

TLM Link Analysis

On-Station Mode Downlink @ 15 deg

Parameter	Symbol	Value	Unit	Source
Frequency	f	19.298	GHz	Midband freq
Transmitter Power	p	0.4	Watt	
S/C Antenna Gain	Gt	6	dBi	26 deg half cone angle
Passive Loss	Li	-2	dB	Input Parameter Estimate
Equiv. Isotropic Radiated Power	EIRP	30.0	dBm	EIRP = P+Gt+Li
Propagation Path Length	S	11410	km	15° Elevation Angle
Free Space Dispersion Loss	Ls	-199.3	dB	$L_s = -92.44 - 20\log(S) - 20\log(f)$
Atmospheric & Rain Loss	La	-6.4	dB	95% availability
Ground Station Pointing Loss		-1.0	dB	
Ground Station G/T	Grp	37.0	dBm/K	
Total Received Power/T		-139.6	dBm/K	
Boltzmann's Constant	k	-198.6	dBm/Hz/K	$k = 10\log(1.38 \times 10^{-23})$
Total Received C/No		59.0		
CARRIER CHANNEL				
Carrier/Total Power		-6.9	dB	
WC mod index		1.10		
Carrier Power/KT		52.1	dBm/Hz/K	
Carrier Loop Bandwidth (1000 Hz)		30.0	dB-Hz	
Carrier/Noise		22.1	dB	
Required Carrier/Noise		10.0	dB	
Carrier Margin		12.1	dB	
DATA CHANNEL (PCM/PM)				
Modulation Index		0.90		
Data/Total Power		-2.1	dB	
Data Power/KT		56.9	dBm/Hz/KT	
Information Rate		39.1	dB-Hz	
Available S/N		17.7	dB	
Required E_b/N_o 10E-6 BER		10.5	dB	
Coding Gain				
Implementation Loss		2.0		
Available Signal Margin		5.2	dB	