Before the
Federal Communications Commission
Washington, D.C. 20554

Application of	)	
	)	
Ligado Networks Subsidiary LLC	)	File No. SAT-MOD-_____
	)	
For Modification of License to Operate MSAT-2 at 106.5ºWL	)	
	)	

Application for Modification

Ligado Networks Subsidiary LLC ("Ligado") is licensed to operate a Mobile Satellite Service ("MSS") satellite, MSAT-2 (call sign AMSC-1), at the 103.3ºWL orbital location.[1] By this application, Ligado requests that the Commission modify the license for MSAT-2 to permit continued operations at 106.5°WL +/-0.1 degrees and during the drift from the satellite's current position.[2]

As discussed below and in the attached Technical Exhibit, Ligado has coordinated the relocation of MSAT-2 with affected satellite operators, the relocation of the satellite will not cause harmful interference to other satellite operators, and the proposed license modification complies with the Commission's technical rules. Moreover, the station-keeping volume of

[1] *Memorandum Opinion, Order and Authorization*, 4 FCC Rcd 6041 (1989); *remanded by Aeronautical Radio, Inc. v. FCC*, 928 F.2d 428 (D.C. Cir. 1991); *Final Decision on Remand*, 7 FCC Rcd 266 (1992); *aff'd, Aeronautical Radio, Inc. v. FCC*, 983 F.2d 275 (D.C. Cir. 1993); *see also AMSC Subsidiary Corporation, Memorandum Opinion and Order*, 8 FCC Rcd 4040 (1993); FCC File No. SAT-MOD-20080303-0005 (granted May 19, 2008) (authority to operate at 101.3ºWL); FCC File No. SAT-MOD-20100412-00075 (granted Nov. 8, 2010) (authority to move MSAT-2 to current location); FCC File No. SAT-MOD-20171215-00172 (granted Jan. 23, 2018) (extending MSAT-2 operations through Dec. 31, 2018).

[2] Ligado has already received authorization from the Commission to drift MSAT-2 to the new location pursuant to its recent application for Special Temporary Authority. *See* FCC File No. SAT-TA-20180810-00061 (granted Aug. 28, 2018). The details of that application are incorporated by reference.

MSAT-2 at the proposed new location will not overlap the station-keeping volume of any other satellite. A Schedule S attachment reflecting technical changes associated with the relocation of the satellite is provided with this application. As required by the Commission's rules,[3] Ligado hereby certifies that all other information related to MSAT-2's licensed operations and not addressed in this application has not changed.

For all of these reasons, Ligado submits that the Commission should grant this application for the relocation of MSAT-2.

Required Information for Application

As provided under 47 C.F.R. §25.117(d)(1), Ligado files the following information required under 47 C.F.R. §25.114 that would change as a result of the application being granted. Information required under §25.114(c) has been provided with Schedule S. Information required under §25.114(d) and a request for authorization under §25.210(j) are provided below.

§25.114(c)(5)(iii) and (iv), §25.210(j): East-west and north-south station-keeping range

MSAT-2 has adopted an increasingly inclined orbit, which will continue to increase for several years after relocation to the new orbital location. Accordingly, to provide necessary flexibility for expected operations for the next five years and to extend MSAT-2 remaining fuel life, Ligado has indicated on Schedule S that the north-south station-keeping range should be changed to +/-13.5 degrees and, pursuant to §25.201(j), requests that the Commission authorize a change to the east-west station-keeping range to +/-0.1 degrees.

As noted above, these ranges will not result in any overlap with any neighboring satellites. The nearest existing satellites to the new orbital location are a U.S. Navy satellite located at 105.5°WL and a Telesat satellite located at 107.3°WL, neither of which will overlap

[3] *See* 47 C.F.R. § 25.117(d)(1).

with MSAT-2's station-keeping range. Ligado has also reviewed planned satellites and determined that there will be no overlap with the nearest planned satellites. Ligado acknowledges and agrees that if a new satellite were to be placed in a location that could result in an overlap, Ligado will coordinate with the new satellite to establish an acceptable station-keeping range between 0.05 and 0.1 degrees.

