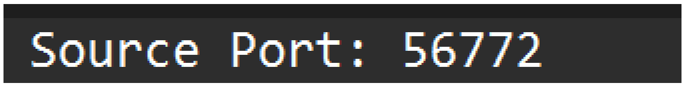
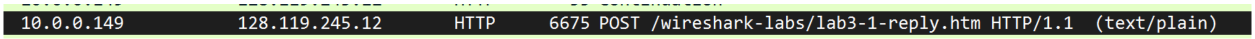
CSCI 156 TCP Lab

1. The source address is 10.0.0.149, and the source port is 56772.

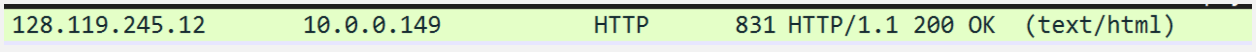


```
Source Port: 56772
```

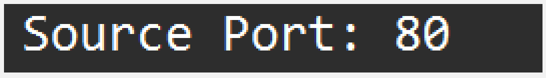


```
10.0.0.149          128.119.245.12       HTTP      6675 POST /wireshark-labs/lab3-1-reply.htm HTTP/1.1  (text/plain)
```

2. The address of gaia.cs.umass.edu is 128.119.245.12, which can be found all the way on the left. It is sending and receiving TCP segments on port 80.



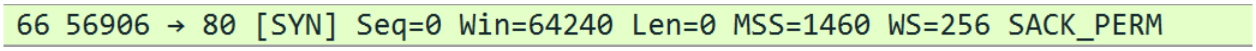
```
128.119.245.12       10.0.0.149          HTTP       831 HTTP/1.1 200 OK  (text/html)
```



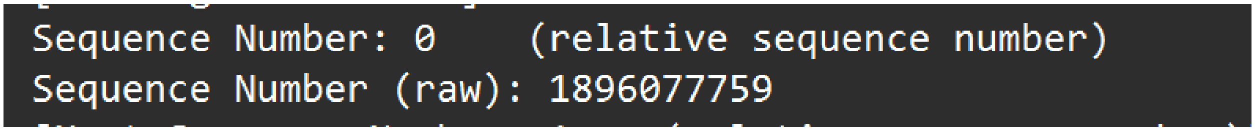
```
Source Port: 80
```

3. Same as question number 1. Source address: 10.0.0.149, Source port: 56772.

4. 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 is:

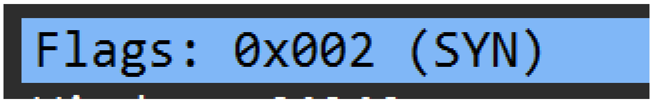


```
66 56906 → 80 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 WS=256 SACK_PERM
```

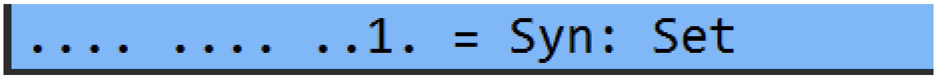


```
Sequence Number: 0    (relative sequence number)
Sequence Number (raw): 1896077759
```

We know it is a SYN segment if the SYN flag is set.

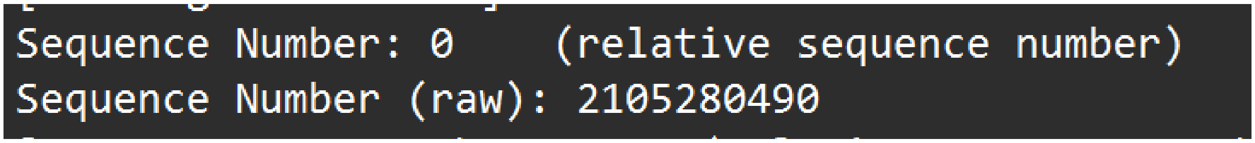


```
Flags: 0x002 (SYN)
```



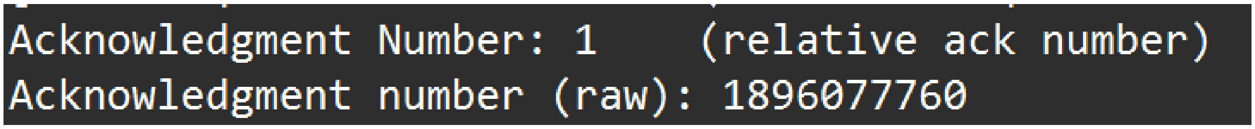
```
.... .... ..1. = Syn: Set
```

5. This is the sequence number for the SYNACK:



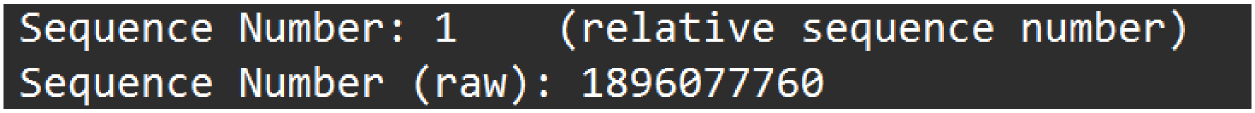
```
Sequence Number: 0    (relative sequence number)
Sequence Number (raw): 2105280490
```

