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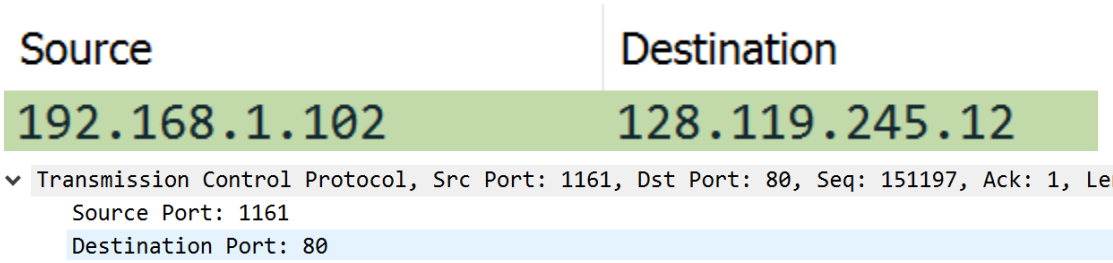
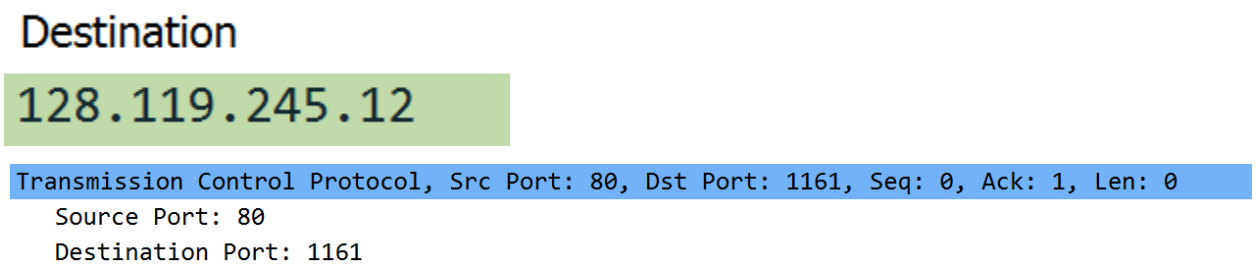
CSE 353
Lab3

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.



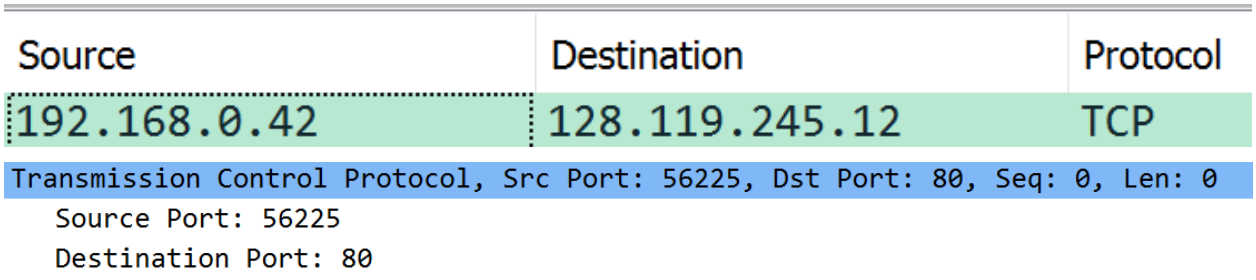
The client IP address is 192.168.1.102, TCP port number is 1161

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?



