



PARSEC TECHNOLOGIES, INC. COMPLETE IOT ANTENNA SOLUTIONS

Confidential

Inquirere
Custom Airship Antenna B4

Program Update



- 1st Milestone
- Calculated Path loss – Slide #3 = Worst Case / Slide #4 Best Case
- Created antenna concept
- Built initial design concept in 3D antenna design software – Slide #5
- Optimized concept to improve coverage area – Slide #6

Airship Link Budget at 80 km and 13.5 deg. elevation

- The main performance limitation is the low 23 dBm maximum transmitter power on the uplink
- 14 dB higher downlink transmitter power allows downlink data rates to be significantly higher than uplink data rates
- The system will need the same antenna gain and pattern at both ends of the link with best gain on uplink frequencies in the direction of the longest distance

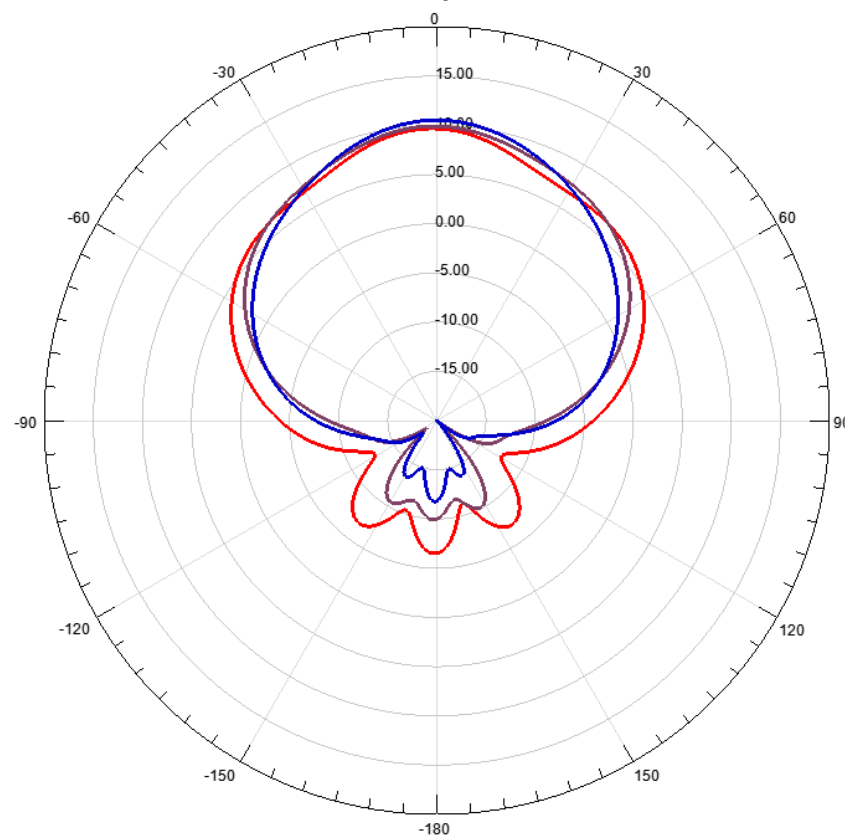
Uplink			Power (dBm)	Downlink			Power (dBm)
TX Power (dBm)	23		23	TX Power (dBm)	37		37
Feedline Loss (dB)	0.5		22.5	Feedline Loss (dB)	0.5		36.5
Antenna Gain (dB)	6		28.5 EIRP	Antenna Gain (dB)	6		42.5 EIRP
Frequency (MHz)	1732.5			Frequency (MHz)	2132.5		
Distance (km)	80			Distance (km)	80		
Path Loss (dB)		135.2753	-106.775	Path Loss (dB)		137.0796	-94.5796
Antenna Gain (dB)	6		-100.775	Antenna Gain (dB)	6		-88.5796
Feedline Loss (dB)	0.5		-101.275 RX Power	Feedline Loss (dB)	0.5		-89.0796 RX Power
Noise Figure (dB)	2.5		-103.775	Noise Figure (dB)	4		-93.0796
Bandwidth (MHz)	2			Bandwidth (MHz)	5		
Thermal Noise (dBm)		-110.99		Thermal Noise (dBm)		-107.01	
Signal/Noise (dB)		7.214435		Signal/Noise (dB)		13.93072	

Airship Link Budget at 19.8 km and directly overhead

- Path loss is 12 dB lower at $\frac{1}{4}$ the maximum distance
- Each antenna can have 6 dB lower gain directly overhead and still match the maximum distance performance
- Antenna performance at uplink remains more critical than downlink performance

