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Wireshark Lab #2 – TCP

1. The IP address of client computer: 192.168.1.102, TCP port: 1161
2. The IP address of server computer: 128.119.245.12, TCP port: 80
3. The IP address of client computer: 10.0.1.36, TCP port: 58475
4. The sequence number of the TCP SYN segment is 0. The SYN flag is set to 1 which indicates that this is a SYN segment
5. The sequence number of the SYNACK segment sent in reply to the SYN is 0. The value of the ACK field is 1, and it was determined by adding 1 to the initial sequence number from the client. The segment is identified as a SYNACK segment becasue both the SYN flag and ACK flag are set to 1.
6. The sequence number of the TCP segement containing the HTTP POST command is 1.
7. The first six segments in the TCP The sequence numbers of the first six segments in the TCP connection are: 1, 566, 2026, 3486, 4946, 6406. The send times, ACK receive times, and RTT can be found in the table below.

Segment	Segment send time	ACK received time	RTT
1	0.026477	0.053937	0.02746
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

From textbook:
EstimatedRTT = 0.875 * EstimatedRTT + 0.125 * SampleRTT

EstimatedRTT after segment 1:
EstimatedRTT = RTT of segment 1 = 0.02746

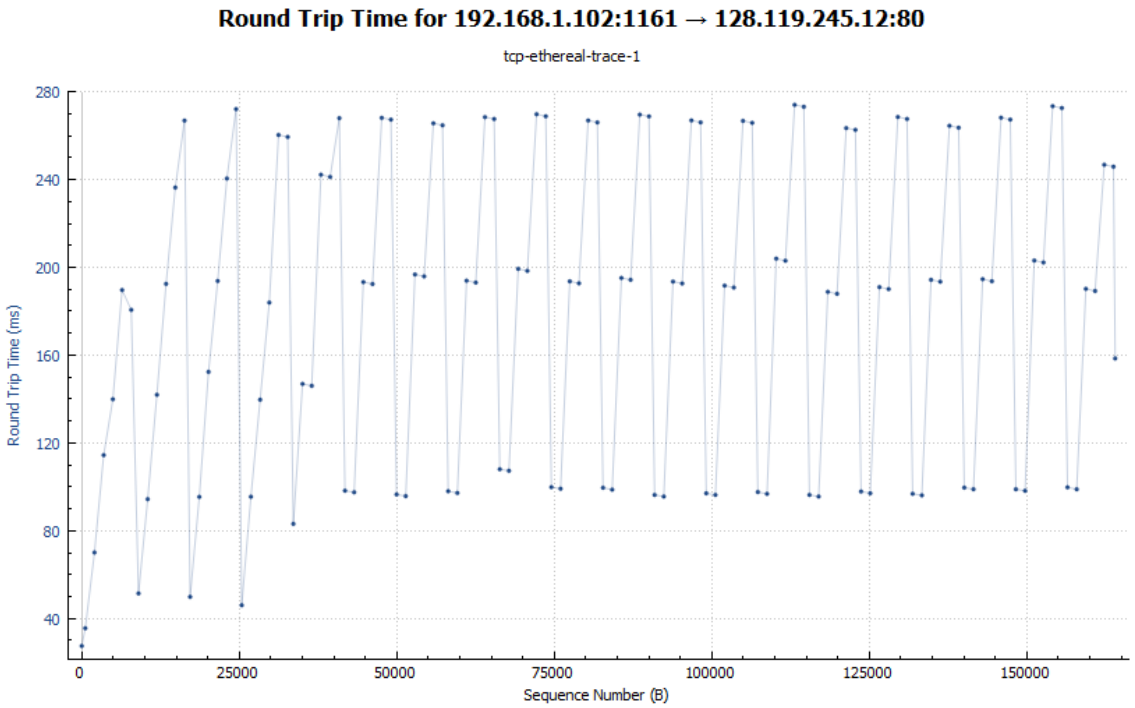
EstimatedRTT after segment 2:
EstimatedRTT = 0.875 * 0.02746 + 0.125 * 0.035557 = 0.0285

EstimatedRTT after segment 3:
EstimatedRTT = 0.875 * 0.0285 + 0.125 * 0.070059 = 0.0337

