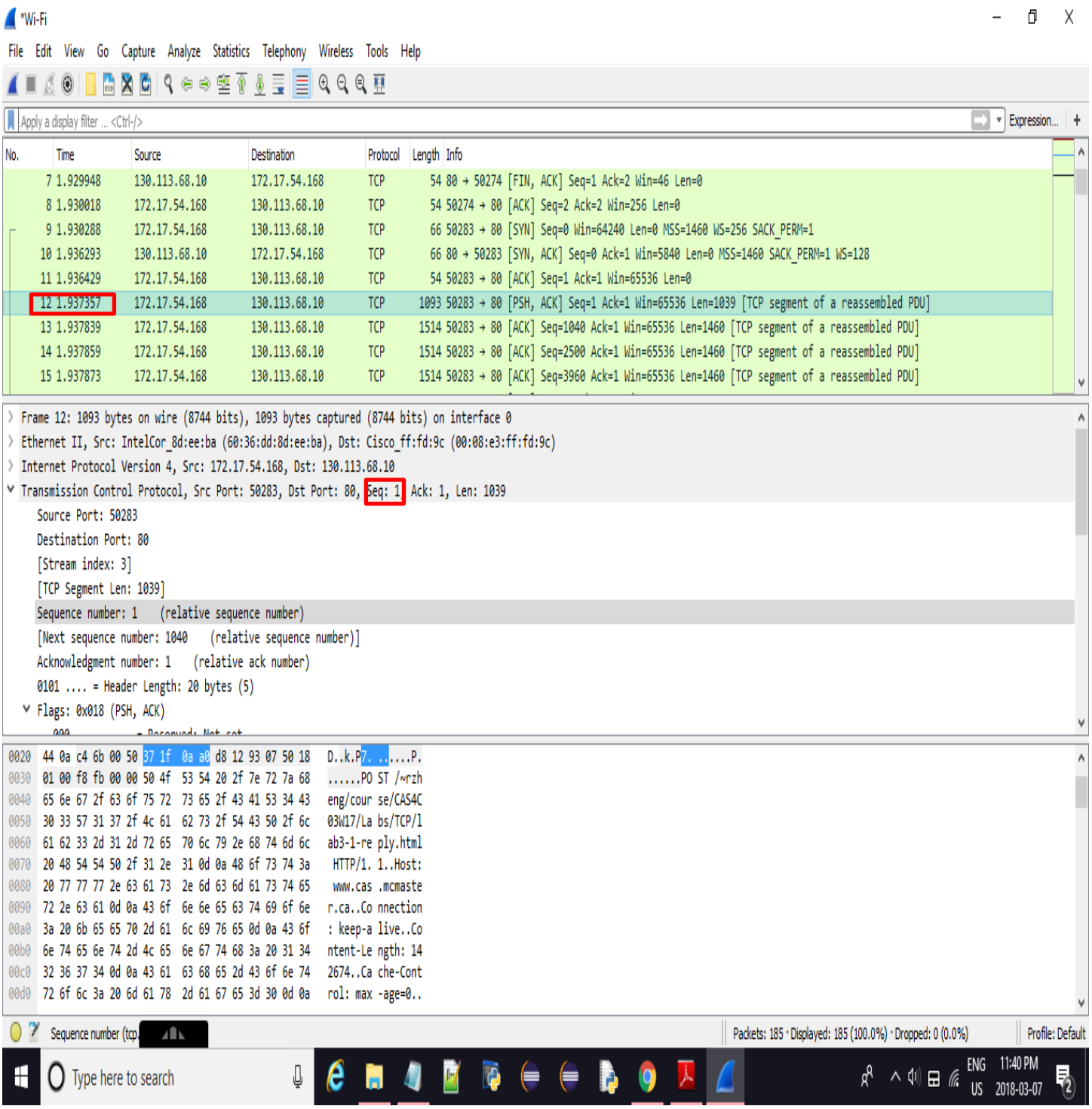
A segment will be identified as a SYN_ACK segment if both SYN flag and Acknowledgement flag in the segment are set to 1.

5.



The sequence number is 1.

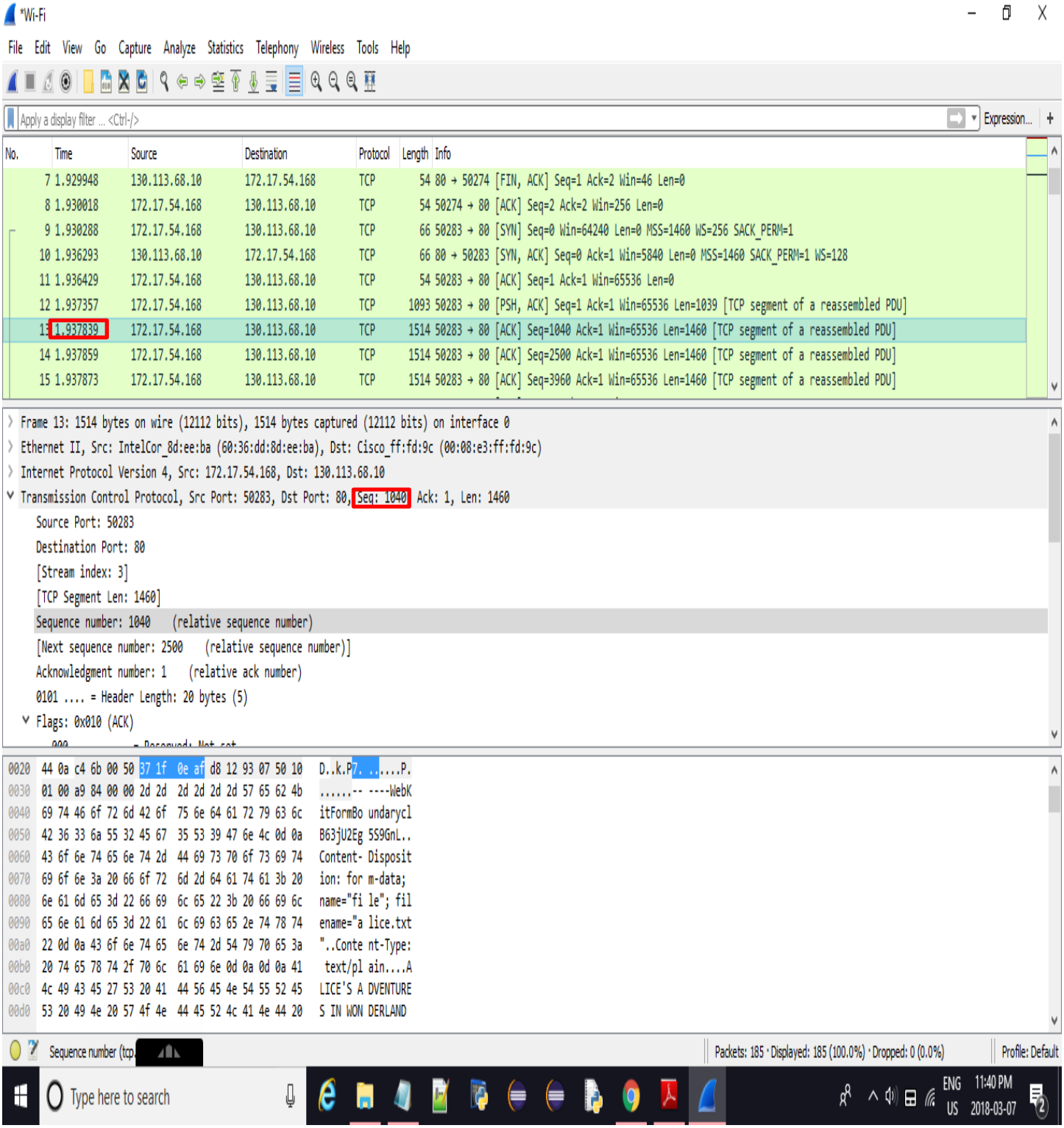
6.



First Segment:

The Sequence number is 1.

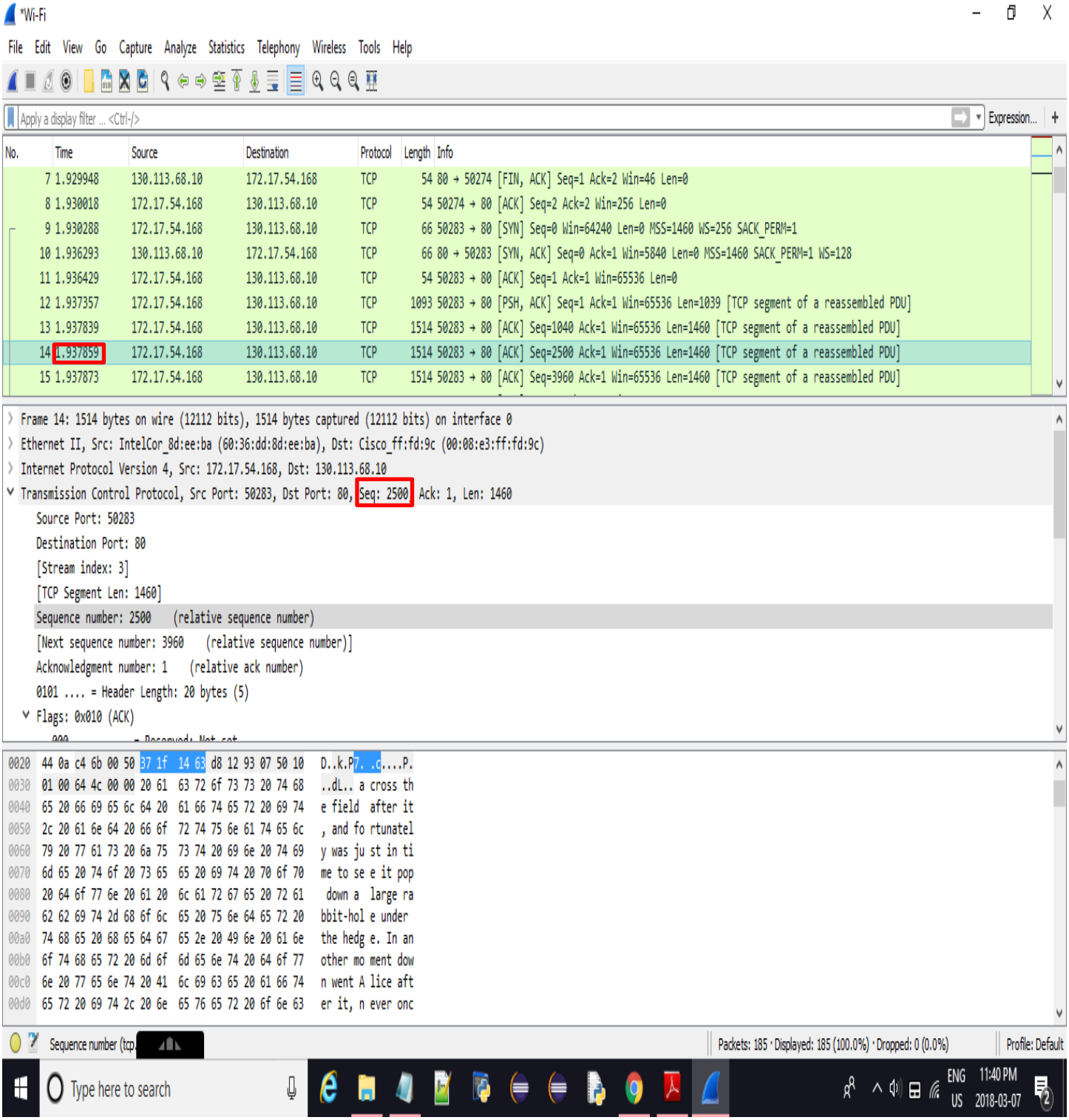
It was sent at 1.937357 s.



Second Segment:

The Sequence number is 1040.

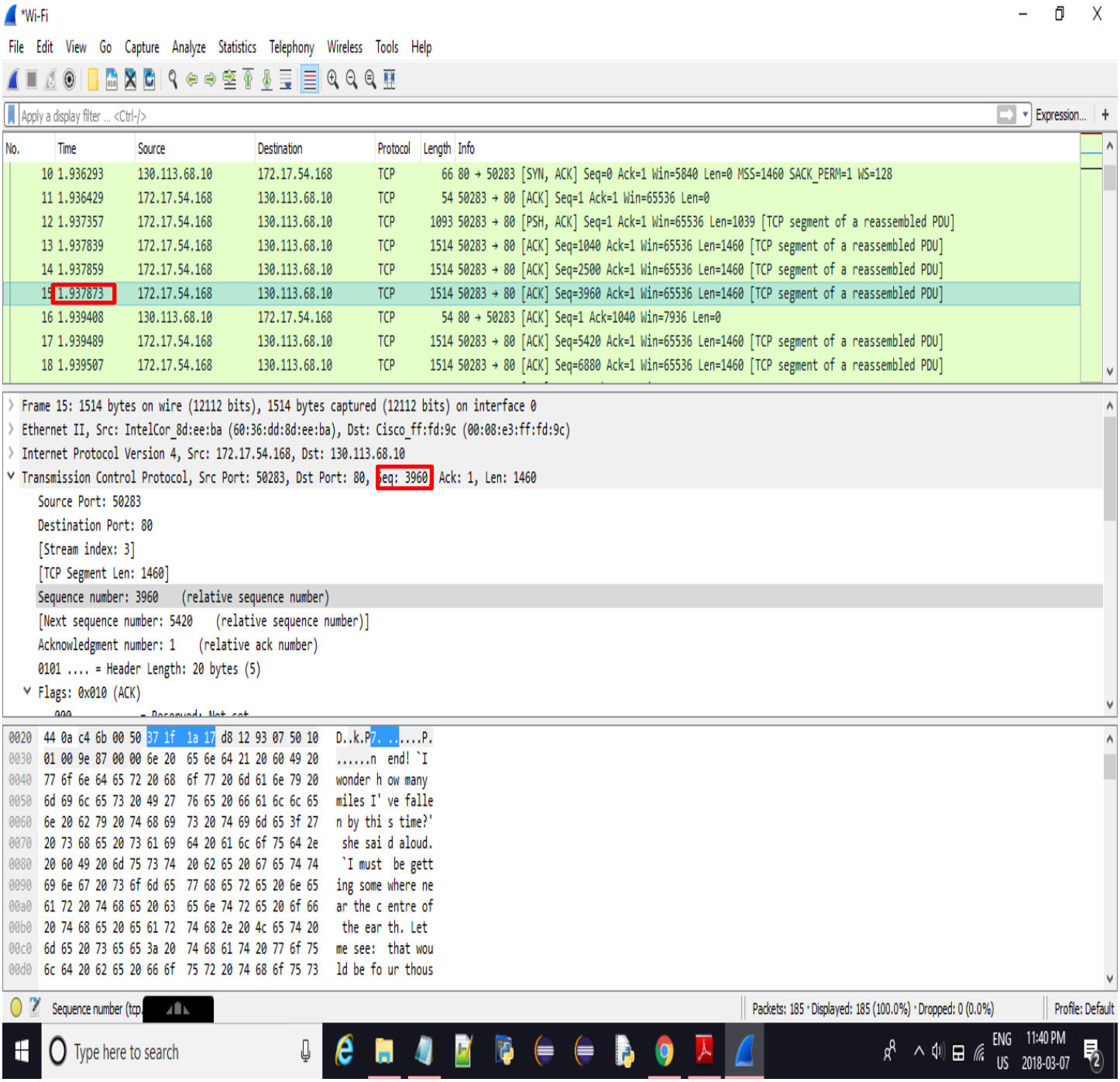
It was sent at 1.937839 s.



Third Segment:

The Sequence number is 2500.

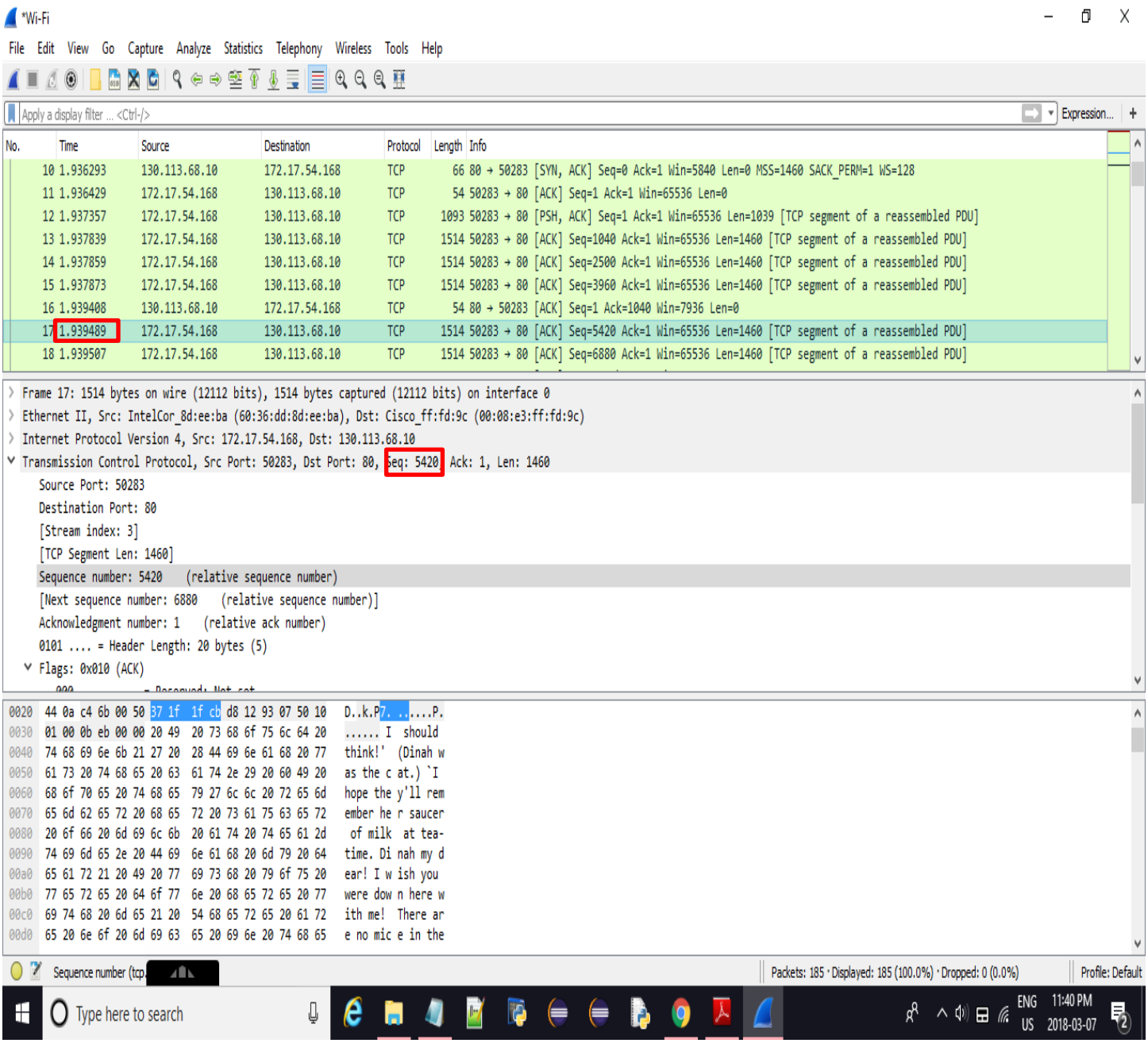
It was sent at 1.937859 s.



