



**Power Point Presentation
(E- CONTENTS)
for**

B.Sc. III Electronics (2023-24)

Paper :

Antenna and Wave Propagation

Unit 1: Antenna Theory

Topic: Types of Antenna

Pravin R. Bagade

Assistant Professor

Department of Electronics

Vivekanand College, Kolhapur (Autonomous)



Types of antennas .

In radio systems, many different **antenna types** are used whose properties are especially crafted for particular applications. Antennas can be classified in various ways.

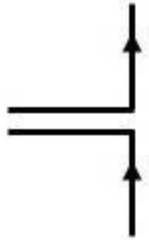
The choice of antenna depends on

1. Physical structure
2. Frequency of operation
3. Radiation Pattern
4. Gain requirements
5. Application

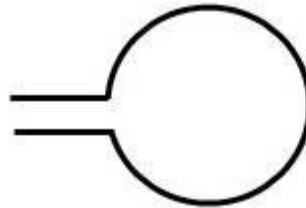
1. Antenna Types (Depends on physical structure)

- 1.1 Wire Antennas
- 1.2 Aperture Antennas
- 1.3 Microstrip Antennas
- 1.4 Array Antennas
- 1.5 Reflector Antennas
- 1.6 Lens Antennas

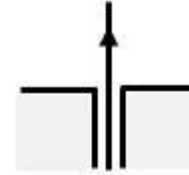
Antenna Types (Depends on physical structure)



Wire Dipole



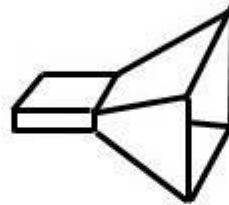
Loop



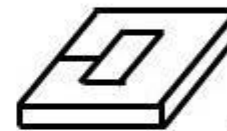
Wire Monopole



Yagi-Uda Array



Horn



Microstrip Patch



Corner Reflector



**Parabolic Reflector
(Dish)**



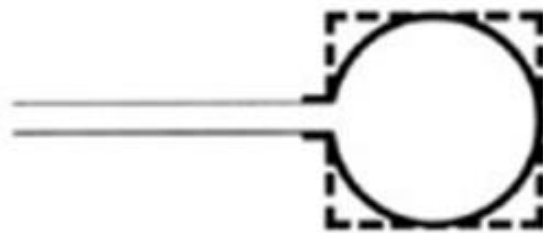
Slot

1. Antenna Types (Depends on physical structure)

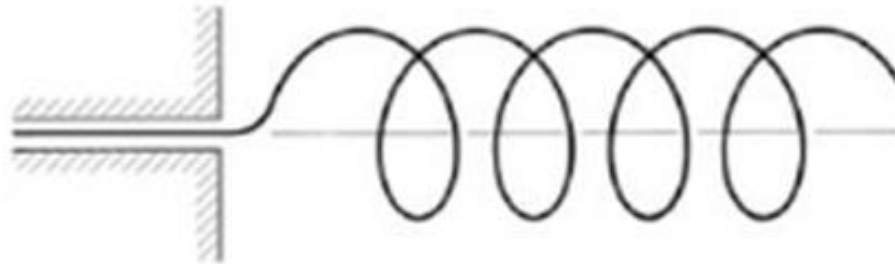
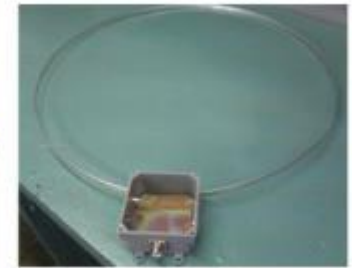
1.1 Wire type Antenna