§25.114(d)(1): Overall description of system facilities, operations and services and explanation of how uplink frequency bands would be connected to downlink frequency bands

MSAT-2 is currently deployed at 103.3°WL, an orbital location that only allows operations on a non-interference basis. It was moved to this orbital location in 2010, when Ligado's next-generation SkyTerra-1 satellite was placed in MSAT-2's previous orbital location at 101.3°WL. By this application, Ligado seeks permission to move MSAT-2 to 106.5°WL, an orbital location occupied by MSAT-1 until 2015, when MSAT-1 was moved to 107.5°WL. As 106.5°WL is an orbital location under Canadian authority, Ligado filed an application on August 20, 2018 with Innovation, Science & Economic Development ("ISED") Canada to establish telemetry, tracking and command ("TT&C") communications with MSAT-2 and will soon file a further application to operate the satellite's service and feeder links from that orbital location. Pursuant to existing interagency procedures as authorized by the ITU, Ligado requests that the Commission indicate to ISED that it consents to relocating MSAT-2 to bring back into use the orbital location at 106.5° WL.[4]

[4] *See* ITU, Radiocommunication Bureau, *WRC-12 decisions included in the Minutes of Plenary meeting relating to space services procedures*, Circular Letter CR/333 (2012) at 2 (citing (§3.12 Doc. CMR12/554); *see also* ITU, Radiocommunication Bureau, *Decisions of past WRCs concerning the application of the Radio Regulations,* Circular Letter CR/380 (2015) at 3 (same); *see, e.g.,* FCC File No. SAT-MOD-200160513-00050 (granted Aug. 18, 2016) (grant of authority to Skynet Satellite Corporation to operate satellite in Canadian orbital location).

As MSAT-2 and MSAT-1 were built to the same design specifications, MSAT-2's operating characteristics and interference envelope are identical to those of MSAT-1, and thus, as further described below, relocation of MSAT-2 will not result in any interference environment that has not already been coordinated with other operators.

MSAT-2 does not provide service to customers given that it acts as a backup satellite to SkyTerra-1 for providing mobile satellite service (MSS) throughout North America, and Ligado plans to continue using MSAT-2 as a backup satellite at the new location.

In all other respects – use of frequencies for service links, feeder links and TT&C, connection of downlink and uplink frequency bands, operation with authorized earth station and mobile earth terminals, and all relevant technical parameters – MSAT-2 will operate in the new orbital location in exactly the same way as it has operated in its current orbital location. Ligado is simultaneously filing an application to modify the license for its Reston earth station (call sign E930124) and the license for its mobile earth terminals (call sign E980179) to reflect the new orbital location.

§25.114(d)(6): Public interest considerations in support of the grant

Grant of the application is in the public interest because, currently, MSAT-2 is operating in a location that only allows operation on a non-interference basis. The relocation of the satellite, without interference or harm to other operators, will result in MSAT-2 being better accommodated in a fully coordinated orbital location, thus providing future certainty for backup MSS operations.

§25.114(d)(7): Information specified in §25.140(a) regarding authorized co-frequency GSO space stations less than two degrees from 106.5°WL

Ligado Networks (Canada) Inc., an affiliate of and under common ownership with Ligado, operates MSAT-1, a Canadian-licensed satellite located at 107.5°WL. MSAT-1 uses

feeder links in the Ku-band frequencies defined in Appendix 30B of the ITU Radio Regulations, conducts Telemetry, Tracking and Command ("TT&C") operations in the standard Fixed Satellite Service ("FSS") Ku-band frequencies (12/14 GHz), and provides service in the L-band. MSAT-2 conducts the same operations in the same frequencies. Ligado certifies that it has coordinated MSAT-1 operations with MSAT-2.

With regard to other satellites that are co-frequency with MSAT-2's Ku-band feeder links, Ligado has determined that MSAT-1 is the only satellite conducting co-frequency operations less than two degrees from 106.5°WL, and Ligado has already coordinated those operations.

With regard to other satellites that are co-frequency with MSAT-2's TT&C operations in the standard FSS Ku-band (12/14 GHz), as an initial matter MSAT-2's operating characteristics and interference envelope are identical to those of MSAT-1,[5] which operated in that location for 19 years without causing any harmful interference to other operators. Moreover, this location has already been coordinated with other L-band operators assuming use by an MSAT-class satellite. Thus, placement of MSAT-2 will not create any new interference risk that has not already been discussed and resolved by the relevant operators.

