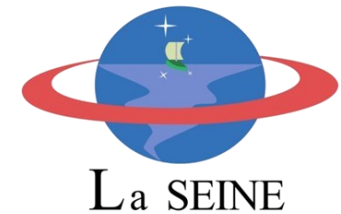


COM- Link Budget



DATE: 28- 04- 2025

Uplink Link Budget

PARAMETERS			
Objective		APRS DIGIPEATER VHF (CABUREI-4S)	
Beam		U2	
			Data Values
			Calculated Values
Emission Type		12K5F2D	Link Margin OK !!
Modulation		AFSK	Link Margin NO OK!!!
Data Rate	[bps]	1200	
Protocol		AX.25	
GROUND STATION			
Ground Station Transmitter Power Output	[W]	5.00	Assumed for BIRDS-X Link Budget
	[dBw]	6.99	
Ground Station Total Transmission Line Losses	[dB]	1.50	Assumed for BIRDS-X Link Budget
Antenna Gain	[dBi]	16.00	Assumed for BIRDS-4 Link Budget
Ground Station EIRP	[dBw]	21.49	
UPLINK PATH			
Orbit Altitude	[km]	400.00	
Elevation Angle	[degree]	25.00	
Slant Range	[km]	901.00	
Ground Station Antenna Pointing Loss	[dB]	2.00	
Ground Station to Spacecraft Antenna Polarization Loss	[dB]	3.00	
Path Loss	[dB]	134.81	
Atmospheric Losses	[dB]	1.00	
Ionospheric Losses	[dB]	0.80	
Isotropic Signal Level at Spacecraft	[dBw]	-120.12	
SPACECRAFT (RX Power Sensitivity Method)			
Spacecraft Antenna Pointing Loss	[dB]	5.00	
Spacecraft Antenna Gain	[dBi]	2.15	Assumed for BIRDS-4 Link Budget
Spacecraft Total Transmission Line Losses		2.35	Assumed for BIRDS-4 Link Budget
Received Power to the TRX	[dBw]	-125.32	
	[dBm]	-95.32	
Receiver Sensitivity	[dBm]	-98.20	APRS DIGIPEATER VHF (CABUREI-4S) based from BIRDS-X Anchoic Chamber Sensitivity test results
System Link Margin	[dB]	2.88	



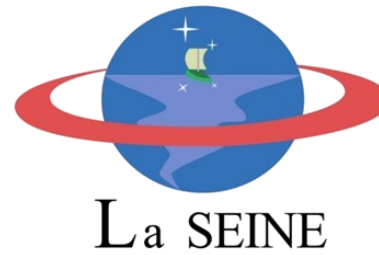
Downlink Link Budget

PARAMETERS							
Objective	Telemetry and other Mission Data (UHF MAIN COM)	Telemetry and other Mission Data (UHF NEW COM)	CW Beacon (UHF MAIN)	CW Beacon (NEW UHF)	APRS DIGIPEATER VHF (CABUREI-4S)		
Emission Type	8K50F1D	8K50F1D	500HA1A	500HA1A	12K5F2D		Data Values
Modulation	GMSK	GMSK	Morse Code	Morse Code	AFSK		Calculated Values
Data Rate [bps]	4800	4800	20 wpm	20 wpm	1200		Means OK !!
Protocol	AX.25	AX.25	-	-	AX.25		Means NO OK!!!
SPACECRAFT							
Spacecraft Transmitter Power Output [W]	0.80	0.80	0.10	0.10	1.00	Assumed for BIRDS-4 Link Budget	
[dBw]	-0.97	-0.97	-10.00	-10.00	0.00	Assumed for BIRDS-4 Link Budget	
Spacecraft Total Transmission Line Losses [dB]	2.00	2.00	2.00	2.00	2.35	Assumed for BIRDS-4 Link Budget	
Spacecraft Antenna Gain [dBi]	2.15	2.15	2.15	2.15	2.15	Assumed for BIRDS-4 Link Budget	
Spacecraft EIRP [dBw]	-0.82	-0.82	-9.85	-9.85	-0.20		
DOWNLINK PATH							
Orbit Altitude [km]	400.00	400.00	400.00	400.00	400.00		
Elevation Angle [degree]	10.00	10.00	10.00	10.00	15.00		
Slant Range [km]	1527.00	1527.00	1527.00	1527.00	1251.00		
Spacecraft Antenna Pointing Loss [dB]	5.00	5.00	5.00	5.00	5.00		
Spacecraft-to-Ground Antenna Polarization Loss [dB]	3.00	3.00	3.00	3.00	3.00		
Path Loss [dB]	148.94	148.94	148.94	148.94	137.66		
Atmospheric Losses [dB]	1.00	1.00	1.00	1.00	1.00		
Ionospheric Losses [dB]	0.40	0.40	0.40	0.40	0.70		
Rain Losses [dB]	0.00	0.00	0.00	0.00	0.00		
Isotropic Signal Level at Ground Station [dBw]	-159.15	-159.15	-168.19	-168.19	-147.56		
GROUND STATION							
Ground Station Antenna Pointing Loss [dB]	1.00	1.00	1.00	1.00	1.00		
Ground Station Antenna Gain [dBi]	22.00	22.00	22.00	22.00	15.00	Assumed for BIRDS-4 Link Budget	
Ground Station Total Transmission Line Losses [dB]	3.40	3.40	3.40	3.40	1.50	Assumed for BIRDS-4 Link Budget	
Signal Power at Ground Station LNA Input [dBw]	-141.55	-141.55	-150.59	-150.59	-135.06		
[dBm]	-111.55	-111.55	-120.59	-120.59	-105.06		
GS (RX Power Sensitivity Method)							
Rceiver Sensitivity [dBm]	-121.00	-121.00	-136.00	-136.00	-122.00	Based on ICOM-9100 data sheet value	
System Link Margin [dB]	9.45	9.45	15.41	15.41	16.94		





Kumo



LAST SLIDE