

## Review Sheet for Wireless Communication Devices

### History

Wireless communication is the transfer of information without a physical connection. A transmitter sends a signal which is picked up by a receiver.

Heinrich Hertz demonstrated Maxwell's ideas in the laboratory, showing that radio waves obeyed the same laws (geometric optics, polarization, etc) as visible light.

Nikola Tesla contributed many inventions essential to wireless communication and holds the US patent for the invention of the radio.

Guglielmo Marconi helped compile the inventions of other scientists and envisioned uses for radio.

Early uses for radio included ship warning systems, public broadcasting, long distance communication and radar.

The spark gap transmitter uses mutual inductance to transform a DC power supply into an AC signal with a stepped up current. An electromagnetic wave is released at the sparks. Changing the capacitance allows one to fine-tune the circuit's resonant frequency.

### Radio

EM waves at audible frequencies would be hard to generate, so a carrier frequency is used

There are several technologies for doing this (AM, FM, DAB, and others)

AM radio uses a simple receiving circuit

The transmitted signal is obtained by multiplying the carrier and the message+1; the message cannot have an amplitude greater than 1

The transmitted signal is composed of three frequencies – the carrier and two sidetones

### Cell Phones

Compared to radio, cell phones use less power, have greater range, and use frequencies more efficiently  
Cities are divided into cells in order to reuse a limited number of frequencies

Cell phones use one frequency for talking and one for listening, compared to two-way radios which use only one channel for both. The set of two frequencies is a voice channel

There are several modes of subdividing available frequency bands; the three which are popular today are FDMA, TDMA and CDMA

There are four generations of cell phone technology, starting with 0G, analog phones with large power supplies, and ending with today's 3G, small digital phones with very high transfer rates

Cell phones can interfere with air traffic communications, leaving the country will make cell phone use difficult, and cell phones might or might not emit radiation which is harmful to humans

### Wi-Fi Networks

The first Wi-Fi products were created in 1991.

Wi-Fi uses radio waves and operates similarly to a two-way radio

A network uses a Spoke-Hub structure or a Mesh structure

Networks follow 802.11 Networking Standards set up by the Institute of Electrical and Electronics Engineers(IEEE)

WEP, PWA, and MAC address filtering are common forms of wireless security