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inspiring connections

April 5, 2004

Legal Department

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

RE: Intelsat LLC
Application of modification of radio station license: E990551
Nuevo, CA
FCC File No. SES-MOD-20040315-00387

Dear Ms. Dortch:

Attached please find an Electromagnetic Compatibility (EMC) Analysis performed for the above-referenced earth station. Would you please associate this EMC analysis with Intelsat LLC's pending above application for modification of radio station license, filed on March 14, 2004.

Intelsat LLC also has reviewed NTIA TR-99-361 Report, *Technical Characteristics of Radiolocation Systems Operating in the 3.1-3.7 GHz Band and Procedures for assessing EMC with Fixed Earth Station Receivers*. To the extent there is a potential for unacceptable interference that may be caused to its receiving earth station, Intelsat agrees to accept such interference. Furthermore, it is aware that the use of an RF filter ahead of the low noise amplifier would limit potential out-of-band interference to the receiving earth station.

Respectfully submitted,

By _____
Intelsat LLC
Robert A. Mansbach
Its Attorney

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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

Site Name: Nuevo, CA (Call Sign: E990551)

Prepared By

COMSEARCH

March 31. 2004

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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-99-361[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	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

Call Sign		E990551			
Licensee Code		INTELS			
Licensee Name		INTELSAT, LLC			
Site Information		**NUEVO, CALIFORNIA**			
Venue Name					
Latitude (NAD 83)		33° 47' 46.0" N			
Longitude (NAD 83)		117° 5' 15.0" W			
Climate Zone		A			
Rain Zone		4			
Ground Elevation (AMSL)		557.76 m / 1829.9 ft			
Link Information					
Satellite Type		Geostationary			
Mode		TR - Transmit-Receive			
Modulation		Analog and Digital			
Satellite Arc		50° W to 190° West Longitude			
Azimuth Range		103.2° to 260.3°			
Corresponding Elevation Angles		10.3° / 5.5°			
Antenna Centerline (AGL)		6.71 m / 22.0 ft			
Antenna Information		**Receive - A40931**		**Transmit - A60931**	
Manufacturer		ANDREW CORPORATION		ANDREW CORPORATION	
Model		ESA9.3-46		ESA9.3-46	
Gain / Diameter		50.7 dBi / 9.3 m		53.9 dBi / 9.3 m	
3-dB / 15-dB Beamwidth		0.52° / 1.00°		0.30° / 0.60°	
Max Available RF Power	(dBW/4 kHz)			-9.6	
	(dBW/MHz)			14.4	
Maximum EIRP	(dBW/4 kHz)			44.3	
	(dBW/MHz)			68.3	
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) - 6425.0		43K8G7W - 72M0G7W / 3625.0 - 4200.0		43K8G7W - 72M0G7W / 5850.0	
Max Great Circle Coordination Distance		658.7 km / 409.3 mi		321.1 km / 199.5 mi	
Precipitation Scatter Contour Radius		427.7 km / 265.7 mi		100.0 km / 62.1 mi	

Coordination Values	**NUEVO, CA**			
Licensee Name	INTELSAT, LLC			
Latitude (NAD 83)	33° 47' 46.0" N			
Longitude (NAD 83)	117° 5' 15.0" W			
Ground Elevation (AMSL)	557.76 m / 1829.9 ft			
Antenna Centerline (AGL)	6.71 m / 22.0 ft			
Antenna Model	ANDREW CORPORATION ESA9.3-46			
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		-9.6 (dBW/4 kHz)		

