REQUEST FOR SPECIAL TEMPORARY AUTHORITY

By this application, SES Government Solutions, Inc., formerly known as Americom Government Services, Inc. ("SES-GS") respectfully requests special temporary authority ("STA") for a period of 30 days to operate an earth station at MacDill Air Force Base in Tampa, FL, that will communicate with the O3b Ka-band non-geostationary orbit fixed-satellite service ("NGSO FSS") satellite fleet. As discussed below, grant of the requested authority is in the public interest as it will allow SES-GS to test and evaluate O3b services that may be of interest to U.S. government customers. SES-GS does not seek to provide commercial services to end users. In order to accommodate the schedule for testing, SES-GS requests action on this STA by no later than October 15.

Background: SES-GS provides reliable and secure commercial satellite services to U.S. Government, Intelligence and Civilian agencies. SES-GS believes that adding access to the O3b network may be an attractive option for such customers. Because of its lower NGSO orbit, the O3b fleet can offer service with reduced latency at affordable rates. In order to introduce prospective customers to the capabilities of the O3b network, SES-GS has procured a set of antennas that can communicate with the O3b constellation and can be used to evaluate and demonstrate the O3b services. SES-GS initially sought and was granted Commission authority to locate these antennas at a site in Bristow, VA,[1] but now proposes to relocate the antennas to Tampa. Under the requested STA, SES-GS seeks to operate the antennas only for testing and providing demonstrations and will not be offering service to customers for a fee.

Protection of Authorized Stations: SES-GS seeks authority herein to communicate with O3b in a subset of the Ka-band spectrum that O3b has been licensed

[1] *See* SES Government Solutions, Inc., File Nos. SES-STA-20131022-00888 (grant-stamped Jan. 6, 2104); SES-STA-20131022-00887 (grant-stamped Jan. 31, 2014); & SES-STA-20140612-00517 (grant-stamped July 29, 2014).

to use for its existing U.S. earth stations.[2] Specifically, SES-GS requests authority for the following O3b beams:

Beam 3: 28.172-28.388 GHz uplink and 18.372-18.588 GHz downlink

Beam 4: 28.601-28.817 GHz uplink and 18.801-19.017 GHz downlink

Beam 5: 28.855-29.071 GHz uplink and 19.055-19.271 GHz downlink

NGSO FSS has a primary allocation in the beam 4 and 5 spectrum, but does not have a primary U.S. allocation in the band 3 spectrum. However, SES-GS demonstrates herein that its proposed communications with the O3b network in the beam 3 frequencies will not cause interference to primary operations, and SES-GS will not claim interference protection from such operations.

LMDS in the 28.172-28.350 GHz Band: In most of the O3b uplink spectrum for beam 3, terrestrial local multipoint distribution service ("LMDS") systems are primary, and FSS has a secondary allocation. In order to ensure that its proposed secondary operations would not cause interference to LMDS operations, SES-GS asked Comsearch to identify all existing and proposed terrestrial networks in the vicinity of the Tampa site. Comsearch notified each of these operators of the technical parameters of the planned SES-GS transmissions. In the attached report, Comsearch confirms that it did not receive any objections to the proposed operations from any of the potentially affected terrestrial systems.

The Commission has previously indicated that secondary FSS operations in the 27.6-28.35 GHz band are "for the purpose of providing limited gateway-type service."[3] SES-GS believes that the focus of these Commission's statements has been on ensuring that FSS operations are compatible with LMDS by limiting the number and

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[2] *See* O3b Limited, Call Sign E130021, File No. SES-LIC-20130124-00089 ("O3b Texas Application"), granted June 20, 2013 ("O3b Texas License"), Section C (authorizing operations in the 17.8-18.6 GHz, 18.8-19.3 GHz, 27.6-28.4 GHz, and 28.6-29.1 GHz bands); O3b Limited, Call Sign E100088, File No. SES-LIC-20100723-00952 ("O3b Hawaii Application"), granted Sept. 25, 2012 ("O3b Hawaii License"), Section C (same).

[3] *Rulemaking to Amend Parts 1, 2, 21, and 25 of the Commission's Rules to Redesignate the 27.5-29.5 GHz Frequency Band, to Reallocate the 29.5-30.0 GHz Frequency Band, to Establish Rules and Policies for Local Multipoint Distribution Service and for Fixed Satellite Services*, First Report and Order and Fourth Notice of Proposed Rulemaking, 11 FCC Rcd 19005, 19025, ¶ 45 (1996).

ubiquity of FSS terminals permitted to use the spectrum. The proposal by SES-GS to operate at a single site in Tampa is clearly consistent with this underlying rationale. Furthermore, as noted above, LMDS systems in the vicinity of the site have been notified of the proposed SES-GS operations and have not objected. Accordingly, grant of the requested SES-GS STA will not undermine the primary spectrum rights of LMDS systems.

GSO FSS in the 28.350-28.388 GHz and 18.372-18.588 GHz Bands: In the remaining segment of the beam 3 uplink frequencies, the spectrum is allocated to GSO FSS uplinks on a primary basis, with a secondary allocation for NGSO FSS uplinks. GSO FSS downlinks are primary throughout the beam 3 downlink spectrum, and there is no NGSO FSS allocation in this segment.

Uplink transmissions from the proposed SES-GS earth station will not cause harmful interference to primary GSO FSS networks. In support of its Hawaii application, O3b demonstrated that its proposed operations at that site would comply with ITU uplink EPFD limits applicable to the 28.35-28.4 GHz band.[4] This showing was based on the power levels of the earth station and the angular separation between the O3b and geostationary orbits as viewed from the Earth. In its later Texas application, O3b cross-referenced the O3b Hawaii Application and demonstrated that because the Texas site is further north than the Hawaii location, the angular separation is greater, providing a greater margin of compliance.[5] The SES-GS proposed Tampa site is also further north than O3b's Hawaii location, and the SES-GS antennas will operate at lower power levels than the O3b Hawaii or Texas antennas.[6] Accordingly, for the reasons set forth in the O3b Hawaii and Texas Applications, the proposed SES-GS operations will comply with the applicable ITU $EPFD_{up}$ limits. As a result, grant of STA

[4] O3b Hawaii Application, Narrative at 14-15 & Technical Appendix at 26-28.

[5] O3b Texas Application, Narrative at 6.

