Before the

FEDERAL COMMUNICATIONS COMMISSION

Washington, DC 20554

In the Matter of

	)	
Application of Panasonic Avionics	)	Call Sign: ____________________
Corporation for an Earth Station License to	)	
Operate a Very Small Aperture Terminal	)	File No.: ____________________
(“VSAT”) Network in the Ku-band	)	

APPLICATION FOR KU-BAND VSAT NETWORK LICENSE

Pursuant to Section 25.115 of the rules of the Federal Communications Commission (the “FCC” or “Commission”), 47 C.F.R. § 25.115, Panasonic Avionics Corporation (“Panasonic”) respectfully seeks an earth station license to operate a network of up to one hundred (100) very small aperture terminals (“VSATs”) in the 10.95-11.2 GHz, 11.45-11.7 GHz and 11.7-12.2 GHz (space-to-Earth) bands, and 14.0-14.5 GHz (Earth-to-space) band, (collectively, the “Ku-band”) at fixed locations in the United States while communicating with space stations on the FCC’s Permitted Space Station List (“Permitted List”). This VSAT network will support operational testing and performance verification of the eXConnect System, Panasonic’s ESAA network, which makes next-generation, in-flight broadband connectivity services available to airline passengers and crew around the world.

Pursuant to Section 25.115 of the Commission’s rules, 47 C.F.R. § 25.115, Panasonic herein includes FCC Form 312 Schedule B and Technical Appendix to provide operational information pertaining to the requested authority.

I. BACKGROUND

Panasonic's earth station aboard aircraft ("ESAA") blanket license[1] authorizes the operation of the eXConnect System, a state-of-the-art aeronautical satellite system that enables in-flight entertainment and connectivity ("IFEC") for airline passengers and crew. Panasonic's global ESAA network provides IFEC services onboard U.S.-registered aircraft (and non-U.S.-registered aircraft in the United States) communicating with a number of U.S. and foreign satellites around the world. Panasonic has fully described the eXConnect System in prior submissions and hereby incorporates by reference information regarding control functionality and other operational characteristics submitted in connection with those submissions.

II. DISCUSSION

A. PROPOSED VSAT NETWORK

With this application, Panasonic seeks to operate a traditional, Ku-band VSAT network in support of the eXConnect System. This VSAT network will allow Panasonic to monitor and test equipment and functionality, to support overall ESAA network operations, and to enhance the operations of the eXConnect System. The proposed VSAT earth stations will not carry any customer communications traffic, but will transmit and receive as described herein.

As with the ESAAs in the eXConnect System, network control and monitoring of the proposed Ku-band VSAT network will be provided by the Panasonic Customer Performance Center ("CPC") in Lake Forest, California, on a 24/7 basis. The CPC makes use of the Network Management System ("NMS") to provide complete control and visibility of all components of the eXConnect System. The NMS system has the capability to shut down any component in the

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[1] *See* Panasonic Avionics Corporation, File No. SES-LIC-20100805-00992, Call Sign E100089, and subsequent filings and modifications ("*ESAA Blanket License*").

system that is malfunctioning. The following table includes the contact details for Panasonic's CPC facility.

Primary Contact:

CPC Direct (office) line: +1-949 4621395
CPC Direct (mobile) line: +1-949-690-6706
Email: cpc@panasonic.aero

Back-Up Contact:

Michael Stephens, CPC Tier 1 Director
Direct (office) line: +1-949 6722143
Direct (mobile) line: +1-949 3459630
Email: michael.stephens@panasonic.aero

Address:

Panasonic Avionics Corporation
Attn: Customer Performance Center
26200 Enterprise Way
Lake Forest, CA 92630 USA

As part of the proposed Ku-band VSAT network, Panasonic seeks to deploy two types of terminals. The first terminal type is a 1.2 m Skyware Global Type 123 antenna (the "Skyware terminal"). The other terminal type associated with the proposed VSAT network is a 1.2 m General Dynamics Series 1120 antenna (the "General Dynamics terminal"). Panasonic seeks authority to operate up to 50 Skyware terminals and up to 50 General Dynamics terminals as standard VSAT remotes operating in accordance with Section 25.218 of the Commission's rules, 47 C.F.R. § 25.218. These terminals have been previously licensed by the Commission for use in Ku-band VSAT networks.[2]

[2] For the Skyware terminal, *see* Call Sign E060317, File No. SES-MFS-20171127-01176. For the General Dynamics terminal, *see* Call Sign E100117, File No. SES-MOD-20131101-00916.

