

APPLICATION FOR EARTH STATION SPECIAL TEMPORARY AUTHORITY

APPLICANT INFORMATION Enter a description of this application to identify it on the main menu:
Carpentersville TT&C STA for HellasSat 4 - 2019-01 (30-Day STA)

I. Applicant

Name:	Lockheed Martin Corporation	Phone Number:	703-413-5747
DBA Name:		Fax Number:	703-413-5908
Street:	2121 Crystal Drive Suite 100	E-Mail:	ryan.n.terry@lmco.com
City:	Arlington	State:	VA
Country:	USA	Zipcode:	22202
Attention:			



File # SES-1A20190129-00049
2-15-19 Grant Date 2-17-19
Call Sign (or other identifier)
Term Dates
From: 2-15-19 To: 3-17-19
Approved: [Signature]

2. Contact			
Name:	Ryan N. Terry	Phone Number:	703-413-5747
Company:	Lockheed Martin Corporation	Fax Number:	703-413-5908
Street:	2121 Crystal Drive Suite 100	E-Mail:	ryan.n.terry@lmco.com
City:	Washington	State:	DC
Country:	USA	Zipcode:	22202 -
Attention:		Relationship:	Same
(If your application is related to an application filed with the Commission, enter either the file number or the IB Submission ID of the related application. Please enter only one.)			
3. Reference File Number SESLIC2008110301443 or Submission ID			
4a. Is a fee submitted with this application?			
☒ If Yes, complete and attach FCC Form 159. If No, indicate reason for fee exemption (see 47 C.F.R. Section 1.1114).			
☐ Governmental Entity ☐ Noncommercial educational licensee ☐ Other (please explain):			
4b. Fee Classification CGX – Fixed Satellite Transmit/Receive Earth Station			
5. Type Request			
☒ Use Prior to Grant ☐ Change Station Location ☒ Other			
6. Requested Use Prior Date 02/15/2019			
7. CityCarpentersville		8. Latitude (dd mm ss.s h) 40 38 39.1 N	

9. State	NJ	10. Longitude (dd mm ss.s h)	75 11 27.8 W
11. Please supply any need attachments.			
Attachment 1: STA Extension	Attachment 2: Freq Coordination	Attachment 3:	
12. Description. (If the complete description does not appear in this box, please go to the end of the form to view it in its entirety.)			
Lockheed Martin Corporation hereby requests extension of its Special Temporary Authority from February 15, 2019, to operate its Carpentersville, New Jersey fixed earth station (Call Sign E7541) to provide telemetry, tracking and control (TT&C) functions during the Electric Orbit Raising (EOR) phase of operation for the HellasSat 4 satellite.			
13. By checking Yes, the undersigned certifies that neither applicant nor any other party to the application is subject to a denial of Federal benefits that includes FCC benefits pursuant to Section 5301 of the Anti-Drug Act of 1988, 21 U.S.C. Section 862, because of a conviction for possession or distribution of a controlled substance. See 47 CFR 1.2002(b) for the meaning of "party to the application"; for these purposes.			
14. Name of Person Signing Jennifer A. Warren		15. Title of Person Signing Vice President, Technology Policy & Regulation	
WILLFUL FALSE STATEMENTS MADE ON THIS FORM ARE PUNISHABLE BY FINE AND / OR IMPRISONMENT (U.S. Code, Title 18, Section 1001), AND/OR REVOCATION OF ANY STATION AUTHORIZATION (U.S. Code, Title 47, Section 312(a)(1)), AND/OR FORFEITURE (U.S. Code, Title 47, Section 503).			

FCC NOTICE REQUIRED BY THE PAPERWORK REDUCTION ACT

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THE FOREGOING NOTICE IS REQUIRED BY THE PAPERWORK REDUCTION ACT OF 1995, PUBLIC LAW 104-13, OCTOBER 1, 1995, 44 U.S.C. SECTION 3507.

