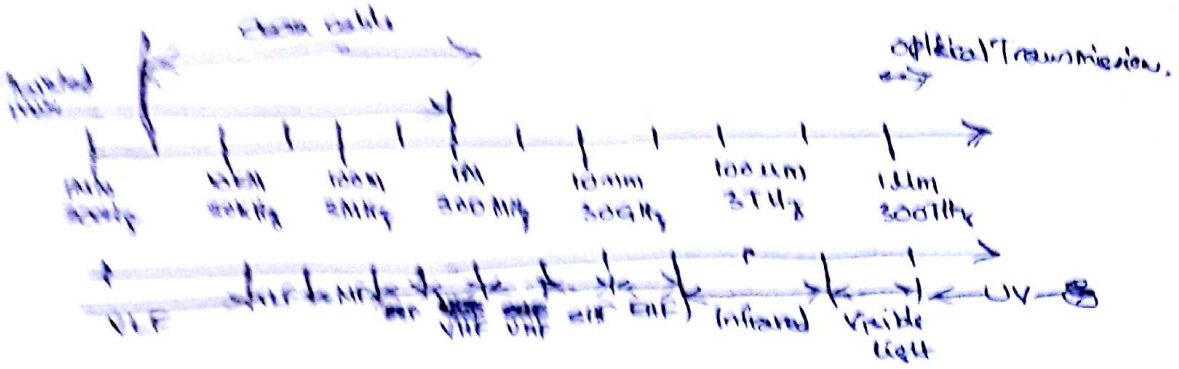
Frequencies for radio transmission:



Radio transmission can take place using many different frequency bands.

Radio frequencies stretch from 3 kHz to 300 THz.

wavelength λ is directly coupled to the frequency f through a equation

$$\lambda = \frac{c}{f} \quad \text{where} \quad c = 3 \cdot 10^8 \text{ m/s (speed of light)}$$

traditional directed radio frequencies upto several hundred kHz used up upto some 100 km

Coaxial cables several hundred MHz worked with several KM (wave length)

fiber optics are used for freq ranges of several hundred THz but the wave length in nm.

VLF → very long waves

LF → these are used in submarines, becoz they can penetrate water and can follow the earth's surface.

some radio stations use these freq in Germany

MF & HF → these are typical for transmission of hundreds of radio stations

AM - Amplitude modulation : 520 KHz - 1605.5 KHz

SW - Shortwave mode : 5.9 MHz - 26.1 MHz

FM - Frequency mode : 87.5 MHz - 108 MHz.

These are fixed by national regulation vary from country to country

VHF - UHF → conventional analog TV is transmitted

174 - 230 MHz to 470 - 790 MHz

DAB (digital audio broadcasting)

digital TV - (223 - 230 MHz to 1452 - 1472 MHz (470 to 862 MHz))

UHF used for mobile phones — analog tech (450-465MHz)
digital GSM (890-960MHz) to (1710-1880MHz)
digital cordless phones (DECT) — (1880-1900 MHz)
3G cellular System — 1900-1980MHz, 2020-2025MHz, 2110-2190 MHz)

UHF allow for small antennas and there are relatively reliable connection for mobile telephony

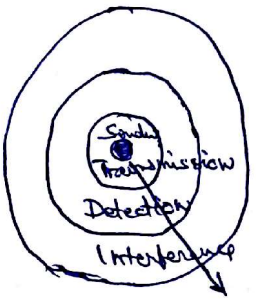
SHF Super high frequencies used for directed Microwave links (2-40 GHz)
fixed Satellite services C band 4 to 4GHz
Ku-band 11 to 14GHz
Ka-band (19 to 29 GHz)

Infra Red (IR) - connect different building via laser links.
wavelengths aprox (850-900 nm)
to connect laptops, PDA's

finally visible light has been used for wireless transmission for thousands optical transmissions.

Light is not reliable due to interference but it is useful built in human receivers

Signal propagation



Transmission range: With in certain radius of the sender transmission is possible with low error rate

Detection range: Within a second radius, detection of the transmission is possible error rate is too high to establish communicat

Interference range: With in a third even larger radius, the sender may interfere with other transmission by adding to the background noise. A receive will not be able to detect the signals.