FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

APPROVED BY OMB
3060-0065
Expires 9/30/98

APPLICATION FOR NEW OR MODIFIED RADIO STATION AUTHORIZATION UNDER PART 5 OF FCC RULES - EXPERIMENTAL RADIO SERVICE (OTHER THAN BROADCAST)

1. Applicant's Name and Post Office address (Street address, city, state, and ZIP Code. See Instruction No. 4)

SPACEQUEST, LTD
3554 CHAIN BRIDGE ROAD
SUITE 305
FAIRFAX, VA 22030

DO NOT WRITE IN THIS BLOCK
File No.
0091-EX-PL-1999

2(a). Application for (check only one box)

☒ New station ☐ Modification of existing authorization

2(b). For Modification indicate below:

File No: Call Sign:

3. Application for Modification: Check the box beside all particulars to be modified. Check either addition or replacement to indicate whether the change is an addition or a replacement of parameters in the current authorization.

☐ FREQUENCY – ☐ addition or ☐ replacement?
☐ EMISSION – ☐ addition or ☐ replacement?
☐ POWER – ☐ addition or ☐ replacement?
☐ LOCATION – ☐ addition or ☐ replacement?

☐ OTHER PARTICULARS - addition or replacement? (Describe below or in attached EXHIBIT No. _____)

4. Particulars of Operation (see instruction below)

Frequency (state whether kHz or MHz) (A)	POWER (B)	(C)	(D)	EMISSION (E)	MODULATING SIGNAL (F)	NECESSARY BANDWIDTH (KHz) (G)
399.920	25 W	25 W	PEAK	10KØF1D	4800	15 KHz
399.955	25 W	25 W	PEAK	10KØF1D	4800	15 KHz
399.990	25 W	25 W	PEAK	10KØF1D	4800	15 KHz
400.025	25 W	25 W	PEAK	10KØF1D	4800	15 KHz

(A) List each frequency or frequency band separately. (If more space is required, attach as EXHIBIT No. _____)
(B) Insert maximum R.F. output power at the transmitter terminals. Specify units.
(C) Insert maximum effective radiated power from the antenna (If pulsed emission, specify peak power). Specify units.
(D) Insert "MEAN" or "PEAK" (See definitions in Part 5).
(E) List each type of emission separately for each frequency. (See Section 2.201 of FCC Rules)
(F) Insert as appropriate for the type of modulation:
(1) the maximum speed of keying in bauds;
(2) maximum audio modulating frequency;
(3) frequency deviation of carrier;
(4) pulse duration and repetition rate.
For complex emissions, describe in detail in the space provided below.
(G) Describe how the necessary bandwidth was determined in space provided below.

CARRIER DEVIATION + FREQUENCY ERROR = Necessary BW.
7 KHz + 8 KHz = 15 KHz

5(a). Proposed location of transmitter and transmitting antenna (check only one box to indicate type of operation):
☐ FIXED/BASE ☐ MOBILE ☒ BASE AND MOBILE

5(b). If permanently located at a FIXED location, give below:

State	County	City or Town
VA	FAIRFAX	FAIRFAX

Number and street (or other indication of location)
3554 CHAIN BRIDGE ROAD

5(c). If mobile, describe the exact area of operation
CONTINENTAL U.S.

5(b)(1). Enter geographical coordinates exact to the nearest second (see instruction 10)

North Latitude (DD-MM-SS)	West Longitude (DD-MM-SS)
38 ° 51 ' 36 "	-77 ° 18 ' 30 "

5(c)(1)Enter geographical coordinates of the approximate center of mobile operation (see instruction 10)

North Latitude	West Longitude
° ' "	° ' "

5(d). Datum (see Instruction 10): ..... ☐ NAD 27 ☒ NAD 83

6. Is a directional antenna (other than radar) used? ☐ YES ☒ NO
If "YES", give the following information:
(a) Width of beam in degrees at the half-power point _____
(b) Orientation in horizontal plane _____ (c) Orientation in vertical plane _____

7. Is this authorization to be used for fulfilling the requirement of a government contract with an agency of the United States Government? ☐ YES ☒ NO
If "YES", attach as EXHIBIT No. _____, a narrative statement describing the government project, agency and contact number.

8. Is this authorization to be used for the exclusive purpose of developing radio equipment for export to be employed by stations under the jurisdiction of a foreign government?
☐ YES ☒ NO
If "YES", attach as EXHIBIT No. _____, the following information: Provide the contract number and the name of the foreign government concerned.

