

**Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554**

In the Matter of Application by)
)
SES AMERICOM, INC.) Call Sign E170089
)
For Special Temporary Authority to)
Communicate with ASTRA 1H to Perform)
TT&C During and After Relocation to 67.1° W.L.)

REQUEST FOR SPECIAL TEMPORARY AUTHORITY

By this application, SES Americom, Inc. (“SES Americom” or “SES”) respectfully requests earth station special temporary authority (“STA”) for a period of 180 days to permit SES to use its E170089 earth station to communicate with the ASTRA 1H spacecraft using Ku-band frequencies in order to provide Tracking, Telemetry and Command (“TT&C”): (1) during the planned relocation of the spacecraft from its current position at 80.8° W.L. to 67.1° W.L.; and (2) to maintain the satellite at 67.1° W.L. +/- 0.10° east/west station keeping, where it will operate in inclined orbit.

SES Americom’s affiliate, SES ASTRA S.A. (“SES ASTRA”), holds an authorization from the Luxembourg Ministry of State, Office of Media and Communications¹ for the ASTRA 1H Ku-band spacecraft. SES ASTRA has requested that SES Americom assist with providing TT&C to support the planned relocation of ASTRA 1H to 67.1° W.L. ASTRA 1H will operate in inclined orbit at the nominal 67° W.L. orbital location.

SES is not requesting U.S. market access or any other authorization from the Commission in relation to the non-U.S.-licensed ASTRA 1H spacecraft, and therefore is not

¹ Ministère d’État, Service des Médias et des Communications of the Grand Duchy of Luxembourg.

providing full technical information about the ASTRA 1H satellite as part of this application.² Details regarding the ASTRA 1H TT&C operations, including the certifications required under Section 25.140 of the Commission's rules, are provided in the attachments to this request. A basic technical description of the satellite's proposed operations and an orbital debris mitigation statement for ASTRA 1H are provided in Attachments 2 and 3 for the Commission's information. As discussed below, communications with ASTRA 1H will not adversely affect the operation of other satellites.

Grant of this request is in the public interest as the requested TT&C authority will facilitate the safe operation of ASTRA 1H as it drifts to and is located at 67.1° W.L.

No Harmful Interference to Other Spacecraft. TT&C transmissions during drift of ASTRA 1H will be on a non-harmful interference basis. The drift of the spacecraft will be coordinated with other satellite operators consistent with industry practice.³

The closest satellites to 67.1° W.L. with overlapping Ku-band operations are SES-10, operated by New Skies Satellite BV, an affiliate of SES, at 66.9° W.L., Star One C1 located at 65° W.L. and Star One C4 located at 70° W.L., both of which are operated by Star One (EMBRATEL). SES will internally coordinate operations of SES-10 and ASTRA 1H at the nominal 67° W.L. orbital location. Furthermore, ASTRA 1H will be positioned more than two degrees away from both Star One satellites and will comply with Commission requirements for operation in a two-degree spacing environment.

² See Waiver Requests, *infra*.

³ The 24/7 point of contact for the proposed ASTRA 1H operations is the SES Payload Management Operations Centre (PMOC) in Woodbine, MD, 1 410 970 7580; e-mail: PMOC@ses.com.

Waiver Requests. SES requests limited waivers of the Commission's requirements in connection with the instant request. Grant of these waivers is consistent with Commission policy:

The Commission may waive a rule for good cause shown. Waiver is appropriate if special circumstances warrant a deviation from the general rule and such deviation would better serve the public interest than would strict adherence to the general rule. Generally, the Commission may grant a waiver of its rules in a particular case if the relief requested would not undermine the policy objective of the rule in question and would otherwise serve the public interest.⁴

Sections 25.137 and 25.114. SES requests a waiver of Section 25.137 and the other Commission rules cross-referenced therein. SES seeks authority in connection with providing TT&C for ASTRA 1H, a foreign-licensed spacecraft. Section 25.137 requires that applicants proposing to use U.S.-licensed earth stations to communicate with foreign-licensed spacecraft demonstrate that the Commission's policies for U.S. market access are satisfied. Section 25.137 also incorporates by reference other requirements for Commission-licensed space stations, including the obligation to file detailed technical information as specified in Section 25.114.