Dipole wire Antenna



Circular loop Antenna

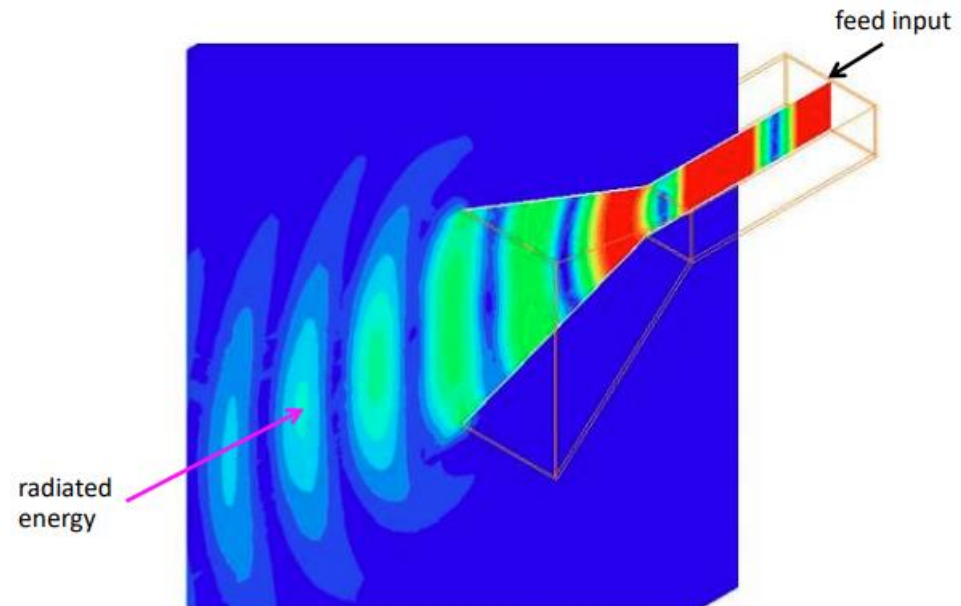
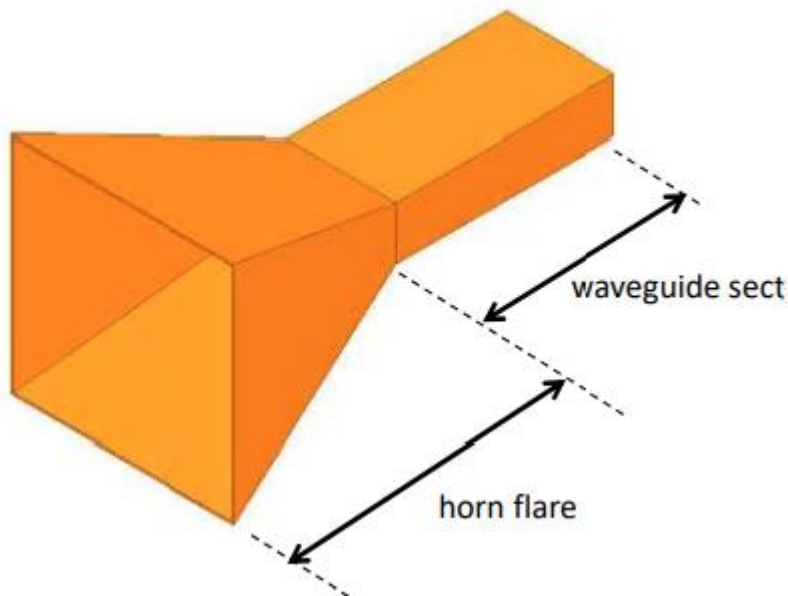


