Prepared By

COMSEARCH
19700 Janelia Farm Boulevard, Ashburn, VA 20147
(703)726-5500 http://www.comsearch.com

Prepared For

Intelsat License LLC
Hagerstown, Maryland

Temporary Transmit-Only Earth Station
Operation Dates: 06/01/2017 - 12/01/2017

Pursuant to Part 25.203(c) of the FCC Rules and Regulations, the satellite earth station proposed in this application was coordinated by Comsearch using computer techniques and in accordance with Part 25 of the FCC Rules and Regulations. Verbal and written coordination was conducted with the below listed carriers on February 9, 2017.

Company

AB Services LLC
AT&T Communications of Virginia, LLC
AT&T Corp.
Adams County Department of Emergency Svc
Affiniti PA, LLC
Appalachia Engineering Services
Argos Engineering, LLC
Atlantic Broadband (Penn), LLC
BLAIR COUNTY 911
Baltimore County of Maryland
Baltimore Gas and Electric Company
Bedford County of
Believe Wireless, LLC
CNG Transmission Corporation
Calvert, County of
Capital Communications of America
Carroll, County of
Cellco Partnership - Bridgeville, PA/WV
Cellco Partnership-WDC/Baltimore
Cellco Prtnrshp - Phil. Tri-State Rgn
Centre Communications Inc.
Charles, County of
Columbia Gas Transmission, LLC
Commonwealth of Pennsylvania-Radio Proj.
Comprehensive Wireless LLC
Conterra Ultra Broadband, LLC
County of Fayette
County of Frederick
County of York
DAUPHIN COUNTY EMERGENCY MANAGEMENT
Delaware Division of Communications
Delmarva Power and Light Company
ECW Wireless, LLC
Eastern MLG LLC
Enoch Pratt Free Library
Exelon Generation Company, LLC

FELHC, INC
Federal Communication Commission
Frederick County
Fulton County of (PA)
Fundamental Broadcasting LLC
Garden State Transmissions
HUNTINGDON COUNTY, PA
Hardy Cellular Telephone Company
Hardy County OEM/E911
Juniata County Emergency Services
Lancaster County-Wide Communications
Loudoun, County of
Maryland Public Broadcasting Commission
Maryland State Highway Administration
Maryland, State of - Dept.of Info & Tech
New Cingular Wireless PCS - Maryland
New Cingular Wireless PCS LLC - DC
New Cingular Wireless PCS LLC - VA
New Cingular Wireless PCS LLC - WV,NC,SC
New Cingular Wireless PCS, LLC - PA
Norfolk Southern Railway
PA Communications
PRESTON COUNTY OFFICE OF EMERGENCY MANAG
PSEG Services Corporation
Pennsylvania Turnpike Commission
Pepco Holdings Inc.
Perry, County of
Perseus Technology Holdings USA Inc.
Prince George's County
Prince William, County of
Radio One Inc
Rappahannock Electric Cooperative
SHENANDOAH VALLEY ELECTRIC COOPERATIVE
Shenandoah Personal Communications, LLC
Somerset, County of
South Central Task Force (SCTFNET)
Southern Maryland Electric Cooperative I
Stafford, County of
State of Maryland, MIEMSS
T-Mobile License LLC
Texas Eastern Communications, LLC
Thought Transmissions, LLC
Transcontinental Gas Pipeline Corp.
US Cellular Operating Company, LLC (WI)
USCOC of Cumberland, Inc.
USOC of Pennsylvania RSA No 10 B2 Inc.
Uniti Fiber PEG, LLC
Verizon Wireless (VAW) LLC - Maryland
Verizon Wireless (VAW) LLC - W/B/V Mkts
Verizon Wireless (VAW) LLC-Pennsylvania
Virginia Department of State Police
Virginia Electric & Power Company
WV DHHR BPH, Office of EMS, Com. Div.
Washington Gas Light Company
Washington Suburban Sanitary Commission
Webline Holdings LLC

World Class Wireless, LLC
YAB Mobile
iSignal

There are no unresolved interference objections with the station contained in these applications.

The following section presents the data pertinent to frequency coordination of the earth station that was circulated to all carriers within its coordination contours.