Five other satellites share the standard FSS Ku-band (12/14 GHz) less than two degrees from 106.5°WL: SES-11 at 104.95°WL, AMC-15 at 105.05°WL, Anik-F1 at 107.3°WL, Anik-F1R at 107.3°WL, and Anik-G1 at 107.3°WL. The Anik satellites are controlled by Telesat, the same entity that Ligado has contracted with to control MSAT-2, and their TT&C operations have been and will continue to be coordinated with Ligado. Ligado provides the required interference

[5] MSAT-2 does differ slightly from MSAT-1 in one respect: MSAT-2 uses 11.7005 GHz as a backup TT&C frequency, while MSAT-1 uses 11.70275 GHz as a backup.

analyses for AMC-15 and SES-11 in the Technical Exhibit attached hereto.

§25.114(d)(14): Information relevant to mitigation of orbital debris

Ligado's orbital debris mitigation statement requires no modification as a result of the move and remains the same as has already been reviewed and authorized by the Commission.[6] All of the representations in Ligado's statement applicable to MSAT-1 will be equally applicable to MSAT-2. In particular, with regard to post-mission disposal information required under 47 C.F.R. §25.114(d)(14)(iv), Ligado notes that after relocation MSAT-2 will continue to reserve approximately 10 kg of propellant for final orbit raising maneuvers to this altitude. Thus, Ligado will continue to be capable of disposing of MSAT-2 by moving it to a minimum altitude of 300 km above the GSO orbit at the end of its operational life.

Specific Issues Related to Schedule S

Orbital Longitude

As specified in Form 312 and this narrative, this application is for authorization to operate at 106.5°WL. The Schedule S online system, however, only shows orbital longitude as rounded integers, and as such the system will only show MSAT-2's orbital longitude as "107". This answer should be read, however, as 106.5.

Polarization Switchable

For each beam, Schedule S asks whether the polarization for the beam is switchable. The online system does not, however, allow the insertion of a Yes or No answer to this question. The answer for all of MSAT-2's receiving and transmitting beams is "No."

[6] *See* Application, FCC File No. SES-MFS-20070530-00731, at Technical Appendix 32-36 (filed May 30, 2007), *granted Comtech Mobile Data Corporation*, 7 FCC Rcd 5283 (2009); *see also* FCC File No. SAT-MOD-20100412-00075 (granted Nov. 8, 2010) (granting modification to statement and waiving 47 C.F.R. §25.283(c)).

Maximum Power Flux Density

The Schedule S online system did not allow for provision of Maximum Power Flux Density values for transmitting beams KUaE, KUbE, OMNE or OMNa. These values are as follows:

KUaE

BW:	**0°-5° (dbW/m^2/BW)**	**5°-10° (dbW/m^2/BW)**	**10°-15° (dbW/m^2/BW)**	**15°-20° (dbW/m^2/BW)**	**20°-25° (dbW/m^2/BW)**	**25°-90° (dbW/m^2/BW)**
Hz	-159.6	-159.4	-159.3	-159.2	-159.1	-159.1

KUbE

BW:	**0°-5° (dbW/m^2/BW)**	**5°-10° (dbW/m^2/BW)**	**10°-15° (dbW/m^2/BW)**	**15°-20° (dbW/m^2/BW)**	**20°-25° (dbW/m^2/BW)**	**25°-90° (dbW/m^2/BW)**
Hz	-159.6	-159.4	-159.3	-159.2	-159.1	-159.1

OMNE

BW:	**0°-5° (dbW/m^2/BW)**	**5°-10° (dbW/m^2/BW)**	**10°-15° (dbW/m^2/BW)**	**15°-20° (dbW/m^2/BW)**	**20°-25° (dbW/m^2/BW)**	**25°-90° (dbW/m^2/BW)**
Hz	-209.0	-209.0	-209.0	-209.0	-209.0	-209.0

OMNa

BW:	**0°-5° (dbW/m^2/BW)**	**5°-10° (dbW/m^2/BW)**	**10°-15° (dbW/m^2/BW)**	**15°-20° (dbW/m^2/BW)**	**20°-25° (dbW/m^2/BW)**	**25°-90° (dbW/m^2/BW)**
Hz	-209.0	-209.0	-209.0	-209.0	-209.0	-209.0

Certifications

The Schedule S online system allowed for the input of answers to all certification, but does not display answers for two of them. Those certifications with Ligado's answers are as follows:

Are the applicable power-flux-density limits of 25.208 met, and is the appropriate technical showing provided within the application? Answer: N/A

If the application is for a 17/24 GHz BSS space station, will it be operated at an offset location with full power and interference protection in accordance with 25.262(b)? Answer: N/A

Technical Exhibit

Feeder Link PFD Compliance Demonstration

The ITU maintains GSO satellite downlink PFD limits across the entire 10.7-11.7 GHz frequency band. *See* Article 21, Table S21-4, ITU Radio Regulation (2016). The Commission's rules specify identical PFD limits for GSO satellites operating in the 10.95-11.2 GHz and 11.45-11.7 GHz bands (47 C.F.R. § 25.114(c)(8)), but do not specify any PFD limits for GSO satellites operating in the 10.7-10.95 GHz or 11.2-11.45 GHz bands.

