

# 【高等電腦網路】

作業別：【HW2】

學號、姓名：M043040026 蒲宏易

作業內容：

## Part1 : Mininet

```
mininet> net
h1 h1-eth0:s1-eth1
h2 h2-eth0:s1-eth2
s1 lo: s1-eth1:h1-eth0 s1-eth2:h2-eth0
c0
mininet>
```

### (1) h1 : s1-eth1 when ping h1->h2

Capturing from s1-eth1 [Wireshark 1.10.6 (v1.10.6 from master-1.10)]

No.	Time	Source	Destination	Protocol	Length	Info
1	0.000000000	10.0.0.1	10.0.0.2	ICMP	98	Echo (ping) request id=0x0e58, seq=1/256, ttl=64 (reply in 2)
2	0.001970000	10.0.0.2	10.0.0.1	ICMP	98	Echo (ping) reply id=0x0e58, seq=1/256, ttl=64 (request in 1)
3	1.001432000	10.0.0.1	10.0.0.2	ICMP	98	Echo (ping) request id=0x0e58, seq=2/512, ttl=64 (reply in 4)
4	1.001760000	10.0.0.2	10.0.0.1	ICMP	98	Echo (ping) reply id=0x0e58, seq=2/512, ttl=64 (request in 3)
5	2.000434000	10.0.0.1	10.0.0.2	ICMP	98	Echo (ping) request id=0x0e58, seq=3/768, ttl=64 (reply in 6)
6	2.000462000	10.0.0.2	10.0.0.1	ICMP	98	Echo (ping) reply id=0x0e58, seq=3/768, ttl=64 (request in 5)
7	2.999427000	10.0.0.1	10.0.0.2	ICMP	98	Echo (ping) request id=0x0e58, seq=4/1024, ttl=64 (reply in 8)
8	2.999446000	10.0.0.2	10.0.0.1	ICMP	98	Echo (ping) reply id=0x0e58, seq=4/1024, ttl=64 (request in 7)
9	3.998435000	10.0.0.1	10.0.0.2	ICMP	98	Echo (ping) request id=0x0e58, seq=5/1280, ttl=64 (reply in 10)
10	3.998464000	10.0.0.2	10.0.0.1	ICMP	98	Echo (ping) reply id=0x0e58, seq=5/1280, ttl=64 (request in 9)
11	4.998364000	10.0.0.1	10.0.0.2	ICMP	98	Echo (ping) request id=0x0e58, seq=6/1536, ttl=64 (reply in 12)
12	4.998392000	10.0.0.2	10.0.0.1	ICMP	98	Echo (ping) reply id=0x0e58, seq=6/1536, ttl=64 (request in 11)
13	5.007420000	d2:e8:37:9a:2a:da	82:50:78:76:ba:57	ARP	42	Who has 10.0.0.1? Tell 10.0.0.2
14	5.007430000	82:50:78:76:ba:57	d2:e8:37:9a:2a:da	ARP	42	10.0.0.1 is at 82:50:78:76:ba:57
15	5.998123000	10.0.0.1	10.0.0.2	ICMP	98	Echo (ping) request id=0x0e58, seq=7/1792, ttl=64 (reply in 16)
16	5.998314000	10.0.0.2	10.0.0.1	ICMP	98	Echo (ping) reply id=0x0e58, seq=7/1792, ttl=64 (request in 15)
17	6.998620000	10.0.0.1	10.0.0.2	ICMP	98	Echo (ping) request id=0x0e58, seq=8/2048, ttl=64 (reply in 18)
18	6.998656000	10.0.0.2	10.0.0.1	ICMP	98	Echo (ping) reply id=0x0e58, seq=8/2048, ttl=64 (request in 17)
19	7.998102000	10.0.0.1	10.0.0.2	ICMP	98	Echo (ping) request id=0x0e58, seq=9/2304, ttl=64 (reply in 20)
20	7.998153000	10.0.0.2	10.0.0.1	ICMP	98	Echo (ping) reply id=0x0e58, seq=9/2304, ttl=64 (request in 19)
21	8.998105000	10.0.0.1	10.0.0.2	ICMP	98	Echo (ping) request id=0x0e58, seq=10/2560, ttl=64 (reply in 22)
22	8.998132000	10.0.0.2	10.0.0.1	ICMP	98	Echo (ping) reply id=0x0e58, seq=10/2560, ttl=64 (request in 21)
23	18.731276000	fe80::7cb9:a7ff:fe83:1ff02::fb	ff02::fb	MDNS	107	Standard query 0x0000 PTR _ipps._tcp.local, "QM" question PTR _ipp._tcp.local, "QM" question