Applicant: Lockheed Martin Corporation
Call Sign: E7541
File No.: SES-STA-20190129-00049
Special Temporary Authority (STA)

Lockheed Martin Corporation is granted extension of STA to operate for 30 days, beginning February 15, 2019, its 14.2m TIW Systems model STD 14.2-MET antenna located at geographic coordinates 40° 38' 39.1N/ 75° 11' 27.8"W in Carpentersville, New Jersey to provide telemetry, tracking, and control ("TT&C") functions during the electric propulsion monitoring for the HellasSat 4/SaudiGeoSat 1 ("HS4") satellite at orbital location 39.0°E on frequencies: 5928.0 MHz and 6422.0 MHz (LHCP/RHCP) (Earth-to-space) and 3704.25 MHz and 4199.0 MHz (LHCP/RHCP) (space-to-Earth). Operations are authorized under the following conditions:

1. Operations will not exceed the operational power levels and parameters requested:

Maximum eirp density: 19.0 dBW/4kHz
Maximum eirp: 91.5 dBW for all carriers
Uplink emission: 1M50F2D
Downlink emission: 1M00G8D

2. All operations under this grant of STA shall be on an unprotected and non-harmful interference basis. Lockheed Martin Corporation shall not cause harmful interference to, and shall not claim protection from interference caused to it by, any other lawfully operating radio communication system.

3. In the event of any harmful interference Lockheed Martin Corporation shall cease operations immediately upon notification of such interference, and shall immediately inform the Commission, in writing, of such an event.

4. Currently the 24x7 contact information for the HS4 satellite mission is as follows: Cell Phone: (609) 865-2658 and/or earth station desk number (908) 859-4050. Request to speak with Michael Usarzewicz.

5. Grant of this STA is without prejudice to any determination that the Commission may make regarding pending or future Lockheed Martin Corporation applications.

6. Any action taken or expense incurred as a result of operations pursuant to this STA is solely at Lockheed Martin Corporation's risk.

This grant is issued pursuant to Section 0.261 of the Commission's rules on delegated authority, 47 C.F.R. § 0.261, and is effective upon release.



File # SES-STA-20190129-00049
Call Sign E7541 Grant Date 2-12-19
(or other identifier)
Term Dates
From: 2-15-19 To: 3-17-19
Approved: [Signature] [Signature]

Description of Operations and Public Interest Statement

Pursuant to 47 CFR 25.120 of the Commission's Rules, Lockheed Martin Corporation ("Lockheed Martin") hereby requests Special Temporary Authority ("STA") for a period of thirty (30) days to operate its Carpentersville, New Jersey fixed earth station (Call Sign E7541) to provide telemetry, tracking, and control ("TT&C") functions during the Electric Orbit Raising ("EOR") period of operation, ranging, and electric propulsion monitoring for the HellasSat 4/ SaudiGeoSat 1 ("HS4") satellite, which Lockheed Martin has manufactured.

HS4 is destined for in-service operation at 39.0° E.L. Owing to changes in the launch schedule, the launch itself has shifted to not earlier than February 5, 2019, aboard an Ariane 5 ECA rocket, from Guiana Space Center. Also, because of the recent lapse in funding for most Federal agencies, Lockheed Martin is only just now able to submit the instant request for continuation of its existing authority.

Lockheed Martin requested authority to begin communications on January 15, 2019, in preparation for the start of EOR.¹ The all-electric propulsion system of HS4 requires extended support for the completion of the mission.

Accordingly, Lockheed Martin is requesting herein extension of its initial request for an additional thirty (30) days, from February 15, 2019, to cover the period required to conduct initial EOR and in-orbit testing being conducted by the launch provider. The all-electric propulsion system of HS4 requires extended support for the completion of the mission.

1. Requested STA Operations

The EOR TT&C and ranging signals will be transmitted in the standard C-band for which Lockheed Martin has authority under Call Sign E7541. As to the instant request for STA, Lockheed Martin seeks herein authority to communicate with HS4 as a point of communication on two C-band frequencies that fall outside of the currently authorized transmit frequencies for the earth station.

The proposed TT&C operations in support of the HS4 launch will be on a strictly non-harmful interference, non-protected basis. When no commands are being sent, a CW carrier that is within the emission of the licensed operation would be present. In the case of an anomaly, extraordinary measures, such as increasing power, may be necessary; if such measures are required during this STA period, Lockheed Martin will notify the FCC within seven (7) business days that such measures were needed.

