1.

IP: 192.168.0.110

TCP port: 61323

2.

IP: 128.119.245.12

TCP port: 80

3.

IP: 142.250.200.78

TCP port: 443

4.

TCP SYN value is 0.

5.

SYNACK value is 0.

ACK value is 1.

Value is set by gaia.cs… by adding 1 to SYN segment from client computer.

The SYN and ACK flag is set to 0.

6.

Number 4 is the TCP segment containing the HTTP POST command.

7.

Segment 1 sequence number: 1

Segment 2 sequence number: 566

Segment 3 sequence number: 2026

Segment 4 sequence number: 3486

Segment 5 sequence number: 4946

Segment 6 sequence number: 6406

Segment – Sent time ACK received time – RTT

1 – 0.026477 – 0.053937 – 0.02746

2 – 2 0.041737 – 0.077294 – 0.035557

3 – 0.054026 – 0.124085 – 0.070059

4 – 0.054690 – 0.169118 – 0.11443

5 – 0.077405 – 0.217299 – 0.13989

6 – 0.078157 – 0.267802 – 0.18964

8.

Length = 565 bytes.

9.

Minimum = 5840 bytes. The sender is never throttled.

10.

There are no retransmitted segments in the trace file. We can verify this by checking the sequence numbers of the TCP segments in the trace file. In the TimeSequence-Graph (Stevens) of this trace, all sequence numbers from the source (192.168.0.110) to the destination (128.119.245.12) are increasing monotonically with respect to time. If there is a retransmitted segment, the sequence number of this retransmitted segment should be smaller than those of its neighboring segments.

11.

The difference between the acknowledged sequence numbers of two consecutive ACKs indicates the data received by the server between these two ACKs. By inspecting the amount of acknowledged data by each ACK, there are cases where the receiver is ACKing every other segment. For example, segment of No. 80 acknowledged data with 2920 bytes = 1460*2 bytes.

12.

The computation of TCP throughput largely depends on the selection of averaging time period. As a common throughput computation, in this question, we select the average time period as the whole connection time. Then, the average throughput for this TCP connection is computed as the ratio between the total amount data and the total transmission time. 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

13.

14.