Terminals of both types will transmit at 14.0-14.5 GHz, and receive at 10.95-11.2 GHz, 11.45-11.7 GHz and 11.7-12.2 GHz, within the Ku-band. Technical information pertaining to the proposed terminal operations is included in FCC Form 312 Schedule B and the attached Technical Appendix. Panasonic has included in the Technical Appendix radiation hazard studies for terminal operations at higher power levels than those proposed herein, and will use those more conservative safety values in operating the terminals. In addition, Panasonic has included datasheets for these widely licensed terminals. The terminals will be located either at Panasonic's Lake Forest, California campus or at other sites in the contiguous United States, Alaska, Hawaii, and U.S. Territories needed for satellite beam testing.

With respect to authorized satellite points of communication, to facilitate operational flexibility Panasonic seeks authority to operate the Ku-band network with any U.S.-licensed satellite and non-U.S.-licensed satellite on the Permitted List. Panasonic will utilize third-party gateway earth stations authorized to communicate with such satellites.

The attached FCC Form 312, Schedule B and associated exhibits to this application contain the relevant information required under the Commission's Rules. As discussed below, grant of the requested authority is in the public interest.

B. GRANT WOULD SERVE THE PUBLIC INTEREST

The operations proposed herein are consistent with the Commission's rules and policies governing Ku-band VSATs, and would otherwise serve the public interest. The operational characteristics of the eXConnect System are well known to the Commission and the Commission has previously authorized the Skyware and General Dynamics terminals for operation in Ku-band VSAT networks. Moreover, because the requested earth stations will be communicating only with satellites on the Permitted List, communications will be conducted at power levels that are compliant with the Commission's two-degree spacing policies and other applicable rules.

Thus, there is no potential for harmful interference or other adverse consequences resulting from the proposed Ku-band VSAT operations.

Grant of the requested VSAT blanket license will enable Panasonic to monitor and optimize the eXConnect System to facilitate operations consistent with the Commission's ESAA rules, 47 C.F.R. § 25.227, and the terms of the *ESAA Blanket License*. This, in turn, will allow more efficient and effective provision of Panasonic's satellite-based mobile broadband services to the benefit of U.S. consumers and commercial airlines. It also will further enhance competition and U.S. leadership in aeronautical broadband connectivity services. Because Commission grant of this application would have significant benefits and no adverse impact on other users of the spectrum, it would strongly serve the public interest.

III. CONCLUSION

Based on the foregoing, Panasonic respectfully requests that the Commission grant its request for a blanket earth station license to operate a Ku-band VSAT network to support the function of the eXConnect System. The VSAT earth stations in the proposed network will be fully compliant with Commission rules and will communicate with satellites on the Permitted List that support Panasonic's ESAA operations.

Panasonic Avionics Corporation
Ku-Band VSAT Network License Application

Technical Appendix

I. Skyware Terminal – Radiation Hazard Analysis

II. Skyware Terminal – Data Sheet

III. General Dynamics Terminal – Radiation Hazard Analysis

IV. General Dynamics Terminal – Data Sheet

I. Skyware Terminal – Radiation Hazard Analysis

Skyware Global Type 123 Radiation Hazard Study

1.2m Offset Feed Earth Station ku-band Antenna with 4W BUC

This analysis predicts the radiation levels around a earth station comprised of one aperture (reflector) type antenna. This report is developed in accordance with the prediction methods contained in OET Bulletin No. 65, Evaluating Compliance with FCC Guidelines for Human Exposure to Radio Frequency Electromagnetic Fields, Edition 97-01, Section 2 Prediction Methods, Aperture Antennas, pp 26-30.

The maximum level of non-ionizing radiation to which **employees** may be exposed is limited to a power density level of 5 milliwatts per square centimeter (**5 mW/cm²**) averaged over any 6 minute period in a **controlled environment** and the maximum level of non-ionizing radiation to which the **general public** is exposed is limited to a power density level of 1 milliwatt per square centimeter (**1 mW/cm²**) averaged over any 30 minute period in a **uncontrolled environment.**

Note that the worse-case radiation hazards exist along the beam axis. Under normal circumstances, it is highly unlikely that the antenna axis will be aligned with any occupied area since that would represent a blockage to the desired signals, thus rendering the link unuseable.

