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Southwestern Bell
Technology Resources

December 19, 1994

Mr. Richard M. Smith
Chief - Office of Engineering and Technology
Federal Communications Commission
2025 M Street, NW
Washington, DC 20554

Re: Southwestern Bell Technology Resources, Inc.
Call Sign KM2XBI
File Number: 3037-EX-PL-92
Quarterly Progress Report Number Ten

Dear Mr. Smith:

In accordance with the Federal Rules and Regulations Part 5, Section 5.204(b), attached please find the tenth quarterly progress report for Southwestern Bell Technology Resources, Inc. in connection with our personal/wireless communications testbed in St. Louis, Missouri.

The main objective in our St. Louis testbed is to verify performance of the emerging wireless communications systems and technologies prior to integration into one of Southwestern Bell Corporation's business units. Attached we are reporting our progress and test results in the area of wireless local loop.

Please direct any inquiries to me at 314-529-7567.

Sincerely,

9/1/94

John A. Moore
Director, Wireless Communications

Attachment

FCC Quarterly Progress Report Number Ten (10) in Connection with Personal/Wireless Communications Testbeds in St. Louis, Missouri

Conducted by Southwestern Bell Technology Resources, Inc.

December 19, 1994

Authorized by FCC Experimental License
Call Sign KM2XBI, File Number 3037-EX-PL-92

1.0 Introduction

This report describes progress in the Wireless Local Loop experimental testbed during the period from September 20, 1994 through December 19, 1994. In addition, a study on Microcell RF distribution technologies will also be discussed. During this period, a study of in-building RF distribution via leaky coax was conducted.

2.0 Wireless Local Loop Progress

In the last quarterly report, we discussed the results of delay spread, signal strength and foliage effects studies performed in the Wireless Local Loop testbed in St. Louis. Since that report we have received the testbed equipment and have deployed it in the field. The equipment consists of 5 Radio Ports (RPs), 30 Wireless Fixed Access Units (WFAUs), a Radio Port Control Unit (RPCU), and a Network Element Manager (NEM). Initial testing of the equipment began on December 2. We made successful calls on December 13, both WFAU to the PSTN and WFAU to WFAU. The voice quality was excellent. Further testing of technical and quality parameters will take place over the next month, with customers (SWBT employees) beginning to use the system in a blind test near the end of January.

The testbed is configured as shown in Figure 2-1 below. The test participants will receive service from the existing copper drop or the wireless local loop system. The selection of the system will be done under control of the TRI Portable Communications Lab via dial-up control line to an A/B switch. This will be a blind test, the participant will not know which is being used. This should provide an objective evaluation of voice quality and service transparency.

