



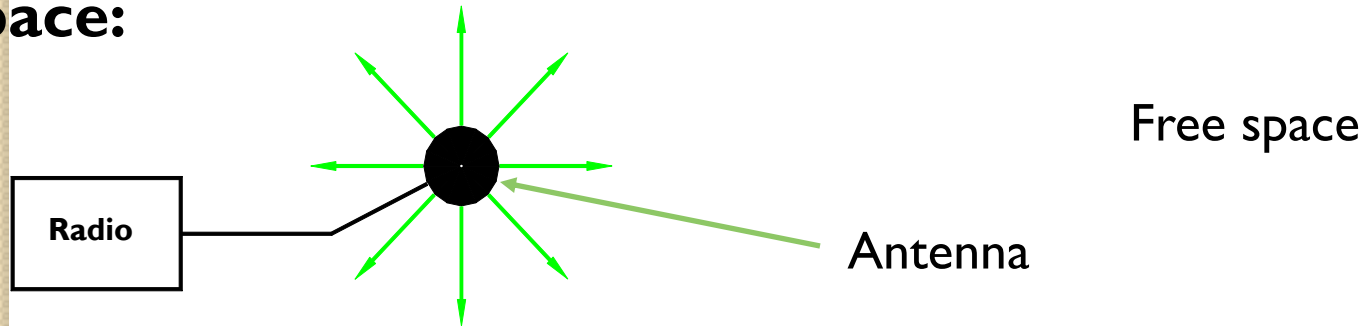
# ANTENNA AND WAVE PROPAGATION



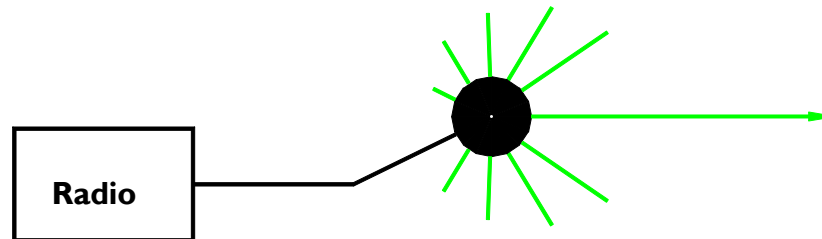
# Parabolic Reflectors

# **An Antenna is :**

**An effective interface between the radio and free space:**



**For Terrestrial Communications, antennas must be directional:**



## Terrestrial Microwave Antennas for Point-To-Point Communication

- Terrestrial antennas generate a beam of RF signal to communicate between two locations.
- Point-To-Point communication depends upon a clear line of sight between two antennas.
- Obstructions, such as buildings, trees or terrain interfere with the signal.
- Depending upon the location, usage and frequency, different types can be utilized.
- We will address the basic characteristics of these various types...

# Basic Parabolic Antenna Types



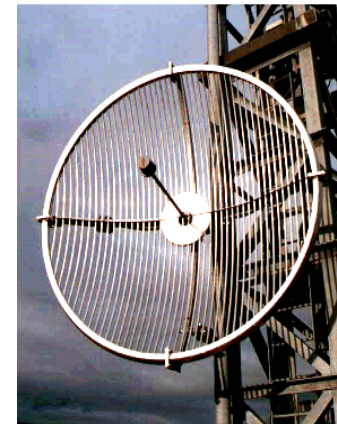
**Standard  
Parabolic  
Antenna**



**Shielded  
(Radomes)  
Antenna**



**Focal Plane  
Antenna**



**GRIDPAK®  
Antenna**

# Standard Parabolic Antenna



- **Basic Antenna**
- **Comprised of**
  - **Reflector**
  - **Feed Assembly**
  - **Mount**



# Shielded Antenna

- **Absorber-Lined Shield**
- **Improved Feed System**
- **Protection Against Ice, Snow and Dirt**
- **Better against the wind**