			Receive 4.0 GHz		Transmit 6.1 GHz	
Azimuth (°)	Horizon Elevation (°)	Antenna Discrimination (°)	Horizon Gain (dBi)	Coordination Distance (km)	Horizon Gain (dBi)	Coordination Distance (km)
0	1.99	99.69	-10.30	193.36	-10.10	100.00
5	2.25	98.15	-10.30	187.38	-10.10	100.00
10	3.00	93.21	-10.30	169.85	-10.10	100.00
15	3.31	88.25	-10.30	160.95	-10.10	100.00
20	3.17	83.29	-10.30	164.24	-10.10	100.00
25	3.32	78.32	-10.30	160.77	-10.10	100.00
30	3.53	73.35	-10.30	156.16	-10.10	100.00
35	3.65	68.39	-10.30	153.61	-10.10	100.00
40	3.51	63.44	-10.30	156.63	-10.10	100.00
45	3.51	58.48	-10.30	156.67	-10.10	100.00
50	3.16	53.57	-10.30	164.43	-10.10	100.00
55	2.85	48.67	-10.03	174.74	-9.83	100.00
60	2.94	43.74	-8.79	179.01	-8.85	100.00
65	3.57	38.73	-7.05	173.70	-7.59	100.00
70	3.60	33.83	-6.07	178.10	-5.87	100.00
75	3.35	29.01	-5.30	187.55	-5.10	100.00
80	3.89	24.06	-5.30	175.83	-5.10	100.00
85	3.80	19.33	-4.76	180.73	-4.56	100.00
90	3.63	14.80	-1.10	203.03	-0.90	100.00
95	2.83	11.12	2.58	240.43	2.78	100.00
100	3.18	7.83	7.03	263.49	7.07	103.67
105	3.38	7.16	8.38	268.76	7.74	102.55
110	4.05	9.22	5.27	228.98	5.47	100.00
115	4.14	13.09	0.61	202.59	0.81	100.00
120	4.13	17.01	-2.91	184.02	-2.71	100.00
125	4.31	20.72	-5.30	166.14	-5.10	100.00
130	4.07	24.59	-5.30	172.22	-5.10	100.00
135	4.66	27.78	-5.30	160.24	-5.10	100.00
140	3.98	31.65	-5.63	172.13	-5.43	100.00
145	4.37	34.57	-6.21	160.28	-6.01	100.00
150	3.86	37.88	-6.88	166.28	-7.25	100.00
155	2.89	41.27	-7.81	185.01	-8.35	100.00
160	2.35	44.02	-8.91	191.84	-8.90	100.00
165	2.99	45.31	-9.36	175.05	-9.16	100.00
170	3.53	46.13	-9.53	160.07	-9.33	100.00
175	4.00	46.45	-9.59	149.78	-9.39	100.00
180	4.57	46.14	-9.53	141.35	-9.33	100.00
185	5.42	45.05	-9.31	133.51	-9.11	100.00

Coordination Values	**NUEVO, CA**			
Licensee Name	*INTELSAT, LLC*			
Latitude (NAD 83)	33° 47' 46.0" N			
Longitude (NAD 83)	117° 5' 15.0" W			
Ground Elevation (AMSL)	557.76 m / 1829.9 ft			
Antenna Centerline (AGL)	6.71 m / 22.0 ft			
Antenna Model	ANDREW CORPORATION ESA9.3-46			
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		-9.6 (dBW/4 kHz)		

			Receive 4.0 GHz		Transmit 6.1 GHz	
Azimuth (°)	Horizon Elevation (°)	Antenna Discrimination (°)	Horizon Gain (dBi)	Coordination Distance (km)	Horizon Gain (dBi)	Coordination Distance (km)
190	5.94	43.81	-8.83	130.45	-8.86	100.00
195	6.07	42.49	-8.30	131.23	-8.60	100.00
200	6.33	40.59	-7.54	131.44	-8.22	100.00
205	6.09	38.67	-7.03	134.77	-7.57	100.00
210	5.63	36.52	-6.60	141.44	-6.71	100.00
215	5.42	33.80	-6.06	146.18	-5.86	100.00
220	6.04	30.20	-5.34	142.71	-5.14	100.00
225	5.61	27.14	-5.30	147.61	-5.10	100.00
230	5.50	23.66	-5.30	148.89	-5.10	100.00
235	5.46	19.99	-5.29	149.36	-5.09	100.00
240	5.45	16.19	-2.25	165.45	-2.05	100.00
245	5.51	12.26	1.44	187.77	1.64	100.00
250	4.93	8.65	6.05	218.82	6.25	100.00
255	4.35	4.96	10.85	264.26	11.05	100.00
260	3.96	1.54	26.23	658.73	26.43	321.11
265	4.03	4.92	11.01	272.13	11.21	104.69
270	4.16	9.79	4.11	219.60	4.31	100.00
275	4.40	14.74	-1.04	189.61	-0.84	100.00
280	3.39	19.81	-5.15	187.46	-4.95	100.00
285	2.45	24.88	-5.30	206.64	-5.10	100.00
290	1.07	30.00	-5.30	244.01	-5.10	109.95
295	0.94	34.96	-6.29	244.16	-6.09	111.55
300	0.00	40.02	-7.31	302.98	-8.10	150.59
305	0.00	44.97	-9.29	289.85	-9.09	147.29
310	0.00	49.93	-10.29	283.47	-10.09	144.10
315	0.00	54.89	-10.30	283.38	-10.10	144.06
320	0.00	59.86	-10.30	283.38	-10.10	144.06
325	0.00	64.83	-10.30	283.38	-10.10	144.06
330	0.00	69.80	-10.30	283.38	-10.10	144.06
335	0.00	74.78	-10.30	283.38	-10.10	144.06
340	0.00	79.75	-10.30	283.38	-10.10	144.06
345	0.00	84.73	-10.30	283.38	-10.10	144.06
350	0.26	89.71	-10.30	275.77	-10.10	138.47
355	1.26	94.69	-10.30	211.02	-10.10	100.00