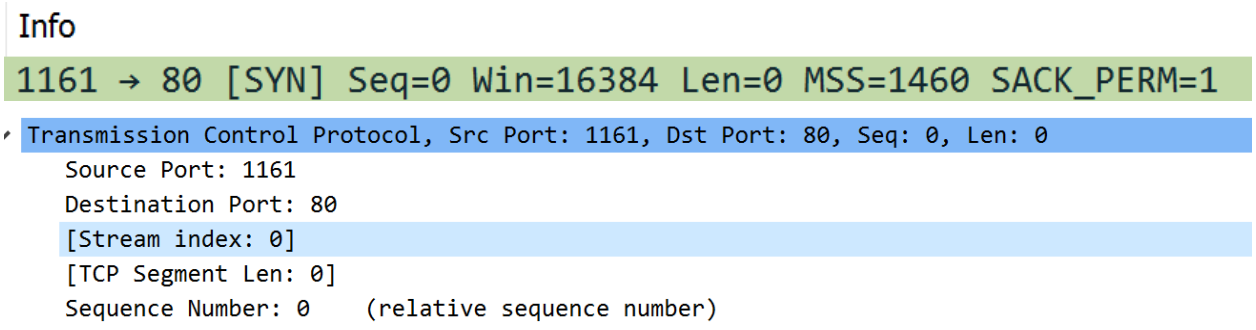
Gaia's IP address is 128.119.245.12, TCP port number is 80

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?



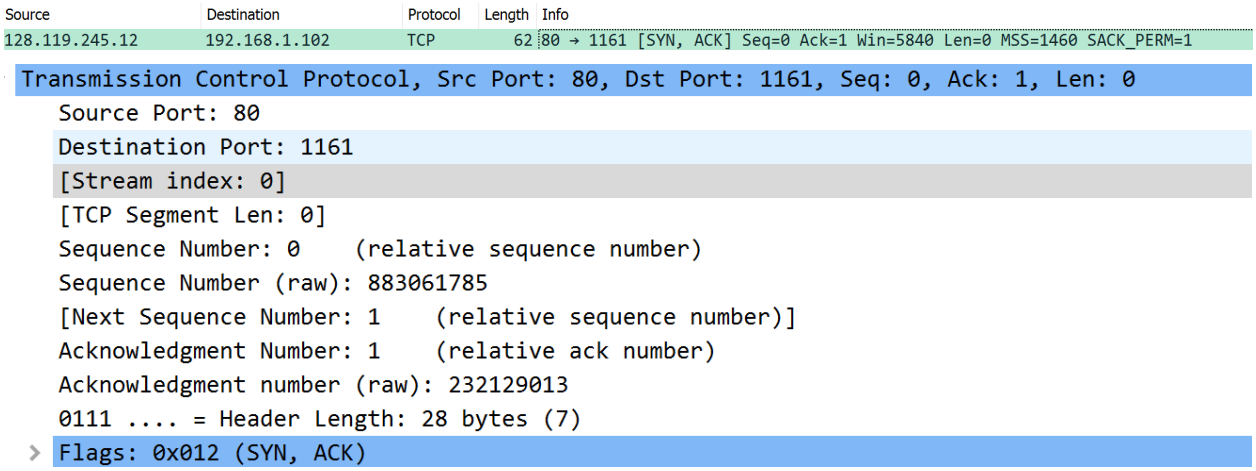
My IP address is 192.168.0.42, TCP port number is 56225

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 is 0 because it's used to imitate the TCP connection.