The value for the acknowledgement field is:



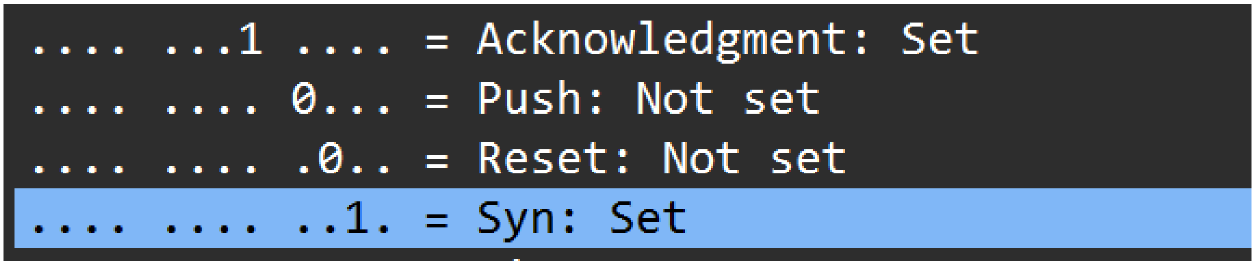
```
Acknowledgment Number: 1    (relative ack number)
Acknowledgment number (raw): 1896077760
```

The value for the acknowledgement field for the SYNACK is determined by the sequence number of the next ACK segment. We can see that they have the same number.



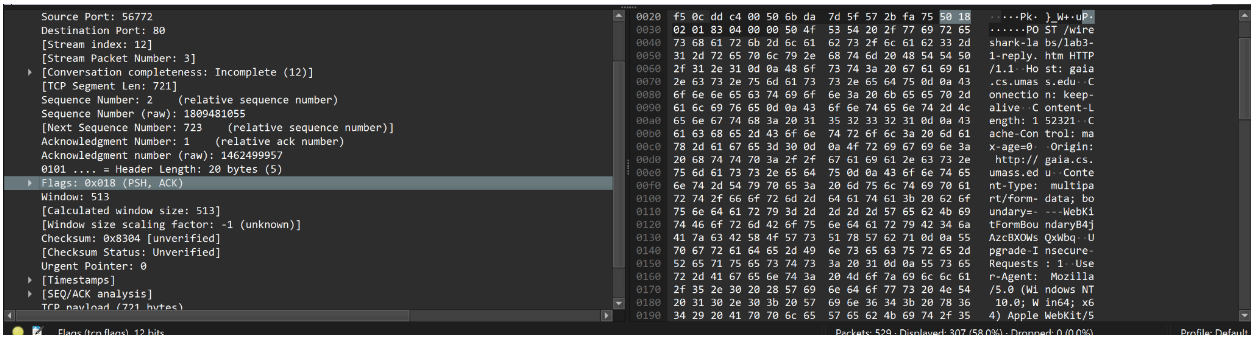
```
Sequence Number: 1    (relative sequence number)
Sequence Number (raw): 1896077760
```

The segment that identifies the segment as a SYNACK segment is when the SYN and ACK flag are both set.



```
.... ...1 .... = Acknowledgment: Set
.... .... 0... = Push: Not set
.... .... .0.. = Reset: Not set
.... .... ..1. = Syn: Set
```

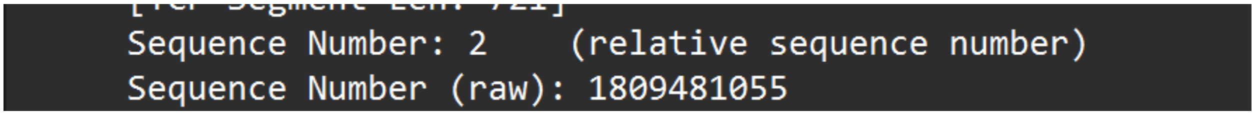
6. The sequence number of the TCP segment containing the HTTP POST command is:



```
    Source Port: 56772
    Destination Port: 80
    [Stream index: 12]
    [Stream Packet Number: 3]
  ▸ [Conversation completeness: Incomplete (12)]
    [TCP Segment Len: 721]
    Sequence Number: 2    (relative sequence number)
    Sequence Number (raw): 1809481055
    [Next Sequence Number: 723    (relative sequence number)]
    Acknowledgment Number: 1    (relative ack number)
    Acknowledgment number (raw): 1462499957
    0101 .... = Header Length: 20 bytes (5)
  ▸ Flags: 0x018 (PSH, ACK)
    Window: 513
    [Calculated window size: 513]
    [Window size scaling factor: -1 (unknown)]
    Checksum: 0x8304 [unverified]
    [Checksum Status: Unverified]
    Urgent Pointer: 0
  ▸ [Timestamps]
  ▸ [SEQ/ACK analysis]
    TCP payload (721 bytes)
```