Table A-1 provides the power density for the feeder downlinks for the MSAT-2 carriers. Table A-2 calculates PFD on the ground based on the maximum density calculated in Table A-1 and compares it with the limits, showing positive margin in each case.

Table A-1: Feeder Link (Return) EIRP Density (10.7 – 11.7 GHz)

Carrier	EIRP (dBW)	BW (kHz)	EIRP Density (dBW/4 kHz)
CW	2.7	6	0.9
GC-S	2.7	6	0.9
QPSK-V	3.7	6	1.9
	Maximum EIRP Density =		1.9

Table A-2: Feeder Link (Return) PFD Compliance (10.7 – 11.7 GHz)

Elevation Angle (degrees)	Slant (km)	Path Spreading Loss (dB-m^2)	MSAT-2 Maximum Power Flux Density (dB(W/m^2/4 kHz))	Maximum PFD Limit (dB(W/m^2/4 kHz))	Margin (dB)
0	41,680	-163.4	-161.5	-150	11.5
5	41,128	-163.3	-161.4	-150	11.4
25	39,072	-162.8	-160.9	-140	20.9
90	35,787	-162.1	-160.1	-140	20.1

Two-Degree Interference Analysis

The MSAT-2 feeder links operate in the Ku-band frequencies defined in Appendix 30B of the ITU Radio Regulations, and the MSAT-2 Telemetry, Tracking, and Command ("TT&C") operations are in the standard Fixed Satellite Service ("FSS") Ku-band frequencies (12/14 GHz). The respective interference analyses are provided below. The MSAT-2 service links operate in the L-band frequencies for which a two-degree analysis is not required.[1] Additionally, Ligado has coordinated the L-band operations of MSAT-1, which is identical to MSAT-2, at 106.5°WL with Inmarsat, Telecomm de Mexico (TdM), Russia (RSCC) and Ligado (Canada) Inc., the only potentially affected North American L-band satellite operators.

Interference Analysis for the Appendix 30B Ku-Band Carriers

In the Appendix 30B plan,[2] the only active satellite within 2 degrees of 106.5° WL is MSAT-1 at 107.5°WL. Both MSAT-1 and MSAT-2 satellites are operated by Ligado and subject to internal coordination.

Interference Analysis for the FSS Ku-Band carriers

In the standard FSS Ku band (12/14 GHz), the other satellites sharing this band within 2 degrees of 106.5°WL are MSAT-2 at 107.5°WL, SES-11 at 104.95°WL, AMC-15 at 105.05°WL, Anik-F1 at 107.3°WL, Anik-F1R at 107.3°WL, and Anik-G1 at 107.3°WL. The three satellites at 107.3°WL are controlled by Telesat as is the MSAT-2 satellite. Telesat is able to coordinate the TT&C of these four satellites so that they will not interfere with each other.

The following is the interference analysis between MSAT-2 and AMC-15.

The carrier types and power densities for the TT&C Ku-band operations of MSAT-2 are

[1] *See* 47 C.F.R.§ 25.150(b); *see also* Letter to Lon Levin from Bob Nelson, File No. SAT- AMD-20031118-00335 (April 23, 2004).

[2] International Telecommunications Union Radio Regulations 2016, Appendix 30B, Article 10.

provided in Table B.

Table B – MSAT-2 12/14 GHz TT&C Carrier Parameters

MSAT-2 at 106.5°WL Ku-Band Uplink			
Carrier	**EIRP (dBW)**	**BW (kHz)**	**EIRP Density dBW/Hz**
Command	69	1000	**9.0**
		Max Uplink Density =	**9.0**
		Min Uplink Density =	**9.0**

MSAT-2 at 106.5°WL Ku-Band Downlink			
Carrier	**EIRP (dBW)**	**BW (kHz)**	**EIRP Density dBW/Hz**
Telemetry	17.5	100	**-32.5**
		Max Downlink Density =	**-32.5**
		Min Downlink Density =	**-32.5**

The carrier types and power densities for AMC-15 at 105.05°WL are provided in Table C.