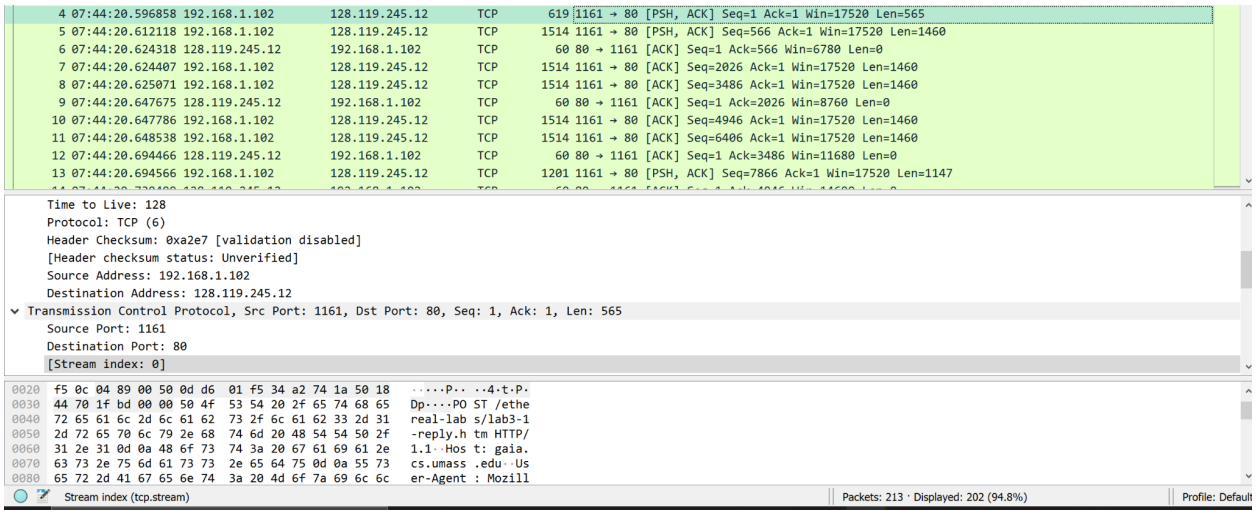
5. What is the sequence number of the SYNACK segment sent by gaia.cs.umass.edu to the client computer in reply to the SYN? What is the value of the Acknowledgement field in the SYNACK segment? How did gaia.cs.umass.edu determine that value? What is it in the segment that identifies the segment as a SYNACK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

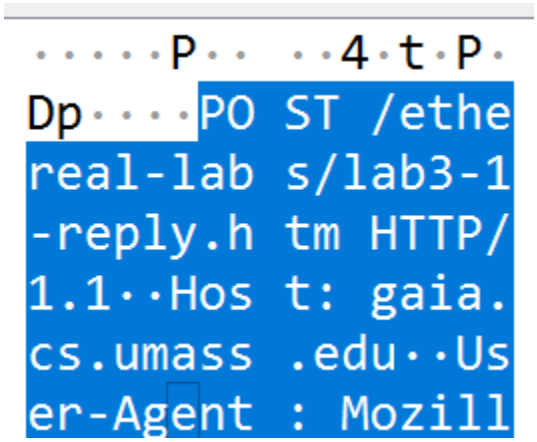


The sequence number of the SYN_ACK segment sent by gaia.cs.umass.edu to the client in reply to the SYN is 0.
The acknowledgement field in the SYN_ACK segment is made by the server at gaia.cs.umass.edu.
The server adds 1 to the sequence number of the SYN segment from the client.
In our example, the sequence number of the SYN segment from the client is 0
So 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 the SYN flag and the ACK flag in the segment are set to 1.

6. What is the sequence number of the TCP segment containing the HTTP POST command? Note that in order to find the POST command, you'll need to dig into

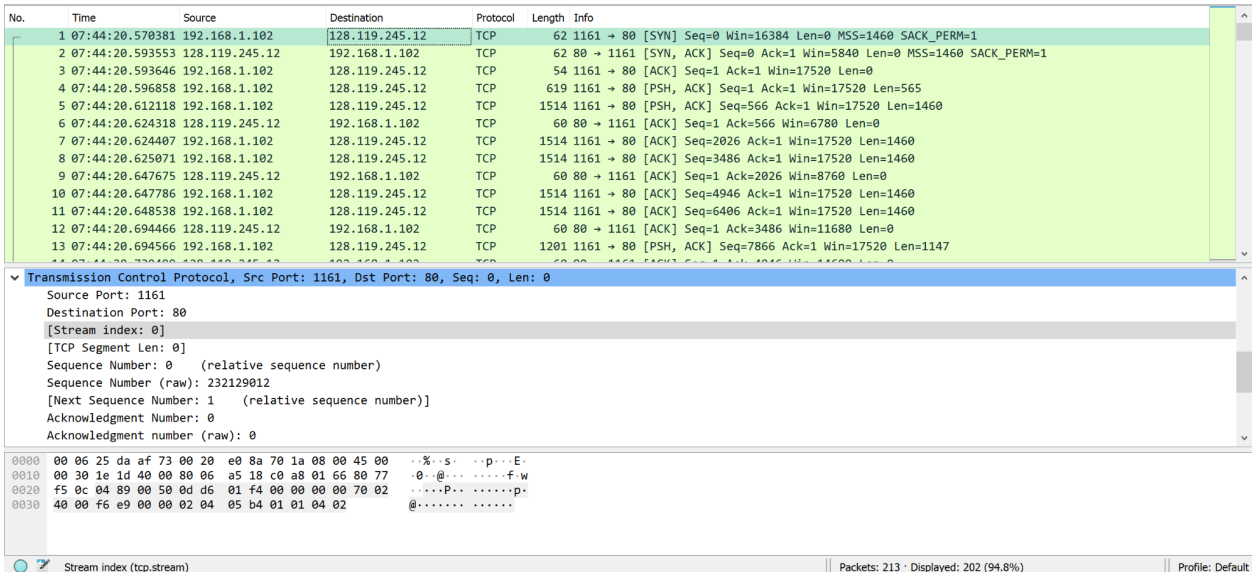
the packet content field at the bottom of the Wireshark window, looking for a segment with a “POST” within its DATA field.

