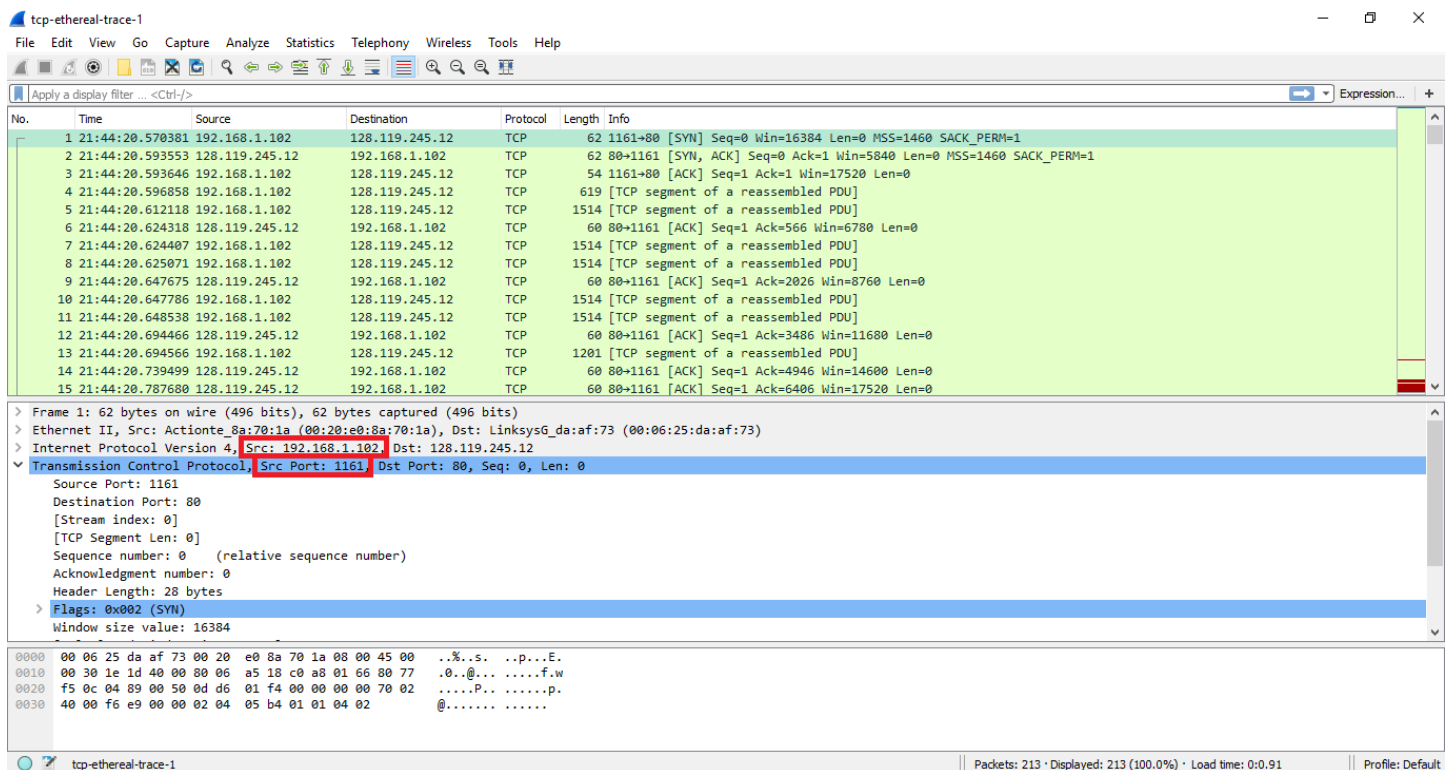


Lab 3

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 IP address used by the client computer is: 192.168.1.102 and the TCP port number used by the client computer 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 IP address of `gaia.cs.umass.edu` is: 128.119.245.12 and the TCP port number used is 80

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
1	21:44:20.570381	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	21:44:20.593553	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	21:44:20.593646	192.168.1.102	128.119.245.12	TCP	54	1161→80 [ACK] Seq=1 Ack=1 Win=17520 Len=0
4	21:44:20.596858	192.168.1.102	128.119.245.12	TCP	619	[TCP segment of a reassembled PDU]
5	21:44:20.612118	192.168.1.102	128.119.245.12	TCP	1514	[TCP segment of a reassembled PDU]
6	21:44:20.624318	128.119.245.12	192.168.1.102	TCP	60	80→1161 [ACK] Seq=1 Ack=566 Win=6780 Len=0
7	21:44:20.624407	192.168.1.102	128.119.245.12	TCP	1514	[TCP segment of a reassembled PDU]
8	21:44:20.625071	192.168.1.102	128.119.245.12	TCP	1514	[TCP segment of a reassembled PDU]
9	21:44:20.647675	128.119.245.12	192.168.1.102	TCP	60	80→1161 [ACK] Seq=1 Ack=2026 Win=8760 Len=0
10	21:44:20.647786	192.168.1.102	128.119.245.12	TCP	1514	[TCP segment of a reassembled PDU]
11	21:44:20.648538	192.168.1.102	128.119.245.12	TCP	1514	[TCP segment of a reassembled PDU]
12	21:44:20.694466	128.119.245.12	192.168.1.102	TCP	60	80→1161 [ACK] Seq=1 Ack=3486 Win=11680 Len=0
13	21:44:20.694566	192.168.1.102	128.119.245.12	TCP	1201	[TCP segment of a reassembled PDU]
14	21:44:20.739499	128.119.245.12	192.168.1.102	TCP	60	80→1161 [ACK] Seq=1 Ack=4946 Win=14600 Len=0
15	21:44:20.787680	128.119.245.12	192.168.1.102	TCP	60	80→1161 [ACK] Seq=1 Ack=6406 Win=17520 Len=0

> Frame 1: 62 bytes on wire (496 bits), 62 bytes captured (496 bits)

> Ethernet II, Src: Actionte_8a:70:1a (00:20:e0:8a:70:1a), Dst: LinksysG_da:af:73 (00:06:25:da:af:73)

> Internet Protocol Version 4, Src: 192.168.1.102, Dst: 128.119.245.12

> Transmission Control Protocol, Src Port: 1161, Dst Port: 80, Seq: 0, Len: 0

Source Port: 1161
Destination Port: 80
[Stream index: 0]
[TCP Segment Len: 0]
Sequence number: 0 (relative sequence number)
Acknowledgment number: 0
Header Length: 28 bytes
Flags: 0x002 (SYN)
Window size value: 16384

```

0000  00 06 25 da af 73 00 20 e0 8a 70 1a 08 00 45 00  ..%.s.  ..p...E.
0010  00 30 1e 1d 40 00 00 06 a5 18 c0 a8 01 66 80 77  .0.@...  ....f.w
0020  f5 0c 04 89 00 50 0d d6 01 f4 00 00 00 00 70 02  ....P..  .....p.
0030  40 00 f6 e9 00 00 02 04 05 b4 01 01 04 02      @.....

```

tcp-ethereal-trace-1

Packets: 213 · Displayed: 213 (100.0%) · Load time: 0:0.91

Profile: Default

3. What is the IP address and TCP port number used by your client computer (source) to transfer the file to gaia.cs.umass.edu?

