READ INSTRUCTIONS CAREFULLY BEFORE PROCEEDING

(1) LOCKBOX # 358160

FEDERAL COMMUNICATIONS COMMISSION
REMITTANCE ADVICE

FCC/MELLON NOV 07 2001

Approved by OMB 3060-0589

SPECIAL USE

FCC USE ONLY

A PAYER INFORMATION

(2) PAYER NAME (if paying by credit card, enter name exactly as it appears on your card): COMSAT CORP. /COMSAT WORLD SYSTEMS

(3) TOTAL AMOUNT PAID (U.S. Dollars and cents): $145.00

(4) STREET ADDRESS LINE NO. 1: 6560 ROCK SPRING DRIVE

(5) STREET ADDRESS LINE NO. 2:

(6) CITY: BETHESDA

(7) STATE: MD

(8) ZIP CODE: 20817

(9) DAYTIME TELEPHONE NUMBER (include area code): 301-214-3459

(10) COUNTRY CODE (if not in U.S.A.):

FCC REGISTRATION NUMBER (FRN) AND TAX IDENTIFICATION NUMBER (TIN) REQUIRED

(11) PAYER (FRN): 0004-1337-91-60

(12) PAYER (TIN): 5221256227

IF PAYER NAME AND THE APPLICANT NAME ARE DIFFERENT, COMPLETE SECTION B
IF MORE THAN ONE APPLICANT, USE CONTINUATION SHEETS (FORM 159 C)

(13) APPLICANT NAME

(14) STREET ADDRESS LINE NO 1

(15) STREET ADDRESS LINE NO. 2

(16) CITY

(17) STATE

(18) ZIP CODE

(19) DAYTIME TELEPHONE NUMBER (include area code)

(20) COUNTRY CODE (if not in U.S.A.)

FCC REGISTRATION NUMBER (FRN) AND TAX IDENTIFICATION NUMBER (TIN) REQUIRED

(21) APPLICANT (FRN)

(22) APPLICANT (TIN)

COMPLETE SECTION C FOR EACH SERVICE, IF MORE BOXES ARE NEEDED, USE CONTINUATION SHEET

(23A) CALL SIGN/OTHER ID: KA-215

(24A) PAYMENT TYPE CODE: CGX

(25A) QUANTITY: 1

(26A) FEE DUE FOR (PTC): $145.00

(27A) TOTAL FEE: $145.00

FCC USE ONLY

(28A) FCC CODE 1

(29A) FCC CODE 2

(23B) CALL SIGN/OTHER ID

(24B) PAYMENT TYPE CODE

(25B) QUANTITY

(26B) FEE DUE FOR (PTC)

(27B) TOTAL FEE

FCC USE ONLY

(28B) FCC CODE 1

(29B) FCC CODE 2

SECTION D CERTIFICATION

(30) CERTIFICATION STATEMENT

I, ROBERT A. MANSBACH, certify under penalty of perjury that the foregoing and supporting information is true and correct to the best of my knowledge, information and belief. SIGNATURE [signature] DATE 11/6/01

SECTION E CREDIT CARD PAYMENT INFORMATION

(31) ☐ MASTERCARD ☐ VISA

MASTERCARD/VISA ACCOUNT NUMBER:

EXPIRATION

I hereby authorize the FCC to charge my VISA or MASTERCARD for the service(s)/authorization herein described.

SIGNATURE ____________ DATE ____________

COMSAT World Systems

Robert A. Mansbach
Senior Counsel

6560 Rock Spring Drive
Bethesda, Maryland 20817
Telephone.301 2 14 3459
Fax 301· 214 7145
Internet robert.mansbach@comsat.com

November 6, 2001

Ms. Magalie Salas
Secretary
Federal Communications Commission
445 12th Street, S.W.
Washington, D.C. 20554

RE: Request for Special Temporary Authority
Paumalu, Hawaii earth station
Call Sign: KA-25 SES-STA-20011107-02081

Dear Ms. Salas:

COMSAT Corporation (COMSAT) herein requests a grant of Special Temporary Authority from March 6, 2002 through April 5, 2002, to provide LEOP (launch and early orbit phase) services by the above-referenced earth station in support of the upcoming launch of the INTELSAT 903 satellite, currently scheduled for March 6, 2002. In support of its request, COMSAT submits the following information.

COMSAT uses this earth station in conjunction with its other licensed earth stations at Clarksburg, Maryland to support certain satellite launches. COMSAT herein requests a grant of Special Temporary Authority to permit it to provide LEOP services in support of the INTELSAT 903 launch via the above-referenced earth station.

COMSAT is attaching hereto detailed technical information which demonstrates that the provision of LEOP services by the above-referenced earth station will be compatible with its electromagnetic environment and will not cause harmful interference into any lawfully operated earth station. In the extremely unlikely event that such interference is caused, COMSAT will take all reasonable steps to eliminate the interference.

COMSAT will coordinate the frequency and power usage with all existing satellites in orbit, which use the same frequency bands, and are in the INTELSAT 903's path. COMSAT will also provide all other satellite operators in that path with an emergency phone number where the licensee or its operators can be immediately contacted in the event that harmful interference occurs. Again, in the extremely unlikely event that such interference is caused, COMSAT will take all reasonable steps to eliminate the interference.

A request of Special Temporary Authority will enable COMSAT to provide LEOP services that are critical to placing and maintaining the INTELSAT 903 spacecraft in its proper orbit at 34.5 degrees W.L. and will thereby promote the public interest.

Respectfully submitted,
COMSAT Corporation

By ______________________
Robert A. Mansbach

cc: R. Repasi, S. Lam, S. Crandall

CERTIFICATION

I hereby certify that COMSAT Corporation is not subject to a denial of Federal benefits pursuant to Section 5301 of the Anti-drug Abuse Act of 1988, 21 U.S.. C. Section 853a.

Robert A. Mansbach
COMSAT Corporation
6560 Rock Spring Drive
Bethesda, Maryland 20817
Its Attorney

EXHIBIT A

FREQUENCY COORDINATION AND INTERFERENCE ANALYSIS REPORT

FREQUENCY **COORDINATION AND INTERFERENCE ANALYSIS REPORT**

-

PREPARED FOR

COMSAT CORPORATION
PAUMALU, HAWAII

SATELLITE EARTH STATION
(CALL SIGN: KA25)

PREPARED BY
COMSEARCH
19700 JANELIA FARM BOULEVARD
ASHBURN, VIRGINIA 20147
MAY 21, 2001

TABLE OF CONTENTS

1. CONCLUSIONS

AN INTERFERENCE STUDY CONSIDERING ALL EXISTING, PROPOSED AND PRIOR COORDINATED MICROWAVE FACILITIES WITHIN THE COORDINATION CONTOURS OF THE PROPOSED EARTH STATION DEMONSTRATES THAT THIS SITE WILL OPERATE SATISFACTORILY WITH THE COMMON CARRIER MICROWAVE ENVIRONMENT. FURTHER, THERE WILL BE NO RESTRICTIONS OF ITS OPERATION DUE TO INTERFERENCE CONSIDERATIONS.

2: SUMMARY OF RESULTS

A NUMBER OF GREAT CIRCLE INTERFERENCE CASES WERE IDENTIFIED DURING THE INTERFERENCE STUDY OF THE PROPOSED EARTH STATION. EACH OF THE CASES WHICH EXCEEDED THE INTERFERENCE OBJECTIVE ON A LINE-OF-SIGHT BASIS WAS PROFILED AND THE PROPAGATION LOSSES ESTIMATED USING NBS TN101 (REVISED) TECHNIQUES. THE LOSSES WERE FOUND TO BE SUFFICIENT TO REDUCE THE SIGNAL LEVELS TO ACCEPTABLE MAGNITUDES IN EVERY CASE.