¹ STA was granted under FCC File No. SES-STA-20181114-03202.

Lockheed Martin incorporates by reference the radiation hazard study that was included with its most recent filings at the FCC. In addition, Lockheed Martin is submitting herewith a Frequency Coordination and Interference Analysis Report prepared by Comsearch.

The all-electric propulsion system of HS4 requires extended support for the completion of the mission. Accordingly, Lockheed Martin is requesting that the duration of this STA be a total of thirty (30) days. Further, a request for extension of the instant STA request for an additional one hundred eighty (180) days is being filed concurrently to cover the entire period required to complete EOR and the in-orbit testing being conducted by the launch provider.

Lockheed Martin designates Michael Usarzewicz to be the contact person that will be available whenever transmission to HS4 is to occur through the subject earth station. Mr. Usarzewicz can be reached at the following phone numbers:

(609) 865-2658 (cellular)
(908) 859-4050 (earth station desk)

2. Grant of the Requested Authority Will Serve the Public Interest

Lockheed Martin believes that the limited operations it proposes in support of the launch of the HS4 satellite serve the public interest. Lockheed Martin understands that the HS4 satellite will provide to provide in-orbit backup, redundancy services for HellasSat 3 and further expansion over Europe and Southern Africa, through increased Ku-band capacity.

Lockheed Martin's Carpentersville earth station will be part of a global network of control and ranging facilities that will be used solely to position the satellite as it progresses from transfer orbit to its final location and to calibrate electric propulsion. No end user service will be provided within the United States at any time. The safe and orderly use of the entire geostationary orbital resource and protection of the hundreds of satellites licensed by the U.S. and other countries that operate there depends in no small part on ensuring that the HS4 satellite is controlled while over North America en route to its final geostationary orbital position. In this regard, Lockheed Martin's earth station thus will serve a vital function.

* * * * *

Lockheed Martin requests authority to operate its Carpentersville, NJ earth station antenna to provide critical TT&C and ranging services during the EOR mission of the HellasSat 4/SaudiGeoSat 1 satellite, for a term of 30 days, from February 15, 2019.

TECHNICAL DETAILS OF SPECIAL TEMPORARY AUTHORITY

Satellite Characteristics

Satellite: HellasSat 4/ SaudiGeoSat 1 Electric Orbit Raising
Orbital Location: 39.0° E.L.
Manufacturer: Lockheed Martin Corporation
Launch Vehicle: Ariane 5 ECA

* * *

Earth Station Characteristics

Antenna: 14.2-m TIW Systems
Antenna Location: 40°38' 39.1" N / 075° 11' 27.8" W
Telecommand Uplink Frequencies:
5928.0 MHz (LHCP/RHCP)
6422.0 MHz (LHCP/RHCP)
Telemetry Downlink Frequencies:
4199.0 MHz (LHCP/RHCP)
3704.25 MHz (LHCP/RHCP)
Antenna Gain: 57.3 dBi @ 6 GHz
Antenna Power: 34.0 dBW (into the flange)
Maximum EIRP: 91.5 dBW for all carriers
EIRP Density: 19.0 dBW/4kHz
Uplink Emission: 1M50F2D
Downlink Emission: 1M00G8D

FREQUENCY COORDINATION AND INTERFERENCE ANALYSIS REPORT

Prepared for
Lockheed Martin Corporation-Phillipsburg
CARPENTERSVILLE, NJ
Satellite Earth Station

Prepared By:
COMSEARCH
19700 Janelia Farm Boulevard
Ashburn, VA 20147
October 29, 2018

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1. CONCLUSIONS

An interference study considering all existing, proposed and prior coordinated microwave facilities within the coordination contours of the proposed earth station demonstrates that this site will operate satisfactorily with the common carrier microwave environment. Further, there will be no restrictions of its operation due to interference considerations.

