



Dr. SNS RAJALAKSHMI COLLEGE OF
ARTS AND SCIENCE
(AUTONOMOUS)

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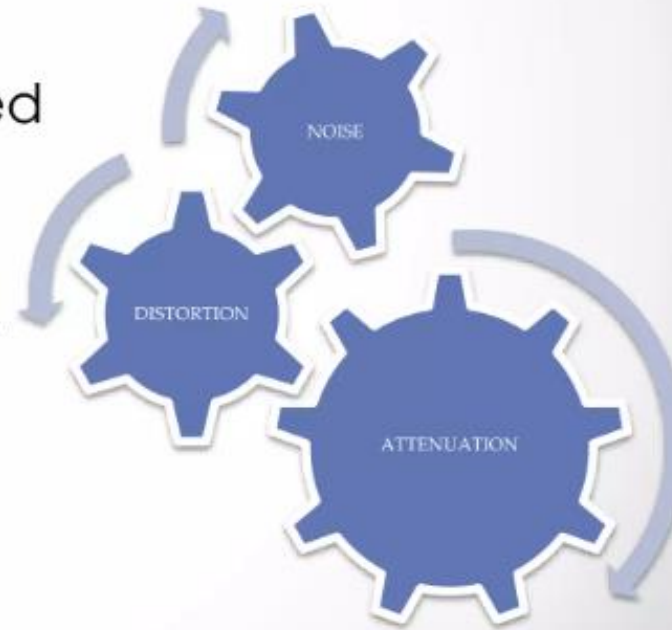


DEPARTMENT OF GRAPHICS AND CREATIVE DESIGN & DATA ANALYTICS

COMPUTER NETWORKS AND DATA COMMUNICATION
Transmission Impairments
UNIT- II

Transmission Impairment

- The Imperfection in transmission media causes signal impairment
- What is sent is not what is received due to impairment
- Three causes of impairment are
 - 1) Attenuation,
 - 2) Distortion
 - 3) Noise

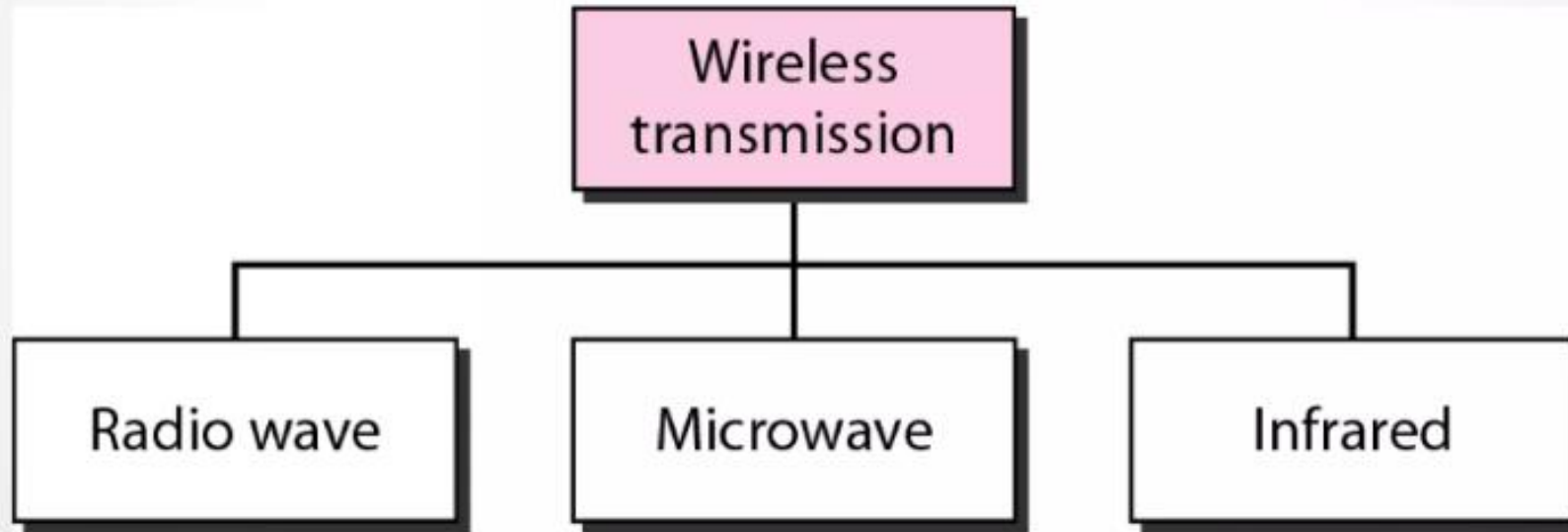


Transmission Impairment

- Attenuation means a loss of energy.
- Distortion means that the signal changes its form or shape.
- Noise is another cause of impairment.
- Several types of noise
Example: thermal noise, induced noise, crosstalk

