21BCE7371

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CN LAB ASSIGNMENT-10

ANS-6

No. 4 segment is the TCP segment containing the HTTP POST command. The sequence number of this segment has the value of 1.
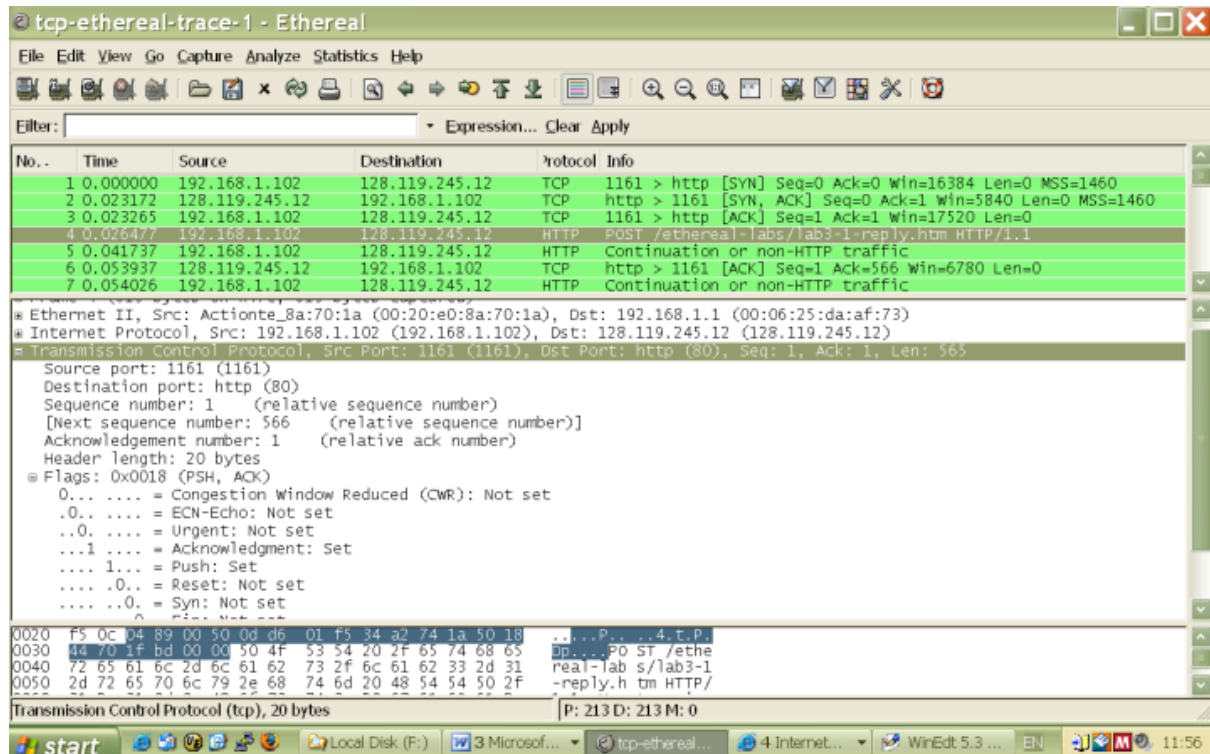

Figure 4: Sequence number of the TCP segment containing the HTTP POST command

ANS-7

The HTTP POST segment is considered as the first segment. Segments 1 – 6
are No. 4, 5, 7, 8, 10, and 11 in this trace respectively. The ACKs of segments 1 – 6 are
No. 6, 9, 12, 14, 15, and 16 in this trace.
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
The sending time and the received time of ACKs are tabulated in the following table.
Sent time ACK received time RTT (seconds)

	Sent time	ACK received time	RTT (seconds)
Segment 1	0.026477	0.053937	0.02746
Segment 2	0.041737	0.077294	0.035557
Segment 3	0.054026	0.124085	0.070059
Segment 4	0.054690	0.169118	0.11443
Segment 5	0.077405	0.217299	0.13989
Segment 6	0.078157	0.267802	0.18964