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 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 recommendations[3]. 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 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.

[3] FCC Rules 47CFR25.251 by reference ITU Radio Regulations Appendix S7.
[4] National Spectrum Managers Association has developed an industry-accepted version that 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	89.8	1765.1	NO	-172.8	-95.0	N/A	-267.7	-208.8	NO	NO
Pascagoula,	MS	302200	0882900	90.4	1694.6	NO	-172.4	-94.3	N/A	-266.7	-207.8	NO	NO
St.Inigoes,	MD	381000	0762300	70.5	2300.9	NO	-175.1	-99.6	N/A	-274.6	-220.7	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	67.0	2373.1	NO	-175.3	-100.1	N/A	-275.4	-205.5	NO	NO
Wallops Island,	VA	375600	0752800	70.8	2353.2	NO	-175.3	-100.0	N/A	-275.2	-205.3	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	59.9	2643.7	NO	-176.3	-102.0	N/A	-278.3	-211.0	NO	NO
Bremerton,	WA	473324	1223811	344.7	993.2	NO	-167.8	-85.0	N/A	-252.7	-187.0	NO	NO
Everett,	WA	475858	1221354	346.3	1015.3	NO	-168.0	-85.4	N/A	-253.3	-187.6	NO	NO
Mayport,	FL	302334	0812427	86.9	2105.9	NO	-174.3	-98.0	N/A	-272.3	-197.4	NO	NO
Norfolk,	VA	365200	0762100	73.0	2311.2	NO	-175.1	-99.7	N/A	-274.8	-204.8	NO	NO
Pascagoula,	MS	302253	0882933	90.4	1693.8	NO	-172.4	-94.3	N/A	-266.7	-191.7	NO	NO
Pearl Harbor,	HI	212000	1580000	260.6	2653.2	NO	-176.3	-102.1	N/A	-278.3	-176.1	NO	NO
Portland,	ME	434100	0701800	60.3	2618.1	NO	-176.2	-101.8	N/A	-278.0	-210.8	NO	NO
San Diego	CA	324105	1170800	182.0	76.6	YES	-145.5	-73.3	-73.3	-218.8	-152.3	YES	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	97.7	3285.4	NO	-178.2	-105.8	N/A	-283.9	-200.9	NO	NO
AFWTF (NR)2	200000	0670000	95.7	3234.5	NO	-178.0	-105.5	N/A	-283.5	-200.5	NO	NO
AFWTF (NR)3	221000	0654800	92.3	3235.9	NO	-178.0	-105.5	N/A	-283.5	-208.6	NO	NO
AFWTF (NR)4	221000	0652000	92.1	3263.5	NO	-178.1	-105.7	N/A	-283.7	-208.8	NO	NO
AFWTF (NR)5	185000	0620000	94.6	3569.7	NO	-178.9	-107.2	N/A	-286.1	-211.2	NO	NO
AFWTF (NR)6	185000	0620000	94.6	3569.7	NO	-178.9	-107.2	N/A	-286.1	-211.2	NO	NO
AFWTF (NR)7	182500	0643000	96.4	3435.8	NO	-178.5	-106.5	N/A	-285.1	-202.0	NO	NO
AFWTF (NR)8	183000	0644500	96.4	3418.1	NO	-178.5	-106.5	N/A	-285.0	-201.9	NO	NO
AFWTF (NR)9	183000	0663800	97.4	3307.0	NO	-178.2	-105.9	N/A	-284.1	-201.0	NO	NO
AFWTF (South Range)												
