

Prepared for the Federal Communications Commission

**Application for New License Authority for
Earth Stations on Board Vessels**

AIRTAP COMMUNICATIONS, LLC.

April 10, 2014

TABLE OF CONTENTS

INTRODUCTION	2
§25.222 (A)(1)(I)(A-C) SPECTRAL DENSITY LIMITS.....	2
SPECTRAL DENSITY ENVELOPES	2
§25.222 (A)(1)(II)(A) ANTENNA POINTING ERROR.....	3
§25.222 (A)(1)(III)(A) AUTOMATIC SHUT-OFF.....	3
§25.222 (A)(3) U.S. CONTACT INFORMATION	3
§ 25.222 (A)(4) VESSEL TRACKING.....	4
FUNCTIONALITY OF VESSEL TRACKING SYSTEM.....	4
§25.222 (A)(5) VESSELS OF FOREIGN REGISTRY.....	4
§25.222 (A)(6) U.S. CONTROL OF ESV HUB EARTH STATION.....	4
§25.222 (A)(7) 10.95-11.2 GHZ.....	5
§25.222 (B)(1)(I) EIRP DENSITY TABLES	5
§25.222 (B)(1)(II) AIRTAP CERTIFICATION.....	5
§25.222 (B)(1)(III) MANUFACTURER CERTIFICATION	6
§25.222 (B)(3) ESV GEOGRAPHIC AREA OF OPERATION	6
§25.222 (B)(4) POINT OF CONTACT	6
§25.222 (B)(5) RADIATION EXPOSURE LIMITS.....	6
§25.222 (C) FREQUENCY COORDINATION	7
§25.222 (D) FREQUENCY COORDINATION	7
APPENDIX A – DECLARATION OF SEATEL, INC.	8
APPENDIX B – DECLARATION OF AIRTAP	9
APPENDIX C – USE OF NON-U.S. SATELLITES	10
APPENDIX D – FAA NOTIFICATION	11

INTRODUCTION

AIRTAP COMMUNICATIONS, LLC. (“AIRTAP”), pursuant to 47 C.F.R. § 25.115 of the Rules and Regulations (“Regulations”) of the Federal Communications Commission (“Commission”), respectfully requests new authority to operate Ku-Band Earth Station on Vessels (“ESVs”) throughout US channels and waterways, the Gulf of Mexico, the Caribbean Sea, the Atlantic Ocean, and the Pacific Ocean. The proposed ESVs seek to operate in the 11.7-12.2 GHz and 14.0-14.5 GHz (“Ku-Band”) frequency bands to communicate with already licensed hub stations located in the United States.

The proposed antenna (“Antenna”) is:

- Seatel USAT30, 75cm Ku-Band (“Seatel 75cm”) -- Manufactured by Seatel, Inc.

The Antenna is capable of providing stabilized tracking. Seatel has performed tests and generated the EIRP spectral density tables and plots here presented. Furthermore, Seatel has declared that if the input power density to the feed of the Antennas is limited to the figures stated below, the Antenna will meet the requirements of Section 25.222 of the Regulations.

<u>Antenna Model</u>	<u>Maximum EIRP Spectral Density</u>
• Seatel 75cm (USAT30)	-21.6 dBW/4KHz

This report together with its attachments and exhibits addresses the requirements of Section 25.222 of the Regulations as well as the underlying ESV Order and Orders on Reconsideration.¹

§25.222 (a)(1)(i)(A-C) SPECTRAL DENSITY LIMITS

“An ESV system shall not exceed the off-axis EIRP spectral-density limits and conditions defined in paragraphs (a)(1)(i)(A) through (a)(1)(i)(D) of this section.” 47 C.F.R §25.222(a)(1)(i)(A).

Spectral Density Envelopes

The spectral density envelopes specified in §25.222(a)(1)(i) are as follows:²

§25.222(a)(1)(i)(A) – Copole Azimuth

• $15 - 25\log(\theta)$	dBW / 4KHz for $1.5^\circ \leq \theta \leq 7.0^\circ$
• -6	dBW / 4KHz for $7.0^\circ \leq \theta \leq 9.2^\circ$
• $18 - 25\log(\theta)$	dBW / 4KHz for $9.2^\circ \leq \theta \leq 48^\circ$
• -24	dBW / 4KHz for $48^\circ \leq \theta \leq 85^\circ$
• -14	dBW / 4KHz for $85^\circ \leq \theta \leq 180^\circ$

The peak EIRP of an individual sidelobe may not exceed the envelope defined above for θ between 1.5° and 7.0° . For $\theta > 7^\circ$, the envelope may be exceeded by no more than 10% of the sidelobes, provided no individual sidelobe exceeds the envelope by more than 3dB.

