Application for Special Temporary Authority (STA) - Supporting Information

Applicant: **Harris Caprock Communications, Inc.**
STA File number: **0363-EX-ST-2011**
STA Confirmation: **EL505754**

General Summary

This application for a Special Temporary Authority (STA) is to license the test and operation of three satellite terminals to test performance and link availability to a US-licensed satellite (Intelsat-903, 34.5°WL) using frequencies in the C-band (4/6 GHz).

The terminals use a VSAT antenna of diameter 60cm, and achieve compatibility with adjacent satellites through the use of spread-spectrum modulation to reduce the power density and hence maintain off-axis power levels to below the levels required to comply with FCC regulations on 2° orbital spacing.

Compatibility with terrestrial systems has been assessed for each of the three antennas by COMSEARCH.

Operation is required for a period of six months between June 13th and December 13th, 2011.

Supporting Information

The following attachments provide supporting information to this application:

(1) Non-ionising radiation analysis (source: Harris Caprock)

(2) Off-Axis EIRP analysis, demonstrating compatibility with FCC requirements (source: Harris Caprock)

(3) Letter from satellite operator detailing permitted operating conditions (source: Intelsat)

(4) Co-ordination analysis for Houston, TX, antenna (source: COMSEARCH)

(5) Co-ordination analysis for Mountainside, MD, antenna (source: COMSEARCH)

(6) Co-ordination analysis for Melbourne, FL, antenna (source: COMSEARCH)

May 19th, 2011

Harris CapRock
Analysis of Non-Ionizing Radiation for a 0.6m Earth station system

This report analyzes the non-ionizing radiation levels for a 0.6m earth station system. The analysis and calculations performed in this report comply with the methods described in the FCC Office of Engineering and Technology Bulletin, No. 65 first published in 1985 and revised in 1987 in Edition 97-01. The radiation safety limits used in the analysis are in conformance the FCC R&O 96-326. Bulletin No. 65 and the FCC R&O specifies that there are two separate tiers of exposure limits that are dependant on the situation in which the exposure takes place and/or the status of the individuals who are subject to the exposure. The Maximum Permissible Exposure (MPE) limits for persons in General Population/Uncontrolled environment are shown in Table 1. The General Population/Uncontrolled MPE is a function of transmit frequency and is for an exposure period of thirty minutes or less. The MPE limits for persons in Occupational/Controlled environment are shown in Table 2. The Occupational MPE is a function of transmit frequency and is for an exposure period of six minutes or less. The purpose of the analysis described in this report is to determine the power flux density levels of earth station in the far-field, near-field, transmission region, between the feed and main reflector surface, at the main reflector surface, and between the antenna edge and the ground and to compare these levels to the specified MPEs.

Frequency Range (MHz)	Power Density (mW/cm^2)
30-300	0.2
300-1500	Frequency (MHz)*(0.8/1200)
1500-100,00	1.0

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

Frequency Range (MHz)	Power Density (mW/cm^2)
30-300	0.2
300-1500	Frequency (MHz)*(0.8/1200)
1500-100,00	1.0

Table 2. Limits for Occupationa;/Controlled Exposure (MPE)

Parameter	Symbol	Formula	Value	Units
Antenna Diameter	D	Input	0.6	m
Antenna Surface Area	$A_{surface}$	$\pi D^2/4$	0.2826	m^2
Frequency	F	Input	6250	MHz
Wavelength	λ	300/F	0.048	M
Transmit Power	P	Input	4	W
Antenna Gain (dBi)	G_{es}	Input	28	dBi
Antenna Gain (factor)	G	$10^{Ges/10}$	630	n/a
Pi	π	Constant	3.1415927	n/a
Antenna Efficiency	η	$G \lambda^2/(\pi^2 D^2)$	65	%

Table 3. Formulas & Parameters Used for determining Power Flux Densities

1. Far Field distance Calculation

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

Distance to the Far Field Region $R_{ff} = 0.60\ D^2 / \lambda$
$=4.5$ m

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

On-Axis Power Density in the Far-Field $S_{ff} = G\ P / (4\ \pi\ R_{ff}^2)$
$=10\ W/m^2$
$= 1 mW/cm^2$

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 using the following equation:

Extent of the Near Field $R_{nf} = D^2 / (4\ \lambda)$
$= 1.875$ m

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

Near Field Power Flux Density $S_{nf} = 16\ \eta\ P / (\pi\ D^2)$
$= 3.6\ mW/cm^2$

3. Transition Region Power Density

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 calculation in Section 1 is the highest power density the antenna can produce in any of the regions away from the antenna. The power density at a distance R_t can be determined from the following equation:

Transition Region Power Density $S_t = S_{nf} R_{nf} / R_t$
$= 1.5\ mW/cm^2$

4. Main Reflector Region

The power density in the main reflector is determined using the following equation:

Power Density at Main Reflector $S_{surface} = 4\ P / A_{surface}$
$= 5.6\ mW/cm^2$

5. Region Between the Main Reflector and the Ground

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

Power density between Reflector and Ground $S_g = P / A_{surface}$
$= 1.4\ mW/cm^2$

6. Summary of Calculations

Region	**Calculated Maximum Radiation power Density Level (mW/cm^2)**		Hazard assessment
1. Far Field	Sff	9.8	Satisfies FCC MPE
2. Near Field	Snf	3.6	Satisfies FCC MPE
3. Transition Region (Rnf<Rt<Rff)	St	0.99	Satisfies FCC MPE
4. Main Reflector	Ssurface	5.6	Satisfies FCC MPE
5. Between Main Reflector and Ground	Sg	1.4	Satisfies FCC MPE

Table 4. Summary of Expected Radiation Levels for Uncontrolled Environments

1. Far Field	Sff	1.875	Satisfies FCC MPE
2. Near Field	Snf	3.6	Satisfies FCC MPE
3. Transition Region (Rnf<Rt<Rff)	St	1.5	Satisfies FCC MPE
4. Main Reflector	Ssurface	5.6	Satisfies FCC MPE
5. Between Main Reflector and Ground	Sg	1.4	Satisfies FCC MPE

Table 4. Summary of Expected Radiation Levels for Controlled Environments

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

7. Conclusion

Based on the above analysis it is concluded that harmful levels of radiation will not exist in regions normally occupied by the public or the earth station's operating personne. The transmitter will be turned off during antenna maintenance so that FCC MPE of 5 mW/cm^2 will be complied with for those regions with close proximity to the reflector that exceed acceptable levels.

