THE HONG KONG POLYTECHNIC UNIVERSITY
香港理工大學

COMP2322 Computer Networking
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Lab 06
TCP

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Question 1 The IP address of the client is 192.168.1.102, while the port number is 1161.

```
   Source Address: 128.119.245.12
   Destination Address: 192.168.1.102
Transmission Control Protocol, Src Port: 80, Dst Port: 1161,
```

Question 5 The sequence number of the SYNACK segment is 0 (raw: 883061785). The value of the acknowledgement field is 1 (raw: 232129013), and it is determined by incrementing the sequence number previously received by the client by 1. It is recognized as a SYNACK segment as in the Flags, both Acknowledgement and Syn are set to 1.

```
Sequence Number: 0    (relative sequence number)
Sequence Number (raw): 883061785
[Next Sequence Number: 1    (relative sequence number)]
Acknowledgment Number: 1    (relative ack number)
Acknowledgment number (raw): 232129013
0111 .... = Header Length: 28 bytes (7)
Flags: 0x012 (SYN, ACK)
   000. .... .... = Reserved: Not set
   ...0 .... .... = Accurate ECN: Not set
   .... 0... .... = Congestion Window Reduced: Not set
   .... .0.. .... = ECN-Echo: Not set
   .... ..0. .... = Urgent: Not set
   .... ...1 .... = Acknowledgment: Set
   .... .... 0... = Push: Not set
   .... .... .0.. = Reset: Not set
>  .... .... ..1. = Syn: Set
   .... .... ...0 = Fin: Not set
```

Question 9 The minimum amount of available buffer space advertised at the received for the entire trace is 5840 bytes (minimum window size), and there is no lack of receiver buffer space that throttles the sender, since the receiver window size keeps increasing throughout the trace.

```
TCP        62 80 → 1161 [SYN, ACK] Seq=0 Ack=1 Win=5840 Len=0 MSS=1460 SACK_PERM
```

Question 11 The receiver typically acknowledges 1460 bytes of data in an ACK. There exist such cases, e.g., packets of No. 87 and No. 88. The difference of the acknowledgement number of the two packets is $64005 - 61085 = 2920 = 2 \times 1460$, which indicates such a situation.

```
87 2.029069     128.119.245.12     192.168.1.102     TCP     60 80 → 1161 [ACK] Seq=1 Ack=61085
88 2.126682     128.119.245.12     192.168.1.102     TCP     60 80 → 1161 [ACK] Seq=1 Ack=64005
```

Question 13 According to the graph, the slow start begins at the packet No. 4. Whereas, the end time of slow start and the start time of congestion control is uncertain.

The difference between the idealized situation and the measured data is that, the distribution of moments when the sender sends packets is not uniform. Several packets are often sent intensively in some short periods of time, but no new packets are sent in the periods. Therefore, the graph is not as smooth as the idealized one.