### (2) h2 : s1-eth2 when ping h1->h2

Capturing from s1-eth2 [Wireshark 1.10.6 (v1.10.6 from master-1.10)]

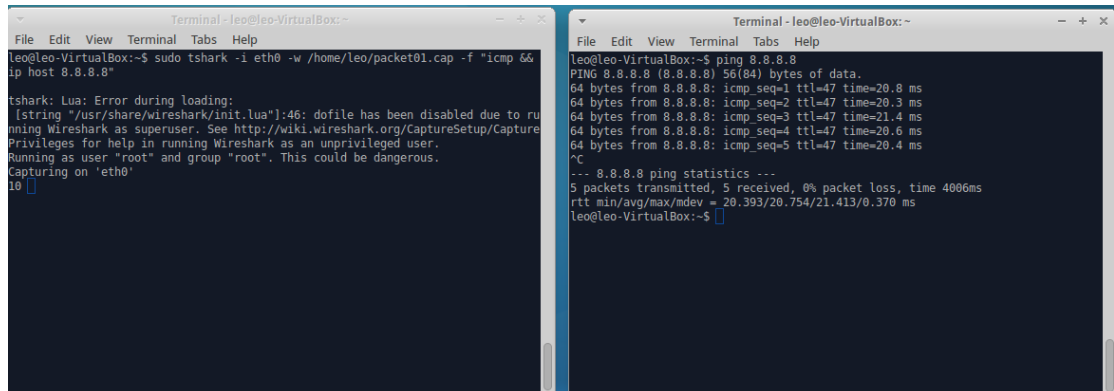
No.	Time	Source	Destination	Protocol	Length	Info
1	0.000000000	10.0.0.1	10.0.0.2	ICMP	98	Echo (ping) request id=0x0e6e, seq=1/256, ttl=64 (reply in 2)
2	0.000019000	10.0.0.2	10.0.0.1	ICMP	98	Echo (ping) reply id=0x0e6e, seq=1/256, ttl=64 (request in 1)
3	1.001010000	10.0.0.1	10.0.0.2	ICMP	98	Echo (ping) request id=0x0e6e, seq=2/512, ttl=64 (reply in 4)
4	1.001028000	10.0.0.2	10.0.0.1	ICMP	98	Echo (ping) reply id=0x0e6e, seq=2/512, ttl=64 (request in 3)
5	1.999920000	10.0.0.1	10.0.0.2	ICMP	98	Echo (ping) request id=0x0e6e, seq=3/768, ttl=64 (reply in 6)
6	1.999935000	10.0.0.2	10.0.0.1	ICMP	98	Echo (ping) reply id=0x0e6e, seq=3/768, ttl=64 (request in 5)
7	2.998908000	10.0.0.1	10.0.0.2	ICMP	98	Echo (ping) request id=0x0e6e, seq=4/1024, ttl=64 (reply in 8)
8	2.998925000	10.0.0.2	10.0.0.1	ICMP	98	Echo (ping) reply id=0x0e6e, seq=4/1024, ttl=64 (request in 7)
9	3.997908000	10.0.0.1	10.0.0.2	ICMP	98	Echo (ping) request id=0x0e6e, seq=5/1280, ttl=64 (reply in 10)
10	3.997924000	10.0.0.2	10.0.0.1	ICMP	98	Echo (ping) reply id=0x0e6e, seq=5/1280, ttl=64 (request in 9)
11	4.997557000	10.0.0.1	10.0.0.2	ICMP	98	Echo (ping) request id=0x0e6e, seq=6/1536, ttl=64 (reply in 12)
12	4.997575000	10.0.0.2	10.0.0.1	ICMP	98	Echo (ping) reply id=0x0e6e, seq=6/1536, ttl=64 (request in 11)
13	5.001877000	d2:e8:37:9a:2a:da	82:50:78:76:ba:57	ARP	42	Who has 10.0.0.1? Tell 10.0.0.2
14	5.003895000	82:50:78:76:ba:57	d2:e8:37:9a:2a:da	ARP	42	10.0.0.1 is at 82:50:78:76:ba:57
15	5.998139000	10.0.0.1	10.0.0.2	ICMP	98	Echo (ping) request id=0x0e6e, seq=7/1792, ttl=64 (reply in 16)
16	5.998157000	10.0.0.2	10.0.0.1	ICMP	98	Echo (ping) reply id=0x0e6e, seq=7/1792, ttl=64 (request in 15)
17	6.997657000	10.0.0.1	10.0.0.2	ICMP	98	Echo (ping) request id=0x0e6e, seq=8/2048, ttl=64 (reply in 18)
18	6.997673000	10.0.0.2	10.0.0.1	ICMP	98	Echo (ping) reply id=0x0e6e, seq=8/2048, ttl=64 (request in 17)
19	7.997765000	10.0.0.1	10.0.0.2	ICMP	98	Echo (ping) request id=0x0e6e, seq=9/2304, ttl=64 (reply in 20)
20	7.997781000	10.0.0.2	10.0.0.1	ICMP	98	Echo (ping) reply id=0x0e6e, seq=9/2304, ttl=64 (request in 19)
21	8.997553000	10.0.0.1	10.0.0.2	ICMP	98	Echo (ping) request id=0x0e6e, seq=10/2560, ttl=64 (reply in 22)
22	8.997569000	10.0.0.2	10.0.0.1	ICMP	98	Echo (ping) reply id=0x0e6e, seq=10/2560, ttl=64 (request in 21)