Table C – AMC-15 Carrier Summary

AMC-15 at 105.05°WL Ku-Band Uplinks			
Earth Station	**Max EIRP Density (dBW/Hz)**	**Min EIRP Density (dBW/Hz)**	**Ant Gain (dBi)**
Antenna Type A	18	-11.7	60.3
Antenna Type B	18	-11.7	56.6
Antenna Type C	18	-11.7	54.1
Antenna Type D	15.6	-11.7	50.6
Antenna Type E	11.7	-11.7	46.1
Antenna Type F	-1.2	-11.7	42.5
Antenna Type G	-3.6	-11.7	40.1

AMC-15 at 105.05°WL Ku-Band Downlinks			
Earth Station	**Max EIRP Density (dBW/Hz)**	**Min EIRP Density (dBW/Hz)**	**Ant Gain (dBi)**
Antenna Type A	-22	-41.5	59
Antenna Type B	-19	-38.9	55.4
Antenna Type C	-19	-36.2	52.7
Antenna Type D	-19	-32.8	49.3
Antenna Type E	-19	-32.1	44.6
Antenna Type F	-19	-31.8	41.3
Antenna Type G	-19	-31.2	38.7
Antenna Type TT&C	-30.1	-33.1	59

Table D presents the results of uplink C/I calculations between the MSAT-2 command carriers and the AMC-15 uplink carriers. In all cases, the calculated delta T/T is lower than the coordination threshold value of 6%. Therefore, there are no apparent interference concerns.

Table D - Uplink Co/Io Calculations for MSAT-2 at 106.5°WL and AMC-15 at 105.05°WL

Uplink Co/Io Calculations for MSAT-2 at 106.5°W and AMC-15 at 105.05°W						
Topocentric Angle = 1.6°						
Interferer				Victim		
Interferer	Max EIRP Density dBW/Hz	Earth Station Antenna Gain (dBi)	Sidelobe Rejection (dB)	Victim	Min EIRP Density dBW/Hz	C/I (dB)
AMC-15	18	60.3	36.4	MSAT-2	9	27.4
AMC-15	18	56.6	32.7	MSAT-2	9	23.7
AMC-15	18	54.1	30.2	MSAT-2	9	21.2
AMC-15	15.6	50.6	26.7	MSAT-2	9	20.1
AMC-15	11.7	46.1	22.2	MSAT-2	9	19.5
AMC-15	-1.2	42.5	18.6	MSAT-2	9	28.8
AMC-15	-3.6	40.1	16.2	MSAT-2	9	28.8
MSAT-2	9	61.1	37.2	AMC-15	-11.7	16.5
MSAT-2	9	61.1	37.2	AMC-15	-11.7	16.5
MSAT-2	9	61.1	37.2	AMC-15	-11.7	16.5
MSAT-2	9	61.1	37.2	AMC-15	-11.7	16.5
MSAT-2	9	61.1	37.2	AMC-15	-11.7	16.5
MSAT-2	9	61.1	37.2	AMC-15	-11.7	16.5
MSAT-2	9	61.1	37.2	AMC-15	-11.7	16.5
					Min Co/Io =	**16.5**
					Max Delta T/T =	**2.24%**

Table E presents the results of downlink C/I calculations between the MSAT-2 telemetry carriers and the AMC-15 downlink carriers. In all cases, the calculated delta T/T is lower than the coordination threshold value of 6%. Therefore, there are no apparent interference concerns.

Table E – Downlink Co/Io Calculations for MSAT-2 at 106.5°WL and AMC-15 at 105.05°WL

Downlink Co/Io Calculations for MSAT-2 at 106.5°W and AMC-15 at 105.05°W						
Topocentric Angle = 1.6°						
Interferer		Victim				
Interferer	Max EIRP Density dBW/Hz	Victim	Earth Station Antenna Gain (dBi)	Sidelobe Rejection (dB)	Min EIRP Density dBW/Hz	C/I (dB)
AMC-15	-22	MSAT-2	60.1	36.2	-32.5	25.7
AMC-15	-19	MSAT-2	60.1	36.2	-32.5	22.7
AMC-15	-19	MSAT-2	60.1	36.2	-32.5	22.7
AMC-15	-19	MSAT-2	60.1	36.2	-32.5	22.7
AMC-15	-19	MSAT-2	60.1	36.2	-32.5	22.7
AMC-15	-19	MSAT-2	60.1	36.2	-32.5	22.7
AMC-15	-19	MSAT-2	60.1	36.2	-32.5	22.7
AMC-15	-30.1	MSAT-2	60.1	36.2	-32.5	33.8
MSAT-2	-35.1	AMC-15	59	35.1	-41.5	28.7
MSAT-2	-35.1	AMC-15	55.4	31.5	-38.9	27.7
MSAT-2	-35.1	AMC-15	52.7	28.8	-36.2	27.7
MSAT-2	-35.1	AMC-15	49.3	25.4	-32.8	27.7
MSAT-2	-35.1	AMC-15	44.6	20.7	-32.1	23.7
MSAT-2	-35.1	AMC-15	41.3	17.4	-31.8	20.7
MSAT-2	-35.1	AMC-15	38.7	14.8	-31.2	18.7
MSAT-2	-35.1	AMC-15	59	35.1	-33.1	37.1
					Min Co/Io =	**18.7**
					Max Delta T/T =	**1.35%**

