Approved by OMB
3060−0678

APPLICATION FOR EARTH STATION SPECIAL TEMPORARY AUTHORITY

APPLICANT INFORMATIONEnter a description of this application to identify it on the main menu:
Carpentersville TT&C STA for Amazonas 5 − 2017−07 (30−Day STA)

1. 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:			

FEDERAL COMMUNICATIONS COMMISSION
GRANTED
International Bureau

File # SES-STA-20170801-00849
Call Sign E7541 Grant Date 8/30/2017
(or other identifier)
Term Dates
From 8/30/2017 To: 9/29/2017
Approved:

Lockheed Martin Corporation
Call Sign E7541
File Number SES-STA-20170801-00849

Lockheed Martin Corporation ("Lockheed Martin") is granted Special Temporary Authority for 30 days starting August 30, 2017, to provide telemetry, tracking, and control ("TT&C") functions and lunch and early orbit phases ("LEOP") of operation for the Amazonas 5 satellite in the 61° W.L. orbital location with earth station located in Carpentersville, New Jersey under the following conditions:

1. Lockheed Martin Corporation ("Lockheed Martin") will perform the operations in the 13999.5 MHz, and 14499.5 MHz (Earth-to-space) and 11701.0 MHz and 12202.25 MHz (space-to-Earth) frequencies within coordinated emission, antenna size and power limits. The maximum EIRP shall not exceed 85 dBW per NTIA manual US 356.

2. All operators of satellites will be provided with an emergency phone number where the licensee can be reached in the event that harmful interference occurs, Currently the 24x7 contact information for the Amazonas 5 mission is Mr. Usarzewicz. He can be reached at the following phone numbers: 609-865-2658 (Cellular) and 908-859-4050 (earth station desk).

3. Operations, shall not cause harmful interference to or claim protection from other lawfully operating stations and it shall cease transmission(s) immediately upon notice of such interference.

4. In the event of any harmful interference under this grant of STA, Lockheed Martin must cease operations immediately upon notification of such interference, and must inform the Commission, in writing, immediately of such an event.

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

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

7. Operations in the 13.75-14.00 GHz band may only exceed 85 dBW/carrier if an emergency situation exists and the applicant must notify FCC OperationCenter@fcc.gov of the situation with a copy to paul.blais@fcc.gov.

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

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2. Contact

Name:	Ryan N. Terry	**Phone Number:**	703-413-5747
Company:	Lockheed Martin Corporation	**Fax Number:**	703-413-5908
Street:	2121 Crystal Drive	E-Mail:	ryan.n.terry@lmco.com
	Suite 100		
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 08/29/2017	
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 Attachment 2: 13.75–14.0 GHz Study 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 Special Temporary Authority beginning August 29, 2017, to operate its Carpentersville, New Jersey fixed earth station (Call Sign E7541) to provide telemetry, tracking and control (TT&C) functions during the LEOP phase of operation for the Amazonas 5 satellite. Specifically, authority is sought to transmit

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.

◉ Yes ○ No

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).

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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.

12. Description

Lockheed Martin Corporation hereby requests Special Temporary Authority beginning August 29, 2017, to operate its Carpentersville, New Jersey fixed earth station (Call Sign E7541) to provide telemetry, tracking and control (TT&C) functions during the LEOP phase of operation for the Amazonas 5 satellite. Specifically, authority is sought to transmit telecommand signals on the 13999.5 and 14499.5 MHz center frequencies for in transit telecommand communications (Earth-to-space), and to receive telemetry signals from the satellite (space-to-Earth) at the center frequencies 11701.0 and 12202.25 MHz.

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 post-launch and early orbit phases ("LEOP") of operation for the Amazonas 5 satellite.

Amazonas 5 is destined for in-service operation at 61.0° W.L., and is currently scheduled for launch on August 31, 2017, aboard a Proton M rocket from the Baikonur Cosmodrome (LC-31).

Accordingly, Lockheed Martin requests to begin test transmissions on August 29, 2017 in preparation for the launch.[1] Further, Lockheed Martin is requesting that the duration of this STA be a total of thirty (30) days to cover any slippage in the anticipated dates of the various phases of operation; it nonetheless expects that all Carpentersville operations in support of the launch will be completed within fourteen (14) days after the Amazonas 5 satellite is launched

1. Requested STA Operations

Lockheed Martin specifically seeks authority to transmit telecommand signals on the 13999.5 and 14499.5 MHz center frequencies for in transit telecommand communications (Earth-to-space), and to receive telemetry signals from the satellite (space-to-Earth) at the center frequencies 11701.0 and 12202.25 MHz.