[6] Specifically, the maximum earth station EIRP density transmitted by the proposed SES-GS 1.8 meter Tampa earth station for a 216 MHz signal is 21.5 dBW/4kHz, which is equivalent to 31.5 dBW/40kHz. This results in an input power spectral density of -31.5 dBW/4kHz. Assuming a 32 - 25 log(Θ) gain mask, the off-axis gain of the transmitting earth station for an off-axis angle of 7.4° is 2.8 dBi, resulting in a worst-case off-axis EIRP density towards the GSO of -28.7 dBW/4kHz or -18.7 dBW/40kHz.

for use of the 28.35-28.4 GHz band on a secondary basis to communicate with the O3b constellation is consistent with Commission precedent.[7]

SES-GS proposes to use the 18.372-18.588 GHz band on a non-conforming basis. SES-GS acknowledges that it is not entitled to protection from interference caused by primary GSO FSS operations in this spectrum. Furthermore, O3b has demonstrated that transmissions from its space stations will comply with the limits developed by the ITU to protect GSO FSS networks from unacceptable interference.[8] O3b's compliance demonstration is based on the angular separation between the O3b and GSO orbits when viewed from the earth, which increases for latitudes further from the equator.[9] SES-GS seeks authority here for operations in Tampa that are at a higher latitude than the O3b authorized site in Hawaii, and accordingly the analysis provided in the O3b Hawaii Application supports grant of authority here.

Earth Station Technical Parameters: SES-GS is attaching the following documents to provide the technical details of the operations proposed under the requested STA:

1. Schedule B. Although SES-GS is not seeking a permanent license for the Tampa demonstration site, SES-GS is providing as Annex 1 hereto a Schedule B with the applicable technical parameters for the Commission's convenience.

2. Comsearch report. As discussed above, Comsearch identified and notified the 28 GHz terrestrial networks in the vicinity of the Tampa site. Attached as Annex 2 is the report confirming that no terrestrial licensee objected to the proposed operations of SES-GS.

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[7] *See, e.g.,* O3b Texas License, Provisions 90086 and 90087 (specifying that transmissions from the earth station are secondary in the 27.6-28.4 GHz band and must comply with ITU EPFD requirements); O3b Hawaii License, Provisions 90039 and 90040 (same); *Northrop Grumman Space & Missions Systems Corp.,* 24 FCC Rcd 2330, 2354 at ¶¶ 72-73 (Int'l Bur. 2009) (authorizing NGSO uplink operations on a secondary basis in primary GSO spectrum conditioned on compliance with ITU EPFD limits); *contactMEO Communications, LLC,* 21 FCC Rcd 4035, 4043-44 at ¶¶ 23-24, (Int'l Bur. 2006) (same).

[8] *See* O3b Hawaii Application, Narrative at 12-14 & Technical Appendix at 22-26.

[9] *See id.*

3. Link budgets. Representative link budgets for the Tampa earth station are provided in Annex 3.

In addition, SES-GS incorporates by reference herein technical materials it previously provided:

1. Antenna patterns. The Tampa site will use the same 1.8 meter antennas, manufactured by General Dynamics SATCOM Technologies, that were used at the SES-GS Bristow site. The antenna patterns were submitted as Annex 3 in File No. SES-STA-20131022-00887.

2. Radiation hazard study. SES-GS has performed an analysis of the maximum radiofrequency levels emitted from the satellite communications antenna, and it was submitted as Annex 5 in File No SES-STA-20131022-00887.

Finally, SES-GS incorporates by reference herein technical materials provided by O3b:

1. Schedule S and beam contour description. In October 2013, O3b provided supplemental information regarding its constellation in connection with O3b's application for a blanket license for Earth Stations on Vessels. This set of data included a revised Schedule S and responses to specific FCC questions. *See* O3b Limited, Call Sign E130098, File No. SES-AMD-20131025-01138, filed Oct. 25, 2013, Completed Schedule S and O3b Reply. The operational characteristics of the proposed SES-GS Tampa terminal are within all aspects of the envelope defined for user terminals in O3b's Schedule S. Furthermore, the beam contours for the proposed operations can be derived from the formulas O3b supplied on page 10 of its Reply.

2. Service area definition. The SES-GS Tampa location falls within the "U" service area identified in the O3b revised Schedule S, which includes all locations on Earth with elevation angles to the operational O3b satellites greater than 3 degrees.

3. U.S. government coordination. As explained in the O3b Hawaii Application, coordination of the O3b NGSO satellite system has been completed, and the coordination agreement has been provided confidentially to the Commission. *See* O3b Hawaii Application, Attachment A at 33, Section A.12. O3b has advised SES-GS that the agreement contemplates the operation of U.S. earth stations.

4. Compliance with PFD limits. O3b has shown that the power flux density ("PFD") of the O3b system complies with all applicable FCC

limits. *See* O3b Limited, Call Sign E130107, File No. SES-LIC-20130618-00516, Technical Supplement filed July 24, 2013 at 6-8. This showing is based on a worst-case methodology to calculate the maximum EIRP density produced by the O3b downlinks. The proposed SES-GS Tampa earth station will be operated with O3b downlink signals that are below this maximum EIRP density level.

5. Notification of satellite operational flexibility. O3b has advised SES-GS that O3b has filed new information with the Commission concerning an expansion of the possible configurations in which O3b positions its NGSO satellites. *See, e.g., O3b Limited,* Call Sign E130107, File No. SES-AMD-20140814-00653, Exhibit. SES-GS has reviewed the O3b document and incorporates it by reference herein.

U.S. Market Access: The O3b Hawaii Application included a showing that allowing U.S. earth stations to communicate with the foreign-licensed O3b NGSO constellation is consistent with U.S. market access policies,[10] as those policies are set forth in the *DISCO II* framework[11] and codified in Section 25.137.[12] The Commission granted the application, thereby authorizing communication between the Hawaii earth station and the O3b satellite fleet.[13] Subsequent to that grant, no change has occurred in the O3b satellite network's operating parameters or the services that the network will be used to provide. Under these circumstances, no additional showing is needed to allow SES-GS to use its proposed Tampa antennas to communicate with the O3b satellite constellation.[14]

In any event, the SES-GS Tampa antennas will be used for evaluation and demonstration purposes only, and not for commercial services. As a result, grant of the requested authority to communicate with the O3b constellation will have no effect on competition within the U.S.

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[10] *See* O3b Hawaii Application, Legal Narrative at 10-24.

[11] *See Amendment of the Commission's Policies to Allow Non-U.S. Licensed Space Stations providing Domestic and International Service in the United States,* Report & Order, 12 FCC Rcd 24094 (1997) ("*DISCO II*").

[12] 47 C.F.R. § 25.137.

[13] *See* O3b Hawaii License, Section D (authorizing communications with the U.K.-licensed O3b NGSO satellite system).

[14] *See DISCO II,* 12 FCC Rcd at 24176, ¶ 192.

Waiver Requests: SES-GS requests grant of any necessary waiver of the Commission's rules in connection with the instant STA request. Such waiver 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.[15]

Section 25.145(c): Section 25.145(c) of the Commission's rules requires Ka-band NGSO systems to meet global and U.S. service coverage requirements.[16] O3b has explained that its network, which was designed with a focus on providing service to emerging markets and areas without significant terrestrial broadband infrastructure, cannot meet these requirements.[17] O3b argued that granting a waiver of the coverage requirements to allow access to the O3b network would further, not undermine, achievement of the rule's purpose – fostering seamless global communications.[18] The Commission granted a waiver of the rule for both the O3b Hawaii and Texas gateway and TT&C earth stations, but stated that the grant was without prejudice to action on any waiver request to provide additional U.S. services.[19]

SES-GS seeks grant of any necessary waiver of Section 25.145(c) in connection with the instant STA request. As with the O3b Hawaii and Texas stations, the proposed SES-GS Tampa antennas will not provide commercial services to end

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

[16] 47 C.F.R. § 25.145(c).