AFWTF (SR)1	180500	0675500	98.7	3246.0	NO	-178.0	-105.6	N/A	-283.6	-200.6	NO	NO
AFWTF (SR)2	180500	0652700	97.3	3391.2	NO	-178.4	-106.3	N/A	-284.7	-201.7	NO	NO
AFWTF (SR)3	181500	0651000	96.9	3402.1	NO	-178.5	-106.4	N/A	-284.8	-201.8	NO	NO
AFWTF (SR)4	181500	0641000	96.4	3461.2	NO	-178.6	-106.7	N/A	-285.3	-202.2	NO	NO
AFWTF (SR)5	170000	0641000	97.9	3505.0	NO	-178.7	-106.9	N/A	-285.6	-202.6	NO	NO
AFWTF (SR)6	165800	0642800	98.1	3488.5	NO	-178.7	-106.8	N/A	-285.5	-202.4	NO	NO
AFWTF (SR)7	153300	0660600	100.7	3443.9	NO	-178.6	-106.6	N/A	-285.1	-202.1	NO	NO
AFWTF (SR)8	153900	0662300	100.8	3423.6	NO	-178.5	-106.5	N/A	-285.0	-201.9	NO	NO
AFWTF (SR)9	163000	0662300	99.8	3392.5	NO	-178.4	-106.3	N/A	-284.8	-201.7	NO	NO
AFWTF (SR)10	163000	0675500	100.7	3302.7	NO	-178.2	-105.9	N/A	-284.1	-201.0	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	94.3	2419.9	NO	-175.5	-100.5	N/A	-276.0	-201.0	NO	NO
AUTEC2	252000	0774500	94.1	2439.4	NO	-175.6	-100.6	N/A	-276.2	-201.2	NO	NO
AUTEC3	232500	0762000	96.3	2577.9	NO	-176.0	-101.6	N/A	-277.6	-194.5	NO	NO
AUTEC4	232500	0771500	96.9	2524.4	NO	-175.9	-101.2	N/A	-277.1	-194.0	NO	NO
FORACS, Hawaii												
FORACS, Hawaii1	212530	1581100	260.9	2660.8	NO	-176.3	-102.1	N/A	-278.4	-176.2	NO	NO
FORACS, Hawaii2	212100	1581500	260.8	2667.1	NO	-176.3	-102.1	N/A	-278.5	-176.2	NO	NO
FORACS, Hawaii3	211500	1580800	260.6	2663.7	NO	-176.3	-102.1	N/A	-278.5	-176.2	NO	NO
FORACS, Hawaii4	211500	1580700	260.5	2662.7	NO	-176.3	-102.1	N/A	-278.4	-176.2	NO	NO
Gulf of Mexico OPAREA												
GoM1	293601	0800130	87.8	2202.3	NO	-174.7	-98.8	N/A	-273.5	-198.6	NO	NO
GoM2	292521	0864800	91.6	1811.1	NO	-173.0	-95.4	N/A	-268.4	-193.5	NO	NO
GoM3	284101	0864800	93.3	1827.2	NO	-173.1	-95.6	N/A	-268.6	-193.7	NO	NO
GoM4	285231	0874400	93.4	1768.7	NO	-172.8	-95.0	N/A	-267.8	-192.9	NO	NO
Pacific Missile Range Facility (PMRF)												
PMRF1	220000	1594500	262.7	2733.5	NO	-176.6	-102.6	N/A	-279.1	-176.9	NO	NO
PMRF2	220800	1620000	264.2	2861.0	NO	-176.9	-103.4	N/A	-280.3	-178.1	NO	NO
PMRF3	224500	1614000	264.9	2822.2	NO	-176.8	-103.1	N/A	-280.0	-177.7	NO	NO
PMRF4	260000	1581500	268.0	2528.1	NO	-175.9	-101.2	N/A	-277.1	-197.0	NO	NO
Pearl Harbor South OPAREA												
PHS1	190800	1591500	258.3	2800.8	NO	-176.8	-103.0	N/A	-279.8	-177.5	NO	NO
PHS2	210000	1580800	260.2	2672.0	NO	-176.4	-102.2	N/A	-278.5	-176.3	NO	NO
