LAN Extension Using Microwave

SYNOPSIS

Applications for microwave transmission are growing with the increased requirements for bandwidth and the need for short-haul communications. Companies are finding that as their needs grow, conventional methods of data and voice transmission are either too costly, inadequate, or unavailable. The rapid proliferation of LANs (local area networks) has presented another challenge: how to link separate LANs in order to share resources. Datapro spoke to the president of Microwave Bypass Systems of Cambridge, MA. This company uses microwave to transmit LAN traffic at the full speed of 10M bps simultaneously with voice and video.

Alternative Implemented: The determining factor in this case was capability. The requirements were to provide simultaneous voice, broadcast video, and full-speed LAN traffic. The RBOC (Regional Bell Operating Company) had unacceptable delays in-installation and the cost would have been prohibitive. To lay fiber optic cable was also not cost-effective. Microwave was able to combine the individual systems into one cohesive transmission.

Payoff: The true payoff was the ability to have a high-capacity system to connect the overall corporate communications with fixed costs and internal control.

ANALYSIS

Recently Microwave Bypass Systems of Cambridge, MA installed a 23GHz short-haul microwave system for a high tech company with offices in Concord and Cambridge, MA. Microwave Bypass Systems is a VAR (value-added reseller) of M/A-Com, and other vendor's, microwave radios. However, the scope of Microwave Bypass Systems goes far beyond sale and installation of M/A-Com equipment. The company is manufacturing an Etherwave transceiver that provides a way to connect Ethernet LANs by making it possible to transmit LAN traffic at full speed using analog microwave. Microwave Bypass Systems is also consulting and designing systems using microwave to combine various forms of communication.

The high tech company where the installation took place was faced with connecting its two buildings in Cambridge with two new buildings in Concord. The two buildings in Cambridge were connected to each other by cable, as were the two buildings in Concord. As the company grew, the need to share the information systems presented increased demand for bandwidth requirements. Microwave offered advantages over other transmission technologies. Leased line was a consideration. The long wait for T1 service from New England Bell and the cost were a deterrent. It also would have been cost-prohibitive to install a fiber optic cable over the distances required. The company was familiar with microwave, having used it in the past to transmit information point-to-point a distance of a few blocks.

Microwave Bypass Systems was able to provide a high-capacity 23GHz short-haul microwave system to connect the offices in Concord and Cambridge spanning a total distance of 13 miles. The system uses two hops of short-haul microwave with a repeater on a tower in Lexington. The space on the tower is leased. The total capacity of the system is 10M bps LAN data, 4T1 voice circuits (96 phone lines), and broadcast-quality video for teleconferencing.

Typically, a multiple T1, wideband, analog microwave radio system would cost about $25,000. With the addition of LAN traffic and including integration hardware, the system would cost about $50,000.

NETWORK COMPONENTS

Microwave Equipment

Each hop in the system consists of 1 MA-23DR with a capacity of 4T1s and 2 MA-23CCs; one MA-23CC is transmitting video while the second MA-23CC has the addition of the Etherwave transceiver as a bus interface for transmission of full-speed LAN traffic. The Etherwave transceiver takes the traffic from the LAN and matches the levels and impedances to that of the microwave system. The muldem used to get from T1 to T2 (4T1s) is an M1/2 from ITT.

All traffic is transmitted from single 4-foot antennas mounted on each building. This is accomplished by combining all the 23GHz radios onto one antenna at each site with a Magic Hybrid Tee from Wave Line. The antennas used are Anexter-Mark and any waveguides used are from Andrew Corp.

Installation: Microwave Bypass Systems did the installation late Spring '86. David Theodore, president of Microwave Bypass Systems explained to Datapro that the installation is critical as most electronic instabilities occur at this time. After installation it is important to closely monitor a microwave system. The only problem confronted during this trial period was frequency instability, which was rectified by retuning the radio, a minor adjustment.

SYSTEM PERFORMANCE

This system has only been in service a short time. The M/A-Com radios are tried and tested products that have proven themselves.

DOWNTIME AVOIDANCE

Maintenance

A maintenance contract was entered into with M/A-Com. Although this contract is in place, Microwave Bypass Systems has a vested interest in this sophisticated system and has provided technical support.