Harris CapRock

FCC Off-Axis EIRP Mask Calculation

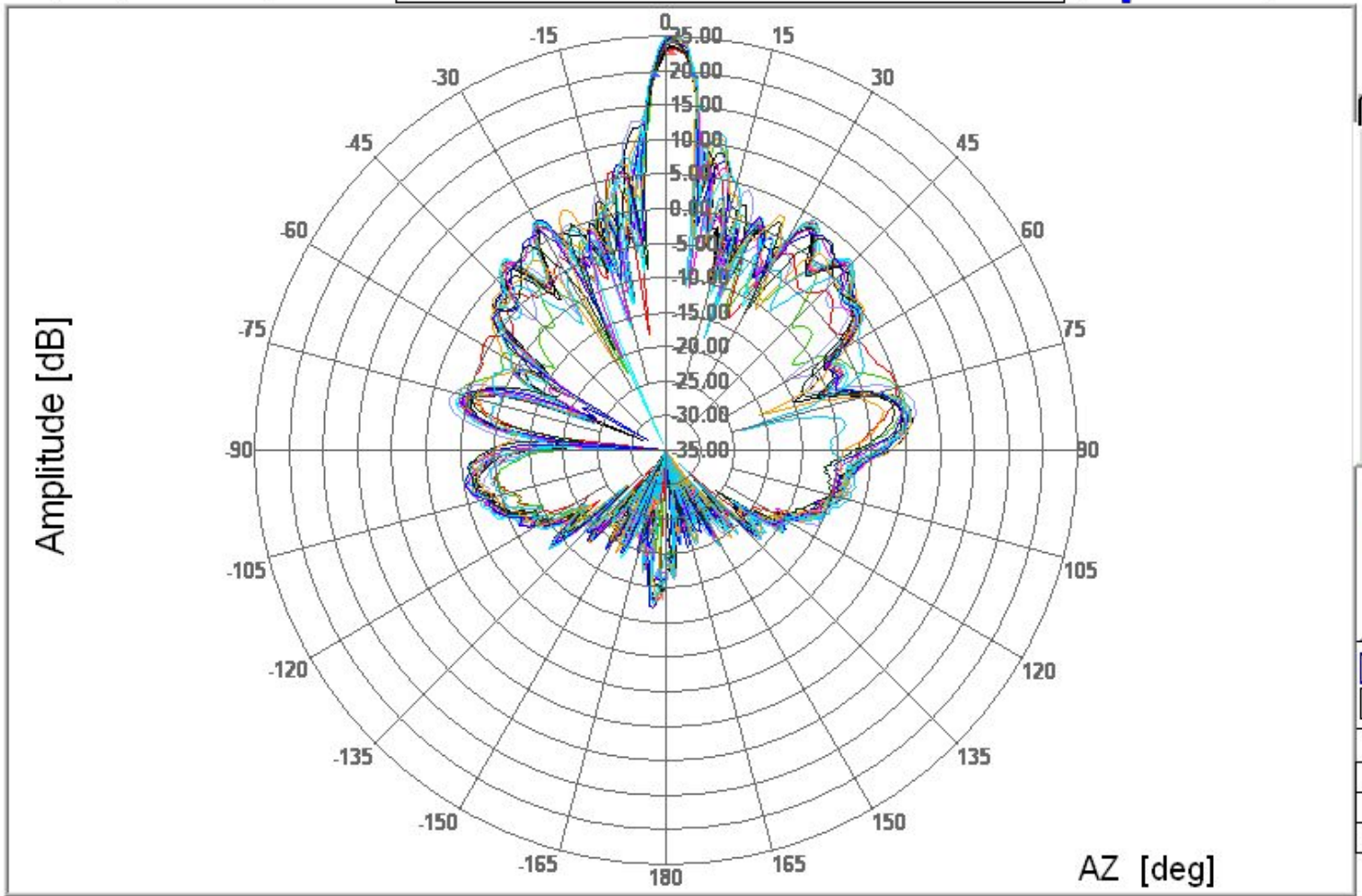
BUC (W)	3.5	5
Bandwidth (kHz)	1250	625

Theta[deg]	ITU mask	Tx Gain (linear pole)	Tx Gain (dBi)	Actual EIRP (dBW/4kHz)	Actual EIRP (dBW/4kHz)
1.00	31.74	24.12	27.12	7.61	12.17
2.00	24.77	23.24	26.24	6.74	11.30
3.00	20.37	20.07	23.07	3.56	8.12
4.00	17.25	17.68	20.68	1.17	5.73
5.00	14.83	10.67	13.67	-5.84	-1.28
6.00	12.85	5.28	8.28	-11.23	-6.67
7.00	11.17	-11.22	-8.22	-27.73	-23.17
8.00	11.30	-1.49	1.51	-18.00	-13.44
9.00	11.30	4.64	7.64	-11.87	-7.31
10.00	10.30	6.12	9.12	-10.39	-5.83
11.00	9.27	6.97	9.97	-9.54	-4.98
12.00	8.32	6.25	9.25	-10.26	-5.70
13.00	7.45	1.97	4.97	-14.54	-9.98
14.00	6.65	-1.91	1.09	-18.42	-13.86
15.00	5.90	-7.28	-4.28	-23.79	-19.23
16.00	5.20	-6.01	-3.01	-22.51	-17.96
17.00	4.54	-8.47	-5.47	-24.98	-20.42
18.00	3.92	-11.40	-8.40	-27.90	-23.35
19.00	3.33	-2.89	0.11	-19.40	-14.84
20.00	2.77	-0.43	2.57	-16.94	-12.38
21.00	2.24	1.26	4.26	-15.25	-10.69
22.00	1.74	0.81	3.81	-15.70	-11.14
23.00	1.26	-1.91	1.09	-18.42	-13.86
24.00	0.79	-3.16	-0.16	-19.66	-15.10
25.00	0.35	-3.98	-0.98	-20.49	-15.93
26.00	-0.07	-4.18	-1.18	-20.69	-16.13
27.00	-0.48	-6.90	-3.90	-23.41	-18.85
28.00	-0.88	-7.93	-4.93	-24.44	-19.88
29.00	-1.26	-2.75	0.25	-19.25	-14.69
30.00	-1.63	1.11	4.11	-15.40	-10.84
31.00	-1.98	2.25	5.25	-14.26	-9.70
32.00	-2.33	2.80	5.80	-13.71	-9.15
33.00	-2.66	3.12	6.12	-13.38	-8.82
34.00	-2.99	3.09	6.09	-13.42	-8.86
35.00	-3.30	2.96	5.96	-13.55	-8.99
36.00	-3.61	2.87	5.87	-13.63	-9.08
37.00	-3.91	2.50	5.50	-14.00	-9.44
38.00	-4.19	2.29	5.29	-14.21	-9.66
39.00	-4.48	1.90	4.90	-14.61	-10.05
40.00	-4.75	1.85	4.85	-14.66	-10.10
41.00	-5.02	2.09	5.09	-14.42	-9.86
42.00	-5.28	2.23	5.23	-14.28	-9.72
43.00	-5.54	2.28	5.28	-14.23	-9.67
44.00	-5.79	2.06	5.06	-14.44	-9.88
45.00	-6.03	1.27	4.27	-15.24	-10.68
46.00	-6.27	0.78	3.78	-15.73	-11.17
47.00	-6.50	-0.36	2.64	-16.87	-12.31
48.00	-6.73	-0.99	2.01	-17.49	-12.93

FCC Off-axis Mask Maximum EIRP Density Specification		Theta[deg]
26.3-25log(theta)	dBW/4kHz	1 ~ 7
5.3		7 ~ 9.2
29.3-25log(theta)		9.2 ~ 48

2008 Helix Tx-Beam pattern

Operator: OH SE KAB



Side lobes | Database | Ax.Ratio

Side Lobes

No.	Ampl	Deg

Ampl. Color

Visible Section

Amplitude [dB]

Phase [deg]

	Not Aligned
No Skirt	Not Normalized
Not Rotated	Phase wrapped
Ends Not Connected	Log. Display

A	P	File Name			Freq. [GHz]		Ch.	Beam	Switch	Beam Peak [dB] Value	[deg]		Beam Width [deg] Value	At dB		Null Depth [dB] Value	[deg]		Avg dB	Dir dBi	Eff A %	GainA dBi
		Singapore_2008_Tx_R-72_P0_Ae-CA			6.320 G		CH1			24.70	1.00	P	4.75	3.00	P				6.72	0.00	0.00	24.70
		Singapore_2008_Tx_R-72_P0_Ae-CA			6.330 G		CH1			25.09	1.00	P	4.80	3.00	P				7.12	0.00	0.00	25.09
		Singapore_2008_Tx_R-72_P0_Ae-CA			6.400 G		CH1			25.25	1.00	P	4.83	3.00	P				7.30	0.00	0.00	25.25
		Singapore_2008_Tx_R-72_P0_Ae-CA			6.450 G		CH1			24.73	1.00	P	4.80	3.00	P				6.77	0.00	0.00	24.73
		Singapore_2008_Tx_R-72_P0_Ae-CA			6.500 G		CH1			24.72	1.00	P	4.79	3.00	P				6.76	0.00	0.00	24.72

18th February 2011

To: Pete Shaw
Teleport & Resource Manager
Schlumberger Oilfield UK Ltd
Newton Road,
Kirkhill Industrial Estate,
Dyce,
Aberdeen AB21 0GE

INTELSAT

Dear Pete,

Confirmation of Operating Conditions for Seaconnect earth stations operating via Intelsat satellites

Intelsat provides transponder services to Schlumberger on various satellites, and hereby confirm the agreed conditions of operation that will apply to Schlumberger's 60cm C-band circular-polarised Seaconnect earth stations operating via Intelsat satellites ("the Stations").