The proposed TT&C operations in support of the Amazonas 5 launch will be on a strictly non-harmful interference, non-protected basis. Lockheed Martin's proposed transmissions will use total input power and emissions for Ku-band telecommand that will fall below the highest input power, EIRP, EIRP density, and bandwidth prescribed for the telecommand carriers in its above-referenced FCC license. When no commands are being sent, a CW carrier that is within the emission of the licensed operation would be present. However, 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.

Lockheed Martin incorporates by reference the radiation hazard study and Schedule B information that were included with its most recent filings at the FCC.

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[1] The proposed test transmissions would occur over a period of approximately two to three days. During these tests, the earth station would not be communicating with any satellite; instead, the transmissions will be made with the antenna at zenith to verify RF functionality.

In order to demonstrate compliance with FCC Report and Order 96-377 regarding operations in the extended Ku-band, Lockheed Martin submits herewith an analysis that states that the proposed operations pose no risk of interference either to U.S. Navy shipboard radar operations or to NASA TDRSS links.

Lockheed Martin designates Michael Usarzewicz to be the contact person that will be available whenever transmission to Amazonas 5 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 Amazonas 5 satellite serve the public interest. Lockheed Martin understands that the Amazonas 5 satellite has been licensed by the Brazilian administration to Hispamar Satélites S.A. (ITU Designation B-SAT-Q) to provide broadband, television, corporate network and other telecommunications services over Mexico, Central America and South America.

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 Amazonas 5 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 LEOP mission of the Amazonas 5 satellite, for a term of 30 days, commencing August 29, 2017.

TECHNICAL DETAILS OF SPECIAL TEMPORARY AUTHORITY

Satellite Characteristics

Satellite: Amazonas 5

Orbital Location: 61.0° W.L.

Manufacturer: SSL

Launch Vehicle: Proton M

* * *

Earth Station Characteristics

Antenna: 14.2-m TIW Systems

Antenna Location: 40°38' 39.1" N / 075° 11' 27.8" W

Telecommand Uplink Frequencies:
13999.5 MHz (RHCP)
14499.5 MHz (RHCP)

Telemetry Downlink Frequencies:
12202.25 MHz (RHCP)
11701.0 MHz (RHCP)

Antenna Gain: 63.5 dBi @ 14 GHz

Antenna Power: 19.1 dBW (into the flange)

Maximum EIRP: 83.0 dBW for all carriers

EIRP Density: 23.0 dBW/4kHz

Uplink Emission: 1M00F2D
Downlink Emission: 1M50G8D

Exhibit For
Lockheed Martin Corporation
Carpentersville, New Jersey
TIW 14.2 Meter Earth Station
Call Sign E7541

Compliance with FCC Report & Order (FCC96-377) for the 13.75 - 14.0 GHz Band
Analysis and Calculations

1. Background

This Exhibit is presented to demonstrate the extent to which the Lockheed Martin Corporation satellite earth station, which is operated in Carpentersville, New Jersey, is in compliance with FCC REPORT & ORDER 96-377. The potential interference from the earth station to US Navy shipboard radiolocation operations (RADAR) and the NASA space research activities in the 13.75 - 14.0 GHz Band is addressed in this exhibit. The parameters for the earth station are:

Table 1. Earth Station Characteristics

• Coordinates (NAD83):	40°38' 39.1" N, 75° 11' 27.8" W
• Satellite Location for Earth Station:	129° W (SES-15)
• Frequency Band:	13.75-14.0 GHz for uplink
• Polarizations:	Circular and Linear
• Emissions:	1M00F2D 400KFXD
• Modulation:	Digital
• Maximum Aggregate Uplink EIRP:	83.0 dBW for the 1 MHz Carriers 83.0 dBW for the 400 kHz Carriers
• Transmit Antenna Characteristics	
Antenna Size:	14.2 meters in Diameter
Antenna Type/Model:	TIW Systems
Gain:	63.5 dBi
• RF power into Antenna Flange:	1 MHz 19.1 dBW or -4.9 dBW/4 kHz (Maximum)

400 kHz
19.1 dBW
or -0.9 dBW/4 kHz (Maximum)

- Minimum Elevation Angles:
  Carpentersville, NJ. — 18.4° @ 244.5° Az. (SES-15) at 129.0° W
- Side Lobe Antenna Gain: — 32 - 25*log(θ)

Because the above uplink spectrum is shared with the Federal Government, coordination in this band requires resolution data pertaining to potential interference between the earth station and both Navy Department and NASA systems. Potential interference from the earth station could impact with the Navy and/or NASA systems in two areas. These areas are noted in FCC Report and Order 96-377 dated September 1996, and consist of (1) Radiolocation and radio navigation, (2) Data Relay Satellites.