The IP address used by my client computer is: 192.168.0.107 and the TCP port number used by my client computer is 23081

3c.pcapng

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tcp

No.	Time	Source	Destination	Protocol	Length	Info
23	12:58:13.131619	74.125.130.102	192.168.0.107	TCP	60	443→23079 [ACK] Seq=912 Ack=1545 Win=373 Len=0
24	12:58:13.585045	192.168.0.107	128.119.245.12	TCP	54	23080→80 [FIN, ACK] Seq=1 Ack=1 Win=256 Len=0
25	12:58:13.585953	192.168.0.107	128.119.245.12	TCP	66	23081→80 [SYN] Seq=0 Win=8192 Len=0 MSS=1460 WS=256 SACK_PERM=1
26	12:58:13.835417	128.119.245.12	192.168.0.107	TCP	66	80→23081 [SYN, ACK] Seq=0 Ack=1 Win=29200 Len=0 MSS=1460 SACK_PERM=1 WS=128
27	12:58:13.835586	192.168.0.107	128.119.245.12	TCP	54	23081→80 [ACK] Seq=1 Ack=1 Win=65536 Len=0
28	12:58:13.835944	128.119.245.12	192.168.0.107	TCP	60	80→23080 [FIN, ACK] Seq=1 Ack=2 Win=229 Len=0
29	12:58:13.836165	192.168.0.107	128.119.245.12	TCP	54	23080→80 [ACK] Seq=2 Ack=2 Win=256 Len=0
30	12:58:13.839383	192.168.0.107	128.119.245.12	TCP	707	[TCP segment of a reassembled PDU]
31	12:58:13.839520	192.168.0.107	128.119.245.12	TCP	8246	[TCP segment of a reassembled PDU]
32	12:58:13.839638	192.168.0.107	128.119.245.12	TCP	4434	[TCP segment of a reassembled PDU]
35	12:58:14.089604	128.119.245.12	192.168.0.107	TCP	60	80→23081 [ACK] Seq=1 Ack=654 Win=30592 Len=0
36	12:58:14.089781	192.168.0.107	128.119.245.12	TCP	1514	[TCP segment of a reassembled PDU]
37	12:58:14.090496	128.119.245.12	192.168.0.107	TCP	60	80→23081 [ACK] Seq=1 Ack=2114 Win=33536 Len=0
38	12:58:14.090498	128.119.245.12	192.168.0.107	TCP	60	80→23081 [ACK] Seq=1 Ack=3574 Win=36352 Len=0
39	12:58:14.090498	128.119.245.12	192.168.0.107	TCP	60	80→23081 [ACK] Seq=1 Ack=5034 Win=39296 Len=0

> Frame 25: 66 bytes on wire (528 bits), 66 bytes captured (528 bits) on interface 0

> Ethernet II, Src: HewlettP_d5:91:dc (fc:3f:db:d5:91:dc), Dst: D-LinkIn_20:a9:68 (10:be:f5:20:a9:68)

> Internet Protocol Version 4, Src: 192.168.0.107, Dst: 128.119.245.12

> Transmission Control Protocol, Src Port: 23081, Dst Port: 80, Seq: 0, Len: 0

```

0000  10 be f5 20 a9 68 fc 3f db d5 91 dc 08 00 45 00  ... .h.? .....E.
0010  00 34 74 7d 40 00 00 06 00 00 c0 a8 00 6b 80 77  .4t}@...  ....k.w
0020  f5 0c 5a 29 00 50 49 73 4c eb 00 00 00 00 00 02  ..Z).Pis L.....
0030  20 00 36 be 00 00 02 04 05 b4 01 03 03 08 01 01  .6.....
0040  04 02

```

Transmission Control Protocol: Protocol

Packets: 123 · Displayed: 115 (93.5%) · Load time: 0:0.84

Profile: Default

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 that is used to initiate the TCP connection is 0. The segment contains a SYN flag which identifies it as a SYN segment.

The image shows a Wireshark packet capture of a TCP connection initiation. The packet list shows 15 packets. The first packet is a SYN segment from 192.168.1.102 to 128.119.245.12. The packet details pane shows the following information:

- Frame 1: 62 bytes on wire (496 bits), 62 bytes captured (496 bits)
- Ethernet II, Src: Actionte_8a:70:1a (00:20:e0:8a:70:1a), Dst: LinksysG_da:af:73 (00:06:25:da:af:73)
- Internet Protocol Version 4, Src: 192.168.1.102, Dst: 128.119.245.12
- Transmission Control Protocol, Src Port: 1161, Dst Port: 80, Seq: 0, Len: 0
 - Source Port: 1161
 - Destination Port: 80
 - [Stream index: 0]
 - [TCP Segment Len: 0]
 - Sequence number: 0 (relative sequence number)
 - Acknowledgment number: 0
 - Header Length: 28 bytes
 - Flags: 0x002 (SYN)
 - Window size value: 16384

The packet bytes pane shows the raw data of the packet, including the Ethernet II header, IP header, and TCP header.

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 in reply to the SYN is 0. The value of the Acknowledgement field in the SYNACK segment is 1. This value was determined by taking the initial sequence number and adding 1. The segment contains SYN and ACK flags which identify it as a SYNACK segment.

tcp-ethereal-trace-1

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No.	Time	Source	Destination	Protocol	Length	Info
1	21:44:20.570381	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	21:44:20.593553	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	21:44:20.593646	192.168.1.102	128.119.245.12	TCP	54	1161→80 [ACK] Seq=1 Ack=1 Win=17520 Len=0
4	21:44:20.596858	192.168.1.102	128.119.245.12	TCP	619	[TCP segment of a reassembled PDU]
5	21:44:20.612118	192.168.1.102	128.119.245.12	TCP	1514	[TCP segment of a reassembled PDU]
6	21:44:20.624318	128.119.245.12	192.168.1.102	TCP	60	80→1161 [ACK] Seq=1 Ack=566 Win=6780 Len=0
7	21:44:20.624407	192.168.1.102	128.119.245.12	TCP	1514	[TCP segment of a reassembled PDU]
8	21:44:20.625071	192.168.1.102	128.119.245.12	TCP	1514	[TCP segment of a reassembled PDU]
9	21:44:20.647675	128.119.245.12	192.168.1.102	TCP	60	80→1161 [ACK] Seq=1 Ack=2026 Win=8760 Len=0
10	21:44:20.647786	192.168.1.102	128.119.245.12	TCP	1514	[TCP segment of a reassembled PDU]
11	21:44:20.648538	192.168.1.102	128.119.245.12	TCP	1514	[TCP segment of a reassembled PDU]
12	21:44:20.694466	128.119.245.12	192.168.1.102	TCP	60	80→1161 [ACK] Seq=1 Ack=3486 Win=11680 Len=0
13	21:44:20.694566	192.168.1.102	128.119.245.12	TCP	1201	[TCP segment of a reassembled PDU]
14	21:44:20.739499	128.119.245.12	192.168.1.102	TCP	60	80→1161 [ACK] Seq=1 Ack=4946 Win=14600 Len=0
15	21:44:20.787680	128.119.245.12	192.168.1.102	TCP	60	80→1161 [ACK] Seq=1 Ack=6406 Win=17520 Len=0

> Frame 2: 62 bytes on wire (496 bits), 62 bytes captured (496 bits)

> 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: 0, Ack: 1, Len: 0

Source Port: 80

Destination Port: 1161

[Stream index: 0]

[TCP Segment Len: 0]

Sequence number: 0 (relative sequence number)

Acknowledgment number: 1 (relative ack number)

Header Length: 28 bytes

Flags: 0x012 (SYN, ACK)

Window size value: 5840

0000 00 20 e0 8a 70 1a 00 06 25 da af 73 08 00 45 00 . .p...%.s..E.

0010 00 30 00 00 40 00 37 06 0c 36 80 77 f5 0c c0 a8 .0..@.7. .6.w....

0020 01 66 00 50 04 89 34 a2 74 19 0d d6 01 f5 70 12 .f.P..4. t.....p.

0030 16 d0 77 4d 00 00 02 04 05 b4 01 01 04 02 ..mM.....

tcp-ethereal-trace-1

Packets: 213 · Displayed: 213 (100.0%) · Load time: 0:0.91

Profile: Default

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 "POST" within its DATA field.