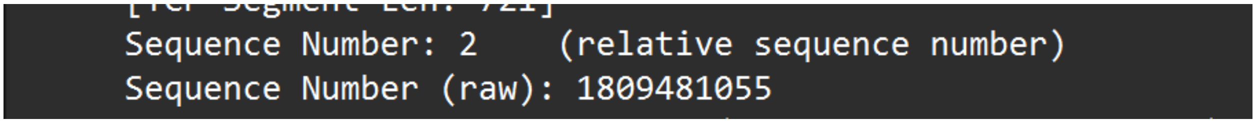
```
0020  f5 0c dd c4 00 50 6b da  7d 5f 57 2b fa 75 50 18   ·····Pk· }_W+·uP·
0030  02 01 83 04 00 00 50 4f  53 54 20 2f 77 69 72 65   ······PO ST /wire
0040  73 68 61 72 6b 2d 6c 61  62 73 2f 6c 61 62 33 2d   shark-la bs/lab3-
0050  31 2d 72 65 70 6c 79 2e  68 74 6d 20 48 54 54 50   1-reply. htm HTTP
0060  2f 31 2e 31 0d 0a 48 6f  73 74 3a 20 67 61 69 61   /1.1··Ho st: gaia
0070  2e 63 73 2e 75 6d 61 73  73 2e 65 64 75 0d 0a 43   .cs.umas s.edu··C
0080  6f 6e 6e 65 63 74 69 6f  6e 3a 20 6b 65 65 70 2d   onnectio n: keep-
0090  61 6c 69 76 65 0d 0a 43  6f 6e 74 65 6e 74 2d 4c   alive··C ontent-L
00a0  65 6e 67 74 68 3a 20 31  35 32 33 32 31 0d 0a 43   ength: 1 52321··C
00b0  61 63 68 65 2d 43 6f 6e  74 72 6f 6c 3a 20 6d 61   ache-Con trol: ma
00c0  78 2d 61 67 65 3d 30 0d  0a 4f 72 69 67 69 6e 3a   x-age=0· ·Origin:
00d0  20 68 74 74 70 3a 2f 2f  67 61 69 61 2e 63 73 2e    http:// gaia.cs.
00e0  75 6d 61 73 73 2e 65 64  75 0d 0a 43 6f 6e 74 65   umass.ed u··Conte
00f0  6e 74 2d 54 79 70 65 3a  20 6d 75 6c 74 69 70 61   nt-Type:  multipa
0100  72 74 2f 66 6f 72 6d 2d  64 61 74 61 3b 20 62 6f   rt/form- data; bo
0110  75 6e 64 61 72 79 3d 2d  2d 2d 2d 57 65 62 4b 69   undary=- ---WebKi
0120  74 46 6f 72 6d 42 6f 75  6e 64 61 72 79 42 34 6a   tFormBou ndaryB4j
0130  41 7a 63 42 58 4f 57 73  51 78 57 62 71 0d 0a 55   AzcBXOWs QxWbq··U
0140  70 67 72 61 64 65 2d 49  6e 73 65 63 75 72 65 2d   pgrade-I nsecure-
0150  52 65 71 75 65 73 74 73  3a 20 31 0d 0a 55 73 65   Requests : 1··Use
0160  72 2d 41 67 65 6e 74 3a  20 4d 6f 7a 69 6c 6c 61   r-Agent:  Mozilla
0170  2f 35 2e 30 20 28 57 69  6e 64 6f 77 73 20 4e 54   /5.0 (Wi ndows NT
0180  20 31 30 2e 30 3b 20 57  69 6e 36 34 3b 20 78 36    10.0; W in64; x6
0190  34 29 20 41 70 70 6c 65  57 65 62 4b 69 74 2f 35   4) Apple WebKit/5
```

Flags (tcp.flags), 12 bits
Packets: 529 · Displayed: 307 (58.0%) · Dropped: 0 (0.0%)
Profile: Default