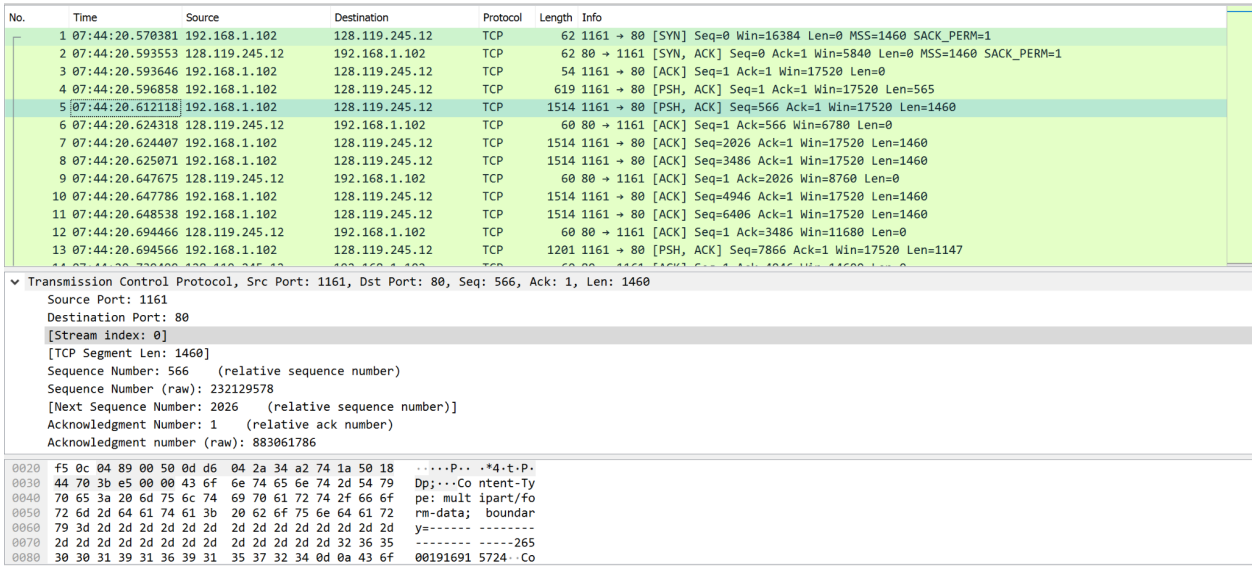




The sequence number of the TCP segment containing the Post is 1.

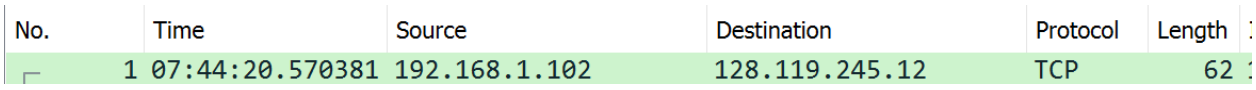
7. Consider the TCP segment containing the HTTP POST as the first segment in the TCP connection. What are the sequence numbers of the first six segments in the TCP connection (including the segment containing the HTTP POST)?