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

tcp-ethereal-trace-1

File Edit View Go Capture Analyze Statistics Telephony Wireless Tools Help

Apply a display filter ... <Ctrl-/>

No.	Time	Source	Destination	Protocol	Length	Info
1	21:44:20.570381	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	21:44:20.593553	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	21:44:20.593646	192.168.1.102	128.119.245.12	TCP	54	1161→80 [ACK] Seq=1 Ack=1 Win=17520 Len=0
4	21:44:20.596858	192.168.1.102	128.119.245.12	TCP	619	[TCP segment of a reassembled PDU]
5	21:44:20.612118	192.168.1.102	128.119.245.12	TCP	1514	[TCP segment of a reassembled PDU]
6	21:44:20.624318	128.119.245.12	192.168.1.102	TCP	60	80→1161 [ACK] Seq=1 Ack=566 Win=6780 Len=0
7	21:44:20.624407	192.168.1.102	128.119.245.12	TCP	1514	[TCP segment of a reassembled PDU]
8	21:44:20.625071	192.168.1.102	128.119.245.12	TCP	1514	[TCP segment of a reassembled PDU]
9	21:44:20.647675	128.119.245.12	192.168.1.102	TCP	60	80→1161 [ACK] Seq=1 Ack=2026 Win=8760 Len=0
10	21:44:20.647786	192.168.1.102	128.119.245.12	TCP	1514	[TCP segment of a reassembled PDU]
11	21:44:20.648538	192.168.1.102	128.119.245.12	TCP	1514	[TCP segment of a reassembled PDU]
12	21:44:20.694466	128.119.245.12	192.168.1.102	TCP	60	80→1161 [ACK] Seq=1 Ack=3486 Win=11680 Len=0
13	21:44:20.694566	192.168.1.102	128.119.245.12	TCP	1201	[TCP segment of a reassembled PDU]
14	21:44:20.739499	128.119.245.12	192.168.1.102	TCP	60	80→1161 [ACK] Seq=1 Ack=4946 Win=14600 Len=0
15	21:44:20.787680	128.119.245.12	192.168.1.102	TCP	60	80→1161 [ACK] Seq=1 Ack=6406 Win=17520 Len=0

> Frame 4: 619 bytes on wire (4952 bits), 619 bytes captured (4952 bits)

> Ethernet II, Src: Actionte_8a:70:1a (00:20:e0:8a:70:1a), Dst: LinksysG_da:af:73 (00:06:25:da:af:73)

> Internet Protocol Version 4, Src: 192.168.1.102, Dst: 128.119.245.12

> Transmission Control Protocol, Src Port: 1161, Dst Port: 80, Seq: 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)

Header Length: 20 bytes

0000 00 06 25 da af 73 00 20 e0 8a 70 1a 08 00 45 00 ..%.s. .p...E.

0010 02 5d 1e 21 40 00 00 06 a2 e7 c0 a8 01 66 80 77 .].!@... ..f.w

0020 f5 0c 04 89 00 50 0d d6 01 f5 34 a2 74 1a 50 18P...4.t.P.

0030 44 70 1f bd 00 50 0f 4f 53 54 20 2f 65 74 68 65 Dp... POST ethe

0040 72 65 61 6c 2d 6c 61 62 73 2f 6c 61 62 33 2d 31 real-lab s/lab3-1

0050 2d 72 65 70 6c 79 2e 68 74 6d 20 48 54 54 50 2f -reply.h tm HTTP/

0060 31 2e 31 0d 0a 48 6f 73 74 3a 20 67 61 69 61 2e 1.1..Hos t: gaia.

0070 63 73 2e 75 6d 61 73 73 2e 65 64 75 0d 0a 55 73 cs.umass .edu..Us

tcp-ethereal-trace-1

Packets: 213 · Displayed: 213 (100.0%) · Load time: 0:0.91

Profile: Default

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.

	SEQ number	Sent time	ACK recvd time	RTT (seconds)
Segment 1	1	20.596858	20.624318	.027460
Segment 2	566	20.612118	20.647675	.035557
Segment 3	2026	20.624407	20.694466	.070059
Segment 4	3486	20.625071	20.739499	.114428
Segment 5	4946	20.647786	20.787680	.139894
Segment 6	6406	20.648538	20.838183	.189645

EstimatedRTT after receipt of the ACK of segment 1 = RTT for Segment 1 = .02746 seconds

EstimatedRTT after receipt of the ACK of segment 2 = $.875 * .02746 + .125 * .035557 = .0285$

EstimatedRTT after receipt of the ACK of segment 3 = $.875 * .0285 + .125 * .070059 = .0337$

EstimatedRTT after receipt of the ACK of segment 4 = $.875 * .0337 + .125 * .114428 = .043791$

EstimatedRTT after receipt of the ACK of segment 5 = $.875 * .043791 + .125 * .139894 = .055804$

EstimatedRTT after the receipt of the ACK of segment 6 = $.875 * .055804 + .125 * .189645 = .072534$

tcp-ethereal-trace-1

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Apply a display filter ... <Ctrl-F>

No.	Time	Source	Destination	Protocol	Length	Info
1	21:44:20.570381	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	21:44:20.593553	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	21:44:20.593646	192.168.1.102	128.119.245.12	TCP	54	1161->80 [ACK] Seq=1 Ack=1 Win=17520 Len=0
4	21:44:20.596858	192.168.1.102	128.119.245.12	TCP	619	[TCP segment of a reassembled PDU]
5	21:44:20.612118	192.168.1.102	128.119.245.12	TCP	1514	[TCP segment of a reassembled PDU]
6	21:44:20.624318	128.119.245.12	192.168.1.102	TCP	60	80->1161 [ACK] Seq=1 Ack=566 Win=6780 Len=0
7	21:44:20.624407	192.168.1.102	128.119.245.12	TCP	1514	[TCP segment of a reassembled PDU]
8	21:44:20.625071	192.168.1.102	128.119.245.12	TCP	1514	[TCP segment of a reassembled PDU]
9	21:44:20.647675	128.119.245.12	192.168.1.102	TCP	60	80->1161 [ACK] Seq=1 Ack=2026 Win=8760 Len=0
10	21:44:20.647786	192.168.1.102	128.119.245.12	TCP	1514	[TCP segment of a reassembled PDU]
11	21:44:20.648538	192.168.1.102	128.119.245.12	TCP	1514	[TCP segment of a reassembled PDU]
12	21:44:20.694466	128.119.245.12	192.168.1.102	TCP	60	80->1161 [ACK] Seq=1 Ack=3486 Win=11680 Len=0
13	21:44:20.694566	192.168.1.102	128.119.245.12	TCP	1201	[TCP segment of a reassembled PDU]
14	21:44:20.739499	128.119.245.12	192.168.1.102	TCP	60	80->1161 [ACK] Seq=1 Ack=4946 Win=14600 Len=0
15	21:44:20.787680	128.119.245.12	192.168.1.102	TCP	60	80->1161 [ACK] Seq=1 Ack=6406 Win=17520 Len=0
16	21:44:20.838183	128.119.245.12	192.168.1.102	TCP	60	80->1161 [ACK] Seq=1 Ack=7866 Win=20440 Len=0
17	21:44:20.875188	128.119.245.12	192.168.1.102	TCP	60	80->1161 [ACK] Seq=1 Ack=9013 Win=23360 Len=0
18	21:44:20.875421	192.168.1.102	128.119.245.12	TCP	1514	[TCP segment of a reassembled PDU]

> Frame 11: 1514 bytes on wire (12112 bits), 1514 bytes captured (12112 bits)

> Ethernet II, Src: Actionte_8a:70:1a (00:20:e0:8a:70:1a), Dst: LinksysG_da:af:73 (00:06:25:da:af:73)

> Internet Protocol Version 4, Src: 192.168.1.102, Dst: 128.119.245.12

> Transmission Control Protocol, Src Port: 1161, Dst Port: 80, Seq: 6406, Ack: 1, Len: 1460

Source Port: 1161

Destination Port: 80

[Stream index: 0]

[TCP Segment Len: 1460]

Sequence number: 6406 (relative sequence number)

```

0000  00 06 25 da af 73 00 20 e0 8a 70 1a 08 00 45 00  ..%.s.  .p...E.
0010  05 dc 1e 26 40 00 00 06 9f 63 c0 a8 01 66 80 77  ...&@... .c...f.w
0020  f5 0c 04 89 00 50 0d d6 1a fa 3a a2 74 1a 50 10  ....P... .4.t.P.
0030  44 70 95 83 00 20 55 6e 69 74 65 64 20 53 74  Dp.... U nited St
0040  61 74 65 73 20 63 6f 70 79 72 69 67 68 74 0d 0a  ates cop yright..
0050  6f 6e 20 6f 72 20 66 6f 72 20 74 68 69 73 20 77  on or fo r this w
0060  6f 72 6b 2c 20 73 6f 20 74 68 65 20 50 72 6f 6a  ork, so the Proj
0070  65 63 74 20 28 61 6e 64 20 79 6f 75 21 29 20 63  ect (and you!) c