[17] *See* O3b Limited, Call Sign E100088, File No. SES-LIC-20100723-00952 ("O3b Hawaii Application"), Legal Narrative at 21-22.

[18] *Id.* at 22.

[19] *See* O3b Hawaii License, Provision 90044; O3b Texas License, Provision 90044.

users. Instead, the antennas will be operated only for purposes of evaluating the capabilities of the O3b network and demonstrating those capabilities to prospective customers interested in using O3b capacity for their communications needs, whether outside or inside the U.S. No fees will be charged to customers for these demonstrations, and accordingly the proposed operations will have no effect on competition in the U.S. In these circumstances, preventing SES-GS from communicating with the operational O3b global satellite network because that network does not comply with Commission coverage requirements would serve no conceivable public interest objective.

Section 25.210(i)(1): O3b has also explained that its satellite constellation does not comply with the minimum cross-polarization isolation requirement for FSS systems in Section 25.210(i)(1).[20] The Commission granted a waiver of this rule in the O3b Hawaii and Texas Licenses.[21] For the same reasons, SES-GS requests that the Commission grant any necessary waiver of Section 25.210(i)(1) in connection with the instant STA request.

Conclusion: The requested STA will allow SES-GS to evaluate and demonstrate the O3b network's operational capabilities and will not result in harmful interference to other authorized spectrum users. Thus, grant of the STA will serve the public interest.

[20] *See* O3b Hawaii Application, Legal Narrative at 22-23.

[21] *See* O3b Hawaii License, Provision 90041; O3b Texas License, Provision 90041.

Approved by OMB
3060-0678

Date & Time Filed:
File Number: ---
Callsign/Satellite ID:

APPLICATION FOR EARTH STATION AUTHORIZATIONS FCC 312 MAIN FORM FOR OFFICIAL USE ONLY	FCC Use Only

APPLICANT INFORMATION

Enter a description of this application to identify it on the main menu:
STA Attachment for MacDill AFB,Tampa FL O3b Ka Demo

1-8. Legal Name of Applicant

Name:	SES Government Solutions, Inc.	Phone Number:	703-610-0906
DBA Name:		Fax Number:	703-610-1030
Street:	2010 Corporate Ridge, Suite 550	E-Mail:	joe.oloughlin@ses-gs.com
City:	McLean	State:	VA
Country:	USA	Zipcode:	22102 -
Attention:	Mr Joseph A O'Loughlin		

9-16. Name of Contact Representative

Name:	Karis Hastings	Phone Number:	202-599-0975
Company:	SatCom Law LLC	Fax Number:	
Street:	1317 F Street, N.W. Suite 400	E-Mail:	karis@satcomlaw.com
City:	Washington	State:	DC
Country:	USA	Zipcode:	20004-
Attention:		Relationship:	Legal Counsel

CLASSIFICATION OF FILING

17. Choose the button next to the classification that applies to this filing for both questions a. and b. Choose only one for 17a and only one for 17b.

a.
◉ a1. Earth Station
(N/A) a2. Space Station

b.
◉ b1. Application for License of New Station
○ b2. Application for Registration of New Domestic Receive-Only Station
(N/A) b3. Amendment to a Pending Application
(N/A) b4. Modification of License or Registration
(N/A) b5. Assignment of License or Registration
(N/A) b6. Transfer of Control of License or Registration
(N/A) b7. Notification of Minor Modification
(N/A) b8. Application for License of New Receive-Only Station Using Non-U.S. Licensed Satellite
(N/A) b9. Letter of Intent to Use Non-U.S. Licensed Satellite to Provide Service in the United States
○ b10. Other (Please specify)
○ b11. Application for Earth Station to Access a Non-U.S.satellite Not Currently

	Authorized to Provide the Proposed Service in the Proposed Frequencies in the United States.

17c. 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):

17d.

Fee Classification BAX - Fixed Satellite Transmit/Receive Earth Station

18. If this filing is in reference to an existing station, enter:	19. If this filing is an amendment to a pending application enter:	
(a) Call sign of station:	(a) Date pending application was filed:	(b) File number of pending application:
Not Applicable	Not Applicable	Not Applicable

TYPE OF SERVICE

20. NATURE OF SERVICE: This filing is for an authorization to provide or use the following type(s) of service(s): Select all that apply:

- ▪ a. Fixed Satellite
- ▪ b. Mobile Satellite
- ▪ c. Radiodetermination Satellite
- ▪ d. Earth Exploration Satellite
- ▪ e. Direct to Home Fixed Satellite
- ▪ f. Digital Audio Radio Service
- ▪ g. Other (please specify)

21. STATUS: Choose the button next to the applicable status. Choose only one.

⌒ Common Carrier ⌒ Non-Common Carrier

22. If earth station applicant, check all that apply.

▪ Using U.S. licensed satellites

▪ Using Non-U.S. licensed satellites

23. If applicant is providng INTERNATIONAL COMMON CARRIER service, see instructions regarding Sec. 214 filings. Choose one. Are these facilities:

⌒ Connected to a Public Switched Network ⌒ Not connected to a Public Switched Network ⌒ N/A

24. FREQUENCY BAND(S): Place an "X" in the box(es) next to all applicable frequency band(s).

▪ a. C-Band (4/6 GHz) ▪ b. Ku-Band (12/14 GHz)

▪ c.Other (Please specify upper and lower frequencies in MHz.)

Frequency Lower: 18372 Frequency Upper: 29071

TYPE OF STATION

25. CLASS OF STATION: Choose the button next to the class of station that applies. Choose only one.

◉ a. Fixed Earth Station

○ b. Temporary-Fixed Earth Station

○ c. 12/14 GHz VSAT Network

○ d. Mobile Earth Station

(N/A) e. Geostationary Space Station

(N/A) f. Non-Geostationary Space Station

○ g. Other (please specify)

26. TYPE OF EARTH STATION FACILITY: Choose only one.

◉ Transmit/Receive ○ Transmit-Only ○ Receive-Only ○ N/A

PURPOSE OF MODIFICATION

27. The purpose of this proposed modification is to: (Place an 'X' in the box(es) next to all that apply.) Not Applicable

ENVIRONMENTAL POLICY

28. Would a Commission grant of any proposal in this application or amendment have a significant environmental impact as defined by 47 CFR 1.1307? If YES, submit the statement as required by Sections 1.1308 and 1.1311 of the Commission's rules, 47 C.F.R. §§ 1.1308 and 1.1311, as an exhibit to this application.A Radiation Hazard Study must accompany all applications for new transmitting facilities, major modifications, or major amendments.	○ **Yes** ◉ **No**

ALIEN OWNERSHIP Earth station applicants not proposing to provide broadcast, common carrier, aeronautical en route or aeronautical fixed radio station services are not required to respond to Items 30-34.

