

Attachment

Description of Modification

1.0 INTRODUCTION

This application requests modification of the existing Row 44, Inc. ("Row 44") Ku-band aeronautical mobile-satellite service ("AMSS") blanket Earth station license to add the Telstar 11N ("T11N") satellite at 37.55° West longitude as a point of communication. Addition of this satellite will provide new North Atlantic oceanic coverage, allowing service to international flights on trans-Atlantic routes. T11N is a U.S.-licensed satellite (Call Sign S2357) operated by Telesat, a privately-held Canadian company.

2.0 TECHNICAL OVERVIEW

In connection with the addition of T11N as a point of communication, Row 44 requests a slight increase in EIRP, which when coupled with an increase in the occupied bandwidth will result in no actual change in the EIRP spectral density that is currently authorized for the Row 44 Satellite Broadband Aircraft RF Subsystem. In addition, in order to utilize T11N's downlink channels, Row 44 seeks authority to use the 11.45-11.7 GHz portion of the Ku-band downlink band, as further described below. Row 44 does not seek any increase in the total number of aeronautical Earth stations ("AESs") authorized for operation with its system, but would utilize the TECOM antenna subsystem up to a maximum of 1,000 units, as previously authorized.

The increased EIRP is being introduced to allow for more robust performance in international operations while satisfying FCC requirements identified in Section 25.134 for power density, Section 25.209 for antenna performance in azimuth and Section 25.222 for EIRP off-axis co-polarization spectral density, off-axis cross-polarization spectral density and pointing accuracy requirements in conformance with two degree satellite spacing, and consistent with the conditions on its existing license.

Over the North Atlantic Ocean, the Row 44 system operates similarly to the current configuration supporting an elevation range from 90° to 0° of continuous coverage with an azimuth coverage that is continuous over 360° with +/-35 degrees skew. Reception occurs in the 11.45 GHz – 12.20 GHz and, consistent with the existing license, transmission occurs in the 14.05 GHz – 14.47 GHz band, utilizing independent linear polarized array antenna elements for communication to and from the T11N geostationary satellite in space. The data rates are unchanged with the RF signal bandwidth doubled and transmit power delivered to the antenna increased by 3 dB. As a result, the EIRP including cable losses is increased from 38.8 dBW to 41.8 dBW while continuing to comply with the EIRP density requirement of -14 dBW/4kHz at the antenna flange by doubling of the RF bandwidth. The EIRP density on boresite remains at 14.8 dBW/4 kHz.

In this requested modification, antenna control, pointing and accuracy remain the same as the existing implementation and in compliance with Section 25.222 of the FCC’s Rules and ITU-R M.1643, Annex 1, Part A, Section 2. The Antenna Control Unit (ACU) ensures that the pointing error is less than 0.2° peak between the orbital location of the target satellite and the axis of the main lobe of the antenna. All emissions automatically cease within 100 milliseconds if the angle between the orbital location of the target satellite and the axis of the main lobe of the antenna is projected to exceed ±0.2°, thus conforming to Section 25.222(a)(7) requiring that transmissions cease in the event this angle exceeds ±0.5°; transmission will not be resumed until the angle is less than 0.2°.

Principal parameters are identified in Table A-1 below for the TECOM antenna and RF subsystem. Items in Table 1 that have changed with respect to the existing authorization are indicated in bold italics. All other aspects of Row 44’s AMSS system operation will remain unaltered from those described in its initial application and license. Consistent with the existing scope of Row 44’s authority, and with the specific purpose of adding T11N as a point of communication, Row 44 asks that operations on T11N be subject to the condition of its current authorization permitting operations over international waters anywhere within the coverage footprint of the satellite.