Earth Station Technical Parameters

Antenna diameter	**1.2 m**
Antenna Isotropic gain	**43.3 dBi**
Maximum Transmit Power	**4 Watts**
Number of carriers	**1**
Nominal Frequency	**14.3** GHz ***(frequency for the 43.3 dBi in FCC312 E42)***

In the following sections, the power density in the above regions, as well as other critically important areas will be calculated and evaluated.

On-axis Near-Field Region

The geometrical limits of the radiated power in the near field approximate a cylindrical volume with a diameter equal to that of the antenna. In the near field, the power density is neither uniform nor does its value vary uniformly with distance from the antenna. For the purpose of considering radiation hazard it is assumed that the on-axis flux density is at its maximum value throughout the length of this region. The length of this region, i.e., the distance from the antenna to the end of the near field, is given by the equation (1).

(1) $L_{nf} = D^2/(4\lambda)$

Where L_{nf} = length to end of the near field,

Where D = antenna diameter

Where λ = wavelength at 14.3 GHz = 21.0 $x10^{-3}$ meters or 21 mm

From equation (1) it is found that the distance to the end of the near field is **17** meters.

The maximum power flux density in the near field PD_{nf} is given by:

(2) $PD_{nf} = 16\ P_t\ \eta/(\pi D^2)$

Where P_t is the maximum power transmitted by the amplifier (**4** Watts).

Where η = Antenna Efficiency

Antenna efficiency can be estimated, or a reasonable approximation for circular apertures can be obtained from the ratio of the effective aperture area to the physical area as follows:

$$\eta = (G\lambda^2/4\pi)/(\pi D^2/4) = G\lambda^2/(\pi^2 D^2) = \mathbf{0.66}$$

Where G = the on-axis gain of the antenna (**43.3** dBi at **14.3** GHz)

From equation (2), we see that

$$PD_{nf} = \mathbf{0.94}\ mW/cm^2$$

Evaluation

Uncontrolled Environment	Complies with FCC Limit of 1 milliwatt per square centimeter
Controlled Environment	Complies with FCC Limit of 5 milliwatts per square centimeter

On-axis Transition Region

The transition region is located between the near and far field regions. As stated in Bulletin 65, the power density begins to vary inversely with distance in the transition region. The maximum power density in the transition region will not exceed that calculated for the near field region, and the transition region begins at that value.

The power density in the near field region, as shown above, will not exceed **0.94** mW/cm^2.

Evaluation

Uncontrolled Environment	Complies with FCC Limit of 1 milliwatt per square centimeter
Controlled Environment	Complies with FCC Limit of 5 milliwatts per square centimeter

On-axis Far-Field Region

Free-space power density is maximum on-axis, varies inversely with the square of the of the distance and may be calculated from equation (3).

(3) $PD_{ff} = GP_t/(4\pi R^2)$

Where PD_{ff} = the power flux density on-axis in the far field,

R = the distance to the far field region and is found from equation (4).

(4) $R = 0.6D^2/\lambda$

From equation (4) it is found that the distance to the far field is **41** meters.

And, PDff is found from equation (3) as follows:

PD_{ff} = **0.40** mW/cm^2

Evaluation

Uncontrolled Environment	Complies with FCC Limit of 1 milliwatt per square centimeter
Controlled Environment	Complies with FCC Limit of 5 milliwatts per square centimeter

Region Between Feed Flange and Reflector

Transmissions from the feed horn are directed toward the reflector surface, and are confined within a conical shape defined by the feed. The energy between the feed and reflector surface can be calculated by determining the power density at the feed flange. This can be accomplished as follows:

Power Density at Feed Flange, $PD_{feed} = 4*P_t/Fa$

Where Fa = Area of Feed Window $= \pi*D_f^2/4$

Where D_f = **7** cm

Fa = **38.5** cm^2

PD_{feed} = **416** mW/cm^2

The energy between the feed horn and reflector is conceded to be in excess of any limits for maximum permissible exposure. This area will not be accessible to the general public. Operators and technicians have received training specifying this area as a high exposure area. Procedures are established that assure that the transmitter is turned off before access by maintenance personnel to this area.

