

Link budgets

The table below shows the link budgets for transmissions from Global-1. The UHF downlink utilizes a whip antenna on the satellite. It is intended to be an omnidirectional system, and the average antenna gain value over the entire spacecraft body frame is used as the antenna gain in this budget (whereas the peak gain is reported elsewhere in the application). The UHF ground system utilizes a yagi antenna. The X-band downlink uses a patch antenna on the spacecraft and a parabolic antenna on the ground. The link budget for both downlinks include an estimate of line-loss on the satellite, whereas the peak signal reported elsewhere in the application does not include line loss (line loss has not yet been measured, and thus including no line loss is conservative from a peak-gain standpoint).

This link budget assumes 550 km mean orbit altitude and a 5 degree elevation above the horizon. Note that Global-1 was designed to operate in orbits up to 600 km altitude, hence the high margins.

Parameter	UHF downlink	X-band downlink	Unit
Circular Altitude	550	550	km
Elevation from Ground Station	5	5	deg
Resulting slant range	2,205.9	2,205.9	km
Center Frequency	401.5	8125	MHz
Spacecraft Transmitter Power	3.0	6.0	dBW
Spacecraft Antenna Gain	-5	15	dBi
Expected Line Loss	0.9	2.0	dB
Spacecraft EIRP	-2.9	19.0	dBW
Isotropic Signal received at Ground Station	-156.9	-161.2	dBW
Ground Station Antenna Gain	13	45.9	dBi
Ground Station Antenna Expected Losses	1.1	1.2	dB
Ground Station G/T	-12.7	22.7	dB/K
Effective data rate (post-FEC)	9.6 kbps	93.7 Mbps	
Resulting Eb/No	19.2	10.2	dB
Specified bit error rate	1.0E-06	1.0E-12	-
Required Eb/No	5.8	5	dB
Resulting Link Margin	13.4	5.2	dB