UNITED STATES OF AMERICA
FEDERAL COMMUNICATIONS COMMISSION

RADIO STATION AUTHORIZATION

Name: KVH Industries, Inc.
Call Sign: E090001
Authorization Type: Modification of License
File Number: SES-MOD-20180314-00221
Non Common Carrier **Grant date:** 07/03/2018 **Expiration Date:** 12/15/2024

Nature of Service: Earth Stations on-board Vessels
Nature of Service: Fixed Satellite Service

Class of Station: Other

A) Site Location(s)

#	Site ID	Address	Latitude	Longitude	Elevation (Meters)	NAD	Special Provisions (Refer to Section H)
1)	ESV NET1	(MOBILE 0.6METER) 3500 UNITS, CARIBBEAN AND COASTAL AREA CONUS, GM, Licensee certifies antenna(s) do not comply with Section 25.209. Please refer to Section E for special conditions placed upon antennas at this site.			0	NA	
2)	ESV NET2	(MOBILE 0.37METER) 50 ENTERPRISE CENTER VARIOUS (1000 UNITS), Licensee certifies antenna(s) do not comply with Section 25.209. Please refer to Section E for special conditions placed upon antennas at this site.			0	NA	
3)	ESV NET3	(MOBILE 1.0METER) (250 UNITS) CONUS, HI, AK USTERR, Licensee certifies antenna(s) do not comply with Section 25.209. Please refer to Section E for special conditions placed upon antennas at this site.				NA	
4)	ESV NET4	(MOBILE 1.0METER) 50 ENTERPRISE CENTER VARIOUS (500 UNITS), Licensee certifies antenna(s) do not comply with Section 25.209. Please refer to Section E for special conditions placed upon antennas at this site.				NA	

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 December 15, 2009 (3 AM Eastern Standard Time) and ending December 15, 2024 (3 AM Eastern Standard Time) . The required date of completion of construction and commencement of operation is July 3, 2019 (3 AM Eastern Standard Time) . Grantee must file with the Commission a certification upon completion of construction and commencement of operation.

FCC Form 488

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B) Particulars of Operations

The General Provision 1010 applies to all receiving frequency bands.
The General Provision 1900 applies to all transmitting frequency bands.
For the text of these provisions, refer to Section H.

#	Frequency (MHz)	Polarization Code	Emission	Tx/Rx Mode	Max EIRP /Carrier (dBW)	Max EIRP Density /Carrier (dBW/4kHz)	Associated Antenna	Special Provisions (Refer to Section H)	Modulation/ Services
1)	14000.0000-14500.0000	H,V	1M80G7D	Tx	41.15	14.60	ESV1		DATA SERVICES
2)	14000.0000-14500.0000	H,V	27M0G7D	Tx	42.40	4.11	ESV1		SPREAD SPECTRUM CRMA OUTBOUND DATA SERVICES
3)	14000.0000-14500.0000	H,V	18M0G7D	Tx	42.40	5.87	ESV1		DIRECT SEQUENCE SPREAD SPECTRUM (DSSS) TECHNIQUE USING A RANDOM ACCESS METHOD CALLED CODE REUSE MULTIPLE ACCESS (CRMA) TO ACCESS THE SATELLITE. DATA SERVICES.
4)	14000.0000-14500.0000	H,V	36M0G7D	Tx	42.40	2.86	ESV1		DIRECT SEQUENCE SPREAD SPECTRUM (DSSS) TECHNIQUE USING A RANDOM ACCESS METHOD CALLED CODE REUSE MULTIPLE ACCESS (CRMA) TO ACCESS THE SATELLITE. DATA SERVICES.
5)	11700.0000-12200.0000	H,V	1M80G7D	Rx			ESV1		DATA SERVICES
6)	11700.0000-12200.0000	H,V	18M0G7D	Rx			ESV1		SPREAD SPECTRUM CRMA OUTBOUND DATA SERVICES
7)	11700.0000-12200.0000	H,V	27M0G7D	Rx			ESV1		SPREAD SPECTRUM CRMA OUTBOUND DATA SERVICES
8)	11700.0000-12200.0000	H,V	36M0G7D	Rx			ESV1		SPREAD SPECTRUM CRMA OUTBOUND DATA SERVICES
9)	11450.0000-11700.0000	H,V	1M80G7D	Rx			ESV1		DATA SERVICES
10)	11450.0000-11700.0000	H,V	27M0G7D	Rx			ESV1		SPREAD SPECTRUM CRMA OUTBOUND DATA SERVICES
11)	10950.0000-11200.0000	H,V	1M80G7D	Rx			ESV1		DATA SERVICES
12)	10950.0000-11200.0000	H,V	27M0G7D	Rx			ESV1		SPREAD SPECTRUM CRMA OUTBOUND DATA SERVICES
13)	14000.0000-14500.0000	H,V	6M87G7W	Tx	38.02	-29.79	ESV2		Digital Data Services
14)	14000.0000-14500.0000	H,V	18M0G7D	Tx	38.02	1.49	ESV2		DIRECT SEQUENCE SPREAD SPECTRUM (DSSS) TECHNIQUE USING A RANDOM ACCESS METHOD CALLED CODE REUSE MULTIPLE ACCESS (CRMA) TO ACCESS THE SATELLITE. DATA SERVICES.