THE FOLLOWING COMPANIES REPORTED POTENTIAL GREAT CIRCLE INTERFERENCE CONFLICTS WHICH DID NOT MEET THE OBJECTIVES ON A LINE-OF-SIGHT BASIS. WHEN OVER-THE-HORIZON LOSSES ARE CONSIDERED ON THE INTERFERING PATHS, SUFFICIENT BLOCKAGE EXISTS TO NEGATE HARMFUL INTERFERENCE FROM OCCURRING WITH THE PROPOSED TRANSMIT AND RECEIVE EARTH STATION.

<u>COMPANY</u>

TUNDRA COMMUNICATIONS, INC
VERIZON HAWAII, INC
AT&T WIRELESS SERVICES OF HAWAII, INC

NO OTHER CARRIERS REPORTED POTENTIAL INTERFERENCE CASES.

3. SUPPLEMENTAL SHOWING
RE: PART 25.203(C)

PURSUANT TO- PART 25.203(C) OF THE FCC RULES AND REGULATIONS, THE SATELLITE EARTH STATION PROPOSED IN THIS APPLICATION WAS COORDINATED BY COMSEARCH USING COMPUTER TECHNIQUES AND IN ACCORDANCE WITH PART 25 OF THE FCC RULES AND REGULATIONS.

EXPEDITED COORDINATION DATA FOR THIS EARTH STATION WAS FAXED TO THE BELOW LISTED CARRIERS WITH A LETTER DATED MAY 9, 2001.

AT&T CORP-GOVT MKTS HAWAII INF TRANSFER
AT&T WIRELESS SERVICES OF HAWAII, INC.
HAWAII ELECTRIC LIGHT CO INC
HAWAII STATE
MAUI COMMUNITY COLLEGE
PACWEST NETWORK HAWAII INC
TUNDRA COMMUNICATIONS INC
UNIVERSITY OF HAWAII
UNIVERSITY OF HAWAII LANGUAGE TELECOMM
VERIZON HAWAII INC.

4. EARTH STATION COORDINATION DATA

THIS SECTION PRESENTS THE DATA PERTINENT TO FREQUENCY COORDINATION OF THE PROPOSED EARTH STATION WHICH WAS CIRCULATED TO ALL COMMON CARRIERS WITHIN ITS COORDINATION CONTOURS.

SATELLITE EARTH STATION
FREQUENCY COORDINATION DATA
04/24/2001

Company	**COMSAT CORPORATION**
Earth Station Name, State	PAUMALU, **HI**
Call Sign	KA25
Latitude (DMS) (NAD83)	**21 40 14.6 N**
Longitude (DMS) (NAD83)	**158 2 3.1 w**
Ground Elevation AMSL (Ft/m)	**475.0 / 144.78**
Antenna Centerline AGL (Ft/m)	**33.0 / 10.06**
Receive Antenna Type:	**TIW 19 METER**
4.0 GHz **Gain** (dBi) / **Diameter** (m)	**56.7 / 19.0**
3 dB / **15** dB **Half Beamwidth**	**0.10 / 0.20**
Transmit Antenna Type:	**TIW 19 METER**
6.0 GHz **Gain** (dBi) / **Diameter** (m)	**59.2 / 19.0**
3 dB / **15** dB **Half Beamwidth**	**0.10 / 0.20**
Operating Mode	**TRANSMIT AND RECEIVE**
Modulation	**ANALOG**
.ission / **Receive Band** (MHz)	800KFXD / **3625.0000 - 4200.0000**
omission / Transmit Band (MHz)	800KFXD / **6172.0000 - 6178.0000**
Max. Available RF Power (dBW)/4 kHz	**10.80**
(dBW)/MHz	**34.80**
Max. EIRP (dBW)/4 kHz	**70.00**
(dBW)/MHz	**94.00**
Max permissible Interference Power	
4.0 GHz, **20%** (dBW/1 **MHz)**	**-164.0**
4.0 GHz, **0.0100%** (dBW/1 MHz)	**-144.0**
6.0 GHz, **20%** (dBW/4 kHz)	**-154.0**
6.0 GHz, **0.0025%** (dBW/4 kHz)	**-131.0**
Leops Earth Station Operations for New Geostationary Satellite Launches	
Leops Azimuth Range (Min/Max) **Degrees**	**0.0 / 360.0**
Minimum Elevation Angle Degrees	**5.0**
Radio Climate	**C**
Rain Zone	**4**
Max Great Circle Coordination Distance (Mi/Km)	
4.0 GHz	**584.8 / 941.3**
6.0 GHz	**457.8 / 736.8**
.ecipitation **Scatter Contour Radius** (Mi/Km)	
4.0 GHz	**62.1 / 100.0**
6.0 GHz	**62.1 / 100.0**

Table of Earth Station Coordination Values
04/24/2001

Earth Station Name **PAUMALU HI**
Owner COMSAT CORPORATION
Latitude (DMS) (NAD83) 21 40 14.6 N
Longitude (DMS) (NAD83)158 **2 3.1 w**
Ground Elevation (Ft/m) 475.0 / 144.78 AMSL
Antenna Centerline (Ft/m) 33.0 / 10.06 **AGL**
Antenna Model **TIW 19 METER**
Objectives: Receive **-164.0** (dBW /1 MHz)
Transmit **-154.0** (dBW /4 kHz) **TX Power** 10.8 (dBW/4 kHz)

Azimuth (Deg)	**Horizon Elevation Angle** (Deg)	**Antenna Disc. Angle** (Deg)	4.0 GHz **Antenna Gain** (dBi)	4.0 GHz **Coordination Distance** (Km)	6.0 GHz **Antenna Gain** (dBi)	6.0 GHz **Coordination Distance** (Km)
0	**0.00**	**72.41**	4.50	**941.3**	4.50	736.8
5	**0.00**	70.74	4.50	941.3	4.50	736.8
10	**0.00**	69.21	4.50	941.3	4.50	736.8
15	**0.00**	67.83	4.50	**941.3**	4.50	736.8
20	**0.00**	66.61	4.50	**941.3**	4.50	736.8
25	**0.00**	65.58	4.50	941.3	4.50	736.8
30	**0.00**	64.73	4.50	941.3	4.50	736.8
35	**0.00**	64.09	4.50	941.3	4.50	736.8
40	**0.00**	63.66	4.50	941.3	4.50	736.8
45	**0.00**	63.44	4.50	941.3	4.50	736.8
50	**0.00**	63.44	4.50	941.3	4.50	736.8
55	**0.00**	63.65	4.50	941.3	4.50	736.8
60	**0.00**	64.08	4.50	941.3	4.50	736.8
65	**0.00**	64.72	4.50	941.3	4.50	736.8
70	**0.00**	65.57	4.50	941.3	4.50	736.8
75	**0.00**	66.60	4.50	941.3	4.50	736.8
80	**0.00**	67.81	4.50	941.3	4.50	736.8
85	0.47	69.54	4.50	743.1	4.50	513.9
90	0.74	71.24	4.50	692.5	4.50	460.3
95	0.94	72.99	4.50	665.8	4.50	432.2
100	1.43	74.99	4.50	611.9	4.50	375.5'
105	1.81	76.97	4.50	578.9	4.50	340.5
110	2.17	78.98	4.50	551.8	4.50	311.8
115	2.02	80.83	4.50	562.7	4.50	323.3
120	2.75	83.01	4.50	514.0	4.50	271.4
125	2.60	84.94	4.50	523.2	4.50	281.3
130	2.86	86.98	4.50	507.4	4.50	264.3
135	2.72	88.98	4.50	515.8	4.50	273.3
140	2.27	91.02	4.50	544.9	4.50	304.4
145	1.69	93.14	4.50	588.8	4.50	350.9
150	1.64	95.23	4.50	593.0	4.50	355.4
155	1.56	97.30	4.50	600.0	4.50	362.8
160	1.49	99.33	4.50	606.3	4.50	369.5
165	2.42	100.89	4.50	534.8	4.50	293.6
170	2.04	102.89	4.50	561.2	4.50	321.8
175	1.85	104.75	4.50	575.7	4.50	337.1
180	1.90	106.38	4.50	571.8	4.50	333.0

