

FCC OET-65 RF Exposure Study - Satellite Uplink Facility
WRAL 4.5 meter Digital Ku-band uplink

FCC Maximum Permissible Exposure Levels	Source	Units
Public/uncontrolled area exposure limit	47CFR §1.1310	1 mW/cm ²
Occupational/controlled area exposure limit	47CFR §1.1310	5 mW/cm ²

Input Data

Antenna Diameter	datasheet	450.0 cm	
Antenna surface area	calculated	159043 cm ²	
Sub-reflector diameter	measured	n/a	Prime focus antenna
Sub-reflector area	calculated	n/a	
Feed flange diameter	datasheet	19.500 cm ²	
Feed flange area	calculated	299	
Frequency	(entry)	14500 MHz	
Wavelength (speed of light = 299,792,458 m/s)	calculated	2.068 cm	
Transmit power at flange	Application	18900 milliwatts	
Antenna gain	datasheet	53.9 dBi	
Antenna gain factor	calculated	245471	
Height of base of antenna above ground/roof	datasheet	1.56 m	
Height of center of antenna above ground/roof	datasheet	3.69 m	
Minimum Elevation Angle	(entry)	12 degrees	
Minimum Elevation Angle	calculated	0.20944 radians	

Results calculated using FCC Bulletin OET-65 (Edition 97-01 August 1997)

			FCC Maximum Permissible Exposure (MPE)	
			Uncontrolled	Controlled
Maximum power density at antenna surface	Eq. 11 Pg 27	0.48 mW/cm ²	Below FCC MPE	Below FCC MPE
Power density at subreflector	Eq. 11 Pg 27	N/A	N/A	N/A
Power density at feed flange	Eq. 11 Pg 27	253.14 mW/cm ²	Potential Hazard	Potential Hazard
Extent of near-field	Eq. 12 Pg 27	24486 cm		
Maximum near-field power density	Eq. 13 Pg 28	0.25 mW/cm ²	Below FCC MPE	Below FCC MPE
Aperture efficiency	Eq. 14 Pg 28	0.53		
Distance to beginning of far-field	Eq. 16 Pg 29	58765.65 cm		
Power density at end of the transition region	Eq. 17 Pg 29	0.1 mW/cm ²	Below FCC MPE	Below FCC MPE
Maximum far-field power density	Eq. 18 Pg 29	0.107 mW/cm ²	Below FCC MPE	Below FCC MPE

Main Beam Far-field region safe exposure distances

Minimum distance for public/uncontrolled exposure	Eq. 18 Pg 29	192.14 meters
Height at minimum antenna elevation angle	calculated	43.64 meters
Horizontal distance	calculated	187.94 meters
Minimum distance for occupational/controlled exposure	Eq. 18 Pg 29	85.93 meters
Height at minimum antenna elevation angle	calculated	21.56 meters
Horizontal distance	calculated	84.05 meters

Off-Axis Near Field/Transition Region safe exposure distances from antenna

(20 dB reduction in power density at distances greater than one antenna diameter from the main beam center.)				
Maximum off-axis near field power density	OET-65 Pg 30	0.0025 mW/cm ²	Below FCC MPE	Below FCC MPE
Public/uncontrolled exposure off-axis distance	Eq. 13 Pg 28	4.5 meters		
Occupational/controlled exposure off-axis distance	Diam/or Eq 17	4.5 meters		

Off-Axis Far Field safe exposure distances from the antenna

(Based on side lobe attenuation required by FCC 25.209(a)(2))		
Angle off main beam axis (1 to 48 degrees)	(entry)	5 degree(s)
Off-axis antenna gain factor	OET-65 Pg 30*	28
Minimum distance for public/uncontrolled exposure	Eq. 18 Pg 29 **	587.66 meters

* Gain converted from dBi to linear multiple

** If calculated distance is less than the start of the far field region, the distance to the start of the far field region is used.

Uplink Remote Control Point Data
WRAL 4.5 meter Digital Ku-band uplink

Location: 30 Rockefeller Plaza
 New York, NY 10112

Telephone Number: (212) 664-1900