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B) Particulars of Operations

The General Provision 1010 applies to all receiving frequency bands.
The General Provision 1900 applies to all transmitting frequency bands.
For the text of these provisions, refer to Section H.

#	Frequency (MHz)	Polarization Code	Emission	Tx/Rx Mode	Max EIRP /Carrier (dBW)	Max EIRP Density /Carrier (dBW/4kHz)	Associated Antenna	Special Provisions (Refer to Section H)	Modulation/ Services
15)	14000.0000-14500.0000	H,V	27M0G7D	Tx	38.02	4.11	ESV2		DIRECT SEQUENCE SPREAD SPECTRUM (DSSS) TECHNIQUE USING A RANDOM ACCESS METHOD CALLED CODE REUSE MULTIPLE ACCESS (CRMA) TO ACCESS THE SATELLITE. DATA SERVICES.
16)	14000.0000-14500.0000	H,V	36M0G7D	Tx	38.02	-1.52	ESV2		DIRECT SEQUENCE SPREAD SPECTRUM (DSSS) TECHNIQUE USING A RANDOM ACCESS METHOD CALLED CODE REUSE MULTIPLE ACCESS (CRMA) TO ACCESS THE SATELLITE. DATA SERVICES.
17)	11700.0000-12200.0000	H,V	18M0G7D	Rx			ESV2		DATA SERVICES
18)	11700.0000-12200.0000	H,V	36M0G7D	Rx			ESV2		DATA SERVICES
19)	11700.0000-12200.0000	H,V	5M00G7W	Rx			ESV2		Digital Data Services
20)	11700.0000-12200.0000	H,V	6M87G7W	Rx			ESV2		Digital Data Services
21)	11700.0000-12200.0000	H,V	27M0G7D	Rx			ESV2		SPREAD SPECTRUM CRMA OUTBOUND DATA SERVICES
22)	11450.0000-11700.0000	H,V	5M00G7W	Rx			ESV2		Digital Data Services
23)	11450.0000-11700.0000	H,V	6M87G7W	Rx			ESV2		Digital Data Services
24)	11450.0000-11700.0000	H,V	27M0G7D	Rx			ESV2		SPREAD SPECTRUM CRMA OUTBOUND DATA SERVICES
25)	10950.0000-11200.0000	H,V	5M00G7W	Rx			ESV2		Digital Data Services
26)	10950.0000-11200.0000	H,V	6M87G7W	Rx			ESV2		Digital Data Services
27)	10950.0000-11200.0000	H,V	27M0G7D	Rx			ESV2		SPREAD SPECTRUM CRMA OUTBOUND DATA SERVICES
28)	1400.0000-14500.0000	H,V	5M00G7W	Tx	38.02	-27.41	ESV2		Digital Data Services
29)	14000.0000-14500.0000	H,V	18M0G7D	Tx	49.00	9.50	ESV3		DIRECT SEQUENCE SPREAD SPECTRUM (DSSS) TECHNIQUE USING A RANDOM ACCESS METHOD CALLED CODE REUSE MULTIPLE ACCESS (CRMA) TO ACCESS THE SATELLITE. DATA SERVICES.