Fourth Segment:

The Sequence number is 3960.

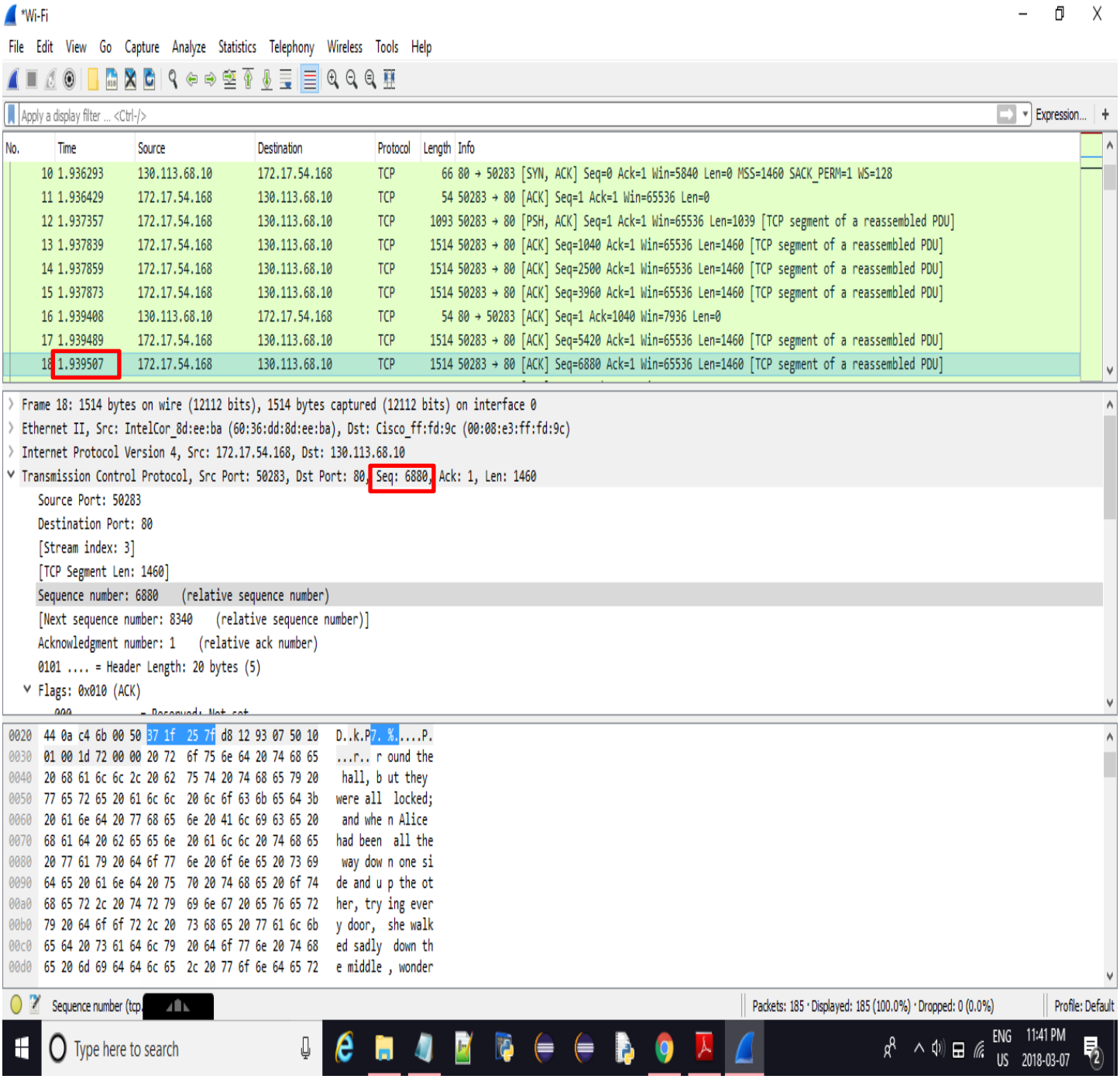
It was sent at 1.937873 s.



Fifth Segment:

The Sequence number is 5420.

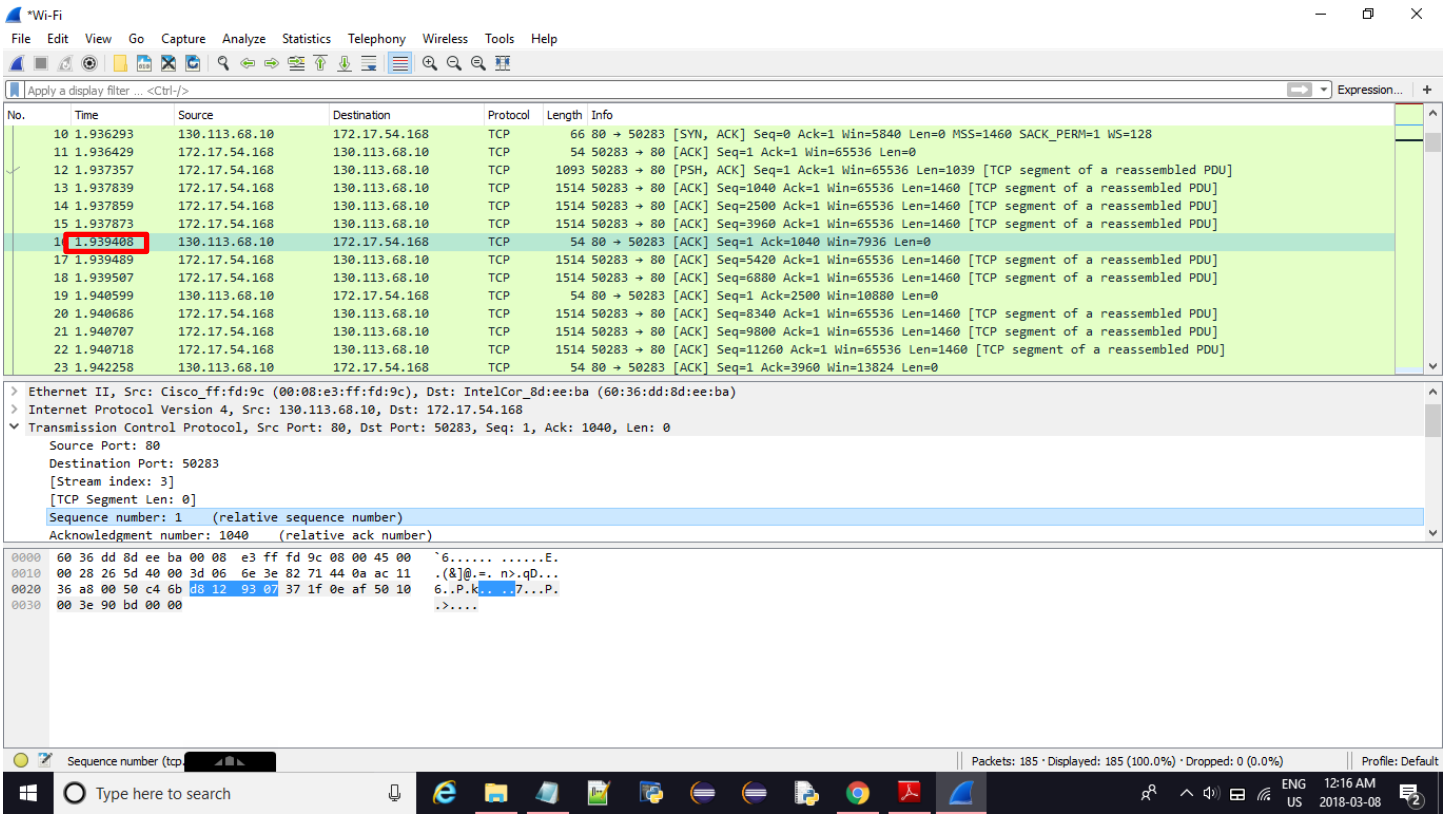
It was sent at 1.939489 s.



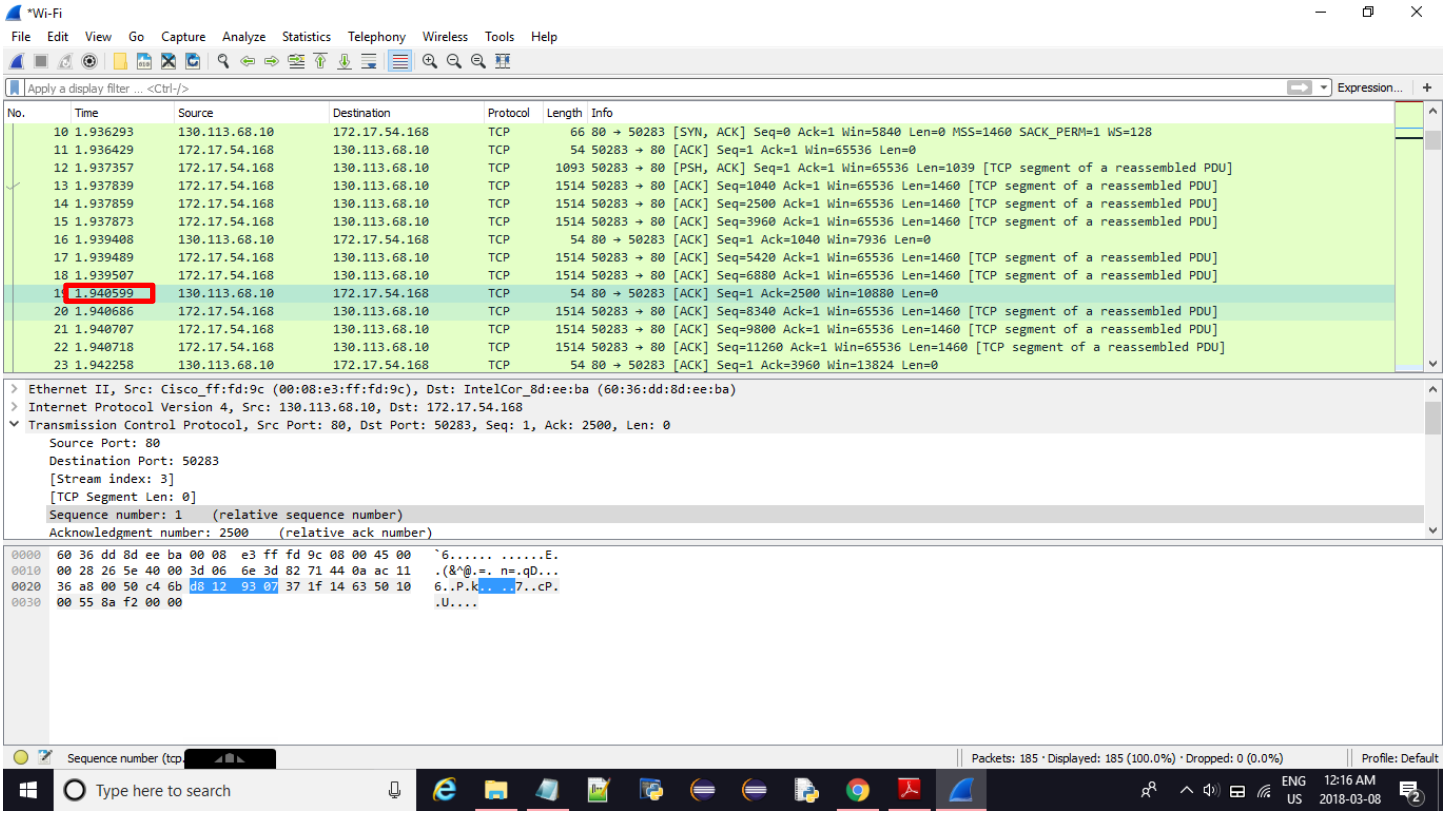
Sixth Segment:

The Sequence number is 6880.

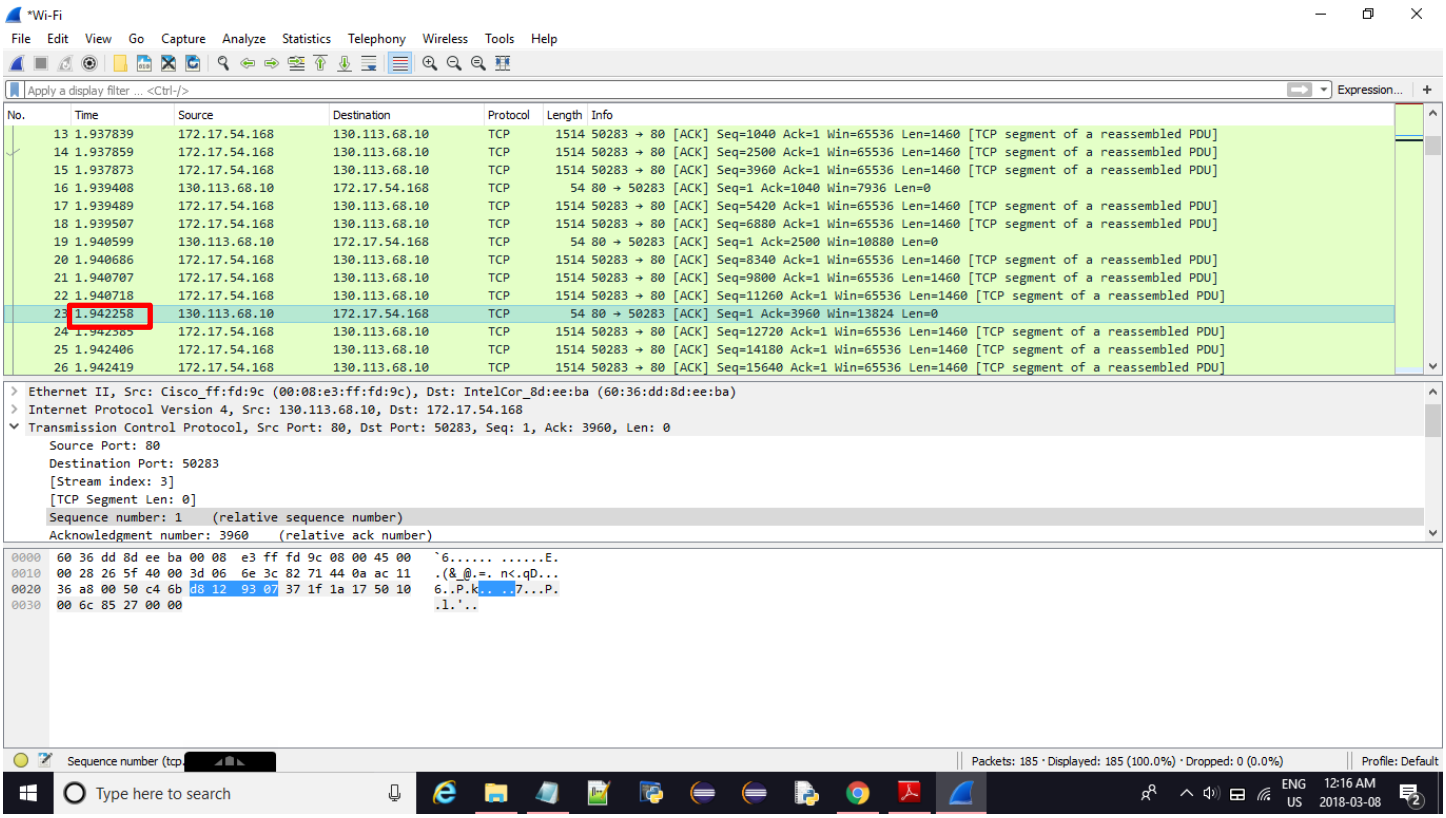
It was sent at 1.939507 s.



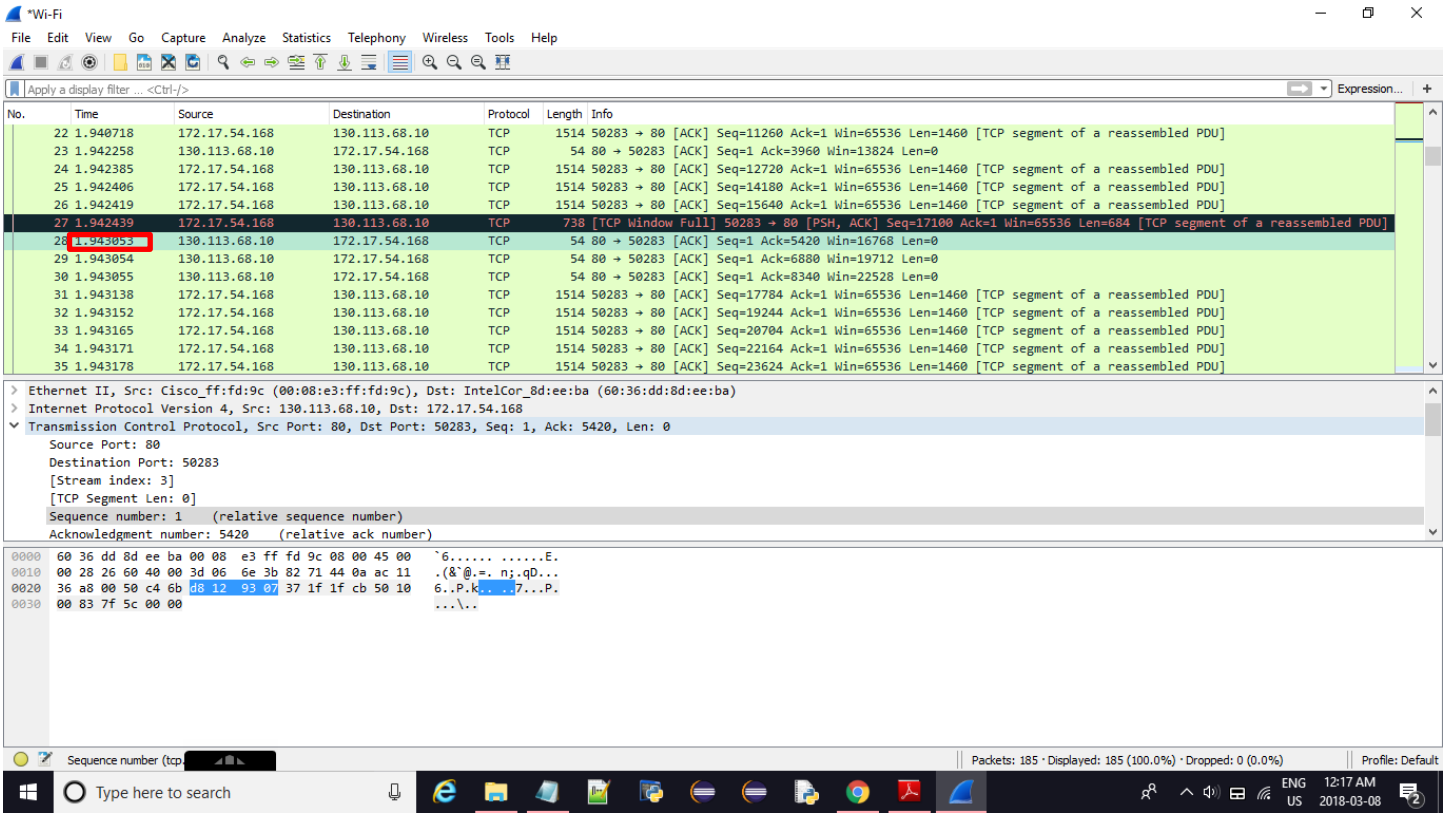
The first segment received at 1.939408 s.