## Part 2:

### 1. tshark

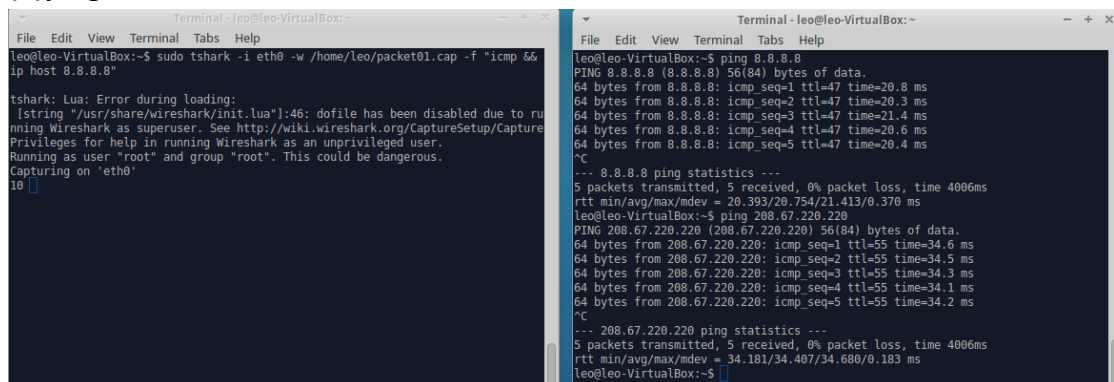
記錄指令 : `sudo tshark -i eth0 -w /home/leo/packet01.cap -f "icmp && ip host 8.8.8.8"`

