

1. Linux Networking Commands (15%)

1. 測試是否可以上網(從樹莓派輸入指令)

```
E94117013@raspberrypi:~ $ 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=112 time=143 ms
64 bytes from 8.8.8.8: icmp_seq=2 ttl=112 time=169 ms
64 bytes from 8.8.8.8: icmp_seq=3 ttl=112 time=294 ms
64 bytes from 8.8.8.8: icmp_seq=4 ttl=112 time=35.6 ms
^C
--- 8.8.8.8 ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3004ms
rtt min/avg/max/mdev = 35.607/160.541/294.446/92.085 ms
E94117013@raspberrypi:~ $
```

2. 查看隨便一個網址(e.g. google.com, apple.com, etc.)的ip

```
E94117013@raspberrypi:~ $ dig facebook.com

; <<>> DiG 9.16.33-Raspbian <<>> facebook.com
;; global options: +cmd
;; Got answer:
;; -->HEADER<-- opcode: QUERY, status: NOERROR, id: 13389
;; flags: qr rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 4, ADDITIONAL: 9

;; OPT PSEUDOSECTION:
;; EDNS: version: 0, flags:; udp: 4096
;; QUESTION SECTION:
;facebook.com.                IN      A

;; ANSWER SECTION:
facebook.com.                253     IN      A      31.13.87.36

;; AUTHORITY SECTION:
facebook.com.                171096  IN      NS      b.ns.facebook.com.
facebook.com.                171096  IN      NS      d.ns.facebook.com.
facebook.com.                171096  IN      NS      a.ns.facebook.com.
facebook.com.                171096  IN      NS      c.ns.facebook.com.

;; ADDITIONAL SECTION:
a.ns.facebook.com.          172529  IN      A      129.134.30.12
a.ns.facebook.com.          171096  IN      AAAA    2a03:2880:f0fc:c:face:b00c:0:35
b.ns.facebook.com.          171096  IN      A      129.134.31.12
b.ns.facebook.com.          171096  IN      AAAA    2a03:2880:f0fd:c:face:b00c:0:35
c.ns.facebook.com.          85820   IN      A      185.89.218.12
c.ns.facebook.com.          85820   IN      AAAA    2a03:2880:f1fc:c:face:b00c:0:35
d.ns.facebook.com.          171096  IN      A      185.89.219.12
d.ns.facebook.com.          172529  IN      AAAA    2a03:2880:f1fd:c:face:b00c:0:35

;; Query time: 10 msec
;; SERVER: 192.168.137.1#53(192.168.137.1)
;; WHEN: Sun Nov 27 07:04:51 GMT 2022
;; MSG SIZE rcvd: 300
```

3. 查看到那個網頁的路徑

```
E94117013@raspberrypi:~ $ traceroute facebook.com
traceroute to facebook.com (31.13.87.36), 30 hops max, 60 byte packets
 1  DESKTOP-3AGD83N.mshome.net (192.168.137.1) 2.965 ms * *
 2  * * *
 3  140.116.118.253 (140.116.118.253) 6.070 ms 6.093 ms 6.082 ms
 4  140.116.243.33 (140.116.243.33) 3.949 ms 3.951 ms 3.969 ms
 5  140.116.243.193 (140.116.243.193) 4.105 ms 4.841 ms 4.854 ms
 6  140.116.243.177 (140.116.243.177) 5.950 ms 4.818 ms 4.348 ms
 7  192.192.61.146 (192.192.61.146) 6.321 ms 6.072 ms 5.706 ms
 8  192.192.61.24 (192.192.61.24) 9.581 ms 9.377 ms 9.161 ms
 9  192.192.61.48 (192.192.61.48) 9.578 ms 9.380 ms 9.542 ms
10  192.192.61.58 (192.192.61.58) 9.156 ms 9.192 ms 9.362 ms
11  ae5.pr01.tpe1.tfbnw.net (157.240.71.56) 63.722 ms 62.723 ms 62.268 ms
12  po111.asw02.tpe1.tfbnw.net (147.75.213.152) 9.485 ms po111.asw01.tpe1.tfbnw.net (147.75.213.150) 9.842 ms 9.727 ms
13  po294.psw01.tpe1.tfbnw.net (147.75.212.245) 9.387 ms po261.psw03.tpe1.tfbnw.net (147.75.213.59) 9.756 ms po236.psw03.tpe1.tfbnw.net (147.75.213.97) 9.433 ms
14  157.240.38.133 (157.240.38.133) 9.475 ms 173.252.67.115 (173.252.67.115) 9.048 ms 173.252.67.11 (173.252.67.11) 9.132 ms
15  edge-star-mini-shv-01-tpe1.facebook.com (31.13.87.36) 9.213 ms 8.754 ms 12.155 ms
E94117013@raspberrypi:~ $
```

2. RaspAP (15%)

1. 更改 Hotspot 名稱&密碼(要 Save settings, Restart hotspot)，安全起見不要設定的太簡單，但自己要能記住。

Basic Security Advanced Logging

Basic settings

Interface

wlan0

SSID

書沒派

Wireless Mode

802.11g - 2.4 GHz

Channel

1

Save settingsStop hotspotRestart hotspot

2. 測試是否可以上網(從電腦輸入指令)

