



SNS COLLEGE OF ENGINEERING
(Autonomous)
DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING



19EC504 – TRANSMISSION LINES AND ANTENNAS

III YEAR/ V SEMESTER

UNIT 4 – SPECIAL ANTENNAS

1



REFLECTOR ANTENNA



- Antenna that is designed for reflecting the incident electromagnetic signals originating from a separate source.
- This antenna is mainly designed to function at high microwave frequencies. It is most popular within spacecraft antenna systems due to its lightweight & simple structure.
- This [antenna](#) is made with various reflectors whose surface is hyperbolic, parabolic, spheroid, or ellipsoid. So, the parabolic is the most frequently used antenna.



WORKING



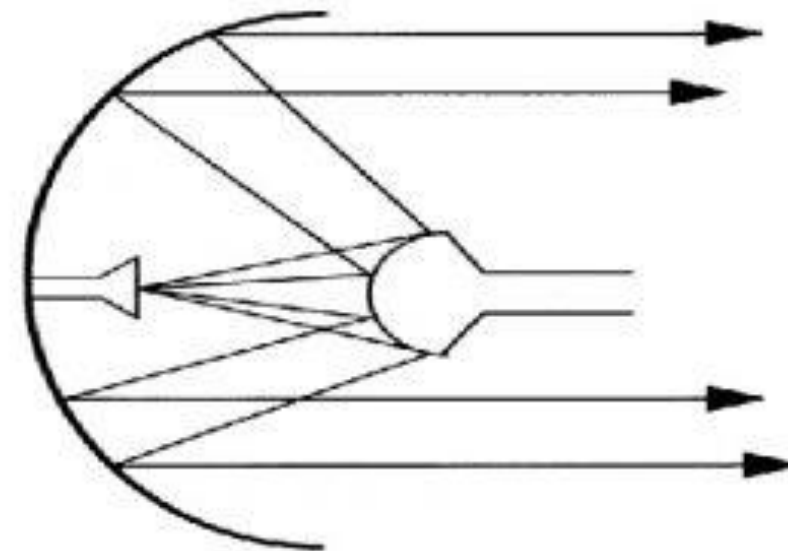
- The operating principle of a reflector antenna is- this antenna works at a high range of microwave frequencies. The electromagnetic wave at this frequency performs as a light wave so, this light wave gets reflected once strikes a surface.
- However, this antenna is a combination of a reflecting surface & feed element which means, a reflecting surface with an antenna element is required is used to give excitation to the reflecting element. So it is composed of both an active & a passive element..



WORKING



The antenna used to provide excitation is called the **active element** whereas the one that again radiates the emitted energy through the active element is known as the passive element or the reflecting surface. So, the active element is the feed whereas the passive element is the reflector. The **reflector antenna diagram** is shown below.



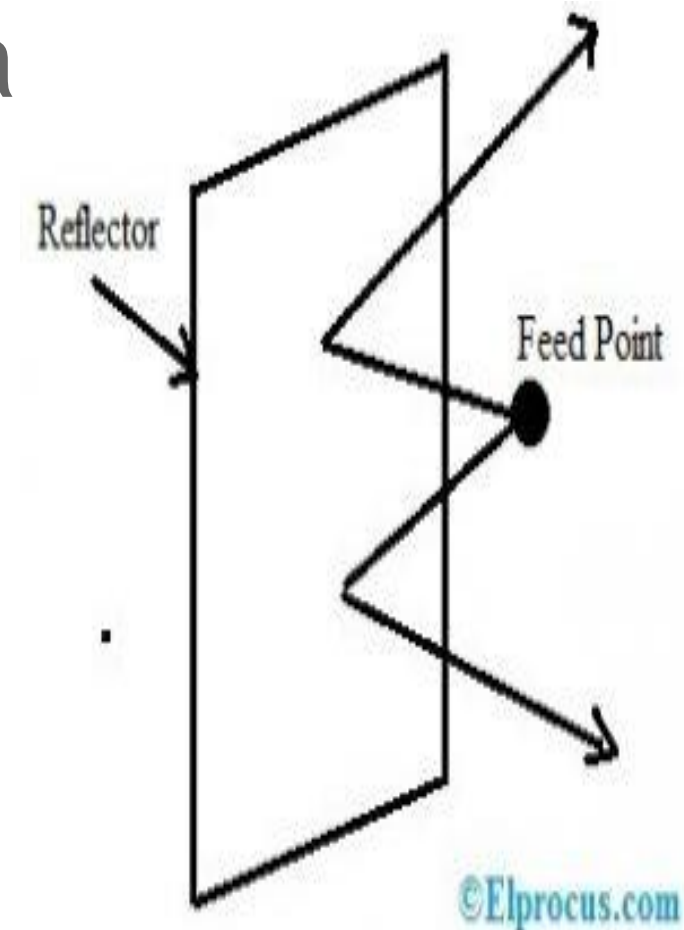


Reflector Antenna Types



1. Plane Reflector

The plane reflector antenna includes a primary antenna & reflecting surface which is very useful to emit electromagnetic energy in the preferred direction however is not feasible to collimate energy within the forward direction. This reflector is also known as a flat sheet reflector & it is considered one of the simple reflectors that direct the EM wave in the suitable direction.