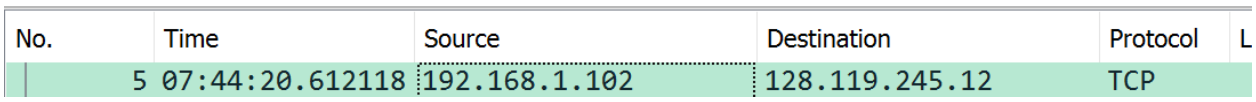




Sequence number for segment 1 is 1, sequence number for segment 2 is 566.

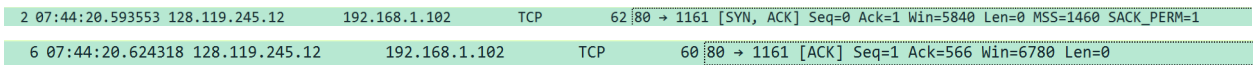
At what time was each segment sent?





7:44:20.570381 for segment 1 and 7:44:20.612118 for segment 2.

When was the ACK for each segment received?



ACK for segment 1 was received at 7:44:20.593553 and ACK for segment 2 was received at 7:44:20.624318.

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?

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

```
> [Timestamps]
  TCP payload (565 bytes)
  [Reassembled PDU in frame: 199]
  TCP segment data (565 bytes)
```

```
20  f5 0c 04 89 00 50 0d d6  01 f5 34 a2 74 1a 50 18   ·····P·· ··4·t·P·
30  44 70 1f bd 00 00 50 4f  53 54 20 2f 65 74 68 65   Dp····PO ST /ethe
40  72 65 61 6c 2d 6c 61 62  73 2f 6c 61 62 33 2d 31   real-lab s/lab3-1
50  2d 72 65 70 6c 79 2e 68  74 6d 20 48 54 54 50 2f   -reply.h tm HTTP/
60  31 2e 31 0d 0a 48 6f 73  74 3a 20 67 61 69 61 2e   1.1··Hos t: gaia.
70  63 73 2e 75 6d 61 73 73  2e 65 64 75 0d 0a 55 73   cs.umass .edu··Us
80  65 72 2d 41 67 65 6e 74  3a 20 4d 6f 7a 69 6c 6c   er-Agent : Mozill
```