Main Reflector Region

The power density in the main reflector region is determined in the same manner as the power density at the feed flange, above, but the area is now the area of the reflector aperture:

Power Density at Reflector Surface, $PD_{reflector} = 4*P_t/Sa$

Where Sa = Surface Area of Reflector = **1.1** m^2

$PD_{reflector}$ = **1.42** mW/cm^2

The power densities at or around the reflector surface are just above the limit for maximum permissible exposure in a Uncontrolled Environment of **1** mW/cm^2 , and below the maximum permissible exposure in a Controlled Environment of **5** mW/cm^2 . This area will not be accessible to the general public. Operators and technicians have received training specifying this area as a high exposure area. Procedures are established that assure that the transmitter is turned off before access by maintenance personnel to this area.

Off-axis Levels at the Far Field Limit and Beyond

In the far field region, the power is distributed in a pattern of maxima and minima (sidelobes) as a function of the off-axis angle between the antenna on-axis center line and the point of interest. The on-axis main-beam will be the location of the greatest of these maxima. The on-axis power density calculated above represent the maximum exposure levels that the system can produce. Off-axis power densities will be considerably less and hence comply with FCC limits.

Off-axis Levels at the Near Field and in the Transition Region

According to Bulletin 65, off-axis calculations in the near field may be performed as follows: assuming that the point of interest is at least one antenna diameter removed from the center of the main beam, the power density at that point is at least a factor of 100 (20dB) less than the value calculated for the equivalent on-axis power density in the main beam. Therefore, for regions at least D meters away from the center line of the dish, whether behind, below, or in front under of the antenna's main beam, the power density exposure is at least 20 dB below the main beam level as follows:

PDnf(off-axis) = PDnf /100 = **0.009** mW/cm²

Evaluation

Uncontrolled Environment	Complies with FCC Limit of 1 milliwatt per square centimeter
Controlled Environment	Complies with FCC Limit of 5 milliwatts per square centimeter

Evaluation of Safe Occupancy Area in Front of Antenna

As covered in the section above "Off-axis levels at the Near Field and in the Transition Region", the off-axis levels are well below the FCC limits. Therefore, no fencing or barrier is required to prevent access to the area in front of the antenna by employees. This area will not be accessible to the general public.

The area not to be accessed by maintenance personnel without the transmitter being turned off is the area between the feed horn and the reflector.

Conclusion

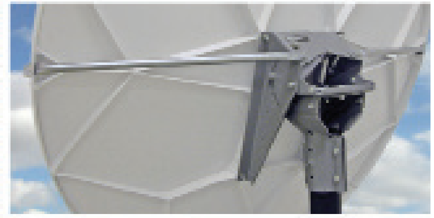
Based on the above analysis it is concluded that harmful levels of radiation will not exist in regions accessible to the general public or to the earth station's operating personnel.

Study Prepared by: x2nsat RF Engineer

II. Skyware Terminal – Data Sheet

Type 123: 1.2m Rx/Tx Extended Ku-Band Class II Antenna System

SKYWARE GLOBAL



- ISO 9001:2008 Certificate of Registration
- All materials comply with EU Directive No. 2002/95/EC (RoHS).
- Long focal length optics for low cross-pol performance.
- Fine azimuth and elevation adjustments.
- Available with Ku-band co–pol or cross–pol feeds.
- Galvanized 19 mm (.75”) O.D. side feed support legs and 51 mm (2”) O.D. lower feed support.
- Plated hardware for maxi mum corrosion resistance.
- Class II system designed for typical 2W and 4W Ku-band Block Up-Converters (BUCs).*

*3.6 kg or 8 lb max. weight for RF electronics (BUC and LNB)

Intelsat

RoHS

The **Skyware Global 1.2m Rx/Tx Extended Ku-Band Class II Antenna** is a rugged commercial grade product suitable for the most demanding applications.

- The reflector is thermoset-molded for strength and surface accuracy. Molded into the rear of the reflector is a network of support ribs which strengthens the antenna and helps to sustain the necessary parabolic shape.
- The reflector optics feature a long focal length for excellent cross-pol performance.
- The heavy gauge steel Az/El mount secures the antenna to any 73-76 mm (2.88”-3.00”) mast and prevents slippage in high winds.
- A special powder paint process offers excellent protection from weather-related corrosion.

