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

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| In the Matter of | ) | |
| | ) | |
| SES AMERICOM, INC. | ) | File No. SAT-MOD-_____ |
| | ) | Call Sign S2180 |
| Application for Modification of AMC-15 | ) | |
| Fixed-Satellite Space Station License | ) | |

## APPLICATION OF SES AMERICOM, INC.

SES Americom, Inc. ("SES") respectfully requests a modification of its license for the AMC-15 fixed-satellite space station to reorient the satellite's Ka-band beams to provide coverage of the continental United States, the Gulf of Mexico, Mexico and parts of the Caribbean and Central America. Grant of the requested modification will serve the public interest by allowing SES to meet customer demand for Ka-band capacity at the 105.05° W.L. orbital location.

A completed FCC Form 312 is attached, and SES incorporates by reference the technical information previously provided in support of AMC-15.[1] In addition, SES is providing here technical information relating to the proposed modification on Schedule S and in narrative form pursuant to Section 25.114 of the Commission's Rules.

## MODIFICATION

AMC-15 is a hybrid Ku/Ka-band satellite that is licensed by the Commission to operate at 105.05° W.L.[2] In response to customer demand, SES proposes to reorient the AMC-

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[1] The most recent technical information regarding AMC-15 is found in File No. SAT-MOD-20060410-00041.

[2] *See* File No. SAT-MOD-20060410-00041, grant-stamped June 8, 2006.

15 Ka-band beams so that they can provide coverage of the continental United States, the Gulf of Mexico, Mexico and parts of the Caribbean and Central America. No change in the Ku-band operations of AMC-15 is proposed. SES proposes to accomplish the desired effect by reorienting AMC-15 to obtain the desired Ka-band coverage and using the gimbal on the Ku-band antenna to maintain the current Ku-band coverage pattern. No existing AMC-15 Ka-band customers will be affected by the reorientation.

Reorientation of AMC-15 as proposed will not adversely affect any other operators. The technical appendix demonstrates that the Ka-band payload of AMC-15 conforms to Commission requirements for operations at two-degree spacing. AMC-15 will also be operated consistent with applicable existing and future coordination agreements.[3]

The Commission has generally permitted satellite operators the flexibility to design and modify their networks in response to customer requirements, absent compelling countervailing public interest considerations.[4] Here, grant of the requested modification will permit SES to make efficient use of AMC-15 in response to customer requirements.

**WAIVER REQUEST**

SES seeks any necessary waiver of Sections 25.114(d)(14)(ii) and 25.283(c) of the Commission's rules in connection with the requested AMC-15 modification. Grant of the waiver is consistent with Commission policy:

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[3] SES has previously coordinated the Ka-band operations of AMC-15 with U.S. Federal systems, as required by footnote US 334 to the table of frequency allocations, 47 C.F.R. § 2.106. SES will advise the appropriate U.S. government representative regarding the proposed change in coverage of the AMC-15 Ka-band payload.

[4] *See, e.g. AMSC Subsidiary Corporation*, 13 FCC Rcd 12316 at ¶ 8 (IB 1998) (the Commission generally leaves space station design decisions to the licensee "because the licensee is in a better position to determine how to tailor its system to meet the particular needs of its customers") (footnote omitted).

> 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.[5]

Sections 25.114(d)(14)(ii) and 25.283(c) address requirements relating to venting stored energy sources at the spacecraft's end of life.[6] AMC-15 is a Lockheed Martin A2100 model spacecraft. As described in more detail in the attached Technical Appendix, the oxidizer tanks on the spacecraft were sealed following completion of the launch phase and will therefore retain residual pressure when the spacecraft is retired. Given the spacecraft design, it is physically impossible for SES to vent the oxidizer tanks in order to comply with Section 25.283(c).

Under Commission precedent, grant of a waiver is warranted. In a number of cases involving various spacecraft models with similar limitations, the Commission has waived Section 25.283(c) to permit launch and operation of spacecraft that do not allow for full venting of pressure vessels at end of life, based on a finding that modifying the space station design at a late stage of construction would pose an undue hardship.[7] SES would have faced the same

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

6 Section 25.283(c) contains the substantive venting requirement, and Section 25.114(d)(14)(ii) requires applicants to submit information that addresses "whether stored energy will be removed at the spacecraft's end of life." 47 C.F.R. § 25.114(d)(14)(ii).