29. Is the applicant a foreign government or the representative of any foreign government?	○ **Yes** ◉ **No**
30. Is the applicant an alien or the representative of an alien?	○ **Yes** ○ **No** ◉ **N/A**
31. Is the applicant a corporation organized under the laws of any foreign government?	○ **Yes** ○ **No** ◉ **N/A**
32. Is the applicant a corporation of which more than one-fifth of the capital stock is owned of record or voted by aliens or their representatives or by a foreign government or representative thereof or by any corporation organized under the laws of a foreign country?	○ **Yes** ○ **No** ◉ **N/A**
33. Is the applicant a corporation directly or indirectly controlled by any other corporation of which more than one-fourth of the capital stock is owned of record or voted by aliens, their representatives, or by a foreign government or representative thereof or by any corporation organized under the laws of a foreign country?	○ **Yes** ○ **No** ◉ **N/A**
34. If any answer to questions 29, 30, 31, 32 and/or 33 is Yes, attach as an exhibit an identification of the aliens or foreign entities, their nationality, their relationship to the applicant, and the percentage of stock they own or vote.	

BASIC QUALIFICATIONS

35. Does the Applicant request any waivers or exemptions from any of the Commission's Rules? If Yes, attach as an exhibit, copies of the requests for waivers or exceptions with supporting documents.	◉ **Yes** ○ **No**
36. Has the applicant or any party to this application or amendment had any FCC station authorization or license revoked or had any application for an initial, modification or renewal of FCC station authorization, license, or construction permit denied by the Commission? If Yes, attach as an exhibit, an explination of circumstances.	○ **Yes** ◉ **No**
37. Has the applicant, or any party to this application or amendment, or any party directly or indirectly controlling the applicant ever been convicted of a felony by any state or federal court? If Yes, attach as an exhibit, an explination of circumstances.	○ **Yes** ◉ **No**
38. Has any court finally adjudged the applicant, or any person directly or indirectly controlling the applicant, guilty of unlawfully monopolizing or attemptiing unlawfully to monopolize radio communication, directly or indirectly, through control of manufacture or sale of radio apparatus, exclusive traffic arrangement or any other means or unfair methods of competition? If Yes, attach as an exhibit, an explanation of circumstances	○ **Yes** ◉ **No**
39. Is the applicant, or any person directly or indirectly controlling the applicant, currently a party in any pending matter referred to in the preceding two items? If yes, attach as an exhinit, an explanation of the circumstances.	○ **Yes** ◉ **No**
40. If the applicant is a corporation and is applying for a space station license, attach as an exhibit the names, address, and citizenship of those stockholders owning a record and/or voting	

10 percent or more of the Filer's voting stock and the percentages so held. In the case of fiduciary control, indicate the beneficiary(ies) or class of beneficiaries. Also list the names and addresses of the officers and directors of the Filer.

41. 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**

42a. Does the applicant intend to use a non-U.S. licensed satellite to provide service in the United States? If Yes, answer 42b and attach an exhibit providing the information specified in *47 C.F.R. 25.137, as appropriate*. If No, proceed to question 43.

(●) **Yes** ( ) **No**

42b. What administration has licensed or is in the process of licensing the space station? If no license will be issued, what administration has coordinated or is in the process of coordinating the space station?United Kingdom

43. Description. (Summarize the nature of the application and the services to be provided). SES Government Solutions seeks FCC authority to operate an earth station at MacDill AFB in Tampa, Florida, with the O3b U.K.-licensed non-geostationary Ka-band satellite system for testing and demonstration purposes only.

43a. Geographic Service Rule Certification

By selecting A, the undersigned certifies that the applicant is not subject to the geographic service or geographic coverage requirements specified in 47 C.F.R. Part 25. ( ) **A**

By selecting B, the undersigned certifies that the applicant is subject to the geographic service or geographic coverage requirements specified in 47 C.F.R. Part 25 and will comply with such requirements. ( ) **B**

By selecting C, the undersigned certifies that the applicant is subject to the geographic service or geographic coverage requirements specified in 47 C.F.R. Part 25 and will not comply with such requirements because it is not feasible as a technical matter to do so, or that, while technically feasible, such services would require so many compromises in satellite design and operation as to make it economically unreasonable. A narrative description and technical analysis demonstrating this claim are attached. (●) **C**

CERTIFICATION

The Applicant waives any claim to the use of any particular frequency or of the electromagnetic spectrum as against the regulatory power of the United States because of the previous use of the same, whether by license or otherwise, and requests an authorization in accordance with this application. The applicant certifies that grant of this application would not cause the applicant to be in violation of the spectrum aggregation limit in 47 CFR Part 20. All statements made in exhibits are a material part hereof and are incorporated herein as if set out in full in this application. The undersigned, individually and for the applicant, hereby certifies that all statements made in this application and in all attached exhibits are true, complete and correct to the best of his or her knowledge and belief, and are made in good faith.

44. Applicant is a (an): (Choose the button next to applicable response.)

- ( ) Individual
- ( ) Unincorporated Association
- ( ) Partnership
- (●) Corporation
- ( ) Governmental Entity
- ( ) Other (please specify)

45. Name of Person Signing	46. Title of Person Signing
Joseph O'Loughlin	CTO

47. Please supply any need attachments.

Attachment 1:	Attachment 2:	Attachment 3:

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).

SATELLITE EARTH STATION AUTHORIZATIONS
FCC Form 312 - Schedule B:(Technical and Operational Description)

FOR OFFICIAL USE ONLY

Location of Earth Station Site

E1: Site Identifier:	MacDill AFB 1.8m Ka	E5. Call Sign:	
E2: Contact Name	Tim Kavanaugh	E6. Phone Number:	703-350-8665
E3. Street:	8532 Marina Bay Drive	E7. City:	Tampa
		E8. County:	Hillsborough
E4. State	FL	E9. Zip Code	33621
E10. Area of Operation:		Fixed	
E11. Latitude:	27 ° 50 ' 34.73 " N		
E12. Longitude:	82 ° 28 ' 59.43 " W		
E13. Lat/Lon Coordinates are:		○ NAD-27	◉ NAD-83 ○ N/A
E14. Site Elevation (AMSL):		0.97 meters	

