

Unguided media

- ▶ Unguided transmission media, also called wireless media, are used to transmit data over the air without the use of physical cables.
- ▶ Unguided media uses electromagnetic waves to transmit signals without physical conductors.
- ▶ provide flexible, allowing mobility
- ▶ Unguided media refers to communication channels that transmit data without the use of physical conductors, relying instead on electromagnetic waves to propagate through the air, vacuum, or other mediums.

Unguided media

Infrared

Laser

Unguided media

Radio

Microwave

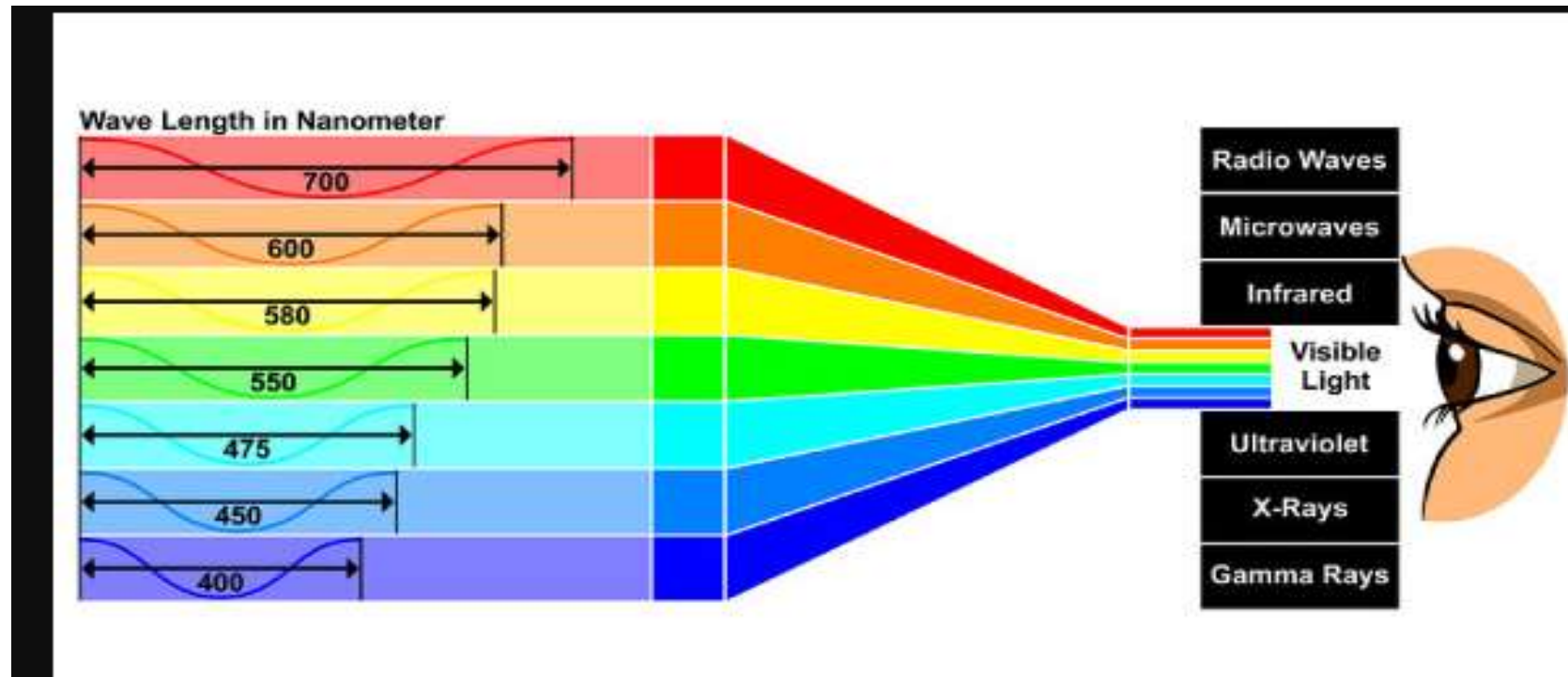


Microwave

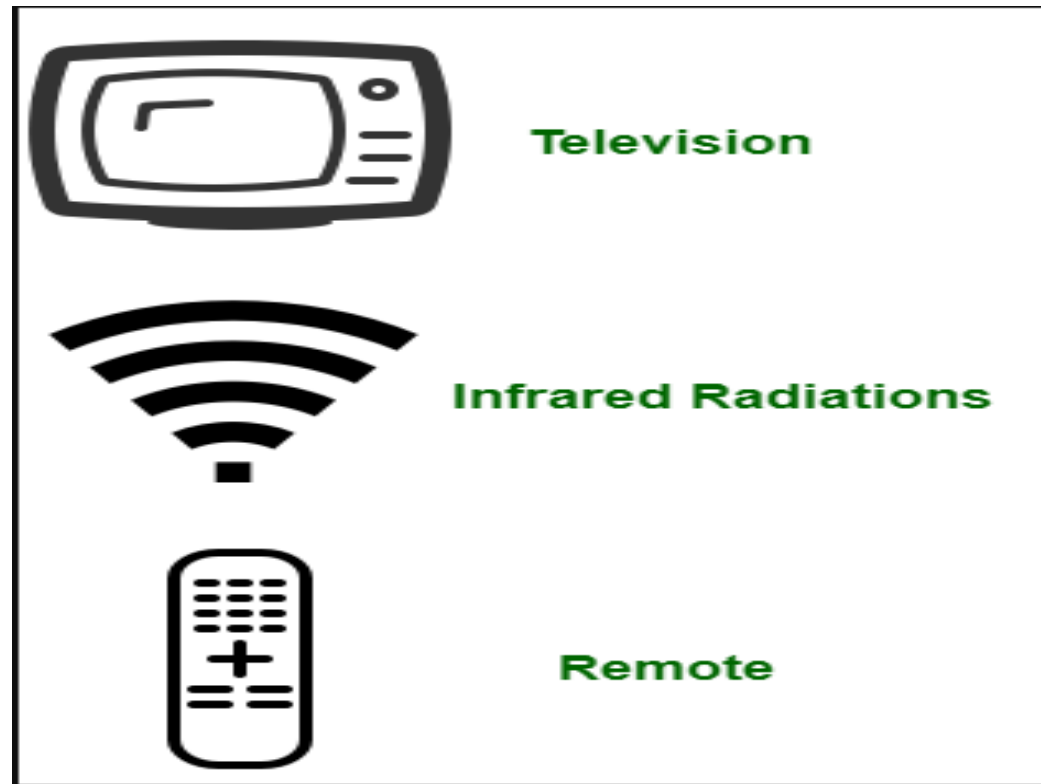
Unguided media

Bluetooth

Infrared



Infrared



Infrared

- ▶ Infrared communication is a wireless technology used for transmitting data over short distances, like in remote controls, and some older devices such as PDAs (Personal Digital Assistants) or early laptops.
- ▶ **Wavelength: 700 nm to 1.4 μm** (micrometers)
- ▶ Infrared radiation (IR) has a frequency range of 300 gigahertz (GHz) to 400 terahertz (THz)

