

# Understanding **TV Transmitter Antennas**: Types and Characteristics

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# Introduction

## What is an Antenna?

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## Analogy with a Light Bulb

Just as a light bulb converts electrical energy into light, an antenna converts electrical energy into EM waves.

# General Antenna Working

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- A transmitting field can be created around a conductor by using a wire coil with voltage. The resulting Electromagnetic field is stationary and does not propagate.
- To make the electric field move, a dipole with two opposite charges separated by a distance is used. Moving the dipole quickly distorts the electric field and creates a kink, which cuts off the electric field from the wire and propagates at the speed of light.

# Antenna Working Principle (Continued)

- The propagated electric field generates a perpendicular magnetic field.

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- The propagated electric field generates a perpendicular magnetic field.
- The magnetic field generates an electric field, creating a cycle until the energy of the wave decreases and disperses into space.

# Types of Antennas

## Omnidirectional Antennas

Omnidirectional antennas emit EM waves in all directions. They are often used for simple wireless communication systems, such as Wi-Fi.

## Directional Antennas

Directional antennas emit EM waves in a specific direction. They are often used for more complex wireless communication systems, such as satellite communication.



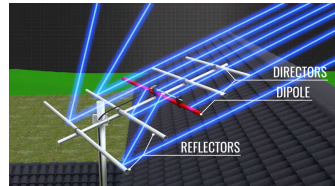
# Explanation of How a Yagi Antenna Works

A Yagi antenna is a type of directional antenna that uses a series of parallel metal elements to focus the transmission in one direction.



# Explanation of How a Yagi Antenna Works

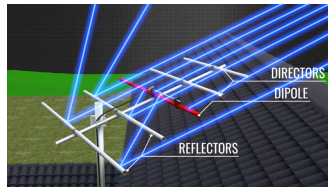
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## Yagi Antenna

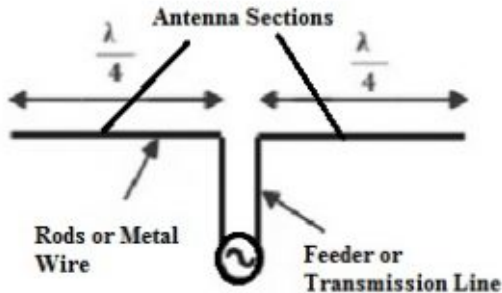
# Characteristics: Directional, Long-Range Transmission

Yagi antennas are directional, meaning they transmit the signal in one specific direction. This allows for long-range transmission, as the energy is focused in a specific direction instead of being scattered in all directions.



# Explanation of How a Dipole Antenna Works

A dipole antenna consists of two metal elements that are equal in length and mounted perpendicular to each other. The dipole antenna transmits the signal in all directions, creating an omnidirectional pattern.

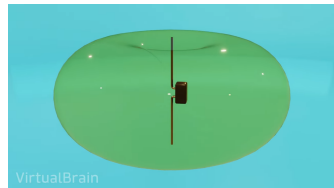


## Dipole Antenna as a Room Lamp

# Explanation of How a Room Lamp Illuminates in All Directions and Comparison to Dipole Antenna

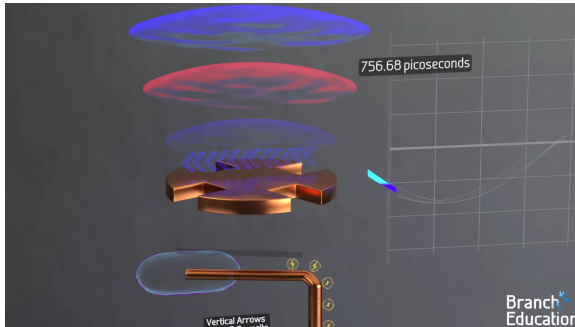
A room lamp illuminates in all directions by emitting light in all directions.

Similarly, a dipole antenna transmits broadcast in all directions by emitting the signal in all directions, creating an omnidirectional pattern.



# Explanation of How a Patch Antenna Works

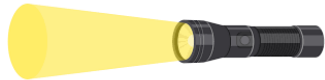
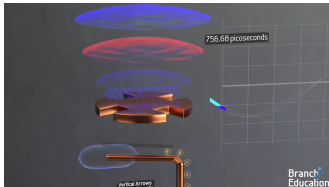
A patch antenna is a type of directional antenna that uses a flat metal element to transmit the signal in one specific direction. The signal is then focused in a specific area, allowing for short-range transmission.



# Explanation of How a Magnifying Glass Focuses Light and Comparison to a Patch Antenna

A magnifying glass focuses light in a specific area by using a lens to direct the light as a beam.

Similarly, a patch antenna focuses broadcast transmission using flat metal element to direct the energy as a beam.



# Recap

In this presentation, we have reviewed.

- **Types** of TV transmitter antennas
  - Yagi
  - Patch
  - Dipole
- Discussed their respective **characteristics** i.e. Their Radiation pattern.



# Acknowledgements

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