4. Communications subsystems

Description of the Communications System

A communications satellite exists to provide a platform in geostationary orbit fo. the relaying of voice, video, and data communications. All other subsystems on th. satellite exist solely to support the communications system, although this may represent only a small part of the volume, weight, and cost of the satellite in orbit. Since it is the communications system that earns the revenue for the system operator, communications satellites are designed to provide the largest traffic capacity possible. The growth in capacity is well illustrated in Figure 3.9 for the Intelsat system. Successive satellites have become larger, heavier, and more costly, but the rate at which traffic capacity has increased has been much greater, resulting in a lower cost per telephone circuit or transmitted bit with each succeeding generation of satellite.

The satellite transponders have limited output power and the earth stations are at least 36,000 km away from a GEO satellite, so the received power level, even with large aperture earth station antennas, is very small and rarely exceeds 10^{-10} W. For the system to perform satisfactorily, the signal power must exceed the power of the noise generated in the receiver by between 5 and 25 dB, depending on the bandwidth of the transmitted signal and the modulation scheme used. With low power transmitters, narrow receiver bandwidths have to be used to maintain the required signal-to-noise ratios.