¹ In the Matter of 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, Report and Order, FCC 204-286, Adopted December 15, 2004, Released January 6, 2005; Order on Reconsideration, FCC 09-63, Adopted July 30, 2009, Released July 31, 2009; Second Order on Reconsideration, FCC 12-79, Adopted July 19, 2012.

² The actual formula in the statute includes a $\log(N)$ term which is subtracted from the spectral density. Since in this case, the system is TDMA and $N=1$ for TDMA, the $\log(1)$ terms goes to zero.

§25.222(a)(1)(i)(B) – Copole in other directions

•	18 – 25log(θ)	dBW / 4KHz for $3.0^\circ \leq \theta \leq 48^\circ$
•	-24	dBW / 4KHz for $48^\circ \leq \theta \leq 85^\circ$
•	-14	dBW / 4KHz for $85^\circ \leq \theta \leq 180^\circ$

The envelope may be exceeded by no more than 10% of the sidelobes provided no individual sidelobe exceeds the gain envelope given above by more than 6dB. The region of the main reflector spillover energy is to be determined as a single lobe and shall not exceed the enveloped by more than 6dB.

§25.222(a)(1)(i)(C) – Crosspole Azimuth

•	5 – 25log(θ)	dBW / 4KHz for $1.8^\circ \leq \theta \leq 7^\circ$
•	-16	dBW / 4KHz for $7^\circ \leq \theta \leq 9.2^\circ$

§25.222 (a)(1)(ii)(A) ANTENNA POINTING ERROR

“Each ESV transmitter shall maintain a pointing error of less than or equal to 0.2° between the orbital location of the target satellite and the axis of the main lobe of the ESV antenna.” 47 C.F.R §25.222(a)(1)(ii)(A).

According to Seatel, the Seatel 75cm will maintain a stabilization pointing accuracy of better than 0.2 degrees under specified ship motion conditions. See Appendix A – Declaration of Seatel, Inc. Paragraph 4.

§25.222 (a)(1)(iii)(A) AUTOMATIC SHUT-OFF

“... all emissions from the ESV shall automatically cease within 100 milliseconds if the line angle between the orbital location of the target satellite and the axis of the main lobe of the ESV antenna exceeds 0.5°, and transmission will not resume until such angle is less than 0.2°.” 47 C.F.R §25.222(a)(1)(iii)(A).

According to Seatel, the Seatel 75cm will automatically cease transmissions within 100 milliseconds if the pointing error should exceed 0.5 degrees and will not resume transmissions until the error drops below 0.2 degrees. See Appendix A – Declaration of Seatel, Inc., Paragraph 5.

§25.222 (a)(3) U.S. CONTACT INFORMATION

“There shall be a point of contact in the United States, with phone number and address included with the application, available 24 hours a day, seven days of 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 U.S. has a bilateral agreement that enables such cessation of emissions.” 47 C.F.R §25.222(a)(3).

Attn: David Heximer, CEO
Airtap Communications, LLC.
220 Burgess Drive Suite 4
Broussard LA 70518
(337) 205-8751

AIRTAP personnel, either via a network port or an out-of-band management system, have the authority and capability to remotely access equipment on the ESV to terminate emissions in case of suspected interference.

§ 25.222 (a)(4) VESSEL TRACKING

“For each ESV transmitter a record of the ship location (i.e. latitude/longitude), transmit frequency, channel bandwidth and satellite used shall be time annotated and maintained for a period of not less than 1 year. Records will be recorded at time intervals no greater than every 20 minutes while the ESV is transmitting. The ESV operator will make this data available upon request to a coordinator, fixed system operator, fixed-satellite system operator, NTIA, or the Commission within 24 hours of the request.” 47 C.F.R. §25.222 (a)(4).

Functionality of Vessel Tracking System

Vessel tracking information at 20 minute intervals, is available real-time from the TDMA manufacturer Network Management System (NMS) and it is stored in the NMS database physically situated at the same location as the hub antenna. Should this data be requested by a frequency coordinator, a fixed operator, the NTIA or the Commission, the database can be queried and presented in spreadsheet form or displayed on a GUI with map and breadcrumb history.

§25.222 (a)(5) VESSELS OF FOREIGN REGISTRY

“ESV operators communicating with vessels of foreign registry must maintain detailed information on each vessel’s country of registry and a point of contact for the relevant administration responsible for licensing ESVs.” 47 C.F.R. §25.222 (a)(5).

In the event AIRTAP must operate foreign-registered ESVs, it will maintain detailed information on each vessel as well as a point of contact for the relevant administration responsible for licensing the ESV.