PHS3	210000	1573600	259.8	2641.0	NO	-176.3	-102.0	N/A	-278.2	-176.0	NO	NO
PHS4	191800	1562000	256.4	2627.0	NO	-176.2	-101.9	N/A	-278.1	-175.8	NO	NO
PHS5	184900	1574500	256.8	2725.7	NO	-176.5	-102.5	N/A	-279.1	-176.8	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	308.1	601.8	NO	-163.4	-76.3	N/A	-239.7	-174.0	NO	NO
SOCAL2	390000	1240000	315.0	526.5	NO	-162.2	-74.0	N/A	-236.2	-170.5	NO	NO
SOCAL3	311500	1163000	168.8	178.8	YES	-152.9	-72.8	-72.8	-225.7	-159.2	NO	NO
SOCAL4	300000	1203000	218.4	329.6	NO	-158.2	-65.8	N/A	-224.0	-153.3	YES	NO
Virginia Capes OPAREA												
VC1	384500	0750000	69.3	2374.5	NO	-175.3	-100.1	N/A	-275.5	-205.5	NO	NO
VC2	384500	0743000	69.2	2402.2	NO	-175.4	-100.3	N/A	-275.8	-205.8	NO	NO
VC3	374500	0724000	70.8	2510.7	NO	-175.8	-101.1	N/A	-276.9	-207.0	NO	NO
VC4	350600	0724000	75.4	2538.2	NO	-175.9	-101.3	N/A	-277.2	-206.5	NO	NO
VC5	320000	0771200	82.2	2322.2	NO	-175.1	-99.7	N/A	-274.9	-204.2	NO	NO
VC6	342400	0773000	77.9	2270.3	NO	-174.9	-99.3	N/A	-274.3	-203.6	NO	NO
VC7	354000	0752500	75.0	2375.0	NO	-175.3	-100.1	N/A	-275.5	-204.7	NO	NO
VC8	370000	0755000	72.6	2339.2	NO	-175.2	-99.9	N/A	-275.1	-205.1	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	344.2	962.0	NO	-167.5	-84.4	N/A	-251.9	-186.2	NO	NO
Yakima Firing	WA	464018	1202135	350.0	905.0	NO	-167.0	-83.4	N/A	-250.3	-184.6	NO	NO
Fort Carson	CO	383810	1044750	60.5	763.5	NO	-165.5	-80.4	N/A	-245.9	-178.7	NO	NO
Fort Riley	KS	385813	0965139	66.4	1182.8	NO	-169.3	-88.0	N/A	-257.3	-187.3	NO	NO
Fort Shafter	HI	211800	1574900	260.4	2643.6	NO	-176.3	-102.0	N/A	-278.3	-176.0	NO	NO
Hunter AAF	GA	320100	0810800	83.6	2093.7	NO	-174.2	-97.9	N/A	-272.2	-201.5	NO	NO
Fort Gillem	GA	333600	0841900	81.3	1887.9	NO	-173.3	-96.1	N/A	-269.5	-198.8	NO	NO
Fort Benning	GA	322130	0845815	84.3	1866.0	NO	-173.2	-95.9	N/A	-269.2	-198.5	NO	NO
Fort Stewart	GA	315145	0813655	84.1	2068.1	NO	-174.1	-97.7	N/A	-271.9	-201.1	NO	NO
Fort Rucker	AL	311947	0854255	86.9	1838.6	NO	-173.1	-95.7	N/A	-268.8	-193.9	NO	NO
Yuma Proving	AZ	330114	1141855	107.7	168.9	YES	-152.4	-72.8	-72.8	-225.2	-143.9	YES	NO
Fort Hood	TX	310830	0974550	94.0	1143.5	NO	-169.0	-87.4	N/A	-256.4	-181.5	NO	NO
Fort Knox	KY	375350	0855655	71.7	1770.7	NO	-172.8	-95.0	N/A	-267.8	-197.9	NO	NO
Fort Bragg	NC	350805	0790035	76.8	2175.9	NO	-174.6	-98.6	N/A	-273.2	-202.5	NO	NO
Fort Campbell	KY	363950	0872820	74.7	1686.8	NO	-172.4	-94.2	N/A	-266.5	-196.6	NO	NO