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B) Particulars of Operations

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The General Provision 1900 applies to all transmitting frequency bands.
For the text of these provisions, refer to Section H.

#	Frequency (MHz)	Polarization Code	Emission	Tx/Rx Mode	Max EIRP /Carrier (dBW)	Max EIRP Density /Carrier (dBW/4kHz)	Associated Antenna	Special Provisions (Refer to Section H)	Modulation/ Services
30)	14000.0000-14500.0000	H,V	36M0G7D	Tx	49.00	9.50	ESV3		DIRECT SEQUENCE SPREAD SPECTRUM (DSSS) TECHNIQUE USING A RANDOM ACCESS METHOD CALLED CODE REUSE MULTIPLE ACCESS (CRMA) TO ACCESS THE SATELLITE. DATA SERVICES.
31)	14000.0000-14500.0000	H,V	27M0G7D	Tx	49.00	10.70	ESV3		DIRECT SEQUENCE SPREAD SPECTRUM (DSSS) TECHNIQUE USING A RANDOM ACCESS METHOD CALLED CODE REUSE MULTIPLE ACCESS (CRMA) TO ACCESS THE SATELLITE. DATA SERVICES.
32)	11700.0000-12200.0000	H,V	18M0G7D	Rx			ESV3		SPREAD OUTBOUND 10 MBPS CARRIER, DATA SERVICE
33)	11700.0000-12200.0000	H,V	27M0G7D	Rx			ESV3		SPREAD OUTBOUND 10 MBPS CARRIER, DATA SERVICE
34)	11700.0000-12200.0000	H,V	36M0G7D	Rx			ESV3		SPREAD OUTBOUND 10 MBPS CARRIER, DATA SERVICE
35)	11450.0000-11700.0000	H,V	18M0G7D	Rx			ESV3		SPREAD OUTBOUND 10 MBPS CARRIER, DATA SERVICE
36)	11450.0000-11700.0000	H,V	27M0G7D	Rx			ESV3		SPREAD OUTBOUND 10 MBPS CARRIER, DATA SERVICE
37)	11450.0000-11700.0000	H,V	36M0G7D	Rx			ESV3		SPREAD OUTBOUND 10 MBPS CARRIER, DATA SERVICE
38)	10950.0000-11200.0000	H,V	18M0G7D	Rx			ESV3		SPREAD OUTBOUND 10 MBPS CARRIER, DATA SERVICE
39)	10950.0000-11200.0000	H,V	27M0G7D	Rx			ESV3		SPREAD OUTBOUND 10 MBPS CARRIER, DATA SERVICE
40)	10950.0000-11200.0000	H,V	36M0G7D	Rx			ESV3		SPREAD OUTBOUND 10 MBPS CARRIER, DATA SERVICE
41)	14000.0000-14500.0000	H,V	18M0G7D	Tx	46.30	9.80	ESV4		DIRECT SEQUENCE SPREAD SPECTRUM (DSSS) TECHNIQUE USING A RANDOM ACCESS METHOD CALLED CODE REUSE MULTIPLE ACCESS (CRMA) TO ACCESS THE SATELLITE. DATA SERVICES.

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The General Provision 1900 applies to all transmitting frequency bands.
For the text of these provisions, refer to Section H.

