THE UNIVERSITY OF MELBOURNE

COMP90007 Internet Technologies SM2, 2018 Assignment 1

Peiyong Wang (username:PEIYONGW)

August 28, 2018

1 QUESTION ONE

$$\begin{aligned} bit\ rate &= baud\ rate \times bits\ per\ baud \\ &= 4800 \times log_2 64 \\ &= 28800\ bps \end{aligned} \tag{1.1}$$

2 QUESTION TWO

$$\begin{aligned} total\ length\ of\ heades &= 150 + 100 + 50 \\ &= 300\ bytes \end{aligned} \tag{2.1}$$

$$total\ length\ message = M + 300\ bytes \tag{2.2}$$

$$bandwidth\ wasted\ on\ headers = \frac{300}{M + 300} \tag{2.3}$$

3 Question Three

$$total\ bits = 1280 \times 720 \times 3 \times 8 = 22118400\ bits \tag{3.1}$$

Over a 1-Mbps cable modem:

$$t_1 = \frac{22118400}{1 \times 10^6} \approx 22.12s \tag{3.2}$$

Over a 100 Mbps ethernet:

$$t_2 = \frac{22118400}{100 \times 10^6} \approx 0.221184s \tag{3.3}$$

Over gigabit ethernet:

$$t_3 = \frac{22118400}{1 \times 10^9} \approx 0.02212s \tag{3.4}$$

4 Question Four

From the information provided by the question, we can have:

$$B = 100\ Mbps = 100 \times 10^6\ bps \tag{4.1}$$

$$T_p = \frac{300\ \mu s}{2} = 150\ \mu s \tag{4.2}$$

and

$$U = \frac{L}{L + 2T_p B} = 0.4 \tag{4.3}$$

so we can get:

$$L = 20000\ bits \tag{4.4}$$

Hence, the minimum frame size is 20000 bits.

5 Question Five

From Figure 5.1 we can clearly see that in the third and fourth column in the green background area are showing the IP address of the source and destination respectively.

6 Question Six

From the flow graph(Fig. 6.2) we can see the essential details of a frame, such as the time of transmission, the size of the frame and the sequence number of the frame and the TCP ports used for the connection. Together with the wireshark trace we can also get the flags, the window size value and TCP options, etc.