E15. If the proposed antenna(s) operate in the Fixed Satellite Service (FSS) with geostationary satellites, do(es) the proposed antenna(s) comply with the antenna gain patterns specified in Section 25.209(a) and (b) as demonstrated by the manufacturer's qualification measurement? If NO, provide asa technical analysis showing compliance with two-degree spacing policy.	○ Yes ○ No ◉ N/A
E16. If the proposed antenna(s) do not operate in the Fixed Satellite Service (FSS), or if they operate in the Fixed Satellite Service (FSS) with non-geostationary satellites, do(es) the proposed antenna(s) comply with the antenna gain patterns specified in Section 25.209(a2) and (b) as demonstrated by the manufacturer's qualification measurements?	◉ Yes ○ No ○ N/A
E17. Is the facility operated by remote control? If YES, provide the location and telephone number of the control point.	○ Yes ◉ No
E18. Is frequency coordination required? If YES, attach a frequency coordination report as	◉ Yes ○ No
E19. Is coordination with another country required? If YES, attach the name of the country(ies) and plot of coordination contours as	○ Yes ◉ No
E20. FAA Notification - (See 47 CFR Part 17 and 47 CFR part 25.113(c)) Where FAA notification is required, have you attached a copy of a completed FCC Form 854 and or the FAA's study regarding the potential hazard of the structure to aviation? FAILURE TO COMPLY WITH 47 CFR PARTS 17 AND 25 WILL RESULT IN THE RETURN OF THIS APPLICATION.	○ Yes ◉ No

POINTS OF COMMUNICATION

Satellite Name:OTHER | OTHER | If you selected OTHER, please enter the following:	
E21. Common Name: O3B-A	E22. ITU Name: O3B-A
E23. Orbit Location: Eq. NGSO	E24. Country: United Kingdom

POINTS OF COMMUNICATION (Destination Points)

E25. Site Identifier: MacDill AFB 1.8m Ka	
E26. Common Name:	E27. Country:USA

ANTENNA

Site ID	E28. Antenna Id	E29. Quantity	E30. Manufacturer	E31. Model	E32. Antenna Size	E41/42. Antenna GainTransmint and/or Recieve(____dBi at _____GHz)
MacDill AFB 1.8m Ka	Ant 1-2	2	GD/Prodelin	GDST-1.8M	1.8	49.1 dBi at 18.562
						52.8 dBi at 28.362

E28. Antenna Id	E33/34. Diameter Minor/Major (meters)	E35. Above Ground Level (meters)	E36. Above Sea Level (meters)	E37. Building Height Above Ground Level (meters)	E38. Total Input Power at antenna flange (Watts)	E39. Maximum Antenna Height Above Rooftop (meters)	E40. Total EIRP for al carriers (dBW)
Ant 1-2	0.0/0.0	2.4	3.37	0.0	40.0	0.0	68.8

FREQUENCY

E28. Antenna Id	E43/44. Frequency Bands(MHz)	E45. T/R Mode	E46. Antenna Polarization (H,V,L,R)	E47. Emission Designator	E48. Maximum EIRP per Carrier(dBW)	E49. Maximum ERIP Density per Carrier (dBW/4kHz)
Ant 1-2	18372 18588	R	Left Hand Circular	1M00G7D	0.0	0.0
E50. Modulation and Services Digital Data						
Ant 1-2	18372 18588	R	Left Hand Circular	216MG7D	0.0	0.0
E50. Modulation and Services Digital Data						
Ant 1-2	18801 19017	R	Left Hand Circular	1M00G7D	0.0	0.0
E50. Modulation and Services Digital Data						
Ant 1-2	18801 19017	R	Left Hand Circular	216MG7D	0.0	0.0
E50. Modulation and Services Digital Data						
Ant 1-2	19055 19271	R	Left Hand Circular	1M00G7D	0.0	0.0
E50. Modulation and Services Digital Data						
Ant 1-2	19055 19271	R		216MG7D	0.0	0.0

			Left Hand Circular			
E50. Modulation and Services Digital Data						
Ant 1-2	28172 28388	T	Right Hand Circular	1M00G7D	48.6	24.6
E50. Modulation and Services Digital Data						
Ant 1-2	28172 28388	T	Right Hand Circular	216MG7D	68.8	21.5
E50. Modulation and Services Digital Data						
Ant 1-2	28601 28817	T	Right Hand Circular	1M00G7D	48.6	24.6
E50. Modulation and Services Digital Data						
Ant 1-2	28601 28817	T	Right Hand Circular	216MG7D	68.8	21.5
E50. Modulation and Services Digital Data						
Ant 1-2	28855 29071	T	Right Hand Circular	1M00G7D	48.6	24.6
E50. Modulation and Services Digital Data						
Ant 1-2	28855 29071	T	Right Hand Circular	216MG7D	68.8	21.5
E50. Modulation and Services Digital Data						

FREQUENCY COORDINATION

E28. Antenna Id	E51. Satellite Orbit Type	E52/53. Frequency Limits (MHz)	E54/55. Range of Satellite Arc E/W Limit	E56. Earth Station Azimuth Angle Eastern Limit	E57. Antenna Elevation Angle Eastern Limit	E58. Earth Station Azimuth Angle Western Limit	E59. Antenna Elevation Angle Western Limit	E60. Maximum EIRP Density toward the Horizon (dBW/4kHz)
Ant 1-2	Non-Geostationary	18300 18600	0.0/ 0.0	144.0	29.0	227.0	44.0	0.0
	Non-Geostationary	18800 19300	0.0/ 0.0	144.0	29.0	227.0	44.0	0.0
	Non-Geostationary	28100 28400	0.0/ 0.0	144.0	29.0	227.0	44.0	21.5
	Non-Geostationary	28600 29100	0.0/ 0.0	144.0	29.0	227.0	44.0	21.5

REMOTE CONTROL POINT LOCATION

REMOTE CONTROL POINT LOCATION

E61. Call Sign NOTE: Please enter the callsign of the controlling station, not the callsign for which this application is being filed.	E65. Phone Number
E62. Street Address	

E63. City	E67. County	E64/68. State/Country /	E66. Zip Code

FCC NOTICE REQUIRED BY THE PAPERWORK REDUCTION ACT

The public reporting for this collection of information is estimated to average 0.25 - 24 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the required data, and completing and reviewing the collection of information. If you have any comments on this burden estimate, or how we can improve the collection and reduce the burden it causes you, please write to the Federal Communications Commission, AMD-PERM, Paperwork Reduction Project (3060-0678), Washington, DC 20554. We will also accept your comments regarding the Paperwork Reduction Act aspects of this collection via the Internet if you send them to PRA@fcc.gov. PLEASE DO NOT SEND COMPLETED FORMS TO THIS ADDRESS.

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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.

Annex 2

Ka-Band Earth Station – MacDill AFB, Fla.

Frequency Coordination Report

28 GHz

Prepared on Behalf of
SES Government
Solutions, Inc.

August 14, 2014

COMSEARCH®
A CommScope Company

Table of Contents

1. Summary of Results

On behalf of SES Government Solutions, Comsearch performed a coordination notice for all existing and proposed terrestrial licenses within the coordination contour of their proposed Ka-Band earth station at MacDill AFB, Fla., transmitting at 28 GHz[1]. Prior notification letters were sent to the licensees and a copy of the notification data is provided in section four of this report. The earth station coordination was finalized on August 11, 2014.