```

tcp-ethereal-trace-1

Packets: 213 · Displayed: 213 (100.0%) · Marked: 6 (2.8%) · Load time: 0:0.91 | Profile: Default

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
1	21:44:20.570381	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	21:44:20.593553	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	21:44:20.593646	192.168.1.102	128.119.245.12	TCP	54	1161→80 [ACK] Seq=1 Ack=1 Win=17520 Len=0
4	21:44:20.596858	192.168.1.102	128.119.245.12	TCP	619	[TCP segment of a reassembled PDU]
5	21:44:20.612118	192.168.1.102	128.119.245.12	TCP	1514	[TCP segment of a reassembled PDU]
6	21:44:20.624318	128.119.245.12	192.168.1.102	TCP	60	80→1161 [ACK] Seq=1 Ack=566 Win=6780 Len=0
7	21:44:20.624407	192.168.1.102	128.119.245.12	TCP	1514	[TCP segment of a reassembled PDU]
8	21:44:20.625071	192.168.1.102	128.119.245.12	TCP	1514	[TCP segment of a reassembled PDU]
9	21:44:20.647675	128.119.245.12	192.168.1.102	TCP	60	80→1161 [ACK] Seq=1 Ack=2026 Win=8760 Len=0
10	21:44:20.647786	192.168.1.102	128.119.245.12	TCP	1514	[TCP segment of a reassembled PDU]
11	21:44:20.648538	192.168.1.102	128.119.245.12	TCP	1514	[TCP segment of a reassembled PDU]
12	21:44:20.694466	128.119.245.12	192.168.1.102	TCP	60	80→1161 [ACK] Seq=1 Ack=3486 Win=11680 Len=0
13	21:44:20.694566	192.168.1.102	128.119.245.12	TCP	1201	[TCP segment of a reassembled PDU]
14	21:44:20.739499	128.119.245.12	192.168.1.102	TCP	60	80→1161 [ACK] Seq=1 Ack=4946 Win=14600 Len=0
15	21:44:20.787680	128.119.245.12	192.168.1.102	TCP	60	80→1161 [ACK] Seq=1 Ack=6406 Win=17520 Len=0
16	21:44:20.830183	128.119.245.12	192.168.1.102	TCP	60	80→1161 [ACK] Seq=1 Ack=7866 Win=20440 Len=0
17	21:44:20.875188	128.119.245.12	192.168.1.102	TCP	60	80→1161 [ACK] Seq=1 Ack=9013 Win=23360 Len=0
18	21:44:20.875421	192.168.1.102	128.119.245.12	TCP	1514	[TCP segment of a reassembled PDU]

> Frame 6: 60 bytes on wire (480 bits), 60 bytes captured (480 bits)

> Ethernet II, Src: LinksysG da:af:73 (00:06:25:da:af:73), Dst: Actiontec_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

[Stream index: 0]

[TCP Segment Len: 0]

Sequence number: 1 (relative sequence number)

Acknowledgment number: 566 (relative ack number)

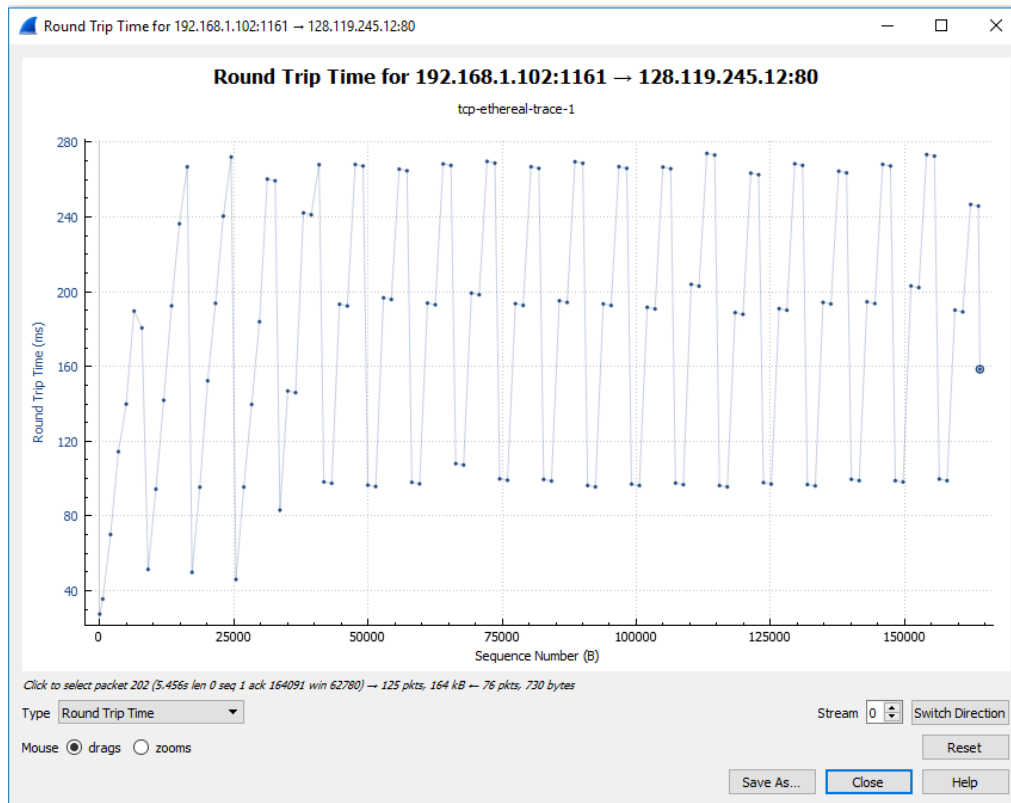
Header Length: 20 bytes

```

0000 00 20 e0 8a 70 1a 00 06 25 da af 73 08 00 45 00  . . . p . . % . s . . E .
0010 00 28 58 72 40 00 37 06 b3 cb 80 77 f5 0c c0 a8  . (Xr@.7. . . w . . . .
0020 01 66 00 50 04 89 34 a2 74 1a 0d d6 04 2a 50 10  . f . P . . 4 . t . . . . * P .
0030 1a 7c 9e 30 00 00 da 12 00 00 47 a5             . | . 0 . . . . . g .

```

Packets: 213 · Displayed: 213 (100.0%) · Marked: 6 (2.8%) · Load time: 0:0.91 | Profile: Default



8. What is the length of each of the first six TCP segments? ¹

Length of 1st segment: 565 bytes

Length of 2nd, 3rd, 4th, 5th, 6th segments: 1460 bytes

tcp-ethereal-trace-1

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Apply a display filter ... <Ctrl-/> Expression...

No.	Time	Source	Destination	Protocol	Length	Info
1	21:44:20.570381	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	21:44:20.593553	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	21:44:20.593646	192.168.1.102	128.119.245.12	TCP	54	1161→80 [ACK] Seq=1 Ack=1 Win=17520 Len=0
4	21:44:20.596858	192.168.1.102	128.119.245.12	TCP	619	[TCP segment of a reassembled PDU]
5	21:44:20.612118	192.168.1.102	128.119.245.12	TCP	1514	[TCP segment of a reassembled PDU]
6	21:44:20.624318	128.119.245.12	192.168.1.102	TCP	60	80→1161 [ACK] Seq=1 Ack=566 Win=6780 Len=0
7	21:44:20.624407	192.168.1.102	128.119.245.12	TCP	1514	[TCP segment of a reassembled PDU]
8	21:44:20.625071	192.168.1.102	128.119.245.12	TCP	1514	[TCP segment of a reassembled PDU]
9	21:44:20.647675	128.119.245.12	192.168.1.102	TCP	60	80→1161 [ACK] Seq=1 Ack=2026 Win=8760 Len=0
10	21:44:20.647786	192.168.1.102	128.119.245.12	TCP	1514	[TCP segment of a reassembled PDU]
11	21:44:20.648538	192.168.1.102	128.119.245.12	TCP	1514	[TCP segment of a reassembled PDU]
12	21:44:20.694466	128.119.245.12	192.168.1.102	TCP	60	80→1161 [ACK] Seq=1 Ack=3486 Win=11680 Len=0
13	21:44:20.694566	192.168.1.102	128.119.245.12	TCP	1201	[TCP segment of a reassembled PDU]
14	21:44:20.739499	128.119.245.12	192.168.1.102	TCP	60	80→1161 [ACK] Seq=1 Ack=4946 Win=14600 Len=0
15	21:44:20.787680	128.119.245.12	192.168.1.102	TCP	60	80→1161 [ACK] Seq=1 Ack=6406 Win=17520 Len=0
16	21:44:20.838183	128.119.245.12	192.168.1.102	TCP	60	80→1161 [ACK] Seq=1 Ack=7866 Win=20440 Len=0
17	21:44:20.875188	128.119.245.12	192.168.1.102	TCP	60	80→1161 [ACK] Seq=1 Ack=9013 Win=23360 Len=0
18	21:44:20.875421	192.168.1.102	128.119.245.12	TCP	1514	[TCP segment of a reassembled PDU]

