

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

Intelsat License LLC

TRANSMIT-RECEIVE EARTH STATION (15.2 METER)

FCC CALL SIGN: E950307

Site Name: Napa, California

Prepared By



COMSEARCH

January 20, 2011

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 band¹. The geographical positions and operating parameters of these systems was derived from NTIA Document TR-99-361².

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	P0N	Q7N	P0N
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	3.5-51.2	10.75
Pulse Repetition Rate (kHz)	1.125	0.152-6.0	2793.3-5050.51
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

Administrative Information					
Status	ENGINEER PROPOSAL				
Call Sign	E950307				
Licensee Code	PANAS				
Licensee Name	Intelsat License LLC				
Site Information					
Venue Name	NAPA, CALIFORNIA				
Latitude (NAD 83)	38° 14' 43.7" N				
Longitude (NAD 83)	122° 16' 50.9" W				
Climate Zone	B				
Rain Zone	3				
Ground Elevation (AMSL)	7.62 m / 25.0 ft				
Link Information					
Satellite Type	Geostationary				
Mode	TR - Transmit-Receive				
Modulation	Analog and Digital				
Satellite Arc	58° W to 194° West Longitude				
Azimuth Range	106.6° to 258.4°				
Corresponding Elevation Angles	11.4° / 5.6°				
Antenna Centerline (AGL)	7.62 m / 25.0 ft				
Antenna Information		Receive		Transmit	
Manufacturer		Vertex Corp.		Vertex Corp.	
Model		15.2 KPC		15.2 KPC	
Gain / Diameter		54.9 dBi / 15.2 m		58.4 dBi / 15.2 m	
3-dB / 15-dB Beamwidth		0.34° / 0.70°		0.22° / 0.44°	
				950KFXD	72MOG7D 1M00G7D
Max Available RF Power	(dBW/4 kHz)			-5.2	-28.0 -18.5
	(dBW/MHz)			18.6	-4.0 5.5
Maximum EIRP	(dBW/4 kHz)			53.2	30.4 39.9
	(dBW/MHz)			77.0	54.4 63.9
	(dBW)			77.0	73.0 63.9
Interference Objectives:	Long Term	-156.0 dBW/MHz	20%	-154.0 dBW/4 kHz 20%	
	Short Term	-146.0 dBW/MHz	0.01%	-131.0 dBW/4 kHz 0.0025%	
Frequency Information		Receive 4.0 GHz		Transmit 6.1 GHz	
Emission / Frequency Range (MHz)		200KFXD / 3947.5		950KFXD / 6173.7	
		200KFXD / 3948.0		950KFXD / 6176.3	
		200KFXD / 3952.0		1M00G7D/ 5850.0 – 5925.0	
		200KFXD / 3952.5		72MOG7D/ 5850.0 – 5925.0	
		60MOG7D/ 3625.0 – 3700.0			
Max Great Circle Coordination Distance		783.4 km / 486.7 mi		411.7 km / 255.8 mi	
Precipitation Scatter Contour Radius		426.1 km / 264.8 mi		100.0 km / 62.1 mi	

Coordination Values**NAPA, CA**

Licensee Name	Intelsat License LLC				
Latitude (NAD 83)	38° 14' 43.7" N				
Longitude (NAD 83)	122° 16' 50.9" W				
Ground Elevation (AMSL)	7.62 m / 25.0 ft				
Antenna Centerline (AGL)	7.62 m / 25.0 ft				
Antenna Model	Vertex Corporation 15.2 KPC				
Antenna Mode	Receive 4.0 GHz		Transmit 6.1 GHz		
Interference Objectives:	Long Term	-156.0 dBW/MHz	20%	-154.0 dBW/4 kHz	20%
	Short Term	-146.0 dBW/MHz	0.01%	-131.0 dBW/4 kHz	0.0025%
Max Available RF Power	-5.2 (dBW/4 kHz)				