EstimatedRTT = 0.875 * EstimatedRTT + 0.125 * SampleRTT
EstimatedRTT after the receipt of the ACK of segment 1:
EstimatedRTT = RTT for Segment 1 = 0.02746 second
EstimatedRTT after the receipt of the ACK of segment 2:
EstimatedRTT = 0.875 * 0.02746 + 0.125 * 0.035557 = 0.0285
EstimatedRTT after the receipt of the ACK of segment 3:
EstimatedRTT = 0.875 * 0.0285 + 0.125 * 0.070059 = 0.0337
EstimatedRTT after the receipt of the ACK of segment 4:
EstimatedRTT = 0.875 * 0.0337+ 0.125 * 0.11443 = 0.0438
EstimatedRTT after the receipt of the ACK of segment 5:
EstimatedRTT = 0.875 * 0.0438 + 0.125 * 0.13989 = 0.0558
EstimatedRTT after the receipt of the ACK of segment 6:
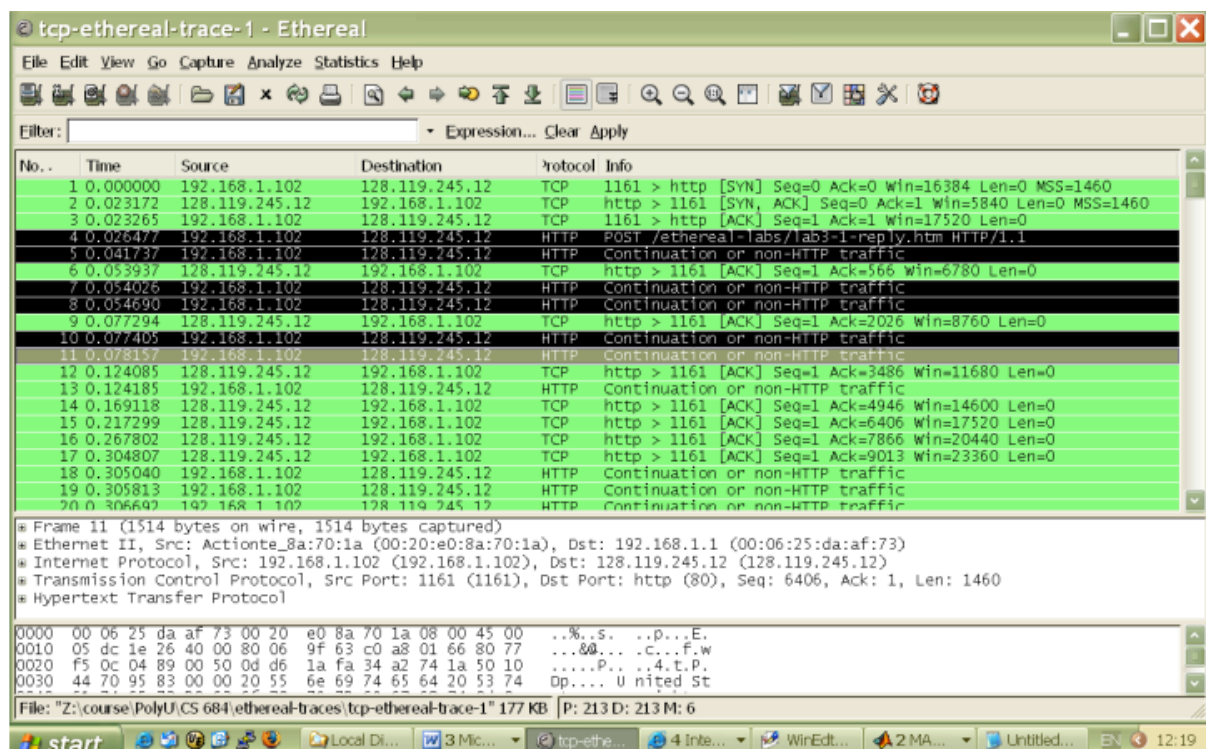EstimatedRTT = 0.875 * 0.0558 + 0.125 * 0.18964 = 0.0725
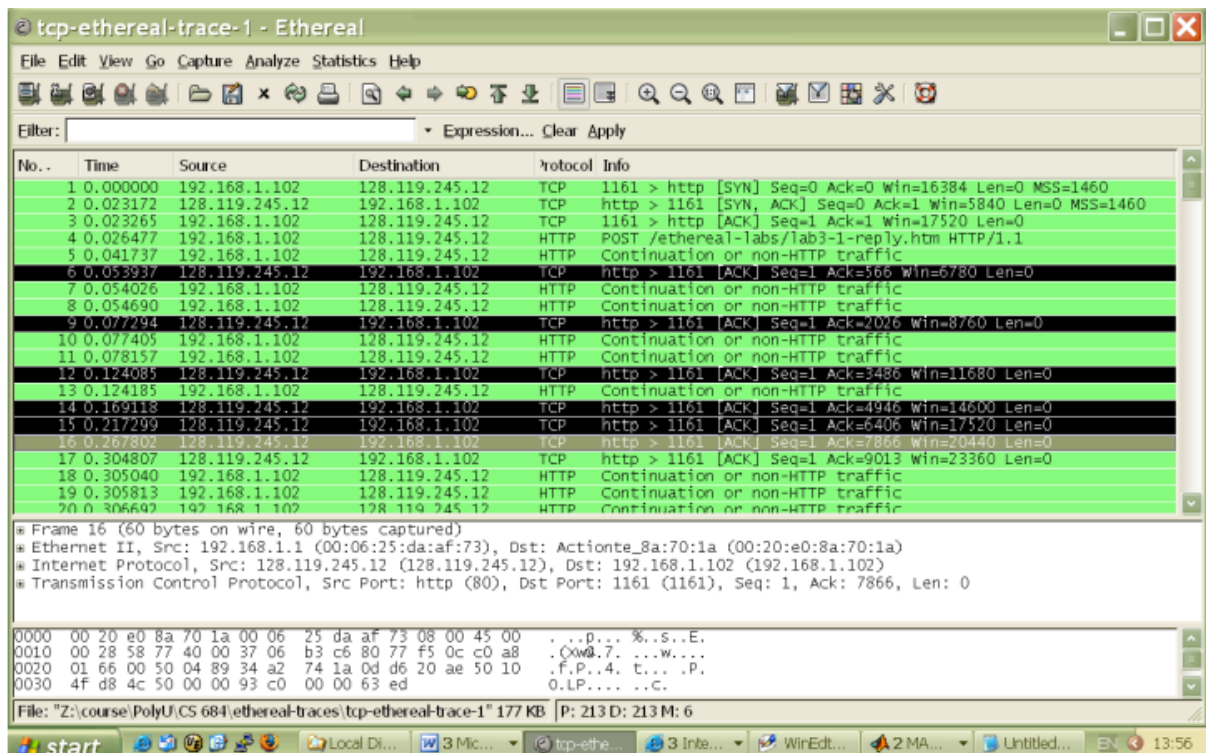Second

