

## 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.

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JUL 28 1999

**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.

407

328.6-335.4	AERONAUTICAL RADIO-NAVIGATION 645 645A		328.6-335.4 AERONAUTICAL RADIO-NAVIGATION 645	328.6-335.4 AERONAUTICAL RADIO-NAVIGATION 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	399.9-400.05 RADIONAVIGATION-SATELLITE	399.9-400.05 RADIONAVIGATION-SATELLITE	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
609 645B	609 645B	609 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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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.<sup>1</sup> 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 399.9-400.05 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.<sup>2</sup> 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.<sup>3</sup> 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.<sup>4</sup> In the Notice, we sought comment on the use of WRC-95 spectrum by applicants in the second processing round.<sup>5</sup> 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.

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

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

<sup>3</sup> See Public Notice: see also Notice ¶¶ 41-42.

<sup>4</sup> See Negotiated Rulemaking Report at 8-9.

<sup>5</sup> See Notice ¶ 78.