9. Is this authorization to be used for providing communications essential to a research project? (The radio communication is not the objective of the research project).
☐ YES ☒ NO
If "YES", attach as EXHIBIT No. _____, a narrative statement provding the following information:
(a) A description of the nature of the research project being conducted.
(b) A showing that the communications facilities requested are necessary for the research project involved.
(c) A showing that existing communications facilities are inadequate.

10. If all the answers to Items 7, 8, and 9, are "NO", attach as EXHIBIT No. 1, a narrative statement describing in detail the following:
(a) The complete program of research and experimentation proposed including description of equipment and theory of operation.
(b) The specific objectives sought to be accomplished.
(c) How the program of experimentation has a reasonable promise of contribution to the development, extension, expansion, or utilization of the radio art, or is along line not already investigated.

11(a). Give an estimate of the length of time that will be required to complete the program of experimentation proposed in this application: 4 YEARS
(b) If less than 2 years, give the length of time in months that the authorization requested in this application will be required: _____

12. Would a Commission grant of this application come within Section 1.1307 of the FCC Rules, such that it may have a significant environmental impact (see instruction 11)? ☐ YES ☒ NO
If "YES", attach as EXHIBIT No. _____ an Environmental Assessment as required by Section 1.1311.

13. List below transmitting equipment to be installed (if experimental, so state):

MANUFACTURER	MODEL NUMBER	NO. OF UNITS
SPACEQUEST, LTD.	EXPERIMENTAL EQUIPMENT	100

14. Is the equipment listed in Item 12 capable of station identification pursuant to Section 5.152? ☐ YES ☒ NO

15. Will the antenna extend more than 6 meters above the ground, or if mounted on an existing building, will it extend more than 6 meters above the building, or will the proposed antenna be mounted on an existing structure other than a building? ☐ YES ☒ NO

If "YES", give the following (see instruction 9):

(a) Overall height above ground to tip of antenna is _____ meters.

(b) Elevation of ground at antenna site above mean sea level is _____ meters.

(c) Distance to nearest aircraft landing area is _____ kilometers.

(d) List any natural formations of existing man-made structures (hills, trees, water tanks, towers, etc.) which, in the opinion of the applicant, would tend to shield the antenna from aircraft and thereby minimize the aeronautical hazard of the antenna.

(e) Submit as EXHIBIT No. _____ a vertical profile sketch of total structure including supporting building, if any, giving heights in meters above ground for all significant features. Clearly indicate existing portion, noting particulars of aviation obstruction lighting already available.

13. Applicant is: *(Check only one box)*

☐ INDIVIDUAL ☐ ASSOCIATION ☐ PARTNERSHIP ☒ CORPORATION

☐ OTHER (describe in space provided below)

17. Is applicant a foreign government or a representative of a foreign government? ☐ YES ☒ NO

18. Has applicant or any party to this application had any FCC station license or permit revoked or had any application for permit, license or renewal denied by this Commission? ☐ YES ☒ NO

If "YES", attach as EXHIBIT No. _____ a statement giving call sign of license or permit revoked and relate circumstances.

19. Will applicant be owner and operator of the station? ☒ YES ☐ NO

20. Give name, title, and telephone number (include area code), and Internet e-mail address (if applicable) of person who can best handle inquiries pertaining to this application.

DR. DINO A. LORENZINI, PRESIDENT, (703) 273-7010, dino@spacequest.com

21. **APPLICANT ANTI-DRUG ABUSE CERTIFICATION:**

By checking "YES", the individual applicant certifies that he or she is eligible for this license. This requires that he or she is not subject to a denial of federal benefits, including FCC benefits, as a result of a drug offense conviction pursuant to Section 5301 of the Anti- Drug Abuse Act of 1988, 21 U.S.C. 862. A non- individual applicant, e.g., corporation, partnership or other unincorporated association, certifies that no party to the application is subject to a denial of federal benefits, pursuant to that section. For definition of a "party" for these purposes, see 47 CFR 1.2002(b).

☒ YES ☐ NO

22. List below all exhibits in numerical sequence and the item number of form requiring the exhibit identified.

EXHIBIT NUMBER	ITEM NO. OF FORM	EXHIBIT NUMBER	ITEM NO. OF FORM	EXHIBIT NUMBER	ITEM NO. OF FORM
1	12				

23 **CERTIFICATION:**

Attention: Read this certification carefully before signing this application.

