Part 1

4.

7	18.001107464	5e:21:65:7e:9f:82	5a:1a:b4:5f:0f:44	ARP	42 10.0.0.2 is at 5e:21:65:7e:9f:82
8	18.001122883	10.0.0.1	10.0.0.2	ICMP	98 Echo (ping) request id=0x798b, seq=1/256, ttl=64 (reply in 9)
9	18.001881427	10.0.0.2	10.0.0.1	ICMP	98 Echo (ping) reply id=0x798b, seq=1/256, ttl=64 (request in 8)
10	19.002044550	10.0.0.1	10.0.0.2	ICMP	98 Echo (ping) request id=0x798b, seq=2/512, ttl=64 (reply in 11)
11	19.002082731	10.0.0.2	10.0.0.1	ICMP	98 Echo (ping) reply id=0x798b, seq=2/512, ttl=64 (request in 10)
12	20.028051233	10.0.0.1	10.0.0.2	ICMP	98 Echo (ping) request id=0x798b, seq=3/768, ttl=64 (reply in 13)
13	20.028093966	10.0.0.2	10.0.0.1	ICMP	98 Echo (ping) reply id=0x798b, seq=3/768, ttl=64 (request in 12)
14	21.056049414	10.0.0.1	10.0.0.2	ICMP	98 Echo (ping) request id=0x798b, seq=4/1024, ttl=64 (reply in 15)
15	21.056092914	10.0.0.2	10.0.0.1	ICMP	98 Echo (ping) reply id=0x798b, seq=4/1024, ttl=64 (request in 14)
16	22.076098234	10.0.0.1	10.0.0.2	ICMP	98 Echo (ping) request id=0x798b, seq=5/1280, ttl=64 (reply in 17)
17	22.076139480	10.0.0.2	10.0.0.1	ICMP	98 Echo (ping) reply id=0x798b, seq=5/1280, ttl=64 (request in 16)
18	23.040021056	5e:21:65:7e:9f:82	5a:1a:b4:5f:0f:44	ARP	42 Who has 10.0.0.1? Tell 10.0.0.2
19	23.040038115	5a:1a:b4:5f:0f:44	5e:21:65:7e:9f:82	ARP	42 10.0.0.1 is at 5a:1a:b4:5f:0f:44
20	23.100064725	10.0.0.1	10.0.0.2	ICMP	98 Echo (ping) request id=0x798b, seq=6/1536, ttl=64 (reply in 21)
21	23.100105408	10.0.0.2	10.0.0.1	ICMP	98 Echo (ping) reply id=0x798b, seq=6/1536, ttl=64 (request in 20)
22	24.124109534	10.0.0.1	10.0.0.2	ICMP	98 Echo (ping) request id=0x798b, seq=7/1792, ttl=64 (reply in 23)
23	24.124149126	10.0.0.2	10.0.0.1	ICMP	98 Echo (ping) reply id=0x798b, seq=7/1792, ttl=64 (request in 22)
24	25.148080761	10.0.0.1	10.0.0.2	ICMP	98 Echo (ping) request id=0x798b, seq=8/2048, ttl=64 (reply in 25)
25	25.148139565	10.0.0.2	10.0.0.1	ICMP	98 Echo (ping) reply id=0x798b, seq=8/2048, ttl=64 (request in 24)
26	26.172045387	10.0.0.1	10.0.0.2	ICMP	98 Echo (ping) request id=0x798b, seq=9/2304, ttl=64 (reply in 27)
27	26.172085839	10.0.0.2	10.0.0.1	ICMP	98 Echo (ping) reply id=0x798b, seq=9/2304, ttl=64 (request in 26)
28	27.196002005	10.0.0.1	10.0.0.2	ICMP	98 Echo (ping) request id=0x798b, seq=10/2560, ttl=64 (reply in 29)
29	27.196020854	10.0.0.2	10.0.0.1	ICMP	98 Echo (ping) reply id=0x798b, seq=10/2560, ttl=64 (request in 2…

Part 2 - tshark

1. to capture and save packet:

   sudo tshark -w packet01 -f '(src host 8.8.8.8 or dst host 8.8.8.8)and icmp'