Waiving Section 25.137 is consistent with the purpose of the rule, which was intended to address situations in which a non-U.S.-licensed satellite is to be used to serve the United States. Here, the E170089 earth station will be used solely for TT&C, not for commercial operations. Thus, SES is not seeking authority to communicate with ASTRA 1H for purposes of providing U.S. service within the meaning of Section 25.137.

⁴ *PanAmSat Licensee Corp.*, 17 FCC Rcd 10483, 10492 (Sat. Div. 2002) (footnotes omitted).

To the extent the Commission disagrees, SES requests a waiver of the market access and other requirements imposed in Section 25.137. Grant of a waiver will not undermine the objectives of these requirements. The market access test described in the rule is intended to ensure that U.S.-licensed systems have “effective competitive opportunities.”⁵ Because SES Americom is not seeking authority to provide commercial services in the United States, the requested modification does not raise any concerns about competitive equality.⁶

Strict adherence with Section 25.114’s requirements for detailed technical information is also unnecessary and would be unduly burdensome. SES Americom is proposing to use E170089 only for the limited purpose of performing TT&C for the satellite as it drifts to and is located at 67.1° W.L., and the relevant technical characteristics of those transmissions are provided below. The transmissions to the spacecraft will be conducted on a non-harmful interference basis. In these circumstances, no valid purpose would be served by requiring a complete description of the ASTRA 1H spacecraft.

SES Americom’s request is consistent with Commission precedent, and the Commission granted a similar request for this earth station to support a prior relocation of ASTRA 1H.⁷ In similar cases in which limited communications by U.S. earth stations with a foreign-licensed satellite were proposed, the Commission has granted operational authority

⁵ 47 C.F.R. § 25.137(a).

⁶ In any event, the ASTRA 1H spacecraft at 67.1° W.L. will be operating under the authority of Luxembourg, a WTO member country, and therefore is exempt from the requirement to make a showing of effective competitive opportunities. 47 C.F.R. § 25.137(a)(2).

⁷ SES Americom, Inc., (Call Sign E170089) File No. SES-STA-20180712-01788, granted Aug. 28, 2018.

without requiring a market access showing under Section 25.137 or full technical data as required by Section 25.114.⁸

Section 2.106 Footnote NG52. To the extent that reception of telemetry at 11693.5 MHz constitutes a domestic (*i.e.*, non-international) service, SES Americom respectfully requests a limited waiver of the international-service-only restriction.⁹ Such a waiver is warranted in the circumstances for the limited purpose of performing TT&C. As the Commission has recognized, TT&C operations generally require uplink and downlink capability from the same earth station. For this reason, the Commission has previously granted waivers of the international service restriction to enable TT&C to be performed in the U.S. using the extended Ku-band frequencies.¹⁰

Grant of the requested waiver would not undermine the purpose of the restriction, which is to ensure that earth station deployments in the extended Ku-band do not negatively impact the deployment of fixed service (“FS”) in the same band or cause interference to such operations. The telemetry downlink signals from ASTRA 1H in the extended Ku-band are narrow in bandwidth and will comply with the power flux density limits in the Commission’s

⁸ See, e.g., Hawaii Pacific Teleport, L.P., File No. SES-STA-20131030-00914 (Call Sign E030115), granted Nov. 18, 2013 (authorizing earth station to provide TT&C services to ASTRA 3A operating at 176.85° W.L.); PanAmSat Licensee Corp., File Nos. SES-STA-20090922-01211 (Call Sign E4132) & SES-STA-20090922-01212 (Call Sign E040125), both grant-stamped Oct. 16, 2009 (authorizing earth stations to communicate with foreign-licensed NSS-12 spacecraft for purposes of providing launch and early operations services).

⁹ 47 U.S.C. § 2.106 Footnote NG52.

