Appendix: A Design Example Spreadsheet

beamwidth *theta* (**given**)		105	degrees
$\frac{f}{D}=\frac{1}{4\tan(\theta/4)}$		0.51	
diameter *D* (**given**)		5.00	meters
focal length *f*	$f=(\frac{f}{D})D$	2.53	meters
depth	$d=\frac{D^2}{16f}$	0.62	meters

Equation of parabola $y=ax^2$

coefficient	$a=\frac{1}{4f}$	0.098629	1/meters

Length of a parabolic segment

$\sqrt{a^2D^2+1}$		1.11	meters
$L=\frac{\ln(\sqrt{a^2D^2+1}+aD)}{4a}+\frac{D\sqrt{a^2D^2+1}}{4}$		2.60	meters

Surface area of a parabolic reflector

$S=\pi\frac{(a^2D^2+1)^{3/2}-1}{6a^2}$		20.78	square meters

Gain of a parabolic reflector

Area	$A=\frac{\pi D^2}{4}$	19.63	square meters
frequency *F (***given**)		1420	MHz
wavelength *lambda*		0.211	meters
efficiency *eta*		50%	
$G=10\log_{10}\left(\eta\frac{4\pi A}{\lambda^2}\right)$		34	dbi