§25.222 (a)(6) U.S. CONTROL OF ESV HUB EARTH STATION

“ESV operators shall control all ESVs by a Hub earth station located in the United States, except that an ESV on U.S.-registered vessels may operate under control of a Hub earth station location outside the United States provided the ESV operator maintains a point of contact within the United States that will have the capability and authority to cause an ESV on a U.S.-registered vessel to cease transmitting if necessary.” 47 C.F.R. §25.222 (a)(6).

The Antenna operated by AIRTAP will be controlled by the earth station listed below:

Callsign	Diameter	Location	Antenna ID
E990016	6.3m	Mount Airy, MD*	H1

*2823 Grimville Road, Mount Airy, MD 21771

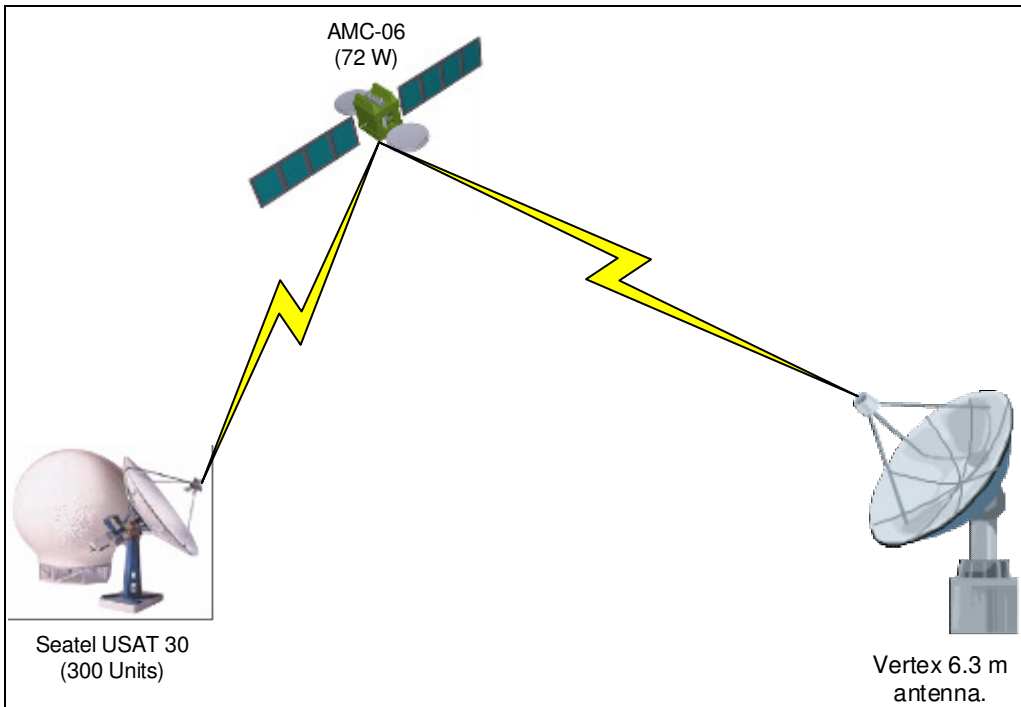


Figure 1. Network Diagram

§25.222 (a)(7) 10.95-11.2 GHz

“In the 10.95-11.2 GHz (Earth-toSpace) frequency bands ESVs shall not claim protection from interference from any authorized terrestrial stations to which frequencies are either already assigned, or may be assigned in the future.”

AIRTAP will not claim protection from interference in the 10.95-11.2GHz from any authorized terrestrial stations to which frequencies are already assigned or may be assigned in the future.

§25.222 (b)(1)(i) EIRP DENSITY TABLES

“Any ESV applicant filling an application pursuant to paragraph (a)(1) of this section must file three tables showing the off-axis EIRP level of the proposed earth station antenna in the direction of the plane of the GSO; the co-polarized EIRP in the elevation plane, that is, in the plane perpendicular to the plane of the GSO; and cross-polarized EIRP. In each table, the EIRP level must be provided at increments of 0.1° for angles between 0° and 10° off-axis, and at increments of 5° for angles between 10° and 180° off-axis. .” 47 C.F.R §25.222(b)(1)(i).

AIRTAP has provided spectral density tables as well as charts as exhibits to Form 312 of the underlying application. Such tables and charts were generated by Seatel for the Seatel 75cm antenna.