(1) ping 8.8.8.8



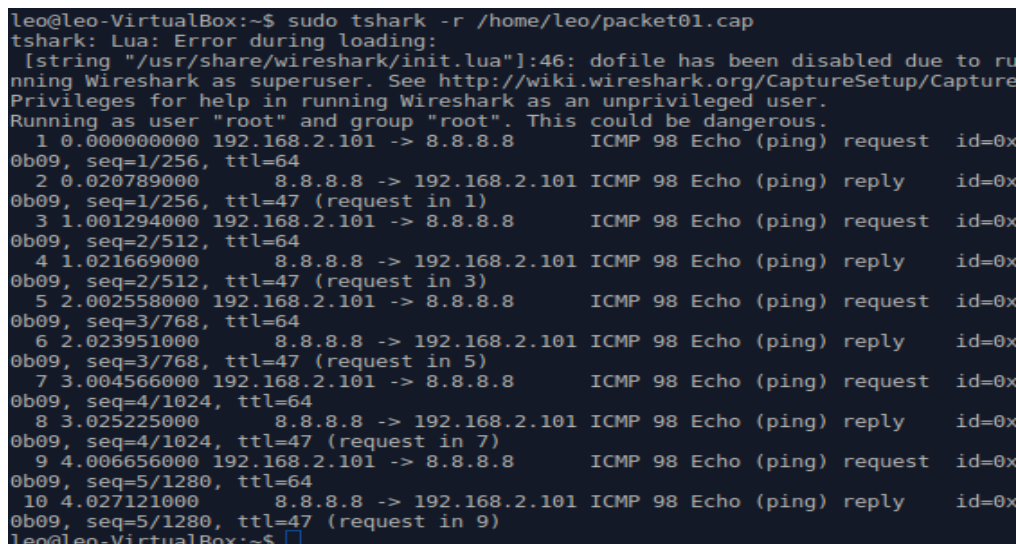
The first terminal window shows the execution of the tshark command to capture ICMP traffic to and from 8.8.8.8 on interface eth0, saving it to packet01.cap. It displays a Lua error message and confirms capturing on eth0. The second terminal window shows the results of a ping command to 8.8.8.8, displaying 5 successful pings with 0% packet loss and an average round-trip time of approximately 20.37 ms.

(2) ping 208.67.220.220



The first terminal window shows the execution of the tshark command to capture ICMP traffic to and from 208.67.220.220 on interface eth0, saving it to packet01.cap. It displays a Lua error message and confirms capturing on eth0. The second terminal window shows the results of a ping command to 208.67.220.220, displaying 5 successful pings with 0% packet loss and an average round-trip time of approximately 34.18 ms.

讀取指令 : `sudo tshark -r /home/leo/packet01.cap`



The terminal window shows the output of the tshark command to read the captured packet01.cap file. It displays a Lua error message and then shows the captured packets in a structured format, including packet number, time, source and destination IP addresses, protocol, and length. The output shows 10 packets, all of which are ICMP Echo (ping) requests and replies to and from 8.8.8.8.