Unguided Media

Wireless transmission waves



Unguided Media – Radio Waves



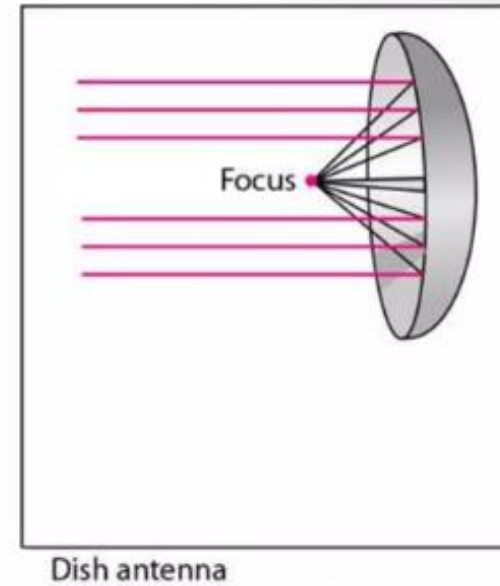
- Omnidirectional Antenna
- Frequencies between 3 KHz and 1 GHz.
- Used for multicasts (multiple way) communications, such as radio and television, and paging system.
- Radio waves can penetrate buildings easily, so that widely use for indoors & outdoors communication.

Antennas

An Antenna is a structure that is generally a metallic object may be a wire or group of wires, used to convert high frequency current into electromagnetic waves.

Antenna are two types:

- **Transmission antenna**
 - Transmit radio frequency from transmitter
 - Radio frequency then
Convert to electromagnetic energy by antenna
 - Then, radiate into surrounding environment
- **Reception antenna**
 - Electromagnetic energy get in antenna
 - Then Antenna convert radio frequency to electrical energy
 - Then, Goes to receiver



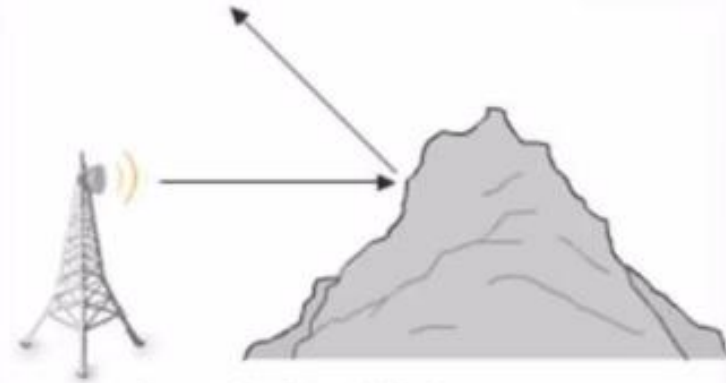
same antenna can be used for both purposes

Microwaves

Microwaves are ideal when large areas need to be covered and there are no obstacles in the path



Line of Sight Propagation



Ground Reflected Path

Micro waves Transmission

- Microwaves are unidirectional
- Micro waves electromagnetic waves having frequency between 1 GHZ and 300 GHZ.
- There are two types of micro waves data communication system : terrestrial and satellite
- Micro waves are widely used for one to one communication between sender and receiver,
example: cellular phone, satellite networks and in wireless LANs(wifi), WiMAX,GPS



