

Ex1:

Q1: The IP address of gaia.cs.umass.edu is 128.119.245.12 . Sending TCP segments port is the source port 1161, receiving port is the destination port 80. Client computer is using IP address is 192.168.1.102 TCP port number is 1161.

Q2: The sequence number containing the HTTP POST command is 232129013.

Q3: The sequence numbers for the first six segment:

1. 232129013 (Sent: 0.026477 Received:0.053937 RTT: 0.02746 eRTT: 0.02746)
2. 232129578 (Sent: 0.041737 Received: 0.077294 Rtt: 0.035557 eRTT: 0.0285)
3. 232131038 (Sent: 0.054026 Received: 0.124085 Rtt: 0.070059 eRTT: 0.0337)
4. 232132498 (Sent: 0.054690 Received: 0.169118 Rtt: 0.11443 eRTT: 0.0438)
5. 232133958 (Sent: 0.077405 Received: 0.217299 Rtt: 0.13989 eRTT: 0.0558)
6. 232135418 (Sent: 0.078157 Received: 0.267802 Rtt: 0.18964 eRTT: 0.0725)

Q4: The length of first six segments:

1. 565
2. 1460
3. 1460
4. 1460
5. 1460
6. 1460

Q5: The minimum amount of available buffer space is 5840 bytes. The lack of receiver buffer space did not throttle the sender.

Q6: Frame 46 is retransmitted, since no response ACK for this frame.

Q7: ACK1 data:565 ACK2 data:1460 ACK3 data:1460
ACK4 data:1460 ACK5 data:1460 ACK6 data:1460

E.g. From No. 9 ACK2's ACK= ACK1's ACK + ACK2 data

$$232131038 = 232129578 + 1460$$

This indicates that the receiver is ACKing every other received segment.

Q8: The throughput = total transmitted data/ total transmit time
= (last ACK number - first ACK number) / (last segment time - first segment time)
$$(232293103 - 232129013)/(5.455830 - 0.026477) = 30.222 \text{ KByte/sec.}$$

Ex2:

Q1: The sequence number of the TCP SYN segment that is used to initiate the TCP connection is 2818463618.

Q2: The sequence number is 1247095790 and the Acknowledge is 2818463619.

The client on either side of a TCP session maintains a 32-bit sequence number uses to keep track of how much data it has sent. This sequence number is included on each transmitted packet, and acknowledged by the opposite host as an acknowledge number to inform the sending host that the transmitted data was received successfully.

Q3: The sequence number of the ACK segment sent by the client in response to the SYNACK is 2818463619. The value of ACK is 1247095791. This segment did contain any data.

Q4: The active close is done by client, because FIN ACK flags appear at the 304 first time and is the client sending message to server tell them to close the server. It is 3 Segment closure.

Q5: From client to server 34 bytes data was sent, from server to client 41 bytes data was sent. The difference between initial sequence number and the final ACK value is the amount of data that has been sent through the whole connection.