Azimuth (°)	Horizon Elevation (°)	Antenna Discrimination (°)	Receive 4.0 GHz		Transmit 6.1 GHz	
			Horizon Gain (dBi)	Coordination Distance (km)	Horizon Gain (dBi)	Coordination Distance (km)
0	0.00	101.50	-10.00	412.20	-10.00	186.59
5	0.00	101.37	-10.00	412.20	-10.00	186.59
10	0.89	96.49	-10.00	265.31	-10.00	119.35
15	0.82	91.58	-10.00	275.46	-10.00	123.51
20	0.47	86.67	-10.00	330.42	-10.00	147.65
25	0.35	81.76	-10.00	361.42	-10.00	162.69
30	0.85	76.84	-10.00	270.63	-10.00	121.52
35	2.10	71.86	-10.00	195.78	-10.00	100.00
40	1.45	66.98	-10.00	228.14	-10.00	105.59
45	2.61	61.97	-10.00	177.19	-10.00	100.00
50	2.86	57.02	-10.00	169.19	-10.00	100.00
55	3.14	52.08	-10.00	160.95	-10.00	100.00
60	3.65	47.10	-9.83	149.00	-9.83	100.00
65	4.37	42.09	-8.60	142.60	-8.60	100.00
70	4.70	37.13	-7.24	145.11	-7.24	100.00
75	4.35	32.30	-5.73	155.20	-5.73	100.00
80	4.14	27.51	-3.99	166.08	-3.99	100.00
85	4.11	22.75	-1.92	177.49	-1.92	100.00
90	3.72	18.25	0.47	201.62	0.47	100.00
95	3.07	14.25	3.15	242.84	3.15	109.24
100	3.51	10.27	6.71	251.06	6.71	112.40
105	2.99	8.56	8.68	316.07	8.68	141.88
110	2.73	9.31	7.78	294.32	7.78	127.70
115	3.04	11.82	5.18	258.75	5.18	115.39
120	3.76	14.99	2.60	213.43	2.60	100.00
125	4.27	18.20	0.50	188.95	0.50	100.00
130	4.49	21.47	-1.30	176.23	-1.30	100.00
135	4.14	25.01	-2.95	171.54	-2.95	100.00
140	3.94	28.27	-4.28	167.96	-4.28	100.00
145	2.78	32.08	-5.65	196.22	-5.65	100.00
150	4.22	33.57	-6.15	154.61	-6.15	100.00
155	4.22	35.88	-6.87	151.28	-6.87	100.00
160	3.96	38.09	-7.52	151.64	-7.52	100.00
165	3.58	40.02	-8.06	158.74	-8.06	100.00
170	3.19	41.55	-8.46	167.00	-8.46	100.00
175	2.85	42.60	-8.74	176.04	-8.74	100.00
180	2.53	43.17	-8.88	186.53	-8.88	100.00
185	2.22	43.22	-8.89	197.72	-8.89	100.00

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

Coordination Values		NAPA, CA			
Licensee Name	Intelsat License LLC				
Latitude (NAD 83)	38° 14' 43.7" N				
Longitude (NAD 83)	122° 16' 50.9" W				
Ground Elevation (AMSL)	7.62 m / 25.0 ft				
Antenna Centerline (AGL)	7.62 m / 25.0 ft				
Antenna Model	Vertex Corporation 15.2 KPC				
Antenna Mode	Receive 4.0 GHz		Transmit 6.1 GHz		
Interference Objectives:	Long Term	-156.0 dBW/MHz	20%	-154.0 dBW/4 kHz	20%
	Short Term	-146.0 dBW/MHz	0.01%	-131.0 dBW/4 kHz	0.0025%
Max Available RF Power	-5.2 (dBW/4 kHz)				