§25.222 (b)(1)(ii) AIRTAP CERTIFICATION

“A certification, in Schedule B, that the ESV antenna conforms to the gain pattern criteria of §25.209 (a) and (b), that, combined with the maximum input power density calculated from the EIRP density less the antenna gain, which is entered in Schedule B, demonstrates that the off-axis EIRP density envelope set forth in paragraphs (a)(1)(i)(A) through (a)(1)(i)(C) of this section will be met under the assumption that the antenna is pointed to the target satellite.” 47 C.F.R §25.222(b)(1)(ii).

See Appendix B – Certification of AIRTAP

§25.222 (b)(1)(iii) MANUFACTURER CERTIFICATION

“An ESV applicant proposing to implement a transmitter under paragraph (a)(1)(ii)(A) of this section, must provide a certification from the equipment manufacturer stating that the antenna tracking system will maintain a pointing error of less than or equal to 0.2° between the orbital location of the target satellite and the axis of the main lobe of the ESV antenna and the antenna tracking system is capable of ceasing emissions within 100 milliseconds in the angle between the orbital location of the satellite and the axis of the main lobe of the ESV antenna exceeds 0.5°.” 47 C.F.R §25.222(b)(1)(iii).

According to Seatel, the Seatel 75cm will automatically cease transmissions within 100 milliseconds if the pointing error should exceed 0.5 degrees and will not resume transmissions until the error drops below 0.2 degrees. See Appendix A – Declaration of Cobham SATCOM, Seatel, Inc., Paragraph 5.

§25.222 (b)(3) ESV GEOGRAPHIC AREA OF OPERATION

“There shall be an exhibit included with the application describing the geographic area(s) in which the ESVs will operate.” 47 C.F.R §25.222(b)(3).

The geographic area where the ESVs will operate is in US channels and waterways, the Gulf of Mexico, Caribbean Sea, Atlantic Ocean, and Pacific Ocean.

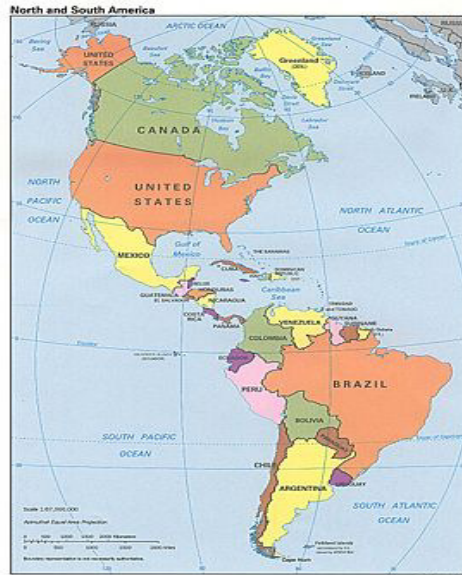


Figure 2. US channels and waterways, the Gulf of Mexico, Caribbean Sea, Atlantic Ocean, and Pacific Ocean

§25.222 (b)(4) POINT OF CONTACT

“The point of contact referred to in paragraph (a)(3) of this section and, if applicable paragraph (a)(6) of this section must be included in the application.” 47 C.F.R §25.222(b)(4).

Included

§25.222 (b)(5) RADIATION EXPOSURE LIMITS

“ESVs that exceed the radiation guidelines of 1.1310 of this chapter, Radiofrequency radiation exposure limits, must provide, with their environmental assessment, a plan for mitigation of radiation exposure to the extent required to meet those guidelines.” 47 C.F.R §25.222(b)(5).

See Exhibit to Form 312 of the underlying application.

§25.222 (c) FREQUENCY COORDINATION

“Operations of ESVs in the 14.0-14.2 GHz (Earth-to-space) frequency band within 125 Km of the NASA TDRSS facilities in Guam ... or White Sands, New Mexico... are subject to coordination through the National Telecommunications and Information Administration (NTIA) Interdependent Radio Advisory Committee (IRAC). [U]pon public notice from the Commission, all Ku-band ESV operators must cease operations....” 47 C.F.R. §25.222 (c).

The ESVs operated by AIRTAP will not operate within 125 Km of the NASA TDRSS facilities in Guam or White Sands, New Mexico.

§25.222 (d) FREQUENCY COORDINATION

“Operations of ESVs in the 14.47-14.5 GHz (Earth-to-space) frequency band within a) 45Km of the radio observatory on St. Croix, Virgin Islands...; b) 125 Km of the radio observatory on Mauna Kea, Hawaii ...; and c) 90 Km of the Arecibo Observatory on Puerto Rico ... are subject to coordination through the National Telecommunications and Information Administration (NTIA) Interdepartment Radio Advisory Committee (IRAC).” 47 C.F.R. §25.222 (d).