#	Frequency (MHz)	Polarization Code	Emission	Tx/Rx Mode	Max EIRP /Carrier (dBW)	Max EIRP Density /Carrier (dBW/4kHz)	Associated Antenna	Special Provisions (Refer to Section H)	Modulation/ Services
42)	14000.0000-14500.0000	H,V	27M0G7D	Tx	46.30	8.00	ESV4		DIRECT SEQUENCE SPREAD SPECTRUM (DSSS) TECHNIQUE USING A RANDOM ACCESS METHOD CALLED CODE REUSE MULTIPLE ACCESS (CRMA) TO ACCESS THE SATELLITE. DATA SERVICES.
43)	14000.0000-14500.0000	H,V	36M0G7D	Tx	46.30	6.80	ESV4		DIRECT SEQUENCE SPREAD SPECTRUM (DSSS) TECHNIQUE USING A RANDOM ACCESS METHOD CALLED CODE REUSE MULTIPLE ACCESS (CRMA) TO ACCESS THE SATELLITE. DATA SERVICES.
44)	11700.0000-12200.0000	H,V	18M0G7D	Rx			ESV4		SPREAD SPECTRUM CRMA OUTBOUND DATA SERVICES
45)	11700.0000-12200.0000	H,V	27M0G7D	Rx			ESV4		SPREAD SPECTRUM CRMA OUTBOUND DATA SERVICES
46)	11700.0000-12200.0000	H,V	36M0G7D	Rx			ESV4		SPREAD SPECTRUM CRMA OUTBOUND DATA SERVICES
47)	11450.0000-11700.0000	H,V	27M0G7D	Rx			ESV4		SPREAD SPECTRUM CRMA OUTBOUND DATA SERVICES
48)	10950.0000-11200.0000	H,V	27M0G7D	Rx			ESV4		SPREAD SPECTRUM CRMA OUTBOUND DATA SERVICES

C) Frequency Coordination Limits

#	Frequency Limits (MHz)	Satellite Arc (Deg. Long.) East Limit	Satellite Arc (Deg. Long.) West Limit	Elevation (Degrees) East Limit	Elevation (Degrees) West Limit	Azimuth (Degrees) East Limit	Azimuth (Degrees) West Limit	Max EIRP Density toward Horizon (dBW/4kHz)	Associated Antenna(s)
1)	14000.0000-14500.0000	172.0W-172.0W		05.0-05.0				-17.8	ESV3
2)	14000.0000-14500.0000	105.0W-105.0W		05.0-05.0				-17.8	ESV3
3)	14000.0000-14500.0000	60.0W-172.0W		05.0-05.0				-17.8	ESV3
4)	14000.0000-14500.0000	37.5W-37.5W		05.0-05.0				-19.5	ESV3
5)	14000.0000-14500.0000	125.0W-125.0W		05.0-05.0				-17.8	ESV3
6)	11700.0000-12200.0000	125.0W-125.0W		05.0-05.0					ESV3
7)	11700.0000-12200.0000	105.0W-105.0W		05.0-05.0					ESV3

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8)	11700.0000-12200.0000	60.0W-172.0W		05.0-05.0					ESV3
9)	11450.0000-11700.0000	172.0W-172.0W		05.0-05.0					ESV3
10)	11450.0000-11700.0000	37.5W-37.5W		05.0-05.0					ESV3
11)	10950.0000-11200.0000	172.0W-172.0W		05.0-05.0					ESV3
12)	10950.0000-11200.0000	37.5W-37.5W		05.0-05.0					ESV3
13)	14000.0000-14500.0000	172.0W-172.0W		05.0-05.0				-20	ESV1
14)	14000.0000-14500.0000	125.0W-125.0W		05.0-05.0				-20	ESV1
15)	14000.0000-14500.0000	105.0W-105.0W		05.0-05.0				-20	ESV1
16)	14000.0000-14500.0000	60.0W-172.0W		05.0-05.0				-20	ESV1
17)	11700.0000-12200.0000	172.0W-172.0W		05.0-05.0					ESV1
18)	11700.0000-12200.0000	125.0W-125.0W		05.0-05.0					ESV1
19)	11700.0000-12200.0000	105.0W-105.0W		05.0-05.0					ESV1
20)	11700.0000-12200.0000	60.0W-172.0W		05.0-05.0					ESV1
21)	11450.0000-11700.0000	172.0W-172.0W		05.0-05.0					ESV1
22)	10950.0000-11200.0000	172.0W-172.0W		05.0-05.0					ESV1
23)	14000.0000-14500.0000	172.0W-172.0W		05.0-05.0				-8.19	ESV1
24)	11700.0000-12200.0000	172.0W-172.0W		05.0-05.0					ESV1
25)	11450.0000-11700.0000	172.0W-172.0W		05.0-05.0					ESV1
26)	10950.0000-11200.0000	172.0W-172.0W		05.0-05.0					ESV1
27)	14000.0000-14500.0000	172.0W-172.0W		10.0-10.0				-27.7	ESV2
28)	14000.0000-14500.0000	125.0W-125.0W		10.0-10.0				-27.7	ESV2
29)	14000.0000-14500.0000	105.0W-105.0W		10.0-10.0				-27.7	ESV2
30)	14000.0000-14500.0000	60.0W-172.0W		10.0-10.0				-27.7	ESV2
31)	11700.0000-12200.0000	172.0W-172.0W		10.0-10.0					ESV2
32)	11700.0000-12200.0000	125.0W-125.0W		10.0-10.0					ESV2
33)	11700.0000-12200.0000	105.0W-105.0W		10.0-10.0					ESV2
34)	11700.0000-12200.0000	60.0W-172.0W		10.0-10.0					ESV2
35)	11450.0000-11700.0000	172.0W-172.0W		10.0-10.0					ESV2
36)	10950.0000-11200.0000	172.0W-172.0W		10.0-10.0					ESV2
37)	14000.0000-14500.0000	172.0W-172.0W		05.0-05.0				-20.9	ESV4
38)	14000.0000-14500.0000	125.0W-125.0W		05.0-05.0				-20.9	ESV4
39)	14000.0000-14500.0000	105.0W-105.0W		05.0-05.0				-20.9	ESV4
40)	14000.0000-14500.0000	60.0W-172.0W		05.0-05.0				-20.9	ESV4
41)	14000.0000-14500.0000	37.5W-37.5W		05.0-05.0				-20.9	ESV4