2. to view packet:

   sudo tshark -r packet01

```
maxhsu@Max-Hsu-Lab:~/Desktop/Desktop/Homework/G3-1/Advanced_Computer_Network/HW2$ sudo tshark -r packet01
Running as user "root" and group "root". This could be dangerous.
    1 0.000000000 192.168.0.210 → 8.8.8.8      ICMP 98 Echo (ping) request  id=0x27e6, seq=1/256, ttl=64
    2 0.006631197      8.8.8.8 → 192.168.0.210 ICMP 98 Echo (ping) reply    id=0x27e6, seq=1/256, ttl=118 (request in 1)
    3 1.001174655 192.168.0.210 → 8.8.8.8      ICMP 98 Echo (ping) request  id=0x27e6, seq=2/512, ttl=64
    4 1.007708041      8.8.8.8 → 192.168.0.210 ICMP 98 Echo (ping) reply    id=0x27e6, seq=2/512, ttl=118 (request in 3)
    5 2.002608909 192.168.0.210 → 8.8.8.8      ICMP 98 Echo (ping) request  id=0x27e6, seq=3/768, ttl=64
    6 2.009082472      8.8.8.8 → 192.168.0.210 ICMP 98 Echo (ping) reply    id=0x27e6, seq=3/768, ttl=118 (request in 5)
    7 3.004236078 192.168.0.210 → 8.8.8.8      ICMP 98 Echo (ping) request  id=0x27e6, seq=4/1024, ttl=64
    8 3.010744021      8.8.8.8 → 192.168.0.210 ICMP 98 Echo (ping) reply    id=0x27e6, seq=4/1024, ttl=118 (request in 7)
    9 4.005503241 192.168.0.210 → 8.8.8.8      ICMP 98 Echo (ping) request  id=0x27e6, seq=5/1280, ttl=64
   10 4.012017845      8.8.8.8 → 192.168.0.210 ICMP 98 Echo (ping) reply    id=0x27e6, seq=5/1280, ttl=118 (request in 9)
   11 5.006650029 192.168.0.210 → 8.8.8.8      ICMP 98 Echo (ping) request  id=0x27e6, seq=6/1536, ttl=64
   12 5.013132530      8.8.8.8 → 192.168.0.210 ICMP 98 Echo (ping) reply    id=0x27e6, seq=6/1536, ttl=118 (request in 11)
   13 6.008239765 192.168.0.210 → 8.8.8.8      ICMP 98 Echo (ping) request  id=0x27e6, seq=7/1792, ttl=64
   14 6.014760642      8.8.8.8 → 192.168.0.210 ICMP 98 Echo (ping) reply    id=0x27e6, seq=7/1792, ttl=118 (request in 13)
   15 7.009760535 192.168.0.210 → 8.8.8.8      ICMP 98 Echo (ping) request  id=0x27e6, seq=8/2048, ttl=64
   16 7.016307591      8.8.8.8 → 192.168.0.210 ICMP 98 Echo (ping) reply    id=0x27e6, seq=8/2048, ttl=118 (request in 15)
   17 8.010557023 192.168.0.210 → 8.8.8.8      ICMP 98 Echo (ping) request  id=0x27e6, seq=9/2304, ttl=64
   18 8.017007025      8.8.8.8 → 192.168.0.210 ICMP 98 Echo (ping) reply    id=0x27e6, seq=9/2304, ttl=118 (request in 17)
   19 9.012127722 192.168.0.210 → 8.8.8.8      ICMP 98 Echo (ping) request  id=0x27e6, seq=10/2560, ttl=64
   20 9.018605535      8.8.8.8 → 192.168.0.210 ICMP 98 Echo (ping) reply    id=0x27e6, seq=10/2560, ttl=118 (request in 19)
   21 10.013838595 192.168.0.210 → 8.8.8.8      ICMP 98 Echo (ping) request  id=0x27e6, seq=11/2816, ttl=64