2. SUMMARY OF RESULTS

A number of great circle interference cases were identified during the interference study of the proposed earth station. Each of the cases, which exceeded the interference objective on a line-of-sight basis, was profiled and the propagation losses estimated using NBS TN101 (Revised) techniques. The losses were found to be sufficient to reduce the signal levels to acceptable magnitudes in every case.

3. SUPPLEMENTAL SHOWING

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.

Coordination data for this earth station was sent to the below listed carriers with a letter dated 09/26/2018.

Company

AB Services LLC
AQ2AT LLC
AT&T Corp.
AT&T Wireless Services 3 LLC - PA
Adams County Department of Emergency Svc
Affiniti PA, LLC
Algonquin Gas Transmission, LLC
Allentown SMSA Limited Partnership
Appalachia Engineering Services
Atlantic City Electric Company
Atlantic, County of
Auburn Data Systems, LLC
Beaver Springs Faith Baptist Church, Inc
Bedford County of
Berks County Department of Emergency Ser
Blair County 911
Blue Ridge Carriers
Blueline Communications
Bucks County Dept. of Emergency Comm
Capital Communications of America
Carbon, County of 911 Center
Cellco Partnership - Bridgeville, PA/WV
Cellco Partnership- PA Region
Cellco Prtnrshp - Phil. Tri-State Rgn
Chester, County of
City of New York
Commonwealth of Pennsylvania-Radio Proj.
Consolidated Edison Company of New York
Conterra Ultra Broadband, LLC
County of Burlington, Public Safety Cntr
County of Camden
County of Fayette
County of Pike
County of Warren, NJ
County of York
Cox Radio Inc
DSRC Networks
Dauphin County Emergency Management
Delaware County (PA) Emergency Services
Delaware Division of Communications
Delmarva Broadcasting Company

Delmarva Power and Light Company
 Direct Broadcast Services, Inc.
 Dominion Energy Transmission, Inc.
 EMS of Northeast Pennsylvania
 Eastern MLG LLC
 Eastern Pennsylvania EMS Council
 Electric Railroad, LLC
 Essex County Sheriff's Office (NJ)
 Exelon Generation Company, LLC
 FELHC, Inc.
 Federal Communication Commission
 Frascogna, Carl
 Fulton County PA
 Fundamental Broadcasting LLC
 GTT America LLC
 Garden State Transmissions
 Gloucester, County of
 Greene, County of (PA)
 Hammarlund Research LLC
 Hardy Cellular Telephone Company
 High Voltage Communications LLC (CFN)
 Higher Ground LLC
 Highway Networks, LLC
 Huntingdon, County of
 Jefferson Microwave, LLC
 Juniata County Emergency Services
 Kryptick Technologies
 Lackawanna, County of
 Lancaster County-Wide Communications
 Luzerne County of PA
 Maryland Public Broadcasting Commission
 Maryland, State of - Dept.of Info & Tech
 Middlesex, County of
 Mifflin County
 Monmouth, County of
 Monroe County Control Center (PA)
 Montgomery County Of
 Morris, County of
 Nassau County Police Department
 New Cingular Wireless PCS LLC - NJ
 New Cingular Wireless PCS LLC-DE/NH/RI
 New Cingular Wireless PCS, LLC - PA
 New Jersey State Police
 New Jersey Transit Rail Operations, Inc.
 New Jersey Turnpike Authority-Pkwy Div
 New Jersey, State of -NJ Transit
 New Line Networks, LLC
 New York City Police Department
 Norfolk Southern Railway
 Northeast Pennsylvania SMSA LTD Prtnrsh
 Northumberland County DPS/911
 Ocean County of - Div of Wireless Tech.
 Office of Emergency Telecom Services, NJ
 Orange County Dept of Emergency Services
 Orange and Rockland Utilities, Inc.
 PSEG Services Corporation

