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Date: June 30th 1998

FCC, Experimental Licensing Branch, Suite 230, 2000 M ST., MS 1300E1,
Washington, DC 20554

Gentlemen:

Please find enclosed a copy of the progress report on the usage of the Experimental License issued to the GeoPhone Company LLC. This report covers and summarizes the testing that was conducted from November 1997 through June 1998. A copy of this report is also being submitted to the FCC Satellite Engineering Branch, Room 512, 2000 M St., MS 08000B1, Washington D.C. 20554, Attention : Mr. Karl Kensinger.
Any questions pertaining to the following information should be directed to the undersigned.

Operations Manager
Theodore L. Battle

cc: Steve Sweeney

PROGRESS REPORT SATELLITE TESTING

1.0 Scope

This report contains information on the progress of KU Band satellite link testing of two GeoPhone Developmental Earth Stations located at GeoPhone headquarters at 180 Admiral Cochrane Drive in Annapolis MD during the period of November 1997 through July 1998. Most of the testing occurred during the latter part of 1997 through the first quarter of 1998. The testing was done under a class XD MO Experimental License Issued to GeoPhone Company LLC under the call sign WA2XB1 under file number 5305-EX-PL-96.

In the first quarter of 1998 GeoPhone's management determined that the C-Band Version of the terminals would be first to market, and the priority was shifted to testing at C-Band instead of KU- Band. Therefore most of the KU-Band testing occurred during the latter part of 1997 through the first quarter of 1998.

Testing was done over the SBS- 6 Satellite Business Systems Satellite located at 74 Degrees West Longitude. These Very Small Aperture Terminals (VSATS) are capable of transmitting a frequency hopped spread spectrum signal in the 14.0 to 14.5 GHz band and receiving in the 11.7 -12.2 GHz band . The developmental equipment operated within a occupied bandwidth of approximately 1 MHz although a complete 43 MHz transponder was leased for the testing.

Antenna Coordinates: The VSAT antenna coordinates are 38.92 degrees North Latitude and 76.55 degrees West Longitude.

Antenna Pointing: The VSAT antenna was pointed at an elevation of 45.22 degrees above the horizon plane and at an azimuth angle of 175.84 degrees from the Geographic North.

Test Configuration: The test configurations will allow IF test loops and a complete RF test loop including the satellite to be configured. The testing will be done in a sequence to maximize the use of satellite test time to obtain data.

Maximum output power: The maximum available output power from the outdoor unit for is 2 watts in the 14 to 14.5 GHz band.

Approval: Approval was provided for the operation of these earth stations under a class XD MO Experimental License Issued to GeoPhone Company LLC under the call sign WA2XB1 under file number 5305-EX-PL-96. A copy of the license is attached at the end of this report.

Applicable Documents:

1. Commercial documents including by not limited to commercial standards, specifications and drawing, as well as all applicable FCC documents.
2. Industry Documents were Hughes Uplink Requirements Document.

2.0 Purpose

Tests performed on these terminals will provide the initial technology evaluation in the GeoPhone Corporation's VSAT Network product development effort.

The key technologies to be evaluated during this test program will consist of low-rate vocoders, new signal processing algorithms, a new spread spectrum modem and a unique RF hardware architecture.

The purpose of the test series was to establish that the CAMA Waveform could be used to provide two way duplex voice links over an operational KU band satellite and to determine how robust the connection was both during the call establishment and the conversation phase.

The evaluation of GeoPhone's Proprietary Spread Spectrum Modems using the CAMA waveform and low rate vocoder over a satellite link under varying operational conditions while measuring the subjective quality of the voice transmissions and BER performance is one of the goals of this test series. The link design analysis will also be validated during these tests.

3.0 Satellite Accesses

All Satellite accesses were coordinated through Hughes Communication Network Operations (HCNO) and were completely in compliance with Hughes access procedures and requirements for the SBS-6 satellite. Several transponders were used for the testing with transmission always on the Vertical Polarization and reception on the Horizontal Polarization.

The FCC type approved 1.2 meter Channel Master antennas were pointed and optimized to maximize the receive and transmitted signals and to minimize cross polarization interference.

The following table indicates typical access times and the transponders used during the satellite test program.

SATELLITE ACCESS EVENTS

DATE	Start/End (Hrs)	Sat Txpdr	Equip tested
10/16/97	10:30 -11:00	15	pre prod.
12/17/97	18:50 - 18:30	9	pre prod.
12/18/97	18:05 - 18:20	9	pre prod.
12/18/97	12:35 - 12:50	9	pre prod.
12/18/97	10:00 - 10:15	9	pre prod.
12/19/97	10:35 - 10:50	9	pre prod.
12/19/97	13:05 - 13:50	9	pre prod
12/19/97	13:40 - 13:55	9	pre prod
12/20/97	11:00 - 11:15	9	pre prod
12/20/97	10:30 - 10:45	9	pre prod.
12/22/97	10:05 - 10:15	9	pre prod
12/22/97	09:00 - 09:15	9	pre prod
12/22/97	12:10 - 12:40	9	pre prod
12/22/97	15:15 - 15:45	9	pre prod
01/03/98	15:25 - 15:40	9	pre prod
01/23/98	15:25 - 15:40	9	pre prod.

