

RADIO STATION AUTHORIZATION

Name: Ligado Networks Subsidiary LLC

Authorization Type: Modification of License

Call Sign: E080030

File Number: SES-MFS-20150605-00324

Special

11.3M - 2

Non Common Carrier

Grant date:

09/16/2015

Expiration Date:

10/27/2023



Class of Station: Fixed Earth Stations

A) Site Location(s)



Licensee certifies antenna(s) comply with gain patterns specified in Section 25.209

Subject to the provisions of the Communications Act of 1934, The Communications Satellite Act of 1962, subsequent acts and treaties, and all present and future regulations made by this Commission, and further subject to the conditions and requirements set forth in this license, the grantee is authorized to construct, use and operate the radio facilities described below for radio communications for the term beginning October 27, 2008 (3 AM Eastern Standard Time) and ending October 27, 2023 (3 AM Eastern Standard Time). The required date of completion of construction and commencement of operation is 00/00/0000. Grantee must file with the Commission a certification upon completion of construction and commencement of operation.

B) Particulars of Operations

For the text of these provisions, refer to Section H.

9) 11200.0000-11450.0000

The General Provision 1010 applies to all receiving frequency bands.

The General Provision 1900 applies to all transmitting frequency bands.

Napa, Napa, CA 94558

EIRP Density **Provisions** Frequency /Carrier /Carrier (Refer to Polarization Tx/Rx Modulation/ Associated (dBW) (dBW/4kHz) (MHz) Section H) Code **Emission Mode** Antenna Services 11.3M - 2 Digital Data Carrier 1M20G7D 85.00 60.30 1) 13248.0000-13250.0000 L,R TX

Max

NON 85.00 85.00 11.3M - 2 CW L,R 2) 13240.5000-13245.5000 TX 71.20 71.20 11.3M - 2 CW L,R NON 3) 12780.0000-13140.0000 TX 11.3M - 2 Digital Data Carrier 1M25G7D 71.20 46.25 4) 12780.0000-13140.0000 L.R Tx Digital Data Carrier 11.3M - 2 312KG7D 60.00 41.10 5) 12780.0000-13140.0000 L,R 11.3M - 2 Digital Data Carrier 40.23 6) 12780.0000-13140.0000 L,R 5M00G7D 71.20 30.50 11.3M - 2 Digital Data Carrier L,R 6K00G7D 32 26 7) 12780.0000-13140.0000 85.00 60.30 11.3M - 2 Digital Data Carrier 8) 12750.0000-12752.0000 L,R 1M20G7D

Max EIRP

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CW

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Rx

NON



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#	Frequency (MHz)	Polarizatio Code	n Emission	Tx/Rx Mode	/Carrier	•	Associated Antenna	(Refer to Section H)	Modulation/ Services
10)	11200.0000-11450.0000	L,R	1M25G7D	Rx			11.3M - 2		Digital Data Carrier
11)	11200.0000-11450.0000	L,R	312KG7D	Rx			11.3M - 2		Digital Data Carrier
12)	11200.0000-11450.0000	L,R	5M00G7D	Rx			11.3M - 2		Digital Data Carrier
13)	11200.0000-11450.0000	L,R	6K00G7D	Rx			11.3M - 2		Digital Data Carrier
14)	11200.0000-11205.0000	L,R	1M20G7D	Rx			11.3M - 2		Digital Data Carrier
15)	10700.0000-10950.0000	L,R	NON	Rx			11.3M - 2		CM
16	10700.0000-10950.0000	L,R	1M25G7D	Rx			11.3M - 2		Digital Data Carrier
17	10700.0000-10950.0000	L,R	312KG7D	Rx			11.3M - 2		Digital Data Carrier
18)	10700.0000-10950.0000	L,R	5M00G7D	Rx			11.3M - 2		Digital Data Carrier
19)	10700.0000-10950.0000	L,R	6K00G7D	Rx			11.3M - 2		Digital Data Carrier
20)	13248.0000-13250.0000	L,R	1M20G7D	Тx	85.00	60.30	11.3M -1		Digital Data Carrier
21)	13240.5000-13245.5000	L,R	NON	Tx	85.00	85.00	11.3M -1		CW
22)	12780.0000-13140.0000	L,R	NON	Тx	71.20	71.20	11.3M -1		CM
23)	12780.0000-13140.0000	L,R	1M25G7D	Тx	71.20	46.25	11.3M -1		Digital Data Carrier
24)	12780.0000-13140.0000	L,R	312KG7D	Т×	60.00	41.10	11.3M -1		Digital Data Carrier
25)	12780.0000-13140.0000	L,R	SM00G7D	Tx	71.20	40.23	11.3M -1		Digital Data Carrier
26)	12780.0000-13140.0000	L,R	6K00G7D	Тx	32.26	30.50	11.3M -1		Digital Data Carrier
27)	12750.0000-12752.0000	L,R	1M20G7D	Тx	85.00	60.30	11.3M -1		Digital Data Carrier
28)	11200.0000-11450.0000	L,R	NON	Rx			11.3M -1		CW
29)	11200.0000-11450.0000	L,R	1M25G7D	Rx			11.3M -1		Digital Data Carrier
30)	11200.0000-11450.0000	L,R	312KG7D	Rx			11.3M -1		Digital Data Carrier
31)	11200.0000-11450.0000	L,R	5M00G7D	Rx			11.3M -1		Digital Data Carrier
32)	11200.0000-11450.0000	L,R	6K00G7D	Rx			11.3M -1		Digital Data Carrier
33)	11200.0000-11205.0000	L,R	1M20G7D	Rx			11.3M -1		Digital Data Carrier