THE APPLICANT CERTIFIES THAT:

(a) Copies of FCC Rule Parts 2 and 5 are on hand; and
(b) Adequate financial appropriations have been made to carry on the program of experimentation which will be conducted by qualified personnel; and
(c) All operations will be on an experimental basis in accordance with Part 5 and other applicable rules, and will be conducted in such a manner and at such a time as to preclude harmful interference to any authorized station; and
(d) Grant of the authorization requested herein will not be construed as a finding on the part of the Commission:
  (1) that the frequencies and other technical parameters specified in the authorization are the best suited for the proposed program of experimentation, and
  (2) that the applicant will be authorized to operate on any basis other than experimental, and
  (3) that the Commission is obligated by the results of the experimental program to make provision in its rules including its table of frequency allocations for applicant's type of operation on a regularly licensed basis.

APPLICANT CERTIFIES FURTHER THAT:

(e) All the statements in the application and attached exhibits are true, complete and correct to the best of the applicant's knowledge; and
(f) The applicant is willing to finance and conduct the experimental program with full knowledge and understanding of the above limitations; and
(g) The applicant waives any claim to the use of any particular frequency or of the electromagnetic spectrum as against the regulatory power of the USA.

Signed and dated this 10TH day of FEBRUARY, 19 99

Name of Applicant SPACEQUEST, LTD.
(must correspond with name given on page 1)

By DINO A. LORENZINI (print) (signature)

Title PRESIDENT

Check appropriate classification:

☐ Individual applicant ☐ Member of applicant partnership

☐ Authorized employee ☒ Office of applicant corporation or association

WILLFUL FALSE STATEMENTS MADE ON THIS FORM ARE PUNISHABLE BY FINE AND/OR IMPRISONMENT (U.S. Code, Title 18, Section 1001), AND/OR REVOCATION OF ANY STATION LICENSE OR CONSTRUCTION PERMIT (U.S. Code, Title 47, Section 312(a)(1)), AND/OR FORFEITURE (U.S. Code, Title 47, Section 503).

NOTIFICATION TO INDIVIDUALS UNDER PRIVACY ACT OF 1974
AND THE PAPERWORK REDUCTION ACT OF 1980

Information requested through this form is authorized by the Communications Act of 1934, as amended, and specified by Section 308 therein. The information will be used by Federal Communications Commission staff to determine eligibility for issuing authorizations in the use of the frequency spectrum and to effect the provisions of regulatory responsibilities rendered by the Commission by the Act. Information requested by this form will be available to the public unless otherwise requested pursuant to 47 CFR 0.459 of the FCC Rules and Regulations. Your response is required to obtain this authorization.

Public reporting burden for this collection of information is estimated to average four (4) hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing the burden to the Federal Communications Commission, Records Management Branch, Paperwork Reduction Project (3060-0065), Washington, DC 20554. **DO NOT send completed applications to this address.** Individuals are not required to respond to this collection unless it displays a currently valid OMB control number.

THE FOREGOING NOTICE IS REQUIRED BY THE PRIVACY ACT OF 1974, P.L. 93-579, DECEMBER 31, 1974, 5 U.S.C. 552a(e)(3), AND THE PAPERWORK REDUCTION ACT OF 1980, P.L. 96-511, DECEMBER 11, 1980, 44 U.S.C. 3507.

Item No. 12, Exhibit 1

(a) The complete program of research and experimentation proposed including description of equipment and theory of operation.

1. The Company has been working on the development, testing and demonstration of compact mobile user terminals for use with non-voice, non-geostationary low-Earth orbit satellites (LeoSats) for the past four years. These low-cost, low-power terminals are capable of communicating with LeoSats at low data rates using an omni-directional antenna.
2. The Company plans to package the UHF receiver, UHF transmitter, GMSK modem, GPS receiver, microprocessor and antenna it has developed into a compact, low-profile, weather-tight enclosure for use on mobile assets in harsh environments.
3. Pending the successful development, testing and certification of these experimental terminals, the Company plans to offer them for sale in the United States and other countries for use with current and future LeoSat systems.
4. The LeoSat terminals the Company is developing respond to a polling request from a low-Earth orbit satellite by transmitting a short data packet containing its identification code and a GPS position report. The satellite relays this information to the user via a ground-based relay station.

(b) The specific objectives sought to be accomplished.