Figure 5: Segments 1 – 6

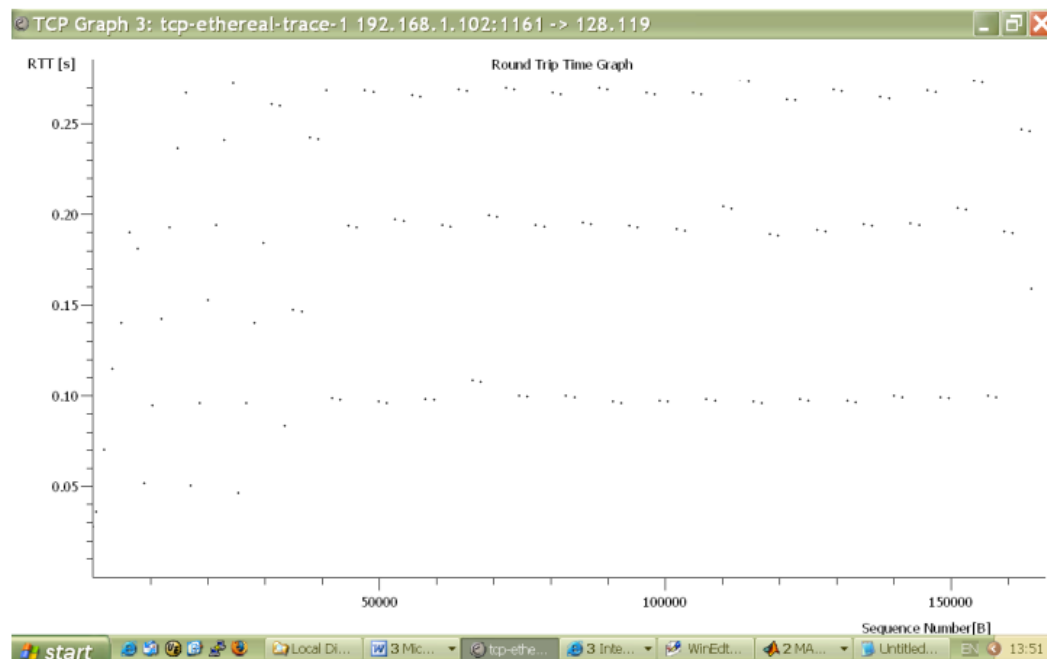**Figure 6: ACKs of segments 1 - 6**

Figure 7: Round Trip Time Graph

ANS-8

Length of the first TCP segment (containing the HTTP POST): 565 bytes Length of each of the other five TCP segments: 1460 bytes (MSS)
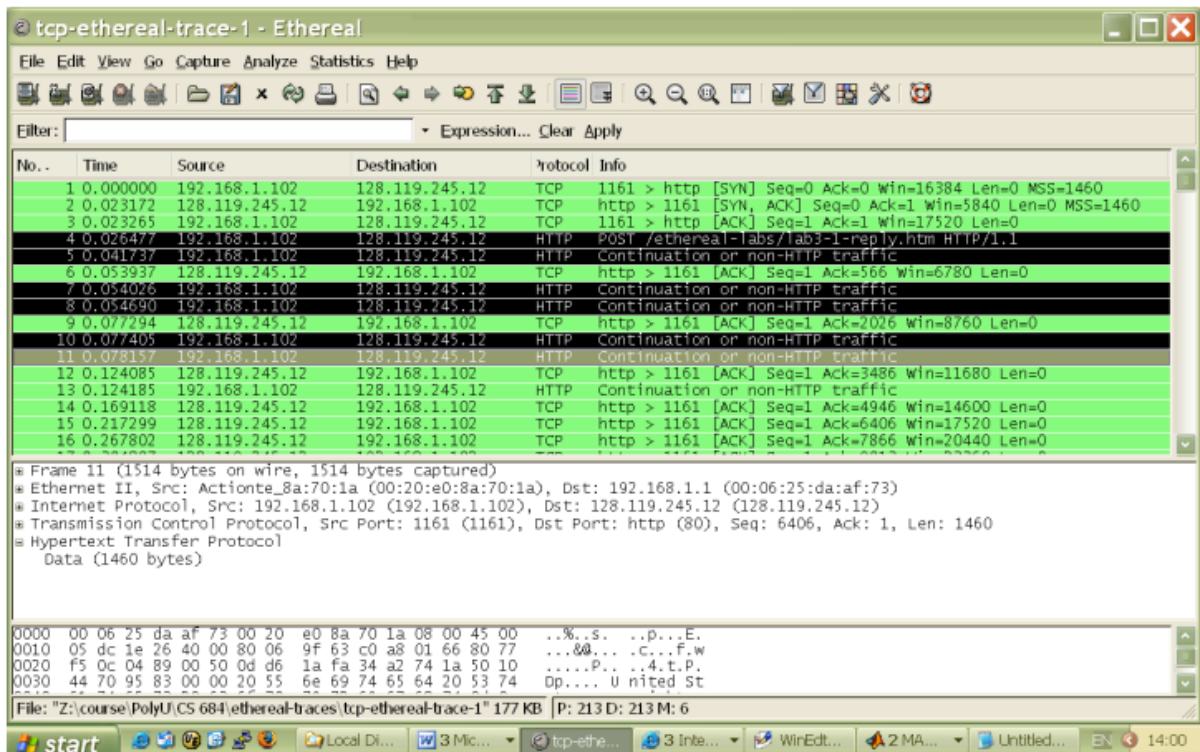
Figure 8: Lengths of segments 1 - 6

