

ABSTRACT

Link Budget is a generic term that is used to describe a series of mathematical calculations designed to model the performance of a communications link. In a typical simplex (one-way) satellite link, there are two link budget calculations: one link from the transmitting ground station to the satellite, and one link from the spacecraft to the receiving ground station. Many link budget analysis tools are available which include: Link budget model, uplink and downlink, satellite receiver, power flux density, positional data model, earth terminal to satellite slant range, earth terminal antenna elevation and azimuth, uplink and downlink doppler frequency shift, benign atmosphere attenuation, clear air attenuation, rain fall attenuation, atmospheric signal scintillation, modulation and channel encoding, noise equivalent bandwidth, modulation spectral efficiency, demodulator implementation loss, probability of detection of error, convolution channel coding gain, earth terminal model, antenna model, receive system model, transmit system model, satellite model, uplink signal power, downlink signal power, transponder signal and noise power sharing, transponder uplink power flux.

A link budget calculation for a spacecraft to ground station link requires the following input items: Earth station latitude, earth station longitude, spacecraft longitude, downlink frequency, antenna gain, antenna noise temperature, low noise amplifier, ortho mode transfer (OMT) loss, effective isotropic radiated power (EIRP), intermediate frequency received bandwidth, transmit data rate, link margin.