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	The total of these provides, text	. 10 20011011	••		Max EIRP	Max EIRP Density		Special Provisions	
#	Frequency (MHz)	Polarizatio Code	n Emission	Tx/Rx Mode	/Carrier	•	Associated Antenna	(Refer to Section H)	Modulation/ Services
34)	10700.0000-10950.0000	L,R	NON	Rx			11.3M -1		CW
35)	10700.0000-10950.0000	L,R	1M25G7D	Rx			11.3M -1		Digital Data Carrier
36)	10700.0000-10950.0000	L,R	312KG7D	Rx			11.3M -1		Digital Data Carrier
37)	10700.0000-10950.0000	L,R	5M00G7D	Rx			11.3M -1		Digital Data Carrier
38)	10700.0000-10950.0000	L,R	6K00G7D	Rx			11.3M -1		Digital Data Carrier
39)	13248.0000-13250.0000	L,R	1M20G7D	Тx	82.50	57.73	7.3M		Digital Data Carrier
40)	13240.5000-13245.5000	L,R	NON	Тx	82.50	82.50	7.3M		CW
41)	12780.0000-13140.0000	L,R	NON	Tx	68.70	68.70	7.3M		CW
42)	12780.0000-13140.0000	L,R	1M25G7D	Тx	68.70	43.75	7.3M		Digital Data Carrier
43)	12780.0000-13140.0000	L,R	312KG7D	Тx	56.50	37.60	7.3M		Digital Data Carrier
44)	12780.0000-13140.0000	L,R	5M00G7D	Tx	68.70	37.73	7.3M		Digital Data Carrier
45)	12780.0000-13140.0000	L,R	6K00G7D	Тx	28.76	27.00	7.3M		Digital Data Carrier
46)	12750.0000-12752.0000	L,R	1M20G7D	Тx	82.50	57.73	7.3M		Digital Data Carrier
47)	11200.0000-11450.0000	L,R	NON	Rx			7.3M		CW
48)	11200.0000-11450.0000	L,R	1M25G7D	Rx			7.3M		Digital Data Carrier
49)	11200.0000-11450.0000	L,R	312KG7D	Rx			7.3M		Digital Data Carrier
50)	11200.0000-11450.0000	L,R	5M00G7D	Rx			7.3M		Digital Data Carrier
51)	11200.0000-11450.0000	L,R	6K00G7D	Rx			7.3M		Digital Data Carrier
52)	11200.0000-11205.0000	L,R	1M20G7D	Rx			7.3M		Digital Data Carrier
53)	10700.0000-10950.0000	L,R	NON	Rx			7.3M		CM
54)	10700.0000-10950.0000	L,R	1M25G7D	Rx			7.3M		Digital Data Carrier
55)	10700.0000-10950.0000	L,R	312KG7D	Rx			7.3M		Digital Data Carrier
56)	10700.0000-10950.0000	L,R	5M00G7D	Rx			7.3M		Digital Data Carrier
57)	10700.0000-10950.0000	L,R	6K00G7D	Rx			7.3M		Digital Data Carrier

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The General Provision 1010 applies to all receiving frequency bands.