Fort Polk	LA	310343	0931226	91.3	1408.3	NO	-170.8	-91.1	N/A	-261.8	-186.9	NO	NO
Fort Leonard	MO	374430	0920737	71.7	1428.7	NO	-170.9	-91.3	N/A	-262.2	-192.3	NO	NO
Fort Irwin	CA	351536	1164102	12.7	103.5	YES	-148.1	-68.1	-68.1	-216.2	-150.5	YES	NO
Fort Sill	OK	344024	0982352	81.5	1071.7	NO	-168.4	-86.3	N/A	-254.7	-184.0	NO	NO
Fort Bliss	TX	314850	1062533	99.5	635.3	NO	-163.9	-77.2	N/A	-241.1	-173.1	NO	NO
Fort Leavenworth	KS	392115	0945500	66.1	1291.3	NO	-170.0	-89.5	N/A	-259.6	-189.6	NO	NO
Fort Drum	NY	440115	0754844	59.4	2333.8	NO	-175.2	-99.8	N/A	-275.0	-207.8	NO	NO
Fort Gordon	GA	332510	0820910	81.1	2014.8	NO	-173.9	-97.3	N/A	-271.2	-200.5	NO	NO
Fort McCoy	WI	440636	0904127	55.1	1589.9	NO	-171.8	-93.2	N/A	-265.0	-197.8	NO	NO
Fort Dix	NJ	400025	0743713	66.9	2390.6	NO	-175.4	-100.2	N/A	-275.6	-205.7	NO	NO
Parks Reserve	CA	374254	1214218	317.5	374.6	NO	-159.3	-68.0	N/A	-227.3	-161.6	NO	NO
Aberdeen Proving	MD	392825	0760655	68.0	2310.4	NO	-175.1	-99.7	N/A	-274.7	-204.8	NO	NO
Fort Huachuca	AZ	313500	1102000	109.4	422.1	NO	-160.3	-70.1	N/A	-230.4	-164.2	NO	NO
Fort Monmouth	NJ	401900	0740215	66.3	2421.5	NO	-175.5	-100.5	N/A	-276.0	-206.0	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?
Picatinny Arsenal	NJ	405600	0743400	65.2	2391.8	NO	-175.4	-100.3	N/A	-275.6	-205.7	NO	NO
Redstone Arsenal	AL	343630	0863610	79.6	1746.8	NO	-172.7	-94.8	N/A	-267.5	-196.7	NO	NO
White Sands	NM	322246	1062813	96.1	623.6	NO	-163.7	-76.9	N/A	-240.6	-172.6	NO	NO
Army Research	MD	390000	0765800	69.0	2265.1	NO	-174.9	-99.3	N/A	-274.2	-204.3	NO	NO
Fort Hunter	CA	355756	1211404	303.6	279.0	NO	-156.7	-62.9	N/A	-219.7	-166.0	NO	NO
Kelly Support	PA	402357	0800925	66.3	2090.2	NO	-174.2	-97.9	N/A	-272.1	-202.2	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 above and an adjacent-band FSS earth station receiver in Nuevo, CA. The interference assessment for 3625 - 3700 MHz at this site identified 4 cases of potential interference. However, due to their relatively low interference margin and the presence of above terrain obstacles Intelsat does not feel that these case will present any problems to the operation of this earth station.

Total Number of Paths 4 sites		Lat (N)	Lon (W)	Out-of-Band Overload?	In-Band Interference?
San Diego	CA	324105	1170800	No	Yes
Yuma Proving	AZ	330114	1141855	No	Yes
SOCAL4		300000	1203000	No	Yes
Fort Irwin	CA	351536	1164102	No	Yes