

COMP3331 Lab4 Report

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1. From the result, we know the client is MIT. Then, the IP address of client is **192.168.1.102** and the port is **1161**.
2. The IP address of server is **128.119.245.12** and the port number is **80**.
3. The sequence number of SYN to initialise the connection is **232129012**. There is a flag in the header shown as **Flags: 0x002(SYN)** and there is one bit that has been set as Syn in TCP flags.
4. The sequence number of SYNACK is **883061785**, and the ACK field value is **232129013**. That ACK value is calculated from adding 1 to the opposite side of sequence number. In this example, the ACK number is the sequence number in SYN segment which is **232129012 + 1 = 232129013**.
5. The sequence number is **232129013**. The ACK field value is **883061786**. The segment does not contain any data because the length is zero. There is a flag in the header shown as **Flags: 0x10(ACK)** and there is one bit that has been set as Acknowledge in TCP flags.
6. The sequence number is **232129013**.
- 7.

Sequence Number	Time each segment sent	Time ACK received	RTT value	EstimatedRTT
232129013	0.026477	0.053937	0.02746	0.02746
232129578	0.041737	0.077294	0.035557	0.028472125
232131038	0.054026	0.124085	0.070059	0.03367048438
232132498	0.054690	0.169118	0.114428	0.04376517383
232133958	0.077405	0.217299	0.139894	0.0557812771
232135418	0.078157	0.267802	0.189645	0.07251424246

8.

Sequence Number	Length
232129013	565
232129578	1460
232131038	1460
232132498	1460
232133958	1460
232135418	1460

9. The minimum amount of buffer space is **5840** bytes for the entire trace. I reckon the sender has not been throttled due to lack of receiver buffer.

10. There is no retransmitted segment in the entire trace. How did I check it for? I manually check sequence number of each segment sent whether it went increasing monotonically. Finally, it turned out that each sequence number is increasing one by one.

11. Except the first **ACK (566)**, the receiver typically acknowledges **1460** bytes. I also found a case where the receiver was ACKing every other received segment. For example, If you look at No.71 and No.78 of the trace file shown in the WireShark (filtered by "tcp"), the receiver first ACK'd **232178985** but skipped this number **232180445** when the sender sent at No.73 as sequence number, and then came straight to ACK **232181905** at No.78 of the trace.

12. Throughput = total bytes transferred / time. Also, total bytes = last ACK number received by sender - the first sequence number the sender sent. From my observation, I reckon No.202 is the last ACK number that the sender received, which is **232293103**. The first sequence number sent is **232129013**. Hence, the total bytes transferred is **232293103 - 232129013 = 164090** bytes. Time is ending time minus starting time, which is **5.455830 - 0.026477 = 5.429353** seconds. Therefore, throughput = **164090/5.429353 = 30.22275** KBytes/sec.