COMSEARCH

Earth Station Data Sheet

19700 Janelia Farm Boulevard, Ashburn, VA 20147
(703)726-5500 http://www.comsearch.com

Date:	02/08/2017
Job Number:	170209COMSGE04

Administrative Information	
Status	TEMPORARY (Operation from 06/01/2017 to 12/01/2017)
Call Sign	TEMP12
Licensee Code	INTELS
Licensee Name	Intelsat License LLC

Site Information	**HAGERSTOWN, MD**
Venue Name	
Latitude (NAD 83)	39° 35' 56.7" N
Longitude (NAD 83)	77° 45' 23.0" W
Climate Zone	A
Rain Zone	2
Ground Elevation (AMSL)	165.08 m / 541.6 ft

Link Information	
Satellite Type	Geostationary
Mode	TO - Transmit-Only
Modulation	Digital
Satellite Arc	6° W to 149° West Longitude
Azimuth Range	101.9° to 257.8°
Corresponding Elevation Angles	5.3° / 5.7°
Antenna Centerline (AGL)	6.1 m / 20.0 ft

Antenna Information		**Transmit - FCC32**
Manufacturer		GD Satcom
Model		9 Meter
Gain / Diameter		53.7 dBi / 9.0 m
3-dB / 15-dB Beamwidth		0.35° / 0.87°
Max Available RF Power	(dBW/4 kHz)	-13.0
	(dBW/MHz)	11.0
Maximum EIRP	(dBW/4 kHz)	40.7
	(dBW/MHz)	64.7
Interference Objectives:	Long Term	-154.0 dBW/4 kHz 20%
	Short Term	-131.0 dBW/4 kHz 0.0025%

Frequency Information	**Transmit 6.1 GHz**
Emission / Frequency Range (MHz)	22M0G7W - 34M0G7W / 5925.0 - 6425.0
Max Great Circle Coordination Distance	299.3 km / 186.0 mi
Precipitation Scatter Contour Radius	100.0 km / 62.1 mi

Coordination Values	**HAGERSTOWN, MD**
Licensee Name	Intelsat License LLC
Latitude (NAD 83)	39° 35' 56.7" N
Longitude (NAD 83)	77° 45' 23.0" W
Ground Elevation (AMSL)	165.08 m / 541.6 ft
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Antenna Mode	Transmit 6.1 GHz
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Short Term	-131.0 dBW/4 kHz 0.0025%
Max Available RF Power	-13.0 (dBW/4 kHz)

			Transmit 6.1 GHz	
Azimuth (°)	Horizon Elevation (°)	Antenna Discrimination (°)	Horizon Gain (dBi)	Coordination Distance (km)
0	0.33	101.82	-10.00	125.00
5	0.55	96.84	-10.00	108.93
10	0.45	91.86	-10.00	115.28
15	0.34	86.88	-10.00	124.11
20	0.30	81.90	-10.00	127.27
25	0.30	76.92	-10.00	127.07
30	0.30	71.94	-10.00	127.09
35	0.25	66.96	-10.00	131.64
40	0.43	61.98	-10.00	117.15
45	0.52	57.00	-10.00	110.34
50	0.29	52.04	-10.00	127.84
55	0.36	47.07	-9.82	122.65
60	0.23	42.12	-8.61	135.87
65	0.26	37.16	-7.25	137.19
70	0.23	32.23	-5.71	144.64
75	0.25	27.30	-3.91	147.96
80	0.24	22.42	-1.76	156.96
85	0.28	17.58	0.88	162.74
90	0.00	12.98	4.17	185.63
95	0.00	8.67	8.55	202.45
100	0.00	5.62	13.26	299.31
105	0.00	6.15	12.28	228.05
110	0.00	9.60	7.45	198.22
115	0.00	13.27	3.93	184.71
120	0.00	16.89	1.31	174.58
125	0.00	20.41	-0.75	164.95
130	0.00	23.83	-2.43	158.63
135	0.00	27.11	-3.83	153.61
140	0.00	30.23	-5.01	149.56
145	0.00	33.14	-6.01	146.27
150	0.00	35.82	-6.85	143.58
155	0.00	38.20	-7.55	141.41
160	0.00	40.26	-8.12	139.70
165	0.00	41.93	-8.56	138.39
170	0.00	43.16	-8.88	137.48
175	0.00	43.92	-9.07	136.93
180	0.00	44.18	-9.13	136.75
185	0.00	43.92	-9.07	136.93

Coordination Values	**HAGERSTOWN, MD**
Licensee Name	Intelsat License LLC
Latitude (NAD 83)	39° 35' 56.7" N
Longitude (NAD 83)	77° 45' 23.0" W
Ground Elevation (AMSL)	165.08 m / 541.6 ft
Antenna Centerline (AGL)	6.1 m / 20.0 ft
Antenna Model	GD Satcom 9 meter
Antenna Mode	Transmit 6.1 GHz
Interference Objectives: Long Term	-154.0 dBW/4 kHz 20%
Short Term	-131.0 dBW/4 kHz 0.0025%
Max Available RF Power	-13.0 (dBW/4 kHz)