Helix wire antenna

1. Antenna Types (Depends on physical structure)

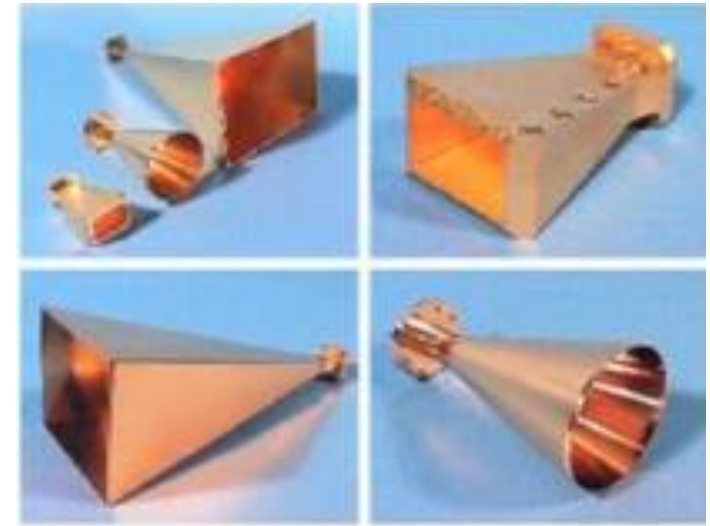
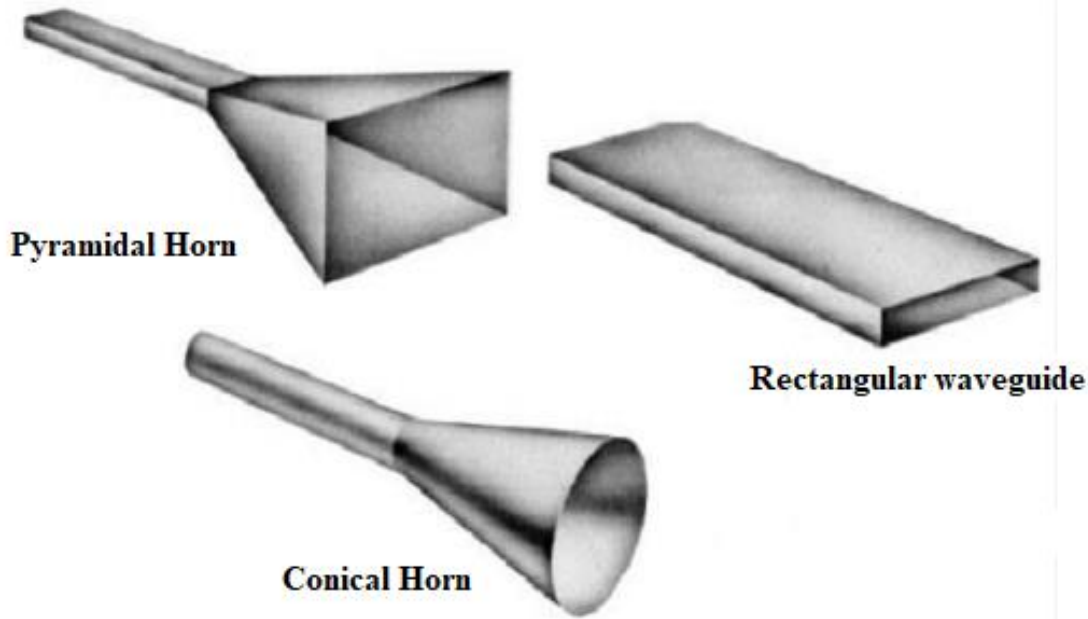
1.2 Aperture / Horn Antenna

A horn antenna consists of a section of rectangular waveguide, which flares outward at the end and terminates in an open aperture. The transmitted wave is excited in the waveguide section, and radiates out the mouth of the horn.