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1011	me text of these provisions, re	ici to section i	••		Max EIRP	Max EIRP Density		Special		
#	Frequency (MHz)	Polarizatio Code	on Emission	Tx/Rx Mode	/Carrier		Associated Antenna	Provisions (Refer to Section H)	Modulation/ Services	
58) 1	646.5000-1660.5000	L,R	312KG7D	Tx	9.00	-9.90	L-band 1		Digital Data	Carrier
59) 1	646.5000-1660.5000	L,R	1M25G7D	Тx	9.00	-15.94	L-band 1		Digital Data	Carrier
60) 1	.646.5000-1660.5000	L,R	625KG7D	Тx	9.00	-12.93	L-band 1		Digital Data	Carrier
61) 1	626.5000-1645.5000	L,R	312KG7D	Тx	9.00	-9.90	L-band 1		Digital Data	Carrier
62) 1	626.5000-1645.5000	L,R	1M25G7D	Тx	9.00	-15.94	L-band 1		Digital Data	Carrier
63) 1	626.5000-1645.5000	L,R	625KG7D	Тx	9.00	-12.93	L-band 1		Digital Data	Carrier
64) 1	1545.0000-1559.0000	L,R	1M25G7D	Rx			L-band 1		Digital Data	Carrier
65) 1	545.0000-1559.0000	L,R	312KG7D	Rx			L-band 1		Digital Data	Carrier
66) 1	545.0000-1559.0000	L,R	625KG7D	Rx			L-band 1		Digital Data	Carrier
67) 1	.525.0000-1544.0000	L,R	1M25G7D	Rx			L-band 1		Digital Data	Carrier
68) 1	.525.0000-1544.0000	L,R	312KG7D	Rx			L-band 1		Digital Data	Carrier
69) <u>1</u>	.525.0000-1544.0000	L,R	625KG7D	Rx			L-band 1		Digital Data	Carrier
70) 1	646.5000-1660.5000	L,R	312KG7D	Tx	9.00	-9.90	L-band 2		Digital Data	Carrier
71) 1	646.5000-1660.5000	L,R	1M25G7D	Tx	9.00	-15.94	L-band 2		Digital Data	Carrier
72) 1	646.5000-1660.5000	L,R	625KG7D	Tx	9.00	-12.93	L-band 2		Digital Data	Carrier
73) 1	626.5000-1645.5000	L,R	312KG7D	Тx	9.00	-9.90	L-band 2		Digital Data	Carrier
74) 1	626.5000-1645.5000	L,R	1M25G7D	Tx	9.00	-15.94	L-band 2		Digital Data	Carrier
75) ₁	626.5000-1645.5000	L,R	625KG7D	Tx	9.00	-12.93	L-band 2		Digital Data	Carrier
76) ₁	545.0000-1559.0000	L,R	1M25G7D	Rx			L-band 2		Digital Data	Carrier
77) 1	545.0000-1559.0000	L,R	312KG7D	Rx			L-band 2		Digital Data	Carrier
78) ₁	545.0000-1559.0000	L,R	625KG7D	Rx			L-band 2		Digital Data	Carrier
79) 1	525.0000-1544.0000	L,R	1M25G7D	Rx			L-band 2		Digital Data	Carrier
80) 1	525.0000-1544.0000	L,R	312KG7D	Rx			L-band 2		Digital Data	Carrier
81) 1	525.0000-1544.0000	L,R	625KG7D	Rx			L-band 2		Digital Data	Carrier

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C) Frequency Coordination Limits