   22 10.020393046      8.8.8.8 → 192.168.0.210 ICMP 98 Echo (ping) reply    id=0x27e6, seq=11/2816, ttl=118 (request in 21)
   23 11.014665548 192.168.0.210 → 8.8.8.8      ICMP 98 Echo (ping) request  id=0x27e6, seq=12/3072, ttl=64
   24 11.021229949      8.8.8.8 → 192.168.0.210 ICMP 98 Echo (ping) reply    id=0x27e6, seq=12/3072, ttl=118 (request in 23)
   25 12.016308354 192.168.0.210 → 8.8.8.8      ICMP 98 Echo (ping) request  id=0x27e6, seq=13/3328, ttl=64
   26 12.022854718      8.8.8.8 → 192.168.0.210 ICMP 98 Echo (ping) reply    id=0x27e6, seq=13/3328, ttl=118 (request in 25)
   27 13.017528405 192.168.0.210 → 8.8.8.8      ICMP 98 Echo (ping) request  id=0x27e6, smaxhsmaxhsmaxhmamaxhmamaxhsu@Mmaxhsumaxhsmaxmmmaxmamaxhmaxhsmax
```

```
root@Max-Hsu-Lab:/home/maxhsu/Desktop/Desktop/Homework/G3-1/Advanced_Computer_Network/HW2# ping 8.8.8.8
PING 8.8.8.8 (8.8.8.8) 56(84) bytes of data.
64 bytes from 8.8.8.8: icmp_seq=1 ttl=118 time=6.64 ms
64 bytes from 8.8.8.8: icmp_seq=2 ttl=118 time=6.55 ms
64 bytes from 8.8.8.8: icmp_seq=3 ttl=118 time=6.50 ms
64 bytes from 8.8.8.8: icmp_seq=4 ttl=118 time=6.53 ms
64 bytes from 8.8.8.8: icmp_seq=5 ttl=118 time=6.53 ms
64 bytes from 8.8.8.8: icmp_seq=6 ttl=118 time=6.50 ms
64 bytes from 8.8.8.8: icmp_seq=7 ttl=118 time=6.55 ms
64 bytes from 8.8.8.8: icmp_seq=8 ttl=118 time=6.56 ms
64 bytes from 8.8.8.8: icmp_seq=9 ttl=118 time=6.46 ms
64 bytes from 8.8.8.8: icmp_seq=10 ttl=118 time=6.51 ms
64 bytes from 8.8.8.8: icmp_seq=11 ttl=118 time=6.56 ms
64 bytes from 8.8.8.8: icmp_seq=12 ttl=118 time=6.57 ms
64 bytes from 8.8.8.8: icmp_seq=13 ttl=118 time=6.56 ms
64 bytes from 8.8.8.8: icmp_seq=14 ttl=118 time=6.55 ms
^C
--- 8.8.8.8 ping statistics ---
14 packets transmitted, 14 received, 0% packet loss, time 13017ms
rtt min/avg/max/mdev = 6.462/6.546/6.648/0.109 ms
root@Max-Hsu-Lab:/home/maxhsu/Desktop/Desktop/Homework/G3-1/Advanced_Computer_Network/HW2# ping 208.67.220.220
PING 208.67.220.220 (208.67.220.220) 56(84) bytes of data.
64 bytes from 208.67.220.220: icmp_seq=1 ttl=56 time=36.3 ms
64 bytes from 208.67.220.220: icmp_seq=2 ttl=56 time=36.1 ms
64 bytes from 208.67.220.220: icmp_seq=3 ttl=56 time=37.7 ms
64 bytes from 208.67.220.220: icmp_seq=4 ttl=56 time=43.8 ms
64 bytes from 208.67.220.220: icmp_seq=5 ttl=56 time=36.1 ms
64 bytes from 208.67.220.220: icmp_seq=6 ttl=56 time=36.1 ms
64 bytes from 208.67.220.220: icmp_seq=7 ttl=56 time=36.0 ms
64 bytes from 208.67.220.220: icmp_seq=8 ttl=56 time=36.1 ms
^C
--- 208.67.220.220 ping statistics ---
```