Table of Earth Station Coordination Values
04/24/2001

Earth Station Name **PAUMALU HI**
Owner **COMSAT CORPORATION**
Latitude (DMS) (NAD83) **21 40 14.6 N**
Longitude (DMS) (NAD83) 158 **2** 3.1 W
Ground Elevation (Ft/m) 475.0 / 144.78 **AMSL**
Antenna Centerline (Ft/m) 33.0 / 10.06 **AGL**
Antenna Model **TIW** 19 **METER**
Objectives: Receive **-164.0** (dBW /1 MHz)
Transmit **-154.0** (dBW /4 kHz) **TX Power** **10.8** (dBW/4 kHz)

Azimuth (Deg)	**Horizon Elevation Angle** (Deg)	**Antenna Disc. Angle** (Deg)	4.0 GHz **Antenna Gain** (dBi)	4.0 GHz **Coordination Distance** (Km)	6.0 GHz **Antenna Gain** (dBi)	6.0 GHz **Coordination Distance** (Km)
185	1.71	**108.07**	4.50	**587.9**	4.50	350.0
190	1.47	**109.68**	4.50	608.2	4.50	371.5
195	1.34	111.08	4.50	620.7	4.50	384.7
200	1.12	112.42	4.50	644.0	4.50.	409.3
205	0.86	113.64	4.50	676.5	4.50	443.5
210	0.66	114.64	4.50	706.9	4.50	475.6
215	0.38	115.55	4.50	764.2	4.50	536.3
220	0.00	116.34	4.50	941.3	4.50	736.8
225	0.00	116.56	4.50	941.3	4.50	736.8
230	0.00	116.56	4.50	941.3	4.50	736.8
235	0.00	116.35	4.50	941.3	4.50	736.8
240	0.00	115.92	4.50	941.3	4.50	736.8
245	0.00	115.28	4.50	941.3	4.50	736.8
250	0.00	114.43	4.50	941.3	4.50	736.8
255	0.00	113.40	4.50	941.3	4.50	736.8
260	0.00	112.19	4.50	941.3	4.50	736.8
265	0.00	110.81	4.50	941.3	4.50	736.8
270	0.00	109.28	4.50	941.3	4.50	736.8
275	0.00	107.61	4.50	941.3	4.50	736.8
280	0.00	105.82	4.50	941.3	4.50	736.8
285	0.00	103.93	4.50	941.3	4.50	736.8
290	0.00	101.94	4.50	941.3	4.50	736.8
295	0.00	99.88	4.50	941.3	4.50	736.8
300	0.00	97.75	4.50	941.3	4.50	736.8
305	0.00	95.57	4.50	941.3	4.50	736.8
310	0.00	93.36	4.50	941.3	4.50	736.8
315	0.00	91.13	4.50	941.3	4.50	736.8
320	0.00	88.89	4.50	941.3	4.50	736.8
325	0.00	86.66	4.50	941.3	4.50	736.8
330	0.00	84.45	4.50	941.3	4.50	736.8
335	0.00	82.28	4.50	941.3	4.50	736.8
340	0.00	80.15	4.50	941.3	4.50	736.8
345	0.00	78.08	4.50	941.3	4.50	736.8
350	0.00	76.10	4.50	941.3	4.50	736.8
355	0.00	74.20	4.50	941.3	4.50	736.8

5. CERTIFICATION

I HEREBY CERTIFY THAT I AM THE TECHNICALLY QUALIFIED PERSON RESPONSIBLE FOR THE PREPARATION OF THE FREQUENCY COORDINATION DATA CONTAINED IN THIS APPLICATION, THAT I AM FAMILIAR WITH PARTS 101 AND 25 OF THE FCC RULES AND REGULATIONS, THAT I HAVE EITHER PREPARED OR REVIEWED THE FREQUENCY COORDINATION DATA SUBMITTED WITH THIS APPLICATION, AND THAT IT IS COMPLETE AND CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF.

BY: ______________________

JEFFREY E. COWLES
SENIOR FREQUENCY COORDINATOR
COMSEARCH
19700 JANELIA FARM BLVD.
ASHBURN, VIRGINIA 20147

DATED: May 21, 2001

EXHIBIT B

RADIATION HAZARD STUDY

Analysis of Non-Ionizing Radiation for a 19.0 Meter Earth.Station System

This report analyzes the non-ionizing radiation levels for a 19.0 met earth station system. The analysis and calculations performed in this repo are in compliance with the methods described in the FCC Office of Engineer. and Technology Bulletin, No. 65 first published in 1985 and revised in 1: in Edition 97-01. The radiation safety limits used in the analysis are conformance with the FCC R&O 96-326. Bulletin No. 65 and the : R&O specifies that there are two separate tiers of exposure limits that . dependant on the situation in which the exposure takes place and/or status of the individuals who are subject to the exposure. The Maxi Permissible Exposure (MPE) limits for persons in a General Populati Uncontrolled environment are shown in Table 1. The General Populati Uncontrolled MPE is a function of transmit frequency and is for an expos period of thirty minutes or less. The MPE limits for persons in Occupational/Controlled environment are shown in Table 2. The Occupatio MPE is a function of transmit frequency and is for an exposure period of minutes or less. The purpose of the analysis described in this report is determine the power flux density levels of the earth station in far-field, near-field, transition region, between the subreflector or f and main reflector surface, at the main reflector surface, and betw the antenna edge and the ground and to compare these levels to specified MPEs.

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

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

Table 3 contains the parameters that are used to calculate the various pc densities for the earth stations.

Table 3. 'Formulas and Parameters Used for Determining 'Power Flux Densitie

Parameter	Abbreviation	Value	Units
Antenna Diameter	D	19.0	meters
Antenna Surface Area	Sa	II * D**2/4	meters**2
Subreflector Diameter	Ds	251.0	cm
Area of Subreflector	As	II * Ds**2/4	cm**2
Frequency	Frequency	6175	MHz
Wavelength	lambda	300/frequency(MHz)	meters
Transmit Power	P	2400.00	Watts
Antenna Gain	Ges	59.2	dBi
Pi	II	3.1415927	n/a
Antenna Efficiency	n	0.55	n/a

1. **Far Field Distance Calculation**

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

Distance to the Far Field Region,(Rf) = 0.60 * D**2 / lambda
= 4458.3 meters

The maximum main beam power density in the Far Field can be determined from the following equation:(2)

On-Axis Power Density in the Far Field,(Wf) = Ges * P / 4 * II * Rf**
= 7.992 Watts/meters**2
= 0.799 mWatts/cm**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: (3)

Extent of the Near Field,(Rn) = D**2 / (4 * lambda)
= 1857.6 meters

The maximum power density in the Near Field can be determined from the following equation:(4)

Near Field Power Density,(Wn) = 16.0 * n * P / II * D**2
= 18.657 Watts/meters**2
= 1.866 mWatts/cm**2