<u>#</u>	Frequency Limits (MHz)	Satellite Arc (Deg. Long.) East West Limit Limit	Elevation (Degrees) East West Limit Limit	Azimuth (Degrees) East West Limit Limit	Max EIRP Density toward Horizon (dBW/4kHz)	Associated Antenna(s)
1)	12750.0000-12752.0000	101.0W-107.3W	34.3-36.6	143.9-159.0	14.7	7.3M
2)	13240.5000-13245.5000	101.0W-107.3W	34.3-36.6	143.9-159.0	14.7	7.3M
3)	13248.0000-13250.0000	101.0W-107.3W	34.3-36.6	143.9-159.0	14.7	7.3M
4)	10700.0000-10950.0000	101.0W-107.3W	34.3-36.6	143.9-159.0		7.3M
5)	11200.0000-11450.0000	101.0W-107.3W	34.3-36.6	143.9-159.0		7.3M
6)	12780.0000-13140.0000	101.0W-107.3W	34.3-36.6	143.9-159.0	14.7	7.3M
7}	1525.0000~1544.0000	101.0W-107.3W	41.7-41.7	152.2-152.2		L-band 1
8)	1545.0000-1559.0000	101.0W-107.3W	41.7-41.7	152.2-152.2		L-band 1
9)	1626.5000-1645.5000	101.0W-107.3W	41.7-41.7	152.2-152.2	-25.9	L-band 1
10)	1646.5000-1660.5000	101.0W-107.3W	41.7-41.7	152.2-152.2	-25.9	L-band 1
11)	1525.0000-1544.0000	101.0W-107.3W	41.7-41.7	152.2-152.2		L-band 2
12)	1545.0000-1559.0000	101.0W-107.3W	41.7-41.7	152.2-152.2		L-band 2
13)	1626.5000-1645.5000	101.0W-107.3W	41.7-41.7	152.2-152.2	-25.9	L-band 2
14)	1646.5000-1660.5000	101.0W-107.3W	41.7-41.7	152.2-152.2	-25.9	L-band 2
15)	11200.0000-11450.0000	101.0W-107.3W	34.3-36.6	143.9-159.0		11.3M - 2
16)	12780.0000-13140.0000	101.0W-107.3W	34.3-36.6	143.9-159.0	14.8	11.3M - 2
17)	12750.0000-12752.0000	101.0W-107.3W	34.3-36.6	143.9-159.0	14.8	11.3M - 2
18)	13248.0000-13250.0000	101.0W-107.3W	34.3-36.6	143.9-159.0	14.8	11.3M - 2
19)	10700.0000-10950.0000	101.0W-107.3W	34.3-36.6	143.9-159.0		11.3M - 2
20)	13240.5000-13245.5000	101.0W-107.3W	34.3-36.6	143.9-159.0	14.8	11.3M - 2
21)	13240.5000-13245.5000	101.0W-107.3W	34.3-36.6	143.9-159.0	14.8	11.3M -1
22)	12780.0000-13140.0000	101.0W-107.3W	34.3-36.6	143.9-159.0	14.8	11.3M -1
23)	12750.0000-12752.0000	101.0W-107.3W	34.3-36.6	143.9-159.0	14.8	11.3M -1
24)	10700.0000-10950.0000	101.0W-107.3W	34.3-36.6	143.9-159.0		11.3M -1
25)	13248.0000-13250.0000	101.0W-107.3W	34.3-36.6	143.9-159.0	14.8	11.3M -1
26)	11200.0000-11450.0000	101.0W-107.3W	34.3-36.6	143.9-159.0		11.3M -1

D) Points of Communications

The following stations located in the Satellite orbits consistent with Sections B and C of this Entry:

¹⁾ Site 1 to MSV-1 satellite name changed to SKYTERRA-1 on 01/09/2009

²⁾ Site 1 to MSAT-1 @ 107.5 degrees W.L. (Canadian Licensed) (Non-U.S.-licensed)

³⁾ Site 1 to MSAT-2 satellite @ 100.95 degrees W.L. satellite(s) of the (U.S.-licensed)

⁴⁾ Site 1 to SKYTERRA 1 satellite @ 101.3 degrees W.L. satellite(s) of the (U.S.-licensed)