1. Antenna Types (Depends on physical structure)

1.2 Aperture / Horn Antenna



1. Antenna Types (Depends on physical structure)

1.3. Microstrip type Antenna

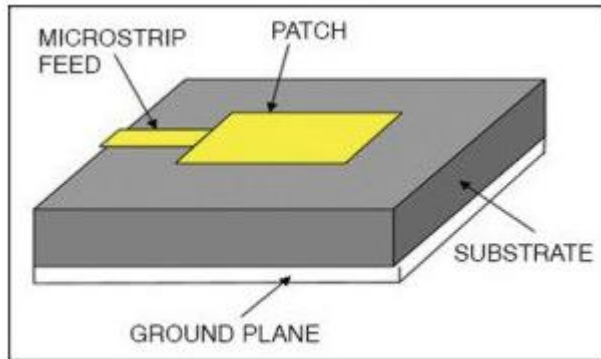
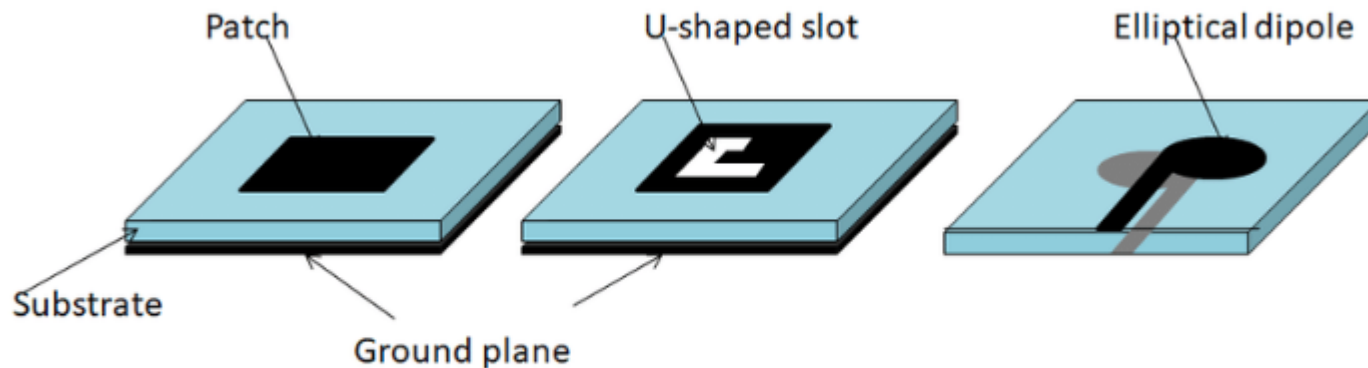


Fig. 1: Physical geometry of microstrip antenna

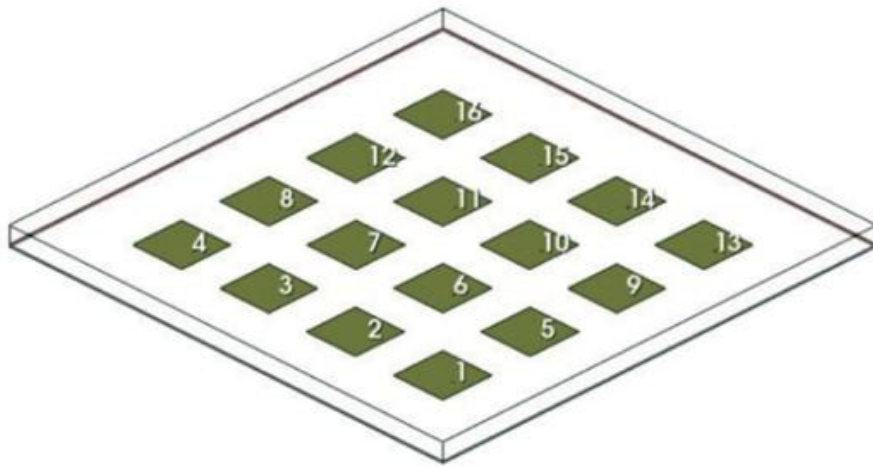


Different types of microstrip antennas; (a) Rectangular patch antenna; (b) Broadband patch antenna with U-shaped slot; (c) Elliptical dipole antenna [128].

1. Antenna Types (Depends on physical structure)

1.4. Array Antennas type Antenna

An antenna array is a collection of antennas which are operated in close proximity to one another, and designed to work in tandem.