3. Transition Region Calculations

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 Rt can be determined from the following equation:(S)

Transition region Power Density,(Tt) = Wn * Rn / Rt
= 1.866 mWatts/cm**2

4. Region between Main Reflector and 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:(6)

Power Density at Feed Flange,(Ws) = 4 * P / As
= 194.014 mWatts/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:(7)

Power Density at the Main Reflector Surface,(Wm) = 4 * P / Sa
= 33.859 Watts/meters**2
= 3.386 mWatts/cm**2

6. Region between Main Reflector and Ground

Assuming uniform illumination of the reflector surface, the power density between the antenna and ground can be determined from the following equation:(8)

Power Density between Reflector and Ground,(Wg) = P / Sa
= 8.465 Watts/meter:
= 0.846 mWatts/cm**:

Table 4. Summary of Expected 'Radiation levels for Uncontrolled. Environment

Region	Calculated Maximum Radiation Power Density Level (mWatts/cm**2)	Hazard Assessmen
1. Far Field (Rf) = 4458.3 meters	0.799	Satisfies FCC MP
2. Near Field (Rn) = 1857.6 meters	1.866	Potential Hazard
3. Transition Region Rn < Rt < Rf, (Rt)	1.866	Potential Hazard
4. Between Main Reflector and Subreflector .	194.014	Potential Hazard
5. Main Reflector	3.386	Potential Hazard
6. Between Main Reflector and Ground	0.846	Satisfies FCC MF

Table 5. Summary of Expected Radiation levels for Controlled Environment

Region	Calculated Maximum Radiation Power Density Level (mWatts/cm**2)	Hazard Assessmer
1. Far Field (Rf) = 4458.3 meters	0.799	Satisfies FCC MI
2. Near Field (Rn) = 1857.6 meters	1.866	Satisfies FCC MI
3. Transition Region Rn < Rt < Rf, (Rt)	1.866	Satisfies FCC MI
4. Between Main Reflector and Subreflector	194.014	Potential Hazar(
5. Main Reflector	3.386	Satisfies FCC M
6. Between Main Reflector and Ground	0.846	Satisfies FCC M

It is the applicant's responsibility to ensure that the public a operational personnel are not exposed to harmful levels of radiatic

7. Conclusions

Based upon the above analysis, it is concluded that during TT&C harmful levels of radiation may exist in those regions noted for the Uncontrolled (Table 4) Environment.

These transmissions are operational only short periods of time during emergency or testing situations. Those operational periods include TT&C functions, a transponder failure, or if a Transponder's performance is brought into question.

The earth station is installed at COMSAT Corporation's Paumalu, Hawaii Teleport facility. The complex is surrounded by a fence, which will restrict any public access. The earth station will be marked with the standard radiation hazard warnings, as well as the area in the vicinity of the earth stations to inform those in the general population, who might be working or otherwise present in or near the direct path of the main beams.

COMSAT Corporation will ensure that the main beam of the antenna will be pointed at least one diameter away from any building, or other obstacles in those areas that exceed the MPE levels.

Finally, the earth station's operating personnel will not have access to areas that exceed the MPE levels, while the earth station is in operation- The transmitter will be turned off during periods of maintenance, so that the MPE standard of 5.0 mw/cm**2 will be complied with for those regions in close proximity to the main reflector, which could be occupied by operating personnel.

EXHIBIT C

FAA NOTIFICATION

FM Notification Not Required

Per PART 17[17.14(a)] of the FCC rules, FAA notification is not required, as the proposed antenna structure will be located in an area with structures of equal or greater height.

EXHIBIT D

ELECTROMAGNETIC COMPATABILITY STUDY

Interference Analysis Report

An Assessment of the Impact of Radiolocation Systems Operating in 3.1-3.7 GHz Band on Fixed Satellite Services Earth Station Receiver

Prepared for

LOCKEED-MARTIN GLOBAL TELECOMMUNICATIONS

TRANSMIT-RECEIVE EARTH STATION (19.0 METER)

FCC CALL SIGN: KA25

Site Name: Paumalu, HI

Prepared By

COMSEARCH

May 21, 2001

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1.0 Introduction

Interference calculations were performed to determine the potential for in-band and out-of-band interference from Radiolocation Systems operating in the 3.1 to 3.7 GHz band[1]. The geographical positions and operating parameters of these systems was derived from NTIA Document TR-99-36 1[2].

2.0 Radiolocation Systems in the 3.1 – 3.7 GHz Band

High powered mobile and fixed radar systems operated by the Federal Government operate in the 3.1 – 3.7 GHz band. These radars are used to search for and track near-surface and high-altitude airborne projectiles, sea surveillance, and airborne objects. The NTIA report referenced above has identified the locations for two types of systems: land-based and shipboard based. Also included in the report are the operating characteristics of these radars. There are two prevalent types of shipboard radars, denoted as type A and Type B, and one type of ground-based radar. An Airborne System radar is also specified. This analysis will concern itself with interference from the ground based and shipboard based radars based upon the relative operating positions and parameters specified in the NTIA report

A summary of the operating parameters for the shipboard and ground based radar systems is shown below:

Table 1 -Technical Characteristics of 3.1-3.7 GHz Radiolocation Systems

Characteristic	Shipboard System A	Shipboard System B	Ground Based System
Modulation	PON	Q7N	PON
Tuning Range (GHz)	3.5-3.7	3.1-3.5	3.1-3.4
Peak transmit Power (MW)	1	4	0.12
Pulse Width (µsec.)	1.0	3.5-s 1.2	10.75
Pulse Repetition Rate (kHz)	1.125	0.152-6.0	2793.3-5050.5 1
Duty Cycle (%)	0.001	0.8-2.0	0.041
Transmit 3-dB Bandwidth (MHz)	4,16.6	4	1,10
Antenna Type	Reflector	Phased Array	Phase scan Array
Antenna Mainbeam Gain (dBi)	32	42	36
Antenna Centerline (m)	46	20	46

[1] This report is being provided as required under Footnote US 245.
[2] National Telecommunications and Information Administration, U.S. DEPARTMENT OF COMMERCE, NTIA Report TR 99-361, *TECHNICAL CHARACTERISTICS OF RADIOLOCATION SYSTEMS OPERATING IN THE 3.1-3.7 GHz BAND AND PROCEDURES FOR ASSESSING EMC WITH FIXED EARTH STATION RECEIVERS*, (December 1999).

'3.0 Earth Station System Parameters

The Fixed Satellite Service Earth Station's operational parameters are shown in the Tables 2 and 3 below:

TABLE 2 - SATELLITE EARTH STATION PARAMETERS AND COORDINATION DATA

Company	COMSAT CORPORATION
Earth Station Name, State	PAUMALU, HI
Call Sign	KA25
Latitude (DMS) (NAD83)	21 40 14.6 N
Longitude (DMS) (NAD83)	158 2 3.1 W
Ground Elevation AMSL (Ft/m)	475.0 / 144.78
Antenna Centerline AGL (Ft/m)	33.0 / 10.06
Receive Antenna Type:	TIW 19.2 METER
4.0 GHz Gain (dBi) / Diameter (m)	56.7 / 19.0
3 dB / 15 dB Half Beamwidth	0.10 / 0.20
Transmit Antenna Type:	TIW 19.2 METER
6.0 GHz Gain (dBi) / Diameter (m)	59.2 / 19.0
3 dB / 15 dB Half Beamwidth	0.10 / 0.20
Operating Mode	TRANSMIT AND RECEIVE
Modulation	ANALOG
Emission / Receive Band (MHz)	800KFXD / 3625.0000 - 4200.0000
Emission / Transmit Band (MHz)	800KFXD / 6172.0000 - 6178.0000
Max. Available RF Power (dBW)/4 kHz	10.80
(dBW)/MHz	34.80
Max. EIRP (dBW)/4 kHz	70.00
(dBW)/MHz	94.00
Max permissible Interference Power	
4.0 GHz, 20% (dBW/1 MHZ)	-164.0
4.0 GHz, 0.0100% (dBW/1 MHZ)	-144.0
6.0 GHz, 20% (dBW/4 kHz)	-154.0
6.0 GHz, 0.0025% (dBW/4 kHz)	-131.0
Low Earth Orbit Satellite	
Azimuth Range (Min/Max) Degrees	0.0 / 360.0
Minimum Elevation Angle Degrees	5.0
Radio Climate	C
Rain Zone	4
Max Great Circle Coordination Distance (Mi/Km)	
4.0 GHz	584.8 / 941.3
6.0 GHz	457.0 / 736.8
Precipitation Scatter Contour Radius (Mi/Km)	
4.0 GHz	62.1 / 100.0
6.0 GHz	62.1 / 100.0

TABLE 3 - TABLE OF EARTH STATION COORDINATION VALUES

Earth Statioh Name PAUMALU HI
Owner COMSAT CORPORATION
Latitude (DMS) (NAD83) 21 40 14.6 N
Longitude (DMS) (NAD83) 158 2 3.1 W
Ground Elevation (Ft/m) 475.0 / 144.78 AMSL
Antenna Centerline (Ft/m) 33.0 / 10.06 AGL
Antenna Model TIW 19.2 METER
Objectives: Receive -164.0 (dBW /1 MHz)
Transmit -154.0 (dBW /4 kHz) TX Power 10.8 (dBW/4 kHz)

Azimuth (Deg)	Horizon Elevation Angie (Deg)	Antenna Disc. Angle (Deg)	4.0 GHz Antenna Gain (dBi)	4.0 GHz Coordination Distance (Km)	6.0 GHz Antenna Gain (dBi)	6.0 GHz Coordination Distance (Km)
0	0.00	72.41	4.50	941.3	4.50	736.8
5	0.00	70.74	4.50	941.3	4.50	736.8
10	0.00	69.21	4.50	941.3	4.50	736.8
15	0.00	67.83	4.50	941.3	4.50	736.8
20	0.00	66.61	4.50	941.3	4.50	736.8
25	0.00	65.58	4.50	941.3	4.50	736.8
30	0.00	64.73	4.50	941.3	4.50	736.8
35	0.00	64.09	4.50	941.3	4.50	736.8
40	0.00	63.66	4.50	941.3	4.50	736.8
45	0.00	63.44	4.50	941.3	4.50	736.8
so	0.00	63.44	4.50	941.3	4.50	736.8
55	0.00	63.65	4.50	941.3	4.50	736.8
60	0.00	64.08	4.50	941.3	4.50	736.8
65	0.00	64.72	4.50	941.3	4.50	736.8
70	0.00	65.57	4.50	941.3	4.50	736.8
75	0.00	66.60	4.50	941.3	4.50	736.8
80	0.00	67.81	4.50	941.3	4.50	736.8
85	0.47	69.54	4.50	743.1	4.50	513.9
90	0.74	71.24	4.50	692.5	4.50	460.3
9s	0.94	72.99	4.50	665.8	4.50	432.2
100	1.43	74.99	4.50	611.9	4.50	375.5
105	1.81	76.97	4.50	578.9	4.50	340.5
110	2.17	78.98	4.50	551.8	4.50	311.8
11s	2.02	'80.83	4.50	562.7	4.50	323.3
120	2.75	83.01	4.50	514.0	4.50	271.4
125	2.60	84.94	4.50	523.2	4.50	281.3
130	2.86	86.98	4.50	507.4	4.50	264.3
135	2.72	88.98	4.50	515.8	4.50	273.3
140	2.27	91.02	4.50	544.9	4.50	304.4
145	1.69	93.14	4.50	588.8	4.50	350.9
150	1.64	95.23	4.50	593.0	4.50	355.4
155	1.56	97.30	4.50	600.0	4.50	362.8
160	1.49	99.33	4.50	606.3	4.50	369.5
165	2.42	100.89	4.50	534.8	4.50	293.6
170	2.04	102.89	4.50	561.2	4.50	321.8
175	1.85	104.75	4.50	575.7	4.50	337.1
180	1.90	106.38	4.50	571.8	4.50	333.0

TABLE 3 - TABLE OF EARTH STATION COORDINATION VALUES (continued)

Earth Station Name PAUMALU HI
Owner COMSAT CORPORATION
Latitude (DMS) (NAD83) 21 40 14.6 N
Longitude (DMS) (NAD83) 158 2 3.1 W
Ground Elevation (Ft/m) 475.0 / 144.78 AMSL
Antenna Centerline (Ft/m) 33.0 / 10.06 AGL
Antenna Model TIW 19.2 METER
Objectives: Receive -164.0 (dBW /1 MHz)
Transmit -154.0 (dBW /4 kHz) TX Power 10.8 (dBW/4 kHz)

Azimuth (Deg)	Horizon Elevation Angle (Deg)	Antenna Disc. Angle (Deg)	4.0 GHz Antenna Gain (dBi)	4.0 GHz Coordination Distance (Km)	6.0 GHz Antenna Gain (dBi)	6.0 GHz Coordination Distance (Km)
185	1.71	108.07	4.50	587.9	4.50	350.0
190	1.4-l	109.68	4.50	608.2	4.50	371.5
195	1.34	111.08	4.50	620.7	4.50	384.7
200	1.12	112.42	4.50	644.0	4.50	409.3
205	0.86	113.64	4.50	676.5	4.50	443.5
210	0.66	114.64	4.50	706.9	4.50	475.6
215	0.38	115.55	4.50	764.2	4.50	536.3
220	0.00	116.34	4.50	941.3	4.50	736.8
225	0.00	116.56	4.50	941.3	4.50	736.8
230	0.00	116.56	4.50	941.3	4.50	736.8
235	0.00	116.35	4.50	941.3	4.50	736.8
240	0.00	115.92	4.50	941.3	4.50	736.8
245	0.00	115.28	4.50	941.3	4.50	736.8
250	0.00	114.43	4.50	941.3	4.50	736.8
255	0.00	113.40	4.50	941.3	4.50	736.8
260	0.00	112.19	4.50	941.3	4.50	736.8
265	0.00	110.81	4.50	941.3	4.50	736.8
270	0.00	109.28	4.50	941.3	4.50	736.8
275	0.00	107.61	4.50	941.3	4.50	736.8
280	0.00	105.82	4.50	941.3	4.50	736.8
285	0.00	103.93	4.50	941.3	4.50	736.8
290	0.00	101.94	4.50	941.3	4.50	736.8
295	0.00	99.88	4.50	941.3	4.50	736.8
300	0.00	97.75	4.50	941.3	4.50	736.8
305	0.00	95.57	4.50	941.3	4.50	736.8
310	0.00	93.36	4.50	941.3	4.50	736.8
315	0.00	91.13	4.50	941.3	4.50	736.8
320	0.00	88.89	4.50	941.3	4.50	736.8
325	0.00	86.66	4.50	941.3	4.50	736.8
330	0.00	84.45	4.50	941.3	4.50	736.8
335	0.00	82.28	4.50	941.3	4.50	736.8
340	0.00	80.15	4.50	941.3	4.50	736.8
345	0.00	78.08	4.50	941.3	4.50	736.8
350	0.00	76.10	4.50	941.3	4.50	736.8
355	0.00	74.20	4.50	941.3	4.50	736.8

