高等電腦網路
HW2

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環境:VMware Ubuntu 14.04

1. 安裝 mininet，可藉由 apt-get install mininet 或其他方式完成安裝。

```
cpeter@ubuntu:~$ sudo apt-get install mininet
```

2. 使用"mn"可建立基本的虛擬拓樸。(需要 root)，切換到 root shell

```
cpeter@ubuntu:~$ mn
*** Mininet must run as root.
cpeter@ubuntu:~$ sudo -i
[sudo] password for cpeter:
root@ubuntu:~# mn
```

```
root@ubuntu:~# mn
*** Creating network
*** Adding controller
*** Adding hosts:
h1 h2
*** Adding switches:
s1
*** Adding links:
(h1, s1) (h2, s1)
*** Configuring hosts
h1 h2
*** Starting controller
*** Starting 1 switches
s1
*** Starting CLI:
```

3. 有幾個基本指令可以顯示現在的虛擬拓樸中節點資訊或鏈結的訊息等

```
mininet> nodes
available nodes are:
c0 h1 h2 s1
mininet> net
h1 h1-eth0:s1-eth1
h2 h2-eth0:s1-eth2
s1 lo:  s1-eth1:h1-eth0 s1-eth2:h2-eth0
c0
mininet> dump
<Host h1: h1-eth0:10.0.0.1 pid=4309>
<Host h2: h2-eth0:10.0.0.2 pid=4310>
<OVSSwitch s1: lo:127.0.0.1,s1-eth1:None,s1-eth2:None pid=4315>
<OVSController c0: 127.0.0.1:6633 pid=4301>
```

4. 請打開 wireshark，擷取兩個虛擬 host 的網卡，再使用 mininet 從 h1 ping h2，將你所看到的 wireshark 畫面擷取下來。

```
mininet> h1 ifconfig
h1-eth0   Link encap:Ethernet
          inet addr:10.0.0.1
```

```
mininet> h2 ifconfig
h2-eth0   Link encap:Ethernet
          inet addr:10.0.0.2
```

```
mininet> h1 ping h2
PING 10.0.0.2 (10.0.0.2) 56(84) bytes of data.
64 bytes from 10.0.0.2: icmp_seq=1 ttl=64 time=0.183 ms
64 bytes from 10.0.0.2: icmp_seq=2 ttl=64 time=0.045 ms
64 bytes from 10.0.0.2: icmp_seq=3 ttl=64 time=0.045 ms
64 bytes from 10.0.0.2: icmp_seq=4 ttl=64 time=0.054 ms
64 bytes from 10.0.0.2: icmp_seq=5 ttl=64 time=0.040 ms
```

lo.	Time	Source	Destination	Protocol	Length	Info
1	0.000000000	10.0.0.1	10.0.0.2	ICMP	98	Echo (ping) request i
2	0.000012000	10.0.0.2	10.0.0.1	ICMP	98	Echo (ping) reply i
3	-0.000085006	10.0.0.1	10.0.0.2	ICMP	98	Echo (ping) request i
4	0.000045000	10.0.0.2	10.0.0.1	ICMP	98	Echo (ping) reply i
5	0.998923000	10.0.0.1	10.0.0.2	ICMP	98	Echo (ping) request i
6	0.998957000	10.0.0.2	10.0.0.1	ICMP	98	Echo (ping) reply i

Part 2:

1. tshark

監聽並存檔:

tshark -i eth0 -f icmp -f "src host 8.8.8.8 or dst host 8.8.8.8" -w packet01

```
root@ubuntu:~# tshark -i eth0  -f icmp -f "src host 8.8.8.8 or dst host 8.8.8.8" -w packet01
```

讀檔:

tshark -r packet01

```
root@ubuntu:~# tshark -r packet01
tshark: Lua: Error during loading:
 [string "/usr/share/wireshark/init.lua"]:46: dofile has been disabled due to running Wireshark as superus
/CapturePrivileges for help in running Wireshark as an unprivileged user.
Running as user "root" and group "root". This could be dangerous.
  1 0.000000000 192.168.79.136 -> 8.8.8.8      ICMP 98 Echo (ping) request  id=0x19ea, seq=1/256, ttl=64
  2 0.020993000      8.8.8.8 -> 192.168.79.136 ICMP 98 Echo (ping) reply    id=0x19ea, seq=1/256, ttl=128
  3 1.001549000 192.168.79.136 -> 8.8.8.8      ICMP 98 Echo (ping) request  id=0x19ea, seq=2/512, ttl=64
  4 1.021834000      8.8.8.8 -> 192.168.79.136 ICMP 98 Echo (ping) reply    id=0x19ea, seq=2/512, ttl=128
  5 2.003667000 192.168.79.136 -> 8.8.8.8      ICMP 98 Echo (ping) request  id=0x19ea, seq=3/768, ttl=64
```

