

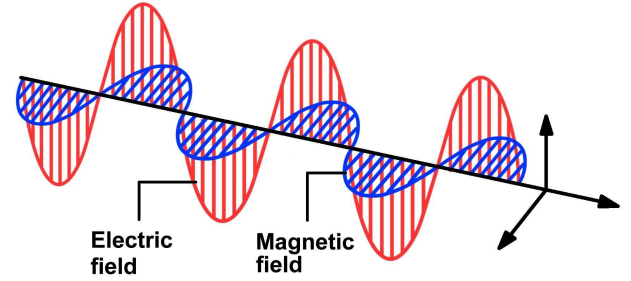
Wireless Network

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Introduction

Wireless transmission

- Signal: Electromagnetic wave
- Single access point



Wireless system

- Face end users directly, with multiple systems working in backend.
- When the connection is unstable, administrators have to find out the reasons in those layers, that is, Wireless network design, Wireless system, Wired network, Firewall.
- Moreover, it can be a problem within the environment.
 - Corner with little signal
 - Interference resulting from other devices



Security Protocol

Wireless encryption standards

- WEP (Wired Equivalent Privacy)
 - First 802.11 security standard
 - Hackable!
- WPA (WiFi Protected Access)
- WPA2

2.4G v.s. 5G

- Actually, the unit is Hz (2.4GHz and 5GHz), which means that they are frequencies.
- The lower frequency is, the energy decays slower than a higher frequency when penetrating objects. That's why it can be transmitted farther.
- Note that, there are many devices that also transmit in 2.4GHz, e.g. Bluetooth.

Laboratory

Signal Strength (RSSI)

RSSI (Received Signal Strength Indication)

- Representation: -47 dBm
- $\text{dBm} = 10 \log_{10} (\text{mW})$
 - AP 很少發送超過 100 mW 的訊號強度
 - 越大越好

那麼，到底 2.4G 和 5G 的訊號比起來如何呢？

let $x = \{\text{組別編號}\}$, $y = \text{Math.ceil}(x / 7)$

請到 $10y$ 教室測量訊號，每間教室皆有 $10y_{2.4G}$ 和 $10y_{5G}$ 兩個 SSID，分別站在以下三個位置測量訊號強度及傳輸速率。（測量工具請參考投影片末的 Resources）

1. AP 最近點
2. 門口
3. 教室的牆壁外

註：lab 時測的 $204_{2.4G}$ 和 204_{5G} 也是可以的，但測量的位置圖請自行繪製，並標注講台和 AP 位置。

Format

SSID: 10x_xG
Strength: ___ dBm
Transmission rate: _ Mbps
Position:



Question

1. 在每間教室指定的三個點分別對 2.4G 和 5G 進行實測，格式如前頁。（也就是，答案應該要有 3 x 2 個結果）
2. 分析 csie 和 csie-5G 是分別發送什麼頻段的訊號（2.4G/5G，答案可能不只一個）。

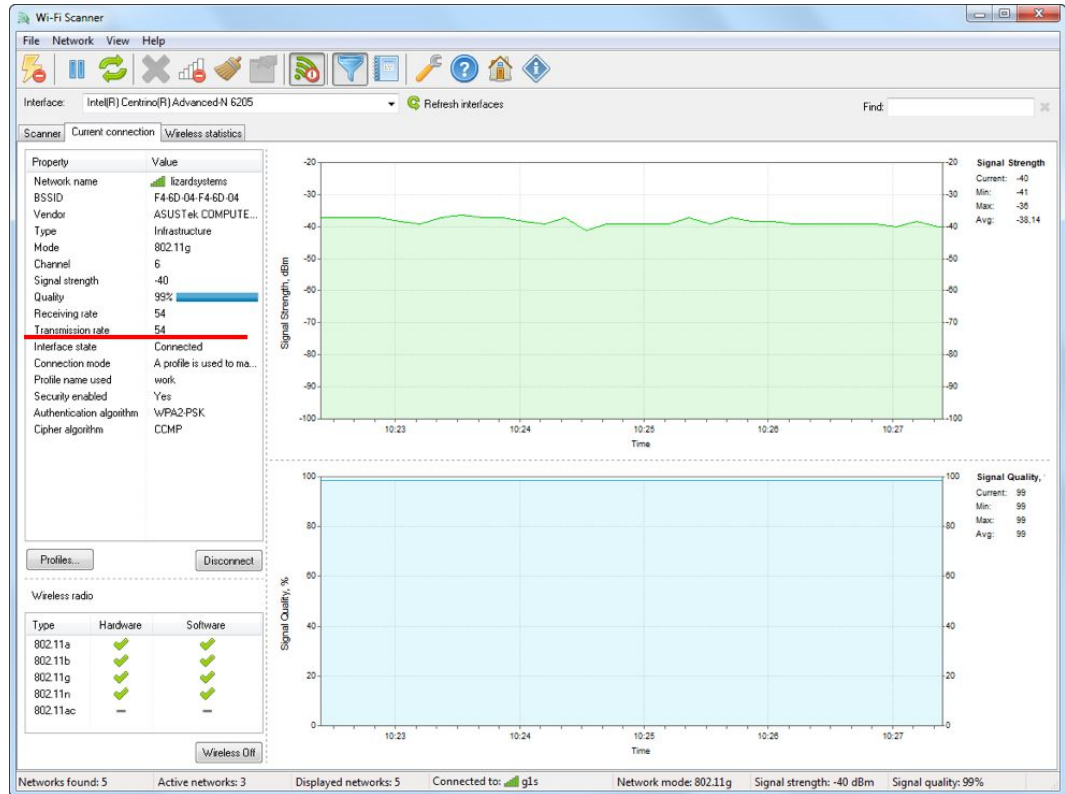
Note:

- 如果網卡不支援 5G，為避免影響問題的答案，可以和同學借電腦進行實測（但勿照抄），無法借得電腦者可以聯繫助教請求協助。
- 檔名：`wifi_<學號>.pdf`
- 放在 Hw7 資料夾中一起壓縮成 .zip 繳交。

Resources

Transmission rate (Windows)

[LizardSystems Wi-Fi Scanner](#)



Transmission rate (Mac OSX)

Press “option” + , and you’ll see.



Transmission rate (Linux)

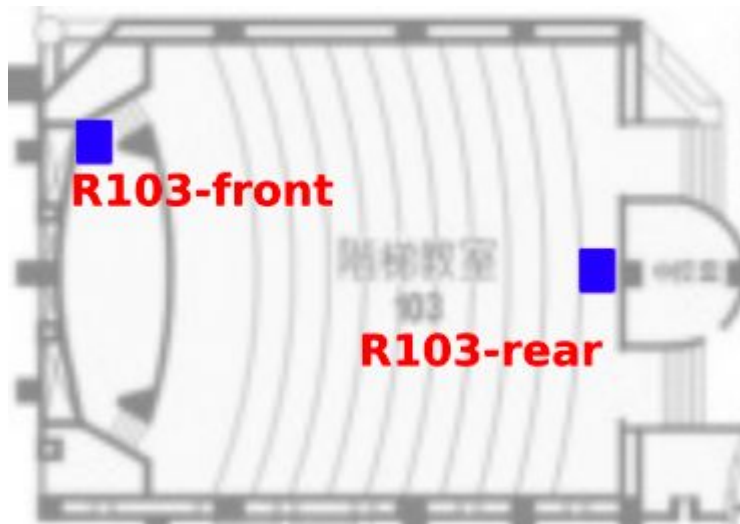
iwconfig

```
wlan0 IEEE 802.11abgn ESSID:"nixcraft5g"  
Mode:Managed Frequency:5.18 GHz Access Point: 74:44:44:44  
Bit Rate=6 Mb/s Tx-Power=15 dBm  
Retry long limit:7 RTS thr:off Fragment thr:off  
Encryption key:off  
Power Management:off  
Link Quality=41/70 Signal level=-69 dBm  
Rx invalid nwid:0 Rx invalid crypt:0 Rx invalid frag:0  
Tx excessive retries:0 Invalid misc:28 Missed beacon:0
```

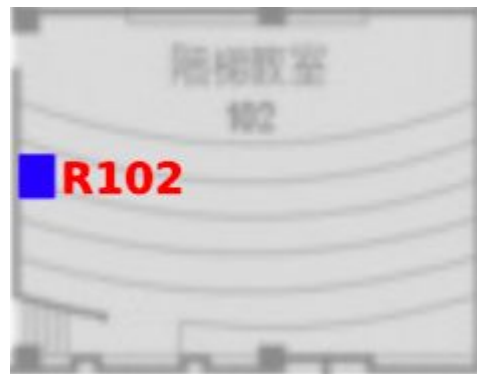
教室俯視圖



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