No objections were received from any of the incumbent 28 GHz licensees. Our notification to the LMDS incumbents was performed under the assumption that the earth stations would be operating on a secondary basis to LMDS Block A operations and a contact at SES Government Solutions has been provided in case any concerns may arise in the future.

2. 28 GHz Common Carrier and LTTS Coordination

In accordance with FCC Rules and Regulations, the Ka-Band earth station at MacDill AFB, Fla. prior-coordinated by Comsearch. A notification letter and datasheet for this earth station were sent to the following 28 GHz common carrier fixed microwave licensee on August 4, 2014. This licensee is authorized to operate temporary fixed operations from 27.5 – 29.5 GHz on a nationwide basis.

Licensee	Authorized Geographic Area
Verizon Wireless	Continental US

A notification letter and datasheet for the Ka-Band earth station at MacDill AFB, Fla. were also sent to the following 28 GHz local television transmission licensee on August 4, 2014. This licensee is authorized to operate temporary fixed operations from 27.5 – 29.5 GHz on a nationwide basis.

Licensee	Authorized Geographic Area
Information Super Station, LLC	Continental US

No objections were received from the common carrier or local television transmission service incumbents.

[1] The proposed earth station will operate in the 27.6 – 28.4 GHz and 28.6 – 29.1 GHz portions of the Ka-Band.

3. 28 GHz LMDS Coordination

A Notification letter was sent to the following 28 GHz LMDS licensees on August 4, 2014. The proposed earth station will operate on frequencies that overlap Block A of the LMDS service. The total frequency allocation for Block A of the LMDS spectrum appears below.

Block A: 27.500-28.350 GHz
29.100-29.250 GHz
31.075-31.225 GHz

Licensee	Market	Market Name
Wireless Distribution Services	BTA239	Lakeland-Winter Haven, FL
Straight Path Spectrum	BTA336	Orlando, FL
Nextlink/XO	BTA440[2]	Tampa-St. Petersburg-Clearwater, FL

No objections were received from the LMDS incumbents.

[2] The proposed earth station will be located inside BTA440.

4. Earth Station Coordination Data

This section presents the data pertinent to the proposed Ka-Band earth station at MacDill AFB, Fla. This data was circulated to all incumbent licensees in the shared 28 GHz frequency ranges.

Date: 08/12/2014
Job Number: 140801COMSGE05

Administrative Information	
Status	ENGINEER PROPOSAL
Call Sign	MACDILL
Licensee Code	AMGOSE
Licensee Name	SES Government Solutions, Inc.

Site Information	**MACDILL AFB, FL**
Venue Name	
Latitude (NAD 83)	27° 50' 34.7" N
Longitude (NAD 83)	82° 28' 59.4" W
Climate Zone	B
Rain Zone	1
Ground Elevation (AMSL)	0.97 m / 3.2 ft

Link Information	
Satellite Type	Low Earth Orbit
Mode	TR - Transmit-Receive
Modulation	Digital
Minimum Elevation Angle	25.0°
Azimuth Range	0.0° to 360°
Antenna Centerline (AGL)	2.74 m / 9.0 ft

Antenna Information		**Receive - FCC32**		**Transmit - FCC32**
Manufacturer		GD Prodelin		GD Prodelin
Model		GDST-1.8m		GDST-1.8m
Gain / Diameter		49.1 dBi / 1.8 m		52.8 dBi / 1.8 m
3-dB / 15-dB Beamwidth		0.23° / 0.60°		0.14° / 0.32°
Max Available RF Power	(dBW/4 kHz)			-31.3
	(dBW/MHz)			-7.3
Maximum EIRP	(dBW/4 kHz)			21.5
	(dBW/MHz)			45.5
Interference Objectives:	Long Term 20%	-156.0 dBW/MHz	20%	-151.0 dBW/4 kHz
	Short Term 0.0025%	-146.0 dBW/MHz	0.01%	-128.0 dBW/4 kHz

Frequency Information	**Receive 18.0 GHz**	**Transmit 28.0 GHz**
Emission / Frequency Range (MHz)	216MG7D / 17852.0 - 18068.0	216MG7D / 27652.0 - 27868.0
	216MG7D / 18112.0 - 18328.0	216MG7D / 27912.0 - 28128.0
	216MG7D / 18372.0 - 18588.0	216MG7D / 28172.0 - 28388.0
	216MG7D / 18801.0 - 19017.0	216MG7D / 28601.0 - 28817.0
	216MG7D / 19055.0 - 19271.0	216MG7D / 28855.0 - 29071.0
Max Great Circle Coordination Distance	171.0 km / 106.2 mi	100.0 km / 62.1 mi
Precipitation Scatter Contour Radius	100.0 km / 62.1 mi	100.0 km / 62.1 mi

Coordination Values	**MACDILL AFB, FL**			
Licensee Name	SES Government Solutions, Inc.			
Latitude (NAD 83)	27° 50' 34.7" N			
Longitude (NAD 83)	82° 28' 59.4" W			
Ground Elevation (AMSL)	0.97 m / 3.2 ft			
Antenna Centerline (AGL)	2.74 m / 9.0 ft			
Antenna Model	GD/Prodelin 1.8 Meter			
Antenna Mode	Receive 18.0 GHz		Transmit 28.0 GHz	
Interference Objectives: Long Term	-156.0 dBW/MHz	20%	-151.0 dBW/4 kHz	20%
Short Term	-146.0 dBW/MHz	0.01%	-128.0 dBW/4 kHz	0.0025%
Max Available RF Power		-31.3 (dBW/4 kHz)		