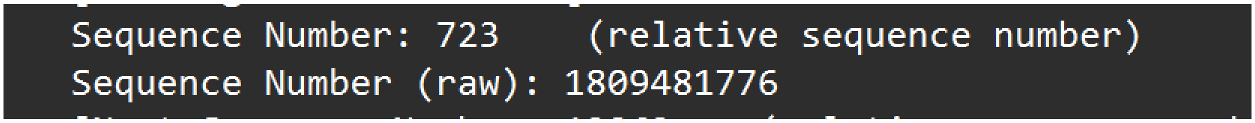


```
[TCP Segment Len: 721]
Sequence Number: 2    (relative sequence number)
Sequence Number (raw): 1809481055
```

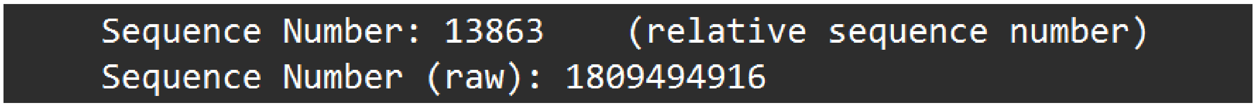
7. The first six sequence numbers are:



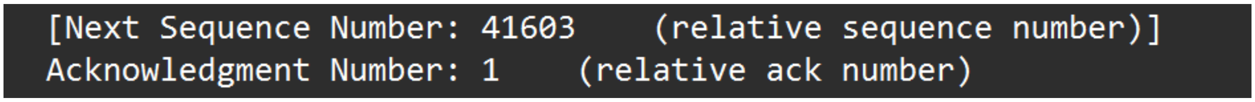
```
[TCP Segment Len: 721]
Sequence Number: 2    (relative sequence number)
Sequence Number (raw): 1809481055
```



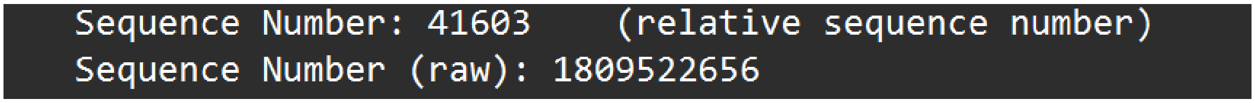
```
Sequence Number: 723    (relative sequence number)
Sequence Number (raw): 1809481776
```



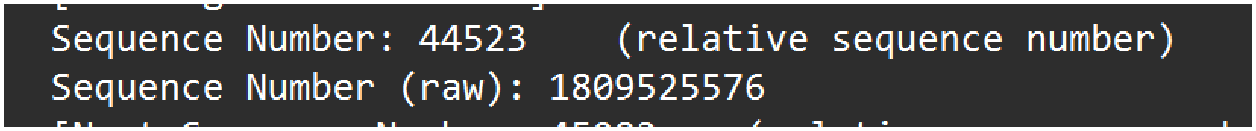
```
Sequence Number: 13863    (relative sequence number)
Sequence Number (raw): 1809494916
```



```
[Next Sequence Number: 41603    (relative sequence number)]
Acknowledgment Number: 1    (relative ack number)
```

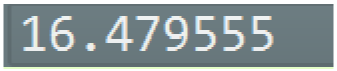


```
 Sequence Number: 41603    (relative sequence number)
 Sequence Number (raw): 1809522656
```

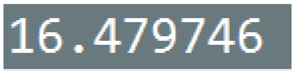


```
Sequence Number: 44523    (relative sequence number)
Sequence Number (raw): 1809525576
```

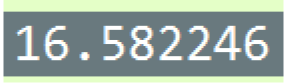
Time sent is as follows:



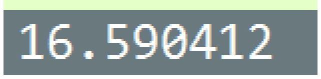
16.479555



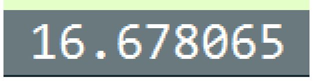
16.479746



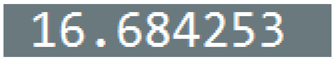
16.582246



16.590412

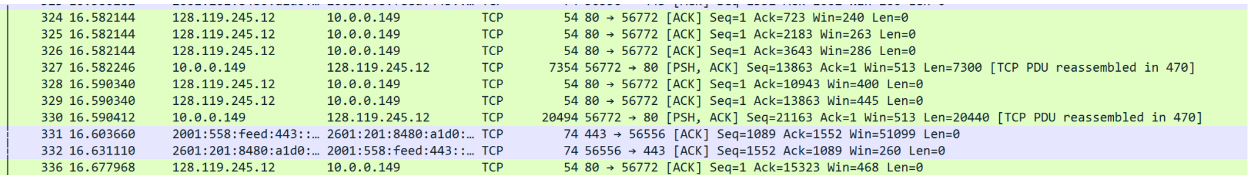


16.678065



16.684253

The times for when the ACK are received:



```
324 16.582144   128.119.245.12      10.0.0.149          TCP      54 80 → 56772 [ACK] Seq=1 Ack=723 Win=240 Len=0
325 16.582144   128.119.245.12      10.0.0.149          TCP      54 80 → 56772 [ACK] Seq=1 Ack=2183 Win=263 Len=0
326 16.582144   128.119.245.12      10.0.0.149          TCP      54 80 → 56772 [ACK] Seq=1 Ack=3643 Win=286 Len=0
327 16.582246   10.0.0.149          128.119.245.12      TCP    7354 56772 → 80 [PSH, ACK] Seq=13863 Ack=1 Win=513 Len=7300 [TCP PDU reassembled in 470]
328 16.590340   128.119.245.12      10.0.0.149          TCP      54 80 → 56772 [ACK] Seq=1 Ack=10943 Win=400 Len=0
329 16.590340   128.119.245.12      10.0.0.149          TCP      54 80 → 56772 [ACK] Seq=1 Ack=13863 Win=445 Len=0
330 16.590412   10.0.0.149          128.119.245.12      TCP   20494 56772 → 80 [PSH, ACK] Seq=21163 Ack=1 Win=513 Len=20440 [TCP PDU reassembled in 470]
331 16.603660   2001:558:feed:443::… 2601:201:8480:a1d0:… TCP     74 443 → 56556 [ACK] Seq=1089 Ack=1552 Win=51099 Len=0
332 16.631110   2601:201:8480:a1d0:… 2001:558:feed:443::… TCP     74 56556 → 443 [ACK] Seq=1552 Ack=1089 Win=260 Len=0
336 16.677968   128.119.245.12      10.0.0.149          TCP      54 80 → 56772 [ACK] Seq=1 Ack=15323 Win=468 Len=0
```

The RTT is as follows:

- 0.103
- 0.103
- 0
- 0
- 0.088
- 0.007

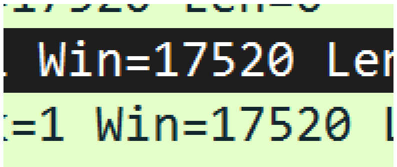
The Estimated RTT values for each segment are as follows:

- 1. 0.103

- 2. 0.103
- 3. 0.090125
- 4. 0.078859375
- 5. 0.080001953125
- 6. 0.070876708984375

8. The length of the first 6 TCP segments are:
   - 565
   - 1460
   - 1460
   - 1460
   - 1460
   - 1460

9. The minimum is 17520 bytes.



```
17520 Len=0
 Win=17520 Len
=1 Win=17520 L
```

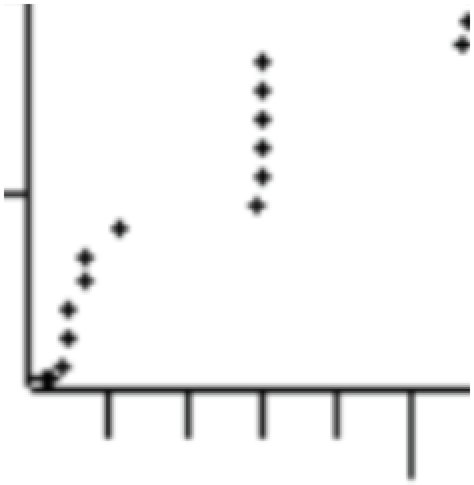
It should not throttle the sender because the segment length is less than the receiver window.

10. There are no retransmitted segments. I checked the behavior of the sequence numbers, since they kept increasing without any repeating values, that means there was never an occurrence of a retransmitted segment.

11. the receiver typically acknowledges 1460 bytes in an ACK. I was not able to find any cases where The receiver was ACKing every other segment.

12. The throughput is 31,262.1926 bytes/second. I calculated this by taking the first segment and the last segment and subtracting them to get 164090 bytes.
    - The transmission time for the first segment is 0.026s
    - The transmission time for the last segment is 5.456s
    - The difference between the two values is: 5.429s
    - Therefore the throughput is: 164090 / 5.429 = 31,262.1926 bytes/second

13. It looks like starstart is from 0 seconds to 0.15 seconds and from 0-10,000 on the sequence number. It Would appear that congestion avoidance takes over at 0.3 seconds and starts at 10,000 for sequence.



14. Same as question 13.