¹⁰ See, e.g., EchoStar KuX Corporation, 20 FCC Rcd 919 (Int’l Bur. 2004) (“*EchoStar 83W Order*”); EchoStar Satellite LLC, 20 FCC Rcd 930 (Int’l Bur. 2004) (“*EchoStar109W Order*”); EchoStar KuX Corporation, 20 FCC Rcd 942 (2004) (“*EchoStar 121W Order*”). These decisions granted waivers of the international only restriction in Footnote NG104, which has been replaced by Footnote NG52.

rules and, thus, will not interfere with FS station operations. Moreover, only one U.S. earth station will be used to perform TT&C in the extended Ku-band.¹¹ As a result, there will be no significant restrictions placed on the deployment of FS in this band.

Section 25.210(j). The ASTRA 1H satellite is authorized by the Luxembourg Government to operate at 67.1° W.L. within a +/- 0.10° east/west station keeping box. To the extent necessary, SES respectfully requests a waiver of Section 25.210(j) of the Commission's rules, which requires geostationary space stations to be operated within a +/- 0.05° east/west station keeping box. The Commission has previously waived this rule based on a finding that allowing an increased station keeping volume would "not adversely affect the operations of other spacecraft and would conserve fuel for future operations."¹²

The facts here fit squarely within this precedent. Allowing ASTRA 1H to be maintained within an increased station keeping volume will not harm other operators. ASTRA 1H's station keeping volume will not overlap with that of any other satellites. In addition, allowing ASTRA 1H to be flown at 67.1° W.L. in an expanded east-west station keeping volume of +/-0.1 degrees will result in fuel savings for the spacecraft. This will prolong the time during which ASTRA 1H will be available to provide service. Under these circumstances, grant of any necessary waiver of Section 25.210(j) will serve the public interest.

SES hereby certifies that no party to this application is subject to a denial of federal benefits pursuant to Section 5301 of the Anti-Drug Abuse Act of 1988, 21 U.S.C. § 862.

¹¹ See *EchoStar 83W Order*, at ¶ 16 ("The Commission has waived this [international only] requirement where the number of potential earth stations in a particular service is inherently small."); *EchoStar 109W Order*, at ¶ 16 (same); *EchoStar 121W Order*, at ¶ 17 (same).

¹² See, e.g., *SES Americom, Inc.*, File Nos. SAT-MOD-20080124-00030 & SAT-AMD-20080311-00070, grant-stamped May 19, 2008, Attachment at ¶ 1.

For the foregoing reasons, SES respectfully requests special temporary authority to communicate with ASTRA 1H for a period of up to 180 days in order to provide TT&C during relocation of the satellite and once it is on station, as described herein. Grant of the requested authority will promote safe operation of the satellite during and after its relocation.

Respectfully submitted,

SES AMERICOM, INC.

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Attachment 1: TT&C Emission Characteristics

1. Earth Station Transmission Characteristics

E170089 (WBK11)

Emission Designator: 800KF9D

Max EIRP: 75.1 dBW

Max EIRP Density: 52.1 dBW/4kHz

2. TT&C Frequencies ¹

Telecommand	14008.5 MHz	(bicone) horizontal polarization (limited to emergency situations)
	14250.5 MHz	(pipe) circular polarization
Telemetry	11693.5 MHz	(pipe) circular polarization
	11707.0 MHz	(pipe) circular polarization/(bicone) vertical polarization (limited to emergency situations)

¹ In compliance with Section 25.202(g)(1) of the Commission's rules, the proposed TT&C operations will cause no greater interference and require no greater protection from harmful interference than communications traffic in these bands.

Attachment 2: ASTRA 1H at 67.1° W.L.

1. **Orbital Location**

67.1° W.L. +/- 0.1° east-west station keeping and operating in inclined orbit

2. **TT&C Frequencies**

Telecommand	14008.5 MHz	(bicone) horizontal polarization (limited to emergency situations)
	14250.5 MHz	(pipe) circular polarization
Telemetry	11693.5 MHz	(pipe) circular polarization
	11707.0 MHz	(pipe) circular polarization/(bicone) vertical polarization (limited to emergency situations)

3. **Section 25.140 Certifications**

Section 25.140(a)(2). SES Americom certifies that the ASTRA 1H TT&C operations in the Ku-band will be coordinated with SES-10 at the nominal 67° W.L. orbital location.