Peco Energy Company
Pennsylvania Turnpike Commission
Perry, County of
Pike County Commissioners
Pittsburgh SMSA Limited Partnership
Port Authority of New York & New Jersey
Qoncept Holdings LLC
Radio License Holding CBC, LLC
SW Networks
Shenandoah Personal Communications, LLC
Snyder, County of
Somerset County Dept. of Emergency Servi
South Central Task Force (SCTFNET)
State of Maryland, MIEMSS
Suffolk County Police Department
Sullivan County DPW
T-Mobile License LLC
Texas Eastern Communications, LLC
Thought Transmissions, LLC
Transcontinental Gas Pipeline Corp.
Transwave Communication Systems, Inc.
USCOC of Cumberland, Inc.
USOC of Pennsylvania RSA No 10 B2 Inc.
Uniti Fiber PEG, LLC
Ursa Navigation Solutions, Inc.
Verizon Wireless (VAW) LLC - Delaware/NJ
Verizon Wireless (VAW) LLC - Maryland
Verizon Wireless (VAW) LLC-Pennsylvania
Virginia Electric & Power Company
WV DHHR BPH, Office of Ems, Com. Div.
Weblin Holdings LLC
Wireless Internetwork LLC
World Class Wireless, LLC
iSignal
xWave Engineering LLC

4. EARTH STATION COORDINATION DATA

This section presents the data pertinent to frequency coordination of the proposed 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: 10/29/2018
Job Number: 180926COMSGE05

Administrative Information

Status: TEMPORARY (Operation from 01/15/2019 to 03/15/2019)
Call Sign: E7541
Licensee Code: RCASTR
Licensee Name: Lockheed Martin Corporation-Phillipsburg

Site Information

CARPENTERSVILLE, NJ

Venue Name: S-ANT 1
Latitude (NAD 83): 40° 38' 39.1" N
Longitude (NAD 83): 75° 11' 27.8" W
Climate Zone: A
Rain Zone: 2
Ground Elevation (AMSL): 54.86 m / 180.0 ft

Link Information

Satellite Type: Geostationary
Mode: TO - Transmit-Only
Modulation: Digital
Satellite Arc: 4° W to 147° West Longitude
Azimuth Range: 102.5° to 257.9°
Corresponding Elevation Angles: 5.5° / 5.0°
Antenna Centerline (AGL): 9.14 m / 30.0 ft

Antenna Information

Transmit - T61421

Manufacturer: TIW SYSTEMS
Model: FCC STD 14.2-MET
Gain / Diameter: 57.5 dBi / 14.2 m
3-dB / 15-dB Beamwidth: 0.24° / 0.46°

Max Available RF Power (dBW/4 kHz): 10.0
(dBW/MHz): 34.0

Maximum EIRP (dBW/4 kHz): 67.5
(dBW/MHz): 91.5

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): 27K7G3N - 1M50F2D / 5927.25 - 5928.75
27K7G3N - 1M50F2D / 6421.25 - 6422.75

Max Great Circle Coordination Distance: 597.5 km / 371.2 mi
Precipitation Scatter Contour Radius: 566.7 km / 352.1 mi

COMSEARCH

Earth Station Data Sheet

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

Coordination Values

CARPENTERSVI, NJ
Licensee Name Lockheed Martin Corporation-Phillipsburg
Latitude (NAD 83) 40° 38' 39.1" N
Longitude (NAD 83) 75° 11' 27.8" W
Ground Elevation (AMSL) 54.86 m / 180.0 ft
Antenna Centerline (AGL) 9.14 m / 30.0 ft
Antenna Model TIW SYSTEMS FCC STD 14.2-MET
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 10.0 (dBW/4 kHz)