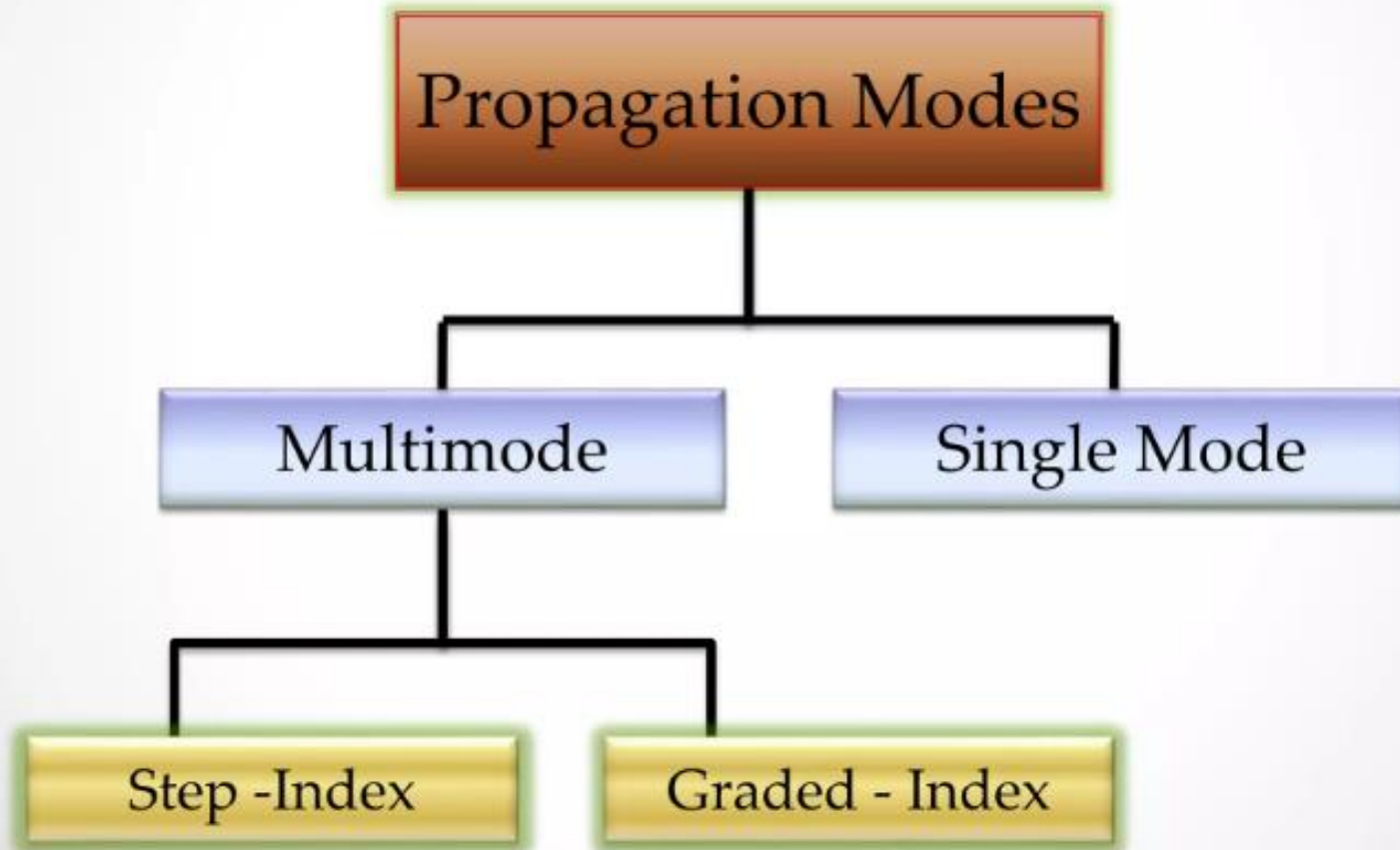
Infrared

- Frequencies between 300 GHz to 400 THz.
- Used for short-range communication
- Example: Night Vision Camera, Remote control, File sharing between two phones, Communication between a PC and peripheral device,