Part 2 – tcpstat

1. to capture : sudo tcpstat -f 'icmp' -s 20 -R 1

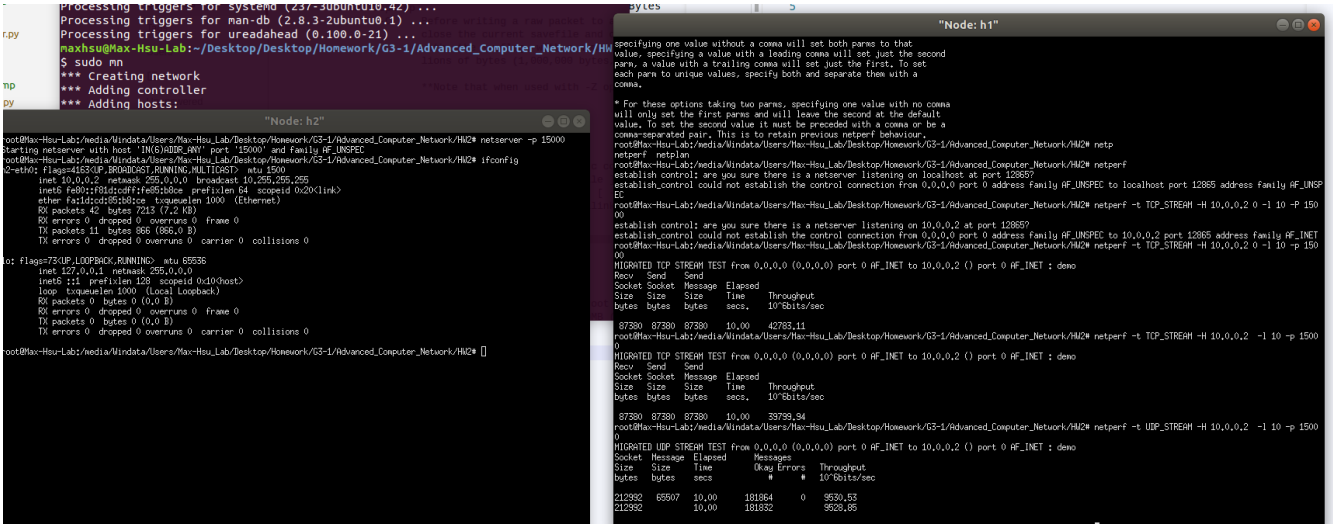
```
root@Max-Hsu-Lab:/home/maxhsu/Desktop/Desktop/Homework/G3-1/Advanced_Computer_Network/HW2# ping 8.8.8.8
PING 8.8.8.8 (8.8.8.8) 56(84) bytes of data.
64 bytes from 8.8.8.8: icmp_seq=1 ttl=118 time=6.56 ms
64 bytes from 8.8.8.8: icmp_seq=2 ttl=118 time=6.43 ms
64 bytes from 8.8.8.8: icmp_seq=3 ttl=118 time=6.59 ms
64 bytes from 8.8.8.8: icmp_seq=4 ttl=118 time=6.54 ms
64 bytes from 8.8.8.8: icmp_seq=5 ttl=118 time=6.64 ms
64 bytes from 8.8.8.8: icmp_seq=6 ttl=118 time=6.57 ms
64 bytes from 8.8.8.8: icmp_seq=7 ttl=118 time=6.48 ms
64 bytes from 8.8.8.8: icmp_seq=8 ttl=118 time=6.52 ms
64 bytes from 8.8.8.8: icmp_seq=9 ttl=118 time=6.45 ms
64 bytes from 8.8.8.8: icmp_seq=10 ttl=118 time=6.61 ms
64 bytes from 8.8.8.8: icmp_seq=11 ttl=118 time=6.58 ms
64 bytes from 8.8.8.8: icmp_seq=12 ttl=118 time=6.56 ms
64 bytes from 8.8.8.8: icmp_seq=13 ttl=118 time=6.51 ms
64 bytes from 8.8.8.8: icmp_seq=14 ttl=118 time=6.50 ms
64 bytes from 8.8.8.8: icmp_seq=15 ttl=118 time=6.59 ms
64 bytes from 8.8.8.8: icmp_seq=16 ttl=118 time=6.47 ms
64 bytes from 8.8.8.8: icmp_seq=17 ttl=118 time=6.41 ms
64 bytes from 8.8.8.8: icmp_seq=18 ttl=118 time=6.46 ms
64 bytes from 8.8.8.8: icmp_seq=19 ttl=118 time=6.57 ms
64 bytes from 8.8.8.8: icmp_seq=20 ttl=118 time=6.60 ms
64 bytes from 8.8.8.8: icmp_seq=21 ttl=118 time=6.63 ms
64 bytes from 8.8.8.8: icmp_seq=22 ttl=118 time=6.50 ms
```

```
maxhsu@Max-Hsu-Lab:~/Desktop/Desktop/Homework/G3-1/Advanced_Computer_Network/HW2$ sudo tcpstat -f 'icmp' -s 20 -R 1
Listening on enp5s0
Time:1601290005 n=10    avg=84.00       stddev=0.00     bps=1344.00
Time:1601290010 n=10    avg=84.00       stddev=0.00     bps=1344.00
Time:1601290015 n=10    avg=84.00       stddev=0.00     bps=1344.00
^CTime:1601290020       n=10    avg=84.00       stddev=0.00     bps=1344.00
```

Question 4-1 : iperf 的用途：檢查網路頻寬 ， 確認電信商有沒有騙人

Question 4-4 : TCP 及 UDP 產生結果差異 ：TCP 有 group ack 及 sliding window 在幫忙控管，所以可以一次傳多 packets，讓 bandwidth 上升

Part 2 - netperf
1.TCP
server : netserver -p 15000
client : netperf -t TCP_STREAM -H 10.0.0.2 -l 10 -p 15000



2.UDP
server : netserver -p 15000
client : netperf -t UDP_STREAM -H 10.0.0.2 -l 10 -p 15000