infrared application & Range

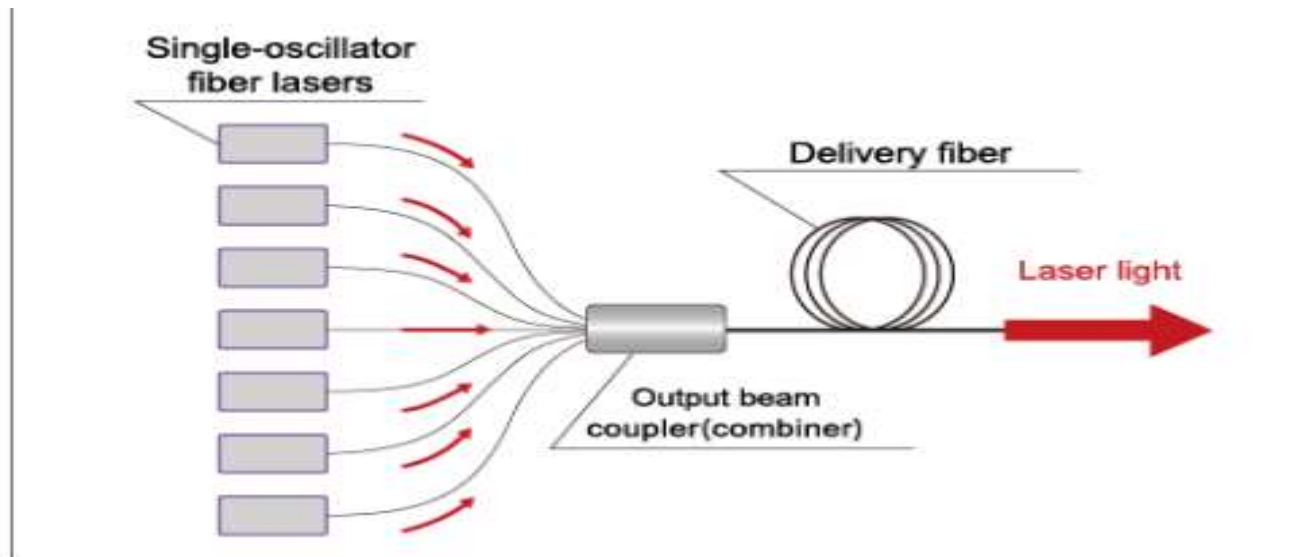
- ▶ TV remotes
- ▶ wireless mouse, keyboard, printer
- ▶ The range of infrared (IR) communication is usually around 10 meters, but can vary depending on the specific application:

Laser

- ▶ Laser communication, also known as optical or free-space communications, uses modulated laser beams to send and receive information wirelessly between two points
- ▶ Laser is safe for data transmission as it is very difficult to tap 1mm wide laser without interrupting the communication channel.
- ▶ Lasers cannot penetrate obstacles such as walls, rain, and thick fog. Additionally, laser beam is distorted by wind, atmosphere temperature, or variation in temperature in the path.
- ▶ wavelengths between 180 and 400 nanometers (nm)

Laser

- ▶ Lasers can be used as a communication system. Unlike the tiny LEDs used in fibre-optic communication, this method uses high power laser beams to transmit light signals.



Laser uses

- Campus wide communication
- Emergency data links (disaster relief etc)
- Outdoor events requiring high speed data feeds
- Building - to - Building communication
- Satellite to Satellite communication
- Backup network in case main cabled network fails

Advantages & Disadvantages

- ▶ Wide bandwidth compared to infrared
 - ▶ Can be set up quickly (compared to laying cable)
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- ▶ Affected by weather (at least on Earth)
 - ▶ Requires line-of-sight to work

Radio

- ▶ As radio waves travel at a speed similar to that of light and are slowed down based on that object's permittivity and permeability while passing through an object.
- ▶ A radio antenna is used to receive radio signals from AM or FM radio stations.
- ▶ Radio waves are the waves having the longest wavelength in the electromagnetic spectrum.
- ▶ Radio signals are broadcast using AM (or Amplitude Modulation) and FM (or Frequency Modulation). Electromagnetic waves are used to transfer data in both cases.

Radio

- ▶ Radio waves are used in radio and television broadcasting, mobile phones, smart meters, and satellite communications. Radio waves are ideal for communication because they can easily pass through the air, and they don't harm the human body if absorbed
- ▶ The wavelength of radio waves ranges from a few millimeters to hundreds of kilometers

Radio