2. tcpstat

監聽

tcpstat -i eth0 -f icmp

選擇 ping 8.8.8.8

```
cpeter@ubuntu:~$ ping 8.8.8.8
PING 8.8.8.8 (8.8.8.8) 56(84)
64 bytes from 8.8.8.8: icmp_se
64 bytes from 8.8.8.8: icmp_se
64 bytes from 8.8.8.8: icmp_se
```

監測到的

```
root@ubuntu:~# tcpstat -i eth0 -f icmp
Time:1443888529 n=10    avg=84.00       stddev=0.00     bps=1344.00
Time:1443888534 n=10    avg=84.00       stddev=0.00     bps=1344.00
```

3. tcpdump & tcpstat & gnupolt

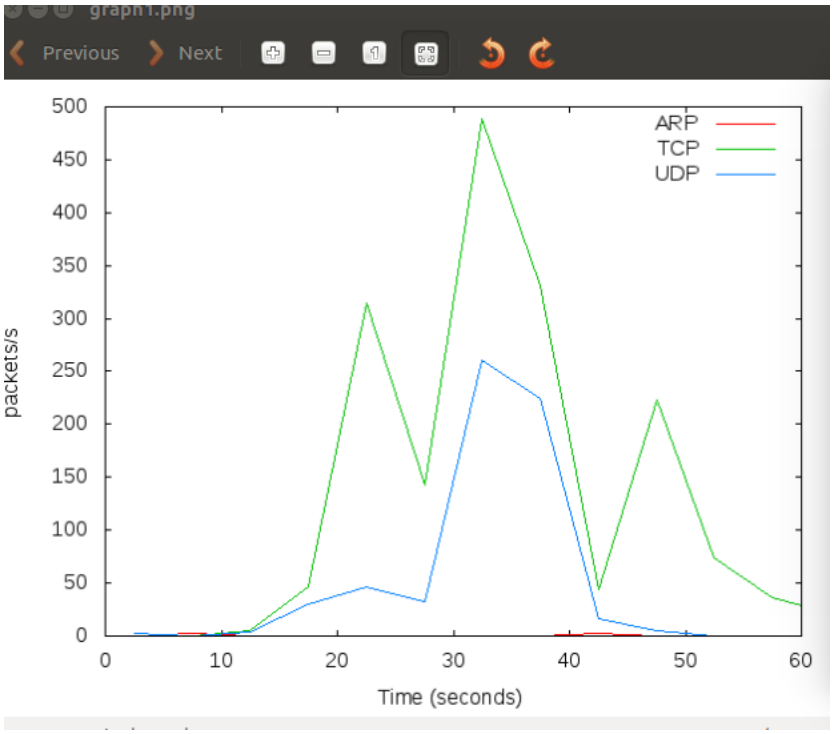
```
root@ubuntu:~# tcpdump -i eth1 -w rawdata.dmp
tcpdump: eth1: No such device exists
(SIOCGIFHWADDR: No such device)
root@ubuntu:~# tcpdump -i eth0 -w rawdata.dmp
tcpdump: listening on eth0, link-type EN10MB (Ether
```

開啟瀏覽器瀏覽網頁約一分鐘，中斷 tcpdump

```
root@ubuntu:~# tcpdump -i eth0 -w rawdata.dmp
tcpdump: listening on eth0, link-type EN10MB (Ethern
s
^C^C3512 packets captured
3512 packets received by filter
0 packets dropped by kernel
```

利用 gnupolt 繪圖，產生如下的圖表

```
root@ubuntu:~# gnuplot /home/cpeter/Desktop/script1 > graph1.png
```



4. netperf

時間我測 15 秒

a. 測量你的電腦與 Server 間的 TCP 網路效能

b. 測量你的電腦與 Server 間的 UDP 網路效能

c. 請寫出正確的指令並截圖證明。

(a)netperf TCP_STREAM -H 140.117.171.242 -l 15

```
root@ubuntu:~# netperf TCP_STREAM -H 140.117.171.242 -l 15
MIGRATED TCP STREAM TEST from 0.0.0.0 (0.0.0.0) port 0 AF_INET to 140.117.171.24
2 () 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  87380  87380    19.00       0.19
```

(b) netperf UDP_STREAM -H 140.117.171.242 -l 15

```
root@ubuntu:~# netperf UDP_STREAM -H 140.117.171.242 -l 15
MIGRATED TCP STREAM TEST from 0.0.0.0 (0.0.0.0) port 0 AF_INET to 140.117.171.24
2 () 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  87380  87380    19.00       0.19
```