These operating conditions are based upon Seaconnect planned operating parameters and are designed to limit interference to adjacent satellites when operated within a 2 degree spacing environment.

Pursuant to the existing service agreements between Schlumberger and Intelsat, Schlumberger will ensure its Stations are operated in full compliance with the following operating conditions:

1. The noise bandwidth of the transmit carrier will be a minimum of 500kHz (based on an occupied carrier bandwidth of 625kHz associated with a 72kbps information rate).

2. Seaconnect earth stations will not exceed a maximum EIRP of 29 dBW

3. Multiple earth stations will not transmit simultaneously at the same frequency/carrier allocation.

4. Off-axis EIRP spectral density for co-polarised signals will not exceed the following limits :

   26.3 - 25log([θ]) dBW/4kHz for 1.5° <= [θ] <= 7.0°

   5.3 dBW/4kHz for 7.0° < [θ] <= 9.2°

   29.3 - 25log([θ]) dBW/4kHz for 9.2° < [θ] <= 48°

   -12.7 dBW/4kHz for 48° < [θ] <= 180°

   where [θ] is the angle in degrees from the axis of the main lobe.

5. Off-axis EIRP spectral density for cross-pol signals will not exceed the following limits :

   16.3 - 25log([θ]) dBW/4kHz for 1.8° <= [θ] <= 7.0°

   -4.7 dBW/4kHz for 7° < [θ] <= 9.2°

   where [θ] is the angle in degrees from the axis of the main lobe.

6. Antenna pointing accuracy towards the target spacecraft will be maintained within ±0.2°.

7. Seaconnect earth stations will automatically inhibit all transmissions in the event of antenna pointing error exceeding 0.5° for more than 100ms. Retransmission will resume only once nominal pointing accuracy (±0.2°) has been restored.

8. Seaconnect earth stations will follow existing Intelsat satellite access procedures.

Intelsat may introduce additional or alternative operating conditions as necessary to meet operational or coordination requirements applicable to any given satellite or orbital location.

Schlumberger will be responsible for ensuring compliance of Seaconnect terminal operations with all applicable regulatory and licensing requirements.

Yours faithfully,

T. Willoughby

for and on behalf of
Intelsat Global Sales & Marketing Ltd.

DETAILED INTERFERENCE ANALYSIS REPORT

Transmit/Receive Earth Station

Prepared For
Access Partnership
(Schlumberger)
Houston, Tx.

(C-band)
Transmit/Receive Earth Station

April 21, 2011

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SECTION 1

INTRODUCTION

Transmit/Receive Earth Station

This report presents the results of a detailed interference analysis for a proposed C-band transmit/receive earth station location. The site was selected by Access Partnership and Schlumberger and is located at Houston, Texas.

The analysis was performed for a 0.6 meter antenna. The long term interference objective at 4 GHz, was -156 dBW/1 MHz, while the 6 GHz long term interference objective was -154 dBW/4 kHz, as specified by the FCC.

The earth station was analyzed for transmission and reception of digital traffic to and from a satellite at 34.5 West (325.5 East) degrees Longitude. This report assumes that the satellite transponders are numbered 1 through 24, with each transponder having a 36 MHz bandwidth.

This detailed interference analysis is meant to provide an estimate of potential interference at this location, and to recommend a course of future action.

SECTION 2

REPORT CONTENTS AND PROCEDURES

Transmit/Receive Earth Station

This section describes the contents of the report for a proposed C-band transmit/receive earth station.

Section 1 describes the site location, the antenna considered, and the system parameters considered in the detailed interference analysis. The analysis was undertaken to determine the potential for microwave interference for the transmit/receive earth station at the site specified.

Initially, a computer analysis of this site was performed to determine the extent of potential interference on a line-of-sight (LOS) basis. This analysis considers the microwave environment with respect to the earth station and calculates predicted signal levels between these systems. Paths which exceed a given objective level are listed for further analysis. The objective levels present the maximum interference levels allowed between the earth station and the surrounding terrestrial microwave environment for the frequency band of interest.

To further analyze the effect of the predicted interference conflicts, terrain path profiles were prepared for the critical cases. This involves plotting the interference path on topographic maps, typically 7.5 minute series U.S.G.S. maps, to determine the terrain characteristics of the path. Once this has been accomplished, predicted over-the-horizon (O-H) losses are calculated using the techniques of the National Bureau of Standards Technical Note 101 (Revised).

These calculations give the amount of signal attenuation achieved due to terrain blockage.

Section 3 summarizes the results of the site analysis. This summary includes the number of cases that were considered, the interference cases that remain, and the proposed resolution of the interference problems.

Tables 3.1-1 and 3.2-1 list the Great Circle interference cases and the predicted O-H losses calculated on the various 6 and 4 GHz paths, respectively. If multiple analyses are considered, such as changes in satellite arc or antenna, the results are presented in Tables 3.1-1.1, 3.1-1.2, 3.2-1.1 3.2-1.2, etc.....

A brief explanation of the various columns shown in Tables 3.1-1 and 3.2-1 follows:

PATH ID: This is the predicted interference path. The first site listed is the transmitter at 4 GHz or the receiver at 6 GHz.

BAND: This shows the frequency plan of the interfering paths. The 4 GHz paths affect reception of the downlink, while the 6 GHz terrestrial facilities are affected by the uplink. Receivers in the low half of the band (5925 - 6175 MHz), are indicated by 6L.

Receivers in the high half of the band (6175 - 6425 MHz), are indicated by 6H.

DIST: This is the distance from the earth station to the terrestrial station in kilometers.

AZ: This is the azimuth bearing in degrees (taken from True North), from the earth station toward the terrestrial station.

ES DISC: This is the earth station discrimination angle in degrees, towards the involved terrestrial facility.

ES GAIN: This is the gain of the earth station in dBi, at the calculated earth station discrimination angle.

LOS LOSS REQ'D: This is the amount of loss required in dB, on a line-of-sight basis, to meet the interference objective.

O-H LOSS: This is the calculated over-the-horizon (O-H) losses in dB, between the earth station and the involved terrestrial station. The 20 percent column represents losses for the long term objective. The 0.0025 and .01 percent columns present the losses for the short term objective at 6 GHz and 4 GHz, respectively.

REVISED MARGIN: This is the difference between the LOS margin and the predicted O-H losses achieved due to terrain blockage. Sufficient attenuation is calculated for the paths which show the word "CLEAR" in the revised margin. Cases showing a positive revised margin will require additional losses to meet the interference objective.

The information listed at the bottom of the table reflects the antennas, satellite arc, and interference objectives considered for the proposed site.

Section 4 presents conclusions and recommendations. It gives an overall description of the microwave environment and suggests a future course of action.

Table 5.1-1 contains the operational parameters for the proposed earth station. Tables 5.1-2 provides azimuth and elevation data for the geostationary arc, and identifies the locations of particular satellites within that arc.

Section 6 presents the Great Circle interference cases. This provides a listing of the utilized channels and type of traffic loading for each path.