ANS-9

The minimum amount of buffer space (receiver window) advertised at gaia.cs.umass.edu for the entire trace is 5840 bytes, which shows in the first acknowledgement from the server. This receiver window grows steadily until a maximum receiver buffer size of 62780 bytes. The sender is never throttled due to lacking of receiver buffer space by inspecting this trace.
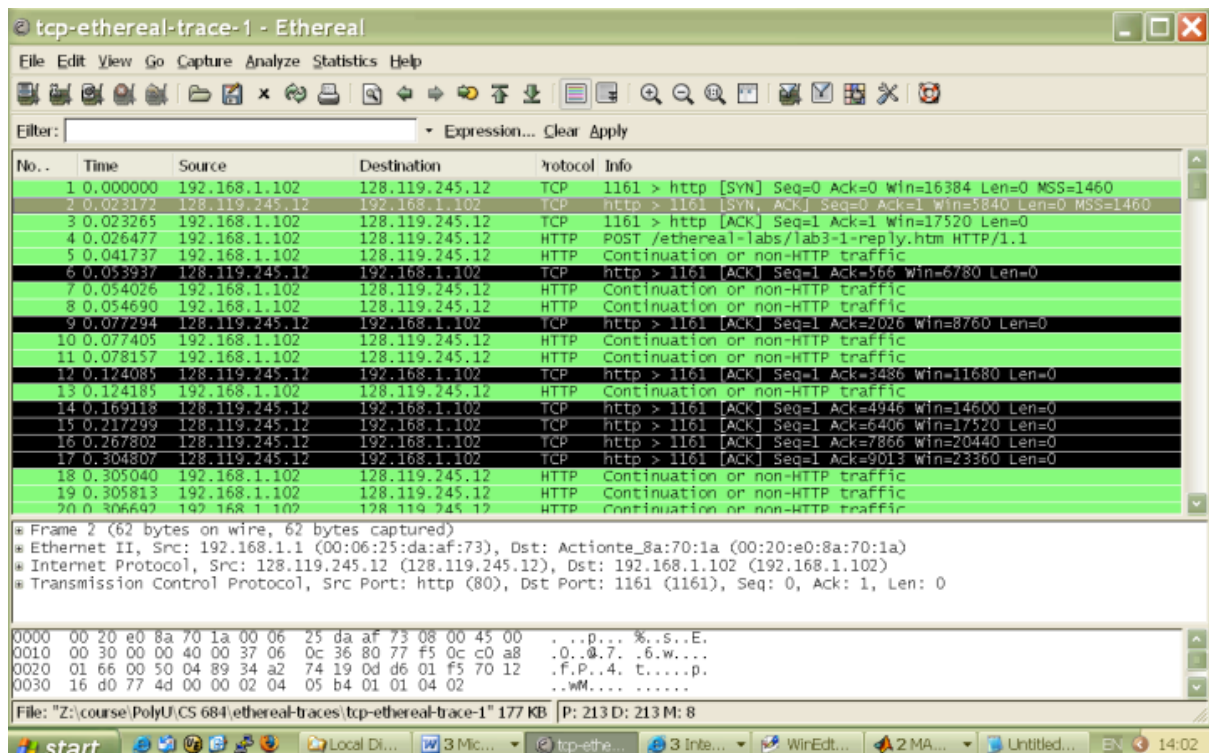
Figure 9: Minimum receive window advertised at gaia.cs.umass.edu (packet No. 2)

ANS-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 (192.168.1.102) 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.
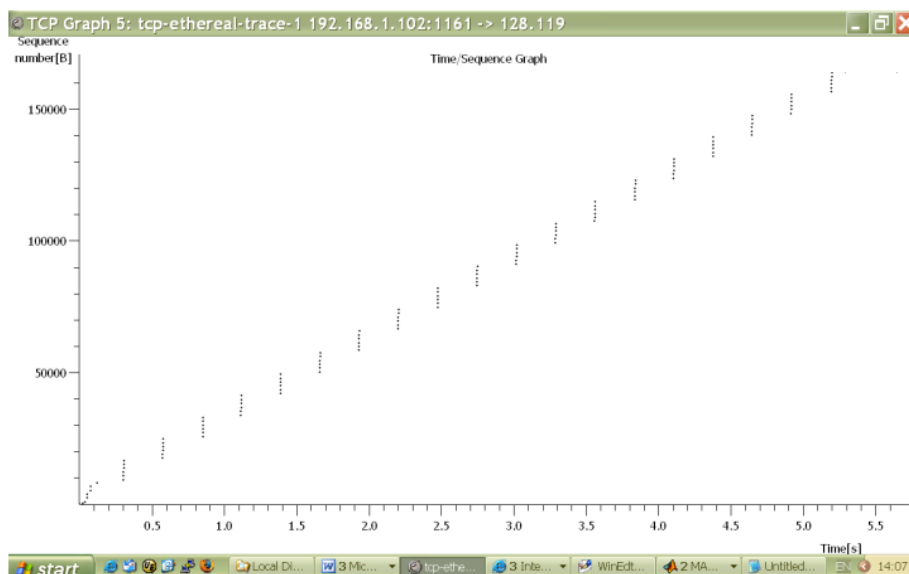

Figure 10: Sequence numbers of the segments from the source (192.168.1.102) to the destination (128.119.245.12)