Section 25.140(a)(3)(ii). SES Americom certifies that the downlink EIRP density for its operations in the conventional and extended Ku-bands will not exceed 17 dBW/4kHz for analog transmissions and that the associated uplink operation will not exceed applicable EIRP density envelopes in Section 25.218 unless the non-routine uplink and/or downlink operation is coordinated with operators of authorized co-frequency space stations at assigned locations within six degrees of the orbital location of the proposed space station.

3. **Compliance with PFD limits in 11.45-11.7 GHz**

The allowable PFD levels in the 11.45-11.70 GHz bands (per 4 kHz) are defined in Section 25.208(b)(1) of the Commission’s rules for all conditions, including clear sky, and for all methods of modulation as follows:

For angles of arrival between 0 and 5 degrees above the horizontal plane:

-150 dBW/m² in any 4 kHz band;

For angles of arrival δ (in degrees) between 5 and 25 degrees above the horizontal plane:

-150 + $(\delta-5)/2$ dBW/m² in any 4 kHz band; and

For angles of arrival between 25 and 90 degrees above the horizontal plane:

-140 dBW/m² in any 4 kHz band.

In order to demonstrate such compliance, the PFD levels for the telemetry carriers are calculated below. It can be seen from the results that compliance with the PFD levels has been achieved.

TM Beam						
Elevation angle, deg	5	10	15	20	25	90
Max. EIRP, dBW	9.5	9.5	9.5	9.5	9.5	9.5
Gain roll-off at elevation angle, dBi	-2	-2	-1	-1	-1	0
EIRP at elevation angle, dBW	7.5	7.5	8.5	8.5	8.5	9.5
Carrier bandwidth, MHz	0.2	0.2	0.2	0.2	0.2	0.2
EIRP density at elevation angle, dBW/4kHz	-9.5	-9.5	-8.5	-8.5	-8.5	-7.5
Minimum spreading loss, dB/m ²	-163.3	-163.2	-163.1	-162.9	-162.8	-162.1
25.208(a) pfd limit (10.95-11.2 and 11.45-11.7 MHz), dBW/m ² /4kHz	-150	-147.5	-145	-142.5	-140	-140
pfd, dBW/m ² /4KHz	-172.8	-172.7	-171.6	-171.4	-171.3	-169.6
Margin, dB, relative to 25.208	22.8	25.2	26.6	28.9	31.3	29.6

4. **TT&C Contour Maps**

The antenna gain contours for the TT&C omni beam operations are not included because the contours at 8 dB below peak fall entirely beyond the edge of the visible Earth.¹

¹ See 47 C.F.R. § 25.114(c)(4)(vi)(A).

Attachment 3: Orbital Debris Mitigation Statement

Information regarding the orbital debris mitigation plan for ASTRA 1H is provided below.

Spacecraft Hardware Design

The ASTRA 1H satellite was built on the proven Boeing 601 bus and was launched in June 1999. No debris is generated during normal on-station operations, and the spacecraft will be in a stable configuration.

The design of SES's spacecraft locates all sources of stored energy within the body of the structure, which provides protection from small orbital debris. SES requires that spacecraft manufacturers assess the probability of micrometeorite damage that can cause any loss of functionality. This probability is then factored into the ultimate spacecraft probability of success. Any significant probability of damage would need to be mitigated in order for the spacecraft design to meet SES's required probability of success of the mission. SES has taken the following steps to limit the effects of such collisions: (1) critical spacecraft components are located inside the protective body of the spacecraft and properly shielded; and (2) where practical, all spacecraft subsystems have redundant components to ensure no single-point failures. The spacecraft will not use any subsystems for end-of-life disposal that are not used for normal operations.

Minimizing Accidental Explosions

The spacecraft manufacturer generates a Failure Mode Effects and Criticality Analysis for the spacecraft to identify all potential mission failures. This analysis indicates failure modes, possible causes, methods of detection, and compensating features of the spacecraft design.