SECTION 3

SUMMARY AND RESULTS

The detailed interference analysis for the proposed earth station site to be located at Houston, Texas revealed that 59 potential interference conflicts exist. After considering the over-the-horizon (O-H) losses, 47 cases were found to have sufficient losses to resolve the predicted margins. A discussion of the remaining cases is presented below.

Transmit Band 5925 - 6425 MHz

In the 6 GHz transmit band, there were 12 cases where insufficient blockage existed. A summary of these cases follows:

Path	Distance (Km)	Azimuth (Degrees)	Line-of-Sight Margin (dB)	Revised Margin 20% (dB)
Genoa - Hobby	11.4	75.7	17.9	17.9
2100 W Loop - Alvin	19.5	326.9	16.6	16.6
Copperfield - Gessner	43.6	322.3	16.3	4.3
Alvin - 2100 W Loop	19.0	140.7	14.4	14.4
Alvin - Pearland	26.2	134.8	14.1	14.1
El Camino - Ellington	18.8	97.7	7.7	7.7
Downtown MTSO - Mandel	19.4	344.6	6.4	6.4
S Houston - Windheather	10.3	57.1	5.9	5.9
Algoa - Chigger Relo	25.5	144.7	4.9	4.9
Windheater - S Houston	8.7	254.7	3.4	3.4
Pearland - Almeda	11.6	156.4	2.9	2.9
Alvin - Pearland	26.0	162.3	2.5	2.5

Additional blockage will need to be identified in the direction of the remaining 6 GHz cases, or frequency offsets will need to be implemented to avoid conflict with the receive frequencies of these facilities.

Table 6.1-1 provides a summary of the remaining interference conflicts to the 6 GHz transmit band and their coordinated receive frequencies.

3.2 Receive Band 3700 to 4200 MHz

No cases exist in the 4 GHz receive band.

SECTION 4

CONCLUSIONS AND RECOMMENDATIONS

4.1 Conclusions

Based on the results of the detailed interference analysis, 12 potential interference conflicts exist to the 6 GHz transmit band that could not be cleared with terrain path profiles. In the event that on-site RFI measurements and path surveys cannot resolve these cases it would be necessary to limit the earth station transmit band around the receive frequencies of the identified 6 GHz receivers. The limited frequencies would be 5925 – 5929, 6110 – 6136, 6169 – 6181, 6243 – 6270 and 6303 – 6425 MHz.

4.2 Recommendations

It is recommended that Access Partnership/Schlumberger review the operating parameters of the proposed earth station antenna and determine whether the above referenced transmit band restrictions are acceptable. In the event that they are not, it is recommended that on-site RFI measurements and path surveys be completed in an attempt to resolve the cases identified in this report.

Table 5.1-1

SATELLITE EARTH STATION
FREQUENCY COORDINATION DATA
04/21/2011

Company	SCHLUMBERGER		
Owner Code			
Earth Station Name, State			HOUSTON, TX
Latitude (DMS) (NAD83)			29 35 54.0 N
Longitude (DMS) (NAD83)			95 20 50.0 W
Ground Elevation AMSL (ft/m)			51.00 / 15.54
Antenna Centerline AGL (ft/m)			6.00 / 1.83
Receive Antenna Type:	FCC32		FCC REFERENCE
			32-25LOG(THETA)
4.0 GHz Gain (dBi) / Diameter (m)			25.0 / 0.6
3 dB / 15 dB Half Beamwidth			2.25 / 5.00
Transmit Antenna Type:	FCC32		FCC REFERENCE
			32-25LOG(THETA)
6.0 GHz Gain (dBi) / Diameter (m)			28.0 / 0.6
3 dB / 15 dB Half Beamwidth			1.50 / 3.25
Operating Mode			TRANSMIT AND RECEIVE
Modulation			DIGITAL
Emission / Receive Band (MHz)	6K25G7W	1M25G7W /	3700.0000 - 4200.0000
Emission / Transmit Band (MHz)	6K25G7W	1M25G7W /	5925.0000 - 6425.0000
Max. Available RF Power	(dBW)/4 kHz)		-16.00
	(dBW)/MHz)		8.00
Max. EIRP	(dBW)/4 kHz)		12.00
	(dBW)/MHz)		36.00
Max. Permissible Interference Power			
4.0 GHz, 20% (dBW/1 MHz)			-156.0
4.0 GHz, 0.0100% (dBW/1 MHz)			-146.0
6.0 GHz, 20% (dBW/4 kHz)			-154.0
6.0 GHz, 0.0025% (dBW/4 kHz)			-131.0
Range of Satellite Arc (Geostationary)			
Degrees Longitude			34.0 W / 35.0 W
Azimuth Range (Min/Max)			105.1 / 105.7
Corresponding Elevation Angles			16.3 / 17.2
Radio Climate			A
Rain Zone			2
Max. Great Circle Coordination Distance (mi./km)			
4.0 GHz			229.8 / 369.8
6.0 GHz			101.2 / 162.8
Precipitation Scatter Contour Radius (mi./km)			
4.0 GHz			319.6 / 514.3
6.0 GHz			62.1 / 100.0

Note: Horizon is less than 0.2 degrees at all azimuths

Table 5.2-1

Earth Station Azimuth and Elevation Table
04/21/2011

Earth Station Name	HOUSTON, TX	
Owner	SCHLUMBERGER	
Latitude (DMS) (NAD83)	29 35 54.0 N	
Longitude (DMS) (NAD83)	95 20 50.0 W	
Ground Elevation (ft/m)	51.00 /	15.54 Amsl
Antenna Centerline (ft/m)	6.00 /	1.83 Agl
Satellite Arc Range	34.0 W	
	35.0 W	

Satellite Longitude	Azimuth (Degrees)	Elevation (Degrees)	Satellite Name
34.0	105.1	16.3	
34.5	105.4	16.7	INTELSAT 903
35.0	105.7	17.2	