	Transmit 28.0 GHz		Receive 18.0 GHz			
Azimuth (°)	Horizon Elevation (°)	Antenna Discrimination (°)	Horizon Gain (dBi)	Coordination Distance (km)	Horizon Gain (dBi)	Coordination Distance (km)
0	0.00	93.53	-10.00	151.60	-10.00	100.00
5	0.00	88.53	-10.00	151.60	-10.00	100.00
10	0.00	83.53	-10.00	151.60	-10.00	100.00
15	0.00	78.54	-10.00	151.60	-10.00	100.00
20	0.00	73.54	-10.00	151.60	-10.00	100.00
25	0.00	68.54	-10.00	151.60	-10.00	100.00
30	0.00	63.55	-10.00	151.60	-10.00	100.00
35	0.00	58.55	-10.00	151.60	-10.00	100.00
40	0.00	53.56	-10.00	151.60	-10.00	100.00
45	0.00	48.56	-10.00	151.60	-10.00	100.00
50	0.00	43.57	-10.00	151.60	-10.00	100.00
55	0.00	38.57	-10.00	151.60	-10.00	100.00
60	0.00	33.58	-10.00	151.60	-10.00	100.00
65	0.00	28.60	-10.00	151.60	-10.00	100.00
70	0.00	23.61	-10.00	151.60	-10.00	100.00
75	0.00	18.64	-9.72	152.60	-9.72	100.00
80	0.00	13.68	-8.84	155.70	-8.84	100.00
85	0.00	8.77	-7.95	158.90	-7.95	100.00
90	0.00	4.08	-7.08	162.10	-7.08	100.00
95	0.00	2.52	-6.25	165.10	-6.25	100.00
100	0.00	6.79	-5.53	167.70	-5.53	100.00
105	0.00	11.65	-4.98	169.70	-4.98	100.00
110	0.00	16.59	-4.66	170.80	-4.66	100.00
115	0.00	21.56	-4.62	170.90	-4.62	100.00
120	0.00	26.54	-4.86	170.10	-4.86	100.00
125	0.00	31.53	-5.36	168.30	-5.36	100.00
130	0.00	36.52	-6.04	165.80	-6.04	100.00
135	0.00	41.51	-6.84	162.90	-6.84	100.00
140	0.00	46.51	-7.71	159.80	-7.71	100.00
145	0.00	51.50	-8.60	156.60	-8.60	100.00
150	0.00	56.50	-9.46	153.50	-9.46	100.00
155	0.00	61.49	-10.00	151.60	-10.00	100.00
160	0.00	66.49	-10.00	151.60	-10.00	100.00
165	0.00	71.48	-10.00	151.60	-10.00	100.00
170	0.00	76.48	-10.00	151.60	-10.00	100.00
175	0.00	81.48	-10.00	151.60	-10.00	100.00
180	0.00	86.47	-10.00	151.60	-10.00	100.00
185	0.00	91.47	-10.00	151.60	-10.00	100.00

Coordination Values	**MACDILL AFB, FL**			
Licensee Name	SES Government Solutions, Inc.			
Latitude (NAD 83)	27° 50' 34.7" N			
Longitude (NAD 83)	82° 28' 59.4" W			
Ground Elevation (AMSL)	0.97 m / 3.2 ft			
Antenna Centerline (AGL)	2.74 m / 9.0 ft			
Antenna Model	GD/Prodelin 1.8 Meter			
Antenna Mode	Receive 18.0 GHz		Transmit 28.0 GHz	
Interference Objectives: Long Term	-156.0 dBW/MHz	20%	-151.0 dBW/4 kHz	20%
Short Term	-146.0 dBW/MHz	0.01%	-128.0 dBW/4 kHz	0.0025%
Max Available RF Power		-31.3 (dBW/4 kHz)		

	Transmit 28.0 GHz		Receive 18.0 GHz			
Azimuth (°)	Horizon Elevation (°)	Antenna Discrimination (°)	Horizon Gain (dBi)	Coordination Distance (km)	Horizon Gain (dBi)	Coordination Distance (km)
190	0.00	96.47	-10.00	151.60	-10.00	100.00
195	0.00	101.46	-10.00	151.60	-10.00	100.00
200	0.00	106.46	-10.00	151.60	-10.00	100.00
205	0.00	111.46	-10.00	151.60	-10.00	100.00
210	0.00	116.45	-9.46	153.50	-9.46	100.00
215	0.00	121.45	-8.60	156.60	-8.60	100.00
220	0.00	126.44	-7.71	159.80	-7.71	100.00
225	0.00	131.44	-6.84	162.90	-6.84	100.00
230	0.00	136.43	-6.04	165.80	-6.04	100.00
235	0.00	141.43	-5.35	168.30	-5.35	100.00
240	0.00	146.42	-4.86	170.10	-4.86	100.00
245	0.00	151.40	-4.61	171.00	-4.61	100.00
250	0.00	156.39	-4.65	170.80	-4.65	100.00
255	0.00	161.36	-4.96	169.70	-4.96	100.00
260	0.00	166.32	-5.52	167.70	-5.52	100.00
265	0.00	171.23	-6.24	165.10	-6.24	100.00
270	0.00	175.92	-7.07	162.10	-7.07	100.00
275	0.00	177.48	-7.94	159.00	-7.94	100.00
280	0.00	173.21	-8.83	155.80	-8.83	100.00
285	0.00	168.35	-9.71	152.60	-9.71	100.00
290	0.00	163.41	-10.00	151.60	-10.00	100.00
295	0.00	158.44	-10.00	151.60	-10.00	100.00
300	0.00	153.46	-10.00	151.60	-10.00	100.00
305	0.00	148.47	-10.00	151.60	-10.00	100.00
310	0.00	143.48	-10.00	151.60	-10.00	100.00
315	0.00	138.49	-10.00	151.60	-10.00	100.00
320	0.00	133.49	-10.00	151.60	-10.00	100.00
325	0.00	128.50	-10.00	151.60	-10.00	100.00
330	0.00	123.50	-10.00	151.60	-10.00	100.00
335	0.00	118.51	-10.00	151.60	-10.00	100.00
340	0.00	113.51	-10.00	151.60	-10.00	100.00
345	0.00	108.52	-10.00	151.60	-10.00	100.00
350	0.00	103.52	-10.00	151.60	-10.00	100.00
355	0.00	98.52	-10.00	151.60	-10.00	100.00

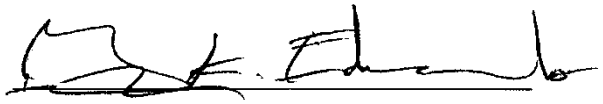
5. Contact Information

For questions or information regarding the 28 GHz Frequency Coordination Report, please contact:

Contact person:	Joanna Lynch
Title:	Manager, Spectrum & Data Solutions
Company:	Comsearch
Address:	19700 Janelia Farm Blvd., Ashburn, VA 20147
Telephone:	703-726-5711
Fax:	703-726-5599
Email:	jlynch@comsearch.com
Web site:	www.comsearch.com