The ESVs operated by AIRTAP will not operate within 48 Km of the radio observatory on St. Croix; within 125 Km of the radio observatory on Mauna Kea; or within 90 Km of the Arecibo observatory on Puerto Rico. ESVs operated by AIRTAP will operate in the Gulf of Mexico, US channels and waterways, the Caribbean Sea, Atlantic Ocean and Pacific Ocean as described above.

APPENDIX A – DECLARATION OF SEATEL, INC.



Sea Tel Inc.
4030 Nelson Ave., Concord
California, 94520, USA
T: +1 (925) 798-7979
F: +1 (925) 798-7986

FCC Declaration of Conformity

1. Sea Tel, Inc. designs, develops, manufactures and services marine stabilized antenna systems for satellite communication at sea. These products are in turn used by our customers as part of their Ku-band Earth Station on Vessels (ESV) networks.
2. FCC regulation 47 C.F.R. § 25.222 defines the provisions for blanket licensing of ESV antennas operating in the Ku Band. This declaration covers the requirements for meeting § 25.222 (a)(1) by the demonstrations outlined in paragraphs (b)(1)(i) and (b)(1)(iii). The requirements for meeting § 25.222 (a)(3)-(a)(7) are left to the applicant. The paragraph numbers in this declaration refer to the 2009 version of FCC 47 C.F.R. § 25.222.
3. Sea Tel hereby declares that the antennas listed below will meet the off-axis EIRP spectral density requirements of § 25.222 (a)(1)(i) with an N value of 1, when the following Input Power spectral density limitations are met:

*0.6 Meter Ku Band, Models 2406 and USAT-24 are limited to	-21.6 dBW/4kHz
*0.75 Meter Ku Band, Models 3011 and USAT-30 are limited to	-21.6 dBW/4kHz
1.0 Meter Ku Band, Models 4003/4006/4009/4010 are limited to	-16.3 dBW/4kHz
1.0 Meter Ku Band Model 4012 is limited to	-16.6 dBW/4kHz
1.2 Meter Ku Band, Models 4996/5009/5010 are limited to	-14.0 dBW/4kHz
1.5 Meter Ku Band, Models 6006/6009 are limited to	-14.0 dBW/4kHz
2.4 Meter Ku Band, Models 9797 and 9711QOR are limited to	-14.0 dBW/4kHz
4. Sea Tel hereby declares that the antennas referenced in paragraph 3 above, will maintain a stabilization pointing accuracy of better than 0.2 degrees under specified ship motion conditions, thus meeting the requirements of § 25.222 (a)(1)(ii)(A). Those antennas marked with * will maintain a stabilization pointing accuracy of better than 0.3 degrees. The Input Power spectral density limits for these antenna have been adjusted to meet the requirements of § 25.222 (a)(1)(ii)(B).
5. Sea Tel hereby declares that the antennas referenced in paragraph 3 above, will automatically cease transmission within 100 milliseconds if the pointing error should exceed 0.5 degrees and will not resume transmission until the error drops below 0.2 degrees, thus meeting the requirements of § 25.222 (a)(1)(iii).
6. Sea Tel maintains all relevant test data, which is available upon request, to verify these declarations.

A handwritten signature in blue ink, appearing to read "Peter Blaney", written over a light blue circular stamp.

Peter Blaney, Chief Engineer
Sea Tel, Inc
Concord, CA


Document Number 130445 Revision G
13-April-2012

APPENDIX B – DECLARATION OF AIRTAP

I, David Heximer CEO at AIRTAP COMMUNICATIONS, LLC., certify that the ESV antenna proposed in the underlying application conforms to the gain pattern criteria of 47 CFR §25.209 (a) and (b), that, combined with the maximum input power density calculated from the EIRP density less the antenna gain, which is entered in Schedule B of Form 312, demonstrates that the off-axis EIRP density envelope set forth in paragraphs 47 CFR §§25.222(a)(1)(i)(A) through (a)(1)(i)(C) of this section will be met under the assumption that the antenna is pointed to the target satellite. In addition, the engineering calculations described in this report are true and correct and are satisfactory in light of 47 CFR §25.222.



David Heximer



Date

APPENDIX C – USE OF NON-U.S. SATELLITES

AIRTAP specifies, pursuant to § 25.137(a) of the Commission's Rules, that the only non-U.S. licensed satellites to be accessed by the earth station proposed in the instant application are those included on the FCC's Permitted List and eligible for ALSAT designation.

APPENDIX D – FAA NOTIFICATION

Pursuant to 47 C.F.R. § 17.14 (b) of the Regulations, Federal Aviation Administration (FAA) notification is not required because all the antenna structures in this application will be less than 6.1m in height.