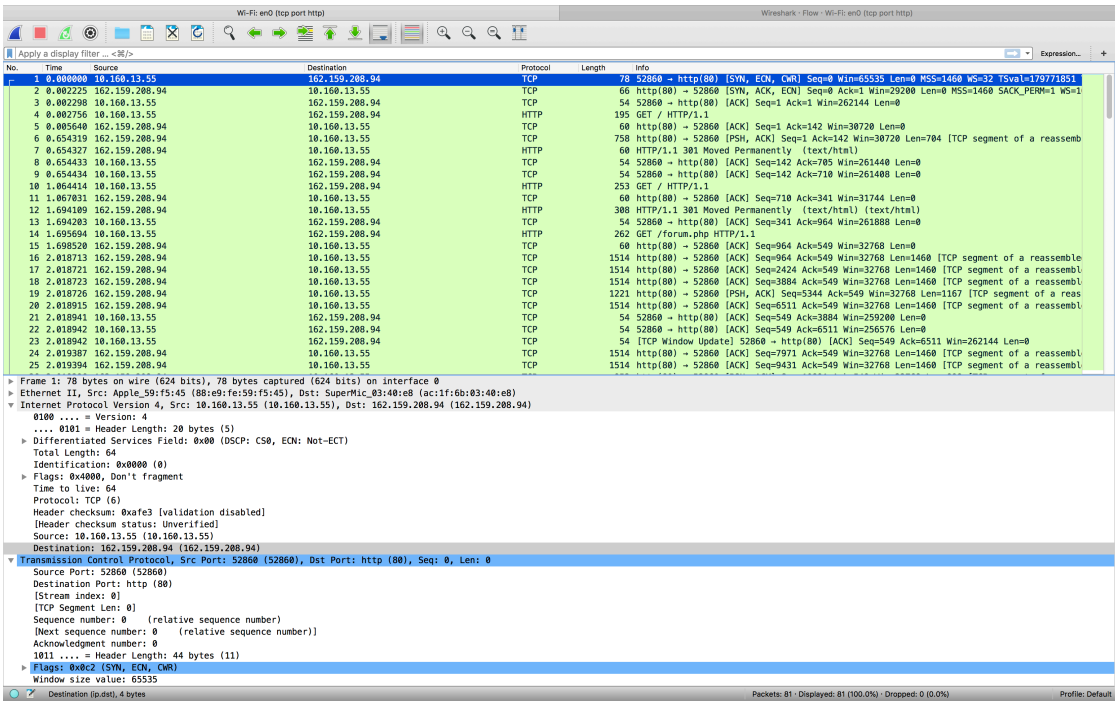

Figure 5.1: Wireshark trace

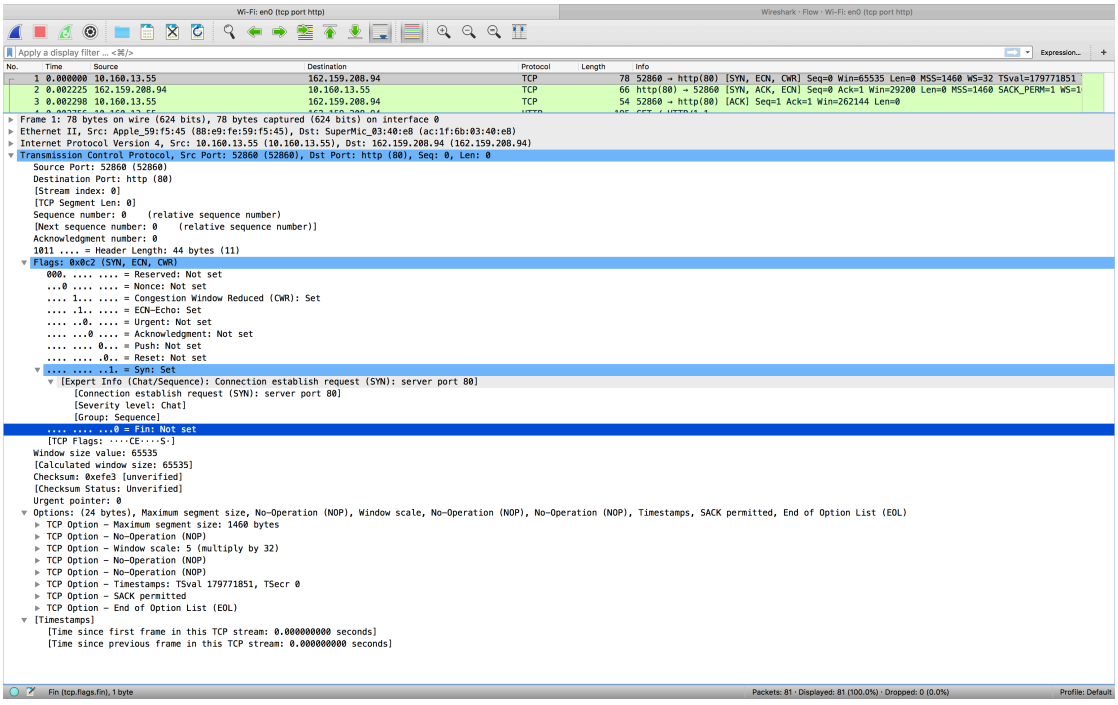

Figure 6.1: Detailed information for packet 1

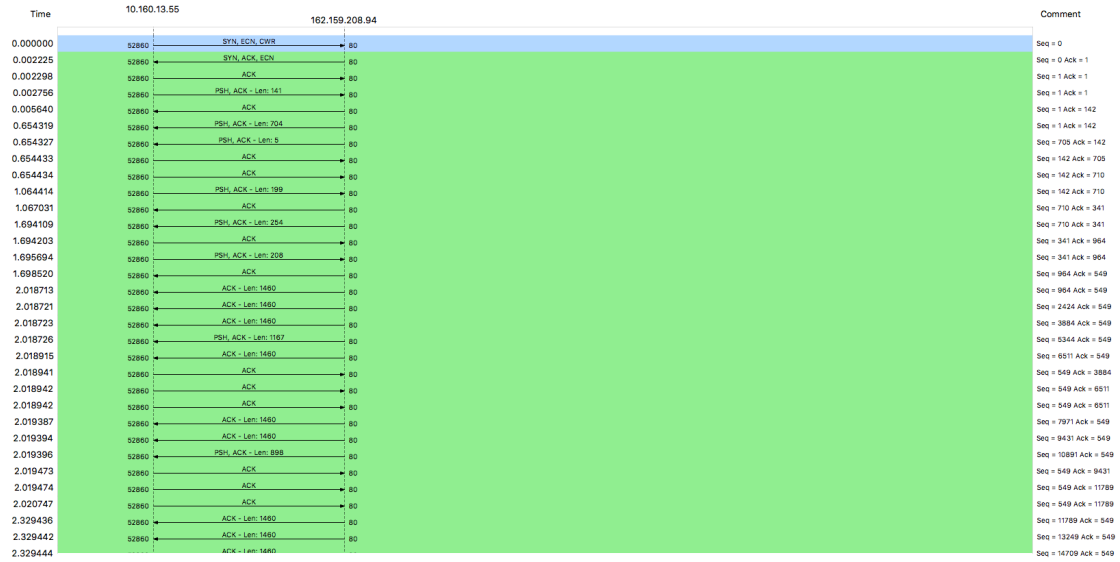

Figure 6.2: Flow graph

Also in the figure we can see from Fig 6.2 that there is a three-handshake process when establishing the connection between the source and the destination.

7 Question Seven

I believe that this is not a very good approach. Usually, large chunks of data are divided into small packets when being sent through a network. If only an acknowledgement is transmitted to the sender when the whole file is received, when packets lost during the transfer process (even a very small amount of packets are lost), the whole file must be transferred again to the receiver, which is both resource-consuming and time-wasting.

In my opinion, when large file is divided and sent packet by packet, the receiver should send an acknowledgment with a "packet id code" to tell the sender specifically which packet it received after receiving a packet. So the sender will only need to re-send the lost packets instead of the whole chunk of file, which will save a lot of time and network resources.

8 Question Eight

I This need both large bandwidth and not very high latency. Usually performed by the Australia-Japan Cable and via Internet technologies such as MMCFTP used by a cooperation named Pacific Northwest Gigapop.

II This task do not usually require large bandwidth because the game files already installed on the smartphones. However a very low latency (low ping value) network is needed. This is

usually satisfied by high speed wifi or 4G mobile networks.

III This usually require moderate bandwidth and not very high latency. Internet connections for remote areas used to be provided by dail-up internet. Now they can have broadband network. It is said by news that Amazon is planning to provide Internet access for remote area by drones with wifi transmitter.

IV This type of task, such as a fire alarm system, often requires not large bandwidth but very low latency. Technology involved in this field are usually LoRaWAN, NB-IoT, GPRS or even 3/4G.

V This requires high bandwidth and low latency often using technologies such as FTP.