7 *See, e.g.*, *EchoStar Satellite Operating Corp.*, Call Sign S2746, File No. SAT-LOA-20071221-00183, grant-stamped Mar. 12, 2008, Attachment at ¶ 4 (granting a partial waiver of Section 25.283(c) for AMC-14, a Lockheed Martin A2100 model spacecraft, on the grounds that requiring modification of the satellite would present an undue hardship); *DIRECTV Enterprises LLC*, Call Sign S2797, File No. SAT-LOA-20090807-00086, grant-stamped Dec. 15, 2009, Attachment at ¶ 4 (same for DIRECTV 12, a Boeing 702 model spacecraft); *PanAmSat Licensee Corp*., Call Sign S2237, File Nos. SAT-MOD-20070207-00027, SAT-AMD-20070716-00102,

hardship if it had been required to alter the design of AMC-15 to conform to Section 25.283(c) prior to launch of the spacecraft.

With AMC-15 already in orbit and operational, there is no question of bringing the satellite into compliance with the rule. The Commission has expressly recognized this, finding a waiver of Section 25.283(c) to be justified for in-orbit spacecraft that cannot satisfy the rule's requirements. For example, in a decision involving the SES AMC-2 satellite, the Commission waived the rule on its own motion, observing that venting the spacecraft's sealed oxidizer tanks "would require direct retrieval of the satellite, which is not currently possible."[8]

The same practical obstacle is present here. Because AMC-15 is already in orbit, SES can do nothing to enable full venting of residual pressure in the oxidizer tanks. Given this reality, a waiver is clearly warranted.

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grant-stamped Oct. 4, 2007, Attachment at ¶ 7 (same for Intelsat 11, an Orbital Sciences Star model spacecraft).

[8] *SES Americom, Inc.*, Call Sign S2134, File No. SAT-MOD-20101215-00261, grant-stamped Mar. 8, 2011, Attachment at ¶ 4. *See also XM Radio Inc.*, Call Sign S2616, File No. SAT-MOD-20100722-00165, grant-stamped Oct. 14, 2010, Attachment at ¶ 2 (waiving Section 25.283(c) for XM-4, a Boeing 702 model spacecraft, because "modification of the spacecraft would present an undue hardship, since XM-4 is an in-orbit space station and venting XM-4's helium and xenon tanks would require direct retrieval of the satellite, which is not currently possible").

## CONCLUSION

For the foregoing reasons, SES seeks a modification of the AMC-15 license to permit reorientation of the satellite's Ka-band beams, as described in the attached materials.

Respectfully submitted,

SES AMERICOM, INC.

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# TECHNICAL APPENDIX

# REPOINTING THE KA-BAND BEAMS OF AMC-15 AT 105.05° W.L.

## 1.0 Overall Description (§25.114(d)(1))

This technical appendix is submitted in support of the modification application of SES Americom, Inc. ("SES") seeking authority to re-orient the Ka-band beams on AMC-15 at 105.05° W.L. SES incorporates by reference the technical information it has already provided with respect to AMC-15[1] and provides here technical information relating to the proposed modification. No change in the spacecraft's Ku-band operations is planned. In the Ka-band frequencies (downlink frequencies from 18.58-18.8 GHz and 19.7-20.2 GHz and uplink frequencies from 28.4-28.6 GHz and 29.5-30 GHz), the satellite will operate using 12 spot beams providing coverage of the continental United States, the Gulf of Mexico, Mexico and parts of the Caribbean and Central America.

## 2.0 Schedule S (§25.114(c))

The Schedule S database is included with this filing. In the Geostationary Satellite Orbital Information Section, the new Schedule S software rounds the orbital location to the nearest whole number; however, as noted above, the actual orbit location is 105.05° W.L. Considering the large number of spot beams utilized in the Ka-band payload, SES is providing information in the Schedule S regarding two representative user beam groups for Transmitting Beams and Receiving Beams. Two representative beams are provided because the new Schedule S software will not allow two non-contiguous spectrum segments to be associated with a single beam. The worst case G/T, EIRP, SFD and PFD values are provided. In accordance with Section 25.114(c)(4)(vii), the predicted antenna gain contours of the two representative transmit and receive antenna beams are provided in Schedule S. In accordance with

[1] The most recent technical information regarding AMC-15 is found in File No. SAT-MOD-20060410-00041.

Section 25.114(c)(4)(vii)(B), Table 1 below provides the latitude and longitude of each spot beam's maximum gain point.