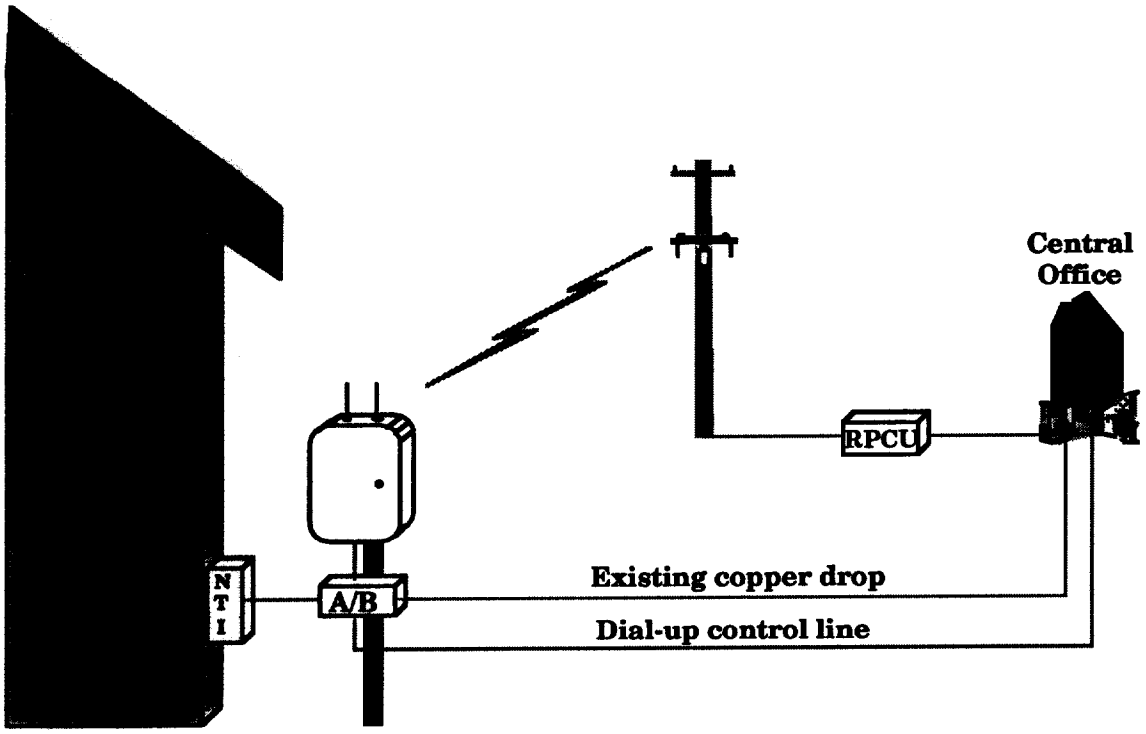

Figure 2-1 - Testbed configuration

The month of December will be used for technical performance testing and system shake-down. Transparent service to the participants will begin in January 1995.

3.0 Investigation of Microcell RF Distribution Technologies: 800 MHz In-Building Propagation Measurements

In March of 1993, Southwestern Bell Mobile Systems, Inc. introduced a new cellular-based Personal Communications Service known as FreedomLink®. FreedomLink provides ubiquitous voice communications via the combination of Southwestern Bell's cellular network for coverage outside of the office and a wireless PBX adjunct providing coverage inside the office. While FreedomLink has been a significant technological advance, SBC Communications continuously strives to improve the quality of wireless communications services provided to the customer. During this quarter, Southwestern Bell Technology Resources (Technology Resources) investigated an innovative RF signal distribution technology which may improve the quality of in-building wireless communications.

Today, many in-building communications systems are deployed in a *cellular-like* geometry where a radio transceiver with an integrated point source antenna provides coverage to some portion of a building floor. Multiple transceivers are deployed to fully cover a large building floor. While this design provides adequate coverage and simplifies installation requirements, performance improvements may be possible. Radiating coaxial cable, also known as "leaky feeder", has a principal advantage over conventional point source antenna systems in that the portables are usually in closer proximity to the antenna system. By reducing the radio propagation path distance, leaky feeder may mitigate multipath propagation impairments and may effect performance advantages including more uniform signal distribution throughout the coverage area and improved containment of signals within the building structure. While potential benefits of a leaky feeder system exist, disadvantages exist as well. Leaky feeder can increase system costs and installation requirements.

During this quarter, Technology Resources investigated a commercially-available leaky feeder antenna system to determine if the potential benefits can be realized at an acceptable cost. The investigation is based on leaky feeder RF signal distribution performance derived from a 800 MHz propagation measurement study. The study was conducted at the Technology Resources facility in St. Louis using both point source and leaky feeder antenna systems. Narrow band signal strength data was collected at 800 MHz to investigate the signal coverage, the desired distribution of signal within the building, and signal containment, the undesired distribution of signal to areas outside the building, and capabilities of both antenna systems. All tests were done in accordance with Technology Resources FCC Experimental License on a prior-coordinated, non-interfering basis.

Study results are promising. In comparison to point source antennas, leaky feeder can provide a more uniform distribution and slightly better containment of downlink signals within the building. Uniform signal distribution is desirable as it enables greater control over transmitted signal levels and reduces coverage overlap or spillover among multiple radio coverage zones. By providing coverage only to the desired serving area, it is possible to improve the system's ability to reuse frequencies at different locations within the building. Spectral efficiency is important for in-building wireless communications as only a small segment of spectrum may be available to serve customers. Signal containment is also desirable as it reduces out-of-building signal emissions and can thereby reduce the potential for interference between the cellular network and the in-building wireless system. Collectively, more uniform signal distribution and increased signal containment can increase both the capacity and call quality of wireless in-building communication systems.