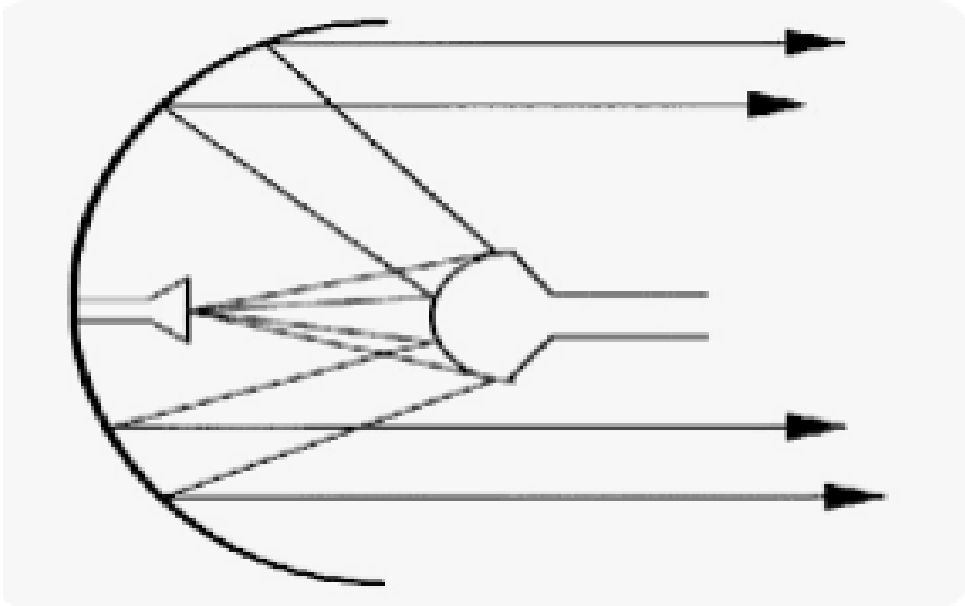


4 X 4 Patch Array



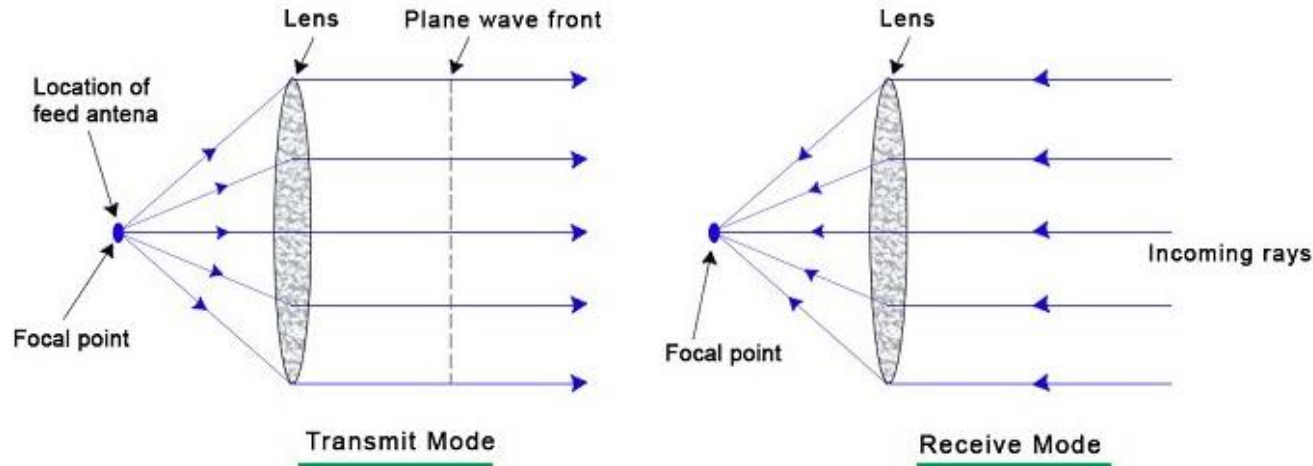
1. Antenna Types (Depends on physical structure)