## 2. tcpstat

指令 : `tcpstat -i eth0 -f 'icmp'`

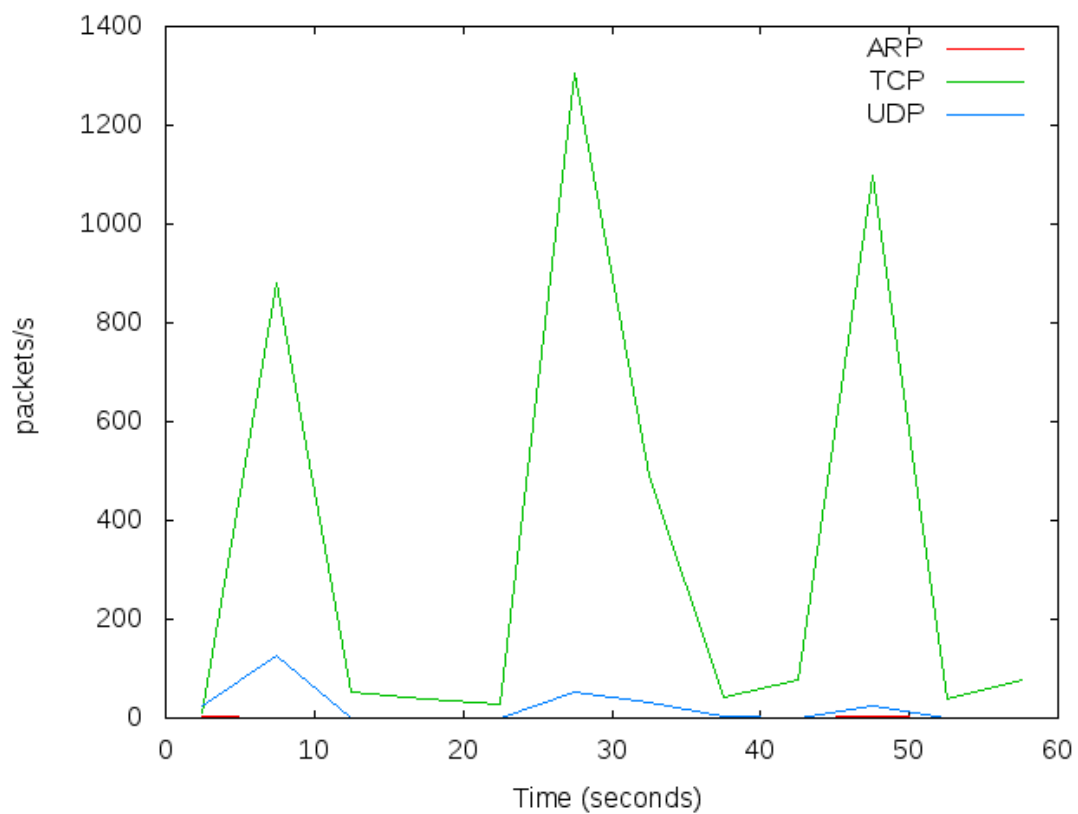
When ping 8.8.8.8

```
Terminal - leo@leo-VirtualBox: ~
File Edit View Terminal Tabs Help
leo@leo-VirtualBox:~$ sudo tcpstat -i eth0 -f 'icmp'
Time:1443793574 n=10 avg=84.00 stddev=0.00 bps=1344.00
Time:1443793579 n=10 avg=84.00 stddev=0.00 bps=1344.00

Terminal - leo@leo-VirtualBox: ~
File Edit View Terminal Tabs Help
leo@leo-VirtualBox:~$ 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=47 time=20.7 ms
64 bytes from 8.8.8.8: icmp_seq=2 ttl=47 time=20.8 ms
64 bytes from 8.8.8.8: icmp_seq=3 ttl=47 time=20.8 ms
64 bytes from 8.8.8.8: icmp_seq=4 ttl=47 time=20.5 ms
64 bytes from 8.8.8.8: icmp_seq=5 ttl=47 time=20.6 ms
64 bytes from 8.8.8.8: icmp_seq=6 ttl=47 time=20.6 ms
64 bytes from 8.8.8.8: icmp_seq=7 ttl=47 time=20.4 ms
64 bytes from 8.8.8.8: icmp_seq=8 ttl=47 time=20.6 ms
64 bytes from 8.8.8.8: icmp_seq=9 ttl=47 time=20.5 ms
64 bytes from 8.8.8.8: icmp_seq=10 ttl=47 time=21.4 ms
64 bytes from 8.8.8.8: icmp_seq=11 ttl=47 time=20.9 ms
^C
--- 8.8.8.8 ping statistics ---
11 packets transmitted, 11 received, 0% packet loss, time 10018ms
rtt min/avg/max/mdev = 20.498/20.753/21.411/0.292 ms
leo@leo-VirtualBox:~$
```

## 3. tcpdump & tcpstat & gnupolt

產生圖表如下圖：



## 4. netperf

(1) TCP指令 : `sudo netperf -H 140.117.171.242 -t TCP_STREAM`

```
Terminal - leo@leo-VirtualBox: ~
File Edit View Terminal Tabs Help
leo@leo-VirtualBox:~$ sudo netperf -H 140.117.171.242 -t TCP_STREAM
MIGRATED TCP STREAM TEST from 0.0.0.0 () port 0 AF_INET to 140.117.171.242 () port 0 AF_INET : demo
Recv  Send  Send
Socket Socket Message Elapsed
Size  Size  Size  Time  Throughput
bytes bytes bytes secs.  10^6bits/sec

87380 16384 16384 10.34 94.05
leo@leo-VirtualBox:~$
```

(2) UDP指令 : `sudo netperf -H 140.117.171.242 -t UDP_STREAM -- -R1`

```
Terminal - leo@leo-VirtualBox: ~
File Edit View Terminal Tabs Help
leo@leo-VirtualBox:~$ sudo netperf -H 140.117.171.242 -t UDP_STREAM -- -R 1
[sudo] password for leo:
MIGRATED UDP STREAM TEST from 0.0.0.0 () port 0 AF_INET to 140.117.171.242 () port 0 AF_INET : demo
Socket Message Elapsed Messages
Size  Size  Time  Okay Errors Throughput
bytes bytes secs  #      #      10^6bits/sec

163840 65507 10.00 40174 0 2105.05
212992 10.00 1139 59.68
leo@leo-VirtualBox:~$
```