Form 312 Line	Parameter (units)	Value for Requested RF Subsystem	Value for Licensed RF Subsystem
<i>E38</i>	<i>Total Input Power at antenna flange (Watts)</i>	20	10
E40	<i>Total EIRP for all carriers (dBW)</i>	41.8	38.8
E41	Antenna Gain (Transmit)	28.8 dBi at 14.25	28.6 dBi at 14.47
E42	Antenna Gain (Receive)	31.1 dBi at 11.75	31.8 dBi at 11.7
<i>E47</i>	<i>Emission Designator</i>	3M20G7D	1M60G7D
<i>E48</i>	<i>Maximum EIRP per carrier (dBW)</i>	41.8	38.8
E49	Maximum EIRP Density per carrier (dBW/4kHz)	14.8	14.8
<i>E54/55</i>	<i>Range of Satellite Arc Eastern/Western Limit</i>	37.5/127.0	83.0/127.0
<i>E56</i>	<i>Earth Station Azimuth Angle Eastern Limit</i>	194.4	206.65
<i>E57</i>	<i>Antenna Elevation Angle Eastern Limit</i>	20.9	35.0
<i>E58</i>	<i>Earth Station Azimuth Angle Western Limit</i>	119.5	138.7
<i>E59</i>	<i>Antenna Elevation Angle Western Limit</i>	2.6	11.2
<i>E60</i>	<i>Maximum EIRP Density toward the Horizon (dBW/4kHz)</i>	13.3	0.0

**Table A-1
Principal Row 44 RF Parameters**

3.0 EIRP SPECTRAL DENSITY; COORDINATION

Row 44’s TECOM antenna is compliant with the off-axis antenna gain envelope established in Section 25.209(a)(1) of the Commission’s rules. Because the antenna is an aircraft mounted AES, Row 44 cannot meet the static elevation plane criteria under Section 25.209(a)(2). Moreover, because the antenna is less than 1.2 meters in diameter, it is not subject to routine processing under Section 25.212(c). However, Row 44 has coordinated its non-conforming use

with all adjacent satellite operators pursuant to Sections 25.209(f) and 25.220 of the Commission's Rules, and a copy of the coordination letter covering these operations, signed by Telesat, Row 44, Intelsat and SES Americom, is attached hereto as Exhibit D.

EIRP spectral density plots for co-polarized signals in the transmit bands at 14.05 GHz, 14.25 GHz, and 14.47 GHz are attached as Exhibit A and are in compliance with Section 25.222(a)(1) of the Commission's Rules. The patterns are provided in two orientations:

1. Vertical and horizontal polarization as referenced to zero degrees. These patterns relate to EIRP spectral density versus azimuth angle and show full compliance with Section 25.222(a)(1)
2. Vertical and horizontal polarization as referenced to an off-axis elevation performance to show compliance in situations where the aircraft is not on the same longitude as the target satellite resulting in skew. The vertical and horizontal polarization off-axis EIRP spectral density depict that the antenna can support up to +/-35 degree effective off-axis angle and be compliant with 25.222(a)(1). The actual skew angle is constantly monitored by the ACU and the aircraft transmitter will be muted in the event that this skew angle is exceeded, consistent with Row 44's current authorization.

4.0 USE OF THE 11.45-11.7 GHz PORTION OF THE DOWNLINK BAND

As indicated above, Row 44 is seeking authority for its AES terminals to receive transmissions in the 11.45-11.7 GHz portion of the Ku-band downlink spectrum, which is utilized by T11N. The U.S. table of Frequency Allocations does not include a domestic allocation for AMSS in this band. Row 44 requests that its current waiver of Section 2.106 of the FCC's Rules allowing operation in the adjacent 11.7-12.2 GHz portion of the band on a non-conforming, non-interference basis, be extended to these frequencies. *See Row 44 License Order*, 24 FCC Rcd 10223, 10237-38 (¶ 33) (IB/OET 2009). The 11.45-11.7 GHz portion of the downlink band is limited to international operations, a limitation with which Row 44's planned use is fully consistent. All transmissions from T11N to Row 44 AESs will serve aircraft flying over the international waters of the Atlantic Ocean and Canada, primarily flights between Europe and North America. These operations will allow passengers to access information anywhere on the Internet and to send international communications. As these transmissions will take place primarily over the open waters of the Atlantic Ocean, they will not pose an interference risk to users of terrestrial fixed service facilities that may be operating in this band.

5.0 LINK BUDGET AND PREDICTED COVERAGE AREA

Exhibit B provides the link budget and coverage predictions for T11N.

6.0 RADIATION HAZARD ANALYSIS

Exhibit C provides the Radiation Hazard Analysis for the TECOM Antenna with the requested increase in EIRP.