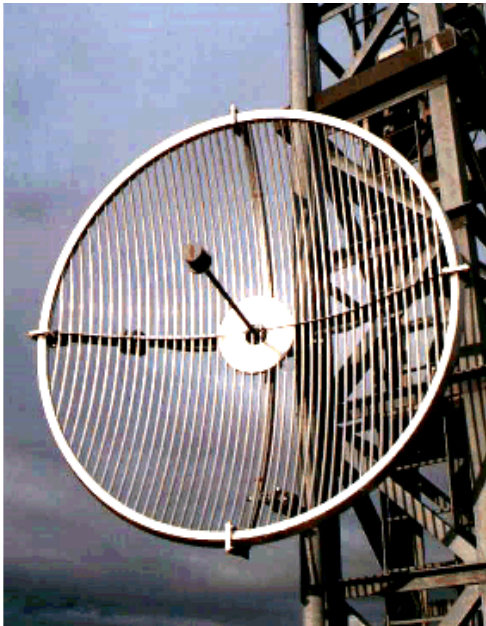


# Focal Plane Antenna



- **Deeper Reflector**
- **Edge Geometry**
- **Slightly Lower Gain**

# GRIDPAK® Antenna



- **Grid Reflector**
- **Low Wind load**
- **Below 2.7GHz**

# Antenna Efficiency

**Well-designed antennas have efficiency ratings of 45 - 65%**

**Efficiency Factor Affected By :**

- **Signal Strength,**
- **Blockage & Obstructions**
- **Reflector Surface**

**Efficiency can never be 100%**



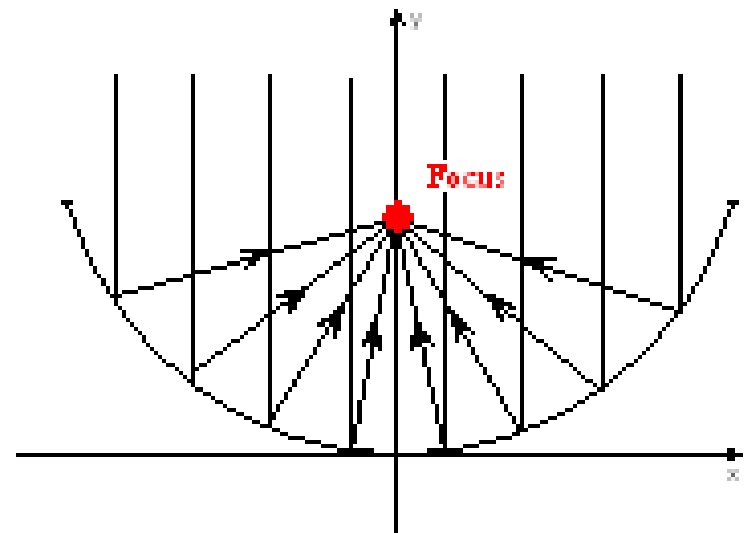
# Calculating the Focal Point

- In order to determine the optimal location for the antenna feed, or receiver, you must calculate the focal point.
- Using the following formula:
  - **$F = D^2 / 16d$**
  - Where
    - F = focal point
    - D = Diameter of the dish
    - d = depth of dish

# Focal Point

The point at which the RF signals meet after reflecting off of the parabolic curve of the antenna.

Parabola Shape



# Calculating the Focal Point

- If you have a Parabolic Dish antenna that is 12" in diameter and 3" deep where would the focal point be located?
- Use the formula:  **$F = D^2 / 16d$** 
  - 12" squared = 144",
  - 144" divided by (16 x 3") or 48"
  - $144/48 = 3$ "
  - The focal point is 3".



# Calculation Worksheet

- Go to the “Handouts” tab on the classroom website dashboard,
- Open the “Parabolic Dish Calculations Worksheet”,
- Work the problems on the worksheet and upload the completed worksheet to the classroom website.