4.0 Interference Calculations

The interference was calculated into the earth station receive system for both in-band and out-of-band interference The interference power level was calculated using the formula below:

$$P_r = P_t + G_t - FSL - OHLOSS + G_{es} - LL_t - LL_{es}$$

Where:

P_r : Interference power level received at *victim earth station, in* dBW
P_t: Transmitter power of Radiolocation system, in dB W
G_t: Gain of Radiolocation transmit system, in dBi
FSL: Free Space Loss between radiolocation system and earth station, in dB
OHLOSS: Over-the-Horizon losses between radiolocation system and earth station, in dB
G_{es}: Horizon gain of the earth station toward radiolocation transmitter, in dBi
LL_t: Line losses of the radiolocation system, in dB (assume 2dB per NTIA report)
LL_{es}: Line losses of the earth station system, in dB (assume 0 dB unless known)

This interference power level was then compared to in-band and out-of-band interference criteria. The in-band criteria was developed using ITU and FCC recommendation?. The out-of-band interference criteria was developed using the following:

The earth station's low -noise amplifier front-end overload criteria of was determined using the following calculations:

$$T = C - G$$

Where:

T = input threshold at which front-end overload occurs, dB W
C = output 1 dB gain compression point of the LNA, typical -20 dBW
G = Gain of the LNA, dB

For the purposes of this report it was assumed that the low-noise amplifier would not provide any out-of-band frequency rejection, thus no Frequency Dependent Rejection values based upon any RF selectivity, such as pre-LNA filtering or inherent LNA filtering, have been assumed. The maximum level of interference is the includes the input saturation threshold value minus a 10 dB output backoff value to consider in operation levels

The maximum interference power receive, P_r, allowable then becomes:

$$\text{Max } P_r \geq T - IPBO$$

For a 65 dB gain LNA this value is -95 dBW. In the absence of manufacturer LNA/LNB specifications the following typical values have been used:

T = -95 dBW
C = -20 dBW
G = 65 dB

The propagation model to determine the over-the-horizon loss is the NSMA OH-Loss model[4]. When the propagation link is very lengthy, over 250 miles, an estimated OH-loss using a rounded earth modeling value has been used.

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[3] FCC Rules 47CFR25.25 1 by reference ITU Radio Regulations Appendix S7.
[4] National Spectrum Managers Association has developed an industry accepted version which incorporates NBS Tech Note 101.

5.0 Summary of Results

The summary calculations arc shown for all shipboard based and land based systems in Tables 4 through 8 below. Whenever Radar A and B are possibly in use, the interference calculations have assumed the higher powered systems (Radar B). The antenna elevation for the Ground Based systems was assumed to be 46 m even though it was not specified in the NTIA report.

Table 4 Shipboard Radar A Land-Based Test and Training Sites

Radar Location		Lat (N)	Lon (w)	Bearing (deg.)	Distance (mi)	Profile (Is path under 250 miles?)	FSL (dB)	Estimated OH-Loss (dB)	Profiled OH-Loss (dB)	Total Path Loss (dB)	Interfering Power Level (dBW/MHz)	In-Band Interference	Out-of Band Overload?
Pensacola,	FL	302128	0871626	66.7	4442.0	NO	-180.8	-110.0	N/A	-290.7	-240.7	NO	NO
Pascagoula,	MS	302200	0882900	66.9	4367.4	NO	-180.6	-109.7	N/A	-290.3	-240.3	NO	NO
St.Inigoes,	MD	1381000	10782300	56.6	5029.4	NO	-181.8	-112.1	N/A	-294.0	-244.0	NO	'NO

Table 6 Shipboard Radar B Land-Based Test and Training Sites

Radar Location		Lat (N)	Lon (w)	Bearing (deg.)	Distance (mi)	Profile (Is path under 250 miles?)	FSL (dB)	Estimated OH-Loss (dB)	Profiled OH-Loss (dB)	Total Path Loss (dB)	Interfering Power Level (dBW/MHz)	In-Band Interference?	Out-of Band Overload?
Moorestown,	NJ	395849	0745630	54.4	5098.5	NO	-182.0	-112.4	N/A	-294.3	-228.3	NO	NO
Wallops Island,	VA	375600	0752800	56.8	5085.0	NO	-181.9	-112.3	N/A	-294.3	-228.2	NO	NO

Table 6 Shipboard Radars A and B Home Ports

Radar Location		Lat (N)	Lon (w)	Bearing (deg.)	Distance (mi)	Profile (Is path under 250 miles?)	FSL (dB)	Estimated OH-Loss (dB)	Profiled OH-Loss (dB)	Total Path Loss (dB)	Interfering Power Level (dBW/MHz)	In-Band Interference?	Out-of Band Overload?
Bath,	ME	435425	0694848	49.5	5358.9	NO	-182.4	-113.2	N/A	-295.6	-229.6	NO	NO
Bremerton,	WA	473324	1223811	38.5	2693.2	NO	-176.4	-101.3	N/A	-277.7	-211.7	NO	NO
Everett,	WA	475858	1221354	38.1	2726.1	NO	-176.5	-101.5	N/A	-278.0	-212.0	NO	NO
Mayport,	FL	302334	0812427	66.0	4803.4	NO	-181.4	-111.3	N/A	-292.8	-226.8	NO	NO.
Norfolk,	VA	365200	0762100	58.1	5042.7	NO	-181.9	-112.2	N/A	-294.0	-228.0	NO	NO
Pascagoula,	MS	302253	0882933	66.9	4366.7	NO	-180.6	-109.7	N/A	-290.3	-224.3	NO	NO
Pearl Harbor,	HI	212000	1580000	174.6	23.3	YES	-135.2	-77.4	-77.4	-212.6	-146.6	YES	NO
Portland,	ME	434100	0701800	49.8	5333.5	NO	-182.4	-113.1	N/A	-295.5	-229.5	NO	NO
San Diego	CA	324105	1170800	63.9	2630.3	NO	-176.2	-100.9	N/A	-277.1	-211.1	NO	NO

Table 7 Naval At-Sea Operational Areas

Operational Area	Lat (N)	Lon (w)	Bearing (deg.)	Distance (mi)	Profile (Is path under 250 miles?)	FSL (dB)	Estimated OH-Loss (dB)	Profiled OH-Loss (dB)	Total Path Loss (dB)	Interfering Power Level (dBW/MHz)	In-Band Interference?	Out-of Band Overload?
AFWTF												
(North Range)	183000	0670000	76.5	5920.4	NO	-183.3	-115.0	N/A	-298.2	-232.2	NO	NO
	200000	0670000	74.9	5888.8	NO	-183.2	-114.9	N/A	-298.1	-232.1	NO	NO
	221000	0654800	72.5	5921.7	NO	-183.3	-115.0	N/A	-298.2	-232.2	NO	NO
	221000	0652000	72.4	5951.6	NO	-183.3	-115.0	N/A	-298.4	-232.3	NO	NO
	185000	0620000	75.2	6237.7	NO	-183.7	-115.9	N/A	-299.6	-233.6	NO	NO
	185000	0620000	75.2	6237.7	NO	-183.7	-115.9	N/A	-299.6	-233.6	NO	NO
	182500	0643000	76.1	6084.6	NO	-183.5	-115.4	N/A	-298.9	-232.9	NO	NO
	183000	0644500	76.0	6066.5	NO	-183.5	-115.4	N/A	-298.9	-232.8	NO	NO
	183000	0663800	76.4	5944.2	NO	-183.3	-115.0	N/A	-298.3	-232.3	NO	NO
AFWTF												
(South Range)	180500	0675500	77.1	5869.7	NO	-183.2	-114.8	N/A	-298.0	-232.0	NO	NO
	180500	0652700	76.6	6030.1	NO	-183.4	-115.3	N/A	-298.7	-232.7	NO	NO
	181500	0651000	76.4	6044.9	NO	-183.4	-115.3	N/A	-298.8	-232.7	NO	NO
	181500	0641000	76.2	6109.8	NO	-183.5	-115.5	N/A	-299.0	-233.0	NO	NO
	170000	0641000	77.5	6137.4	NO	-183.6	-115.6	N/A	-299.2	-233.1	NO	NO
	165800	0642800	77.6	6118.6	NO	-183.6	-115.5	N/A	-299.1	-233.1	NO	NO
	153300	0660600	79.3	6043.4	NO	-183.4	-115.3	N/A	-298.8	-232.7	NO	NO
	153900	0662300	79.3	6022.7	NO	-183.4	-115.3	N/A	-298.7	-232.6	NO	NO
	163000	0662300	78.4	6003.9	NO	-183.4	-115.2	N/A	-298.6	-232.6	NO	NO
	163000	0675500	78.7	5903.8	NO	-183.2	-114.9	N/A	-298.1	-232.1	NO	NO