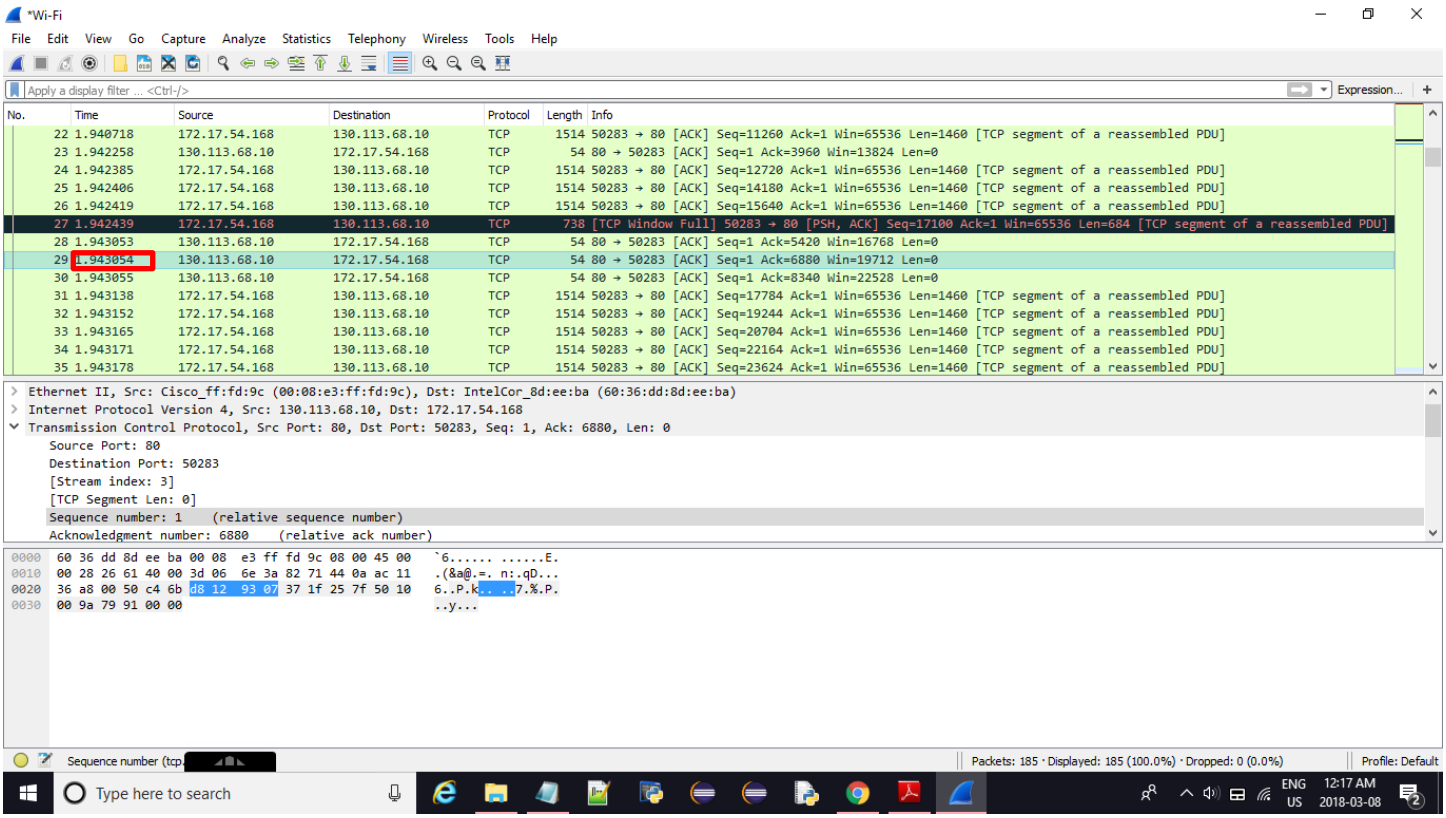
The second segment received at 1.940599 s.



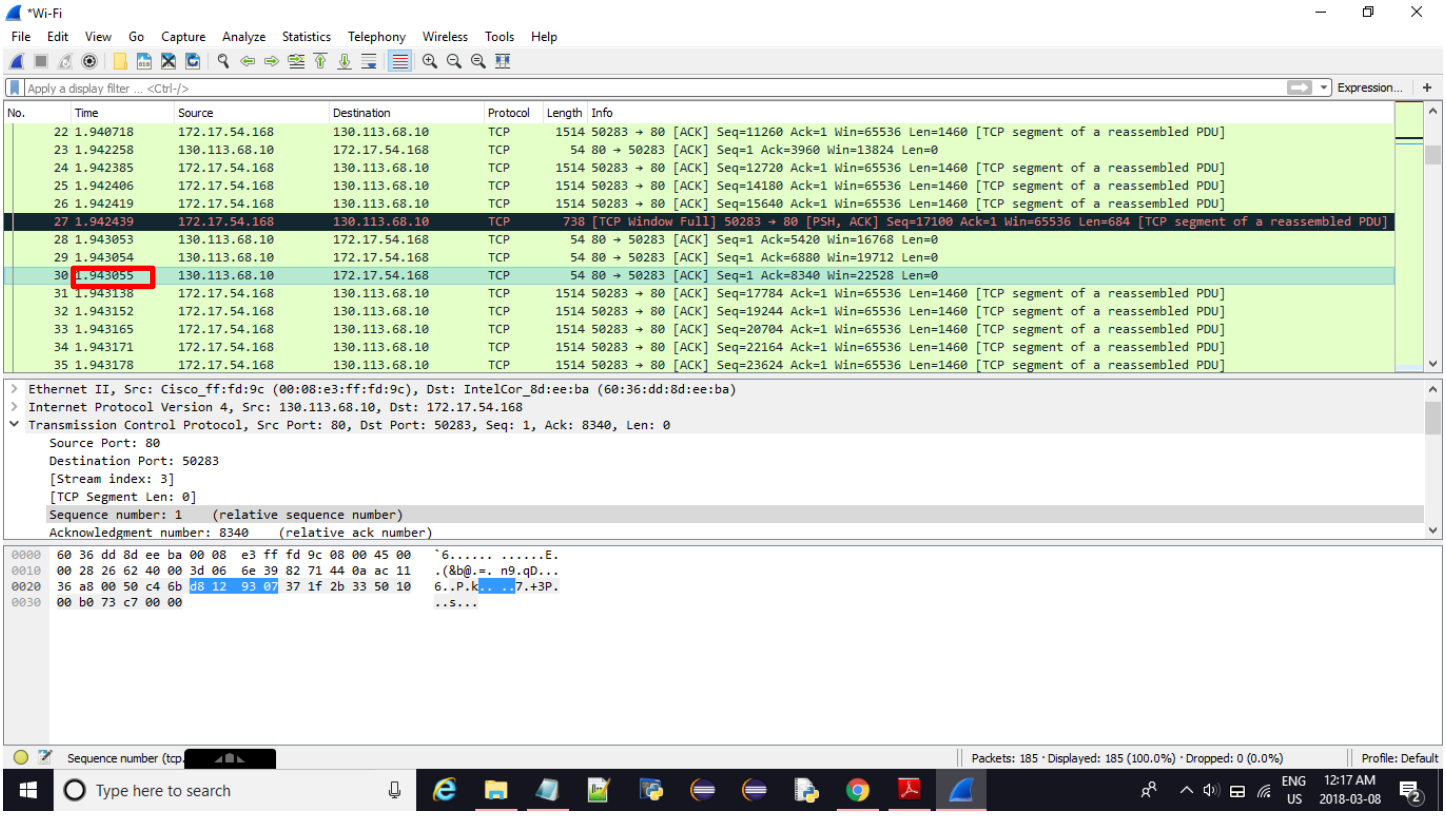
The third segment received at 1.942258 s.



The fourth segment received at 1.943053 s.



The fifth segment received at 1.943054 s.

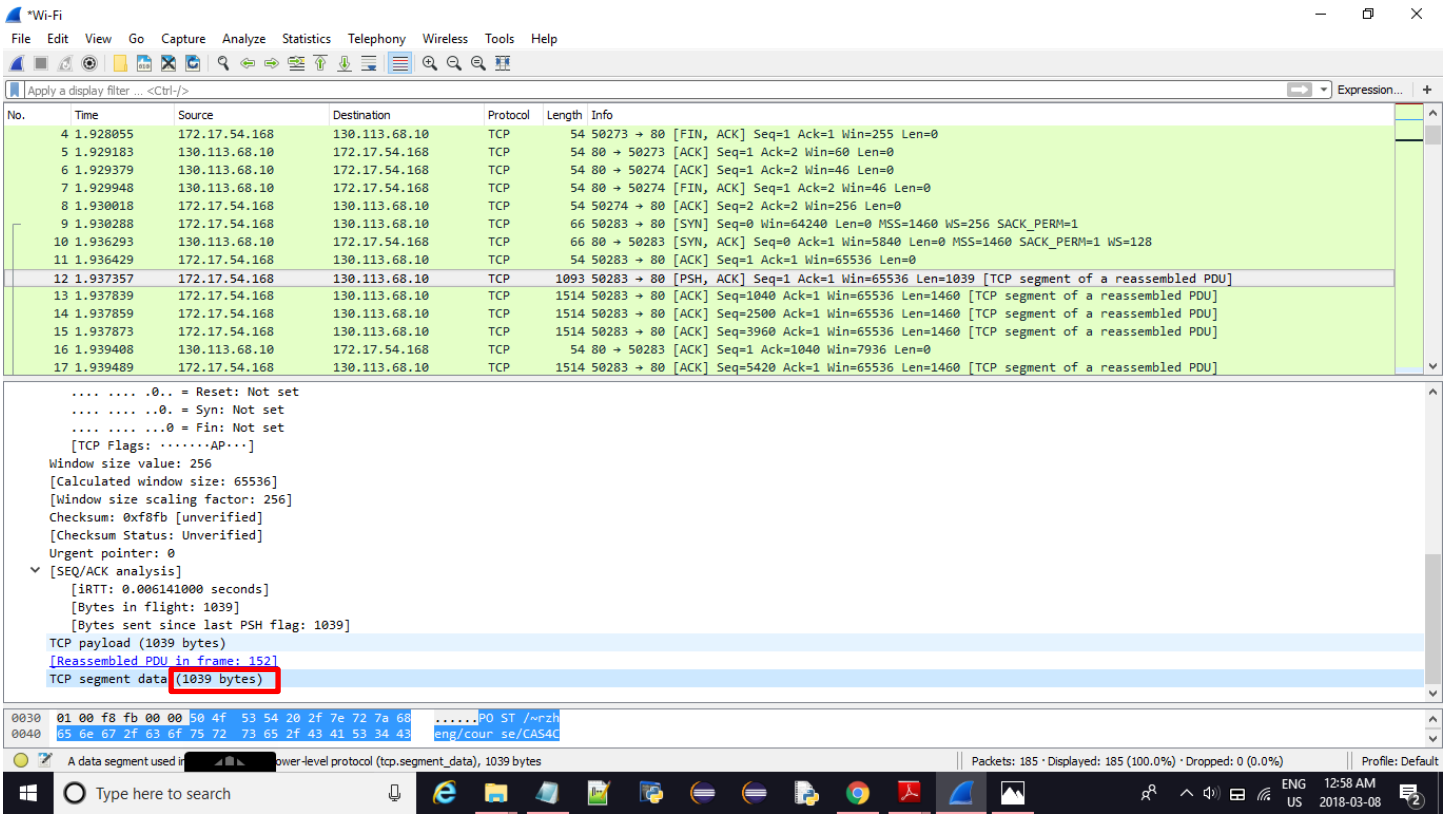


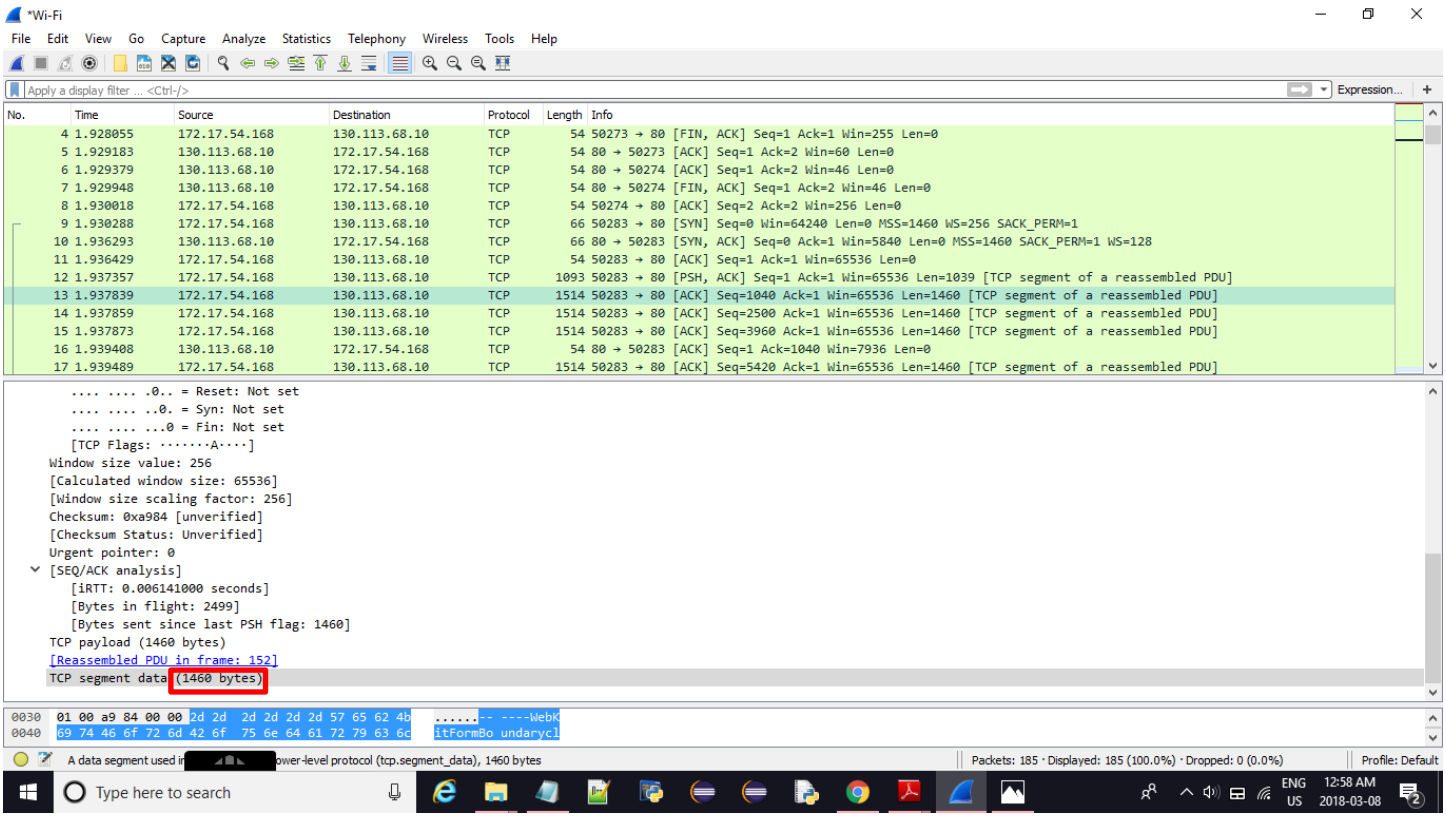
The sixth segment received at 1.943055 s.