The design of the ASTRA 1H spacecraft is such that the risk of explosion is minimized both during and after mission operations. In designing and building the spacecraft, the manufacturer took steps to ensure that debris generation will not result from the conversion of energy sources on board the satellite into energy that fragments the satellite. All propulsion subsystem pressure vessels, which have high margins of safety at launch, have even higher margins in orbit, since use of propellants and pressurants during launch decreases the propulsion system pressure. Burst tests are performed on all pressure vessels during qualification testing to demonstrate a margin of safety against burst. Bipropellant mixing is prevented by complete isolation of propellant species from each other. Pressures, including a subset of the batteries, will be monitored by telemetry.

At the end of operational life, after the satellite has reached its final disposal orbit, all on-board sources of stored energy will be depleted or secured, excess propellant remaining in the chemical propulsion tanks will be vented, and the batteries will be discharged.

Safe Flight Profiles

SES has assessed and limited the probability of the space station becoming a source of debris by collisions with large debris or other operational space stations. Specifically, SES has assessed the possibility of collision with satellites located at, or reasonably expected to be located at, the requested orbital location or assigned in the vicinity of that location. Regarding avoidance of collisions with controlled objects, in general, if a geosynchronous satellite is controlled within its specified longitude and latitude station-keeping limits, collision with another controlled object (excluding where the satellite is collocated with another object) is the direct result of that object entering the allocated space.

ASTRA 1H will be positioned at 67.1° W.L. with +/- 0.1 degree station keeping tolerance. In considering current and planned satellites that may have a station-keeping volume that overlaps the ASTRA 1H satellite, SES has reviewed the FCC databases for FCC licensed satellite networks and those that are currently under consideration by the FCC. In addition, networks for which a request for coordination has been published by the ITU within ±0.15 degrees of 67.1° W.L. have also been reviewed. Only those networks that either operate, or are planned to operate, and have an overlapping station-keeping volume with the ASTRA 1H satellite, have been taken into account in the analysis.

Based on these reviews, the only satellite operating near 67.1° W.L. is SES-10 operating 0.2 degrees away at 66.9° W.L. SES is not aware of any pending applications before the Commission requesting authorization to use an orbital location within ±0.15° of 67.1° W.L., and within this sub-arc, SES is not aware of any proposals by any other administration to launch or deploy a satellite to such locations in the near term. SES will be able to manage the safe operations of ASTRA 1H and SES-10 through its internal satellite management processes.

On-station station-keeping operations will be within the +/- 0.10 degree E-W control box with no inclination control, thereby ensuring adequate collision avoidance distance from other satellites in geosynchronous orbit.

SES uses the Space Data Center (“SDC”) system from the Space Data Association to monitor the risk of close approach of its satellites with other objects. Any close encounters (separation of less than 10 km) are flagged and investigated in more detail. If required, avoidance maneuvers are performed to eliminate the possibility of collisions. During any relocation, the moving spacecraft is maneuvered such that it is at least 30 km away from the synchronous radius at all times. In most cases, much larger deviation from the synchronous

radius is used. In addition, the SDC system is used to ensure no close encounter occurs during the move. When de-orbit of a spacecraft is required, the initial phase is treated as a satellite move, and the same precautions are used to ensure collision avoidance.

Post Mission Disposal Plan

At the end of the satellite's life, SES plans to maneuver ASTRA 1H to a disposal orbit with a minimum perigee of 250.0 km above the normal operational altitude. The proposed disposal orbit altitude complies with the altitude resulting from application of the IADC formula based on the following calculation:

Area of the satellite (average aspect area): 28.7 m²

Mass of the spacecraft: 1908 kg

C_R (solar radiation pressure coefficient): 1.00

Therefore the Minimum Disposal Orbit Perigee Altitude, as calculated under the IADC formula, is:

$36,021 \text{ km} + (1000 \times C_R \times A/m) = 36036.0 \text{ km}$, or 250.0 km above the GSO arc (35,786 km)

SES intends to reserve 9.7 kg of fuel in order to account for post-mission disposal of ASTRA 1H. SES has assessed fuel-gauging uncertainty and has provided an adequate margin of fuel reserve to address the assessed uncertainty.