Backup Facilities

There are no backup facilities for this system. Mr. Theodore noted that microwave is so reliable for this application that there was no necessity for battery backup or system redundancy. He stated the only plausible reason for an outage could be an extremely excessive rainfall, which is not likely.

FUTURE PLANS

There are future plans to use teleconferencing from a point in California, on a 56K bps line, to Concord and then to utilize the microwave to carry the teleconferencing to Concord. □

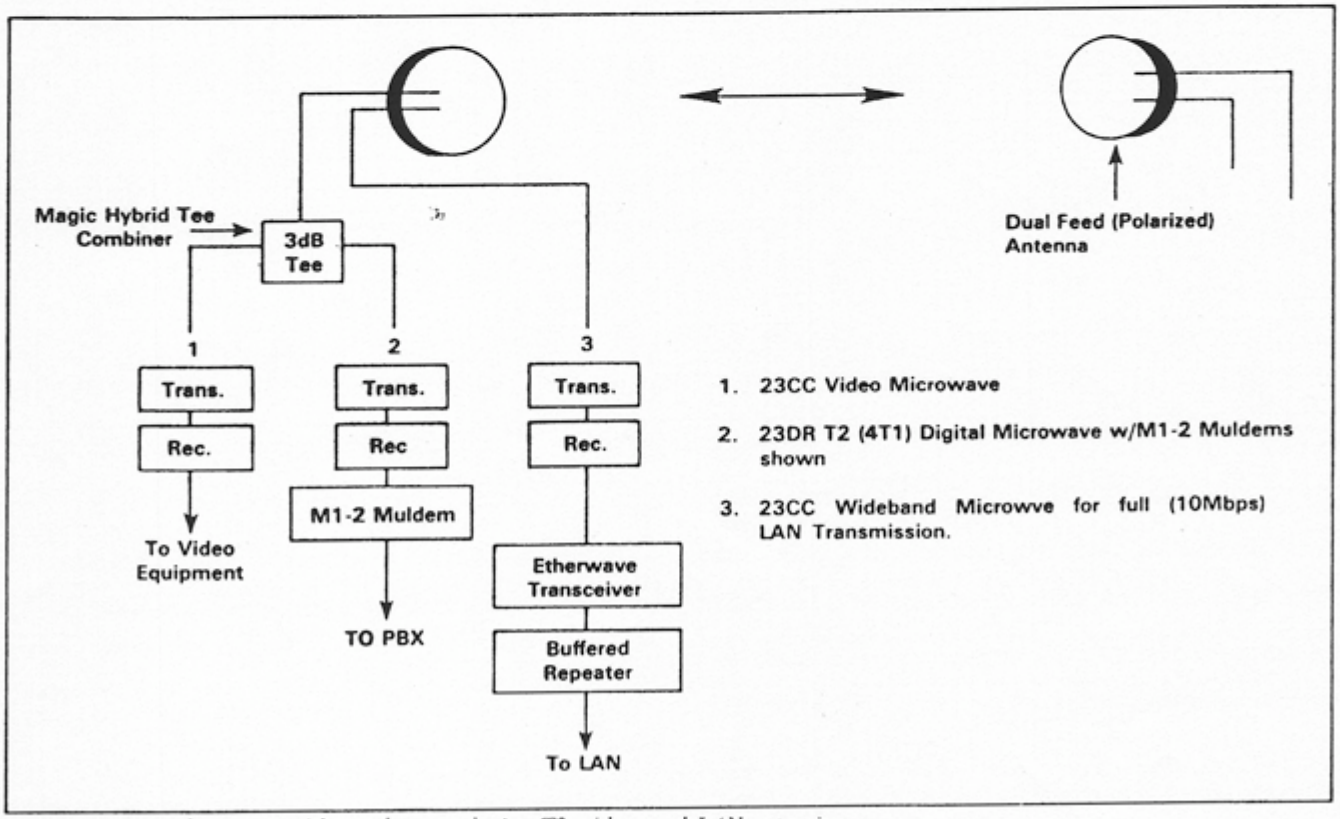

Figure 1. A sample system with one hop employing T2, video, and LAN extension