Azimuth (°)	Horizon Elevation (°)	Antenna Discrimination (°)	Transmit 6.1 GHz	
			Horizon Gain (dBi)	Coordination Distance (km)
0	3.51	102.08	-10.50	105.42
5	3.90	97.51	-10.50	100.00
10	2.91	92.51	-10.50	116.39
15	2.84	87.51	-10.50	117.67
20	2.83	82.52	-10.50	117.88
25	3.07	77.52	-10.50	113.50
30	3.44	72.52	-10.50	106.67
35	3.78	67.52	-10.50	100.69
40	3.82	62.52	-10.50	100.00
45	3.80	57.53	-10.50	100.32
50	3.59	52.54	-10.50	104.01
55	3.40	47.55	-10.01	109.29
60	3.31	42.56	-9.01	114.91
65	3.12	37.58	-7.53	123.77
70	2.88	32.61	-5.54	134.26
75	3.07	27.61	-4.02	136.52
80	3.04	22.64	-2.08	145.19
85	3.06	17.68	0.89	159.02
90	3.07	12.74	4.76	180.10
95	2.74	8.00	7.50	201.28
100	2.73	3.74	14.55	238.46
105	2.58	3.84	14.16	385.67
110	2.72	7.37	7.50	201.66
115	2.80	10.92	5.58	190.32
120	2.62	14.56	2.94	181.37
125	2.05	18.40	0.46	182.49
130	1.63	22.02	-1.71	183.82
135	2.22	24.75	-3.35	157.53
140	2.76	27.32	-3.96	142.78
145	2.31	30.46	-4.68	149.42
150	2.22	33.06	-5.72	146.78
155	1.94	35.55	-6.72	149.17
160	2.22	37.22	-7.39	140.10
165	2.67	38.33	-7.83	130.96
170	2.46	39.65	-8.36	133.08
175	1.94	40.84	-8.67	141.15
180	1.90	41.11	-8.72	141.93
185	1.86	40.92	-8.68	143.25

COMSEARCH

Earth Station Data Sheet

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

Coordination Values

CARPENTERSVI, NJ

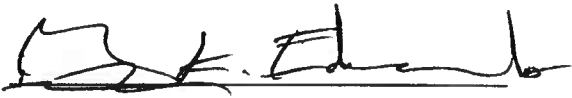
Licensee Name Lockheed Martin Corporation-Phillipsburg
Latitude (NAD 83) 40° 38' 39.1" N
Longitude (NAD 83) 75° 11' 27.8" W
Ground Elevation (AMSL) 54.86 m / 180.0 ft
Antenna Centerline (AGL) 9.14 m / 30.0 ft
Antenna Model TIW SYSTEMS FCC STD 14.2-MET
Antenna Mode Transmit 6.1 GHz
Interference Objectives: Long Term -154.0 dBW/4 kHz 20%
Short Term -131.0 dBW/4 kHz 0.0025%
Max Available RF Power 10.0 (dBW/4 kHz)

Azimuth (°)	Horizon Elevation (°)	Antenna Discrimination (°)	Transmit 6.1 GHz	
			Horizon Gain (dBi)	Coordination Distance (km)
190	1.23	40.84	-8.67	161.54
195	1.33	39.59	-8.34	160.02
200	2.37	37.09	-7.34	137.30
205	1.76	35.72	-6.79	154.04
210	1.77	33.44	-5.88	157.67
215	2.21	30.54	-4.72	151.54
220	3.42	26.81	-3.86	132.13
225	3.50	23.78	-2.77	133.66
230	4.90	19.59	-0.25	124.04
235	4.41	16.68	1.49	136.38
240	4.50	13.22	4.28	147.23
245	3.77	10.24	6.26	172.31
250	2.53	7.51	7.50	205.64
255	2.28	4.01	13.48	411.20
260	2.60	3.20	16.69	597.51
265	3.11	7.34	7.50	193.17
270	3.39	12.19	5.31	175.83
275	2.86	17.22	1.17	164.97
280	2.80	22.19	-1.81	151.47
285	3.05	27.15	-3.93	137.28
290	3.56	32.11	-5.35	124.08
295	4.21	37.09	-7.34	106.00
300	4.98	42.08	-8.92	100.00
305	5.49	47.09	-9.92	100.00
310	5.46	52.09	-10.50	100.00
315	5.57	57.09	-10.50	100.00
320	4.81	62.08	-10.50	100.00
325	3.99	67.09	-10.50	100.00
330	3.36	72.09	-10.50	108.07
335	3.16	77.09	-10.50	111.71
340	3.15	82.09	-10.50	111.92
345	3.00	87.09	-10.50	114.67
350	3.23	92.08	-10.50	110.55
355	3.48	97.08	-10.50	105.89

5. CERTIFICATION

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

BY: _____



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

DATED: October 29, 2018