Satcom solutions for the long haul

1315 Outlet Center Drive, Smithfield, NC 27577 T + 1 919 934 9711 F + 1 919 989 2274 Sales @ Skyware Global.com

1.2 m Rx/Tx Extended Ku-Band Class II Antenna

Type Approval Information

Antenna Model 62-1236201

Intelsat Standard............. Standard G (IESS 601)

Approval Code IA077SA00

(See Our Website for a Complete List of Type Approvals)

RF Performance

Effective Aperture .... 1.2m (48 in)

Operating Frequency
TX............................ .12.75-14.50GHz
RX 10.70-11.70GHz

Polarization.................... Linear, Orthogonal

Gain (±0.2 dB)
TX.......................... .43.3 dBi @ 14.3GHz
RX .... .41.8 dBi @ 12.0GHz

3 dB Beamwidth
TX .... 1.2° @ 14.3GHz
RX .... .1.5° @ 12.0GHz

Sidelobe Envelope (Tx, Co-Pol dBi)
1.5°<θ<20°...................... 29-25 log θ dBi
20° <θ<26.3° .... -3.5dBi
26.3°<θ<48° .... .32-25 log θ dBi
48°<θ<180° .... -10

Antenna Cross-Polarization........... 30 db in 1 dB Contour

Antenna Noise Temperature
10° EL...................................... 45K
20° EL...................................... 31K
30° EL...................................... 24K

VSWR
TX...................................... 1.3:1
RX...................................... 1.5:1

Isolation (Port to Port)
TX 80db
RX...................................... .35db

Feed Interface
TX .... WR75 Flat Flange
RX........................... .WR75 Flat Flange

(All specifications typical)

Mechanical Performance

Reflector Material....... Glass Fiber Reinforced Polyester

Antenna Optics ...... One-Piece Offset Feed Prime Focus

Mount Type .... Elevation over Azimuth

Elevation Adjustment Range.......... 7°-84° Continuous Fine Adjustment

Azimuth Adjustment Range .... 360° Continuous ±20° Fine Adjustment

Mast Pipe Interface......................... .73-76 mm (2.88 in-3.00 in) Diameter

Enviromental Performance

Wind Loading
Operational......................... 50 mph (80 km/h)

Functional Survival .... .80 mph (128 km/h)

Ultimate Survival .... 125 mph (200 km/h)

Operational Temperature................ -40°C to +60°C

Survival Temperature .... -50°C to +80°C

Humidity...................... 0 to 100% (Condensing)

Atmosphere............... Standard Hardware 500 Hrs SST Requirements (ASTM B-117)

Solar Radiation .... 360 BTU/h/ft²

Shock and Vibration............. As Encountered during Shipping and handling

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III. General Dynamics Terminal –

Radiation Hazard Analysis

Analysis of Non-Ionizing Radiation for a 1.2-Meter Earth Station System

This report analyzes the non-ionizing radiation levels for a 1.2-meter earth station system. The analysis and calculations performed in this report 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. The radiation safety limits used in the analysis are in conformance with the FCC R&O 96-326. Bulletin No. 65 and the FCC R&O specifies that there are two separate tiers of exposure limits that are dependant on the situation in which the exposure takes place and/or the status of the individuals who are subject to the exposure. The Maximum Permissible Exposure (MPE) limits for persons in a General Population/Uncontrolled environment are shown in Table 1. The General Population/Uncontrolled MPE is a function of transmit frequency and is for an exposure period of thirty minutes or less. The MPE limits for persons in an Occupational/ Controlled environment are shown in Table 2. The Occupational MPE is a function of transmit frequency and is for an exposure period of six minutes or less. The purpose of the analysis described in this report is to determine the power flux density levels of the earth station in the far-field, near-field, transition region, between the subreflector or feed and main reflector surface, at the main reflector surface, and between the antenna edge and the ground and to compare these levels to the specified MPEs.

Table 1. Limits for General Population/Uncontrolled Exposure (MPE)

Frequency Range (MHz)	Power Density (mW/cm^2)
30-300	0.2
300-1500	Frequency (MHz)*(0.8/1200)
1500-100,000	1.0

Table 2. Limits for Occupational/Controlled Exposure (MPE)

Frequency Range (MHz)	Power Density (mW/cm^2)
30-300	1.0
300-1500	Frequency (MHz)*(4.0/1200)
1500-100,000	5.0