			Transmit 6.1 GHz	
Azimuth (°)	Horizon Elevation (°)	Antenna Discrimination (°)	Horizon Gain (dBi)	Coordination Distance (km)
190	0.21	42.96	-8.83	136.85
195	0.00	41.93	-8.56	138.39
200	0.37	39.93	-8.03	127.36
205	0.22	38.02	-7.50	139.71
210	0.36	35.52	-6.76	130.95
215	0.42	32.81	-5.90	129.08
220	0.65	29.74	-4.83	118.63
225	0.54	26.72	-3.67	126.97
230	0.60	23.40	-2.23	128.11
235	0.74	19.90	-0.47	127.05
240	0.74	16.39	1.64	133.29
245	1.01	12.59	4.50	130.27
250	1.09	8.86	8.31	139.89
255	1.12	5.35	13.79	203.14
260	1.10	5.09	14.32	283.79
265	0.95	8.63	8.60	146.23
270	0.77	13.15	4.02	137.90
275	0.70	17.90	0.68	132.17
280	0.63	22.76	-1.93	127.56
285	0.58	27.66	-4.04	124.17
290	0.50	32.59	-5.83	122.64
295	0.42	37.53	-7.36	124.71
300	0.34	42.49	-8.71	127.89
305	0.38	47.44	-9.90	121.33
310	0.41	52.40	-10.00	118.27
315	0.47	57.37	-10.00	113.93
320	0.45	62.34	-10.00	115.33
325	0.32	67.32	-10.00	125.70
330	0.30	72.30	-10.00	127.11
335	0.51	77.27	-10.00	110.71
340	0.42	82.25	-10.00	117.55
345	0.40	87.23	-10.00	119.48
350	0.33	92.21	-10.00	125.04
355	0.42	97.19	-10.00	117.33

Certification

I hereby certify that I am the technically qualified person responsible for the preparation of the frequency coordination data contained in this report. I am familiar with Parts 101 and 25 of the FCC Rules and Regulations and I have either prepared or reviewed the frequency coordination data submitted with this report, and that it is complete and correct to the best of my knowledge and belief.

BY: _______________________________

Gary K. Edwards
Senior Manager
COMSEARCH
19700 Janelia Farm Boulevard
Ashburn, VA 20147

DATED: February 24, 2017

Radiation Hazard Report

Analysis of Non-Ionizing Radiation for a 9 m Earth Station

This analysis provides the calculated non-ionizing radiation levels for a 9-meter earth station system.

The methods and calculations performed in this analysis are based on the FCC Office of Engineering and Technology Bulletin, No.65, October1985 as revised in 1997 in Edition 97-01. The radiation safety limits used in the analysis are in conformance with the FCC R&O 96-326 (Summarized in Annex 1). There are separate exposure limits applicable to the General Population/Uncontrolled Environment and the Occupational/Controlled Environment. The Maximum Permissible Exposure (MPE) limits for persons in a General Population/Uncontrolled environment for the frequency band of this antenna, is 1 mW/cm2 for a 30 minute or lower time period as shown in Annex 1 (a). The MPE limit for persons in an Occupational/Controlled environment for the frequency band of this antenna is 5 mW/cm2 for a 6 minute time or lower period as shown in Annex 1 (b). The purpose of this analysis described is to determine the power flux density levels of the earth station at the main reflector surface, the near-field, transition region, far-field, between the sub-reflector or feed and, at the main reflector surface, and between the antenna edge and the ground and to compare these levels to the specified MPEs.

The parameters of the antenna that is the subject of this analysis are shown in Table 1. Intermediate calculated values and constants are provided in Table 2.