Azimuth (°)	Horizon Elevation (°)	Antenna Discrimination (°)	Receive 4.0 GHz		Transmit 6.1 GHz	
			Horizon Gain (dBi)	Coordination Distance (km)	Horizon Gain (dBi)	Coordination Distance (km)
190	1.90	42.80	-8.79	212.22	-8.79	100.00
195	1.53	41.93	-8.56	233.25	-8.56	107.39
200	0.92	40.79	-8.26	275.23	-8.26	122.89
205	0.52	39.03	-7.78	340.35	-7.78	151.18
210	0.00	36.98	-7.20	448.50	-7.20	202.49
215	0.00	34.21	-6.35	460.06	-6.35	207.39
220	0.00	31.20	-5.36	473.50	-5.36	213.30
225	0.00	28.00	-4.18	490.61	-4.18	220.42
230	0.00	24.63	-2.79	511.67	-2.79	229.08
235	0.00	21.13	-1.12	538.04	-1.12	239.79
240	0.00	17.51	0.92	571.97	0.92	253.36
245	0.22	13.67	3.60	608.53	3.60	265.87
250	0.26	9.89	7.12	652.78	7.12	283.37
255	0.21	6.40	11.85	783.40	11.85	341.48
260	0.31	5.52	13.46	755.53	13.46	411.69
265	0.45	8.34	8.97	595.42	8.97	257.42
270	0.49	12.63	4.47	499.83	4.47	219.97
275	0.50	17.31	1.04	448.83	1.04	198.25
280	0.46	22.14	-1.63	425.93	-1.63	188.57
285	0.51	27.01	-3.79	383.25	-3.79	169.92
290	0.87	31.88	-5.59	305.55	-5.59	134.85
295	0.97	36.81	-7.15	277.73	-7.15	123.59
300	0.81	41.79	-8.53	288.46	-8.53	128.51
305	1.19	46.72	-9.74	244.67	-9.74	112.40
310	0.80	51.72	-10.00	277.19	-10.00	124.23
315	0.89	56.69	-10.00	266.50	-10.00	119.83
320	0.99	61.66	-10.00	255.51	-10.00	116.76
325	1.11	66.64	-10.00	246.99	-10.00	113.40
330	0.84	71.63	-10.00	272.83	-10.00	122.42
335	0.00	76.63	-10.00	412.20	-10.00	186.59
340	0.00	81.60	-10.00	412.20	-10.00	186.59
345	0.00	86.58	-10.00	412.20	-10.00	186.59
350	0.00	91.55	-10.00	412.20	-10.00	186.59
355	0.00	96.53	-10.00	412.20	-10.00	186.59

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:

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

Where:

- P_r : Interference power level received at victim earth station, in dBW
- P_t : Transmitter power of Radiolocation system, in dBW
- 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 recommendations³. 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, dBW
- 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 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:

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

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:

$$\begin{aligned} T &= -95 \text{ dBW} \\ C &= -20 \text{ dBW} \\ G &= 65 \text{ dB} \end{aligned}$$

The propagation model to determine the over-the-horizon loss is the NSMA OH-Loss model⁴. When the propagation link is very lengthy, over 250 miles, an estimated OH-loss using a rounded earth modeling value has been used.

³ FCC Rules 47CFR25.251 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 are 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	95.3	2075.0	NO	-174.2	-97.5	N/A	-271.6	-204.9	NO	NO
Pascagoula, MS	302200	0882900	96.2	2008.0	NO	-173.9	-96.9	N/A	-270.8	-204.1	NO	NO
St.Inigoes, MD	381000	0762300	75.9	2498.0	NO	-175.8	-100.7	N/A	-276.5	-220.5	NO	NO