1. Measure the ability of miniature satellite transceivers to send short packet data to a low-Earth orbiting satellite under actual field operating conditions.
2. Evaluate the robustness of Gaussian Minimum Shift Keying modulation techniques and efficient data transfer protocols when working with a large number of units that transmit very short data packets.
3. Determine the minimum amount of transmitter power required to transfer short data packets reliably to a LeoSat.
4. Investigate the effectiveness and efficiency of various power management techniques.
5. Evaluate a new technique for satellite signal capture and Doppler compensation.
6. Measure the radiation pattern and polarization of a novel, flat-plate antenna system.
7. Conduct limited field trials with prospective customers to determine the operational performance of the radio equipment and identify potential commercial benefits.
8. Demonstrate the use of satellite radio equipment to prospective customers.

(c) How the program of experimentation has a reasonable promise of contribution to the development, extension, expansion, or utilization of the radio art, or is along line not already investigated.

1. The Company will develop a mobile satellite transceiver unit that consume very little power and can be mass produced at very low cost (less than $200 each).
2. The Company will develop and test a novel, low-profile, omni-directional UHF/GPS antenna system having circular polarization that can be installed and operated successfully on a mobile trailer or container.
3. The Company will develop and test an efficient packet radio communications protocol for maximizing the transfer of small amounts of data from a large number of ground terminals to an orbiting satellite.
4. The Company will validate the performance of a new Doppler compensation technique.

SpaceQuest, Ltd.

3554 Chain Bridge Road
Suite 305
Fairfax, VA 22030

Fax Cover Sheet

DATE: 4/14/99 6:44 PM

TO: Mr. Huie
FCC Experimental Branch

FAX: 202-418-1918
TEL: 202-418-2430

FROM: Dino Lorenzini
SpaceQuest, Ltd.

PHONE: (703) 273-7010
FAX: (703) 273-7011

REF: FILE NO. 0091 EX-PL-1999

Number of pages including cover sheet: 5

Message:

Dear Mr. Huie,

In response to your request for additional information regarding SpaceQuest's Application for an Experimental License to operate ground transmitters in the frequency band from 399.90 to 400.05 MHz, the following data is provided:

1. Our program of experimental research will operate several mobile transmitters infrequently to:
   (1) A simulated satellite receiver in Fairfax, Virginia
   (2) The German SAFIR-2 satellite
   (3) NVNG satellites not yet placed into orbit.

2. The SAFIR-2 is a 60 kg. data messaging and relay satellite built and operated by OHB System in Bremen, Germany. The SAFIR-2 orbital parameters are:
   (1) Perigee = 815 km
   (2) Apogee = 819 km
   (3) Inclination = 98.8 degrees
   (4) Period = 101.2 minutes

3. For your convenience I have attached extracts from CFR 47 Part 2 showing the allocation of the 399.9 – 400.05 MHz band for Earth-to-Space communications in the NVNG Mobile Satellite Service. The use of this band was relinquished by the US Navy when the Transit Navigation satellite was deactivated on January 1, 1997 and re-allocated to the Mobile Satellite Service on a primary basis.

4. Note US326 allocated this band on a primary basis after January 1, 1997 to non-voice, non-geostationary satellite systems.

5. I have also included extracts from the FCC Report and Order, IB Docket No. 96-220, that describes the Rules and Policies Pertaining to the Second Processing Round of the non-Voice, Non-Geostationary Mobile Satellite Service. At WRC-95, uplink spectrum in the 399.90 - 400.05 MHz band was allocated for Little LEO services. However, because none of the second round applicants expressed an interest in operating its system in the WRC-95 399.90 - 400.05 MHz band, it was not included in the spectrum sharing plan for the second processing round, and has not been licensed to any of the current Little LEO license holders.

6. I trust that this additional information will be helpful to you in coordinating our request to conduct experimental testing in the 399.90- 400.05 Little LEO band during the next two years.

328.6–335.4	AERONAUTICAL RADIONAVIGATION 645 645A		328.6–335.4 AERONAUTICAL RADIONAVIGATION 645	328.6–335.4 AERONAUTICAL RADIONAVIGATION 645
335.4–399.9	FIXED MOBILE 641		335.4–399.9 FIXED MOBILE G27 G100	335.4–399.9
399.9–400.05 RADIONAVIGATION-SATELLITE 609 645B	399.9–400.05 RADIONAVIGATION-SATELLITE 609 645B	399.9–400.05 RADIONAVIGATION-SATELLITE 609 645B	399.9–400.05 RADIONAVIGATION-SATELLITE MOBILE-SATELLITE (Earth-to-space) US319 US326 645B	399.9–400.05 RADIONAVIGATION-SATELLITE MOBILE-SATELLITE (Earth-to-space) US319 US326 645B
400.05–400.15	STANDARD FREQUENCY AND TIME SIGNAL-SATELLITE (400.1 MHz) 646 647		400.05–400.15 STANDARD FREQUENCY AND TIME SIGNAL-SATELLITE 646	400.05–400.15 STANDARD FREQUENCY AND TIME SIGNAL-SATELLITE 646

609 Emissions of the radionavigation-satellite service in the bands 149.9–150.05 MHz and 399.9–400.05 MHz may also be used by receiving earth stations of the space research service.