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: August 13, 2014

O3b Network Link Analysis - Tier 2 Service For Tampa, United States			
Link Budget Creator - Rev 3.2.9: August 18, 2014		**Tier 2**	**Tier 2**
Ground Parameter		**Teleport**	**Telco**
Location		Vernon (LHCP), United States	Tampa, United States
Latitude	(°)	34.2	27.8
Longitude (East)	(°)	260.7	277.5
E/S Range to SV	(km)	10138.9	9292.1
E/S Elevation to SV	(°)	30.2	43.5
E/S Altitude	(km)	0.3	0.0
SV Beam Identifier	(#)	12	
Minutes Into Pass (Sample #55)	(Min)	26:8	
Telco Spot Beam Off-Angle	(°)	0.20	
Telco Spot Beam Diameter	(km)	64.90	
Maximum Roundtrip Latency	(msec)	129.63	
Modulation Parameters		**Forward**	**Return**
Enter Receiver	Type	DVB-S2	
Modem Overhead	(%)	3.3%	
Number of Carriers per Channel	(#)	1	
Available Bandwidth	(Hz)	216,000,000	
Channel Symbol Rate	(sps)	180,000,000	
Channel Modulation Type		32APSK	
Channel FEC Rate		0.83	
Channel Spectral Efficiency	(bits/Sym)	4.17	
Channel Throughput (100% / 100% of Full Rate)	(bps)	725,506,073	
Uplink		**Forward**	**Return**
E/S Tx Channels per HPA	(#)	5	
E/S Tx Carrier Frequency	(MHz)	28,020	
E/S Tx HPA Power Level	(W)	500	
E/S Tx OBO	(dB)	-8.00	
E/S Tx Post-HPA Losses	(dB)	-2.24	
E/S Tx Antenna Gain (7.3 m / 2.4 m)	(dB)	64.82	
E/S Tx EIRP Per Channel	(dBW)	74.58	
E/S Tx Pointing Loss	(dB)	-0.50	
E/S Tx RF Link Availability	(%)	75.000	
E/S Tx Atmospheric Losses	(dB)	-1.27	
E/S Tx Spreading Loss	(dB)	-151.11	
Satellite		**Forward**	**Return**
SV Number of Channels per HPA	(#)	1	
SV Rx G/T	(dB/K)	5.41	
SV Rx Power Per Tier	(dBW)	-123.31	
SV Rx Flux Density Per Tier	(dBW/m^2)	-78.31	
SV Tx OBO (ALC / ALC)	(dB)	-3.80	
SV Tx Post-TWTA Losses	(dB)	-1.50	
SV Tx Antenna Gain	(dBi)	31.81	
SV Tx EIRP Per Channel/Carrier	(dBW)	44.64	
SV Tx Pointing Loss	(dB)	0.00	
Downlink		**Forward**	**Return**
E/S Rx Carrier Frequency	(MHz)	18,220	
E/S Rx Wavelength	(m)	0.016454	
E/S Rx RF Link Availability	(%)	50	
E/S Rx Atmospheric Losses	(dB)	-0.51	
E/S Rx Pointing Loss	(dB)	-0.50	
E/S Rx Antenna Gain (2.4 m / 7.3 m)	(dBi)	51.1	
E/S Rx Effective G/T	(dB/K)	27.6	
E/S Rx Power Per Channel	(dBW)	-102.3	
E/S Rx Flux Density Per Channel	(dBW/m^2)	-106.7	
Total Link		**Forward**	**Return**
Carrier / Noise Bandwidth	(dB)	82.55	
Carrier / Noise Uplink	(dB)	22.74	
Carrier / Noise Downlink	(dB)	20.25	
Carrier / Intermodulation Im (C/Im)	(dB)	29.35	
(C/N) - Total Actual	(dB)	17.19	
(C/N) - Total Required	(dB)	16.60	
(E_b/N_o) - Total Actual	(dB)	11.00	
(E_b/N_o) - Total Required	(dB)	10.40	
Excess Margin	**(dB)**	**0.59**	
Fade Margin	**(dB)**	**19.39**	

Tampa SES RTN link example

O3b Network Link Analysis - Tier 2 Service For Tampa, United States			
Link Budget Creator - Rev 3.2.9: August 18, 2014		**Tier 2**	**Tier 2**
Ground Parameter		**Teleport**	**Telco**
Location		Vernon (LHCP), United States	Tampa, United States
Latitude	(°)	34.2	27.8
Longitude (East)	(°)	260.7	277.5
E/S Range to SV	(km)	10138.9	9292.1
E/S Elevation to SV	(°)	30.2	43.5
E/S Altitude	(km)	0.3	0.0
SV Beam Identifier	(#)	12	
Minutes Into Pass (Sample #55)	(Min)	26:8	
Telco Spot Beam Off-Angle	(°)	0.20	
Telco Spot Beam Diameter	(km)	64.90	
Maximum Roundtrip Latency	(msec)	129.63	
Modulation Parameters		**Forward**	**Return**
Enter Receiver	Type		DVB-S2
Modem Overhead	(%)		3.2%
Number of Carriers per Channel	(#)		1
Available Bandwidth	(Hz)		216,000,000
Channel Symbol Rate	(sps)		180,000,000
Channel Modulation Type			8PSK
Channel FEC Rate			0.75
Channel Spectral Efficiency	(bits/Sym)		2.25
Channel Throughput (100% / 100% of Full Rate)	(bps)		**391,954,582**
Uplink		**Forward**	**Return**
E/S Tx Channels per HPA	(#)		1
E/S Tx Carrier Frequency	(MHz)		28,020
E/S Tx HPA Power Level	(W)		40
E/S Tx OBO	(dB)		-3.00
E/S Tx Post-HPA Losses	(dB)		-0.77
E/S Tx Antenna Gain (7.3 m / 2.4 m)	(dB)		55.0
E/S Tx EIRP Per Channel	(dBW)		67.27
E/S Tx Pointing Loss	(dB)		-0.50
E/S Tx RF Link Availability	(%)		50.000
E/S Tx Atmospheric Losses	(dB)		-0.96
E/S Tx Spreading Loss	(dB)		-150.35
Satellite		**Forward**	**Return**
SV Number of Channels per HPA	(#)		5
SV Rx G/T	(dB/K)		4.66
SV Rx Power Per Tier	(dBW)		-130.29
SV Rx Flux Density Per Tier	(dBW/m^2)		-84.54
SV Tx OBO (ALC / ALC)	(dB)		-15.00
SV Tx Post-TWTA Losses	(dB)		-1.50
SV Tx Antenna Gain	(dBi)		31.90
SV Tx EIRP Per Channel/Carrier	(dBW)		26.54
SV Tx Pointing Loss	(dB)		0.00
Downlink		**Forward**	**Return**
E/S Rx Carrier Frequency	(MHz)		18,220
E/S Rx Spreading Loss	(dB)		-151.11
E/S Rx RF Link Availability	(%)		75.000
E/S Rx Atmospheric Losses	(dB)		-0.69
E/S Rx Pointing Loss	(dB)		-0.50
E/S Rx Antenna Gain (2.4 m / 7.3 m)	(dBi)		61.91
E/S Rx Effective G/T	(dB/K)		38.84
E/S Rx Power Per Channel	(dBW)		-110.51
E/S Rx Flux Density Per Channel	(dBW/m^2)		-125.76
Total Link		**Forward**	**Return**
Carrier / Noise Bandwidth	(dB)		82.55
Carrier / Noise Uplink	(dB)		15.76
Carrier / Noise Downlink	(dB)		12.46
Carrier / Intermodulation Im (C/Im)	(dB)		25.81
(C/N) - Total Actual	(dB)		10.50
(C/N) - Total Required	(dB)		9.50
(E_b/N_o) - Total Actual	(dB)		6.98
(E_b/N_o) - Total Required	(dB)		5.98
Excess Margin	**(dB)**		**1.00**
Fade Margin	**(dB)**		**12.70**