**Table 1**

| Beam | Longitude | Latitude |
|---|---|---|
| Ka1 Downlink | -72.6 | 30.6 |
| Ka1 Uplink | -73.8 | 29.8 |
| Ka2 Uplink | -94.9 | 25.0 |
| Ka2 Downlink | -95.0 | 24.3 |
| Ka3 Uplink | -70.7 | 19.9 |
| Ka3 Downlink | -69.9 | 19.9 |
| Ka4 Uplink | -93.2 | 33.4 |
| Ka4 Downlink | -93.2 | 33.4 |
| Ka5 Uplink | -136.8 | 11.8 |
| Ka5 Downlink | -136.6 | 10.6 |
| Ka6 Uplink | -82.6 | 31.6 |
| Ka6 Downlink | -83.4 | 31.5 |
| Ka7 Uplink | -104.4 | 26.3 |
| Ka7 Downlink | -103.8 | 26.3 |
| Ka8 Uplink | -61.2 | 30.6 |
| Ka8 Downlink | -107.0 | 29.0 |
| Ka9 Uplink | -86.2 | 21.9 |
| Ka9 Downlink | -86.2 | 21.9 |
| Ka10 Uplink | -113.4 | 45.1 |
| Ka10 Downlink | -113.2 | 44.2 |
| Ka11 Uplink | -76.7 | 23.5 |
| Ka 11 Downlink | -75.7 | 24.2 |
| Ka12 Uplink | -102.3 | 32.6 |
| Ka12 Downlink | -102.3 | 32.6 |

Pursuant to 25.114(c)(4)(v), the gain-to-temperature ratio at beam peak and saturated flux density are not required for the command beam; however, the new Schedule S requires an entry for this parameter so we submitted dummy values (of 0 and -1). The beam peak flux density at the command threshold is -143.8 dBW/$m^2$/1MHz. Pursuant to 25.114(c)(4)(vi)(A), the contour at 8 dB below peak of beams falls entirely beyond visible Earth so GXT files are not provided for TC1, TM1, TM2, TM3.

## 3.0 Certification with respect to two degree spacing levels (§25.140)

SES certifies that AMC-15 will not generate a power flux-density at the Earth's surface in excess of −118 dBW/$m^2$/MHz and that its associated uplink operations will not exceed applicable EIRP density envelopes in §25.138(a) 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 and except as provided in §25.140(d).

## 4.0 Maximum Theoretical Operation Levels

AMC-15 will be operated consistent with coordination agreements with adjacent satellites. In any case, in the 11.7-12.2 GHz band, the downlink EIRP density of the AMC-15 digital carriers will not exceed -19 dBW/Hz; and in the 14-14.5 GHz band, the input power density of the uplink digital carriers of earth stations operating with AMC-15 will not exceed -45 dBW/Hz. In the 18.58-18.8 GHz and 19.7-20.2 GHz bands, the power flux-density at the Earth's surface produced by AMC-15 emissions will not exceed -115 dBW/$m^2$/MHz, and in the 28.4-28.6 GHz and 29.5-30 GHz bands, the input power density of the uplink digital carriers of earth stations operating with AMC-15 will not exceed -50 dBW/Hz.

## 5.0 Mitigation of Orbital Debris (§25.114(d)(14))

The information required under Section 25.114(d)(14) of the Commission's Rules is already on file with the Commission and is incorporated by reference herein.[2] SES hereby submits the following supplemental information regarding orbital debris mitigation:

**§ 25.114(d)(14)(ii):**

The AMC-15 satellite was designed and manufactured by Lockheed Martin and was launched in 2004. At the end of operational life, after the satellite has reached its final disposal orbit, onboard

[2] *See* SAT-MOD-20060410-00041, Technical Appendix at 3-5.

sources of stored energy will be depleted or secured, and the batteries will be discharged. However, at the end of AMC-15's operational life, there will be oxidizer remaining in the tanks that cannot be vented. Following insertion of the spacecraft into orbit, the spacecraft manufacturer permanently sealed the oxidizer tanks by firing pyrotechnic valves. This is a design feature of the Lockheed A2100 series spacecraft that cannot now be changed or remedied. Information regarding the residual oxidizer in the tanks is as follows:

| Tank | Volume [l] | pressure [bar] | temp. [deg C] | Oxidizer mass [kg] |
|---|---|---|---|---|
| Ox 1 | 327.5 | 16.79 | 8 | 11.6 |
| Ox 2 | 327.5 | 16.79 | 8 | 11.6 |

The oxidizer tanks are well shielded, and the residual pressure in the tanks will be well below their maximum rating.

In the narrative portion of this application, SES requests any necessary waiver of Sections 25.114(d)(14)(ii) and 25.283(c) in connection with the residual oxidizer that will remain in these tanks at the end of the satellite's life.

**§ 25.114(d)(14)(iii):**

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.

DECLARATION

I, Donna Wang, hereby certify under penalty of perjury that I am the technically qualified person responsible for the technical information contained in the foregoing exhibit; that I am familiar with the technical requirements of Part 25; and that I either prepared or reviewed the technical information contained in the exhibit and that it is complete and accurate to the best of my knowledge, information and belief.

*_/s/_Donna Wang_____*

Donna Wang
Engineer, Spectrum Management and Development Americas
SES

Dated: March 1, 2017