Table 1. Input Parameters Used for Determining Power Flux Densities

Parameter	Symbol	Formula	Value	Units
Antenna Diameter	D	Input	9	m
Sub-reflector Diameter	D_{sr}	Input	116.84	cm
Frequency	F	Input	6195	MHz
Transmit Power	P	Input	750	W
Antenna Gain (dBi)	G_{es}	Input	53.7	dBi

Table 2. Calculated Values and Constants

Parameter	Symbol	Formula	Value	Units
Antenna Surface Area	$A_{surface}$	$\pi D^2/4$	63.62	m^2
Area of Sub-reflector	A_{sr}	$\pi D_{sr}^2/4$	10721.93	cm^2
Wavelength	λ	300/F	0.048426	m
Antenna Gain (factor)	G	$10^{Ges/10}$	234422.88	n/a
Pi	π	Constant	3.1415927	n/a
Antenna Efficiency	η	$G\lambda^2/(\pi^2 D^2)$	0.69	n/a

1. Antenna Main Reflector Surface

The power density in the main reflector is determined from the Power level and the area of the main reflector aperture. This is determined from the following equation:

Power Density at the Main Reflector Surface:

$$S_{surface} = 4P/A_{surface} \quad (1)$$

$$= 47.157 \quad W/m^2$$

$$= 4.716 \quad mW/cm^2$$

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 is determined from the following equation:

Extent of the Near Field:

$$R_{nf} = D^2 / (4\lambda) \quad (2)$$

$$= 418.16 \quad m$$

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

Near Field Density:

$$S_{nf} = 16.0\ \eta\ P / (\pi\ D^2) \quad (3)$$

$$= 3.243 \quad mW/cm^2$$

3. Transition Region Calculation

The Transition Region is located between the Near and Far Field regions. The power density begins to decrease linearly with increasing distance in the Transition region. While the power density decreases inversely with distance in the Transition region, the power density decreases inversely with the square of the distance in the Far Field region. The power density calculated in Section 1 is the highest power density the antenna can produce in any of the regions away from the antenna. The power density at a distance R_t is determined from the following equation:

Transition Region Power Density:

$$S_t = S_{nf} R_{nf} / R_t \quad (4)$$

$$= 3.243 \quad mW/cm^2$$

4. Far Field Distance Calculation

The distance to the Far Field Region is calculated using the following equation:

Distance to Far Field Region:

$$R_{ff} = 0.6\ D^2 / \lambda \qquad (5)$$

$$= \quad 1003.590 \quad m$$

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

On-axis Power Density in the Far Field:

$$S_{ff} = G\ P / (4\ \pi\ R_{ff}^2) \qquad (6)$$

$$= \quad 1.389 \quad mW/cm^2$$

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 is determined from the following equation:

Power Density between Reflector and Ground:

$$S_g = P / A_{surface} \qquad (7)$$

$$= \quad 1.179 \quad mW/cm^2$$

6. Power Density at the Sub-reflector

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

Power Density at the Subreflector:

$$S_{sr} = 4000\ P / A_{sr} \qquad (8)$$

$$= \quad 279.800 \quad mW/cm^2$$

7. Summary of Calculations

Table 3. Summary of Expected Radiation levels for Uncontrolled Environment

Region	Symbol	Calculated Maximum Radiation Power Density Level (mW/cm^2)	Hazard Assessment
1. Main Reflector	$S_{surface}$	4.716	Potential Hazard
2. Near Field (R_{nf} = 418.16 m)	S_{nf}	3.243	Potential Hazard
3. Transition Region ($R_{nf} < R_t < R_{ff}$)	S_t	3.243	Potential Hazard
4. Far Field (R_{ff} = 1003.59 m)	S_{ff}	1.389	Potential Hazard
5. Between Main Reflector and Subreflector	S_{sr}	279.800	Potential Hazard
6. Between Main Reflector and Ground	S_g	1.179	Potential Hazard

Table 4. Summary of Expected Radiation levels for Controlled Environment

Region	Symbol	Calculated Maximum Radiation Power Density Level (mW/cm^2)	Hazard Assessment
1. Main Reflector	$S_{surface}$	4.716	Satisfies FCC MPE
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5. Between Main Reflector and Subreflector	S_{sr}	279.800	Potential Hazard
6. Between Main Reflector and Ground	S_g	1.179	Satisfies FCC MPE

It is the applicant's responsibility to ensure that the public and operational personnel are no exposed to harmful levels of radiation.

8. Conclusion

Based upon the above analysis, it is concluded that harmful levels of radiation may exist in those regions noted for the Uncontrolled (Table 3) Environment and the Controlled Environment (Table 4).

The antenna is located at an Intelsat License LLC’s teleport facility in Hagerstown, MD. The teleport is a gated and fenced facility with secured access in and around the proposed antenna. The earth station will be marked with the standard radiation hazard warnings, as well as the area in the vicinity of the earth station to inform those in the general population, who might be working or otherwise present in or near the direct path of the main beam.