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E) Antenna Facilities

Site ID		Dia Units (m	ameter leters) Manufacture	er Model number	Site Elevation . (Meters)	Max Antenna Height (Meters)	Special Provisions (Refer to Section H)
Site 1	11.3M - 2	1 :	11.3 Viasat	11.3 Meter	3	12.7 AGL/ 14.35 AMSL	
	-	-	. © 11.0000 GHz antenna flange (Watt P for all carriers (d	.s) = 301.99	0000 GHz		
Site 1	11.3M -1	1	11.3 Viasat	11.3 Meter	3	12.7 AGL/ 14.35 AMSL	
		_	. 0 11.0000 GHz antenna flange (Watt P for all carriers (d	s) = 301.99	0000 GH2		
Site 1	7.3M	1	7.3 Viasat	7.3 Meter	3	7.97 AGL/ 10.35 AMSL	
	-	•	. @ 11.0000 GHz antenna flange (Watt P for all carriers (d	s) = 295.10	0000 GHz		
Site 1	L-band 1	1 (0.35 Viasat	Horn antenn	a 3	3 AGL/ 7 AMSL	
1	•	•	. @ 1.5000 GHz antenna flange (Watt P for all carriers (d	s) = 1.26	000 GHz		
Site 1	L-band 2	1 (0.35 Viasat	Horn antenn	a 3	3 AGL/ 7 AMSL	
1			. @ 1.5000 GHz antenna flange (Watt P for all carriers (d	s) = 1.26	000 GHz		

F) Remote Control Point:

Site 1 Call Sign:

G) Antenna Structure marking and lighting requirements:

None unless otherwise specified under Special and General Provisions



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H) Special and General Provisions

- A) This RADIO STATION AUTHORIZATION is granted subject to the following special provisions and general conditions:
 - 223 --- Footnote NG104 of the U.S. Table of Frequency Allocations, 47 C.F.R. § 2.106, is waived to permit operation of this station in the 10.7-10.95 GHz (space-to-Earth), 11.2-11.45 GHz (space-to-Earth) and 12.75-13.25 MHz (Earth-to-space) frequency bands for domestic communications. Operation in these bands is protected from interference from Fixed Service operations to the extent coordinated pursuant to the Frequency Coordination Report that MSV filed pursuant to 47 C.F.R. § 25.203(c).
 - 246 --- Operation of this station shall be in accordance with the relevant terms and conditions of the MSV-1 space-station license.
 - 247 --- Operation of this station in portions of the 12.75-13.25 GHz frequency band shall be on a no-harmful-interference basis pending issuance of an ITU finding permitting such use pursuant to Appendix 30B of the ITU Radio Regulations.
 - 252 --- Operation of this station in the 12.75-13.25 GHz frequency band shall be in compliance with any requirements concerning stations in the Broadcast Auxiliary Service and the Cable Television Relay Service adopted in the rulemaking proceeding in ET Docket No. 03-254.
 - 254 --- Uplink operation of this station shall not harmfully interfere with operation of any Fixed Service station at its present site in the event the Fixed Service station's assigned frequencies are shifted pursuant to Sections 101.85, 101.89, 101.91, or 101.95 of the Commission's rules.
 - 258 --- The licensee shall comply with the terms of Footnote US251 to 47 U.S.C. § 2.106 to ensure that operation of this station in the 12.75-13.25 MHz frequency band does not interfere with space research operation at Goldstone, California.
 - 263 --- Licensee shall coordinate with the National Science Foundation (NSF) in the 1660.0-1660.5 MHz band to ensure sharing of co-primary services.
 - 1010 --- Applicable to all receiving frequency bands. Emission designator indicates the maximum bandwidth of received signal at associated station(s). Maximum EIRP and maximum EIRP density are not applicable to receive operations.
 - 2916 --- Transmitter(s) must be turned off during antenna maintenance to ensure compliance with the FCC-specified safety guidelines for human exposure to radiofrequency radiation in the region between the antenna feed and the reflector. Appropriate measures must also be taken to restrict access to other regions in which the earth station's power flux density levels exceed the specified guidelines.
 - 2938 --- Upon completion of construction, each licensee must file with the Commission a certification including the following information: (1) name of the licensee, (2) file number of the application, (3) call sign of the antenna, (4) date of the license, (5) certification that the facility as authorized has been completed, (6) certification that each antenna facility has been tested and is within 2 dB of the pattern specified in Section 25.209, and (7) certification that the station is operational (including the date of commencement of service) and will remain operational during the license period unless the license is submitted for cancellation.

of 9) FCC Form 488



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H) Special and General Provisions