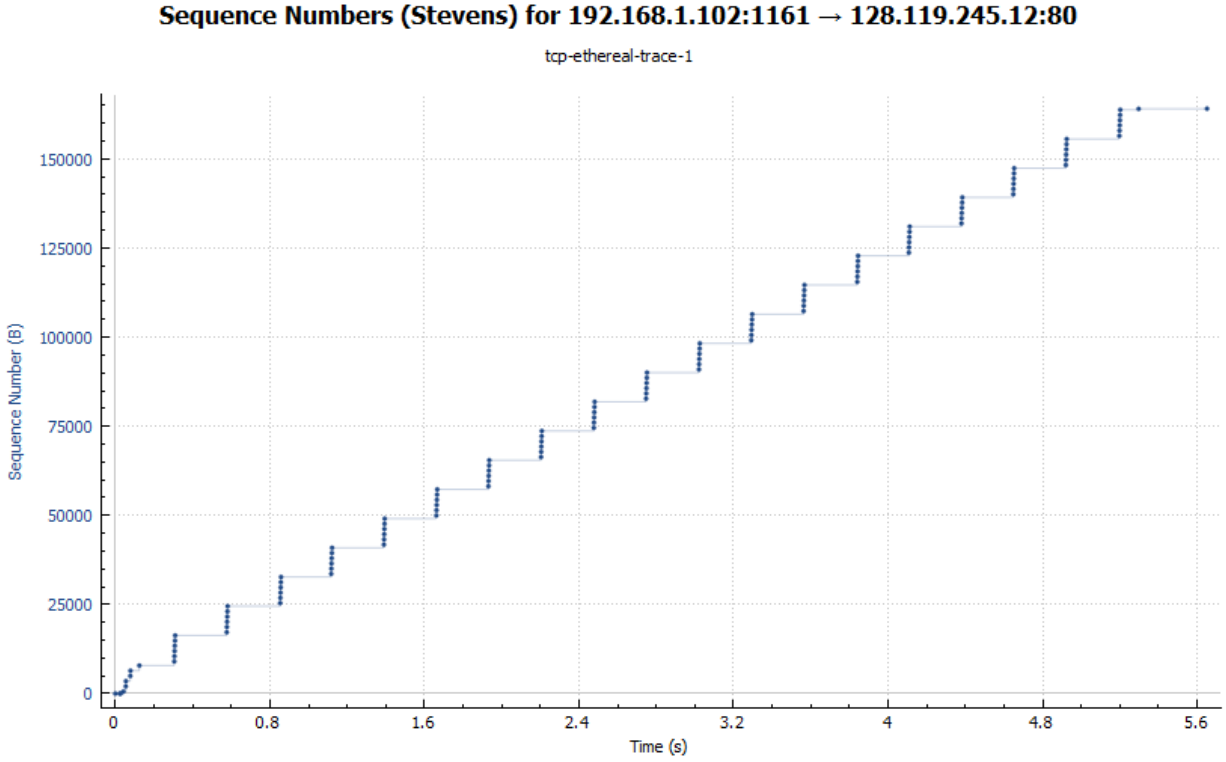
EstimatedRTT after segment 4:
EstimatedRTT = 0.875 * 0.0337+ 0.125 * 0.11443 = 0.0438

EstimatedRTT after segment 5:
EstimatedRTT = 0.875 * 0.0438 + 0.125 * 0.13989 = 0.0558

EstimatedRTT after segment 6:
EstimatedRTT = 0.875 * 0.0558 + 0.125 * 0.18964 = 0.0725



8. Length of the first six segments: 565 bytes, last 5 are 1460 bytes
9. The size of the intial window is 5840 bytes, as seen in the first ACK. The size of the window increases until it reached 62780 bytes, and never throttles the sender.
10. There are no retransmitted segments, as can be seen on the time/sequence (stevens) graph.



11. The receiver typically ACKs 1 segment at a time, or 1460 bytes at once. There are cases where the receiver ACKs every other received message, where the sequence numbers differ by 2920 bytes.
12. Throughput can be calculated by (Data transferred/time), which in the case of this connection is:
    Time = 5.455830 – 0.026477 = 5.4294 sec
    Data transferred = 164091 – 1 = 164090 bytes
    Throughput = 164090 bytes / 5.4294 sec = 30222.49 bytes/sec
13. TCP slow start starts at the beginning of the connection, however we cannot determine where it ends and the congenstion avoidance takes over. The Time-Sequence Graph (Stevens) is inserted above, in problem 10.
14. Two questions answered for personal trace:
    a. Question 11:

       The receiver typically ACKs 3-4 segments at a time, or 4380-5840 bytes at once. There are cases where the receiver ACKs every other received message, however it is not often.

    b. Question 12:
       Throughput can be calculated by (Data transferred/time), which in the case of this connection is:
       Time = 1.744656 – 1.474388 = 0.270268
       Data transferred = 152873 – 1 = 153873 bytes
       Throughput = 153873 bytes / 0.270268 sec = 569334.88 bytes/sec