Text, letter

Description automatically generated

A black and white document

Description automatically generated with low confidence

A picture containing text, document

Description automatically generated

Table

Description automatically generated with medium confidence

Diagram, letter

Description automatically generated

Text, letter

Description automatically generated

A picture containing text, document, screenshot

Description automatically generated

Wireshark lab

1.

Graphical user interface, text, application, email

Description automatically generated

2.

Graphical user interface, text, application, email

Description automatically generated

3.

Graphical user interface, application, table

Description automatically generated

4.

Graphical user interface, text, application

Description automatically generated

The message has flag SYN, sequence number 0

5.

Graphical user interface, text, application, email

Description automatically generated

The value of the acknowledgement field is 1. This value is calculated by adding 1 to the initial sequence number

The message has flags SYN ACK

6.

Graphical user interface, text, application, email

Description automatically generated

7.

Table

Description automatically generated with medium confidence

Table

Description automatically generatedA picture containing timeline

Description automatically generated

8.

Table

Description automatically generated with medium confidence

The length of the first TCP segment is 565 bytes, the length of all the other segment is 1460 bytes

9.

Graphical user interface

Description automatically generated with medium confidence

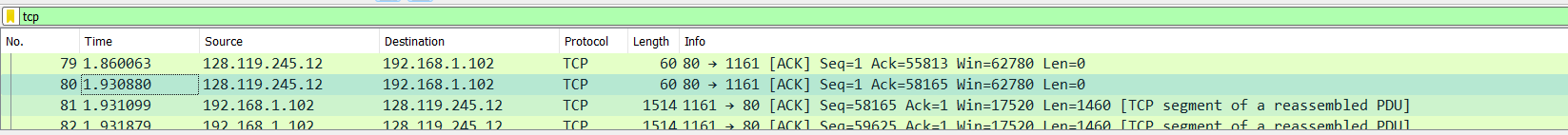
The minimum amount of available buffer space advertised is 17520. The sender is never throttled due to lacking receiver buffer space.

10.

There were no segments retransmitted, this can be seen by the fact that an old ACK number was never resent to re-request previous packets. This can also be seen in the behavior in the graph on question 13

11.

The difference between the ACK sequence numbers of two consecutive ACKS shows the data that the server receives between these 2 ACKs. There are some cases where the receiver ACK every other segment. If we look at segment 80 we can clearly see ACK data with 2920 bytes = 1460 \* 2 bytes



12.

The total amount data transmitted can be computed by the difference

between the sequence number of the first TCP segment (i.e. 1 byte for No. 4 segment)

and the acknowledged sequence number of the last ACK (164091 bytes for No. 202

segment). Therefore, the total data are 164091 - 1 = 164090 bytes. The whole

transmission time is the difference of the time instant of the first TCP segment (i.e.,

0.026477 second for No.4 segment) and the time instant of the last ACK (i.e., 5.455830

second for No. 202 segment). Therefore, the total transmission time is 5.455830 -

0.026477 = 5.4294 seconds. Hence, the throughput for the TCP connection is computed

as 164090/5.4294 = 30.222 KByte/sec

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0.026477 = 5.4294 seconds. Hence, the throughput for the TCP connection is computed

as 164090/5.4294 = 30.222 KByte/sec

The total amount of data transmitted can be computed by the difference between the sequence number of the first TCP segment and the acknowledged sequence number of the last ACK.

Last:



total amount of data transmitted: 164091 - 1 = 164090 bytes

The transmission time is the difference between the instant time of the first TCP segment and instant time of the last ACK

Transmission time: 5.455830 – 0.026477 = 5.4294 seconds

Throughput for the TCP connection is 164090 / 5.4294 = 30.222 Kbyte/sec

13.

Chart

Description automatically generated

Slow start: first one and half milliseconds

Congestion avoidance: all the straight vertical lines (0.3, 0.55, 0.85 1.1, 1.35, …)

The measured data differs from the idealized behavior of TCP that we have studied in the text since the plotted graph is more uneven, and we also have perfectly vertical lines that are presented as more gradual lines in the book.

14.

The following answers are based on a file I transferred from my computer to gaia.cs.umass.edu

Calculating throughput:

Graphical user interface, text, application

Description automatically generated



total amount of data transmitted: 2458318- 1 = 2458317 bytes

Transmission time: 4.446772 – 2.672151 = 1.774621 seconds

Throughput for the TCP connection is 164090 / 5.4294 = 1385.263 Kbyte/sec Chart, line chart

Description automatically generated

Slow start: no slow start seen

Congestion avoidance: all the straight vertical lines

Compared to the example from the book this case doesn’t present slow start and it also differs by having perfect straight lines for congestion avoidance, instead of more gradual lines like the graph present in the book