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C) Frequency Coordination Limits

#	Frequency Limits (MHz)	Satellite Arc (Deg. Long.) East Limit	Satellite Arc (Deg. Long.) West Limit	Elevation (Degrees) East Limit	Elevation (Degrees) West Limit	Azimuth (Degrees) East Limit	Azimuth (Degrees) West Limit	Max EIRP Density toward Horizon (dBW/4kHz)	Associated Antenna(s)
42)	11700.0000-12200.0000	125.0W-125.0W		05.0-05.0					ESV4
43)	11700.0000-12200.0000	105.0W-105.0W		05.0-05.0					ESV4
44)	11700.0000-12200.0000	60.0W-172.0W		05.0-05.0					ESV4
45)	11450.0000-11700.0000	172.0W-172.0W		05.0-05.0					ESV4
46)	11450.0000-11700.0000	37.5W-37.5W		05.0-05.0					ESV4
47)	10950.0000-11200.0000	172.0W-172.0W		05.0-05.0					ESV4
48)	10950.0000-11200.0000	37.5W-37.5W		05.0-05.0					ESV4

D) Points of Communications

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

1) ESV NET3 to EUTELSAT 172A (S2610) @ 174 degrees E.L. (formerly GE-23) (U.S.-licensed)
2) ESV NET3 to TELSTAR 11N (S2357) @ 37.55 degrees W.L. (U.S.-licensed)
3) ESV NET1 to EUTELSAT 172A (S2610) @ 174 degrees E.L. (formerly GE-23) (U.S.-licensed)
4) ESV NET1 to Permitted Space Station List
5) ESV NET2 to Permitted Space Station List
6) ESV NET2 to EUTELSAT 172A (S2610) @ 174 degrees E.L. (formerly GE-23) (U.S.-licensed)
7) ESV NET4 to TELSTAR 11N (S2357) @ 37.55 degrees W.L. (U.S.-licensed)
8) ESV NET4 to EUTELSAT 172A (S2610) @ 174 degrees E.L. (formerly GE-23) (U.S.-licensed)

E) Antenna Facilities

Site ID	Antenna ID	Units	Diameter (meters)	Manufacturer	Model number	Site Elevation (Meters)	Max Antenna Height (Meters)	Special Provisions (Refer to Section H)
ESV NET1	ESV1	3500	0.6	KVH INDUSTRIES, INC.	TRACPHONE V7	0	0.6 AGL/ 0.6 AMSL	

Max Gains(s): 37.4 dBi @ 14.2500 GHz 35.5 dBi @ 11.9500 GHz
Maximum total input power at antenna flange (Watts) = 4.00
Maximum aggregate output EIRP for all carriers (dBW) = 42.40