用 ipconfig 或 ping 10.3.141.1

```
C:\Users\USER>ipconfig

Windows IP 設定

乙太網路卡 乙太網路:

    媒體狀態 . . . . . : 媒體已中斷連線
    連線特定 DNS 尾碼 . . . . . :

無線區域網路介面卡 區域連線* 1:

    媒體狀態 . . . . . : 媒體已中斷連線
    連線特定 DNS 尾碼 . . . . . :

無線區域網路介面卡 區域連線* 10:

    媒體狀態 . . . . . : 媒體已中斷連線
    連線特定 DNS 尾碼 . . . . . :

無線區域網路介面卡 Wi-Fi:

    連線特定 DNS 尾碼 . . . . . :
    連結-本機 IPv6 位址 . . . . . : fe80::8743:4354:b041:43c3%10
    IPv4 位址 . . . . . : 10.3.141.64
    子網路遮罩 . . . . . : 255.255.255.0
    預設閘道 . . . . . : 10.3.141.1

C:\Users\USER>
```

C:\Windows\system32\cmd.exe

Microsoft Windows [版本 10.0.19044.2251]
(c) Microsoft Corporation. 著作權所有，並保留一切權利。

C:\Users\USER>ping 10.3.141.1

Ping 10.3.141.1 (使用 32 位元組的資料):
回覆自 10.3.141.1: 位元組=32 時間=5ms TTL=64
回覆自 10.3.141.1: 位元組=32 時間=6ms TTL=64
回覆自 10.3.141.1: 位元組=32 時間=5ms TTL=64
回覆自 10.3.141.1: 位元組=32 時間=6ms TTL=64

10.3.141.1 的 Ping 統計資料:
封包: 已傳送 = 4, 已收到 = 4, 已遺失 = 0 (0% 遺失),
大約的來回時間 (毫秒):
最小值 = 5ms, 最大值 = 6ms, 平均 = 5ms

3. 將手機連上 AP，測試是否可以連到手機

```
E94117013@raspberrypi:~ $ ping 10.3.141.61
PING 10.3.141.61 (10.3.141.61) 56(84) bytes of data.
64 bytes from 10.3.141.61: icmp_seq=1 ttl=64 time=2.85 ms
64 bytes from 10.3.141.61: icmp_seq=2 ttl=64 time=5.89 ms
64 bytes from 10.3.141.61: icmp_seq=3 ttl=64 time=87.9 ms
64 bytes from 10.3.141.61: icmp_seq=4 ttl=64 time=3.91 ms
64 bytes from 10.3.141.61: icmp_seq=5 ttl=64 time=27.1 ms
^C
> --- 10.3.141.61 ping statistics ---
5 packets transmitted, 5 received, 0% packet loss, time 4006ms
rtt min/avg/max/mdev = 2.850/25.529/87.857/32.418 ms
E94117013@raspberrypi:~ $
```

手机 ip

Client list



Active DHCP leases

Expire time	MAC Address	IP Address	Host name	Client ID
1669761726	74:40:bb:37:a7:a3	10.3.141.64	DESKTOP-3AGD83N	01:74:40:bb:37:a7:a3
1669760685	6a:9e:78:94:3e:e7	10.3.141.61	*	01:6a:9e:78:94:3e:e7

4. 給電腦設定一個固定 IP:10.3.141.xx (與原本 DHCP 配發的 IP 相同即可)

Static leases

Clients with a particular hardware MAC address can always be allocated the same IP address. This option adds **dhcp-host** entries to the dnsmasq configuration.

74:40:bb:37:a7:a3	10.3.141.64	DESKTOP-3AGD83N	
MAC address	IP address	Optional comment	

Restrict access

☒ Limit network access to static clients

Enable this option if you want RaspAP to **ignore any clients** which are not specified in the static leases list. This option adds **dhcp-ignore** to the dnsmasq configuration.

Save settings	Stop dnsmasq
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Information provided by Dnsmasq

5. 查看從此電腦 (10.3.141.xx) 到 google.com 的路徑為何

```
C:\Users\USER>tracert google.com
```

在上限 30 個躍點上

追蹤 google.com [172.217.160.110] 的路由:

```
 1      2 ms      2 ms      2 ms  10.3.141.1
 2      8 ms      5 ms      5 ms  140.116.118.253
 3      7 ms      5 ms      3 ms  140.116.243.33
 4      7 ms      8 ms      3 ms  140.116.243.193
 5      8 ms      4 ms      4 ms  140.116.243.177
 6      8 ms      4 ms      6 ms  192.192.61.146
 7     12 ms      8 ms      8 ms  192.192.61.24
 8     13 ms     10 ms      9 ms  192.192.61.184
 9     13 ms     13 ms     10 ms  192.192.61.203
10     15 ms     14 ms      9 ms  72.14.202.60
11     13 ms     10 ms     11 ms  172.253.50.121
12    366 ms     17 ms     11 ms  108.170.225.177
13     14 ms     10 ms     10 ms  tsa03s06-in-f14.1e100.net [172.217.160.110]
```

追蹤完成。

```
C:\Users\USER>_
```