645B Recognizing that the use of the band 399.9–400.05 MHz by the fixed and mobile service may cause harmful interference to the radionavigation satellite service, administrations are urged not to authorize such use in application of No. 342.

US319 In the 137–138, 143–149.9, 149.9–150.05, 399.9–400.05, and 400.15–401 MHz bands, Government stations in the mobile-satellite service shall be limited to earth stations operating with non-Government satellites.

US326 The 399.9–400.05 MHz band is allocated to the mobile-satellite service (Earth-to-space) on a primary basis after January 1, 1997 and shall be limited to non-voice, non-geostationary satellite systems, including satellite links between land earth stations.

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of	)	
	)	
Amendment of Part 25 of the	)	
Commission's Rules to Establish	)	IB Docket No. 96-220
Rules and Policies Pertaining	)	to the
Second Processing Round	)	
of the Non-Voice, Non-Geostationary	)	
Mobile Satellite Service	)	

REPORT AND ORDER

Adopted: October 8, 1997 Released: October 15, 1997

By the Commission:

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Topic Paragraph Numbers

8. At the 1995 World Radio Conference ("WRC-95"), additional uplink spectrum was allocated for the Little LEO service. The WRC-95 spectrum consists of the 399.9-400.05 MHz, 455-456 MHz, and 459-460 MHz frequency bands. The 399.9-400.05 MHz frequency band is allocated worldwide and domestically for land MSS use.[1] The 455-456 MHz and the 459-460 MHz frequency bands are allocated for MSS use in International Telecommunication Union ("ITU") Region 2 only and are proposed to be allocated domestically for MSS use in a pending Commission proceeding.

22. At WRC-95, uplink spectrum was allocated for the Little LEO service, specifically, the 399.9-400.05 MHz (worldwide use), 455-456 MHz, and 459-460 MHz frequency bands (Region 2 use only). We have allocated the 399.9-400.05 MHz band for domestic use and have proposed domestically allocating the 455-456 MHz and 459-460 MHz bands for this service. The Joint Proposal does not contemplate use of the 399.90-400.05 MHz band by any of the applicants to implement their systems. Therefore, we will not include use of this spectrum in the spectrum sharing plan we adopt in this Report and Order. Most of the pending applicants do, however, request that we assign the WRC-95 455-456 MHz and 459-460 MHz frequency bands to second round licensees for uplink operations.[2] However, as previously noted, these bands have been proposed to be domestically allocated for the Little LEO service. If the bands are domestically

27. We will use the WARC-92 spectrum available for Little LEO service in the 148-150.05 MHz uplink band and the 137-138 MHz and 400.15-401 MHz downlink bands. When we established the second processing round, we invited applications for service in these frequency bands and in the Notice we proposed licensing systems in the WARC-92 frequency bands.[3] In their first round sharing plan, Orbcomm, GE-Starsys, and VITA agreed that additional systems could be accommodated in these bands by using frequency division multiple access ("FDMA") and code division multiple access ("CDMA") transmission techniques.[4] In the Notice, we sought comment on the use of WRC-95 spectrum by applicants in the second processing round.[5] However, none of the applicants expresses an interest in operating its system in the WRC-95 399.9-400.05 MHz band. As previously discussed, the 455-456 MHz and 459-460 MHz bands have been proposed to be domestically allocated for the Little LEO service in a pending Commission rulemaking proceeding. Consequently, we will not include any WRC-95 spectrum in the spectrum sharing plan we adopt for the second processing round.

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1 International Telecommunication Union, Final Acts of the World Radiocommunication Conference, Art. S5 at 119 (1995); 47 C.F.R. § 2.106; Footnotes US319, US326.

2 Id. at 9. These uplink bands are allocated on a worldwide, co-primary basis to the Little LEO service.

3 See Public Notice; see also Notice ¶¶ 41-42.

4 See Negotiated Rulemaking Report at 8-9.

5 See Notice ¶ 78.