Denice Harris
Manager
Federal Regulatory Relations

1275 Pennsylvania Avenue, N.W., Suite 400
Washington, D.C. 20004
(202) 383-6430
Fax: (202) 347-0320

August 8, 1996

Mr. H. Frank Morgan, Chief
Experimental Licensing Branch
Federal Communications Commission
Mail Stop 1300E1
2000 M Street, N.W., Room 230
Washington, D.C. 20554

Dear Mr. Morgan:

Re: *Progress Report for Experimental License*
Call Sign: KM2XOF File Number 5022-EX-ML-95

On behalf of Telesis Technologies Laboratory, please find enclosed its *"First Progress Report"* covers activity for the time period from the initial authorization to August 2, 1996. This report is provided in compliance with the conditions set forth in the Experimental Radio Station Construction Permits and Licenses granted on February 8, 1996.

Please stamp and return the provided copy of this transmittal letter to confirm your receipt. Please contact Mal Ziegler at (510) 244-2142 or me should you have any questions or require additional information concerning this matter.

Sincerely,

Denice Harris

Denice Harris
Internet: denice.harris@pactel.com

Enclosure

Experimental License Progress Report

August 1996

TELESIS TECHNOLOGIES LABORATORY℠

A Pacific Telesis Company

Experimental License Progress Report

On November 7, 1994, the FCC granted Telesis Technologies Laboratory (TTL) an experimental license to determine propagation characteristics of Local Multipoint Distribution Systems (LMDS) and other similar wireless systems as well as point-to-point and multi-point to multi-point video delivery systems using 28 and 38 GHz spectrum in the State of California. On February 8, 1996 the FCC granted a modification to the license to include additional frequency bands in order to more fully evaluate a variety of delivery systems for video service including MMDS digital and, to a lesser extent, other wireless services. The terms of the modified experimental license require that TTL submit a progress report to the FCC. This is the first such report, covering the period ending August 2, 1996.

Over this period TTL has pursued a comprehensive investigation of the technical issues associated with delivery of multi-channel video service using millimeter wave spectrum. Specific attention was paid to rain attenuation, possible use of reflected signals and loss through foliage. Additionally, TTL has begun investigating digital 2 GHz, wireless cable technologies with an emphasis on 64 QAM digitally modulated signals. TTL has also studied and tested interference effects, multipath, co and adjacent channel interference, and propagation issues as well as effects on and by compressed digital of other signals and modulation techniques. Attention is also paid to uses, other than video, that can be made on portions of the band.

1. Experimental Activity

This brief description of TTL's activities using the experimental license, as modified include:

- A propagation trial of millimeter-wave (38 GHz) facilities in the desert area of Southern California.
- Investigation of various technical issues associated with wireless cable spectrum (2 GHz), as well as other bands, and the services that potentially could use such spectrum is in progress.

1.1 Millimeter-wave Technical Trial

TTL's Millimeter-wave trial was conducted in the desert area of southern California and consisted of a single 38 GHz transmitter and associated traveling wave tube amplifier that broadcasted over fifty channels of video and audio using analog (FM) techniques. Additionally a 38 GHz duplex, digital (4XT1) radio system within the path and spectrum of the video system was used for the trial. The major focus of the trial was to examine propagation issues including rainfall attenuation, depolarization, reflected path, and foliage attenuation.

- The results showed that under dry conditions, the FM signal provided fair quality video pictures exceeding 11 miles with an excellent picture up to about 5 miles. This confirmed our calculations. The rainfall attenuation predicted was exceeded during periods of testing due to extremely high rainfall rates. The rainfall rate averaged about 4.25 mm/hr over a 4 hour period. This resulted in a rainfall attenuation of 12 dB for a path of 3 miles. The heaviest rain rate measured 29.6 mm/hr produced an attenuation of over 40 dB on the same path. Our conclusion was that the accepted design criteria for 38 GHz produces acceptable availability in all but the rare periods of rainfall that exceed predictions.
- The testing data on reflections taken from buildings, roads, a water tower and other structures indicated less than desired results for a usable signal. In general, the resultant signals proved to be too low in level or highly unstable and not suitable for a high quality service offering. A marginal quality video picture was possible using a reflected signal.
- Limited tests of indigenous southern trees indicated that attenuation varied by the density of leaves rather than the type of leaves. We experienced attenuation of over 25 dB for the worst case and an average of about 15 dB was in most cases encountered.
- The use of a broadband FM signal with very directional antennas and a narrow band BPSK (Binary Phase Shift Keying) signal on the same path and frequency was studied and little or no degradation of either signal was observed.

1.2 Wireless Cable (MMDS) Spectrum

TTL has begun investigating propagation of digitally modulated 2 GHz wireless cable spectrum. The new 64 QAM transmitters with compressed MPEG II encoded video material

present many propagation issues such as effects of co-channel and adjacent interference digital signals using the same polarization and cross polarized. Similar issues exist for transmitter overlap and multipath. Additionally, expanded and more efficient use of existing bandwidth is being examined to determine if services other than compressed video can be effectively used on a non-interfering basis without diminishing the primary compressed video use.

- TTL has started performing some of these propagation tests in both northern and southern California. TTL will also be conducting extensive tests and evaluation of both wideband and narrowband data transport in conjunction with the propagation tests.
- Another focus of the testing is aimed at examining the possible way of utilizing spectrum in a more efficient manner. One avenue to be explored is associated with combining several different services utilizing different techniques including modulation, power management, etc. to conserve spectrum.
- TTL also plans to develop or assist others in developing new network architecture /propagation models and to verify model outputs.