Table 7 Naval At-Sea Operational Areas (continued)

Operational Area	Lat (N)	Lon (w)	Bearing (deg.)	Distance (mi)	Profile (Is path under 250 miles?)	FSL (dB)	Estimated OH-Loss (dB)	Profiled OH-Loss (dB)	Total Path Loss (dB)	Interfering Power Level (dBW/MHz)	In-Band Interference?	Out-of Band. Overload?
AUTEC												
	252000	0780500	71.2	5080.5	NO	-181.9	-112.3	N/A	-294.2	-228.2	NO	NO
	252000	0774500	71.2	5101.7	NO	-182.0	-112.4	N/A	-294.3	-228.3	NO	NO
	232500	0762000	73.0	5223.5	NO	-182.2	-112.8	N/A	-295.0	-228.9	NO	NO
	232500	0771500	73.2	5164.9	NO	-182.1	-112.6	N/A	-294.7	-228.6	NO	NO
FORACS, Hawaii												
	212530	1581100	209.6	19.4	YES	-133.6	-67.0	-67	-200.6	-134.6	YES	NO
	212100	1581500	212.2	26.1	YES	-136.1	-76.5	-76.5	-212.6	-146.6	YES	NO
	211500	1580800	192.5	29.6	YES	-137.3	-81.1	-81.1	-218.4	-152.3	YES	NO
	211500	1580700	190.4	29.4	YES	-137.2	-79.5	-79.5	-216.7	-150.7	YES	NO
Gulf of Mexico OPAREA												
	~293601	~0800130~	66.7	4898.4	NO	-181.6	-111.7	N/A	-293.3	-227.3	NO	NO
	292521	0864800	67.8	4480.3	NO	-180.8	-110.1	N/A	-291.0	-224.9	NO	NO
	284101	0864800	68.7	4488.0	NO	-180.9	-110.1	N/A	-291.0	-225.0	NO,	NO
	285231	0874400	68.6	4427.9	NO	-180.7	-109.9	N/A	-290.7	-224.6	NO	NO
Pacific Missile Range Facility (PMRF)												
	220000	1594500	281.9	112.5	YES	-148.8	-65.1	-65.1	-213.9	-147.9	YES	NO
	220800	1620000	277.9	256.6	NO	-156.0	-60.4	N/A	-216.4	-150.4	YES	NO
	224500	1614000	288.4	244.3	YES	-155.6	-70.1	-70.1	-225.7	-159.7	YES	NO
	260000	1581500	357.4	298.2	NO	-157.3	-63.0	N/A	-220.4	-162.3	YES	NO
Pearl Harbor South OPAREA												
	190800	1591500	204.5	191.5	YES	-153.5	-73.5	-73.5	-227.0	-160.9	YES	NO
	210000	1580800	187.9	46.6	YES	-141.2	-67.8	-67.8	-209.0	-143.0	YES	NO
	210000	1573600	148.7	54.0	YES	-142.5	-67.7	-67.7	-210.2	-144.1	YES	NO
	191800	1562000	145.6	196.9	YES	-153.7	-76.7	-76.7	-230.4	-164.4	NO	NO

	184900	1574500	174.6	197.2	YES	-153.7	-77.8	-77.8	-231.5	-165.5	NO	NO

Table 7 Naval At-Sea Operational Areas (continued)

Operational Area	Lat (N)	Lon (w)	Bearing (deg.)	Distance (mi)	Profile (Is path under250 miles?)	FSL (dB)	Estimated OH-Loss (dB)	Profiled OH-Loss (dB)	Total Path Loss (dB)	Interfering Power Level (dBW/MHz)	In-Band Interference?	Out-of Band Overload7
Southern California (SOCAL)												
	385200	1255200	50.3	2258.8	No	-174.9	-98.2	N/A ,	-273.1	-207.1	N O	NO
	390000	1240000	51.0	2358.1	NO	-175.3	-99.0	N/A	-274.2	-208.2	NO	NO
	311500	1163000	66.4	2656.9	NO	-176.3	-101.0	N/A	-277.3	-211.3	NO	NO
	300000	1203000	68.0	2407.6	NO	-175.5	-99.3	N/A	-274.8	-208.8	NO	NO
Virginia Capes OPAREA												
	384500	0750000	55.8	5105.2	NO	-182.0	-112.4	N/A	-294.4	-228.3	NO	NO
	384500	0743000	55.7	5134.3	NO	-182.0	-112.5	N/A	-294.5	-228.5	NO	N O
	374500	0724000	56.7	5251.1	NO	-182.2	-112.9	N/A	-295.1	-229.1	NO	NO
	350600	0724000	59.6	5280.6	NO	-182.3	-113.0	N/A	-295.2	-229.2	NO	NO
	320000	0771200	63.6	5043.1	NO	-181.9	-112.2	N/A	-294.0	-228.0	NO	NO
	342400	0773000	61.0	4998.1	NO	-181.8	-112.0	N/A	-293.8	-227.8	NO	NO
	354000	0752500	59.3	5109.8	NO	-182.0	-112.4	N/A	-294.4	-228.4	NO	'NO
	370000	0755000	57.8	5071.9	NO	-181.9	-112.3	N/A	-294.2	-228.2	NO	N O

Table 8 Land-Based Radar Test and Training Sites

Radar Location	Lat (N)	Lon (w)	Bearing (deg.)	Distance (mi)	Profile (Is path under250 miles7)	FSL (dB)	Estimated OH-Loss (dB)	Profiled OH-Loss (dB)	Total Path Loss (dB)	Interfering Power Level (dBW/MHz)	In-Band Interference?	Out-of.' Band Overload?
Fort Lewis WA	470525	1223510	39.1	2678.4	NO	-176.4	-101.2	N/A	-277.6	-211.5	NO	N O
Yakima Firing WA	464018	1202135	40.8	2761.9	NO	-176.6	-101.7	N/A	-278.4	-212.3	NO	NO
Fort Carson CO	383810	1044750	56.5	3394.4	NO	-178.4	-105.3	N/A	-283.7	-217.7	NO	NO
Fort Rliey KS	385813	0965139	56.5	3845.1	NO	-179.5	-107.5	N/A	-287.0	-221 .0	NO	NO
Fort Shafler HI	211800	1574900	151.2	29.1	YES	-137.1	-77.8	-77.8	-214.9	-148.9	YES	NO
Hunter AAF GA	320100	0810800	64.1	4802.5	NO	-181.4	-111.3	N/A	-292.8	-226.7	NO	'NO