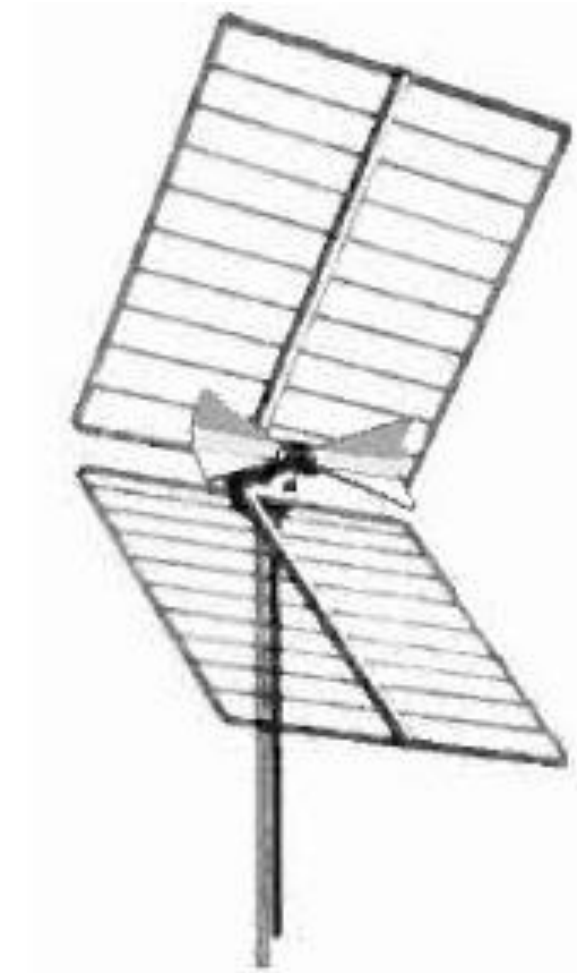


Reflector Antenna Types



2. Corner Reflector

The corner reflector antenna includes a minimum of two or three conducting flat surfaces which are intersecting mutually. So in this type of antenna, the feed element is either a dipole or a collection of collinear dipoles. The corner reflector type antenna is mainly used to attain collimation of electromagnetic energy within the forward direction. So it is used to suppress radiation in the side & backward directions.



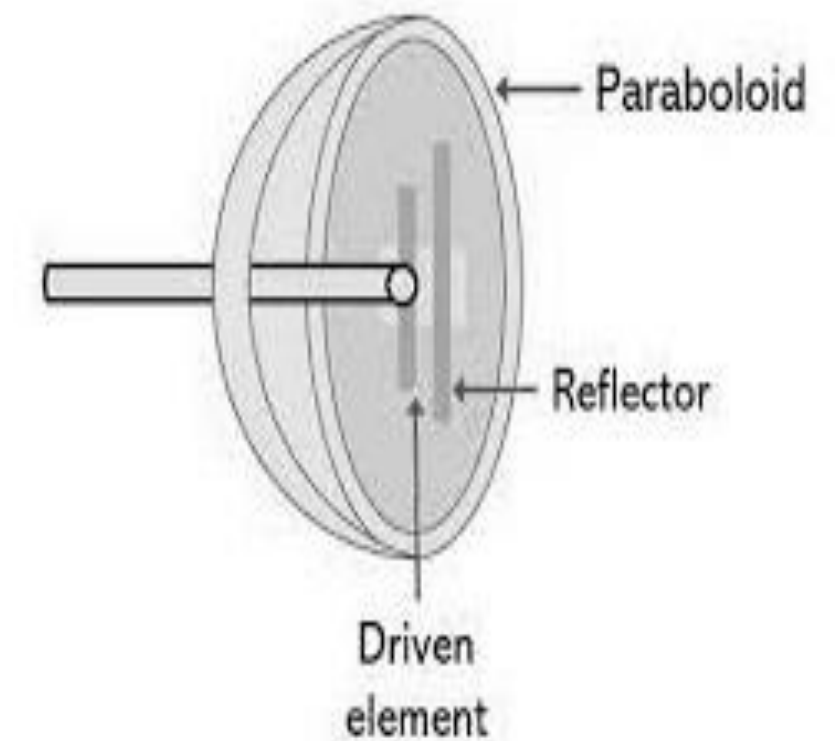


Reflector Antenna Types



3. Parabolic Reflector

A type of reflector antenna that is designed in a paraboloid structure by using the parabola properties is known as a parabolic reflector. In this antenna, the active element is present which focuses the main axis to reflect the radiated wave in a parallel direction to the main axis..





ADVANTAGES

- These are versatile.
- They have outstanding radiation performances.
- The parabolic type antenna has high gain and high directivity.
- The parabolic reflector decreases minor lobes.
- The amount of wastage of power is fairly low as compared to other antennas.
- It provides flexibility while arranging the feed element.
- The parabolic reflector provides easy beam adjustment.



DISADVANTAGES

- The reflector antenna needs to be balanced to keep away from obstruction of the feed point.
- The parabolic type antenna design is a complex procedure.
- The surface distortions in parabolic reflector antenna can take place in an extremely large dish. So this can be decreased with a broad mesh in place of a continuous surface.
- This antenna size is quite large and the overall cost is also high.
- To achieve the best performance results, the feed should be placed exactly at the focus of the parabolic antenna. This is difficult to achieve practically.



APPLICATIONS



- A reflector antenna has been extensively used in satellite communications, radars, deep-space telemetry, radio astronomy & remote sensing.
- A reflector type is an essential part of communication as well as radar systems.
- These antennas are extensively used in point-to-point communication, remote sensing, satellite communication, deep-space telemetry, and TV signal broadcasting.
- Reflector types are applicable in radio astronomy, weather radar & in spacecraft systems.
- The performance of the antenna can be enhanced with reflectors. So reflector antenna is used to enhance directivity.
- This antenna is utilized within spacecraft applications..



THANK YOU