Table 5 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	72.4	2547.0	NO	-175.9	-101.0	N/A	-277.0	-208.2	NO	NO
Wallops Island, VA	375600	0752800	76.0	2552.0	NO	-176.0	-101.1	N/A	-277.0	-205.0	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	64.6	2767.6	NO	-176.7	-102.5	N/A	-279.1	-212.9	NO	NO
Bremerton, WA	473324	1223811	358.5	643.0	NO	-164.0	-77.1	N/A	-241.1	-165.1	NO	NO
Everett, WA	475858	1221354	0.2	672.2	NO	-164.4	-77.9	N/A	-242.3	-176.2	NO	NO
Mayport, FL	302334	0812427	91.5	2399.4	NO	-175.4	-100.0	N/A	-275.4	-198.9	NO	NO
Norfolk, VA	365200	0762100	78.2	2523.6	NO	-175.9	-100.9	N/A	-276.7	-204.7	NO	NO
Pascagoula, MS	302253	0882933	96.1	2007.1	NO	-173.9	-96.9	N/A	-270.8	-188.0	NO	NO
Pearl Harbor, HI	212000	1580000	250.4	2441.8	NO	-175.6	-100.3	N/A	-275.9	-192.7	NO	NO
Portland, ME	434100	0701800	65.1	2744.8	NO	-176.6	-102.3	N/A	-278.9	-210.1	NO	NO
San Diego, CA	324105	1170800	141.4	480.9	NO	-161.5	-72.1	-73.3	-233.5	-161.8	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												
AFWTF (NR)1	183000	0670000	98.9	3631.3	NO	-179.0	-107.2	N/A	-286.2	-203.5	NO	NO
AFWTF (NR)2	200000	0670000	97.1	3571.5	NO	-178.9	-106.9	N/A	-285.8	-203.1	NO	NO
AFWTF (NR)3	221000	0654800	93.9	3556.1	NO	-178.8	-106.8	N/A	-285.7	-209.2	NO	NO
AFWTF (NR)4	221000	0652000	93.7	3582.7	NO	-178.9	-107.0	N/A	-285.9	-209.4	NO	NO
AFWTF (NR)5	185000	0620000	95.6	3902.0	NO	-179.6	-108.4	N/A	-288.1	-205.4	NO	NO
AFWTF (NR)6	185000	0620000	95.6	3902.0	NO	-179.6	-108.4	N/A	-288.1	-205.4	NO	NO
AFWTF (NR)7	182500	0643000	97.5	3776.2	NO	-179.4	-107.9	N/A	-287.2	-204.5	NO	NO
AFWTF (NR)8	183000	0644500	97.5	3758.7	NO	-179.3	-107.8	N/A	-287.1	-204.4	NO	NO
AFWTF (NR)9	183000	0663800	98.6	3652.0	NO	-179.1	-107.3	N/A	-286.4	-203.6	NO	NO
AFWTF (South Range)												
AFWTF (SR1)	180500	0675500	99.9	3596.5	NO	-178.9	-107.0	N/A	-286.0	-203.2	NO	NO
AFWTF (SR2)	180500	0652700	98.4	3735.8	NO	-179.3	-107.7	N/A	-287.0	-204.2	NO	NO
AFWTF (SR3)	181500	0651000	98.1	3745.1	NO	-179.3	-107.7	N/A	-287.0	-204.3	NO	NO
AFWTF (SR4)	181500	0641000	97.5	3801.9	NO	-179.4	-108.0	N/A	-287.4	-204.7	NO	NO
AFWTF (SR5)	170000	0641000	98.8	3852.8	NO	-179.5	-108.2	N/A	-287.8	-205.0	NO	NO
AFWTF (SR6)	165800	0642800	99.1	3837.1	NO	-179.5	-108.2	N/A	-287.7	-204.9	NO	NO
AFWTF (SR7)	153300	0660600	101.5	3803.8	NO	-179.4	-108.0	N/A	-287.4	-204.7	NO	NO
AFWTF (SR8)	153900	0662300	101.6	3783.7	NO	-179.4	-107.9	N/A	-287.3	-204.6	NO	NO
AFWTF (SR9)	163000	0662300	100.7	3748.1	NO	-179.3	-107.7	N/A	-287.0	-204.3	NO	NO
AFWTF(SR10)	163000	0675500	101.6	3661.9	NO	-179.1	-107.3	N/A	-286.4	-203.7	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												
AUTEC1	252000	0780500	97.2	2749.0	NO	-176.6	-102.4	N/A	-279.0	-196.2	NO	NO
AUTEC2	252000	0774500	97.0	2767.5	NO	-176.7	-102.5	N/A	-279.1	-196.4	NO	NO
AUTEC3	232500	0762000	98.7	2916.3	NO	-177.1	-103.4	N/A	-280.5	-197.8	NO	NO
AUTEC4	232500	0771500	99.3	2865.3	NO	-177.0	-103.1	N/A	-280.0	-197.3	NO	NO
FORACS, Hawaii												
FORACS 1	212530	1581100	250.7	2447.6	NO	-175.6	-100.3	N/A	-275.9	-192.8	NO	NO
FORACS2	212100	1581500	250.6	2454.3	NO	-175.6	-100.4	N/A	-276.0	-192.9	NO	NO
FORACS3	211500	1580800	250.4	2452.4	NO	-175.6	-100.4	N/A	-276.0	-192.8	NO	NO
FORACS4	211500	1580700	250.4	2451.5	NO	-175.6	-100.4	N/A	-276.0	-192.8	NO	NO
Gulf of Mexico OPAREA												
GoM1	293601	0800130	92.0	2500.0	NO	-175.8	-100.7	N/A	-276.5	-200.0	NO	NO
GoM2	292521	0864800	96.7	2129.4	NO	-174.4	-97.9	N/A	-272.3	-189.6	NO	NO
GoM3	284101	0864800	98.0	2152.8	NO	-174.5	-98.1	N/A	-272.6	-189.9	NO	NO
GoM4	285231	0874400	98.4	2095.4	NO	-174.2	-97.6	N/A	-271.9	-189.2	NO	NO
Pacific Missile Range Facility (PMRF)												
PMRF1	220000	1594500	252.9	2507.2	NO	-175.8	-100.8	N/A	-276.6	-193.4	NO	NO
PMRF2	220800	1620000	255.0	2623.2	NO	-176.2	-101.5	N/A	-277.7	-194.6	NO	NO
PMRF3	224500	1614000	255.6	2580.6	NO	-176.1	-101.3	N/A	-277.3	-187.8	NO	NO
PMRF4	260000	1581500	257.8	2271.7	NO	-174.9	-99.0	N/A	-274.0	-184.5	NO	NO
Pearl Harbor South OPAREA												
PHS1	190800	1591500	248.5	2602.4	NO	-176.1	-101.4	N/A	-277.5	-194.4	NO	NO
PHS2	210000	1580800	250.0	2462.9	NO	-175.6	-100.5	N/A	-276.1	-193.0	NO	NO
PHS3	210000	1573600	249.5	2434.9	NO	-175.5	-100.3	N/A	-275.8	-192.7	NO	NO