Table 6.1-1

Great Circle Interference Conflicts
04/21/2011

```
Earth Station Name     HOUSTON, TX
Owner                  SCHLUMBERGER
Latitude  (DMS) (NAD83)  29 35 54.0 N
Longitude (DMS) (NAD83)  95 20 50.0 W
Ground Elevation (ft/m)       51.00 /    15.54 Amsl
Antenna Centerline (ft/m)      6.00 /     1.83 Agl
Antenna Model              FCC REFERENCE 32-25LOG(THETA)
Objectives: Receive      -156.0 (dBW /1 MHz)
            Transmit     -154.0 (dBW /4 kHz)  Tx Power   -16.0 (dBW/4 kHz)

       Terrestrial Path              Gnd   Edisct  Ges FsLoss Dist  Pr Tpwr Plan
    Latitude   Longitude Call Sign   Acl   Tdisct  Gts Tant    Az  Margin LL
    Owner                                             Loading
    Freq/Pol


  7 GENOA       TXHOBBY       TX    13.01  33.3  -6.0 129.4   11.4-136.1 29.0LT
     29 37 25  95 13 58 WQMK566      24.69   3.3  17.8 A63999  75.7 17.9   2.4
    P4166 : GTE Mobilnet of South Texas LTD Partners 2016CH   DIG  RCN: 09063029
    5945.2000H   5974.8500V
     Status:  L                        Equipment: TEMH95 Emission: 30M0D7W
      OH LOSS  20% / 0.0025%:    0.00 /   0.00

  9 2100 W LOOP TXALVIN       TX    19.57 135.7 -10.0 134.1   19.5-137.4 19.0HT
     29 44 45  95 27 27 WQKW531      72.54   3.1  22.7 41731A 326.9 16.6   0.0
    ERFWIR: ERF Wireless Bundled Services, Inc.      1 CH     DIG  RCN: 09043028
    6286.1900V
     Status:  L                        Equipment: TEMR63 Emission: 30M0D7W
      OH LOSS  20% / 0.0025%:    0.00 /   0.00

 11 COPPERFIELD TXGESSNER     TX    40.20 139.8 -10.0 141.1   43.6-137.7 19.0HT
     29 54 35  95 37 24 WLR640       54.25 358.6  33.1 41732A 322.3 16.3   3.7
    P4166 : GTE Mobilnet of South Texas LTD Partners 2016CH   DIG  RCN: 10012711
    6226.8900V
     Status:  L                        Equipment: TEMH95 Emission: 30M0D7W
      OH LOSS  20% / 0.0025%:   12.00 /  -4.40

 17 ALVIN       TX2100 W LOOP TX    10.97  38.5  -7.6 133.8   19.0-139.6 19.0LT
     29 27 57  95 13 24 WQKW530      28.41 356.9  17.9 41731A 140.7 14.4   0.0
    ERFWIR: ERF Wireless Bundled Services, Inc.      1 CH     DIG  RCN: 09043028
    6034.1500V
     Status:  L                        Equipment: TEMR63 Emission: 30M0D7W
      OH LOSS  20% / 0.0025%:    0.00 /   0.00

 20 ALVIN       TXPEARLAND    TX     6.70  33.4  -6.1 136.6   26.2-139.9 29.0HT
     29 25 54  95  9 20 WQNH492      44.20 357.4  22.3 40236C 134.8 14.1   3.5
    HARITC: Harris County ITC                        2016CH   DIG  RCN: 09022520
    6197.2400H
     Status:  P                        Equipment: TEX105 Emission: 30M0D7W
      OH LOSS  20% / 0.0025%:    0.00 /   0.00

 25 EL CAMINO   TXELLINGTON   TX     9.10  18.0   0.6 133.7   18.8-146.3 15.0LT
     29 34 32  95  9 19 WQJC383      23.47 347.4   4.8 61022A  97.7  7.7   2.0
    P4166 : GTE Mobilnet of South Texas LTD Partners 2016CH   DIG  RCN: 10111224
    6152.7500V
     Status:  L                        Equipment: TEMH95 Emission: 30M0D7W
      OH LOSS  20% / 0.0025%:    0.00 /   0.00

 28 DOWNTWN MTSOTXMANDEL      TX    15.24 119.1 -10.0 134.0   19.4-147.6 12.0HT
     29 46  2  95 24  2 WQHR569      32.31 354.3  12.9 44377A 344.6  6.4   0.5
    P4166 : GTE Mobilnet of South Texas LTD Partners 1 CH     DIG  RCN: 09110321
    6197.2400V   6226.8900H
     Status:  L                        Equipment: TEMS02 Emission: 30M0D7W
      OH LOSS  20% / 0.0025%:    0.00 /   0.00

 31 S HOUSTON   TXWINDHEATHER TX    12.20  50.0 -10.0 128.6   10.3-148.1 28.0HT
     29 38 56  95 15 28 WQIU859      36.60 352.0   8.3 41731A  57.1  5.9   1.9
    MANINC: METROPOLITAN AREA NETWORKS, INC.         1 CH     DIG  RCN: 07111637
    6286.1900H
     Status:  L                        Equipment: TEMN41 Emission: 30M0D7W
      OH LOSS  20% / 0.0025%:    0.00 /   0.00
```

Earth Station Name HOUSTON, TX
Owner SCHLUMBERGER
Latitude (DMS) (NAD83) 29 35 54.0 N
Longitude (DMS) (NAD83) 95 20 50.0 W
Ground Elevation (ft/m) 51.00 / 15.54 Amsl
Antenna Centerline (ft/m) 6.00 / 1.83 Agl
Antenna Model FCC REFERENCE 32-25LOG(THETA)
Objectives: Receive -156.0 (dBW /1 MHz)
Transmit -154.0 (dBW /4 kHz) Tx Power -16.0 (dBW/4 kHz)

	Terrestrial Path		Gnd	Edisct	Ges	FsLoss	Dist	Pr	Tpwr	Plan
	Latitude Longitude	Call Sign	Acl	Tdisct	Gts	Tant	Az	Margin		LL
	Owner					Loading				
	Freq/Pol									
37	ALGOA	TXCHIGGER RELOTX	10.40	42.1	-8.6	136.4	25.5-149.1		19.0	LT
	29 24 38 95 11 43	WQJC387	33.53	355.9	14.8	41731A	144.7	4.9		2.9
	P4166 : GTE Mobilnet of South Texas LTD Partners				2016	CH	DIG	RCN: 08040203		
	6004.5000V 6063.8000V 6093.4500H									
	Status: L		Equipment: TEX105 Emission: 30M0D7W							
	OH LOSS 20% / 0.0025%:	0.00 / 0.00								
39	ALVIN	TXPEARLAND TX	9.40	58.3	-10.0	136.6	26.0-150.4		27.5	LT
	29 22 29 95 15 57	WLC564	45.72	355.3	15.7	A67730	162.3	3.6		3.5
	P4166 : GTE Mobilnet of South Texas LTD Partners				1	CH	DIG	RCN: 11022814		
	6152.7500H									
	Status: P		Equipment: TEMY43 Emission: 30M0D7W							
	OH LOSS 20% / 0.0025%:	0.00 / 0.00								
40	WINDHEATHER TXS HOUSTON	TX	18.60	145.0	-10.0	127.1	8.7-150.6		28.0	LT
	29 34 39 95 26 3	WQIU860	45.70	9.5	4.8	41731A	254.7	3.4		2.3
	MANINC: METROPOLITAN AREA NETWORKS, INC.				1	CH	DIG	RCN: 07111637		
	6034.1500H									
	Status: L		Equipment: TEMN41 Emission: 30M0D7W							
	OH LOSS 20% / 0.0025%:	0.00 / 0.00								
41	PEARLAND	TXALMEDA TX	14.02	52.8	-10.0	129.5	11.6-151.1		26.0	HT
	29 30 10 95 17 58	WLB386	31.70	10.1	7.5	A67730	156.4	2.9		3.0
	P4166 : GTE Mobilnet of South Texas LTD Partners				2016	CH	DIG	RCN: 10031905		
	6375.1400H									
	Status: L		Equipment: TEMH95 Emission: 30M0D7W							
	OH LOSS 20% / 0.0025%:	0.00 / 0.00								
42	ALVIN	TXPEARLAND TX	9.40	58.3	-10.0	136.6	26.0-151.5		28.8	LT
	29 22 29 95 15 57	WLC564	45.72	355.3	15.7	A67730	162.3	2.5		4.6
	P4166 : GTE Mobilnet of South Texas LTD Partners				2016	CH	DIG	RCN: 11022814		
	6004.5000V 6063.8000V									
	Status: P		Equipment: TEM548 Emission: 30M0D7W							
	OH LOSS 20% / 0.0025%:	0.00 / 0.00								

DETAILED INTERFERENCE ANALYSIS REPORT

Transmit/Receive Earth Station

Prepared For
Access Partnership
(Schlumberger)
Mountainside, Md.

(C-band)
Transmit/Receive Earth Station

April 29, 2010

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Table 6.1-1 Potential Interference Cases 6 GHz Transmit Band

SECTION 1

INTRODUCTION

Transmit/Receive Earth Station

This report presents the results of a detailed interference analysis for a proposed C-band transmit/receive earth station location. The site was selected by Access Partnership and Schlumberger and is located at Mountainside, Maryland.

The analysis was performed for a 0.6 meter antenna. The long term interference objective at 4 GHz, was -156 dBW/1 MHz, while the 6 GHz long term interference objective was -154 dBW/4 kHz, as specified by the FCC.

The earth station was analyzed for transmission and reception of digital traffic to and from a satellite at 34.5 West (325.5 East) degrees Longitude. This report assumes that the satellite transponders are numbered 1 through 24, with each transponder having a 36 MHz bandwidth.