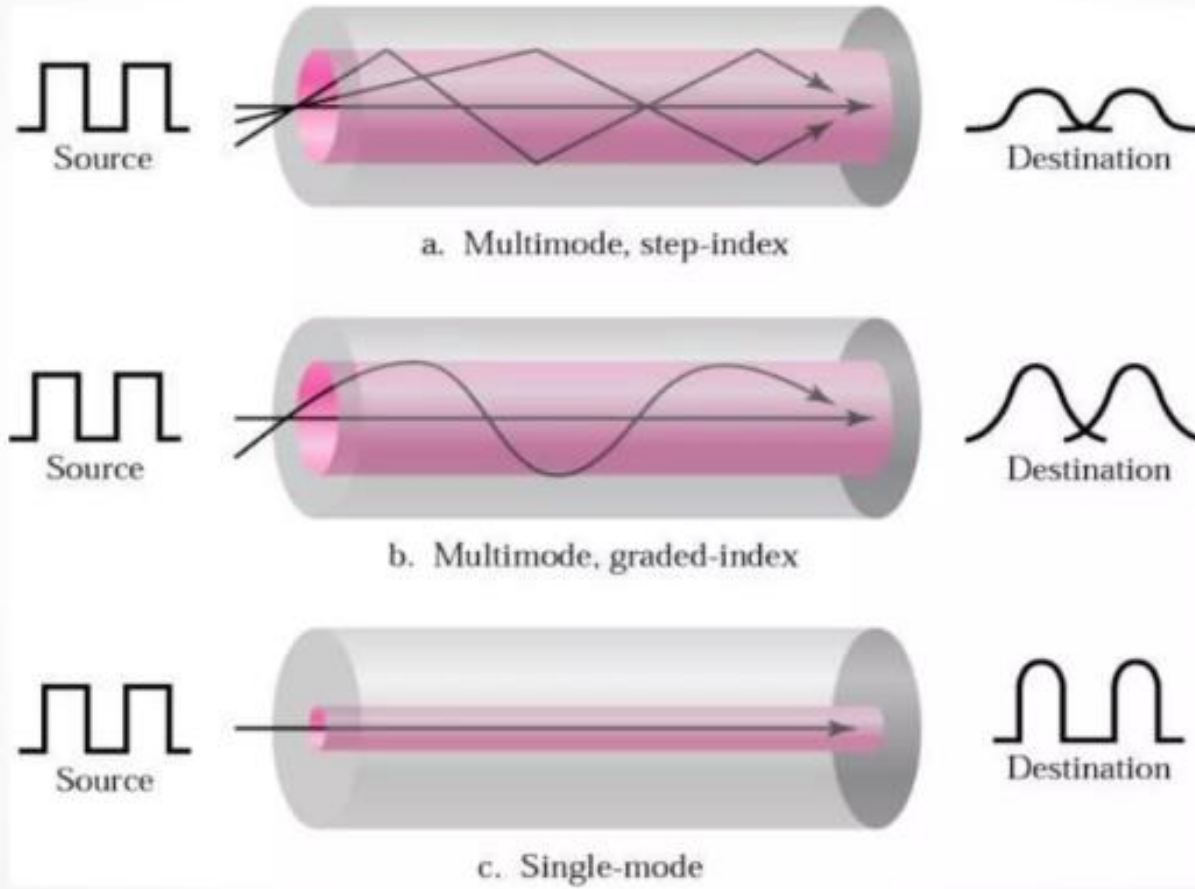


Propagation Modes

When signal goes from one point to another there are need for propagation modes.



Propagation Modes

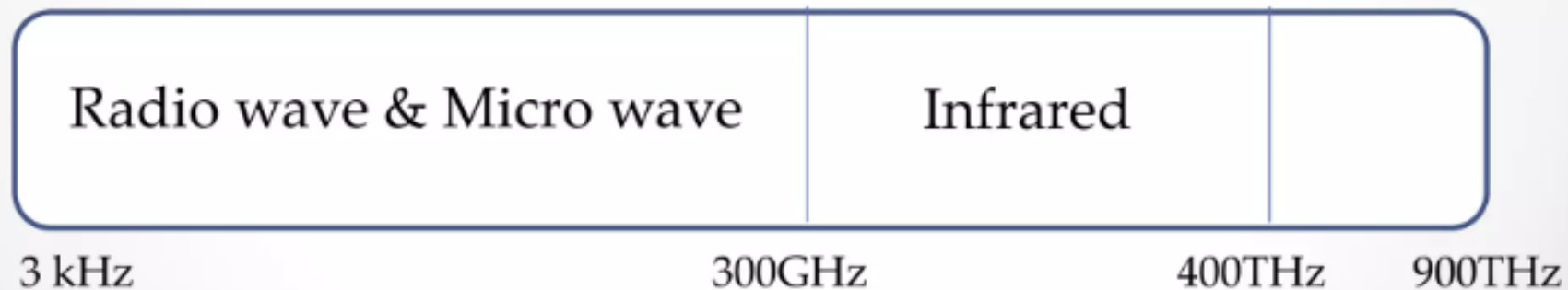


Unguided Media: Wireless Transmission

Unguided media transport electromagnetic waves without using a physical conductor it is known as wireless communication.

Signals broadcast through free space and available to capable receiver

Electro magnetic spectrum for wireless communication:

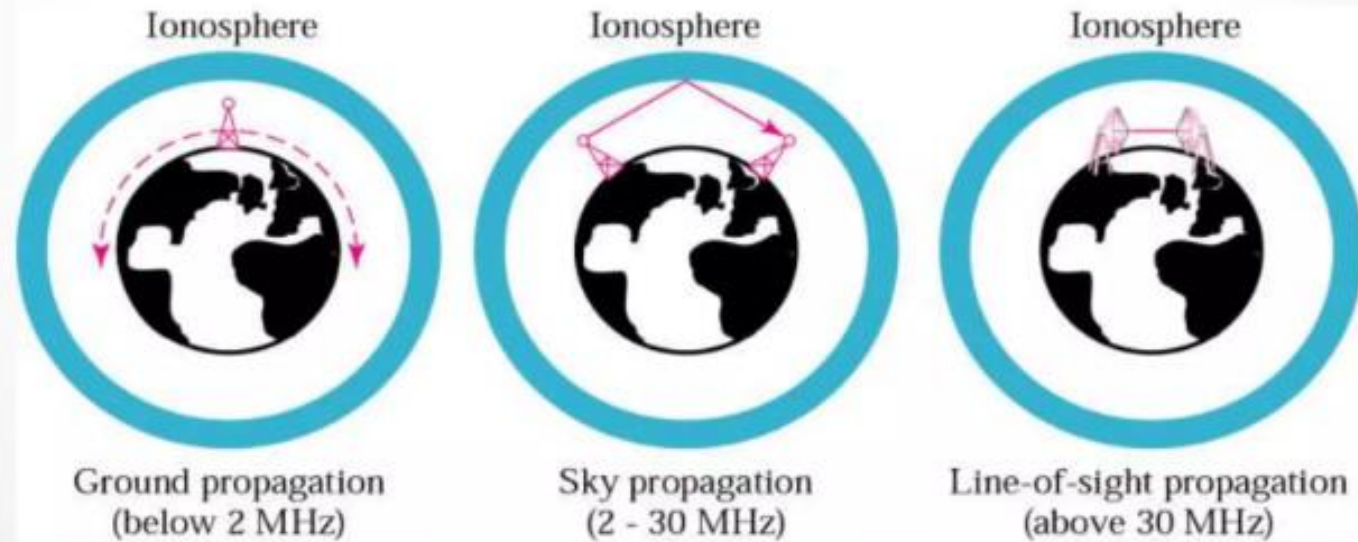


Propagation methods

Unguided signals travel from the source to destination in several ways; it is known as propagation.

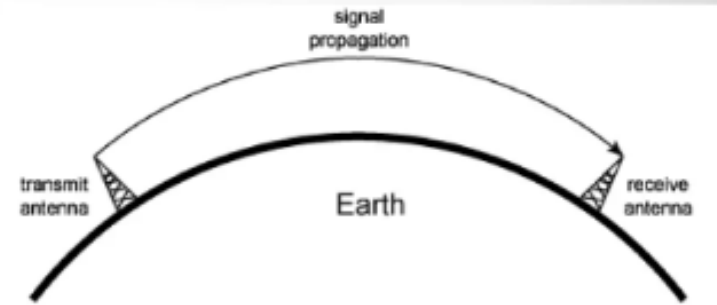
They are three types:

- Ground propagation
- Sky propagation
- Line-of-Sight Propagation



Ground propagation:

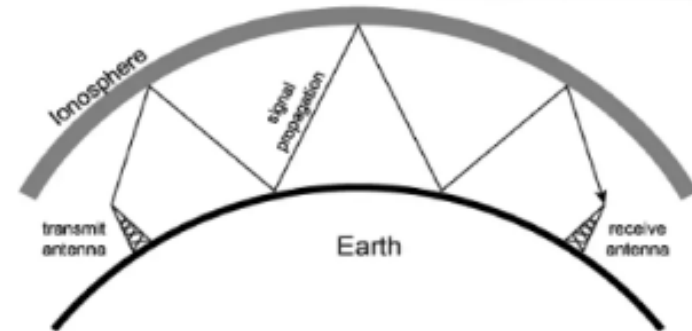
- Radio waves travel through the lowest portion of the atmosphere
- Touching the earth.



(a) Ground-wave propagation (below 2 MHz)

Sky propagation:

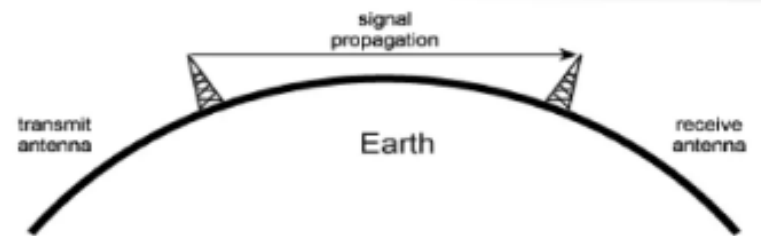
- Radio waves radiate to the ionosphere then they are reflected back to earth.



(b) Sky-wave propagation (2 to 30 MHz)

Line-of-Sight Propagation:

- In straight lines directly from antenna to antenna.



(c) Line-of-sight (LOS) propagation (above 30 MHz)