> Frame 4: 619 bytes on wire (4952 bits), 619 bytes captured (4952 bits)

> Ethernet II, Src: Actionte_8a:70:1a (00:20:e0:8a:70:1a), Dst: LinksysG_da:af:73 (00:06:25:da:af:73)

> Internet Protocol Version 4, Src: 192.168.1.102, Dst: 128.119.245.12

> Transmission Control Protocol, Src Port: 1161, Dst Port: 80, Seq: 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)

0000 00 06 25 da af 73 00 20 e0 8a 70 1a 08 00 45 00 ..%.s. .p...E.
0010 02 5d 1e 21 40 00 00 06 a2 e7 c0 a8 01 66 80 77 .]!@... ..f.w
0020 f5 0c 04 89 00 50 0d d6 01 f5 34 a2 74 1a 50 18P...4.t.P.
0030 44 70 1f bd 00 00 50 4f 53 54 20 2f 65 74 68 65 Dp...PO ST /ethe
0040 72 65 61 6c 2d 6c 61 62 73 2f 6c 61 62 33 2d 31 real-lab s/lab3-1
0050 2d 72 65 70 6c 79 2e 68 74 6d 20 48 54 54 50 2f -reply.h tm HTTP/

tcp-ethereal-trace-1

Packets: 213 · Displayed: 213 (100.0%) · Load time: 0:0.91

Profile: Default

tcp-ethereal-trace-1

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Apply a display filter ... <Ctrl-/> Expression...

No.	Time	Source	Destination	Protocol	Length	Info
1	21:44:20.570381	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	21:44:20.593553	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	21:44:20.593646	192.168.1.102	128.119.245.12	TCP	54	1161→80 [ACK] Seq=1 Ack=1 Win=17520 Len=0
4	21:44:20.596858	192.168.1.102	128.119.245.12	TCP	619	[TCP segment of a reassembled PDU]
5	21:44:20.612118	192.168.1.102	128.119.245.12	TCP	1514	[TCP segment of a reassembled PDU]
6	21:44:20.624318	128.119.245.12	192.168.1.102	TCP	60	80→1161 [ACK] Seq=1 Ack=566 Win=6780 Len=0
7	21:44:20.624407	192.168.1.102	128.119.245.12	TCP	1514	[TCP segment of a reassembled PDU]
8	21:44:20.625071	192.168.1.102	128.119.245.12	TCP	1514	[TCP segment of a reassembled PDU]
9	21:44:20.647675	128.119.245.12	192.168.1.102	TCP	60	80→1161 [ACK] Seq=1 Ack=2026 Win=8760 Len=0
10	21:44:20.647786	192.168.1.102	128.119.245.12	TCP	1514	[TCP segment of a reassembled PDU]
11	21:44:20.648538	192.168.1.102	128.119.245.12	TCP	1514	[TCP segment of a reassembled PDU]
12	21:44:20.694466	128.119.245.12	192.168.1.102	TCP	60	80→1161 [ACK] Seq=1 Ack=3486 Win=11680 Len=0
13	21:44:20.694566	192.168.1.102	128.119.245.12	TCP	1201	[TCP segment of a reassembled PDU]
14	21:44:20.739499	128.119.245.12	192.168.1.102	TCP	60	80→1161 [ACK] Seq=1 Ack=4946 Win=14600 Len=0
15	21:44:20.787680	128.119.245.12	192.168.1.102	TCP	60	80→1161 [ACK] Seq=1 Ack=6406 Win=17520 Len=0
16	21:44:20.838183	128.119.245.12	192.168.1.102	TCP	60	80→1161 [ACK] Seq=1 Ack=7866 Win=20440 Len=0
17	21:44:20.875188	128.119.245.12	192.168.1.102	TCP	60	80→1161 [ACK] Seq=1 Ack=9013 Win=23360 Len=0
18	21:44:20.875421	192.168.1.102	128.119.245.12	TCP	1514	[TCP segment of a reassembled PDU]

> Frame 5: 1514 bytes on wire (12112 bits), 1514 bytes captured (12112 bits)

> Ethernet II, Src: Actionte_8a:70:1a (00:20:e0:8a:70:1a), Dst: LinksysG_da:af:73 (00:06:25:da:af:73)

> Internet Protocol Version 4, Src: 192.168.1.102, Dst: 128.119.245.12

> Transmission Control Protocol, Src Port: 1161, Dst Port: 80, Seq: 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)

0000 00 06 25 da af 73 00 20 e0 8a 70 1a 08 00 45 00 ..%.s. .p...E.
0010 05 dc 1e 22 40 00 00 06 9f 67 c0 a8 01 66 80 77 ..."@... .g...f.w
0020 f5 0c 04 89 00 50 0d d6 04 2a 34 a2 74 1a 50 18P...4.t.P.
0030 44 70 3b e5 00 00 43 6f 6e 74 65 6e 74 2d 54 79 Dpj...Co ntent-Ty
0040 70 65 3a 20 6d 75 6c 74 69 70 61 72 74 2f 66 6f pe: mult ipart/fo
0050 72 6d 2d 64 61 74 61 3b 20 62 6f 75 6e 64 61 72 rm-data; boundar

tcp-ethereal-trace-1

Packets: 213 · Displayed: 213 (100.0%) · Load time: 0:0.91

Profile: Default

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

The minimum amount of available buffer space advertised at the receiver for the entire trace is 5840 bytes. No, the sender is never throttled because we never reach full capacity of the window.

tcp-ethereal-trace-1

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Apply a display filter ... <Ctrl-/> Expression...

No.	Time	Source	Destination	Protocol	Length	Info
1	21:44:20.570381	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	21:44:20.593553	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	21:44:20.593646	192.168.1.102	128.119.245.12	TCP	54	1161→80 [ACK] Seq=1 Ack=1 Win=17520 Len=0
4	21:44:20.596858	192.168.1.102	128.119.245.12	TCP	619	[TCP segment of a reassembled PDU]
5	21:44:20.612118	192.168.1.102	128.119.245.12	TCP	1514	[TCP segment of a reassembled PDU]
6	21:44:20.624318	128.119.245.12	192.168.1.102	TCP	60	80→1161 [ACK] Seq=1 Ack=566 Win=6780 Len=0
7	21:44:20.624407	192.168.1.102	128.119.245.12	TCP	1514	[TCP segment of a reassembled PDU]
8	21:44:20.625071	192.168.1.102	128.119.245.12	TCP	1514	[TCP segment of a reassembled PDU]
9	21:44:20.647675	128.119.245.12	192.168.1.102	TCP	60	80→1161 [ACK] Seq=1 Ack=2026 Win=8760 Len=0
10	21:44:20.647786	192.168.1.102	128.119.245.12	TCP	1514	[TCP segment of a reassembled PDU]
11	21:44:20.648538	192.168.1.102	128.119.245.12	TCP	1514	[TCP segment of a reassembled PDU]
12	21:44:20.694466	128.119.245.12	192.168.1.102	TCP	60	80→1161 [ACK] Seq=1 Ack=3486 Win=11680 Len=0
13	21:44:20.694566	192.168.1.102	128.119.245.12	TCP	1201	[TCP segment of a reassembled PDU]
14	21:44:20.739499	128.119.245.12	192.168.1.102	TCP	60	80→1161 [ACK] Seq=1 Ack=4946 Win=14600 Len=0
15	21:44:20.787680	128.119.245.12	192.168.1.102	TCP	60	80→1161 [ACK] Seq=1 Ack=6406 Win=17520 Len=0
16	21:44:20.838183	128.119.245.12	192.168.1.102	TCP	60	80→1161 [ACK] Seq=1 Ack=7866 Win=20440 Len=0
17	21:44:20.875188	128.119.245.12	192.168.1.102	TCP	60	80→1161 [ACK] Seq=1 Ack=9013 Win=23360 Len=0
18	21:44:20.875421	192.168.1.102	128.119.245.12	TCP	1514	[TCP segment of a reassembled PDU]