Fort Gillem	GA	333600	0841900	62.6	4594.7	NO	-181.1	-110.5	N/A	-291.6	-225.6	NO	NO
Fort Benning	GA	322130	0845815	64.1	4565.3	NO	-181.0	-110.4	N/A	-291.4	-225.4	NO	NO
Fort Stewart	GA	315145	0813655	64.3	4774.7	NO	-181.4	-111.2	N/A	-292.6	-226.6	NO	NO
Fort Rucker	AL	311017	0854255	65.4	4528.9	NO	-180.9	-110.3	N/A	-291.2	-225.2	NO	NO
Yuma Proving	AZ	330114	1141855	63.7	2799.4	NO	-176.8	-101.9	N/A	-278.7	-212.7	NO'	NO
Fort Hood	TX	310830	0974550	66.7	3793.0	NO	-179.4	-107.2	N/A	[illegible]	-220.6	NO	NO
Fort Knox	KY	[illegible]	[illegible]	57.8	[illegible]	NO	[illegible]	[illegible]	N/A	-290.9	[illegible]	NO	NO
Fort Bragg	NC	350805	[illegible]90035	60.3	4900.4	NO	-181.6	-111.7	N/A	-293.3	-227.3	NO	NO
Fort Campbell	KY	363950	[illegible]	[illegible]	4388.6	NO	-180.7	-109.8	N/A	-290.4	-224.4	NO	NO
Fort Polk	LA	310343	0931226	66.5	4072.0	NO	-180.0	-108.5	N/A	-288.5	-222.4	NO	NO
Fort Leonard [illegible]	MO	374430	0920737	58.1	[illegible]	NO	[illegible]	[illegible]	N/A	-288.7	[illegible]	NO	NO
Fort Irwin	CA	351536	1164102	59.7	2684.8	NO	-176.4	-101.2	N/A	-277.6	-211.6	NO	NO
Fort Sill	OK	344024	0982352	62.1	3747.7	NO	-179.3	-107.0	N/A	-286.3	-220.3	NO	NO
Fort Bliss	TX	314850	1062533	66.0	3265.7	NO	-178.1	-104.6	N/A	-282.7	-216.7	NO	NO
Fort Leavenworth	KS	392115	0945500	56.0	3956.8	NO	-179.8	-108.0	N/A	-287.7	-221.7	NO	NO
Fort Drum	NY	440115	0754844	49.9	5024.8	NO	-181.8	-112.1	N/A	-293.9	-227.9	NO	NO
Fort Gordon	GA	332510	0820910	62.6	4727.0	NO	-181.3	-111.0	N/A	-292.4	-226.3	NO'	NO
Fort McCoy	WI	440636	0904127	50.2	4209.7	NO	-180.3	-109.0	N/A	-289.3	-223.3	NO	NO
Fort Dix	NJ	400025	0743713	54.3	5116.8	NO	-182.0	-112.4	N/A	-294.4	-228.4	NO	NO
Parks Reserve	CA	374254	1214218	[illegible]	[illegible]	NO	-175.6	-99.6	N/A	[illegible]	-209.2	NO	NO
Aberdeen Proving	MD	392825	0760655	55.1	5034.7	NO	-181.9	-112.1	N/A	-294.0	-228.0	NO	NO
Fort Huachuca	AZ	[illegible]	[illegible]	[illegible]	3029.5	NO	-177.4	[illegible]	N/A	[illegible]	-214.7	NO	NO
Fort Monmouth	NJ	401900	0740215	53.9	5147.9	NO	-182.1	-112.5	N/A	-294.6	-228.6	NO	NO
Picatinny Arsenal	NJ	1405600	0743400	53.3	5112.9	NO	-182.0	-112.4	N/A	-294.4	-226.4	NO	NO

Table 8 Land-Based Radar Test and Training Sites (continued)

Radar Location		Lat (N)	Lon (w)	Bearing (deg.)	Distance (mi)	Profile (Is path under 250 miles?)	FSL (dB)	Estimated OH-Loss (dB)	Profiled OH-Loss (dB)	Total Path Loss (dB)	Interfering Power Level (dBW/MHz)	In-Band Interference?	Out-of Band Overload?
Redstone Arsenal	AL	343630	0863610	61.6	4450.3	NO	-180.8	-110.0	N/A	-296.8	-224.8	NO	NO
White Sands	NM	322246	1062813	65.2	3263.9	NO	-178.1	-104.6	N/A	-282.7	-216.7	NO	NO
Army Research	MD	390000	0765800	55.7	4988.9	NO	-181.8	-112.0	NIA	-293.8	-227.7	NO	NO
Fort Hunter	CA	355756	1211404	57.3	2439.4	NO	-175.6	-99.6	N/A	-275.1	-209.1	NO	NO
Kelly Support	PA	402357	0800925	54.3	4796.7	NO	-181.4	-111.3	N/A	-292.7	-226.7	NO	NO

Table Headings

Radar Location : The site name of the radar system
Lat (N) : Radar latitude
Lon (w) : Radar Longitude
Bearing (deg.) : Azlmuth from earth station toward radar.
Distance (mi) : Distance from earth station to radar
Profile (Is path under 250 miles?) : If path is over 250 miles no OH-loss profile is generated
FSL (dB) : Free Space Loss
Estimated OH-Loss (dB) : Using a rounded-earth model an estimated OH-loss is calculated for long paths
Profiled OH-Loss (dB) : Using the NSMA Tropo Loss actual OH-loss calculcations are performed for shorter paths
Total Path Loss (dB) : Total of Free Space Loss plus Over-the-Horizon loss
Interfering Power Level (dBW/MHz) : Level of RF interference at the earth station's LNA input
In-Band Interference7 : If the Radar is operating In-band Is the max. permissible interference criteria being met?
Out-of Band Overload7 : If the Radar is operating In out-of-band spectrum is the LNA overload threshold being met?

6.0 Conclusions

Calculations were perform to assess the electromagnetic compatibility (EMC) between the radars listed below and adjacent-band FSS earth station receiver at Paumalu, Hawaii. Interference assessment for Earth Stations Operating at 3625 - 3700 MHz at the Paumaly HI site identified 15 cases of In-band potential interference. The applicant is aware of this potential for interference and will work with the Government Users to mitigate the problem

Results

Total Number of Paths 15 sites		Lat (N)	Lon (W)	Out-of-Band Overload?	In-Band Interference?
Pearl Harbor	HI	2120000	1580000	NO	Yes
FORACS, HAWAII	HI	212530	1581100	No	Yes
FORACS, HAWAII	HI	212100	1581500	No	Yes
FORACS, HAWAII	HI	211500	1580800	No	Yes
FORACS, HAWAII	HI	211500	1580700	No	Yes
PACIFIC MISSILERANGE	HI	220000	15945	No	Yes
PACIFIC MISSILERANGE	HI	220800	1620000	No	Yes
PACIFIC MISSILERANGE	HI	260000	1581500	No	Yes
PACIFIC MISSILERANGE	HI	224500	1614000	No	Yes
PEARL HARBOR SOUTH	HI	190800	1591500	No	Yes
PEARL HARBOR SOUTH	HI	210000	1580800	No	Yes
PEARL HARBOR SOUTH	HI	210000	1573600	No	Yes
PEARL HARBOR SOUTH	HI	191800	1562000	No	Yes
PEARL HARBOR SOUTH	HI	184900	1574500	No	Yes
FORT SHAFTER	HI	211800	1574900	No	Yes

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