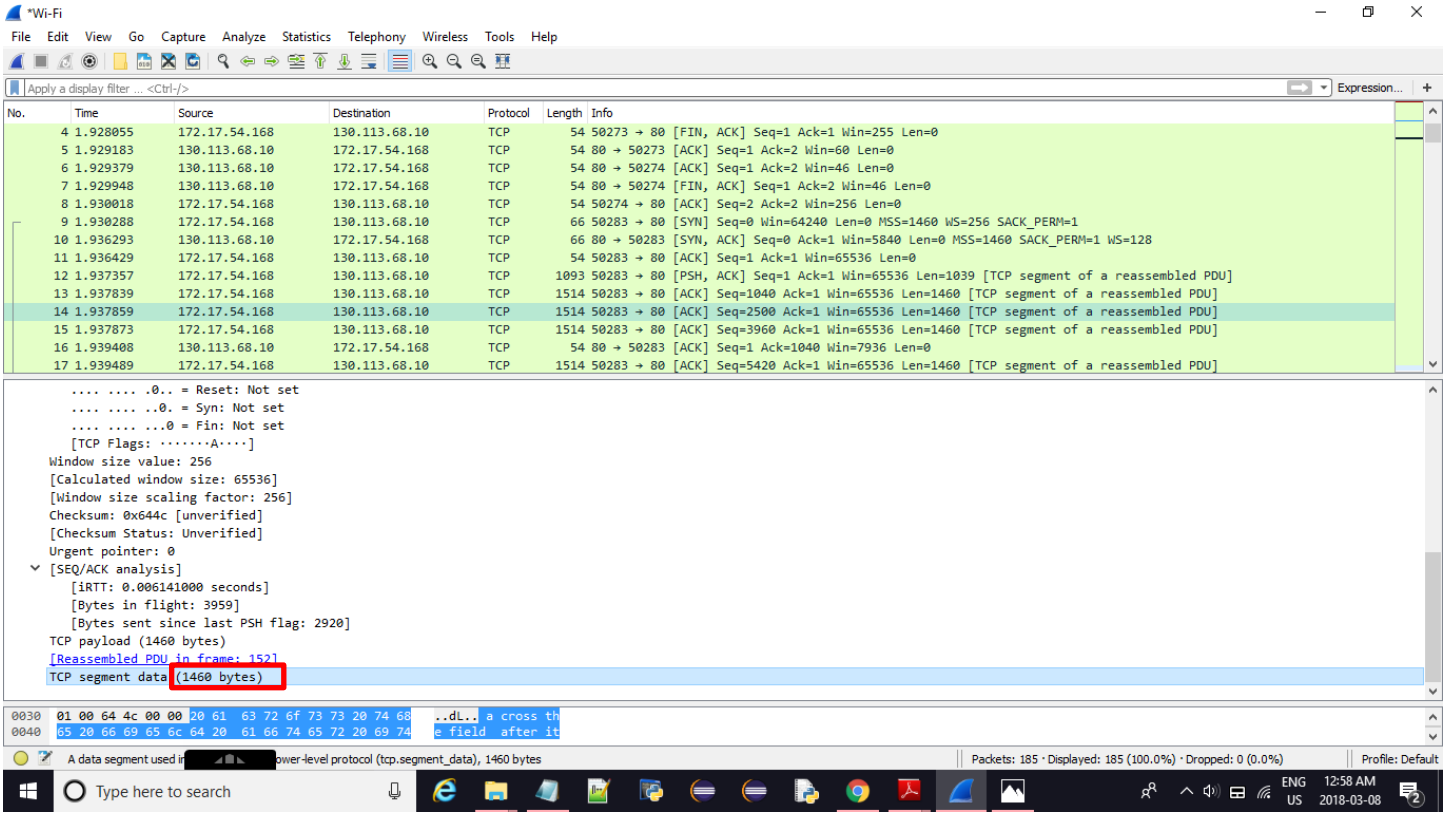
Segment	Packet Number	Sequence Number	Time Sent(s)	Time ACK Received	Sample RTT (s) (Time received – Time Sent)
1	12	1	1.937357	1.939408	0.002051
2	13	1040	1.937839	1.940599	0.00276
3	14	2500	1.937859	1.942258	0.004399
4	15	3960	1.937873	1.943053	0.00518
5	17	5420	1.939489	1.943054	0.003565
6	18	6880	1.939507	1.943055	0.003548

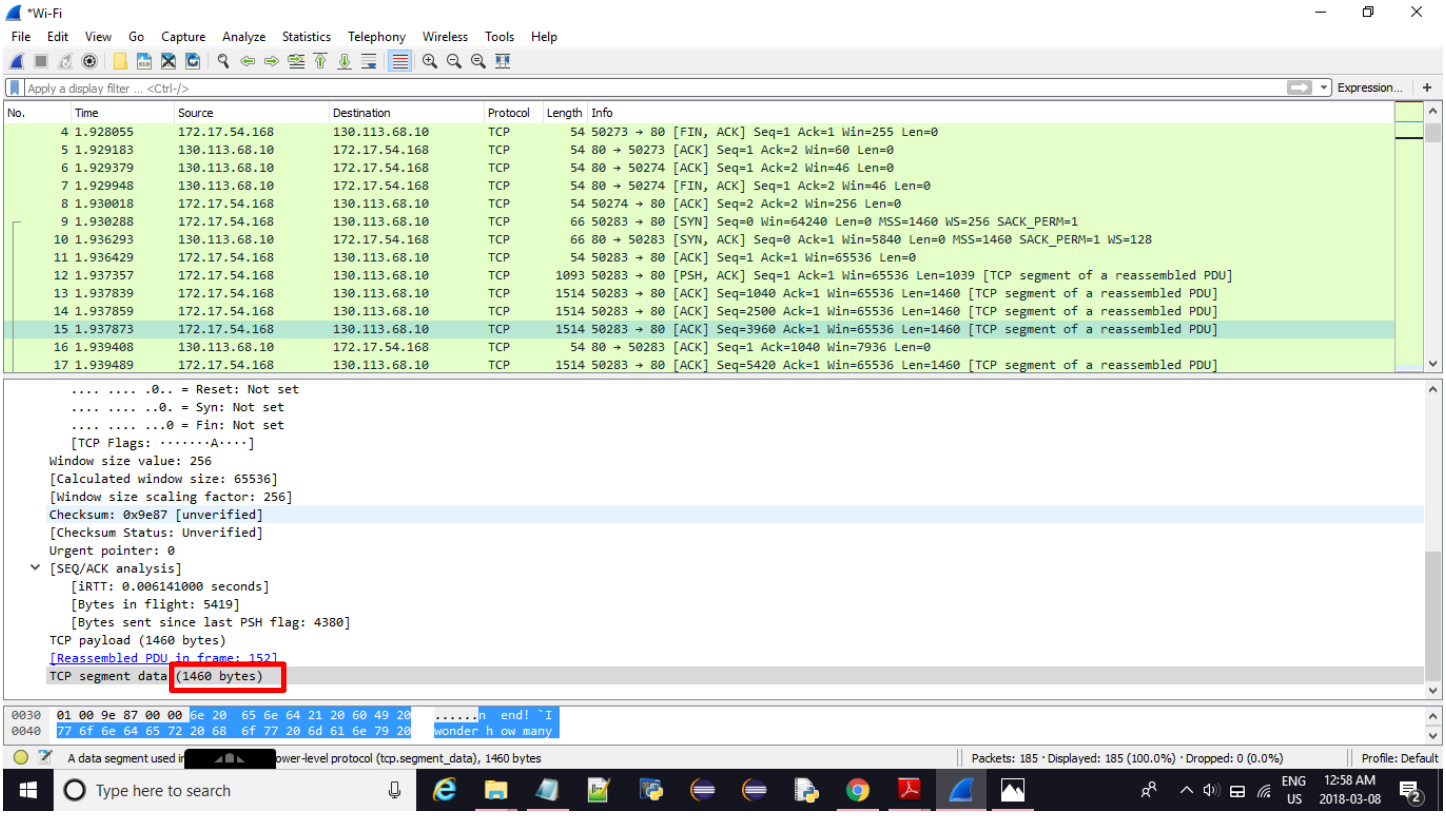
Segment	Estimated RTT Estimated RTT = (1-alpha) * Estimated RTT + alpha * Sample RTT
1	Estimated RTT = (1-0.125) * 0.002051 + 0.125 * 0.002051 = 0.002051
2	Estimated RTT = (1-0.125) * 0.002051 + 0.125 * 0.00276 = 0.002139525
3	Estimated RTT = (0.875) * 0.002139525 + 0.125 * 0.004399 = 0.002421718
4	Estimated RTT = (0.875) * 0.002139525 + 0.125 * 0.00518 = 0.00251958
5	Estimated RTT = (0.875) * 0.00251958 + 0.125 * 0.003565 = 0.00265025
6	Estimated RTT = (0.875) * 0.00265025+ 0.125 * 0.003548 = 0.002762468

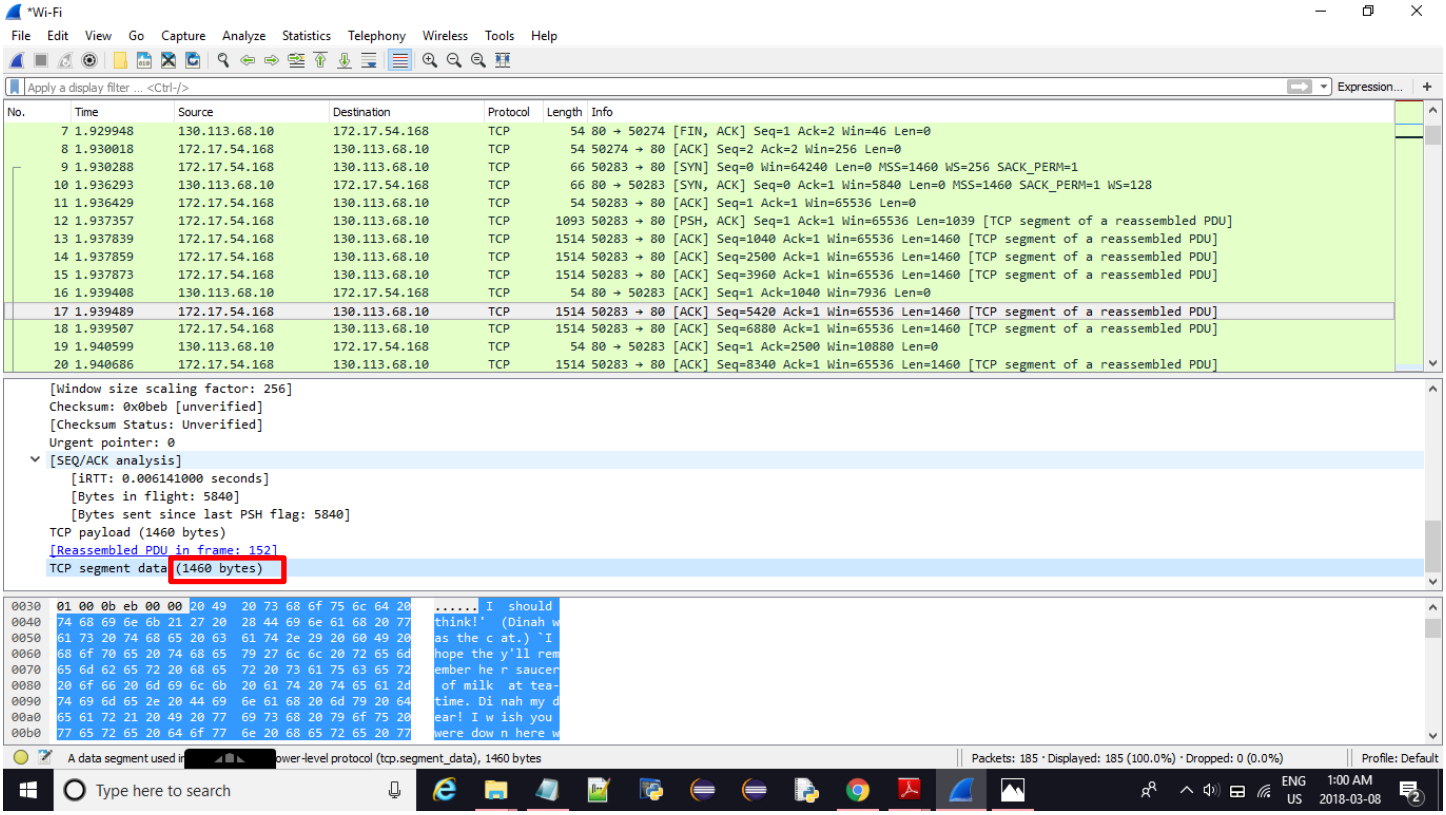
7.

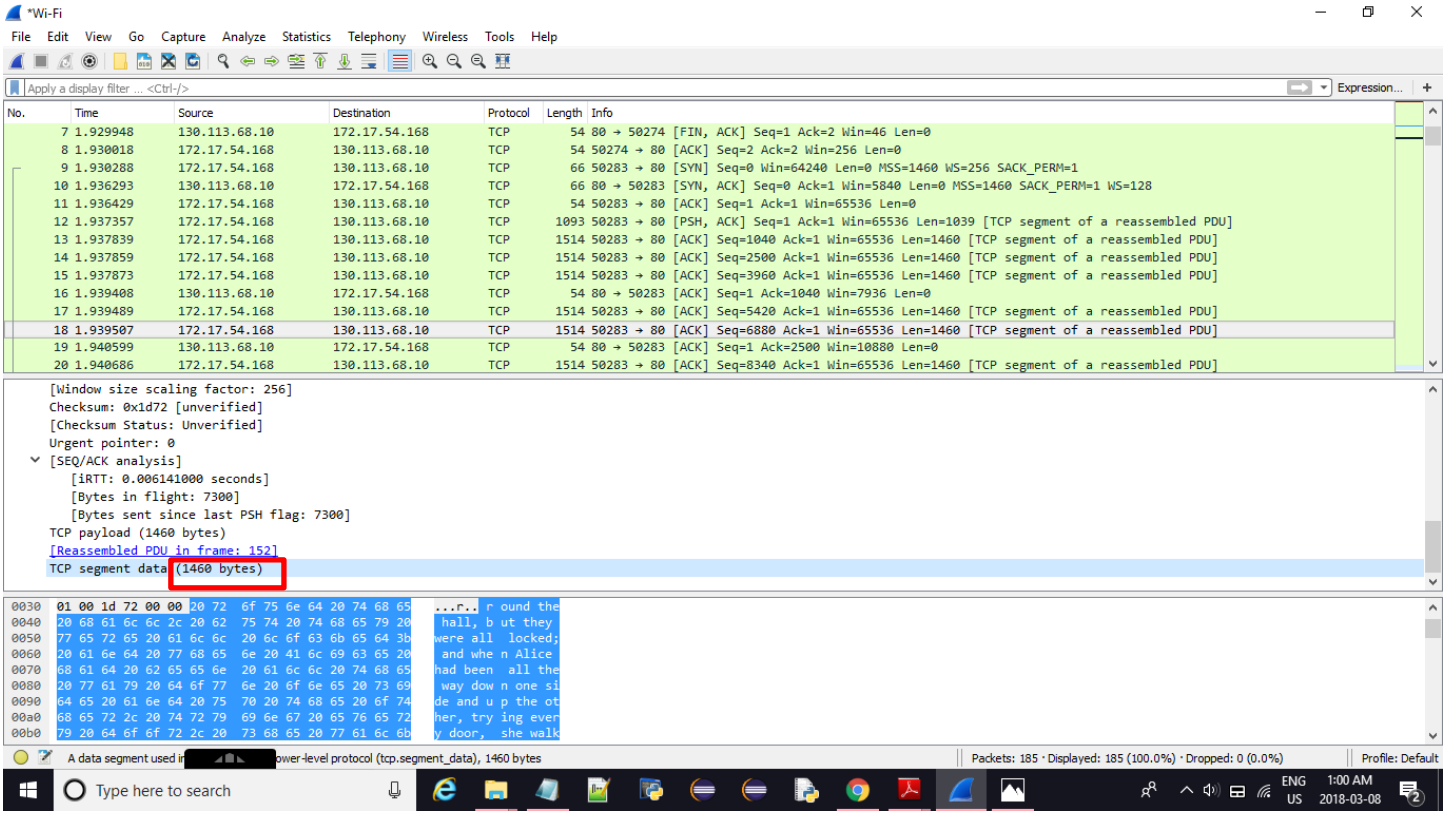

*Wi-Fi
File Edit View Go Capture Analyze Statistics Telephony Wireless Tools Help
Apply a display filter ... <Ctrl-/>
Expression...
No. Time Source Destination Protocol Length Info
4 1.928055 172.17.54.168 130.113.68.10 TCP 54 50273 → 80 [FIN, ACK] Seq=1 Ack=1 Win=255 Len=0
5 1.929183 130.113.68.10 172.17.54.168 TCP 54 80 → 50273 [ACK] Seq=1 Ack=2 Win=60 Len=0
6 1.929379 130.113.68.10 172.17.54.168 TCP 54 80 → 50274 [ACK] Seq=1 Ack=2 Win=46 Len=0
7 1.929948 130.113.68.10 172.17.54.168 TCP 54 80 → 50274 [FIN, ACK] Seq=1 Ack=2 Win=46 Len=0
8 1.930018 172.17.54.168 130.113.68.10 TCP 54 50274 → 80 [ACK] Seq=2 Ack=2 Win=256 Len=0
9 1.930288 172.17.54.168 130.113.68.10 TCP 66 50283 → 80 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 WS=256 SACK_PERM=1
10 1.936293 130.113.68.10 172.17.54.168 TCP 66 80 → 50283 [SYN, ACK] Seq=0 Ack=1 Win=5840 Len=0 MSS=1460 SACK_PERM=1 WS=128
11 1.936429 172.17.54.168 130.113.68.10 TCP 54 50283 → 80 [ACK] Seq=1 Ack=1 Win=65536 Len=0
12 1.937357 172.17.54.168 130.113.68.10 TCP 1093 50283 → 80 [PSH, ACK] Seq=1 Ack=1 Win=65536 Len=1039 [TCP segment of a reassembled PDU]
13 1.937839 172.17.54.168 130.113.68.10 TCP 1514 50283 → 80 [ACK] Seq=1040 Ack=1 Win=65536 Len=1460 [TCP segment of a reassembled PDU]
14 1.937859 172.17.54.168 130.113.68.10 TCP 1514 50283 → 80 [ACK] Seq=2500 Ack=1 Win=65536 Len=1460 [TCP segment of a reassembled PDU]
15 1.937873 172.17.54.168 130.113.68.10 TCP 1514 50283 → 80 [ACK] Seq=3960 Ack=1 Win=65536 Len=1460 [TCP segment of a reassembled PDU]
16 1.939408 130.113.68.10 172.17.54.168 TCP 54 80 → 50283 [ACK] Seq=1 Ack=1040 Win=7936 Len=0
17 1.939489 172.17.54.168 130.113.68.10 TCP 1514 50283 → 80 [ACK] Seq=5420 Ack=1 Win=65536 Len=1460 [TCP segment of a reassembled PDU]
.... .0.. = Reset: Not set
....0. = Syn: Not set
....0 = Fin: Not set
[TCP Flags: ·····AP···]
Window size value: 256
[Calculated window size: 65536]
[Window size scaling factor: 256]
Checksum: 0xf8fb [unverified]
[Checksum Status: Unverified]
Urgent pointer: 0
[SEQ/ACK analysis]
[iRTT: 0.006141000 seconds]
[Bytes in flight: 1039]
[Bytes sent since last PSH flag: 1039]
TCP payload (1039 bytes)
[Reassembled PDU in frame: 152]
TCP segment data (1039 bytes)
0030 01 00 f8 fb 00 00 50 4f 53 54 20 2f 7e 72 7a 68 ......PO ST /~rzh
0040 65 6e 67 2f 63 6f 75 72 73 65 2f 43 41 53 34 43 eng/cour se/CAS4C
A data segment used in [redacted] ower-level protocol (tcp.segment_data), 1039 bytes
Packets: 185 · Displayed: 185 (100.0%) · Dropped: 0 (0.0%)
Profile: Default
Type here to search
ENG US
12:58 AM 2018-03-08