Uplink			Power (dBm)			Downlink			Power (dBm)		
TX Power (dBm)	23		23			TX Power (dBm)	37		37		
Feedline Loss (dB)	0.5		22.5			Feedline Loss (dB)	0.5		36.5		
Antenna Gain (dB)	0		22.5 EIRP			Antenna Gain (dB)	0		36.5 EIRP		
Frequency (MHz)	1732.5					Frequency (MHz)	2132.5				
Distance (km)	19.8					Distance (km)	19.8				
Path Loss (dB)		123.1468	-100.647			Path Loss (dB)		124.9511	-88.4511		
Antenna Gain (dB)	0		-100.647			Antenna Gain (dB)	0		-88.4511		
Feedline Loss (dB)	0.5		-101.147 RX Power			Feedline Loss (dB)	0.5		-88.9511 RX Power		
Noise Figure (dB)	2.5		-103.647			Noise Figure (dB)	4		-92.9511		
Bandwidth (MHz)	2					Bandwidth (MHz)	5				
Thermal Noise (dBm)		-110.99				Thermal Noise (dBm)		-107.01			
Signal/Noise (dB)		7.342931				Signal/Noise (dB)		14.05922			

Directivity Plot 1



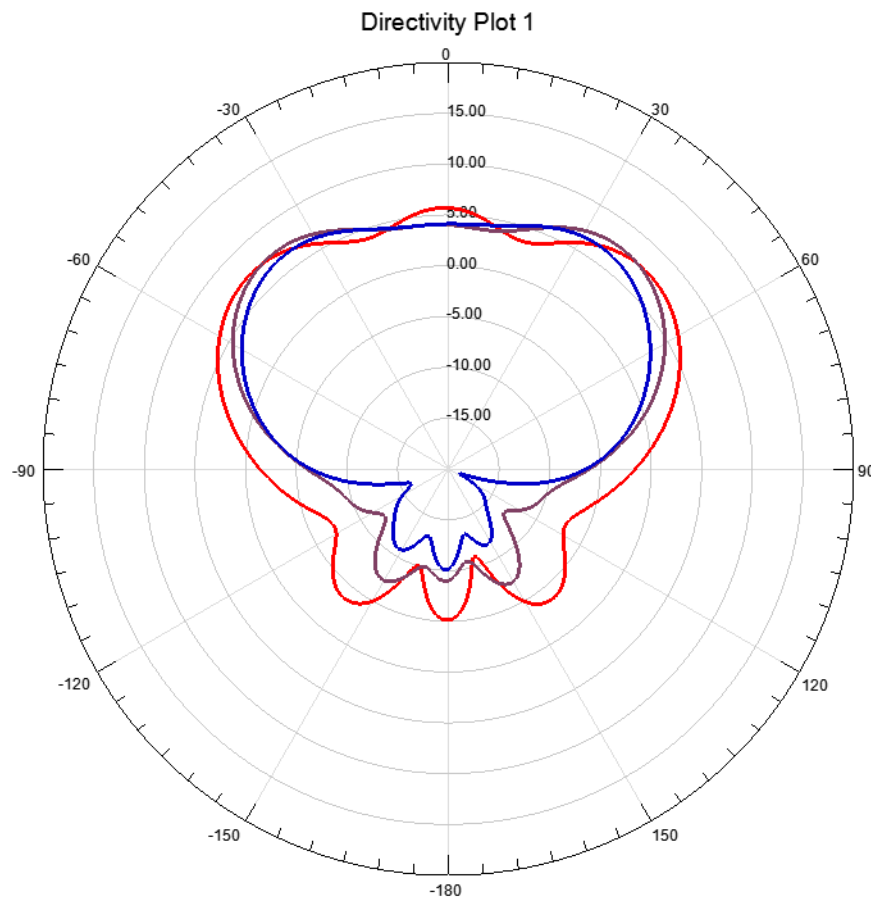
HFSSDesign1 ▲

Curve Info	xdb10Beamwidth(3)	max
dB(DirTotal) Setup1 : Sweep1 Freq='1.71GHz' Phi='0deg'	69.4782	9.6646
dB(DirTotal) Setup1 : Sweep1 Freq='1.94GHz' Phi='0deg'	73.5094	9.8923
dB(DirTotal) Setup1 : Sweep1 Freq='2.17GHz' Phi='0deg'	55.9084	10.5045

Program Update



HFSSDesign1 ▲



Curve Info	xdb10Beamwidth(3)	max
dB(DirTotal) Setup1 : Sweep1 Freq='1.71GHz' Phi='0deg'	42.8000	7.5501
dB(DirTotal) Setup1 : Sweep1 Freq='1.94GHz' Phi='0deg'	42.9835	7.6223
dB(DirTotal) Setup1 : Sweep1 Freq='2.17GHz' Phi='0deg'	117.6557	6.5367

The goal was to have a 10mbps DL / 5mbps UL connection at 65K Ft in a 30 mi radius

Based on our initial calculations we have developed a concept to have the Airship antenna mount on your frame. The concept size is current about 2ft x 2ft.

We need to continue to build out the initial design for more gain.

The UE antenna at the hot spot on the ground would also include a similar antenna, although it would not require the same space grade material and environmental conditions

Based on our calculations we could expect to get 10-12mbps DL / 3mbps UL on 85%- 90% of the coverage area.

1. Antenna Placement: Would this be inside ship, meaning not entirely exposed to the outside?
2. As we continue to modify the antenna design we also need the exact specifications on the receiver sensitivity specs on both subscriber unit and based station unit along with the channel set up. ie: bandwidth and coding scheme.
3. Connector Type / Cable Type