- A) This RADIO STATION AUTHORIZATION is granted subject to the following special provisions and general conditions:
 - 5208 --- The licensee shall take all necessary measures to ensure that the antenna does not create potential exposure of humans to radiofrequency radiation in excess of the FCC exposure limits defined in 47 CFR 1.1307(b) and 1.1310 wherever such exposures might occur. Measures must be taken to ensure compliance with limits for both occupational/controlled exposure and for general population/uncontrolled exposure, as defined in these rule sections. Compliance can be accomplished in most cases by appropriate restrictions, such as fencing. Requirements for restrictions can be determined by predictions based on calculations, modeling, or by field measurements. The FCC's OET Bulletin 65 (available on-line at www.fcc.gov/oet/rfsafety) provides information on predicting exposure levels and on methods for ensuring compliance, including the use of warning and alerting signs and protective equipment for workers.
 - 5216 --- All operations shall be on a non-common carrier basis.
- 90222 --- LightSquared's request for waiver of Section 25.283(c) of the Commission's rules, 47 C.F.R. § 25.283(c), IS GRANTED. Section 25.283(c) requires discharge of all stored energy sources when a space station is retired from service. MSAT-1 is a Boeing 601 model spacecraft, which has a liquid propulsion system that includes two helium pressurant tanks and two pairs of fuel and oxidizer tanks. The fuel and oxidizer tanks will be vented in the end-of-life shutdown procedure. The helium tanks were sealed by firing pyrotechnic valves shortly after launch in 1996, and contain an estimated mass of approximately 130 grams of helium in each tank, with each tank having a volume of 43.42 liters. We waive Section 25.283(c) in light of the fact that the action taken to seal the helium tanks was taken prior to the adoption of this rule, and compliance would require direct retrieval of the spacecraft.
- 90223 --- LightSquared's request for partial waiver of Section 25.114(c) of the Commission's rules, 47 C.F.R. § 25.114(c), IS GRANTED. The information provided satisfies the relevant informational requirements.
- 90224 --- Authorized communications with MSAT-1 are limited to frequencies within the L band (1525-1559 MHz and 1626.5-1660.5 MHz).



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B) This RADIO STATION AUTHORIZATION is granted subject to the additional conditions specified below:

This authorization is issued on the grantee's representation that the statements contained in the application are true and that the undertakings described will be carried out in good faith.

This authorization shall not be construed in any manner as a finding by the Commission on the question of marking or lighting of the antenna system should future conditions require. The grantee expressly agrees to install such marking or lighting as the Commission may require under the provisions of Section 303(q) of the Communications Act. 47 U.S.C. § 303(q).

Neither this authorization nor the right granted by this authorization shall be assigned or otherwise transferred to any person, firm, company or corporation without the written consent of the Commission. This authorization is subject to the right of use or control by the government of the United States conferred by Section 706 of the Communications Act. 47 U.S.C. § 706. Operation of this station is governed by Part 25 of the Commission's Rules. 47 C.F.R. Part 25.

This authorization shall not vest in the licensee any right to operate this station nor any right in the use of the designated frequencies beyond the term of this license, nor in any other manner than authorized herein.

This authorization is issued on the grantee's representation that the station is in compliance with environmental requirements set forth in Section 1.1307 of the Commission's Rules. 47 C.F.R. § 1.1307.

This authorization is issued on the grantee's representation that the station is in compliance with the Federal Aviation Administration (FAA) requirements as set forth in Section 17.4 of the Commission's Rules. 47 C.F.R.§ 17.4.

The following condition applies when this authorization permits construction of or modifies the construction permit of a radio station.

This authorization shall be automatically forfeited if the station is not ready for operation by the required date of completion of construction unless an application for modification of authorization to request additional time to complete construction is filed by that date, together with a showing that failure to complete construction by the required date was due to factors not under control of the grantee.

Licensees are required to pay annual regulatory fees related to this authorization. The requirement to collect annual regulatory fees from regulatees is contained in Public Law 103-66, "The Omnibus Budget Reconciliation Act of 1993." These regulatory fees, which are likely to change each fiscal year, are used to offset costs associated with the Commission's enforcement, public service, international and policy and rulemaking activities. The Commission issues a Report and Order each year, setting the new regulatory fee rates. Receive only earth stations are exempt from payment of regulatory fees.