> Frame 2: 62 bytes on wire (496 bits), 62 bytes captured (496 bits)

> 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: 0, Ack: 1, Len: 0

Source Port: 80

Destination Port: 1161

[Stream index: 0]

[TCP Segment Len: 0]

Sequence number: 0 (relative sequence number)

Acknowledgment number: 1 (relative ack number)

Header Length: 28 bytes

```

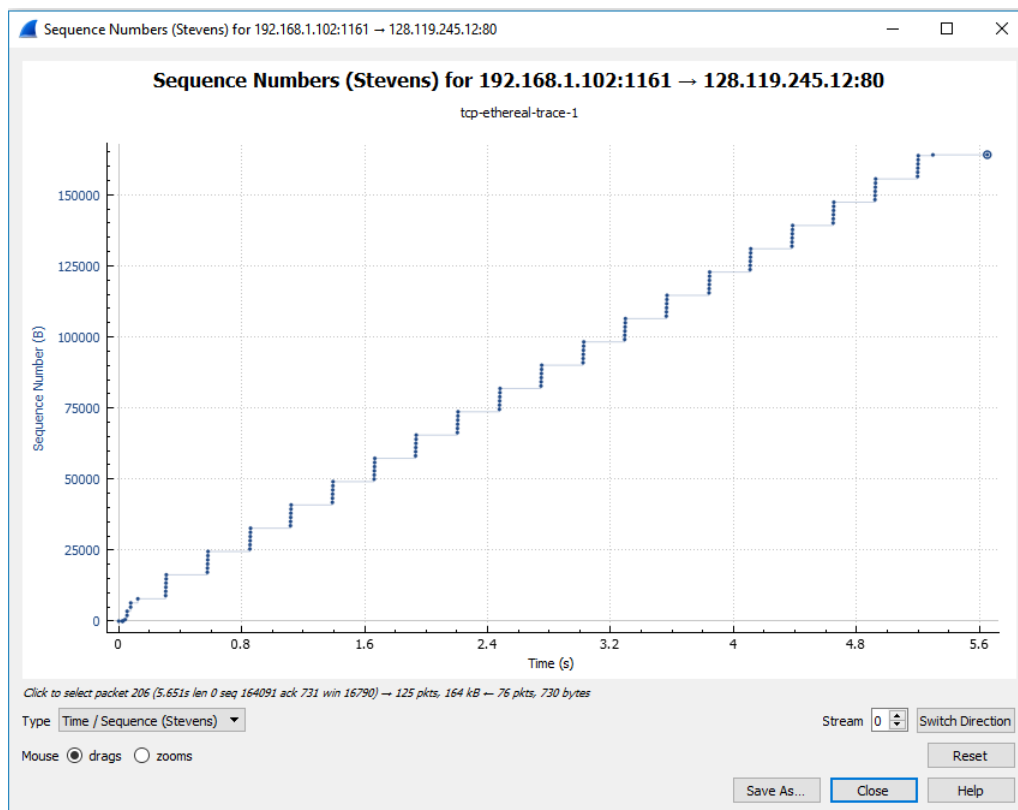
0000  00 20 e0 8a 70 1a 00 06 25 da af 73 08 00 45 00  . . . p . . % . s . E .
0010  00 30 00 00 40 00 37 06 0c 36 80 77 f5 0c c0 a8  . . . @ . 7 . 6 . w . . .
0020  01 66 00 50 04 89 34 a2 74 19 0d d6 01 f5 70 12  . f . P . . 4 . t . . . . p .
0030  16 d0 77 4d 00 00 02 04 05 b4 01 01 04 02      . . n f . . . . . . . .

```

Packets: 213 · Displayed: 213 (100.0%) · Load time: 0:0.91 · Profile: Default

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. To check, I looked at the Time-Sequence-Graph (Stevens) of this trace and ensured that the sequence numbers and time had a linear relationship. In other words, as time increased, so too did the sequence numbers.



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).

	ACK number	Acknowledged data
ACK 1	566	566
ACK 2	2026	1460
ACK 3	3486	1460
ACK 4	4946	1460
ACK 5	6406	1460
ACK 6	7866	1460

The receiver typically acknowledges 1460 bytes per ACK. There are some cases where the receiver is ACKing every other received segment as can be seen in segment 60 where the amount of data acknowledged 2920 (1460*2).

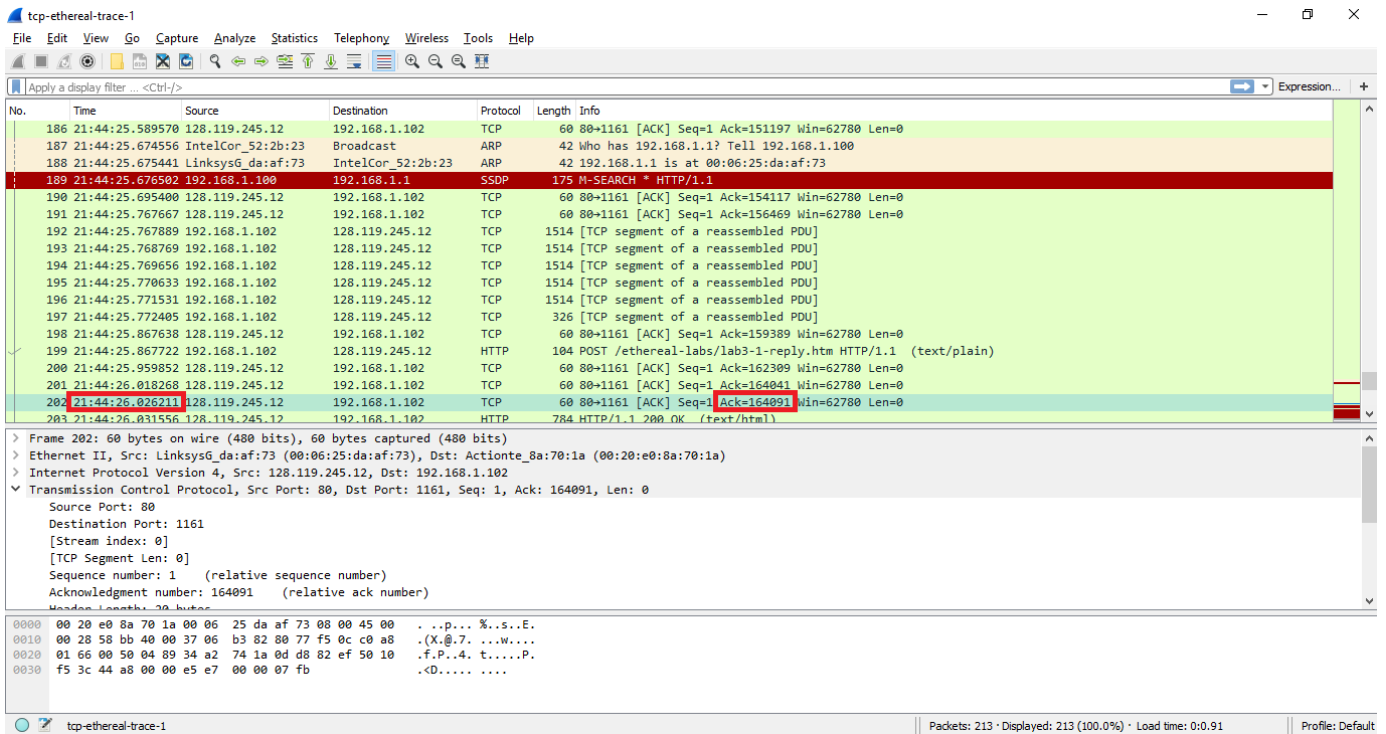
The screenshot shows a Wireshark capture of a TCP connection. The packet list pane displays several packets, with packet 60 highlighted. The details pane for packet 60 shows the TCP segment structure, including the sequence number (1) and acknowledgment number (35049). The packet bytes pane shows the raw data in hexadecimal and ASCII.

