

U S WEST, Inc.
Suite 700
1020 Nineteenth Street, NW
Washington, DC 20036
202 429-3134
FAX 202 296-5157

USWEST

Elridge A. Stafford
Executive Director-
Federal Regulatory

April 4, 1996

Mr. H. John Morgan
Office of Engineering and Technology
Experimental Licensing Branch
2000 M Street, N.W., Room 230
Washington, D.C. 20554

RE: U S WEST Communications, Inc.
PCS Experimental License for Boulder, CO
Call Sign KK2XCC
File Numbers: 2148-EX-PL-91, 3306-EX-ML-92
3630-EX-ML-93, 3630-EX-R-93, 4064, EX-ML-93,
4506-EX-ML-94, 4970-EX-MR-95
Sixteenth Quarterly Report

Dear Mr. Morgan:

Enclosed please find U S WEST Communications' sixteenth quarterly report addressing the above referenced authorization for PCS field trials in Boulder, Colorado.

Should you have any questions or require additional information, please call me.

Sincerely,

Elridge Stafford

Enclosures

APR 4 4 26 PM '96

RECEIVED

U S WEST Communications

Field Testing

**Quarterly Process Report, Boulder Test Bed
FCC Experimental License
KK2XCC**

April 4, 1996

Submitted to

**Federal Communications Commission
Experimental Licensing Branch
Room 230
Washington, DC 20554**

Prepared by

**U S WEST Communications
Wireless Group
1999 Broadway, 10th Floor
Denver, CO 80202**

Table of Contents

Executive Summary	page 3
Propagation Testing	page 3
Polarization Testing	page 4
J-STD-008 CDMA Testing	page 4
Future Plans	page 5

Executive Summary

This quarterly report summarizes the field testing conducted by U S WEST Communications in the Boulder Test Bed under FCC Experimental License KK2XCC from January 4, 1996 through April 4, 1996. During this quarter tests involving emissions in the 1850 MHz through 1990 MHz band were conducted in propagation testing for cell site selection, antenna polarization testing and J-STD-008 (CDMA) performance and verification testing.

1. Propagation Testing

The objective of the propagation testing was to determine the best locations for the cell site locations for this trial. Testing was conducted at ten locations throughout the City and County of Boulder. At each location, a test set utilizing a 10 watt transmitter, 6 dBd omni antenna and data collection gear was used to collect data every 40 wavelengths (approximately every 20 feet) to determine the coverage area of each site. Variations in height, topographic area, clutter and percentage of overlap were analyzed. As a result of this analysis, eight locations were chosen:

- Location A, with an antenna height of 31 feet, is intended to determine how a low line site in a light clutter area would provide coverage in a residential neighborhood that is adjacent to a major highway.
- Location B, with an antenna height of 73 feet, is designed to determine coverage in an urban area.
- Location C, with a slim profile 35 foot tower, uses vertical diversity to aid in the determination of the effects of vertical vs. horizontal diversity on a tower structure. This location is in a rural office park environment.
- Location D, with an antenna height of 100 feet, will provide data in a high clutter environment.
- Location E, with a slim profile 44 foot tower, will provide data on a rural residential neighborhood with little to no clutter.
- Location F, with a roof top 35 foot tower, will provide data on coverage in a light industrial area adjacent to a major highway.
- Location G, with a slim profile 44 foot tower, is on a butte in a high traffic industrial area and will provide data on a location that has 50 percent overlap with surrounding locations.
- Location H, with an antenna height of 40 feet, is in an urban area and will provide data in a high volume area with minimal overlap with surrounding locations.

2. Polarization Testing

The objective of this test was to determine if there is a more suitable polarization other than the standard vertical linear polarization that is most commonly used. The test took place at Location B using three different polarizations: vertical linear as the standard, circular (RHCP) and dual slant 45 degree transmitting on one slant 45 polarization only.

The three antennas were situated on the top of Location B at a height of 73 feet pointed in a west by northwest direction toward the most urban area. Each antenna was separated by 10 feet. The antennae varied in gain from 16.0 to 16.5 dBi of gain and were transmitting at an EIRP of +50 dBm. The test vehicle was equipped with four unity gain antennae and a four channel receiver for data collection. One antenna was mounted on the top of the vehicle and three antennae were mounted inside the vehicle with one at a 45 degree angle to simulate a user holding a handset.

The data was collected over a 10 mile drive test route at a rate of 400 samples every 20 feet. The data was collected in only the downlink direction and is currently being analyzed.

3. J-STD-008 CDMA Testing

J-STD-008 field testing began on February 29, 1996 utilizing AT&T infrastructure equipment that consist of 2 base stations connected via leased T1's to a 5ESS switch located in the U S WEST East Central Office. The two base stations being used for these test are at Locations A and B that have a separation distance of 3.2 miles.

Each site consists of 3 sectors configured at azimuths of 349, 109, and 229 degrees true north. Three antennae comprise a single sector, one for the transmit and two for receive diversity. Each site utilizes antennae with 14 dBd of gain and a horizontal beamwidth of 90 degrees. The single frequency used for these test is 1946.590 MHz for the forward link and 1866.590 MHz for the reverse link. The following tests currently are being conducted:

- Mobile to mobile, mobile to land and land to mobile calls
- Pilot surveying of E_c/I_o with single and multiple sites
- Two way soft and two way soft/softer handoffs
- Verification of neighbor list updating
- Range testing to a radius of 8 miles to determine the number of access probes and arrival power levels
- Paging and synchronization of overhead messaging
- Verification of Service Option 2 (MARKOV)
- Voice synchronization with a known data pattern
- Bit Error Rate, total number of frames, bad frames and Err rate
- Power control, both open and closed loop to check talk-in talk-out balance and interference testing
- Audio quality assessment

4. Future Plans

During the next quarter, J-STD-008 CDMA testing will continue. The resulting data will be used to verify parameters, loading, and optimization. In addition, in the next quarter, it is anticipated that handsets will be distributed to trial participants for the purpose of a subjective evaluation of the quality of the service and of associated wireline-like features.