This detailed interference analysis is meant to provide an estimate of potential interference at this location, and to recommend a course of future action.

SECTION 2

REPORT CONTENTS AND PROCEDURES

Transmit/Receive Earth Station

This section describes the contents of the report for a proposed C-band transmit/receive earth station.

Section 1 describes the site location, the antenna considered, and the system parameters considered in the detailed interference analysis. The analysis was undertaken to determine the potential for microwave interference for the transmit/receive earth station at the site specified.

Initially, a computer analysis of this site was performed to determine the extent of potential interference on a line-of-sight (LOS) basis. This analysis considers the microwave environment with respect to the earth station and calculates predicted signal levels between these systems. Paths which exceed a given objective level are listed for further analysis. The objective levels present the maximum interference levels allowed between the earth station and the surrounding terrestrial microwave environment for the frequency band of interest.

To further analyze the effect of the predicted interference conflicts, terrain path profiles were prepared for the critical cases. This involves plotting the interference path on topographic maps, typically 7.5 minute series U.S.G.S. maps, to determine the terrain characteristics of the path. Once this has been accomplished, predicted over-the-horizon (O-H) losses are calculated using the techniques of the National Bureau of Standards Technical Note 101 (Revised).

These calculations give the amount of signal attenuation achieved due to terrain blockage.

Section 3 summarizes the results of the site analysis. This summary includes the number of cases that were considered, the interference cases that remain, and the proposed resolution of the interference problems.

Tables 3.1-1 and 3.2-1 list the Great Circle interference cases and the predicted O-H losses calculated on the various 6 and 4 GHz paths, respectively. If multiple analyses are considered, such as changes in satellite arc or antenna, the results are presented in Tables 3.1-1.1, 3.1-1.2, 3.2-1.1 3.2-1.2, etc.....

A brief explanation of the various columns shown in Tables 3.1-1 and 3.2-1 follows:

PATH ID: This is the predicted interference path. The first site listed is the transmitter at 4 GHz or the receiver at 6 GHz.

BAND: This shows the frequency plan of the interfering paths. The 4 GHz paths affect reception of the downlink, while the 6 GHz terrestrial facilities are affected by the uplink. Receivers in the low half of the band (5925 - 6175 MHz), are indicated by 6L.

Receivers in the high half of the band (6175 - 6425 MHz), are indicated by 6H.

DIST: This is the distance from the earth station to the terrestrial station in kilometers.

AZ: This is the azimuth bearing in degrees (taken from True North), from the earth station toward the terrestrial station.

ES DISC: This is the earth station discrimination angle in degrees, towards the involved terrestrial facility.

ES GAIN: This is the gain of the earth station in dBi, at the calculated earth station discrimination angle.

LOS LOSS REQ'D: This is the amount of loss required in dB, on a line-of-sight basis, to meet the interference objective.

O-H LOSS: This is the calculated over-the-horizon (O-H) losses in dB, between the earth station and the involved terrestrial station. The 20 percent column represents losses for the long term objective. The 0.0025 and .01 percent columns present the losses for the short term objective at 6 GHz and 4 GHz, respectively.

REVISED MARGIN: This is the difference between the LOS margin and the predicted O-H losses achieved due to terrain blockage. Sufficient attenuation is calculated for the paths which show the word "CLEAR" in the revised margin. Cases showing a positive revised margin will require additional losses to meet the interference objective.

The information listed at the bottom of the table reflects the antennas, satellite arc, and interference objectives considered for the proposed site.

Section 4 presents conclusions and recommendations. It gives an overall description of the microwave environment and suggests a future course of action.

Table 5.1-1 contains the operational parameters for the proposed earth station. Tables 5.1-2 provides azimuth and elevation data for the geostationary arc, and identifies the locations of particular satellites within that arc.

Section 6 presents the Great Circle interference cases. This provides a listing of the utilized channels and type of traffic loading for each path.

SECTION 3

SUMMARY AND RESULTS

The detailed interference analysis for the proposed earth station site to be located at Mountainside, Maryland revealed that 18 potential interference conflicts exist. After considering the over-the-horizon (O-H) losses, 15 cases were found to have sufficient losses to resolve the predicted margins. A discussion of the remaining cases is presented below.

Transmit Band 5925 - 6425 MHz

In the 6 GHz transmit band, there were three cases where insufficient blockage existed. A summary of these cases follows:

Path	Distance (Km)	Azimuth (Degrees)	Line-of-Sight Margin (dB)	Revised Margin 20% (dB)
Sideling Hil - Clear Spg	47.6	281.8	5.2	5.2
Catoctin - Clear Spring	25.2	117.6	4.6	4.6
Hagerstown - Clear Spg	5.2	13.4	1.4	1.4

Additional blockage will need to be identified in the direction of the remaining 6 GHz cases, or frequency offsets will need to be implemented to avoid conflict with the receive frequencies of these facilities.

Table 6.1-1 provides a summary of the remaining interference conflicts to the 6 GHz transmit band and their coordinated receive frequencies.

3.2 Receive Band 3700 to 4200 MHz

No cases exist in the 4 GHz receive band after terrain pathloss calculations that could present an interference conflict at this location. The predicted interference margin is based on a downlink long term interference objective of -156 dBW/ 1 MHz.

SECTION 4

CONCLUSIONS AND RECOMMENDATIONS

4.1 Conclusions

Based on the results of the detailed interference analysis, three potential interference conflicts exist to the 6 GHz transmit band that could not be cleared with terrain path profiles. In the event that on-site RFI measurements and path surveys cannot resolve these cases it would be necessary to limit the earth station transmit band around the receive frequencies of the identified 6 GHz receivers. The limited frequencies would be 5925 – 5958, 5990 – 6077, 6109 – 6136, 6168 – 6425 MHz.

4.2 Recommendations

It is recommended that Access Partnership/Schlumberger review the operating parameters of the proposed earth station antenna and determine whether the above referenced transmit band restrictions are acceptable. In the event that they are not, it is recommended that on-site RFI measurements and path surveys be completed in an attempt to resolve the cases identified in this report.

Table 5.1-1

SATELLITE EARTH STATION
FREQUENCY COORDINATION DATA
04/28/2010

Company	SCHLUMBERGER	
Owner Code		
Earth Station Name, State		MOUNTAINSIDE, MD
Latitude (DMS) (NAD83)		39 36 1.0 N
Longitude (DMS) (NAD83)		77 45 30.0 W
Ground Elevation AMSL (Ft/m)		565.00 / 172.21
Antenna Centerline AGL (Ft/m)		6.00 / 1.83
Receive Antenna Type:	FCC32	FCC REFERENCE 32-25LOG(THETA)
4.0 GHz Gain (dBi) / Diameter (m)		25.0 / 0.6
3 dB / 15 dB Half Beamwidth		4.50 / 10.00
Transmit Antenna Type:	FCC32	FCC REFERENCE 32-25LOG(THETA)
6.0 GHz Gain (dBi) / Diameter (m)		28.0 / 0.6
3 dB / 15 dB Half Beamwidth		3.00 / 6.50
Operating Mode		TRANSMIT AND RECEIVE
Modulation		DIGITAL
Emission / Receive Band (MHz)	6K25G7W	1M25G7W / 3700.0000 - 4200.0000
Emission / Transmit Band (MHz)	6K25G7W	1M25G7W / 5925.0000 - 6425.0000
Max. Available RF Power (dBW)/4 kHz)		-16.00
(dBW)/MHz)		8.00
Max. EIRP (dBW)/4 kHz)		12.00
(dBW)/MHz)		36.00
Max. Permissible Interference Power		
4.0 GHz, 20% (dBW/1 MHz)		-156.0
4.0 GHz, 0.0100% (dBW/1 MHz)		-146.0
6.0 GHz, 20% (dBW/4 kHz)		-154.0
6.0 GHz, 0.0025% (dBW/4 kHz)		-131.0
Range of Satellite Arc (Geostationary)		
Degrees Longitude		34.0 W / 35.0 W
Azimuth Range (Min/Max)		123.7 / 124.6
Corresponding Elevation Angles		26.0 / 26.7
Radio Climate		A
Rain Zone		2
Max. Great Circle Coordination Distance (Mi/Km)		
4.0 GHz		205.8 / 331.3
6.0 GHz		90.1 / 145.0
Precipitation Scatter Contour Radius (Mi/Km)		
4.0 GHz		307.0 / 494.1
6.0 GHz		62.1 / 100.0