PHS4	191800	1562000	245.9	2443.7	NO	-175.6	-100.3	N/A	-275.9	-192.8	NO	NO
PHS5	184900	1574500	246.7	2538.4	NO	-175.9	-101.0	N/A	-276.9	-193.7	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?
Southern California (SOCAL)												
SOCAL1	385200	1255200	283.6	198.9	YES	-153.8	-71.8	-71.8	-225.6	-151.2	YES	NO
SOCAL2	390000	1240000	299.8	106.6	YES	-148.4	-62.5	-62.5	-210.9	-143.4	YES	NO
SOCAL3	311500	1163000	144.1	583.7	NO	-163.1	-75.4	-72.8	-238.6	-166.8	NO	NO
SOCAL4	300000	1203000	169.3	577.4	NO	-163.0	-75.3	N/A	-238.3	-170.7	NO	NO
Virginia Capes OPAREA												
VC1	384500	0750000	74.5	2563.2	NO	-176.0	-101.1	N/A	-277.1	-208.4	NO	NO
VC2	384500	0743000	74.4	2590.3	NO	-176.1	-101.3	N/A	-277.4	-208.6	NO	NO
VC3	374500	0724000	75.5	2708.1	NO	-176.5	-102.1	N/A	-278.6	-206.5	NO	NO
VC4	350600	0724000	79.7	2764.4	NO	-176.7	-102.5	N/A	-279.1	-207.1	NO	NO
VC5	320000	0771200	86.6	2589.4	NO	-176.1	-101.3	N/A	-277.4	-200.9	NO	NO
VC6	342400	0773000	82.8	2512.7	NO	-175.8	-100.8	N/A	-276.6	-204.6	NO	NO
VC7	354000	0752500	79.8	2599.7	NO	-176.1	-101.4	N/A	-277.5	-205.5	NO	NO
VC8	370000	0755000	77.8	2549.4	NO	-175.9	-101.0	N/A	-277.0	-205.0	NO	NO

Table 8 Land-Based Radar 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?
Fort Lewis WA	470525	1223510	358.6	610.7	NO	-163.5	-76.2	N/A	-239.8	-163.7	NO	NO
Yakima Firing WA	464018	1202135	8.9	589.8	NO	-163.2	-75.6	N/A	-238.9	-172.8	NO	NO
Fort Carson CO	383810	1044750	82.9	948.9	NO	-167.4	-83.9	N/A	-251.2	-179.2	NO	NO
Fort Riley KS	385813	0965139	80.0	1376.7	NO	-170.6	-90.3	N/A	-260.9	-188.9	NO	NO
Fort Shafter HI	211800	1574900	250.2	2433.5	NO	-175.5	-100.2	N/A	-275.8	-192.6	NO	NO

