

APPLICATION FOR EARTH STATION SPECIAL TEMPORARY AUTHORITY

APPLICANT INFORMATION Enter a description of this application to identify it on the main menu:  
STA to cover additional sites for SBN IOT (Mar 2010) – Seattle, 30 days

1. Applicant

<b>Name:</b>	TerreStar License Inc.	<b>Phone Number:</b>	703-483-7800
<b>DBA Name:</b>		<b>Fax Number:</b>	
<b>Street:</b>	12010 Sunset Hills Road	<b>E-Mail:</b>	doug.brandon@terrestar.com
<b>City:</b>	Reston	<b>State:</b>	VA
<b>Country:</b>	USA	<b>Zipcode:</b>	20190 -
<b>Attention:</b>	Mr Douglas I Brandon		



File # SES-STA-20100325-00362  
E070098  
Call Sign                      Grant Date 3-31-10  
(or other identifier)  
From 4-5-10 Term Dates                       
To 5-5-10  
Appr. d:

**2. Contact**

<b>Name:</b>	Joseph A. Godles, Esq.	<b>Phone Number:</b>	202-429-4900
<b>Company:</b>	Goldberg Godles Wiener & Wright	<b>Fax Number:</b>	202-429-4912
<b>Street:</b>	1229 19th Street, NW	<b>E-Mail:</b>	jgodles@g2w2.com
<b>City:</b>	Washington	<b>State:</b>	DC
<b>Country:</b>	USA	<b>Zipcode:</b>	20036 -2413
<b>Attention:</b>		<b>Relationship:</b>	Legal Counsel

(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 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  
04/05/2010

7. City Seattle

8. Latitude  
(dd mm ss.s h) 47 47 30.0 N



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**Request for STA for Additional S-band Transmit/Receive Sites to support SBN-IOT**

TerreStar License Inc. (“TerreStar”) hereby respectfully requests, pursuant to Section 25.120 of the Commission’s rules, Special Temporary Authority (“STA”) to conduct in-orbit testing (“IOT”) of the TerreStar-1 satellite in the manner described below. The proposed operations will be conducted using up to five (5) temporary-fixed facilities at the locations identified below. Accordingly, TerreStar is submitting a unique STA request for each of the different locations.

**1. Introduction**

TerreStar, in coordination with its contractor Space Systems Loral (SSL), has been conducting the SBN-IOT (Satellite Beam-forming Network – In Orbit Testing) activity since fall 2009. A set of STA requests was initially filed and granted by the Bureau on July 6, 2009; those STA’s were most recently extended to June 30, 2010 in order to permit TerreStar and SSL to conduct additional beam-forming tests via the TerreStar-1 satellite.<sup>1</sup>

During the SBN-IOT tests thus far the S-band transmit/receive facility used has been the one located in North Las Vegas (NLV). However, as the overall volume of SBN test results and ground based beam forming knowledge have grown in the ensuing period, acting upon the advice of SSL, TerreStar has concluded that measuring the variability between different pairs of elemental and spot beams to create geographic diversity in the measurements would allow for greater precision in test results than only measuring from one site. This testing will allow for the measurement of gain differential between elemental and formed beams and capture gain variances from a geographically diverse beam sample.

Accordingly, TerreStar has arranged for testing of transmit/receive test signals via five additional sites to support the beam-forming advantage tests in the

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<sup>1</sup> The Bureau granted TerreStar an initial 30-day Special Temporary Authority until August 4, 2009, to operate, respectively, the gateway antennas licensed under Call Sign E070098 and a 1.8-m mobile earth terminal pursuant to the application requests submitted as File Nos. SES-STA-20090625-00794 and SES-STA-20090523-00646. TerreStar’s requests seeking 60-day extensions of those STA’s pursuant to the application requests submitted as File Nos. SES-STA-20090625-00795 and SES-STA-20090523-00644 were granted on August 11, 2009.

Subsequently, TerreStar sought and was issued STA to operate the facilities as part of Phase II operations in order to test the Satellite Beam-forming Network (SBN). The initial Phase II STA’s were submitted as File Nos. SES-STA-20090728-00925 and SES-STA-20090728-00926, and were granted on August 11, 2009. The Phase II STA’s were ultimately extended, for 60 days, pursuant to File Nos. SES-STA-20090728-00927 and SES-STA-20090728-00922 and for a first 90-day term, pursuant to File Nos. SES-STA-20091102-01408 and SES-STA-20091102-01409, and a second 90-day term, pursuant to File Nos. SES-STA-20100208-00167 and SES-STA-20100208-00166.

forward and return channel directions. The tests are designed to measure/ confirm the increase in S-band beam gain with a formed spot beam relative to an unformed (i.e., element) beam at the same location. This STA seeks the authority to transmit test signals from these additional five test sites.

Apart from the addition of the temporary fixed sites, the S-band frequencies to be used for the subject STA are the same as those previously authorized by the Commission. Moreover, the maximum transmit EIRP for these remaining SBN tests is lower than the 72 dBW previously authorized.<sup>2</sup> All of the remaining testing will transmit unmodulated CW carriers at maximum EIRP of 47 dBW except for one test which requires a peak EIRP of 52 dBW (see Note 3 to the table below).

The additional tests are planned to commence the week of April 5, 2010, in conjunction with the testing of Terrestrial's overall network as necessary for the impending commercial launch of the system.