*Wi-Fi
File Edit View Go Capture Analyze Statistics Telephony Wireless Tools Help
Apply a display filter ... <Ctrl-/>
Expression...
No. Time Source Destination Protocol Length Info
4 1.928055 172.17.54.168 130.113.68.10 TCP 54 50273 → 80 [FIN, ACK] Seq=1 Ack=1 Win=255 Len=0
5 1.929183 130.113.68.10 172.17.54.168 TCP 54 80 → 50273 [ACK] Seq=1 Ack=2 Win=60 Len=0
6 1.929379 130.113.68.10 172.17.54.168 TCP 54 80 → 50274 [ACK] Seq=1 Ack=2 Win=46 Len=0
7 1.929948 130.113.68.10 172.17.54.168 TCP 54 80 → 50274 [FIN, ACK] Seq=1 Ack=2 Win=46 Len=0
8 1.930018 172.17.54.168 130.113.68.10 TCP 54 50274 → 80 [ACK] Seq=2 Ack=2 Win=256 Len=0
9 1.930288 172.17.54.168 130.113.68.10 TCP 66 50283 → 80 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 WS=256 SACK_PERM=1
10 1.936293 130.113.68.10 172.17.54.168 TCP 66 80 → 50283 [SYN, ACK] Seq=0 Ack=1 Win=5840 Len=0 MSS=1460 SACK_PERM=1 WS=128
11 1.936429 172.17.54.168 130.113.68.10 TCP 54 50283 → 80 [ACK] Seq=1 Ack=1 Win=65536 Len=0
12 1.937357 172.17.54.168 130.113.68.10 TCP 1093 50283 → 80 [PSH, ACK] Seq=1 Ack=1 Win=65536 Len=1039 [TCP segment of a reassembled PDU]
13 1.937839 172.17.54.168 130.113.68.10 TCP 1514 50283 → 80 [ACK] Seq=1040 Ack=1 Win=65536 Len=1460 [TCP segment of a reassembled PDU]
14 1.937859 172.17.54.168 130.113.68.10 TCP 1514 50283 → 80 [ACK] Seq=2500 Ack=1 Win=65536 Len=1460 [TCP segment of a reassembled PDU]
15 1.937873 172.17.54.168 130.113.68.10 TCP 1514 50283 → 80 [ACK] Seq=3960 Ack=1 Win=65536 Len=1460 [TCP segment of a reassembled PDU]
16 1.939408 130.113.68.10 172.17.54.168 TCP 54 80 → 50283 [ACK] Seq=1 Ack=1040 Win=7936 Len=0
17 1.939489 172.17.54.168 130.113.68.10 TCP 1514 50283 → 80 [ACK] Seq=5420 Ack=1 Win=65536 Len=1460 [TCP segment of a reassembled PDU]
.... .0.. = Reset: Not set
....0. = Syn: Not set
....0 = Fin: Not set
[TCP Flags: ·····A····]
Window size value: 256
[Calculated window size: 65536]
[Window size scaling factor: 256]
Checksum: 0xa984 [unverified]
[Checksum Status: Unverified]
Urgent pointer: 0
[SEQ/ACK analysis]
[iRTT: 0.006141000 seconds]
[Bytes in flight: 2499]
[Bytes sent since last PSH flag: 1460]
TCP payload (1460 bytes)
[Reassembled PDU in frame: 152]
TCP segment data (1460 bytes)
0030 01 00 a9 84 00 00 2d 2d 2d 2d 2d 2d 57 65 62 4b ......-- ----WebK
0040 69 74 46 6f 72 6d 42 6f 75 6e 64 61 72 79 63 6c itFormBo undarycl
A data segment used in [redacted] ower-level protocol (tcp.segment_data), 1460 bytes
Packets: 185 · Displayed: 185 (100.0%) · Dropped: 0 (0.0%)
Profile: Default
Type here to search
ENG US
12:58 AM 2018-03-08

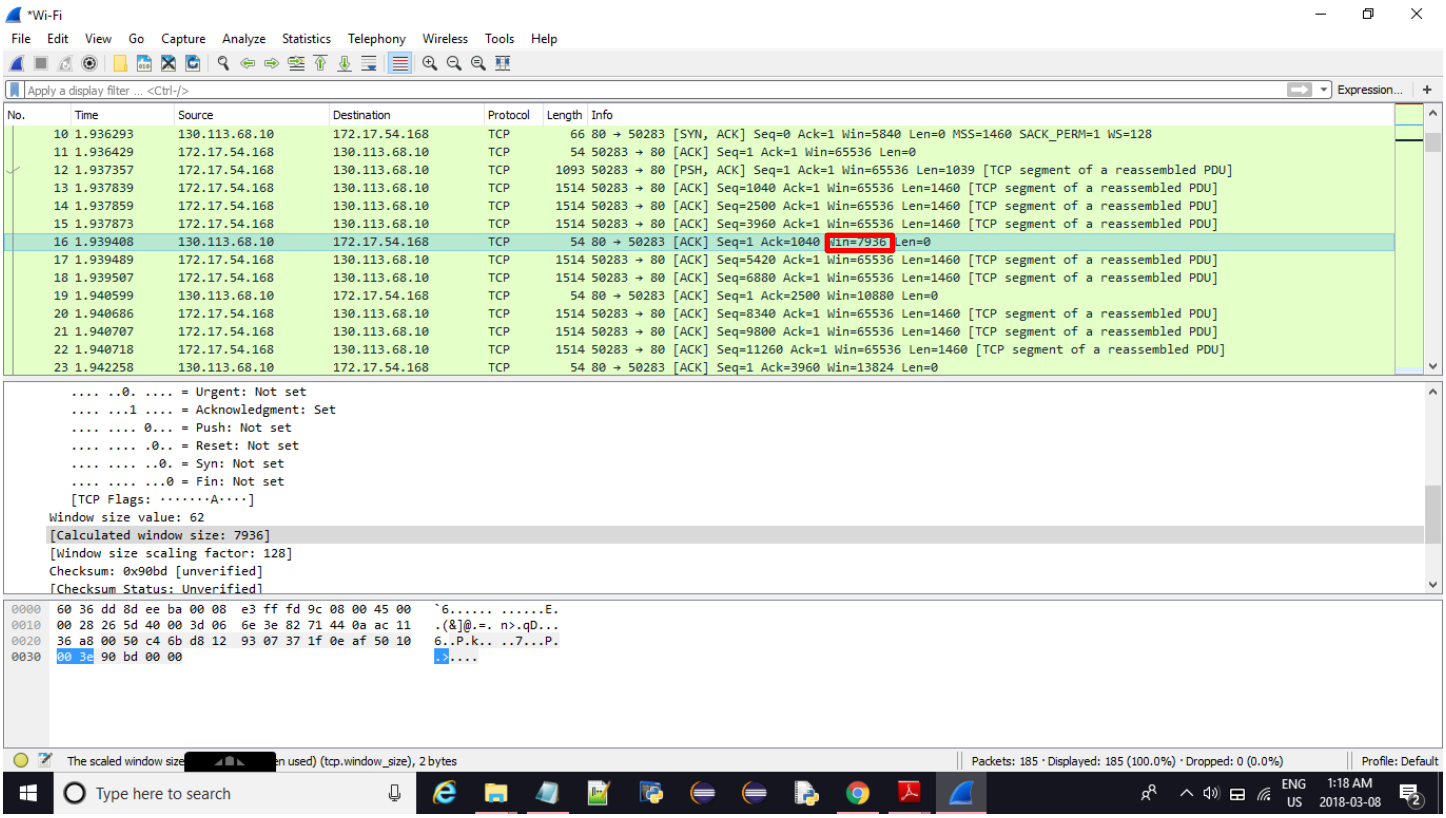

*Wi-Fi
File Edit View Go Capture Analyze Statistics Telephony Wireless Tools Help
Apply a display filter ... <Ctrl-/>
Expression...
No. Time Source Destination Protocol Length Info
4 1.928055 172.17.54.168 130.113.68.10 TCP 54 50273 → 80 [FIN, ACK] Seq=1 Ack=1 Win=255 Len=0
5 1.929183 130.113.68.10 172.17.54.168 TCP 54 80 → 50273 [ACK] Seq=1 Ack=2 Win=60 Len=0
6 1.929379 130.113.68.10 172.17.54.168 TCP 54 80 → 50274 [ACK] Seq=1 Ack=2 Win=46 Len=0
7 1.929948 130.113.68.10 172.17.54.168 TCP 54 80 → 50274 [FIN, ACK] Seq=1 Ack=2 Win=46 Len=0
8 1.930018 172.17.54.168 130.113.68.10 TCP 54 50274 → 80 [ACK] Seq=2 Ack=2 Win=256 Len=0
9 1.930288 172.17.54.168 130.113.68.10 TCP 66 50283 → 80 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 WS=256 SACK_PERM=1
10 1.936293 130.113.68.10 172.17.54.168 TCP 66 80 → 50283 [SYN, ACK] Seq=0 Ack=1 Win=5840 Len=0 MSS=1460 SACK_PERM=1 WS=128
11 1.936429 172.17.54.168 130.113.68.10 TCP 54 50283 → 80 [ACK] Seq=1 Ack=1 Win=65536 Len=0
12 1.937357 172.17.54.168 130.113.68.10 TCP 1093 50283 → 80 [PSH, ACK] Seq=1 Ack=1 Win=65536 Len=1039 [TCP segment of a reassembled PDU]
13 1.937839 172.17.54.168 130.113.68.10 TCP 1514 50283 → 80 [ACK] Seq=1040 Ack=1 Win=65536 Len=1460 [TCP segment of a reassembled PDU]
14 1.937859 172.17.54.168 130.113.68.10 TCP 1514 50283 → 80 [ACK] Seq=2500 Ack=1 Win=65536 Len=1460 [TCP segment of a reassembled PDU]
15 1.937873 172.17.54.168 130.113.68.10 TCP 1514 50283 → 80 [ACK] Seq=3960 Ack=1 Win=65536 Len=1460 [TCP segment of a reassembled PDU]
16 1.939408 130.113.68.10 172.17.54.168 TCP 54 80 → 50283 [ACK] Seq=1 Ack=1040 Win=7936 Len=0
17 1.939489 172.17.54.168 130.113.68.10 TCP 1514 50283 → 80 [ACK] Seq=5420 Ack=1 Win=65536 Len=1460 [TCP segment of a reassembled PDU]
.... .0.. = Reset: Not set
....0. = Syn: Not set
....0 = Fin: Not set
[TCP Flags: ·····A····]
Window size value: 256
[Calculated window size: 65536]
[Window size scaling factor: 256]
Checksum: 0x644c [unverified]
[Checksum Status: Unverified]
Urgent pointer: 0
[SEQ/ACK analysis]
[iRTT: 0.006141000 seconds]
[Bytes in flight: 3959]
[Bytes sent since last PSH flag: 2920]
TCP payload (1460 bytes)
[Reassembled PDU in frame: 152]
TCP segment data (1460 bytes)
0030 01 00 64 4c 00 00 20 61 63 72 6f 73 73 20 74 68 ..dL.. a cross th
0040 65 20 66 69 65 6c 64 20 61 66 74 65 72 20 69 74 e field after it
A data segment used i ower-level protocol (tcp.segment_data), 1460 bytes
Packets: 185 · Displayed: 185 (100.0%) · Dropped: 0 (0.0%)
Profile: Default
Type here to search
ENG US
12:58 AM 2018-03-08


*Wi-Fi
File Edit View Go Capture Analyze Statistics Telephony Wireless Tools Help
Apply a display filter ... <Ctrl-/>
Expression...
No. Time Source Destination Protocol Length Info
4 1.928055 172.17.54.168 130.113.68.10 TCP 54 50273 → 80 [FIN, ACK] Seq=1 Ack=1 Win=255 Len=0
5 1.929183 130.113.68.10 172.17.54.168 TCP 54 80 → 50273 [ACK] Seq=1 Ack=2 Win=60 Len=0
6 1.929379 130.113.68.10 172.17.54.168 TCP 54 80 → 50274 [ACK] Seq=1 Ack=2 Win=46 Len=0
7 1.929948 130.113.68.10 172.17.54.168 TCP 54 80 → 50274 [FIN, ACK] Seq=1 Ack=2 Win=46 Len=0
8 1.930018 172.17.54.168 130.113.68.10 TCP 54 50274 → 80 [ACK] Seq=2 Ack=2 Win=256 Len=0
9 1.930288 172.17.54.168 130.113.68.10 TCP 66 50283 → 80 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 WS=256 SACK_PERM=1
10 1.936293 130.113.68.10 172.17.54.168 TCP 66 80 → 50283 [SYN, ACK] Seq=0 Ack=1 Win=5840 Len=0 MSS=1460 SACK_PERM=1 WS=128
11 1.936429 172.17.54.168 130.113.68.10 TCP 54 50283 → 80 [ACK] Seq=1 Ack=1 Win=65536 Len=0
12 1.937357 172.17.54.168 130.113.68.10 TCP 1093 50283 → 80 [PSH, ACK] Seq=1 Ack=1 Win=65536 Len=1039 [TCP segment of a reassembled PDU]
13 1.937839 172.17.54.168 130.113.68.10 TCP 1514 50283 → 80 [ACK] Seq=1040 Ack=1 Win=65536 Len=1460 [TCP segment of a reassembled PDU]
14 1.937859 172.17.54.168 130.113.68.10 TCP 1514 50283 → 80 [ACK] Seq=2500 Ack=1 Win=65536 Len=1460 [TCP segment of a reassembled PDU]
15 1.937873 172.17.54.168 130.113.68.10 TCP 1514 50283 → 80 [ACK] Seq=3960 Ack=1 Win=65536 Len=1460 [TCP segment of a reassembled PDU]
16 1.939408 130.113.68.10 172.17.54.168 TCP 54 80 → 50283 [ACK] Seq=1 Ack=1040 Win=7936 Len=0
17 1.939489 172.17.54.168 130.113.68.10 TCP 1514 50283 → 80 [ACK] Seq=5420 Ack=1 Win=65536 Len=1460 [TCP segment of a reassembled PDU]
.... .0.. = Reset: Not set
....0. = Syn: Not set
....0 = Fin: Not set
[TCP Flags: ·····A····]
Window size value: 256
[Calculated window size: 65536]
[Window size scaling factor: 256]
Checksum: 0x9e87 [unverified]
[Checksum Status: Unverified]
Urgent pointer: 0
[SEQ/ACK analysis]
[iRTT: 0.006141000 seconds]
[Bytes in flight: 5419]
[Bytes sent since last PSH flag: 4380]
TCP payload (1460 bytes)
[Reassembled PDU in frame: 152]
TCP segment data (1460 bytes)
0030 01 00 9e 87 00 00 6e 20 65 6e 64 21 20 60 49 20 ......n end! `I
0040 77 6f 6e 64 65 72 20 68 6f 77 20 6d 61 6e 79 20 wonder h ow many
A data segment used i ower-level protocol (tcp.segment_data), 1460 bytes
Packets: 185 · Displayed: 185 (100.0%) · Dropped: 0 (0.0%)
Profile: Default
Type here to search
ENG US
12:58 AM 2018-03-08