Hunter AAF	GA	320100	0810800	88.6	2369.6	NO	-175.3	-99.8	N/A	-275.1	-198.6	NO	NO
Fort Gillem	GA	333600	0841900	87.4	2153.0	NO	-174.5	-98.1	N/A	-272.6	-196.1	NO	NO
Fort Benning	GA	322130	0845815	90.1	2147.3	NO	-174.5	-98.1	N/A	-272.5	-196.0	NO	NO
Fort Stewart	GA	315145	0813655	89.1	2346.9	NO	-175.2	-99.6	N/A	-274.8	-198.3	NO	NO
Fort Rucker	AL	311947	0854255	92.5	2133.5	NO	-174.4	-98.0	N/A	-272.4	-195.9	NO	NO
Yuma Proving	AZ	330114	1141855	126.5	575.1	NO	-163.0	-75.2	-72.8	-238.2	-163.5	NO	NO
Fort Hood	TX	310830	0974550	102.4	1479.3	NO	-171.2	-91.6	N/A	-262.8	-180.1	NO	NO
Fort Knox	KY	375350	0855655	79.5	1981.2	NO	-173.8	-96.7	N/A	-270.4	-198.4	NO	NO
Fort Bragg	NC	350805	0790035	82.2	2412.6	NO	-175.5	-100.1	N/A	-275.6	-203.5	NO	NO
Fort Campbell	KY	363950	0872820	82.7	1916.9	NO	-173.5	-96.1	N/A	-269.6	-197.5	NO	NO
Fort Polk	LA	310343	0931226	98.4	1728.6	NO	-172.6	-94.3	N/A	-266.9	-184.1	NO	NO
Fort Leonard	MO	374430	0920737	81.9	1646.2	NO	-172.1	-93.5	N/A	-265.6	-193.6	NO	NO
Fort Irwin	CA	351536	1164102	121.9	372.6	NO	-159.2	-114.4	-114.4	-273.6	-195.0	NO	NO
Fort Sill	OK	344024	0982352	93.4	1352.9	NO	-170.4	-90.0	N/A	-260.5	-184.0	NO	NO
Fort Bliss	TX	314850	1062533	111.7	1002.4	NO	-167.8	-84.8	N/A	-252.7	-183.9	NO	NO
Fort Leavenworth	KS	392115	0945500	78.5	1479.1	NO	-171.2	-91.6	N/A	-262.8	-190.8	NO	NO
Fort Drum	NY	440115	0754844	65.4	2457.0	NO	-175.6	-100.4	N/A	-276.0	-207.3	NO	NO
Fort Gordon	GA	332510	0820910	86.7	2277.4	NO	-175.0	-99.1	N/A	-274.1	-197.6	NO	NO
Fort McCoy	WI	440636	0904127	65.8	1696.1	NO	-172.4	-94.0	N/A	-266.4	-197.6	NO	NO
Fort Dix	NJ	400025	0743713	72.2	2563.8	NO	-176.0	-101.1	N/A	-277.1	-208.4	NO	NO
Parks Reserve	CA	374254	1214218	139.2	48.2	YES	-141.5	-74.1	-74.1	-215.6	-143.8	YES	NO
Aberdeen Proving	MD	392825	0760655	73.6	2491.4	NO	-175.7	-100.6	N/A	-276.4	-207.6	NO	NO
Fort Huachuca	AZ	313500	1102000	120.7	819.2	NO	-166.1	-81.3	N/A	-247.4	-183.8	NO	NO
Fort Monmouth	NJ	401900	0740215	71.6	2590.5	NO	-176.1	-101.3	N/A	-277.4	-208.6	NO	NO
Picatinny Arsenal	NJ	405600	0743400	70.6	2553.7	NO	-176.0	-101.1	N/A	-277.0	-208.3	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	86.6	2003.8	NO	-173.9	-96.9	N/A	-270.7	-194.2	NO	NO
White Sands Army Research NM	322246	1062813	109.8	980.7	NO	-167.6	-84.5	N/A	-252.1	-183.3	NO	NO
Fort Hunter CA	390000	0765800	74.6	2452.6	NO	-175.6	-100.4	N/A	-276.0	-207.2	NO	NO
Kelly Support PA	355756	1211404	159.5	167.5	YES	-152.3	-89.0	-89	-241.3	-187.8	NO	NO
	402357	0800925	72.9	2262.0	NO	-174.9	-99.0	N/A	-273.9	-205.1	NO	NO

Table Headings

- Radar Location : The site name of the radar system
- Lat (N) : Radar latitude
- Lon (w) : Radar Longitude
- Bearing (deg.) : Azimuth 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 calculations 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 Interference? : If the Radar is operating in-band is the max. permissible interference criteria being met?
- Out-of Band Overload? : If the Radar is operating in out-of-band spectrum is the LNA overload threshold being met?

6.0 Conclusions

Calculations were performed to assess the electromagnetic compatibility (EMC) between the radars listed below and adjacent-band FSS earth station receiver at Napa, California. Interference assessment for Earth Stations Operating at 3625 - 3700 MHz at Napa, California site identified 3 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 11 sites	Lat (N)	Lon (W)	Out-of-Band Overload?	In-Band Interference?
SOCAL 1,	385200	1255200	No	Yes
SOCAL 2,	390000	1240000	No	Yes
Parks Reserve, CA	374254	1214218	No	Yes