

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 JCSAT-18 - 2019-12 (30-Day STA)

1. Applicant

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Attention:	Ryan N. Terry		

30 days "With conditions"

File # SES-STA-20191205-01640

Call Sign E7541 Grant Date 12/27/2019
(or other identifier)

Term Dates
From: 12/27/2019 To: 01/27/2020

Approved: [Signature]



GRANTED
International Bureau

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 12/14/2019	
7. City Carpentersville	
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: 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 expedited Special Temporary Authority beginning December 14, 2019, to operate its Carpentersville, New Jersey fixed earth station (Call Sign E7541) to provide telemetry, tracking and control (TT&C) functions during the Launch and Early Orbit (LEOP) phase of operation for the JCSAT-18 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).		

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Applicant: Lockheed Martin Corporation
Call Sign: E7541
File No.: SES-STA-20191205-01640
Special Temporary Authority ("STA")



"With conditions"

File # SES-STA-20191205-01640

Call Sign E7541 Grant Date 12/27/19
(or other identifier)

Term Dates
From: 12/27/2019 To: 01/27/2022

Approved: [Signature]

Lockheed Martin Corporation ("Lockheed Martin") is granted special temporary authority for 30 days, beginning December 27, 2019, to operate its Carpentersville, New Jersey fixed earth station to provide telemetry, tracking, and control ("TT&C") functions during the Launch and Early Operations Phase ('LEOP') period of ranging and propulsion monitoring for the JCSAT-18 satellite at the 150.0° E.L. orbital location using the following frequencies: 13.7525 GHz, and 14.4990.0 GHz, (Earth-to-space); 12.7485 GHz, and 12.7495 GHz (space-to-Earth) under the following conditions.

1. All operations shall be on an unprotected and non-harmful interference basis, Lockheed Martin shall not cause harmful interference to, and shall not claim protection from, interference caused to it by any other lawfully operating station and it shall cease transmission(s) immediately upon notice of such interference and must inform the Commission, in writing, immediately of such an event.
2. All operators of satellites in that path will be provided with an emergency phone number where the licensee can be reached when harmful interference occurs. Currently the 24x7 contact information for the JCSAT-18 mission is as follows: Ph.: (609) 865-2658 (cellular); and (908) 859-4050 (earth station desk).
3. Grant of this STA is without prejudice to any determination that the Commission may make regarding pending or future Lockheed Martin applications.
4. Any action taken or expense incurred as a result of operations pursuant to this STA is solely at Lockheed Martin's risk.

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 upon release.

URGENT – EXPEDITED TREATMENT REQUESTED

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 Launch and Early Operations Phase ("LEOP") period of ranging and propulsion monitoring for the JCSAT-18 satellite. JCSAT-18 is intended to be launched on December 15, 2019. For the reasons outlined below, Lockheed Martin requests expedited treatment of this urgent request.

JCSAT-18 will be operated by SKY Perfect JSAT Corporation ("JSAT"). JSAT had contracted with Intelsat for the provision of critical ground station launch support. Intelsat had dedicated an antenna at its Castle Rock, CO facility for launch support.

Lockheed Martin understands from Intelsat that its Castle Rock antenna has suffered a structural failure, and Intelsat has requested that Lockheed Martin provide either primary or secondary support for the JCSAT-18 launch, pending the outcome of efforts to repair the Castle Rock antenna system. Accordingly, and given the significant safety implications of ensuring proper ground system support for the launch, Lockheed Martin urgently requests authority to begin communications on December 14, 2019, in preparation for LEOP activity.¹

1. Requested STA Operations

The TT&C and ranging signals will be transmitted partly in the standard Ku-band for which Lockheed Martin already has authority under Call Sign E7541. As to the instant request for STA, Lockheed Martin seeks herein authority to communicate with JCSAT-18 as a point of communication and has identified all of the Ku-band frequencies that it requires in the attached technical exhibit. In all other respects, operation of the earth station will be consistent with the parameters set forth under the existing permanent authority.

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.

¹ Proposed test transmissions would occur over a period of approximately one to two 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

Lockheed Martin designates Michael Usarzewicz to be the contact person that will be available whenever transmission to JCSAT-18 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, but critical, operations it proposes in support of the launch of the JCSAT-18 satellite serve the public interest. Lockheed Martin understands that the JCSAT-18 satellite will ultimately be positioned at the 150.0 E.L. orbital position.

Lockheed Martin's Carpentersville earth station will be part of a network of control and ranging facilities that will be used solely to position the satellite as it progresses in transfer to its final location and to calibrate 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 JCSAT-18 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 expedited authority to operate its Carpentersville, NJ earth station antenna to provide critical TT&C and ranging services during the JCSAT-18 mission, for a term of 30 days, commencing December 14, 2019.

TECHNICAL DETAILS OF SPECIAL TEMPORARY AUTHORITY

Satellite Characteristics

Satellite: JCSAT-18 LEOP mission

Orbital Location: 150.0 E.L.

* * *

Earth Station Characteristics

Antenna: 14.2-m TIW Systems

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

Telecommand Uplink Frequencies:
13752.5 MHz (V/RHCP)
14499.0 MHz (V/RHCP)

Telemetry Downlink Frequencies:
12748.5 MHz (V/RHCP)
12749.5 MHz (V/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: 1M30F2D (FM, BPSK)

Downlink Emission: 300KG2D (PCM, BPSK)

**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/m²/4 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:

	<u>1 MHz</u>	<u>400 kHz</u>
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-m²).

$$\begin{aligned} &= -4.9 \text{ dBW/4 kHz} + (-10.0) \text{ dBi} - 10 \cdot \log[4\pi \cdot (82000\text{m})^2] \\ &= -124.1 \text{ dBW/m}^2/4 \text{ kHz} + \text{Additional Path Losses } (\sim 64 \text{ dB}) \\ &= -188.1 \text{ dBW/m}^2/4 \text{ kHz} \end{aligned}$$

400 kHz Carriers

PFD = Antenna Feed Power density (dBW/4 kHz) + Antenna Off-Axis Gain (dBi) – Spread Loss (dBW-m²).

$$\begin{aligned} &= -0.9 \text{ dBW/4 kHz} + (-10.0) \text{ dBi} - 10 \cdot \log[4\pi \cdot (82000\text{m})^2] \\ &= -120.1 \text{ dBW/m}^2/4 \text{ kHz} + \text{Additional Path Losses } (\sim 64 \text{ dB}) \\ &= -184.1 \text{ dBW/m}^2/4 \text{ kHz} \end{aligned}$$

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/m²/4 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 Carpentersville, 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.