Table 5.2-1

Earth Station Azimuth and Elevation Table
04/28/2010

Earth Station Name	MOUNTAINSIDE, MD	
Owner	SCHLUMBERGER	
Latitude (DMS) (NAD83)	39 36 1.0 N	
Longitude (DMS) (NAD83)	77 45 30.0 W	
Ground Elevation (Ft/m)	565.00 /	172.21 AMSL
Antenna Centerline (Ft/m)	6.00 /	1.83 AGL
Satellite Arc Range	34.0 W	
	35.0 W	

Satellite Longitude	Azimuth (Degrees)	Elevation (Degrees)	Satellite Name
34.0	123.7	26.0	
34.5	124.1	26.3	INTELSAT 903
35.0	124.6	26.7	

Table 6.1-1

Great Circle Interference Conflicts
04/28/2010

```
Earth Station Name     MOUNTAINSIDE, MD
Owner                  SCHLUMBERGER
Latitude  (DMS) (NAD83)  39 36  1.0 N
Longitude (DMS) (NAD83)  77 45 30.0 W
Ground Elevation (Ft/m)      565.00 /   172.21 AMSL
Antenna Centerline (Ft/m)      6.00 /     1.83 AGL
Antenna Model              FCC REFERENCE 32-25LOG(THETA)
Objectives: Receive      -156.0 (dBW /1 MHz)
            Transmit     -154.0 (dBW /4 kHz)  Tx Power   -16.0 (dBW/4 kHz)

       Terrestrial Path              Gnd   Edisct  Ges FsLoss Dist  Pr Tpwr Plan
    Latitude   Longitude Call Sign   Acl   Tdisct  Gts Tant    Az  Margin LL
    Owner                                              Loading
    Freq/Pol


  14 SIDELING HILMDN CLEAR SPGSMD   481.60 145.6 -10.0 141.8   47.6-148.8 31.1LT
     39 41 12  78 18  6 WMT231       33.53   2.4  21.5 1654JA 281.8  5.2   2.5
    P4189 : USCOC of Cumberland, Inc.                2016CH   DIG  RCN: 08121931
   5974.8500V   6152.7500V
    Status:  L                      Equipment: TEMC52 Emission: 30M0D7W
     OH LOSS  20% / 0.0025%:    0.00 /   0.00


  15 CATOCTIN    MDCLEAR SPRINGMD   534.00  26.8  -3.7 136.3   25.2-149.4 29.0LT
     39 29 41  77 29 55 WMR958       30.48   5.2   8.6 A74117 117.6  4.6   2.0
    NCNGVA: New Cingular Wireless PCS - VA/DC/MD     2016CH   DIG  RCN: 02103038
   6093.4500H
    Status:  L                      Equipment: TEMX95 Emission: 30M0D7W
     OH LOSS  20% / 0.0025%:    2.40 /  -1.60


  18 HAGERSTOWN  MDN CLEAR SPGSMD   188.98 108.1 -10.0 122.7    5.2-152.6 28.6LT
     39 38 46  77 44 39 WLV260       33.53 283.7  -0.9 A62300  13.4  1.4   3.0
    P4189 : USCOC of Cumberland, Inc.                2016CH   DIG  RCN: 06020812
   5974.8500V
    Status:  L                      Equipment: TEMB47 Emission: 30M0D7W
     OH LOSS  20% / 0.0025%:    0.00 /   0.00
```

DETAILED INTERFERENCE ANALYSIS REPORT

Transmit/Receive Earth Station

Prepared For
Access Partnership
(Schlumberger)
Melbourne, Fl.

(C-band)
Transmit/Receive Earth Station

April 21, 2011

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Table 5.1-1 Earth Station Parameters

Table 5.2-1 Earth Station Azimuth Elevation Table

Table 6.1-1 Potential Interference Cases 6 GHz Transmit Band

SECTION 1

INTRODUCTION

Transmit/Receive Earth Station

This report presents the results of a detailed interference analysis for a proposed C-band transmit/receive earth station location. The site was selected by Access Partnership and Schlumberger and is located at Melbourne, Florida.

The analysis was performed for a 0.6 meter antenna. The long term interference objective at 4 GHz, was -156 dBW/1 MHz, while the 6 GHz long term interference objective was -154 dBW/4 kHz, as specified by the FCC.

The earth station was analyzed for transmission and reception of digital traffic to and from a satellite at 34.5 West (325.5 East) degrees Longitude. This report assumes that the satellite transponders are numbered 1 through 24, with each transponder having a 36 MHz bandwidth.

This detailed interference analysis is meant to provide an estimate of potential interference at this location, and to recommend a course of future action.

SECTION 2

REPORT CONTENTS AND PROCEDURES

Transmit/Receive Earth Station

This section describes the contents of the report for a proposed C-band transmit/receive earth station.

Section 1 describes the site location, the antenna considered, and the system parameters considered in the detailed interference analysis. The analysis was undertaken to determine the potential for microwave interference for the transmit/receive earth station at the site specified.

Initially, a computer analysis of this site was performed to determine the extent of potential interference on a line-of-sight (LOS) basis. This analysis considers the microwave environment with respect to the earth station and calculates predicted signal levels between these systems. Paths which exceed a given objective level are listed for further analysis. The objective levels present the maximum interference levels allowed between the earth station and the surrounding terrestrial microwave environment for the frequency band of interest.

To further analyze the effect of the predicted interference conflicts, terrain path profiles were prepared for the critical cases. This involves plotting the interference path on topographic maps, typically 7.5 minute series U.S.G.S. maps, to determine the terrain characteristics of the path. Once this has been accomplished, predicted over-the-horizon (O-H) losses are calculated using the techniques of the National Bureau of Standards Technical Note 101 (Revised).

These calculations give the amount of signal attenuation achieved due to terrain blockage.

Section 3 summarizes the results of the site analysis. This summary includes the number of cases that were considered, the interference cases that remain, and the proposed resolution of the interference problems.

Tables 3.1-1 and 3.2-1 list the Great Circle interference cases and the predicted O-H losses calculated on the various 6 and 4 GHz paths, respectively. If multiple analyses are considered, such as changes in satellite arc or antenna, the results are presented in Tables 3.1-1.1, 3.1-1.2, 3.2-1.1 3.2-1.2, etc.....

A brief explanation of the various columns shown in Tables 3.1-1 and 3.2-1 follows:

PATH ID: This is the predicted interference path. The first site listed is the transmitter at 4 GHz or the receiver at 6 GHz.

BAND: This shows the frequency plan of the interfering paths. The 4 GHz paths affect reception of the downlink, while the 6 GHz terrestrial facilities are affected by the uplink. Receivers in the low half of the band (5925 - 6175 MHz), are indicated by 6L.

Receivers in the high half of the band (6175 - 6425 MHz), are indicated by 6H.

DIST: This is the distance from the earth station to the terrestrial station in kilometers.

AZ: This is the azimuth bearing in degrees (taken from True North), from the earth station toward the terrestrial station.

ES DISC: This is the earth station discrimination angle in degrees, towards the involved terrestrial facility.