1st segment is 565 bytes

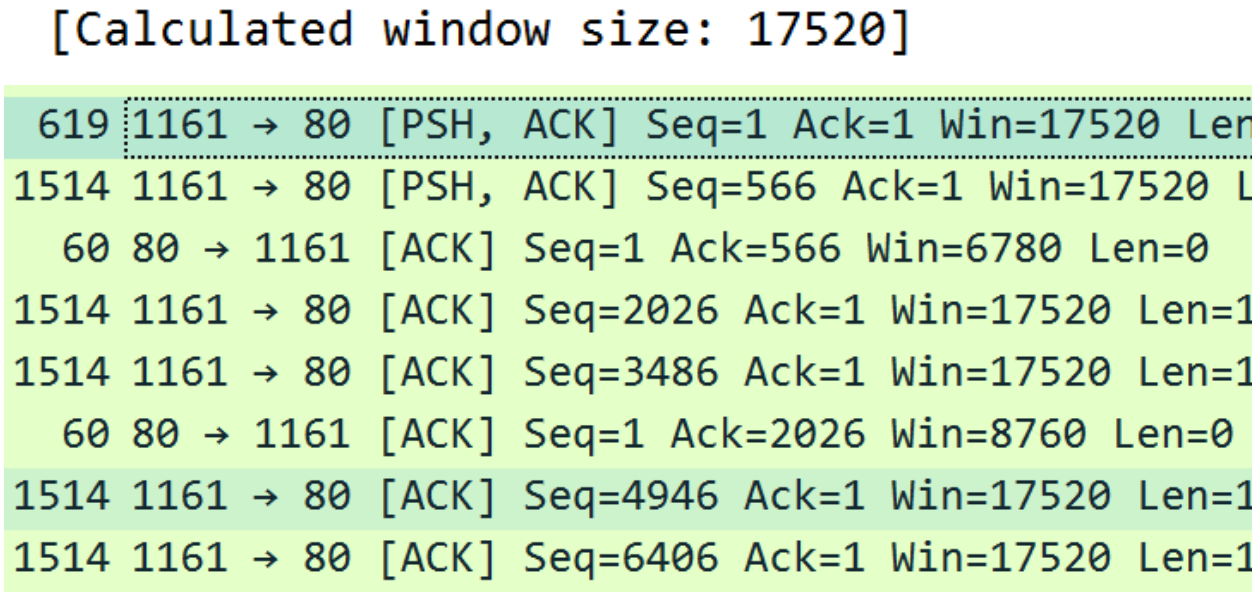
```
    [Calculated window size: 17520]
    [Window size scaling factor: -2 (no window scaling used)]
    Checksum: 0x3be5 [unverified]
    [Checksum Status: Unverified]
    Urgent Pointer: 0
  > [SEQ/ACK analysis]
  > [Timestamps]
    TCP payload (1460 bytes)
    [Reassembled PDU in frame: 199]
    TCP segment data (1460 bytes)
```

2nd segment is 1460 bytes

```
    [Calculated window size: 17520]
    [Window size scaling factor: -2 (no window scaling used)]
    Checksum: 0xb98e [unverified]
    [Checksum Status: Unverified]
    Urgent Pointer: 0
  > [SEQ/ACK analysis]
  > [Timestamps]
    TCP payload (1460 bytes)
    [Reassembled PDU in frame: 199]
    TCP segment data (1460 bytes)
```

3rd is 1460 bytes…
Each segment after this is of the same size,
So segments 4-6 are 1460 bytes.

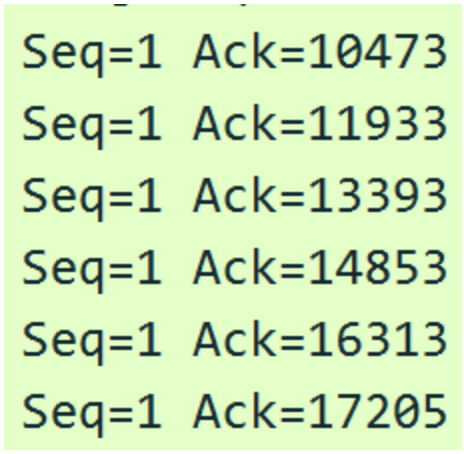
9. What is the minimum amount of available buffer space advertised at the received for the entire trace? Does the lack of receiver buffer space ever throttle the sender?



The minimum amount of available buffer space advertised at the received is 17520 bytes.

10. Are there any retransmitted segments in the trace file? What did you check for (in the trace) in order to answer this question?
There aren't any retransmitted segments in the trace file. I checked for this by looking for packets with the same sequence number found at different times.

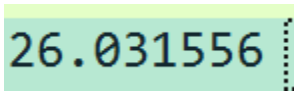
11. How much data does the receiver typically acknowledge in an ACK? Can you identify cases where the receiver is ACKing every other received segment (see Table 3.2 on page 250 in the text).



According to the screenshot, we can see that the ACK numbers increase in the sequence of 10473, 11933, 13393....
The ACK number increases by 1400 each time, which shows that the receiver is acknowledging 1400 bytes.

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

Throughput = Size of Data / Time
Size of Data = 150,965 bytes
Time =26.031556 - 20.596858 = 5.434698sec
Throughput = 150,965 / 5.434698
=27777 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.

14. Answer each of two questions above for the trace that you have gathered when you transferred a file from your computer to gaia.cs.umass.edu