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

Total amount of data transmitted = 164091 (the last ACK received) – 1 (sequence number of first segment) = 164090 bytes

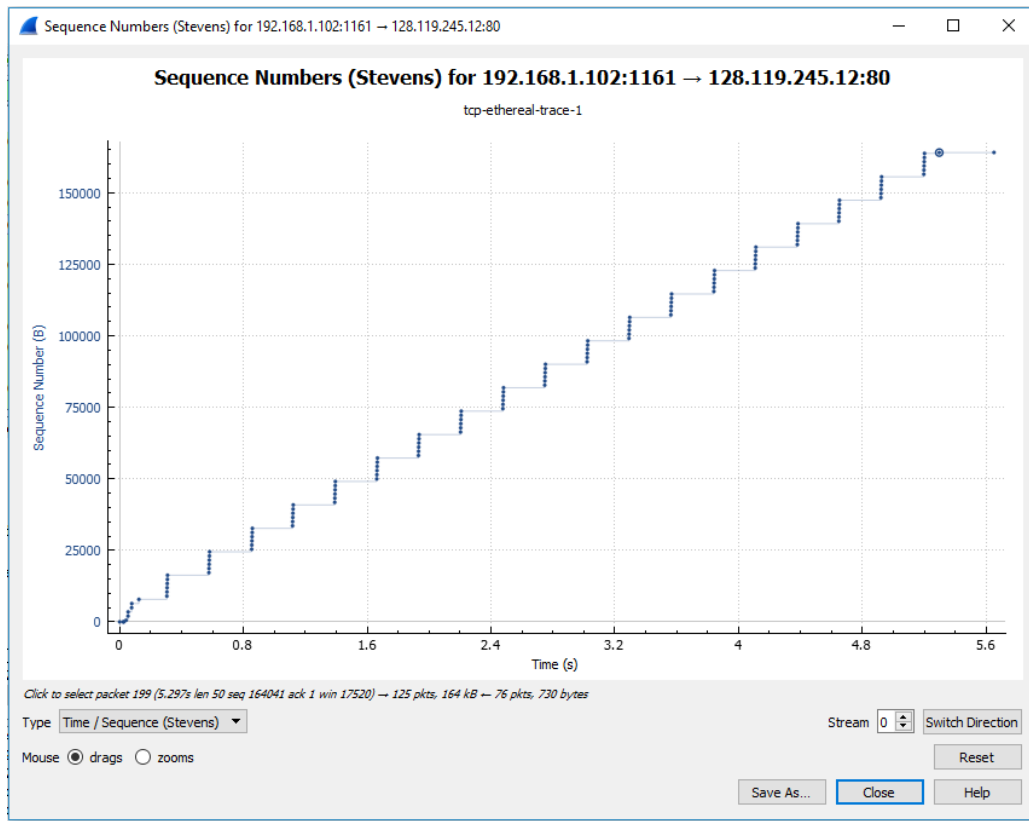
Total transmission time = 26.026211 (time last ACK received) – 20.596858 (time first segment sent) = 5.429353 seconds

Throughput = 164090 / 5.429353 = 30,223 bytes/sec



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.

In order to identify the slowstart phase/congestion avoidance phases, we must look at the client's congestion window. However, the size of this window is not advertised. By looking at the amount of data sent out but not yet ACK'd, we can estimate the lower bound of the window. As can be seen in the table below, TCP's slowstart phase begins at the start of the connection and the un-ACK'd data increases rapidly but never grows above 8192B. So, it's not possible to identify the end of the slowstart phase because the client is not sending data fast enough to push the server into congestion avoidance. This behavior is different from the idealized behavior of TCP that we've studied where we normally assume that the clients have an abundance of data that they need to transmit. But in this case, the transmission is already complete before the network ever detects any congestion.

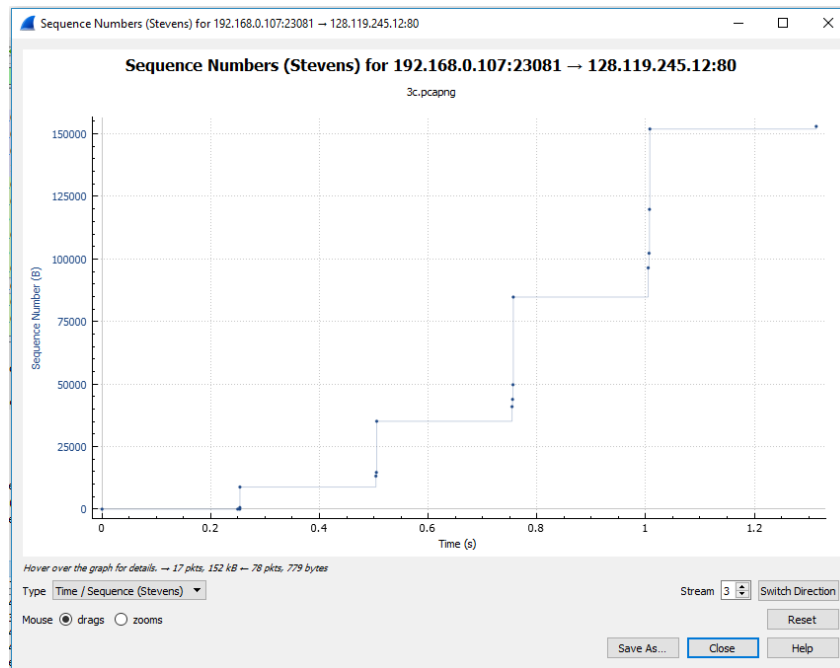


	SEQ number	Size	ACK number	Un-ACK'd data
DATA	1	565		565
DATA	566	1460		2025
ACK			566	1460
DATA	2026	1460		2920
DATA	3486	1460		4380
ACK			2026	2920
DATA	4946	1460		4380
DATA	6406	1460		5840
ACK			3486	4380
DATA	7866	1147		5527
ACK			4946	4067
ACK			6406	2607
ACK			7866	1147
ACK			9013	0
DATA	9013	1460		1460
DATA	10473	1460		2920
DATA	11933	1460		4380
DATA	13393	1460		5840
DATA	14853	1460		7300
DATA	16313	892		8192
ACK			10473	6732
ACK			11933	5272
ACK			13393	3812
ACK			14853	2352
ACK			16313	892
ACK			17205	0
DATA	17205	1460		1460
DATA	18665	1460		2920
DATA	20125	1460		4380
DATA	21585	1460		5840
DATA	23045	1460		7300

DATA	24505	892		8192
ACK			18665	6732
ACK			20125	5272
ACK			21585	3812
ACK			23045	2352
ACK			24505	892
ACK			25397	0
DATA	25397	1460		1460
DATA	26857	1460		2920
DATA	28317	1460		4380
DATA	29777	1460		5840
DATA	31237	1460		7300
DATA	32697	892		8192
ACK			26857	6732
ACK			28317	5272
ACK			29777	3812
ACK			31237	2352
ACK			33589	0
DATA	33589	1460		1460
DATA	35049	1460		2920
DATA	36509	1460		4380
DATA	37969	1460		5840
DATA	39429	1460		7300
DATA	40889	892		8192
ACK			35049	6732
ACK			37969	3812
ACK			40889	892
ACK			41781	0
DATA	41781	1460		1460
DATA	43241	1460		2920
DATA	44701	1460		4380
DATA	46161	1460		5840
DATA	47621	1460		7300
DATA	49081	892		8192
ACK			44701	5272
ACK			47621	2352
ACK			49973	0
DATA	49973	1460		1460
DATA	51433	1460		2920
DATA	52893	1460		4380
DATA	54353	1460		5840
DATA	55813	1460		7300
DATA	57273	892		8192
ACK			52893	5272
ACK			55813	2352
ACK			58165	0

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 behavior I observed when transferring a file from my own computer to gaia.cs.umass.edu was quite similar to that of the TCP trace provided. However, as previously noted, my trace indicates a TCP length greater than 1500 bytes, and Wireshark was reporting the wrong TCP segment length. Because of this inconsistency, calculating the un-ACK'd data was inefficient.