1.5. Reflector Type Antennas



1. Antenna Types (Depends on physical structure)

1.6. LenseType Antennas



2. Antenna Types (Depends on Frequencies)

❖ High Frequency Antennas

- V, Inverted V, Rhombic, Travelling wave

❖ Medium Frequency Antennas

- Tower antenna

❖ VHF/UHF Antennas

- Folded Dipole, Yagi- Uda, Ground Plane, Helical

❖ Microwave Antennas

- Parabolic Reflector, Horn, Lens

❖ Broadband Antenna

- Helical, Log-periodic, Bi-Conical, Slot, Turnstile

3. Antenna Types (Depends on Radiation Pattern)

- **Isotropic Antenna:** An isotropic radiator is defined as "a hypothetical lossless antenna having equal radiation in all directions." It is an Idea antenna and it does not exist.
- **Omnidirectional antenna:** This antenna radiates and receives equally in all directions in azimuth. The following diagram shows the radiation pattern of an omni-directional antenna.
- **Directional antenna:** A directional antenna is one "having the property to radiating or receiving electromagnetic waves more effectively in some directions than in others.

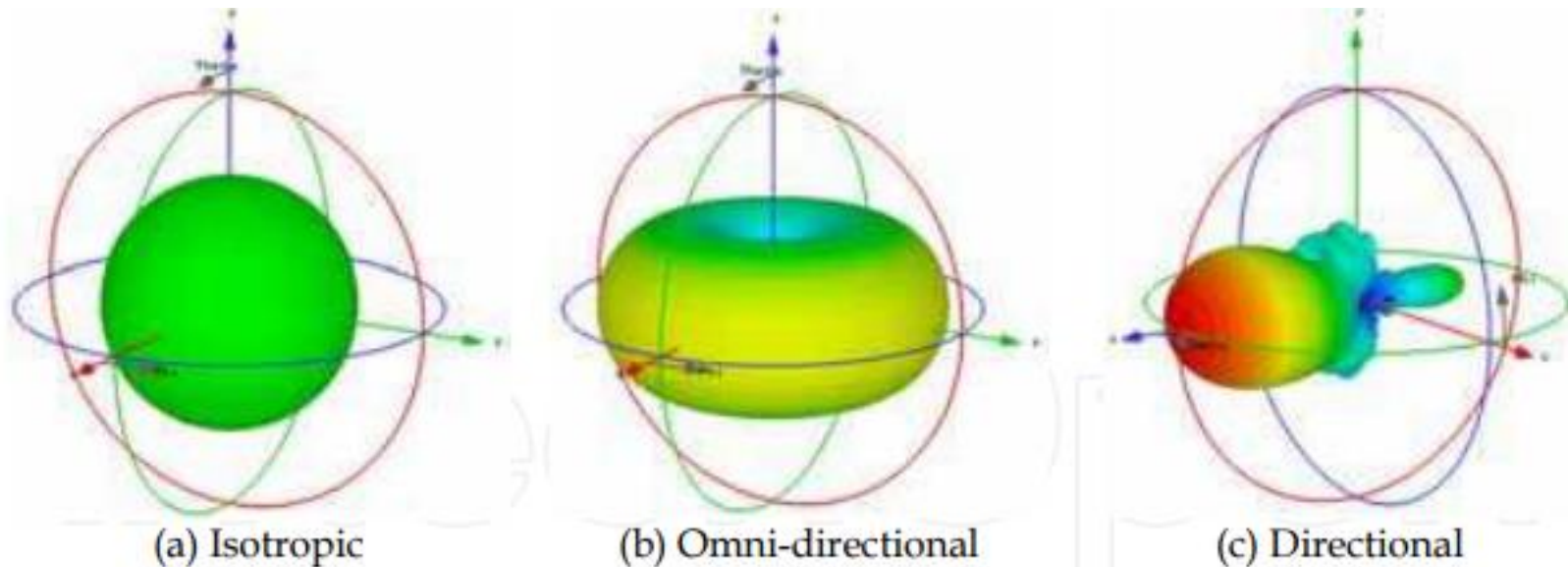


Fig. 2. Three dimensional radiation patterns

Reference Books:

Principles of Electromagnetics, M. N. O. Sadiku, Oxford University Press
(2001)

Antenna Theory: Analysis and design –C. Balanis ,Wiley India.

Antenna Theory and Design, Robert S. Elliott, Wiley-India, 2007

Antenna Theory and Design, W. L. Stutzman and G. A. Thiele, 3rd Ed.,
Wiley,