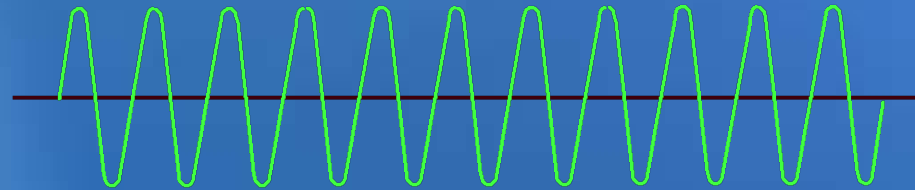


Radio Spectrum

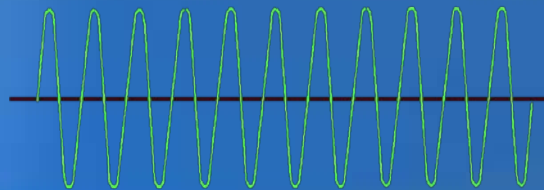
Radio Waves

Radio waves are electromagnetic waves.

They can have different frequencies. The set of all frequencies from 0Hz to infinity is known as the radio spectrum.



Low frequency



High frequency

Channel Sharing

- Radio waves travel or propagate through a common channel that everybody can potentially access.
- We must work out some method of sharing it. This process is called multiplexing.
- One way is to allocate every user a separate band of frequencies. We call this Frequency Division Multiplexing (FDM).



- The radio spectrum is very crowded!



Regulating the Radio Spectrum

The government owns the radio spectrum and regulates it.

- In Hong Kong, this is performed by The Office of the Communications Authority (OFCA)

<http://www.ofca.gov.hk/>

The governments of different countries must coordinate their regulation.

- OFCA does this with the International Telecommunications Union (ITU), an organization under the United Nations and headquartered in Geneva, Switzerland

<http://www.itu.int/>

Dividing the Radio Spectrum

Generally you must obtain a license (e.g., from OFCA) to use the radio spectrum.

Sometimes, the government sells parts of the spectrum through an auction.

- 700MHz spectrum auctioned for HK\$160B (2008)
- 3G spectrum auctioned for HK\$300B in Germany/UK
- UK 4G bands (2.6GHz) auctioned for HK\$24B (2013)
- HK 4G bands auctioned for HK\$1.54B in HK (2013)

This is thought more efficient since it allows the spectrum to be allocated by the free market.

Hong Kong Mobile Phone Allocations

Three

- 827.5-835/872.5-880MHz
- 897.5-905/942.5-950MHz
- 1765-1770/1860-1865 MHz
- 1964.9 - 1979.7/ 2154.9 - 2169.7/2019.7 - 2024.7 MHz (3G)
- 2515-2520 and 2635-2640 MHz

PCCW Mobile

- 1775-1789/1870-1875MHz
- 1920.3 - 1935.1/2110.3 - 2125.1/ 1914.9 - 1919.9 MHz (3G)

China Mobile

- 1755-1760/1850-1855MHz
- 2530-2535 and 2650-2655MHz

SmarTone

- 907.5-915/952.5/960MHz
- 1745-1750/1840-1845MHz (DCS1800)
- 1950.1 - 1964.9/2140.1 - 2154.9/1909.9 - 1914.9 MHz (3G)
- 2520-2530 and 2640-2650MHz

CSL

- 835-842.5/880-887.5MHz
- 890-897.5/935-942.5MHz
- 1725-1730/1820-1825MHz
- 1735-1740/1830-1835MHz
- 1935.1 - 1949.9/ 2125.1 - 2139.9/ 1904.9 - 1909.9 MHz (3G)
- 2535-2540 and 2655-2660MHz