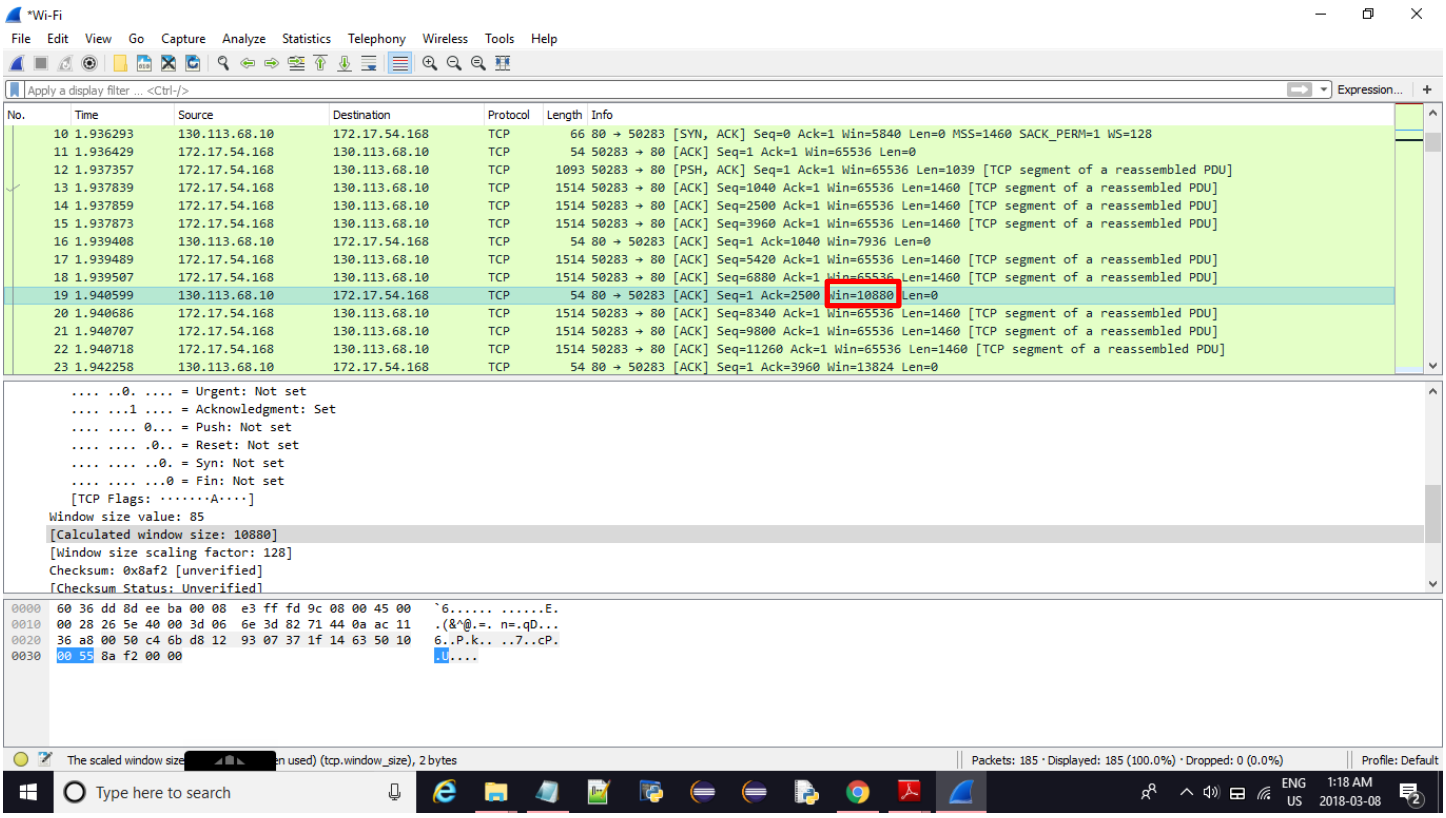

*Wi-Fi
File Edit View Go Capture Analyze Statistics Telephony Wireless Tools Help
Apply a display filter ... <Ctrl-/>
Expression...
No. Time Source Destination Protocol Length Info
7 1.929948 130.113.68.10 172.17.54.168 TCP 54 80 → 50274 [FIN, ACK] Seq=1 Ack=2 Win=46 Len=0
8 1.930018 172.17.54.168 130.113.68.10 TCP 54 50274 → 80 [ACK] Seq=2 Ack=2 Win=256 Len=0
9 1.930288 172.17.54.168 130.113.68.10 TCP 66 50283 → 80 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 WS=256 SACK_PERM=1
10 1.936293 130.113.68.10 172.17.54.168 TCP 66 80 → 50283 [SYN, ACK] Seq=0 Ack=1 Win=5840 Len=0 MSS=1460 SACK_PERM=1 WS=128
11 1.936429 172.17.54.168 130.113.68.10 TCP 54 50283 → 80 [ACK] Seq=1 Ack=1 Win=65536 Len=0
12 1.937357 172.17.54.168 130.113.68.10 TCP 1093 50283 → 80 [PSH, ACK] Seq=1 Ack=1 Win=65536 Len=1039 [TCP segment of a reassembled PDU]
13 1.937839 172.17.54.168 130.113.68.10 TCP 1514 50283 → 80 [ACK] Seq=1040 Ack=1 Win=65536 Len=1460 [TCP segment of a reassembled PDU]
14 1.937859 172.17.54.168 130.113.68.10 TCP 1514 50283 → 80 [ACK] Seq=2500 Ack=1 Win=65536 Len=1460 [TCP segment of a reassembled PDU]
15 1.937873 172.17.54.168 130.113.68.10 TCP 1514 50283 → 80 [ACK] Seq=3960 Ack=1 Win=65536 Len=1460 [TCP segment of a reassembled PDU]
16 1.939408 130.113.68.10 172.17.54.168 TCP 54 80 → 50283 [ACK] Seq=1 Ack=1040 Win=7936 Len=0
17 1.939489 172.17.54.168 130.113.68.10 TCP 1514 50283 → 80 [ACK] Seq=5420 Ack=1 Win=65536 Len=1460 [TCP segment of a reassembled PDU]
18 1.939507 172.17.54.168 130.113.68.10 TCP 1514 50283 → 80 [ACK] Seq=6880 Ack=1 Win=65536 Len=1460 [TCP segment of a reassembled PDU]
19 1.940599 130.113.68.10 172.17.54.168 TCP 54 80 → 50283 [ACK] Seq=1 Ack=2500 Win=10880 Len=0
20 1.940686 172.17.54.168 130.113.68.10 TCP 1514 50283 → 80 [ACK] Seq=8340 Ack=1 Win=65536 Len=1460 [TCP segment of a reassembled PDU]
[Window size scaling factor: 256]
Checksum: 0x0beb [unverified]
[Checksum Status: Unverified]
Urgent pointer: 0
[SEQ/ACK analysis]
[iRTT: 0.006141000 seconds]
[Bytes in flight: 5840]
[Bytes sent since last PSH flag: 5840]
TCP payload (1460 bytes)
[Reassembled PDU in frame: 152]
TCP segment data (1460 bytes)
0030 01 00 0b eb 00 00 20 49 20 73 68 6f 75 6c 64 20 ..... I should
0040 74 68 69 6e 6b 21 27 20 28 44 69 6e 61 68 20 77 think!' (Dinah w
0050 61 73 20 74 68 65 20 63 61 74 2e 29 20 60 49 20 as the c at.) `I
0060 68 6f 70 65 20 74 68 65 79 27 6c 6c 20 72 65 6d hope the y'll rem
0070 65 6d 62 65 72 20 68 65 72 20 73 61 75 63 65 72 ember he r saucer
0080 20 6f 66 20 6d 69 6c 6b 20 61 74 20 74 65 61 2d of milk at tea-
0090 74 69 6d 65 2e 20 44 69 6e 61 68 20 6d 79 20 64 time. Di nah my d
00a0 65 61 72 21 20 49 20 77 69 73 68 20 79 6f 75 20 ear! I w ish you
00b0 77 65 72 65 20 64 6f 77 6e 20 68 65 72 65 20 77 were dow n here w
A data segment used i ower-level protocol (tcp.segment_data), 1460 bytes
Packets: 185 · Displayed: 185 (100.0%) · Dropped: 0 (0.0%)
Profile: Default
Type here to search
ENG US
1:00 AM 2018-03-08


*Wi-Fi
File Edit View Go Capture Analyze Statistics Telephony Wireless Tools Help
Apply a display filter ... <Ctrl-/>
Expression...
No. Time Source Destination Protocol Length Info
7 1.929948 130.113.68.10 172.17.54.168 TCP 54 80 → 50274 [FIN, ACK] Seq=1 Ack=2 Win=46 Len=0
8 1.930018 172.17.54.168 130.113.68.10 TCP 54 50274 → 80 [ACK] Seq=2 Ack=2 Win=256 Len=0
9 1.930288 172.17.54.168 130.113.68.10 TCP 66 50283 → 80 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 WS=256 SACK_PERM=1
10 1.936293 130.113.68.10 172.17.54.168 TCP 66 80 → 50283 [SYN, ACK] Seq=0 Ack=1 Win=5840 Len=0 MSS=1460 SACK_PERM=1 WS=128
11 1.936429 172.17.54.168 130.113.68.10 TCP 54 50283 → 80 [ACK] Seq=1 Ack=1 Win=65536 Len=0
12 1.937357 172.17.54.168 130.113.68.10 TCP 1093 50283 → 80 [PSH, ACK] Seq=1 Ack=1 Win=65536 Len=1039 [TCP segment of a reassembled PDU]
13 1.937839 172.17.54.168 130.113.68.10 TCP 1514 50283 → 80 [ACK] Seq=1040 Ack=1 Win=65536 Len=1460 [TCP segment of a reassembled PDU]
14 1.937859 172.17.54.168 130.113.68.10 TCP 1514 50283 → 80 [ACK] Seq=2500 Ack=1 Win=65536 Len=1460 [TCP segment of a reassembled PDU]
15 1.937873 172.17.54.168 130.113.68.10 TCP 1514 50283 → 80 [ACK] Seq=3960 Ack=1 Win=65536 Len=1460 [TCP segment of a reassembled PDU]
16 1.939408 130.113.68.10 172.17.54.168 TCP 54 80 → 50283 [ACK] Seq=1 Ack=1040 Win=7936 Len=0
17 1.939489 172.17.54.168 130.113.68.10 TCP 1514 50283 → 80 [ACK] Seq=5420 Ack=1 Win=65536 Len=1460 [TCP segment of a reassembled PDU]
18 1.939507 172.17.54.168 130.113.68.10 TCP 1514 50283 → 80 [ACK] Seq=6880 Ack=1 Win=65536 Len=1460 [TCP segment of a reassembled PDU]
19 1.940599 130.113.68.10 172.17.54.168 TCP 54 80 → 50283 [ACK] Seq=1 Ack=2500 Win=10880 Len=0
20 1.940686 172.17.54.168 130.113.68.10 TCP 1514 50283 → 80 [ACK] Seq=8340 Ack=1 Win=65536 Len=1460 [TCP segment of a reassembled PDU]
[Window size scaling factor: 256]
Checksum: 0x1d72 [unverified]
[Checksum Status: Unverified]
Urgent pointer: 0
[SEQ/ACK analysis]
[iRTT: 0.006141000 seconds]
[Bytes in flight: 7300]
[Bytes sent since last PSH flag: 7300]
TCP payload (1460 bytes)
[Reassembled PDU in frame: 152]
TCP segment data (1460 bytes)
0030 01 00 1d 72 00 00 20 72 6f 75 6e 64 20 74 68 65 ...r.. r ound the
0040 20 68 61 6c 6c 2c 20 62 75 74 20 74 68 65 79 20 hall, b ut they
0050 77 65 72 65 20 61 6c 6c 20 6c 6f 63 6b 65 64 3b were all locked;
0060 20 61 6e 64 20 77 68 65 6e 20 41 6c 69 63 65 20 and whe n Alice
0070 68 61 64 20 62 65 65 6e 20 61 6c 6c 20 74 68 65 had been all the
0080 20 77 61 79 20 64 6f 77 6e 20 6f 6e 65 20 73 69 way dow n one si
0090 64 65 20 61 6e 64 20 75 70 20 74 68 65 20 6f 74 de and u p the ot
00a0 68 65 72 2c 20 74 72 79 69 6e 67 20 65 76 65 72 her, try ing ever
00b0 79 20 64 6f 6f 72 2c 20 73 68 65 20 77 61 6c 6b y door, she walk
A data segment used i ower-level protocol (tcp.segment_data), 1460 bytes
Packets: 185 · Displayed: 185 (100.0%) · Dropped: 0 (0.0%)
Profile: Default
Type here to search
ENG US
1:00 AM 2018-03-08

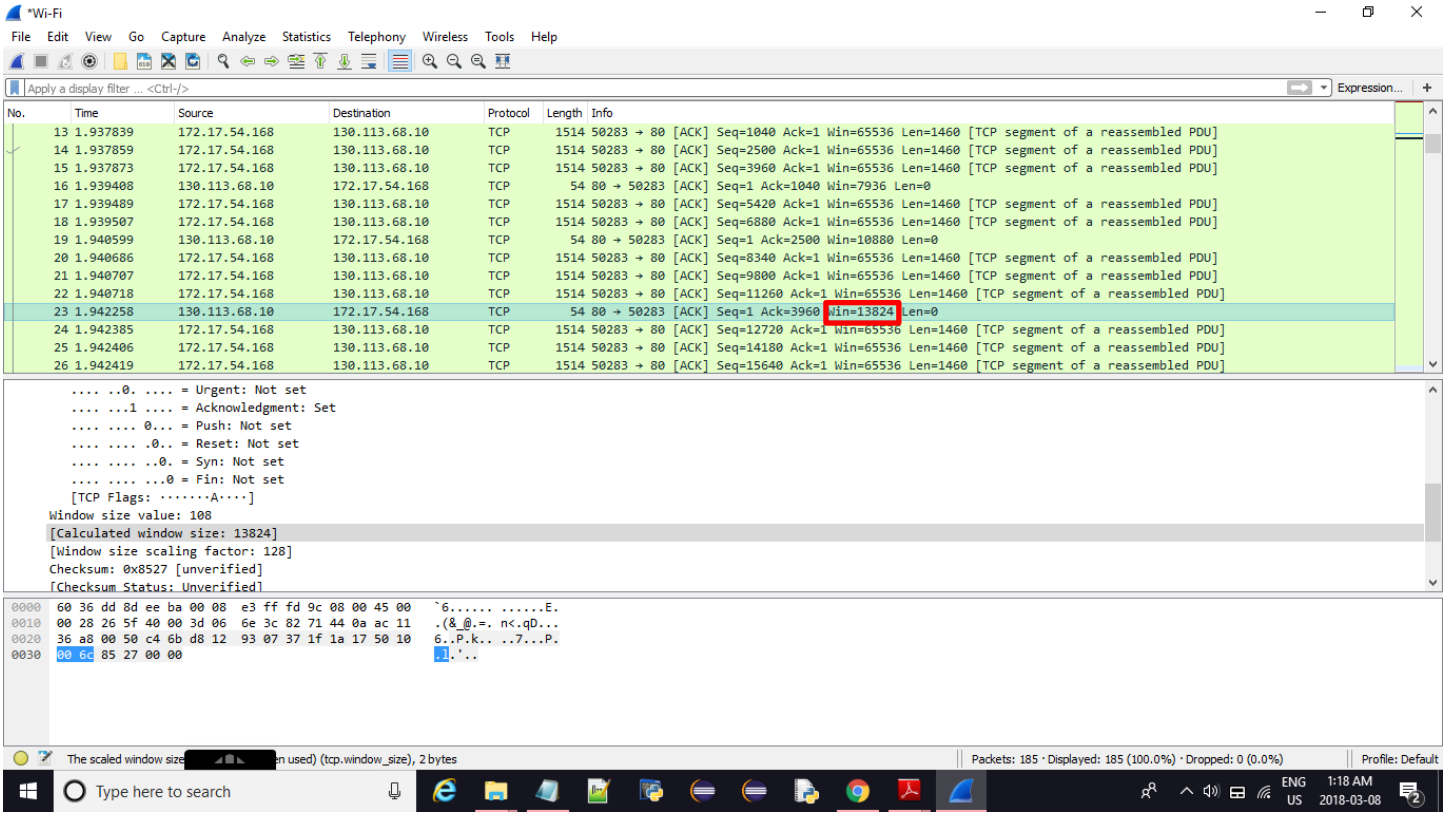
8.