Summary of Coordination Issues:

1) Potential Impact to Government Radiolocation (Shipboard Radar)
2) Potential Impact to NASA Data Relay Satellite Systems (TDRSS)

2. Potential Impact to Government Radiolocation (Shipboard Radar)

Radiolocation operations (RADAR) may occur anywhere in the 13.4 - 14 GHz frequency band aboard ocean going United States Navy ships. The Federal Communication Commission (FCC) order 96-377 allocates the top 250 MHz of this 600 MHz band to the Fixed Satellite Service (FSS) on a co-primary basis with the radiolocation operations and provides for an interference protection level of -167 dBW/m^2/4 kHz.

The closest distance to the shoreline from the Carpentersville earth station is approximately 82.0 km Southeast toward the Atlantic Ocean. The calculation of the power spectral density at this distance is given by:

	1 MHz	400 kHz
1. Clear Sky EIRP:	83.0 dBW	83.0 dBW
2. Carrier Bandwidth:	1 MHz	400.0 kHz
3. PD at antenna input: dBW/4 kHz	-4.9	-0.9
4. Transmit Antenna Gain:	63.9 dBi	
5. Antenna Gain Horizon:	FCC Reference Pattern	
6. Antenna Elevation Angles:	18.4°	

The proposed earth station will radiate interference toward the Chesapeake Bay according to its off-axis side-lobe performance. A conservative analysis, using FCC standard reference pattern, results in off-axis antenna gains of -10.0 dBi towards the Atlantic Ocean.

The signal density at the shoreline, through free space is:

1MHz Carriers
PFD = Antenna Feed Power density (dBW/4 kHz) + Antenna Off-Axis Gain (dBi) – Spread Loss (dBw-m^2).

= -4.9 dBw/4 kHz + (-10.0) dBi – 10*log[4Π*(82000m)^2]
= -124.1 dBW/m^2/4 kHz + Additional Path Losses (~64 dB)
= -188.1 dBW/m^2/4 kHz

400 kHz Carriers
PFD = Antenna Feed Power density (dBW/4 kHz) + Antenna Off-Axis Gain (dBi) – Spread Loss (dBw-m^2).

= -0.9 dBw/4 kHz + (-10.0) dBi – 10*log[4Π*(82000m)^2]
= -120.1 dBW/m^2/4 kHz + Additional Path Losses (~64 dB)
= -184.1 dBW/m^2/4 kHz

Our calculations show additional path loss of approximately 64 dB including absorption loss and earth diffraction loss for the actual path profiles from the proposed earth station to the nearest shoreline.

The calculated PFD including additional path losses to the closest shoreline location is –184.1 dBW/m^2/4 kHz. This is 17.1 dB below the –167 dBW/m2/4 kHz interference criteria of R&O 96-377. Therefore, there should be no interference to the US Navy RADAR from the Carpentersville earth station due to the distance and the terrain blockage between the site and the shore.

3. Potential Impact to NASA's Data Relay Satellite System (TDRSS)

The geographic location of the Lockheed Martin earth station in Carpenterville, New Jersey is outside the 390 km radius coordination contour surrounding NASA's White Sands, New Mexico ground station complex. Therefore, the TDRSS space-to-earth link will not be impacted by the Lockheed Martin earth station in Carpentersville, New Jersey.

The TDRSS space-to-space link in the 13.772 to 13.778 GHz band is assumed to be protected if an earth station produces an EIRP less than 71 dBW/6 MHz in this band. The 14.2 meter earth station antenna will have an EIRP greater than 71 dBW/6 MHz for both the 1 MHz and 400 kHz carriers in this band. Therefore, the Carpentersville, New Jersey earth station may not be tuned to operate on frequencies in the 13.772 to 13.778 GHz band.

4. Coordination Issue Result Summary and Conclusions

The results of the analysis and calculations performed in this exhibit indicate that compatible operations between the earth station at the Carpentersville facility and the US Navy and NASA systems space-to-earth link. The Carpentersville facility will not transmit in the NASA systems space-to-space link (13772.0 to 13778.0 MHz) therefore avoiding conflict with this system.