

Spacecraft Technology- Structure

A satellite communications system can be broadly divided into two segments—a ground segment and a space segment.

The space segment will obviously include the satellites, but it also includes the ground facilities needed to keep the satellites operational, these being referred to as the *Tracking, Telemetry, and Command (TT&C)* facilities. In many networks it is a common practice to employ a ground station solely for the purpose of TT&C.



Fig 2.1 Satellite Structure

The equipment carried aboard the satellite also can be classified according to function. The *payload* refers to the equipment used to provide the service for which the satellite has been launched.

In a communications satellite, the equipment which provides the connecting link between the satellite's transmit and receive antennas is referred to as the *Transponder*. The transponder forms one of the main sections of the payload, the other being the antenna subsystems. In this chapter the main characteristics of certain bus systems and payloads are described.

The Power Supply

The primary electrical power for operating the electronic equipment is obtained from solar cells. Individual cells can generate only small amounts of power and therefore, arrays of cells in series-parallel connection are required. Figure 2.1 shows the solar cell panels for the HS 376 satellite manufactured by Hughes Space and Communications Company.

In geostationary orbit the telescoped panel is fully extended so that both are exposed to sun- light. At the beginning of life, the panels produce 940 W dc power, which may drop to 760 W at the end of 10 years. During eclipse, power is provided by two nickel-cadmium (Ni-Cd) long-life batteries, which will deliver 830 W. At the end of life, battery recharge time is less than 16 h.

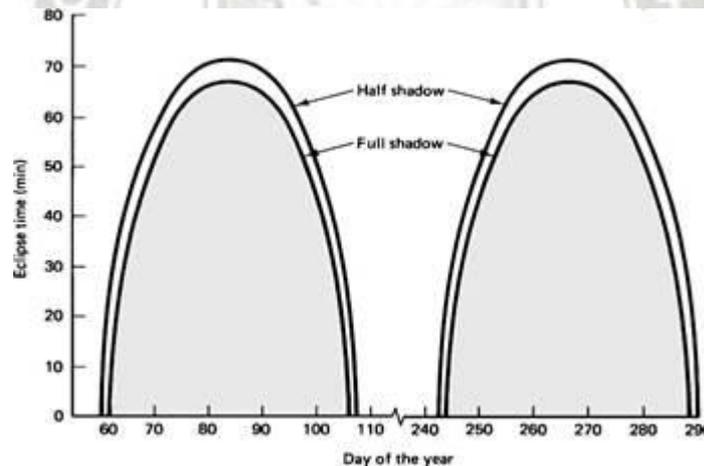


Fig 2.2 Satellite Eclipse time as a function of the current day of the year

In cylindrical and solar-sail satellites, the cross-over point is estimated to be about 2 kW, where the solar-sail type is more economical than the cylindrical type.