

Antenna types for satellite communication

Satellite communication is very important today (e.g. television, military ...). Without antennas it would not be possible.

Parabolic antennas



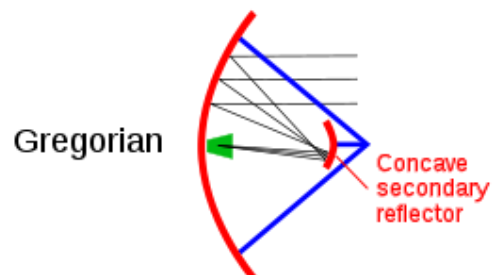
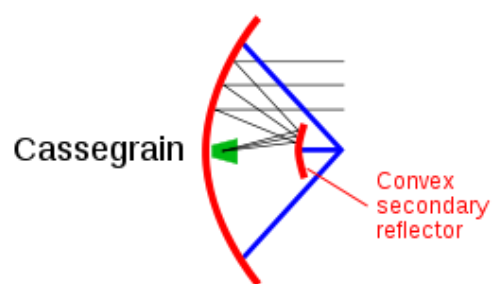
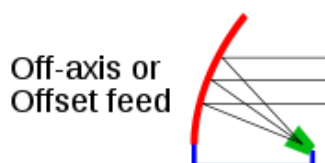
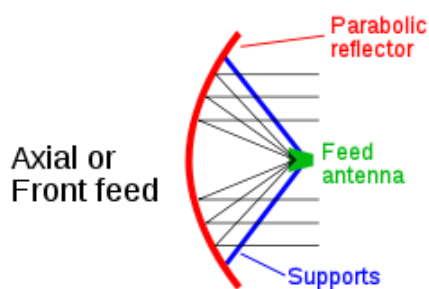
- Common type for satellite communication
- High directivity (→ small beam width)
- Example: satellite television

Gain: $G = \frac{4\pi A_a}{\lambda^2} q$

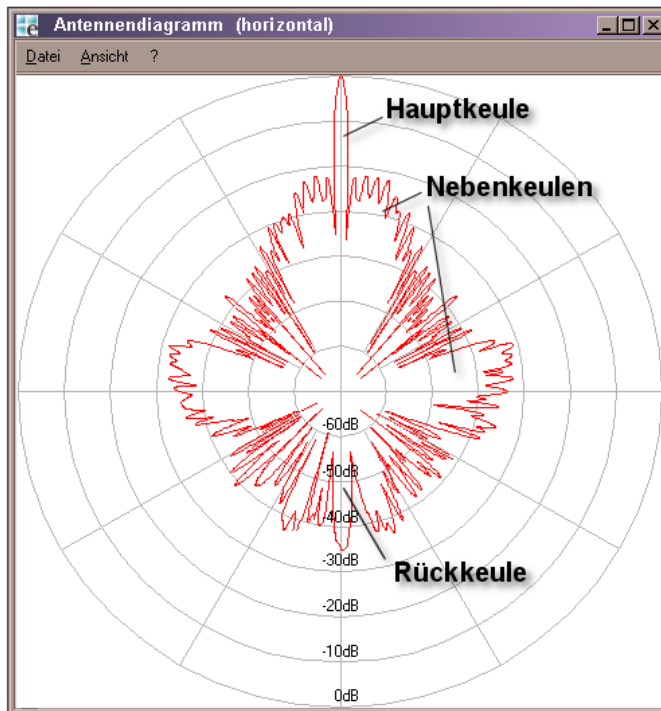
q ... aperture efficiency ($0 \leq q \leq 1$)

A_a ... Area of antenna aperture ($= \frac{d^2 \cdot \pi}{4}$)

Different types:



Radiation pattern example:



Main lobe: very narrow → high directivity → small beam width

Side lobes and back lobe:
at least 20dB lower than the main lobe; mostly even 30dB lower

- Half power beam width (angle between -3dB points at the main lobe)
- Beam width formula: $\theta = \frac{k \cdot \lambda}{d}$
 - k ... factor depending on shape of reflector (Ideal: 57,3; typical: ~70)
 - d ... diameter of the dish

Other antennas

- | | |
|---------------------------|---|
| • Horn antennas | often used as feed for parabolic antennas |
| • Helical antennas | basically a helical formed wire |
| • Phased array | group of antennas |