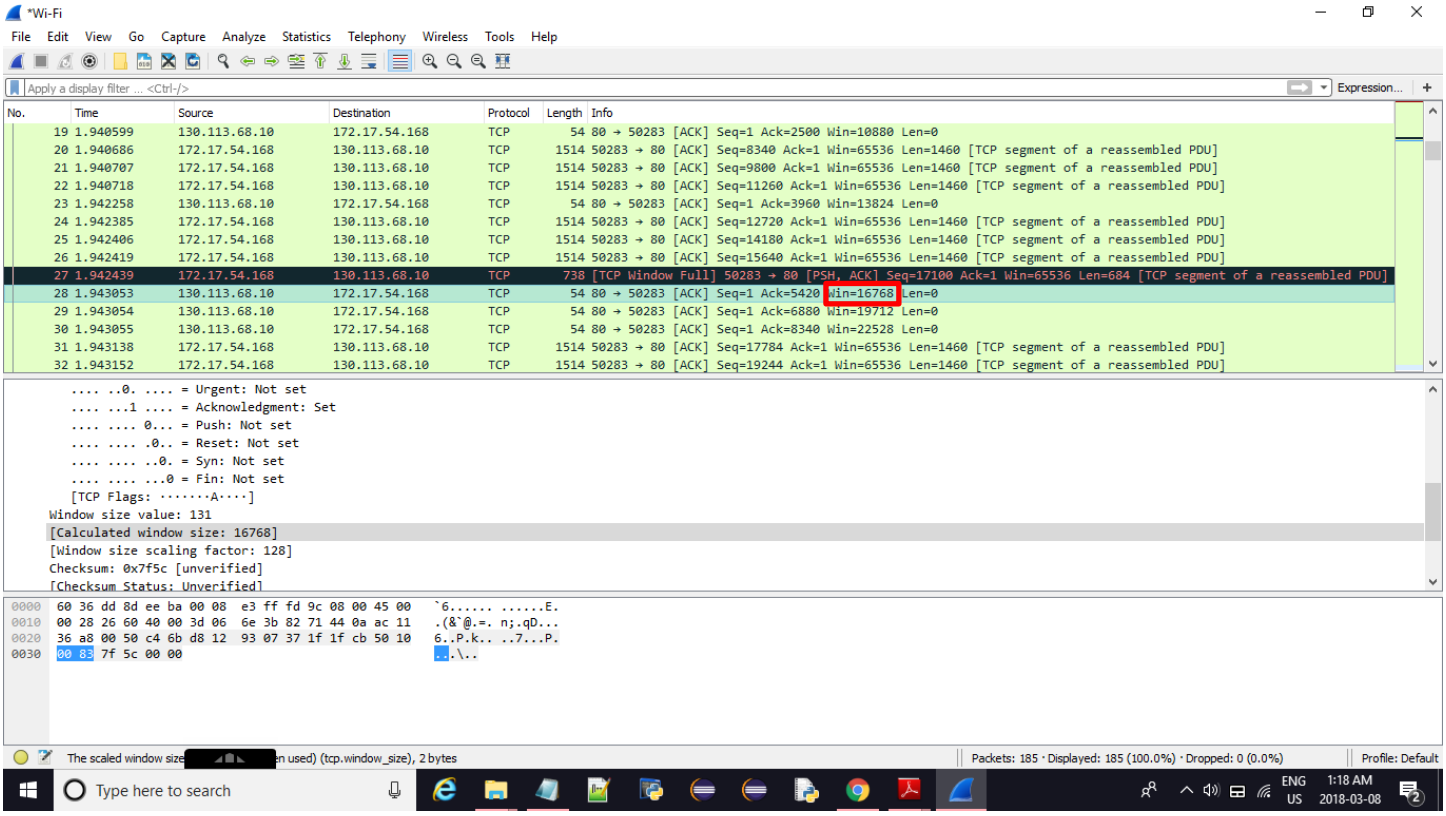
Buffer space : 7936



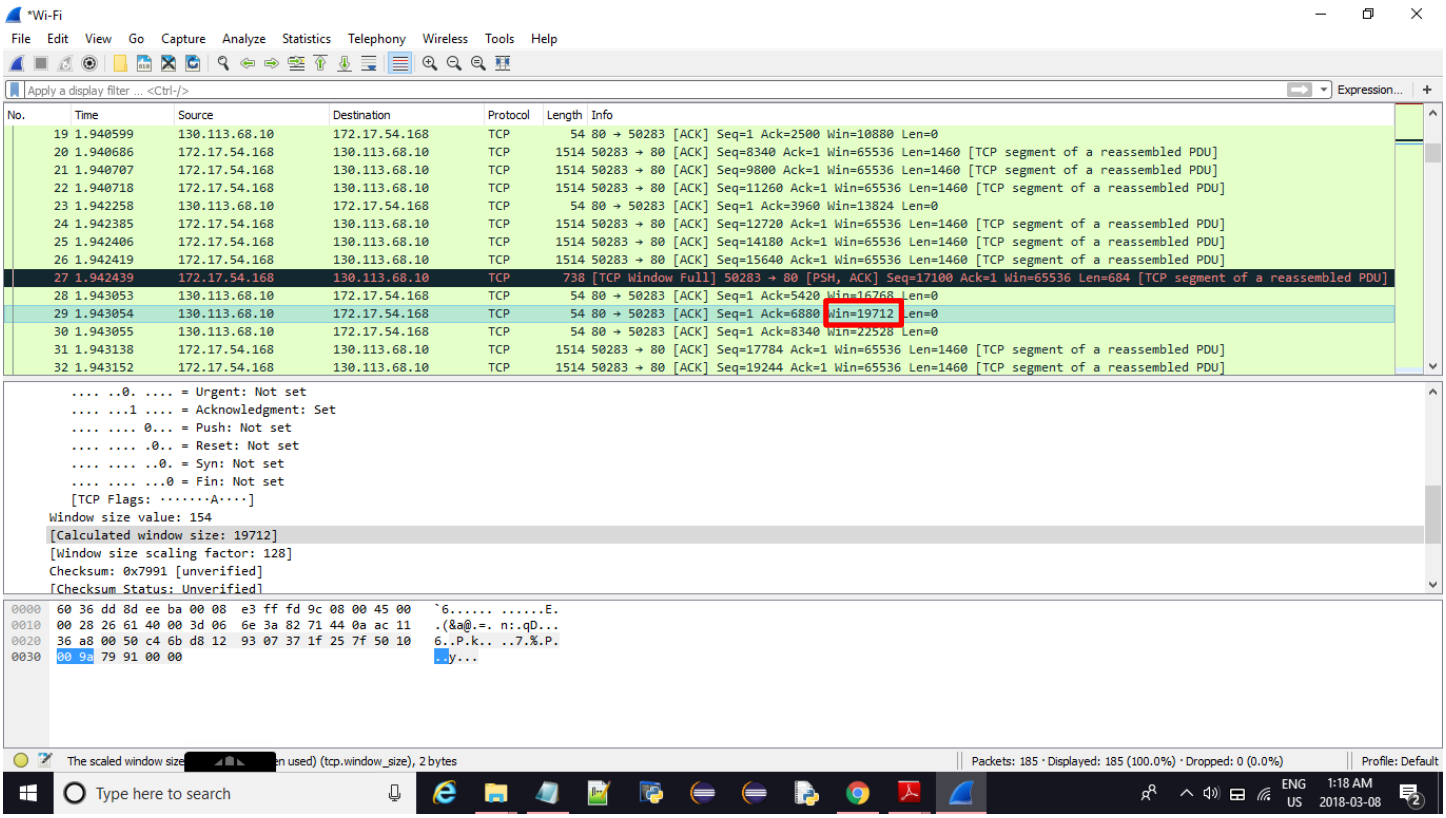
Buffer space: 10880



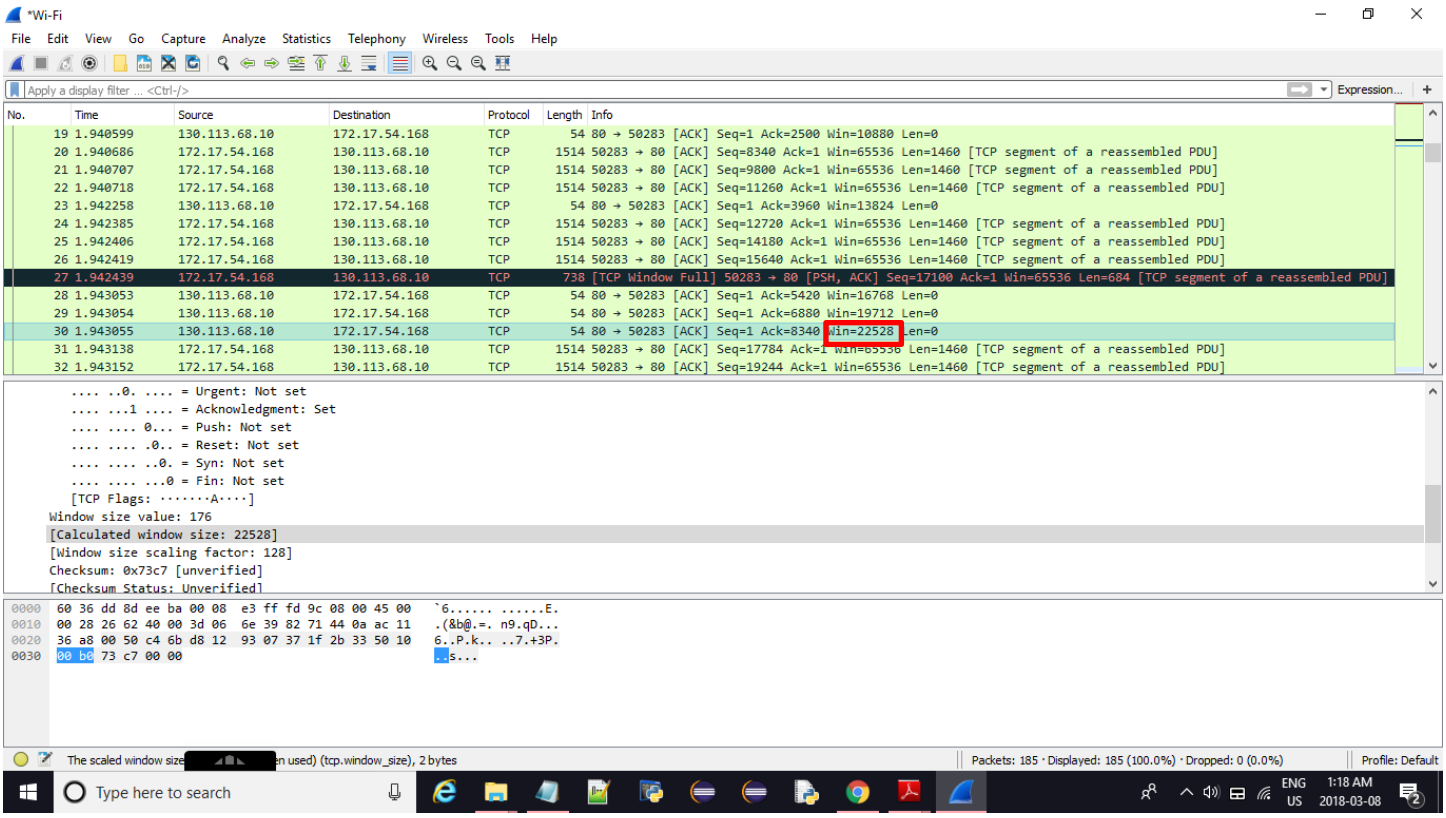
Buffer Space: 13824



Buffer Space: 16768



Buffer space: 19712



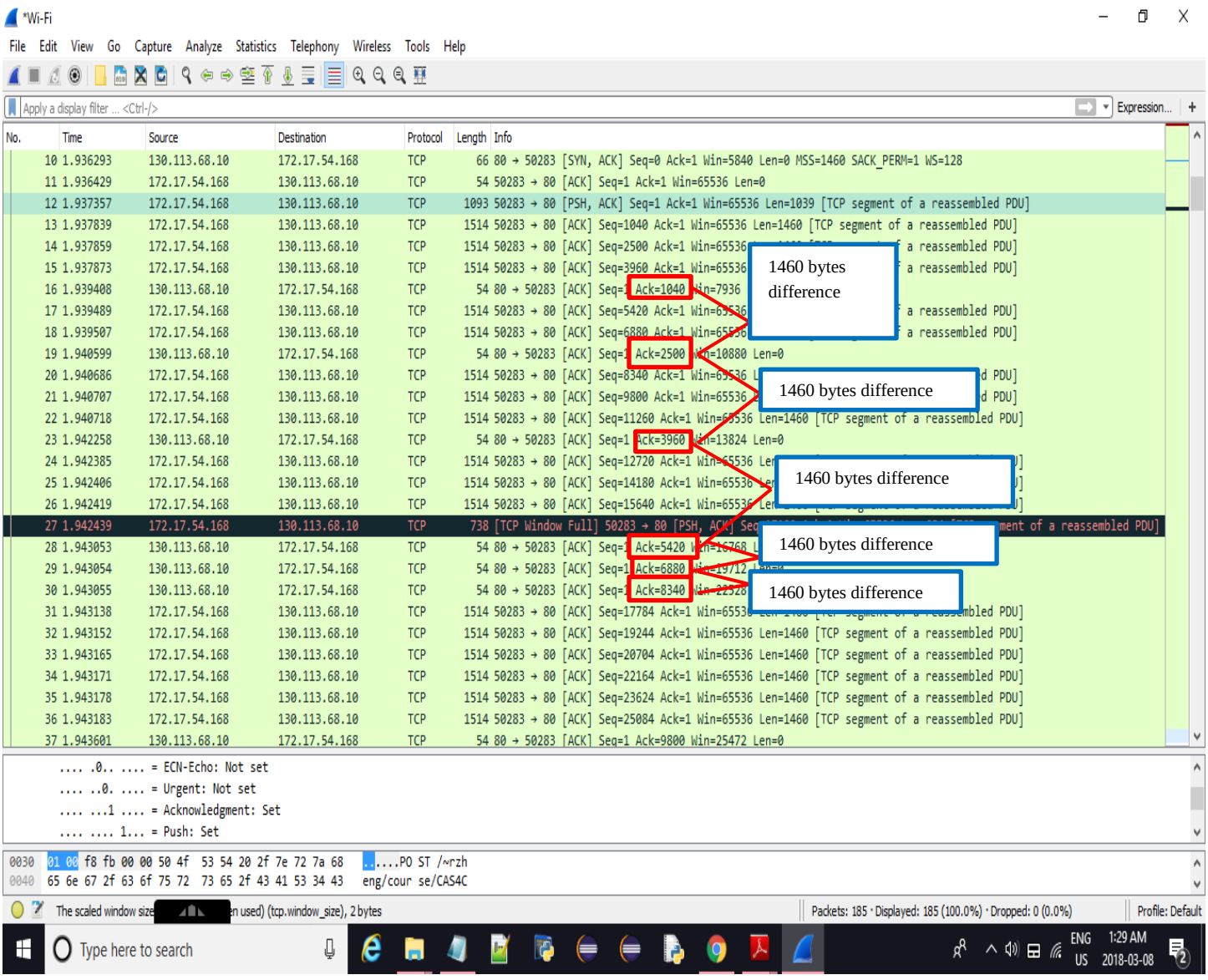
Buffer space: 22528

Therefore the minimum buffer space is 7936.

9.

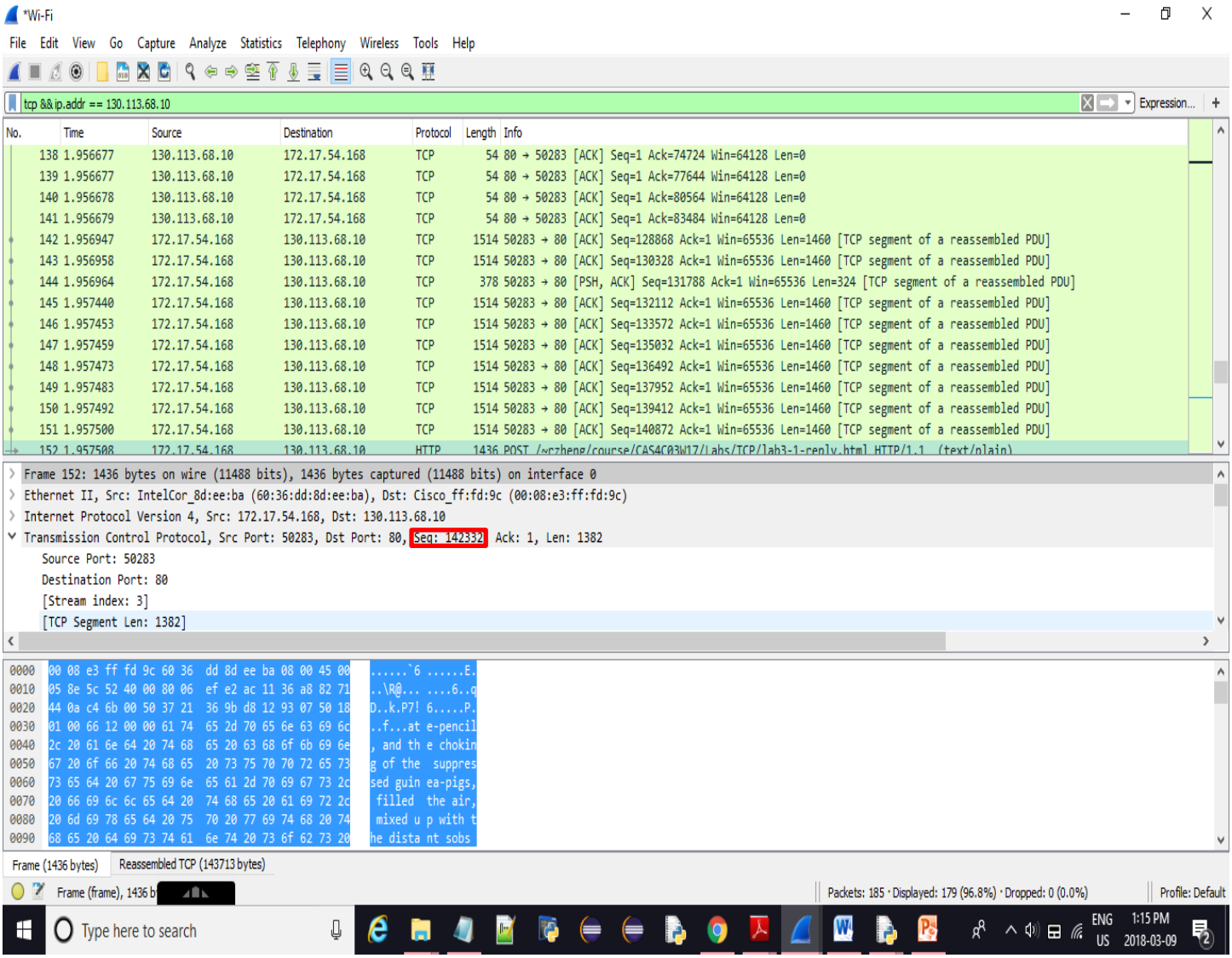
There is no retransimitted segements. I check the ACK value, if there is a retransmitted segment, the ACK value of the received segement should decrease. This can also be checked by the sequence number of the segements being sent, If there is no packets with the same sequence number at different time, then there is no retransmitted segements. In this example, we can not find packets with the same sequence number at different time.

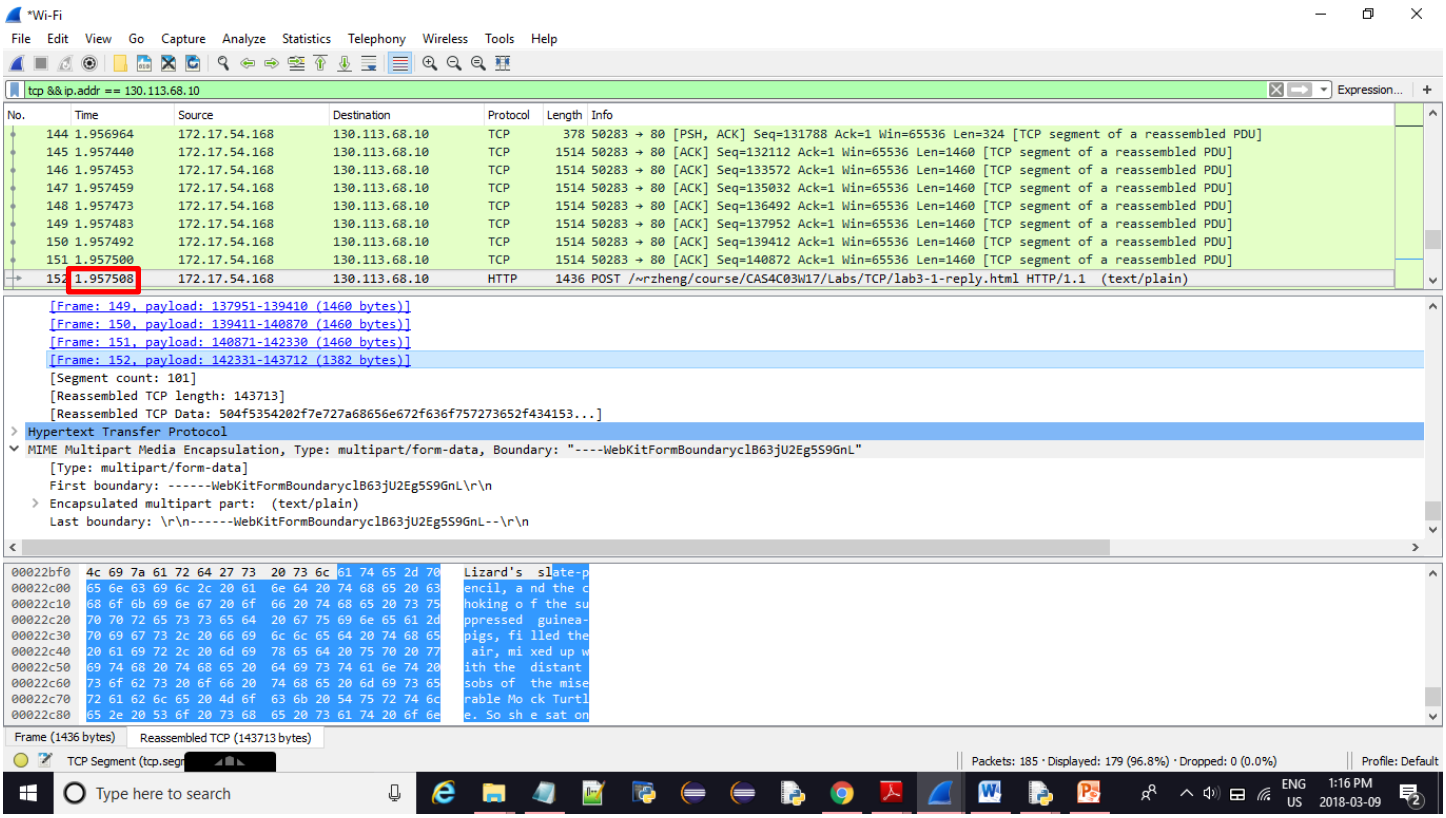
10.