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E) Antenna Facilities

Site ID	Antenna ID	Units	Diameter (meters)	Manufacturer	Model number	Site Elevation (Meters)	Max Antenna Height (Meters)	Special Provisions (Refer to Section H)
ESV NET2	ESV2	1000	0.37	TRACPHONE	V3	0	0.4 AGL/ 0.4 AMSL	

Max Gains(s): 33.3 dBi @ 14.2500 GHz 31.6 dBi @ 11.9500 GHz
Maximum total input power at antenna flange (Watts) = 3.00
Maximum aggregate output EIRP for all carriers (dBW) = 38.02

Site ID	Antenna ID	Units	Diameter (meters)	Manufacturer	Model number	Site Elevation (Meters)	Max Antenna Height (Meters)	Special Provisions (Refer to Section H)
ESV NET3	ESV3	250	1	MELCO	KU-MATE(SX-5300)		1 AGL/ 1 AMSL	

Max Gains(s): 41.8 dBi @ 14.2500 GHz 40.2 dBi @ 11.9500 GHz
Maximum total input power at antenna flange (Watts) = 5.29
Maximum aggregate output EIRP for all carriers (dBW) = 49.00

Site ID	Antenna ID	Units	Diameter (meters)	Manufacturer	Model number	Site Elevation (Meters)	Max Antenna Height (Meters)	Special Provisions (Refer to Section H)
ESV NET4	ESV4	500	1	KVH INDUDTRIES	TRACPHONE V11		1 AGL/ 1 AMSL	

Max Gains(s): 42.2 dBi @ 14.2500 GHz 40.4 dBi @ 11.8500 GHz
Maximum total input power at antenna flange (Watts) = 2.58
Maximum aggregate output EIRP for all carriers (dBW) = 46.30

F) Remote Control Point:

ESV NET1
6155 EL CAMINO REAL, (0.6M.)
SAN DIEGO, CARLSBAD, CA 92009
760-476-2583
Call Sign: VARIOUS

ESV NET2
6155 EL CAMINO REAL, (V.37M.)
SAN DIEGO, CARLSBAD, CA 92009
760-476-2583
Call Sign: VARIOUS

ESV NET3
50 ENTERPRISE CENTER, (1.0M.)
MIDDLETOWN, NEWPORT, RI 02842
401-847-3327
Call Sign: CONUS

ESV NET4
6155 EL CAMINO REAL, (1.0METER)
CARLSBAD, SAN DIEGO, CA 92009
760-476-2583
Call Sign: 030131

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G) Antenna Structure marking and lighting requirements:

None unless otherwise specified under Special and General Provisions

H) Special and General Provisions

A) This RADIO STATION AUTHORIZATION is granted subject to the following special provisions and general conditions:

4 --- Licensee must ensure that a current listing of the name, title, mailing address, email address, and telephone number of the responsible point of contact are on file at the FCC. Any changes must be filed electronically in the International Bureau Filing System (IBFS) in the "Other Filings" tab within 10 days of the change.

5 --- Licensee must notify the Commission when this earth station is no longer operational or when it has not been used to provide any service during any 6-month operation.

6 --- Licensee must comply with the license modification and notification requirements of 47 CFR § 25.118 to change the coordinates of its authorized earth station.

105 --- Subject to Rule Making: This license is subject to the outcome of any future rule making concerning ESV operations. Grant of this authorization shall not prejudice the outcome of any rulemaking.

167 --- This authorization is limited to the total number of terminals listed in Section A of this license for this Site ID.

300 --- With respect to antenna size and pointing accuracy, licensee is authorized to operate in accordance with Article 4.4 of the ITU Radio Regulations. The operations authorized herein shall not cause harmful interference to, and shall not claim protection from harmful interference caused by, a station operating in accordance with the provisions of the ITU Constitution, the ITU Convention, and the ITU Radio Regulations. The operations authorized herein are otherwise consistent with ITU provisions.

301 --- KVH Industries, Inc. shall maintain a point of contact for discussing interference concerns with other licensees and U.S. Government agencies and shall submit a letter to be included in its license file with the name and telephone number of the contact prior to commencing operation.

302 --- KVH Industries, Inc. shall notify the Commission of the date when commercial operation of its ESV networks commences. Twelve months after commencing commercial operation, KVH Industries shall file a report on the system's aggregate off-axis radiation performance since the commencement of commercial operation, based on the most recent available data and taking into account all relevant variables.