4.0 Test Results

Reviewing the testing program over the last six months, it can be seen that very effective use was made of satellite access time. The performance of these tests in a laboratory environment, enabled GeoPhone to improve the design of the next generation of its products by incorporating design features that were uncovered during this experimental testing series. The key technologies evaluated during this experimental terminal program was to evaluate low rate vocoders, new signal processing algorithms, a new spread spectrum modem and a unique hardware architecture. The terminals were also used to demonstrate CAMA operation over existing commercial satellites.

The tests performed during the experimental terminal program were designed to test that the CAMA waveform could be used to provide a two way duplex voice link over an operational KU band satellite and how robust the connection was during the call establishment and the conversation phase. These tests were made over varying operational conditions while measuring the subjective quality of the voice transmissions and BER bit error rate.

We were able to determine how this new CAMA technique would operate in a commercial satellite environment, with its rain fading, proximity of other carriers, Doppler frequency variations, satellite frequency offsets, cross polarization interference effects.

The optimal signal levels for operating the various components in the system and the sensitivity of this type of modulation to the non linear effects of saturation of components in the system were determined which helped us to finalize the system design for the production terminals.

During this testing we were able to test and evaluate the following satellite and terminal characteristics and determine solutions for implementing them in the pre production prototypes.

- Compensation of the Doppler shifted frequency of the satellite
- Satellite flux density measurement (SFD)
- Effect of the satellite transponder saturation characteristics on performance
- Compensation of rate of drift and instability of the satellite frequency translation
- Evaluation of power stability of link budget including fading characteristics
- Effect of spatial satellite movement on link performance with a fixed antenna
- Effect of interference signals in satellite environment
- Telephone call setup, connection, and tear down over the satellite.

The following design enhancements were added to the for the production units as a result of the experimental terminal testing program and engineering development.

1) Cost reduction.

2) Frequency Acquisition/Tracking.

3) Power control/ Throttling

4) 500 MHz agility

5) Design for C-band and Extended C-band operation

6) Time multiplexed channels

7) Flexible hardware design allowing enhancements to be added via software upgrade.

8) Frequency Hopping for time multiplexed channels.

9) Automatic switching of data, facsimile and voice traffic.

4.2 Test results on the Pre Production Prototypes

Eight pre production KU Band satellite terminals were constructed for test and evaluation. These units use improved software and hardware designs which allowed the complete indoor unit (IDU) to be constructed in a computer tower case and was designed to accommodate four time multiplexed voice, data or facsimile channels simultaneously. The outdoor equipment (ODU) was specifically designed with characteristics to provide improved performance and operational features. Since the last report until the present, testing was done over 1.2 Meter Ku band antennas over the SBS6 Satellite using these pre production units.

We have simulated the loading and the capacity of network using Matlab software. We had originally planned to test over a eight terminal KU Band network to test congestion scenarios.

However, our management determined that our C-Band product would come to market first, and it was decided to convert the eight terminal KU Band network to an eight terminal C- Network utilizing the recently developed C-Band Terminal Equipment.

Therefore additional testing at KU Band was "put on the shelf" until testing at C- Band was completed. It is expected to resume KU Band testing in August 1998, and we have applied for an extension of our KU Band license to be extended, since it expires August1, 1998.

5.0 Future Testing Plans

GeoPhone is in the process of installing a eight terminal KU Band Network utilzing redesigned RF equipment by the end of 1998 that will enable us to fully test the effects of network performance characteristics such as channel loading tests, capacity tests as well as network power and frequency control algorithms at KU Band Frequencies. The antennas used for this series of testing will be the FCC and Intelsat approved Prodelin 1.8 Meter Ku Band antennas as well as the existing 1.2 Meter Channel Master antennas. The 1.8 Meter Antennas will be located in Annapolis, at 905 Commerce Drive, well within the approved 161 km FCC limit.

The risk of operating a network at customer sites which will be located in developing countries will be greatly reduced as a result of GeoPhone having tested and evaluated an operational eight terminal satellite network in Annapolis.

Once we have completed this series of testing, we will be able to start to ship KU Band networks to our customers in developing countries for implementation. We have applied for an extension to the existing license from the FCC. to facilitate this next phase of testing and network development.