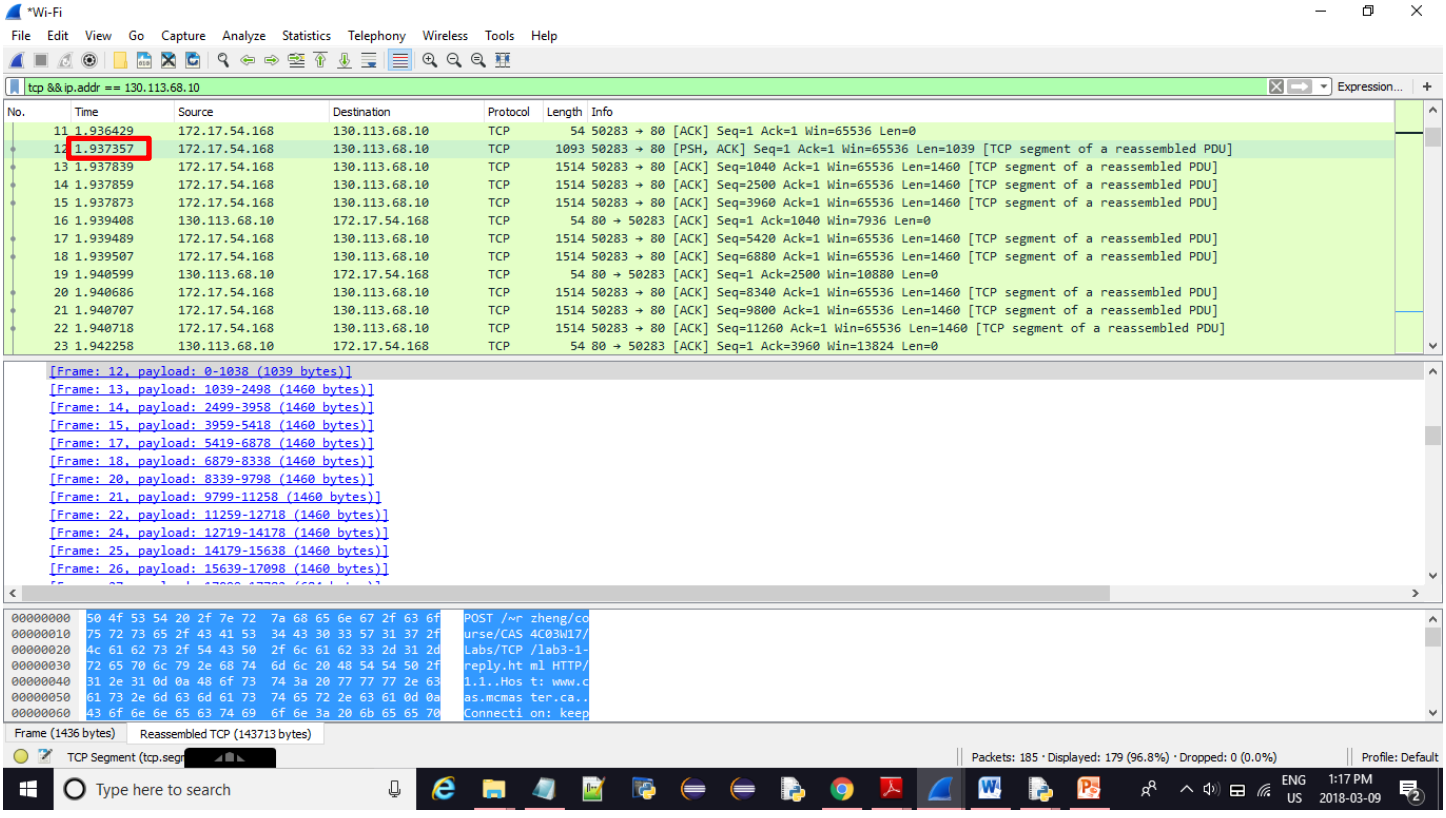


The receiver typically acknoledge 1460 bytes in an ACK.

11.


*Wi-Fi
File Edit View Go Capture Analyze Statistics Telephony Wireless Tools Help
tcp && ip.addr == 130.113.68.10
Expression...
No. Time Source Destination Protocol Length Info
138 1.956677 130.113.68.10 172.17.54.168 TCP 54 80 → 50283 [ACK] Seq=1 Ack=74724 Win=64128 Len=0
139 1.956677 130.113.68.10 172.17.54.168 TCP 54 80 → 50283 [ACK] Seq=1 Ack=77644 Win=64128 Len=0
140 1.956678 130.113.68.10 172.17.54.168 TCP 54 80 → 50283 [ACK] Seq=1 Ack=80564 Win=64128 Len=0
141 1.956679 130.113.68.10 172.17.54.168 TCP 54 80 → 50283 [ACK] Seq=1 Ack=83484 Win=64128 Len=0
142 1.956947 172.17.54.168 130.113.68.10 TCP 1514 50283 → 80 [ACK] Seq=128868 Ack=1 Win=65536 Len=1460 [TCP segment of a reassembled PDU]
143 1.956958 172.17.54.168 130.113.68.10 TCP 1514 50283 → 80 [ACK] Seq=130328 Ack=1 Win=65536 Len=1460 [TCP segment of a reassembled PDU]
144 1.956964 172.17.54.168 130.113.68.10 TCP 378 50283 → 80 [PSH, ACK] Seq=131788 Ack=1 Win=65536 Len=324 [TCP segment of a reassembled PDU]
145 1.957440 172.17.54.168 130.113.68.10 TCP 1514 50283 → 80 [ACK] Seq=132112 Ack=1 Win=65536 Len=1460 [TCP segment of a reassembled PDU]
146 1.957453 172.17.54.168 130.113.68.10 TCP 1514 50283 → 80 [ACK] Seq=133572 Ack=1 Win=65536 Len=1460 [TCP segment of a reassembled PDU]
147 1.957459 172.17.54.168 130.113.68.10 TCP 1514 50283 → 80 [ACK] Seq=135032 Ack=1 Win=65536 Len=1460 [TCP segment of a reassembled PDU]
148 1.957473 172.17.54.168 130.113.68.10 TCP 1514 50283 → 80 [ACK] Seq=136492 Ack=1 Win=65536 Len=1460 [TCP segment of a reassembled PDU]
149 1.957483 172.17.54.168 130.113.68.10 TCP 1514 50283 → 80 [ACK] Seq=137952 Ack=1 Win=65536 Len=1460 [TCP segment of a reassembled PDU]
150 1.957492 172.17.54.168 130.113.68.10 TCP 1514 50283 → 80 [ACK] Seq=139412 Ack=1 Win=65536 Len=1460 [TCP segment of a reassembled PDU]
151 1.957500 172.17.54.168 130.113.68.10 TCP 1514 50283 → 80 [ACK] Seq=140872 Ack=1 Win=65536 Len=1460 [TCP segment of a reassembled PDU]
152 1.957508 172.17.54.168 130.113.68.10 HTTP 1436 POST /~rzheng/course/CAS4C03W17/Labs/TCP/lab3-1-reply.html HTTP/1.1 (text/plain)
Frame 152: 1436 bytes on wire (11488 bits), 1436 bytes captured (11488 bits) on interface 0
Ethernet II, Src: IntelCor_8d:ee:ba (60:36:dd:8d:ee:ba), Dst: Cisco_ff:fd:9c (00:08:e3:ff:fd:9c)
Internet Protocol Version 4, Src: 172.17.54.168, Dst: 130.113.68.10
Transmission Control Protocol, Src Port: 50283, Dst Port: 80, Seq: 142332 Ack: 1, Len: 1382
Source Port: 50283
Destination Port: 80
[Stream index: 3]
[TCP Segment Len: 1382]
0000 00 08 e3 ff fd 9c 60 36 dd 8d ee ba 08 00 45 00 ......`6 ......E.
0010 05 8e 5c 52 40 00 80 06 ef e2 ac 11 36 a8 82 71 ..\R@... ....6..q
0020 44 0a c4 6b 00 50 37 21 36 9b d8 12 93 07 50 18 D..k.P7! 6.....P.
0030 01 00 66 12 00 00 61 74 65 2d 70 65 6e 63 69 6c ..f...at e-pencil
0040 2c 20 61 6e 64 20 74 68 65 20 63 68 6f 6b 69 6e , and th e chokin
0050 67 20 6f 66 20 74 68 65 20 73 75 70 70 72 65 73 g of the suppres
0060 73 65 64 20 67 75 69 6e 65 61 2d 70 69 67 73 2c sed guin ea-pigs,
0070 20 66 69 6c 6c 65 64 20 74 68 65 20 61 69 72 2c filled the air,
0080 20 6d 69 78 65 64 20 75 70 20 77 69 74 68 20 74 mixed u p with t
0090 68 65 20 64 69 73 74 61 6e 74 20 73 6f 62 73 20 he dista nt sobs
Frame (1436 bytes)
Reassembled TCP (143713 bytes)
Frame (frame), 1436 b
Packets: 185 · Displayed: 179 (96.8%) · Dropped: 0 (0.0%)
Profile: Default
Type here to search
ENG US
1:15 PM 2018-03-09


*Wi-Fi
File Edit View Go Capture Analyze Statistics Telephony Wireless Tools Help
tcp && ip.addr == 130.113.68.10
No. Time Source Destination Protocol Length Info
144 1.956964 172.17.54.168 130.113.68.10 TCP 378 50283 → 80 [PSH, ACK] Seq=131788 Ack=1 Win=65536 Len=324 [TCP segment of a reassembled PDU]
145 1.957440 172.17.54.168 130.113.68.10 TCP 1514 50283 → 80 [ACK] Seq=132112 Ack=1 Win=65536 Len=1460 [TCP segment of a reassembled PDU]
146 1.957453 172.17.54.168 130.113.68.10 TCP 1514 50283 → 80 [ACK] Seq=133572 Ack=1 Win=65536 Len=1460 [TCP segment of a reassembled PDU]
147 1.957459 172.17.54.168 130.113.68.10 TCP 1514 50283 → 80 [ACK] Seq=135032 Ack=1 Win=65536 Len=1460 [TCP segment of a reassembled PDU]
148 1.957473 172.17.54.168 130.113.68.10 TCP 1514 50283 → 80 [ACK] Seq=136492 Ack=1 Win=65536 Len=1460 [TCP segment of a reassembled PDU]
149 1.957483 172.17.54.168 130.113.68.10 TCP 1514 50283 → 80 [ACK] Seq=137952 Ack=1 Win=65536 Len=1460 [TCP segment of a reassembled PDU]
150 1.957492 172.17.54.168 130.113.68.10 TCP 1514 50283 → 80 [ACK] Seq=139412 Ack=1 Win=65536 Len=1460 [TCP segment of a reassembled PDU]
151 1.957500 172.17.54.168 130.113.68.10 TCP 1514 50283 → 80 [ACK] Seq=140872 Ack=1 Win=65536 Len=1460 [TCP segment of a reassembled PDU]
152 1.957508 172.17.54.168 130.113.68.10 HTTP 1436 POST /~rzheng/course/CAS4C03W17/Labs/TCP/lab3-1-reply.html HTTP/1.1 (text/plain)
[Frame: 149, payload: 137951-139410 (1460 bytes)]
[Frame: 150, payload: 139411-140870 (1460 bytes)]
[Frame: 151, payload: 140871-142330 (1460 bytes)]
[Frame: 152, payload: 142331-143712 (1382 bytes)]
[Segment count: 101]
[Reassembled TCP length: 143713]
[Reassembled TCP Data: 504f5354202f7e727a68656e672f636f757273652f434153...]
Hypertext Transfer Protocol
MIME Multipart Media Encapsulation, Type: multipart/form-data, Boundary: "----WebKitFormBoundaryclB63jU2Eg5S9GnL"
[Type: multipart/form-data]
First boundary: ------WebKitFormBoundaryclB63jU2Eg5S9GnL\r\n
Encapsulated multipart part: (text/plain)
Last boundary: \r\n------WebKitFormBoundaryclB63jU2Eg5S9GnL--\r\n
00022bf0 4c 69 7a 61 72 64 27 73 20 73 6c 61 74 65 2d 70 Lizard's slate-p
00022c00 65 6e 63 69 6c 2c 20 61 6e 64 20 74 68 65 20 63 encil, a nd the c
00022c10 68 6f 6b 69 6e 67 20 6f 66 20 74 68 65 20 73 75 hoking o f the su
00022c20 70 70 72 65 73 73 65 64 20 67 75 69 6e 65 61 2d ppressed guinea-
00022c30 70 69 67 73 2c 20 66 69 6c 6c 65 64 20 74 68 65 pigs, fi lled the
00022c40 20 61 69 72 2c 20 6d 69 78 65 64 20 75 70 20 77 air, mi xed up w
00022c50 69 74 68 20 74 68 65 20 64 69 73 74 61 6e 74 20 ith the distant
00022c60 73 6f 62 73 20 6f 66 20 74 68 65 20 6d 69 73 65 sobs of the mise
00022c70 72 61 62 6c 65 20 4d 6f 63 6b 20 54 75 72 74 6c rable Mo ck Turtl
00022c80 65 2e 20 53 6f 20 73 68 65 20 73 61 74 20 6f 6e e. So sh e sat on
Frame (1436 bytes) Reassembled TCP (143713 bytes)
TCP Segment (tcp.seg
Packets: 185 · Displayed: 179 (96.8%) · Dropped: 0 (0.0%)
Profile: Default
Type here to search
ENG US 1:16 PM 2018-03-09


*Wi-Fi
File Edit View Go Capture Analyze Statistics Telephony Wireless Tools Help
tcp && ip.addr == 130.113.68.10
No. Time Source Destination Protocol Length Info
11 1.936429 172.17.54.168 130.113.68.10 TCP 54 50283 → 80 [ACK] Seq=1 Ack=1 Win=65536 Len=0
12 1.937357 172.17.54.168 130.113.68.10 TCP 1093 50283 → 80 [PSH, ACK] Seq=1 Ack=1 Win=65536 Len=1039 [TCP segment of a reassembled PDU]
13 1.937839 172.17.54.168 130.113.68.10 TCP 1514 50283 → 80 [ACK] Seq=1040 Ack=1 Win=65536 Len=1460 [TCP segment of a reassembled PDU]
14 1.937859 172.17.54.168 130.113.68.10 TCP 1514 50283 → 80 [ACK] Seq=2500 Ack=1 Win=65536 Len=1460 [TCP segment of a reassembled PDU]
15 1.937873 172.17.54.168 130.113.68.10 TCP 1514 50283 → 80 [ACK] Seq=3960 Ack=1 Win=65536 Len=1460 [TCP segment of a reassembled PDU]
16 1.939408 130.113.68.10 172.17.54.168 TCP 54 80 → 50283 [ACK] Seq=1 Ack=1040 Win=7936 Len=0
17 1.939489 172.17.54.168 130.113.68.10 TCP 1514 50283 → 80 [ACK] Seq=5420 Ack=1 Win=65536 Len=1460 [TCP segment of a reassembled PDU]
18 1.939507 172.17.54.168 130.113.68.10 TCP 1514 50283 → 80 [ACK] Seq=6880 Ack=1 Win=65536 Len=1460 [TCP segment of a reassembled PDU]
19 1.940599 130.113.68.10 172.17.54.168 TCP 54 80 → 50283 [ACK] Seq=1 Ack=2500 Win=10880 Len=0
20 1.940686 172.17.54.168 130.113.68.10 TCP 1514 50283 → 80 [ACK] Seq=8340 Ack=1 Win=65536 Len=1460 [TCP segment of a reassembled PDU]
21 1.940707 172.17.54.168 130.113.68.10 TCP 1514 50283 → 80 [ACK] Seq=9800 Ack=1 Win=65536 Len=1460 [TCP segment of a reassembled PDU]
22 1.940718 172.17.54.168 130.113.68.10 TCP 1514 50283 → 80 [ACK] Seq=11260 Ack=1 Win=65536 Len=1460 [TCP segment of a reassembled PDU]
23 1.942258 130.113.68.10 172.17.54.168 TCP 54 80 → 50283 [ACK] Seq=1 Ack=3960 Win=13824 Len=0
[Frame: 12, payload: 0-1038 (1039 bytes)]
[Frame: 13, payload: 1039-2498 (1460 bytes)]
[Frame: 14, payload: 2499-3958 (1460 bytes)]
[Frame: 15, payload: 3959-5418 (1460 bytes)]
[Frame: 17, payload: 5419-6878 (1460 bytes)]
[Frame: 18, payload: 6879-8338 (1460 bytes)]
[Frame: 20, payload: 8339-9798 (1460 bytes)]
[Frame: 21, payload: 9799-11258 (1460 bytes)]
[Frame: 22, payload: 11259-12718 (1460 bytes)]
[Frame: 24, payload: 12719-14178 (1460 bytes)]
[Frame: 25, payload: 14179-15638 (1460 bytes)]
[Frame: 26, payload: 15639-17098 (1460 bytes)]
00000000 50 4f 53 54 20 2f 7e 72 7a 68 65 6e 67 2f 63 6f POST /~r zheng/co
00000010 75 72 73 65 2f 43 41 53 34 43 30 33 57 31 37 2f urse/CAS 4C03W17/
00000020 4c 61 62 73 2f 54 43 50 2f 6c 61 62 33 2d 31 2d Labs/TCP /lab3-1-
00000030 72 65 70 6c 79 2e 68 74 6d 6c 20 48 54 54 50 2f reply.ht ml HTTP/
00000040 31 2e 31 0d 0a 48 6f 73 74 3a 20 77 77 77 2e 63 1.1..Hos t: www.c
00000050 61 73 2e 6d 63 6d 61 73 74 65 72 2e 63 61 0d 0a as.mcmas ter.ca..
00000060 43 6f 6e 6e 65 63 74 69 6f 6e 3a 20 6b 65 65 70 Connecti on: keep
Frame (1436 bytes) Reassembled TCP (143713 bytes)
TCP Segment (tcp.seg
Packets: 185 · Displayed: 179 (96.8%) · Dropped: 0 (0.0%)
Profile: Default
Type here to search
ENG US 1:17 PM 2018-03-09

Amount of data transmitted = 142332 bytes

Time incurred = 1.957508 – 1.937357 = 0.020151 s

Throughput = (Amount of data transmitted)/ (time incurred)

= 142332 / 0.020151

= 7063272.294 bytes/sec

4(1)

The TCP slowstart phase starts at 0.006s and ends at 0.02 s. After 0.02s, we do not see the expected linear increase behaviour anymore and TCP session is always in the congestion avoidance state.

The congestion avoidance takes over at 0.013s, 0.02 s, 0.024s, 0.028s. This happens because there are too many cocurrent segements sending at the same time, therefore the rate result in a suddenly drop.