Table 3. Formulas and Parameters Used for Determining Power Flux Densities

Parameter	Symbol	Formula	Value	Units
Antenna Diameter	D	Input	1.2	m
Antenna Surface Area	$A_{surface}$	$\pi D^2 / 4$	1.13	m^2
Subreflector Diameter	D_{sr}	Input	19.0	cm
Area of Subreflector	A_{sr}	$\pi D_{sr}^2/4$	283.53	cm^2
Frequency	F	Input	14250	MHz
Wavelength	λ	300 / F	0.021053	m
Transmit Power	P	Input	4.00	W
Antenna Gain (dBi)	G_{es}	Input	43.2	dBi
Antenna Gain (factor)	G	$10^{Ges/10}$	20893.0	n/a
Pi	π	Constant	3.1415927	n/a
Antenna Efficiency	η	$G\lambda^2/(\pi^2 D^2)$	0.65	n/a

1. Far Field Distance Calculation

The distance to the beginning of the far field can be determined from the following equation:

Distance to the Far Field Region	$R_{ff} = 0.60\ D^2 / \lambda$ $= 41.0$ m	(1)

The maximum main beam power density in the far field can be determined from the following equation:

On-Axis Power Density in the Far Field	$S_{ff} = G\ P / (4\ \pi\ R_{ff}^{\ 2})$ $= 3.949\ W/m^2$ $= 0.395\ mW/cm^2$	(2)

2. Near Field Calculation

Power flux density is considered to be at a maximum value throughout the entire length of the defined Near Field region. The region is contained within a cylindrical volume having the same diameter as the antenna. Past the boundary of the Near Field region, the power density from the antenna decreases linearly with respect to increasing distance.

The distance to the end of the Near Field can be determined from the following equation:

Extent of the Near Field	$R_{nf} = D^2 / (4\ \lambda)$ $= 17.1$ m	(3)

The maximum power density in the Near Field can be determined from the following equation:

Near Field Power Density	$S_{nf} = 16.0\ \eta\ P / (\pi\ D^2)$ $= 9.218\ W/m^2$ $= 0.922\ mW/cm^2$	(4)

3. Transition Region Calculation

The Transition region is located between the Near and Far Field regions. The power density begins to decrease linearly with increasing distance in the Transition region. While the power density decreases inversely with distance in the Transition region, the power density decreases inversely with the square of the distance in the Far Field region. The maximum power density in the Transition region will not exceed that calculated for the Near Field region. The power density calculated in Section 1 is the highest power density the antenna can produce in any of the regions away from the antenna. The power density at a distance R_t can be determined from the following equation:

Transition Region Power Density	$S_t = S_{nf}\ R_{nf} / R_t$ $= 0.922\ mW/cm^2$	(5)

4. Region between the Main Reflector and the Subreflector

Transmissions from the feed assembly are directed toward the subreflector surface, and are reflected back toward the main reflector. The most common feed assemblies are waveguide flanges, horns or subreflectors. The energy between the subreflector and the reflector surfaces can be calculated by determining the power density at the subreflector surface. This can be determined from the following equation:

Power Density at the Subreflector $S_{sr} = 4000\ P / A_{sr}$ (6)

$= 56.432\ mW/cm^2$

5. Main Reflector Region

The power density in the main reflector is determined in the same manner as the power density at the subreflector. The area is now the area of the main reflector aperture and can be determined from the following equation:

Power Density at the Main Reflector Surface $S_{surface} = 4\ P / A_{surface}$ (7)

$= 14.147\ W/m^2$

$= 1.415\ mW/cm^2$

6. Region between the Main Reflector and the Ground

Assuming uniform illumination of the reflector surface, the power density between the antenna and the ground can be determined from the following equation:

Power Density between Reflector and Ground $S_g = P / A_{surface}$ (8)

$= 3.537\ W/m^2$

$= 0.354\ mW/cm^2$

7. Summary of Calculations

Table 4. Summary of Expected Radiation levels for Uncontrolled Environment

Region	Calculated Maximum Radiation Power Density Level (mW/cm^2)		Hazard Assessment
1. Far Field (R_{ff} = 41.0 m)	S_{ff}	0.395	Satisfies FCC MPE
2. Near Field (R_{nf} = 17.1 m)	S_{nf}	0.922	Satisfies FCC MPE
3. Transition Region ($R_{nf} < R_t < R_{ff}$)	S_t	0.922	Satisfies FCC MPE
4. Between Main Reflector and Subreflector	S_{sr}	56.432	Potential Hazard
5. Main Reflector	$S_{surface}$	1.415	Potential Hazard
6. Between Main Reflector and Ground	S_g	0.354	Satisfies FCC MPE