The applicant will ensure that the main beam of the antenna will be pointed at least one diameter away from any building, or other obstacles in those area that exceed the MPE levels. Since one diameter removed from the center of the main beam the levels are down by at least 20 dB, or by a factor of 100, these potential hazards do not exist for either the public, or for earth station personnel.

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

“The licensee shall take all necessary measures to ensure that the antenna does not create potential exposure of humans to radiofrequency radiation in excess of the FCC exposure limits defined in 47 CFR 1.1307(b) and 1.1310 wherever such exposures might occur. Measures must be taken to ensure compliance with limits for both occupational/controlled exposure and for general population/uncontrolled exposure, as defined in these rule sections. Compliance can be accomplished in most cases by appropriate restrictions such as fencing. Requirements for restrictions can be determined by predictions based on calculations, modeling or by field measurements. The FCC's OET Bulletin 65 (available on-line at www.fcc.gov/oet/rfsafety) provides information on predicting exposure levels and on methods for ensuring compliance, including the use of warning and alerting signs and protective equipment for workers.”

ANNEX 1

(MPE Levels)

a) Limits for General Population/Uncontrolled Exposure (MPE)

Frequency Range (MHz)	Power Density (mW/cm^2)
30-300	0.2
300-1500	Frequency(MHz)*(4.0/1200)
1500-100,000	1

b) Limits for Occupational/Controlled Exposure (MPE)

Frequency Range (MHz)	Power Density (mW/cm^2)
30-300	1
300-1500	Frequency(MHz)*(4.0/1200)
1500-100,000	5

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Parameter	Symbol	Formula	Value	Units
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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 is determined from the following equation:

Extent of the Near Field:

$$R_{nf} = D^2 / (4\lambda) \quad (2)$$

$$= 418.16 \ m$$

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

Near Field Density:

$$S_{nf} = 16.0 \ \eta \ P / (\pi \ D^2) \quad (3)$$

$$= 3.243 \ mW/cm^2$$

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

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$$R_{ff} = 0.6\ D^2 / \lambda \qquad (5)$$

$$= \quad 1003.590 \quad m$$

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

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$$= \quad 1.389 \quad mW/cm^2$$

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5. Between Main Reflector and Subreflector	S_{sr}	279.800	Potential Hazard
6. Between Main Reflector and Ground	S_g	1.179	Satisfies FCC MPE

It is the applicant's responsibility to ensure that the public and operational personnel are no exposed to harmful levels of radiation.

8. Conclusion

Based upon the above analysis, it is concluded that harmful levels of radiation may exist in those regions noted for the Uncontrolled (Table 3) Environment and the Controlled Environment (Table 4).

The antenna is located at an Intelsat License LLC's teleport facility in Hagerstown, MD.
The teleport is a gated and fenced facility with secured access in and around the proposed antenna. The earth station will be marked with the standard radiation hazard warnings, as well as the area in the vicinity of the earth station to inform those in the general population, who might be working or otherwise present in or near the direct path of the main beam.

The applicant will ensure that the main beam of the antenna will be pointed at least one diameter away from any building, or other obstacles in those area that exceed the MPE levels. Since one diameter removed from the center of the main beam the levels are down by at least 20 dB, or by a factor of 100, these potential hazards do not exist for either the public, or for earth station personnel.

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

"The licensee shall take all necessary measures to ensure that the antenna does not create potential exposure of humans to radiofrequency radiation in excess of the FCC exposure limits defined in 47 CFR 1.1307(b) and 1.1310 wherever such exposures might occur. Measures must be taken to ensure compliance with limits for both occupational/controlled exposure and for general population/uncontrolled exposure, as defined in these rule sections. Compliance can be accomplished in most cases by appropriate restrictions such as fencing. Requirements for restrictions can be determined by predictions based on calculations, modeling or by field measurements. The FCC's OET Bulletin 65 (available on-line at www.fcc.gov/oet/rfsafety) provides information on predicting exposure levels and on methods for ensuring compliance, including the use of warning and alerting signs and protective equipment for workers."

ANNEX 1

(MPE Levels)

a) Limits for General Population/Uncontrolled Exposure (MPE)

Frequency Range (MHz)	**Power Density (mW/cm^2)**
30-300	0.2
300-1500	Frequency(MHz)*(4.0/1200)
1500-100,000	1

b) Limits for Occupational/Controlled Exposure (MPE)

Frequency Range (MHz)	**Power Density (mW/cm^2)**
30-300	1
300-1500	Frequency(MHz)*(4.0/1200)
1500-100,000	5