The following is the interference analysis between MSAT-2 and SES-11.

The carrier types and power densities for the TT&C Ku-band operations of MSAT-2 are provided in Table B, above. The carrier types and power densities for SES-11 at 104.95°WL are provided in Table F.

Table F – SES-11 12/14 GHz TT&C Carrier Parameters

SES-11 at 104.95°WL Ku-Band Uplink			
Carrier	**EIRP (dBW)**	**BW (kHz)**	**EIRP Density dBW/Hz**
Command	76.2	856	**16.9**
Command	75.0	856	**15.7**
		Max Uplink Density =	**16.9**
		Min Uplink Density =	**15.7**

SES-11 at 104.95°WL Ku-Band Downlink			
Carrier	**EIRP (dBW)**	**BW (kHz)**	**EIRP Density dBW/Hz**
Telemetry	17.3	275	**-37.1**
Telemetry	14.1	275	**-40.3**
		Max Downlink Density =	**-37.1**
		Min Downlink Density =	**-40.3**

Table G presents the results of uplink C/I calculations between the MSAT-2 command carriers and the SES-11 uplink carriers. In all cases, the calculated delta T/T is lower than the coordination threshold value of 6%. Therefore, there are no apparent interference concerns.

Table G - Uplink Co/Io Calculations for MSAT-2 at 106.5°WL and SES-11 at 104.95°WL

Uplink Co/Io Calculations for MSAT-2 at 106.5°W and SES-11 at 104.95°W						
Topocentric Angle = 1.7°						
Interferer				Victim		
Interferer	**Max EIRP Density dBW/Hz**	**Earth Station Antenna Gain**	**Sidelobe Rejection (dB)**	**Victim**	**Min EIRP Density dBW/Hz**	**C/I (dB)**
SES-11	16.9	59.5	36.3	MSAT-2	9	28.4
MSAT-2	9	61.1	37.9	AMC-15	15.7	44.6
					Min Co/Io =	**28.4**
					Max Delta T/T =	**0.15%**

Table H presents the results of downlink C/I calculations between the MSAT-2 telemetry carriers and the SES-11 downlink carriers. In all cases, the calculated delta T/T is lower than the coordination threshold value of 6%. Therefore, there are no apparent interference concerns.

Table H – Downlink Co/Io Calculations for MSAT-2 at 106.5°WL and SES-11 at 104.95°WL

Downlink Co/Io Calculations for MSAT-2 at 106.5°W and SES-11 at 104.95°W						
Topocentric Angle = 1.7°						
Interferer		Victim				
	Max EIRP				Min EIRP	
Interferer	Density dBW/Hz	Victim	Earth Station Antenna Gain (dBi)	Sidelobe Rejection (dB)	Density dBW/Hz	C/I (dB)
SES-11	-37.1	MSAT-2	60.1	36.9	-32.5	41.5
MSAT-2	-35.1	SES-11	51.7	28.5	-40.3	23.3
					Min Co/Io =	23.3
					Max Delta T/T =	0.47%

Conclusion

Accordingly, based on the analysis provided above, operation of MSAT-2 at 106.5°WL complies with the Commission's technical rules.

Technical Certification

I, Maqbool Aliani, Senior Vice President of Spectrum Standards & Technology for Ligado Networks Subsidiary LLC, certify under penalty of perjury that:

I am the technically qualified person with overall responsibility for preparation of the technical information contained in this application. I am familiar with the requirements of Part 25 of the Commission's rules, and the information contained in the application is true and correct to the best of my knowledge and belief.

/s/
Maqbool Aliani

Dated: September 12, 2018