ISAT US Inc.
FCC Form 312
Exhibit C
Response to Question Q28

Radiation Hazard Analysis for the antenna model: Sailor GX 60

This section analyzes the non-ionizing radiation levels for the Sailor GX 60 earth station included in this application. The analysis and calculations performed in this Exhibit comply with the methods described in the FCC Office of Engineering and Technology Bulletin, No. 65 first published in 1985 and revised in 1997 in Edition 97-01.

Bulletin No. 65 and the FCC R&O 96-326 specifies two Maximum Permissible Exposure (MPE) limits that are dependent on the situation in which the exposure takes place and/or the status of the individuals who are subject to the exposure. These are described below:

- General Population/Uncontrolled environment MPE limit is 1 mW/cm^2. The General Population / Uncontrolled MPE is a function of transmit frequency and is for an exposure period of thirty minutes or less.
- Occupational/Controlled environment MPE limit is 5 mW/cm^2. The Occupational MPE is a function of transmit frequency and is for an exposure period of six minutes or less.

The analysis provided in this report determined the power flux density levels of the earth station in the 1) far-field, 2) near-field, 3) transition region, 4) region between the feed and main reflector surface, 5) at the main reflector surface, and 6) between the antenna edge and the ground.

The analysis assumed the maximum allowed input power to antenna of 5W and a 100% duty cycle resulting in worst case radiation levels. In a significant number of deployments the terminals duty cycle would be below 100% and the actual power required would be lower than the 5W maximum resulting in lower radiation levels than those calculated.

Detailed calculations

Input Parameter	Value	Units	Symbol
Antenna Diameter	0.65	m	D
Antenna Transmit Gain	43.65	dBi	G
Transmit Frequency	29750	MHz	f
Antenna Feed Flange Diameter	5	cm	d
Power Input to the Antenna	5	Watts	P

Calculated Parameter	Value	Units	Symbol	Formula
Antenna Surface Area	0.3318	m^2	A	$\pi D^2/4$
Area of Antenna Flange	19.6344	cm^2	a	$\pi d^2/4$

Antenna Efficiency	0.5652	real	η	$g\lambda^2/(\pi^2D^2)$
Gain Factor	23173.9465	real	g	10^(G/10)
Wavelength	0.0101	m	λ	300/f

Calculated Parameter	Value	Units	Symbol	Formula
Near-Field Distance	10.47447917	m	Rnf	$D^2/(4\lambda)$
Distance to Far-Field	25.13875	m	Rff	$0.6D^2/\lambda$
Distance of Transition Range	10.47447917	m	Rt	Rt=Rnf

Calculated Parameter	Value	Units	Symbol	Formula
Power Density in the Near Field	3.4064	mW/cm^2	Snf	$16\eta P/(\pi D^2)$
Power Density in the Far Field	1.4591	mW/cm^2	Sff	$gP/(4\pi Rff^2)$
Power Density in the Transition Region	3.4064	mW/cm^2	St	Snf*Rnf/Rt

Calculated Parameter	Value	Units	Symbol	Formula
Power Density at the Feed Flange	1018.6217	mW/cm^2	Sfa	4P/a

Calculated Parameter	Value	Units	Symbol	Formula
Power Density at Main Reflector	6.0273	mW/cm^2	Ssurface	4P/A

Calculated Parameter	Value	Units	Symbol	Formula
Power Density between Reflector and Ground	1.5068	mW/cm^2	Sg	P/A

Summary of Results

Region	Calculated Power Density (mW/cm^2)	Limit Controlled Environment ≤ 5 mW/cm^2	Limit Uncontrolled Environment ≤ 1 mW/cm^2
Near Field	3.4064	meets limit	exceeds limit
Far Field	1.4591	meets limit	exceeds limit
Transition Region	3.4064	meets limit	exceeds limit
Feed Flange	1018.6217	exceeds limit	exceeds limit
Main Reflector	6.0273	exceeds limit	exceeds limit

Between Reflector and Ground	1.5068	meets limit	exceeds limit

As summarized in the above tables, the Sailor GX 60 antenna meets the FCC's MPE levels for controlled environments except for at the feed flange as well as at the main reflector. Since the antenna will be enclosed within a radome, these areas will not be accessible while the antenna is in operation. The terminal proposed in this application is for professional use and not for use by the general public. Training of personnel with access to the antenna would include consideration of the operation mode of the antenna and information on how to prevent radiation exposure, including disabling the communications system. When maintenance of the antenna is required and the radome is removed, the trained technicians will turn off the transmit power before performing work in these areas. The areas where the limits for uncontrolled environments could be exceeded will be restricted to trained personnel. Therefore, the general population will be protected.

In conclusion, the results show that the Sailor GX 60 antenna, in a controlled environment, and under the proper mitigation procedures, meets the guidelines specified in § 1.1310 of the Regulations. Moreover, the applicant agrees to take all necessary measures to ensure that the antenna does not create potential exposure of humans to radiofrequency radiation in excess of the FCC exposure limits.