Table 5. Summary of Expected Radiation levels for Controlled Environment

Region	Calculated Maximum Radiation Power Density Level (mW/cm^2)		Hazard Assessment
1. Far Field (R_{ff} = 41.0 m)	S_{ff}	0.395	Satisfies FCC MPE
2. Near Field (R_{nf} = 17.1 m)	S_{nf}	0.922	Satisfies FCC MPE
3. Transition Region ($R_{nf} < R_t < R_{ff}$)	S_t	0.922	Satisfies FCC MPE
4. Between Main Reflector and Subreflector	S_{sr}	56.432	Potential Hazard
5. Main Reflector	$S_{surface}$	1.415	Satisfies FCC MPE
6. Between Main Reflector and Ground	S_g	0.354	Satisfies FCC MPE

It is the applicant's responsibility to ensure that the public and operational personnel are not exposed to harmful levels of radiation.

8. Conclusions

Based on the above analysis it is concluded that the FCC MPE guidelines have been exceeded (or met) in the regions of Table 4 and 5. The applicant proposes to comply with the MPE limits by one or more of the following methods.

Radiation hazard signs will be posted while this earth station is in operation.

The earth station will be located in a Gated and Fenced facility with secured access in and around the proposed antenna, public safety will be ensured for the near and far field regions.

Radiation Hazard Report

<u>Means of Compliance Controlled Areas</u>

The earth station's operational staff will not have access to the areas that exceed the MPE levels while the earth station is in operation.

The transmitters will be turned off during antenna maintenance

The applicant agrees to abide by the conditions specified in Condition 5208 provided below:

> *Condition 5208 - The licensee shall 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 defined in 47 CFR 1.1307(b) and 1.1310 wherever such exposures might occur. Measures must be taken to ensure compliance with limits for both occupational/controlled exposure and for general population/uncontrolled exposure, as defined in these rule sections. Compliance can be accomplished in most cases by appropriate restrictions such as fencing. Requirements for restrictions can be determined by predictions based on calculations, modeling or by field measurements. The FCC's OET Bulletin 65 (available on-line at www.fcc.gov/oet/rfsafety) provides information on predicting exposure levels and on methods for ensuring compliance, including the use of warning and alerting signs and protective equipment for worker.*

IV. General Dynamics Terminal – Data Sheet

1.2M Ku-Band Rx/Tx

Series 1120

Technical Specifications

Electrical		Series 1120 Ku-Band
Antenna Size		1.2 M (48 in.)
Operating Frequency (GHz)	Receive Transmit	10.95 - 12.75 GHz 13.75 - 14.50 GHz
Midband Gain (+/- .5dB)	Receive Transmit	41.7 dBi 43.2 dBi
Antenna Noise Temperature	20° Elevation 30° Elevation	46 K 43 K
Sidelobe Envelope, $100\lambda/D \leq \theta \leq 20°$ $20° < \theta \leq 26.3°$ $26.3° < \theta \leq 48°$ $48° < \theta$		 29 - 25 Logθ dBi -3.5 dBi 32 - 25 Logθ dBi -10 dBi (averaged)
Max. Tx Weight		Tier 1 = 6 lbs. Tier 2 = 12 lbs.
Insertion Loss		0.2 dB max.
Cross-Pol Isolation (Linear)		>30 dB (on axis)
VSWR		1.3:1 Max.

Mechanical	
Reflector Material	Glass Fiber Reinforced Polyester SMC
Antenna Optics	Prime Focus, Offset Feed
Mount Type	Elevation over Azimuth
Mast Pipe Size	2” SCH 40 Pipe (2.38” OD) 6.03 cm
Elevation Adjustment Range	5° to 90°, Continuous Fine Adjustment
Azimuth Adjustment Range	360° Continuous, Coarse
Shipping Specifications	60 lbs. (22.2 kg.)

Environmental Performance		
Wind Loading	Operational Survival	40 mph (72 km/h) 125 mph (201 km/h)
Temperature	Operational Survival	-40° to 140° F (-40° to 60° C) -50° to 160° F (-46° to 71° C)
Rain	Operational Survival	1/2”/hr 2”/hr
Ice	Operational Survival	------ 1/2” radial
Atmospheric Conditions		Salt, Pollutants and Contaminants as Encountered in Coastal and Industrial Areas
Solar Radiation		360 BTU/h/ft2

GENERAL DYNAMICS
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