2. Additional S-band Transmit/Receive Sites

The locations, frequencies, as well as characteristics of signals that will be used for the transmit/ receive functions at the five additional sites are described in the table below.

Site	Gaithersburg	Seattle	San Diego	Richardson	Reston
State	Maryland	Washington	California	Texas	VA <i>Note 2</i>
Latitude/ Longitude (in degrees)	39.1522N 77.2089W	47.7919N 122.1953W	32.9507N 117.1251W	32.9867N 96.6617W	38.9561N 77.3566W
Transmit frequency (in MHz)	2004.900	2004.950	2004.950	2004.900	2004.900
Max Transmit EIRP (in dBW)	12.0	12.0	12.0	12.0	12.0
Transmit signal	CW	CW	CW	CW	CW

<sup>2</sup> See Table 1 of Exhibit 1 to Terrestrial initial applications for Special Temporary Authority (File Nos. SES-STA-20090728-00926 *et al.*; filed Jul. 28, 2009) at 8.

Polarization	Linear	Linear	Linear	Linear	Linear
Antenna type	Andrew DB992 HG28N-B; High-gain array 31cmx31cm <i>Note 1</i>	Andrew DB992 HG28N-B; High-gain array 31cmx31cm	Andrew DB992 HG28N-B; High-gain array 31cmx31cm	Andrew DB992 HG28N-B; High-gain array 31cmx31cm	Andrew DB992 HG28N-B; High-gain array 31cmx31cm
Receive frequency (in MHz) (with element beam)	2193.629	2193.619	2193.609	2193.609	2193.629
Receive frequency (in MHz) (with formed spot beam)					
Max Receive EIRP per carrier (in dBW) <i>Note 3</i>	47	47	47	47	47

*Note 1* - Detailed antenna characteristics are shown in Attachment 1 to this document.

*Note 2* - Please note that the Reston, Virginia site is a back-up site to the Gaithersburg, Maryland site.

*Note 3* - Note in section 1 above that maximum EIRP for all tests except one will be 47 dBW. The exception is a beamforming accuracy/null stability test that will require 52 dBW for measurement accuracy.

3. Interference Analysis

3.1 Broadcast Auxiliary Service (BAS)

TerreStar has reviewed Sprint Nextel Corporation’s most recent reports filed in accordance with a recent OET Order regarding relocation of Broadcast Auxiliary Service licensees above 2025 MHz.<sup>3</sup> TerreStar confirms that the DMAs in which the \_\_\_\_\_

<sup>3</sup> See *Improving Public Safety Communications in the 800 MHz Band, Order*, 2010 FCC LEXIS 732, DA 10-235 (rel. Feb. 5, 2010).

proposed five additional transmit/receive test sites are located have all been cleared of BAS in TerreStar's operating band of 2000-2010 MHz. Therefore, narrowband CW transmission from these temporary fixed sites will not cause interference to any BAS receive site still using channel A1 in the original band plan.

### 3.2 Fixed Microwave Service (FS)

As shown in the table above, the test signal frequencies that will be used in the satellite forward channel and received at the five sites are exactly the same as those that were described in the original TerreStar SBN-IOT STA filing in July 2009, the only differences here being: a) the addition of additional test sites so that the tests can take into account factors of geographic diversity; and b) the forward channel signal power has been reduced to accommodate additional transmission time. Because of these changes, TerreStar has performed an updated analysis and confirmed that the test transmissions meet TSB-86 criteria that govern the interference from MSS (Mobile Satellite Service) to FS. Thus, no interference impact is expected from transmissions received at these five additional sites.

## 4. Radiation Hazard Analysis

TerreStar has performed an analysis on the estimated radiation exposure levels at the near field as well as at the far field of the proposed transmit antennas covered in this STA. It concluded that, with the public safety measures it shall take, the antennas meet the limits set forth in Appendix A (FCC Exposure Criteria) of Supplement C to OET Bulletin 65 document. Specifically, the Maximum Permissible Exposure (MPE) limits for 2 GHz transmission are:

- 5 mW/cm<sup>2</sup> for Occupational/Controlled Exposure;
- 1.0 mW/cm<sup>2</sup> for General Population/Uncontrolled Exposure;

If any of the five proposed sites can be accessed by the general public, TerreStar shall: (a) cordon off the area directly in front of the antenna at least 3.0 m from the antenna; and (b) place a radiation hazard warning sign near the antenna. With these measures, TerreStar has calculated that:

- Within the 0.32 m region of the antenna (i.e., the near field) the estimated exposure is 1.23 mW/cm<sup>2</sup>;
- At 3.0 m directly in front of the antenna, the estimated exposure is 0.014 mW/cm<sup>2</sup>;



It can thus be seen that, with the safety measures to be taken by TerreStar at the antenna test sites, the antennas meet the MPE limits set by the FCC for both Occupational/Controlled Exposure in the near field and General Population/Uncontrolled Exposure at 3.0 m distance and beyond.

5. Conclusion

TerreStar's request for STA is supported by good cause. Grant of the instant STA request is in the public interest, as it will enable TerreStar to better assess the in-orbit testing being conducted on its TerreStar-1 satellite to ensure the proper functioning of the satellite's communications payload in anticipation of providing service to the public and public safety agencies during a regional or national emergency.