303 --- All operating ESVs must be monitored, and operations adjusted if necessary, to ensure that no more interference in the geostationary plane is caused by the entire network of ESVs at any time (accumulating the interference caused by all correctly pointed and all mispointed higher-power ESV antennas) than would be caused by a single earth station transmitting in compliance with Sections 25.222(a)(1), 25.222(a)(3), and 25.222(a)(4) of the Commission's rules, using N=1.

304 --- Pursuant to this authorization operations in the 14.47-14.5 GHz (Earth-to-Space) frequency band within 45 km of the radio observatory on St. Croix, Virgin Islands, 125 Km of the radio observatory on Mauna Kea, Hawaii and 90 km of the Arecibo observatory on Puerto Rico are prohibited unless KVH reaches an agreement with the National Science Foundation permitting such operations, and this agreement is approved by NTIA and the FCC.

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Authorization Type: Modification of License **File Number:** SES-MOD-20180314-00221
Non Common Carrier **Grant date:** 07/03/2018 **Expiration Date:** 12/15/2024

H) Special and General Provisions

A) This RADIO STATION AUTHORIZATION is granted subject to the following special provisions and general conditions:

354 --- The licensee must coordinate its operations with Ku-band Non-Geostationary Satellite Orbit (NGSO) Fixed Satellite Service (FSS) systems, and obtain an affidavit from any Ku-band NGSO FSS licensee that the ESV licensee's operations are acceptable. In the absence of such an affidavit, the licensee's ESV system must cease service immediately upon launch and operation of the first satellite in a Ku-band NGSO FSS system, or demonstrate that it will not cause harmful interference to the new NGSO FSS system. Failure to make such a demonstration may subject the licensee's ESVs to further conditions by the Commission designed to address potential harmful interference.

355 --- The KVH ESV networks shall operate in compliance with any pertinent limits established by the International Telecommunication Union (ITU) to protect other services allocated internationally.

356 --- The licensee shall maintain a point of contact, available 24 hours a day, seven days a week, with authority and ability to cease all emissions from the ESVs, either directly or through the facilities of a U.S. Hub or a Hub located in another country with which the United States has a bilateral agreement that enables such cessation of emissions, for discussing interference concerns with other licensees and U.S. Government agencies and shall submit a letter to be included in its license file with the name and telephone number of the contact prior to commencing operation.

357 --- Twelve months from the date of the grant of this authorizations, the licensee shall file a report on the system's aggregate off-axis radiation performance, based on the most recent available data and taking into account all relevant variables.

358 --- KVH shall operate a maximum of 7 ESV NET 1 antennas transmitting simultaneously in the same satellite receiving beam. KVH shall operate a maximum of 13 ESV NET 2 antennas (36 MHz bandwidth) or 6 ESV NET 2 antennas (18 MHz bandwidth) transmitting simultaneously in the same satellite receiving beam. All operating ESVs must be monitored, and operations adjusted if necessary, to ensure that no more interference in the geostationary plane is caused by the entire network of ESVs at any time (accumulating the interference caused by all correctly pointed and all mispointed ESV antennas) than would be caused by a single earth station transmitting in compliance with Sections 25.222(a)(1)(i)(A)-(C) of the Commission's rules, using N=1.

359 --- Pursuant to this authorization operations in the 14.47-14.5 GHz (Earth-to-Space) frequency band within 45 km of the radio observatory on St. Croix, Virgin Islands, 125 km of the radio observatory on Mauna Kea, Hawaii and 90 km of the Arecibo observatory on Puerto Rico are prohibited unless the licensee reaches an agreement with the National Science Foundation permitting such operations, and this agreement is approved by the National Telecommunications and Information Administration's Interdepartment Radio Advisory Committee and the FCC.

360 --- This license is subject to the revised ESV rules adopted in Procedures to Govern the Use of Satellite Earth Stations on Board Vessels in the 5925-6425 MHz/3700-4200 MHz Bands and 14.0-14.5 GHz/11.7-12.2 GHz Bands, IB Docket No. 02-10, ESV Order on Reconsideration, FCC 09-63 (released July 31, 2009).