ES GAIN: This is the gain of the earth station in dBi, at the calculated earth station discrimination angle.

LOS LOSS REQ'D: This is the amount of loss required in dB, on a line-of-sight basis, to meet the interference objective.

O-H LOSS: This is the calculated over-the-horizon (O-H) losses in dB, between the earth station and the involved terrestrial station. The 20 percent column represents losses for the long term objective. The 0.0025 and .01 percent columns present the losses for the short term objective at 6 GHz and 4 GHz, respectively.

REVISED MARGIN: This is the difference between the LOS margin and the predicted O-H losses achieved due to terrain blockage. Sufficient attenuation is calculated for the paths which show the word "CLEAR" in the revised margin. Cases showing a positive revised margin will require additional losses to meet the interference objective.

The information listed at the bottom of the table reflects the antennas, satellite arc, and interference objectives considered for the proposed site.

Section 4 presents conclusions and recommendations. It gives an overall description of the microwave environment and suggests a future course of action.

Table 5.1-1 contains the operational parameters for the proposed earth station. Tables 5.1-2 provides azimuth and elevation data for the geostationary arc, and identifies the locations of particular satellites within that arc.

Section 6 presents the Great Circle interference cases. This provides a listing of the utilized channels and type of traffic loading for each path.

SECTION 3

SUMMARY AND RESULTS

The detailed interference analysis for the proposed earth station site to be located at Melbourne, Florida revealed that three potential interference conflicts exist. After considering the over-the-horizon (O-H) losses, two cases were found to have sufficient losses to resolve the predicted margins. A discussion of the remaining case is presented below.

Transmit Band 5925 - 6425 MHz

In the 6 GHz transmit band, there was one case where insufficient blockage existed. A summary follows:

Path	Distance (Km)	Azimuth (Degrees)	Line-of-Sight Margin (dB)	Revised Margin 20% (dB)
Kenansville - Melbourne	44.6	239.5	22.7	11.0

Additional blockage will need to be identified in the direction of this remaining 6 GHz case, or frequency offsets will need to be implemented to avoid conflict with the receive frequencies of this facility.

Table 6.1-1 provides a summary of the remaining interference conflicts to the 6 GHz transmit band and the coordinated receive frequencies.

3.2 Receive Band 3700 to 4200 MHz

No cases exist in the 4 GHz receive band.

SECTION 4

CONCLUSIONS AND RECOMMENDATIONS

4.1 Conclusions

Based on the results of the detailed interference analysis, one potential interference conflict exists to the 6 GHz transmit band that could not be cleared with terrain path profiles. In the event that on-site RFI measurements and path surveys cannot resolve these cases it would be necessary to limit the earth station transmit band around the receive frequencies of the identified 6 GHz receiver. The limited frequencies would be 5925 – 6181, 6214 – 6425 MHz.

4.2 Recommendations

It is recommended that Access Partnership/Schlumberger review the operating parameters of the proposed earth station antenna and determine whether the above referenced transmit band restrictions are acceptable. In the event that they are not, it is recommended that on-site RFI measurements and path surveys be completed in an attempt to resolve the cases identified in this report.

Table 5.1-1

SATELLITE EARTH STATION
FREQUENCY COORDINATION DATA
04/21/2011

Company	SCHLUMBERGER		
Owner Code			
Earth Station Name, State			MELBOURNE, FL
Latitude (DMS) (NAD83)			28 5 23.0 N
Longitude (DMS) (NAD83)			80 38 19.0 W
Ground Elevation AMSL (ft/m)			24.00 / 7.32
Antenna Centerline AGL (ft/m)			6.00 / 1.83
Receive Antenna Type:	FCC32		FCC REFERENCE
			32-25LOG(THETA)
4.0 GHz Gain (dBi) / Diameter (m)			25.0 / 0.6
3 dB / 15 dB Half Beamwidth			2.25 / 5.00
Transmit Antenna Type:	FCC32		FCC REFERENCE
			32-25LOG(THETA)
6.0 GHz Gain (dBi) / Diameter (m)			28.0 / 0.6
3 dB / 15 dB Half Beamwidth			1.50 / 3.25
Operating Mode			TRANSMIT AND RECEIVE
Modulation			DIGITAL
Emission / Receive Band (MHz)	6K25G7W	1M25G7W /	3700.0000 - 4200.0000
Emission / Transmit Band (MHz)	6K25G7W	1M25G7W /	5925.0000 - 6425.0000
Max. Available RF Power	(dBW)/4 kHz)		-16.00
	(dBW)/MHz)		8.00
Max. EIRP	(dBW)/4 kHz)		12.00
	(dBW)/MHz)		36.00
Max. Permissible Interference Power			
4.0 GHz, 20% (dBW/1 MHz)			-156.0
4.0 GHz, 0.0100% (dBW/1 MHz)			-146.0
6.0 GHz, 20% (dBW/4 kHz)			-154.0
6.0 GHz, 0.0025% (dBW/4 kHz)			-131.0
Range of Satellite Arc (Geostationary)			
Degrees Longitude			34.0 W / 35.0 W
Azimuth Range (Min/Max)			114.0 / 114.7
Corresponding Elevation Angles			29.7 / 30.6
Radio Climate			A
Rain Zone			1
Max. Great Circle Coordination Distance (mi./km)			
4.0 GHz			199.4 / 320.8
6.0 GHz			87.3 / 140.5
Precipitation Scatter Contour Radius (mi./km)			
4.0 GHz			348.5 / 560.9
6.0 GHz			62.1 / 100.0

Note: Horizon is less than 0.2 degrees at all azimuths

Table 5.2-1

Earth Station Azimuth and Elevation Table
04/21/2011

Earth Station Name	MELBOURNE, FL	
Owner	SCHLUMBERGER	
Latitude (DMS) (NAD83)	28 5 23.0 N	
Longitude (DMS) (NAD83)	80 38 19.0 W	
Ground Elevation (ft/m)	24.00 /	7.32 Amsl
Antenna Centerline (ft/m)	6.00 /	1.83 Agl
Satellite Arc Range	34.0 W	
	35.0 W	

Satellite Longitude	Azimuth (Degrees)	Elevation (Degrees)	Satellite Name
34.0	114.0	29.7	
34.5	114.3	30.2	INTELSAT 903
35.0	114.7	30.6	

Table 6.1-1

Great Circle Interference Conflicts
04/21/2011

```
Earth Station Name     MELBOURNE, FL
Owner                  SCHLUMBERGER
Latitude  (DMS) (NAD83)  28  5 23.0 N
Longitude (DMS) (NAD83)  80 38 19.0 W
Ground Elevation (ft/m)       24.00 /     7.32 Amsl
Antenna Centerline (ft/m)      6.00 /     1.83 Agl
Antenna Model              FCC REFERENCE 32-25LOG(THETA)
Objectives: Receive      -156.0 (dBW /1 MHz)
            Transmit     -154.0 (dBW /4 kHz)  Tx Power   -16.0 (dBW/4 kHz)
```

	Terrestrial Path			Gnd	Edisct	Ges	FsLoss	Dist	Pr	Tpwr	Plan
	Latitude	Longitude	Call Sign	Acl	Tdisct	Gts	Tant	Az	Margin	LL	
	Owner						Loading				
	Freq/Pol										
1	KENANSVILLE FL	MELBOURNE	FL	22.50	119.4	-10.0	141.3	44.6	-131.3	28.0	HT
	27 53 5	81 1 44	WQIK608	53.30	359.8	38.5	41731A	239.5	22.7	2.6	
	MANINC: METROPOLITAN AREA NETWORKS, INC.					1 CH		DIG	RCN: 07111942		
	6197.2400V										
	Status: L			Equipment: TEMN41			Emission: 30M0D7W				
	OH LOSS 20% / 0.0025%:			11.70 / -4.80							