** As noted in footnote 3 of the lab instructions, I used the tcp-ethereal-trace-1 trace file for all of the calculations and analysis required as my trace indicated a TCP length greater than 1500 bytes. Wireshark was reporting the wrong TCP segment length and showed only one large TCP segment rather than multiple smaller segments. I have provided some screen shots below of my trace.

3c.pcapng

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tcp

No.	Time	Source	Destination	Protocol	Length	Info
24	12:58:13.585045	192.168.0.107	128.119.245.12	TCP	54	23080→80 [FIN, ACK] Seq=1 Ack=1 Win=256 Len=0
25	12:58:13.585953	192.168.0.107	128.119.245.12	TCP	66	23081→80 [SYN] Seq=0 Win=8192 Len=0 MSS=1460 WS=256 SACK_PERM=1
26	12:58:13.835417	128.119.245.12	192.168.0.107	TCP	66	80→23081 [SYN, ACK] Seq=0 Ack=1 Win=29200 Len=0 MSS=1460 SACK_PERM=1 WS=128
27	12:58:13.835586	192.168.0.107	128.119.245.12	TCP	54	23081→80 [ACK] Seq=1 Ack=1 Win=65536 Len=0
28	12:58:13.835944	128.119.245.12	192.168.0.107	TCP	60	80→23080 [FIN, ACK] Seq=1 Ack=2 Win=229 Len=0
29	12:58:13.836165	192.168.0.107	128.119.245.12	TCP	54	23080→80 [ACK] Seq=2 Ack=2 Win=256 Len=0
30	12:58:13.839383	192.168.0.107	128.119.245.12	TCP	707	[TCP segment of a reassembled PDU]
31	12:58:13.839520	192.168.0.107	128.119.245.12	TCP	8246	[TCP segment of a reassembled PDU]
32	12:58:13.839638	192.168.0.107	128.119.245.12	TCP	4434	[TCP segment of a reassembled PDU]
35	12:58:14.089604	128.119.245.12	192.168.0.107	TCP	60	80→23081 [ACK] Seq=1 Ack=654 Win=30592 Len=0
36	12:58:14.089781	192.168.0.107	128.119.245.12	TCP	1514	[TCP segment of a reassembled PDU]
37	12:58:14.090496	128.119.245.12	192.168.0.107	TCP	60	80→23081 [ACK] Seq=1 Ack=2114 Win=33536 Len=0
38	12:58:14.090498	128.119.245.12	192.168.0.107	TCP	60	80→23081 [ACK] Seq=1 Ack=3574 Win=36352 Len=0
39	12:58:14.090498	128.119.245.12	192.168.0.107	TCP	60	80→23081 [ACK] Seq=1 Ack=6024 Win=30206 Len=0

Sequence number: 654 (relative sequence number)
 [Next sequence number: 8846 (relative sequence number)]
 Acknowledgment number: 1 (relative ack number)
 Header Length: 20 bytes
 Flags: 0x018 (PSH, ACK)
 Window size value: 256
 [Calculated window size: 65536]
 [Window size scaling factor: 256]
 Checksum: 0x369e [unverified]
 [Checksum Status: Unverified]
 Urgent pointer: 0
 [SEQ/ACK analysis]
 [Reassembled PDU in frame: 85]
 TCP segment data (8192 bytes)

0030 01 00 36 9e 00 00 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 69 42 ...tFormBo undaryiB
 0050 54 6d 53 51 43 69 4b 6f 67 41 65 4c 61 66 0d 0a ...TmSQCiKo gAeLaF..
 0060 43 6f 6e 74 65 6e 74 2d 44 69 73 70 6f 73 69 74 ...Content- Disposit
 0070 69 6f 6e 3a 20 66 6f 72 6d 2d 64 61 74 61 3b 20 ...ion: for m-data;
 0080 6e 61 6d 65 3d 22 66 69 6c 65 22 3b 20 66 69 6c ...name="fi le"; fil

Details at: http://www.wireshark.org/docs/wsug_html_chunked/ChAdvChecksums.html (tcp.checksum), 2 bytes

Packets: 123 · Displayed: 115 (93.5%) · Load time: 0:0.4 Profile: Default

3c.pcapng

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tcp

No.	Time	Source	Destination	Protocol	Length	Info
24	12:58:13.585045	192.168.0.107	128.119.245.12	TCP	54	23080→80 [FIN, ACK] Seq=1 Ack=1 Win=256 Len=0
25	12:58:13.585953	192.168.0.107	128.119.245.12	TCP	66	23081→80 [SYN] Seq=0 Win=8192 Len=0 MSS=1460 WS=256 SACK_PERM=1
26	12:58:13.835417	128.119.245.12	192.168.0.107	TCP	66	80→23081 [SYN, ACK] Seq=0 Ack=1 Win=29200 Len=0 MSS=1460 SACK_PERM=1 WS=128
27	12:58:13.835586	192.168.0.107	128.119.245.12	TCP	54	23081→80 [ACK] Seq=1 Ack=1 Win=65536 Len=0
28	12:58:13.835944	128.119.245.12	192.168.0.107	TCP	60	80→23080 [FIN, ACK] Seq=1 Ack=2 Win=229 Len=0
29	12:58:13.836165	192.168.0.107	128.119.245.12	TCP	54	23080→80 [ACK] Seq=2 Ack=2 Win=256 Len=0
30	12:58:13.839383	192.168.0.107	128.119.245.12	TCP	707	[TCP segment of a reassembled PDU]
31	12:58:13.839520	192.168.0.107	128.119.245.12	TCP	8246	[TCP segment of a reassembled PDU]
32	12:58:13.839638	192.168.0.107	128.119.245.12	TCP	4434	[TCP segment of a reassembled PDU]
35	12:58:14.089604	128.119.245.12	192.168.0.107	TCP	60	80→23081 [ACK] Seq=1 Ack=654 Win=30592 Len=0
36	12:58:14.089781	192.168.0.107	128.119.245.12	TCP	1514	[TCP segment of a reassembled PDU]
37	12:58:14.090496	128.119.245.12	192.168.0.107	TCP	60	80→23081 [ACK] Seq=1 Ack=2114 Win=33536 Len=0
38	12:58:14.090498	128.119.245.12	192.168.0.107	TCP	60	80→23081 [ACK] Seq=1 Ack=3574 Win=36352 Len=0
39	12:58:14.090498	128.119.245.12	192.168.0.107	TCP	60	80→23081 [ACK] Seq=1 Ack=5024 Win=30706 Len=0

Sequence number: 8846 (relative sequence number)
[Next sequence number: 13226 (relative sequence number)]
Acknowledgment number: 1 (relative ack number)
Header Length: 20 bytes
> Flags: 0x010 (ACK)
Window size value: 256
[Calculated window size: 65536]
[Window size scaling factor: 256]
Checksum: 0x369e [unverified]
[Checksum Status: Unverified]
Urgent pointer: 0
> [SEQ/ACK analysis]
[Reassembled PDU in frame: 85]
TCP segment data (4380 bytes)

0030 01 00 36 9e 00 00 74 6f 20 64 6f 20 54 48 41 54 ..6..to do THAT
0040 20 69 6e 20 61 20 68 75 72 72 79 2e 20 20 60 4e in a hu rry. `N
0050 6f 2c 20 49 27 6c 6c 20 6c 6f 6f 6b 0d 0a 66 69 o, I'll look..fi
0060 72 73 74 2c 27 20 73 68 65 20 73 61 69 64 2c 20 rst,' sh e said,
0070 60 61 6e 64 20 73 65 65 20 77 68 65 74 68 65 72 `and see whether
0080 20 69 74 27 73 20 6d 61 72 6b 65 64 20 22 70 6f it's ma rked "po

Details at: [http://www.wireshark.org/docs/wsug_html_chunked/ChAdvChecksums.html\(tcp.checksum\), 2 bytes](http://www.wireshark.org/docs/wsug_html_chunked/ChAdvChecksums.html(tcp.checksum), 2 bytes)

Packets: 123 · Displayed: 115 (93.5%) · Load time: 0:0.4

Profile: Default