361 --- KVH, Inc. may decline this authorization as conditioned within 30 days from the date of release of this Order and Authorization. Failure to respond within that period will constitute formal acceptance of the authorization as conditioned.

362 --- This Order and Authorization is issued on delegated authority pursuant to Sections 0.51 and 0.261 of the Commission's rules, 47 C.F.R. §§ 0.51 and 0.261, and is effective upon release. Petitions for reconsideration under Section 1.106 or applications for review under Section 1.115 of the Commission's rules, 47 C.F.R. §§ 1.106, 1.115, may be filed within 30 days of the date of the public notice indicating that this action was taken.

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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:

503 --- Pursuant to this authorization operations in the 14.0-14.2 GHz (Earth-to-space) frequency band within 125 km of the NASA TDRSS facilities on Guam (located at latitude: 13°36'55" N, longitude 144°51'22" E) or White Sands, New Mexico (latitude: 32°20'59" N, longitude 106°36'31" W and latitude: 32°32'40" N, longitude 106°36'48" W), as well as future TDRSS sites, are prohibited unless the licensee reaches an agreement with NASA permitting such operations, and this agreement is approved by the National Telecommunications and Information Administration's Interdepartment Radio Advisory Committee and the FCC.

90013 --- The licensee shall not operate in the band 14.0-14.2 GHz within 125 km of the NASA TDRSS facilities on Guam (located at latitude 13°36'55" N, longitude 144°51'22" E) or White Sands, New Mexico (located at latitude 32°20'59" N, longitude 106°36'31" W and latitude 32°32'40" N, longitude 106°36'48" W), or any future TDRSS facility NTIA notifies to the FCC, unless and until the licensee enters into an agreement with NASA that NTIA has approved. The licensee must conform its operations to the terms of any coordination agreement with the NASA and must file a copy of the agreement with the Commission within 30 days of execution.

90014 --- The licensee shall not operate in the band 14.47-14.50 GHz within (a) 45 km of the radio observatory on St. Croix, Virgin Islands (located at latitude 17°46' N, longitude 64°35' W); (b) 125 km of the radio observatory on Mauna Kea, Hawaii (located at latitude 19°48' N, longitude 155°28' W); and (c) 90 km of the Arecibo Observatory on Puerto Rico (located at latitude 18°20'46" W, longitude 66°45'11" N) unless and until the licensee enters into an agreement with the National Science Foundation that has been approved by NTIA. The licensee must conform its operations to the terms of any coordination agreement with the National Science Foundation and must file a copy of the agreement with the Commission within 30 days of execution.

90398 --- Changes to previously authorized transmitting facilities, operations and devices regulated by the Commission that may have significant environmental impact, and are not excluded by §1.1306, require the preparation of an Environmental Assessment (EA) by the licensee. (See 47 C.F.R. §§1.1307, 1.1308 and 1.1311)

90399 --- The licensee shall, at all times, take all necessary measures to ensure that operation of this (these) authorized earth station(s) 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. Physical 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.

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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:

900407 --- The Permitted Space Station List (Permitted List) is a list of all geostationary space stations providing fixed-satellite service pursuant to a Commission license or grant of U.S. market access. The Permitted List currently includes the following frequency bands per §25.103 and §25.115(k)(1):

3600-4200 MHz (space-to-Earth)
5850-6725 MHz (Earth-to-space)
10.95-11.2 GHz (space-to-Earth)
11.45-12.2 GHz (space-to-Earth)
13.75-14.5 GHz (Earth-to-space)
18.3-18.8 GHz (space-to-Earth)
19.7-20.2 GHz (space-to-Earth)
24.75-25.25 GHz (Earth-to-space)
28.35-28.6 GHz (Earth-to-space)
29.25-30.0 GHz (Earth-to-space).

Earth stations with "Permitted List" designated as a point of communication may access any space station on the Permitted List, provided the operations comply with the applicable "routine" uplink and downlink limits, are within the specific frequency bands authorized in the earth station license, have completed coordination with terrestrial stations pursuant to §25.203, and otherwise comply with all terms and conditions of both the earth station license and the space station grant.

UNITED STATES OF AMERICA
FEDERAL COMMUNICATIONS COMMISSION

RADIO STATION AUTHORIZATION

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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.