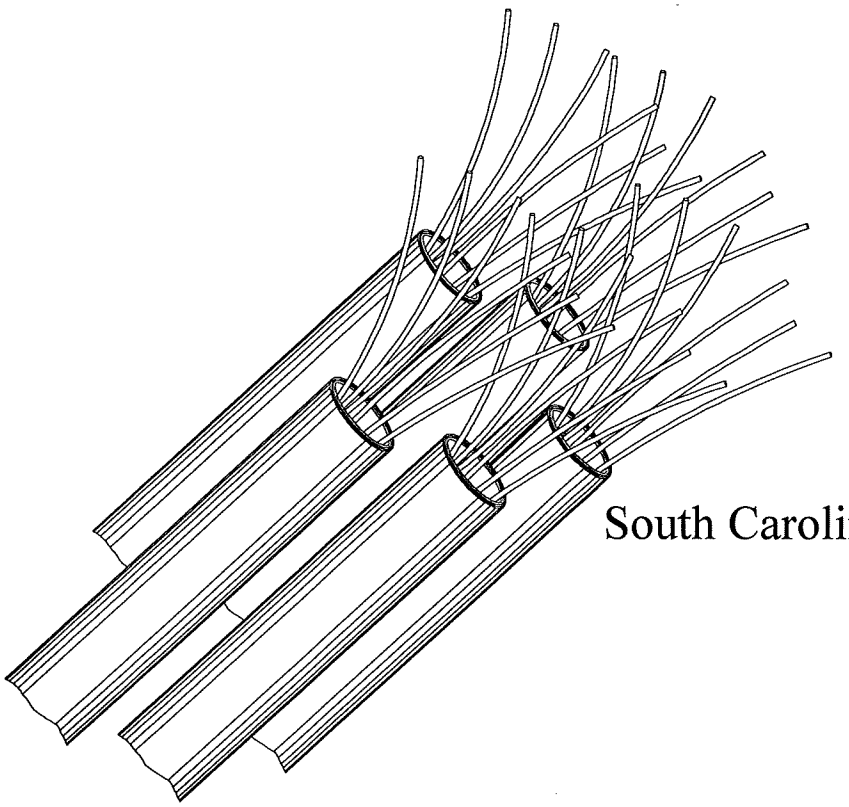
Municipal Fiber Optic Systems
Three South Carolina Projects in Progress*



Gaffney
Georgetown
Greenwood

South Carolina Municipal Power Systems
1998 Annual Meeting
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***Plus One: Orangeburg**

On Bell's Photophone...

The ordinary man...will find a little difficulty in comprehending how sunbeams are to be used. Does Prof. Bell intend to connect Boston and Cambridge...with a line of sunbeams hung on telegraph posts, and, if so, what diameter are the sunbeams to be...?...will it be necessary to insulate them against the weather...?.....until (the public) sees a man going through the streets with a coil of No. 12 sunbeams on his shoulder, and suspending them from pole to pole, there will be a general feeling that there is something about Prof. Bell's photophone which places a tremendous strain on human credulity.

New York Times Editorial
30 August 1880

ACKNOWLEDGMENTS

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UTEC wishes to thank the following individuals for reviewing the section on their particular systems:

Chuck Bolin, Gaffney BPW
Greg Dietterick, City of Georgetown
Ed Miller, Greenwood CPW
John Bagwell, Orangeburg DPU

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1. INTRODUCTION

Since 1991, Gaffney, Georgetown, and Greenwood have installed, or are in the process of installing, a combined total of 107 circuit miles or 4,761 fiber-miles[1] of optical cable. This represents an investment of about $2.3 million[2]. Orangeburg installed its first optical cable in 1988 and now has an installed base of 43 circuit miles or 600 fiber-miles of cable. Orangeburg estimated it has invested over $1 million in its fiber system.

The decision to install fiber can be justified on several fronts. UTEC has recommended optical fiber as the communications media of choice on three recent transmission relaying projects because of its speed, reliability, and immunity from electromagnetic effects. For similar reasons, UTEC has used optical fiber on each of eight recent SCADA system design and SCADA communication system design projects.

Electric utilities are installing fiber to meet their own communication needs. Many utilities, including the four highlighted in this report, have installed fiber systems with capacities well beyond the technical requirements of the utility functions. One justification for the excess of installed capacity is the small marginal cost of additional fibers. For example, assume the installed cost of a 24 fiber system is $3.35 per foot. The cost of a similar system using a 48 fiber cable is $4.21 per foot (see Appendix A for the details of UTEC's cost estimate for this example). A fiber count increase of 100 percent costs only 26 percent more on an installed cost basis. Clearly the incremental cost of additional fiber is low, about 3½ cents per foot per additional fiber. But the installation of additional fibers begs the question why; if the utility's needs can be met without the additional fiber, why install it regardless of how low the incremental cost?

The answer is revenue. Many utilities believe their excess capacity can be leased to telecommunication providers or users, and increase utility revenue. There is little doubt the volume of data and voice traffic is growing. In a May 25, 1998 article, page 90, FORTUNE Magazine estimates voice traffic is growing at 10 percent per year, but data traffic is growing at between 200 and 600 percent per year (the graph in Figure 1 is based on a 10 percent growth rate for voice and a 200 percent growth rate for data for five years). The need for communication capacity is growing. IOUs, telecos, and cable companies are all installing fiber to meet the growing demand. Several organizations are spending billions to install satellite systems for both voice and data.

Municipal utilities are facing increased competition. The need for revenue enhancement is growing. Is fiber a means to add revenue? Two SC municipal systems, Greenwood CPW and Orangeburg DPU, have leased portions of their fiber optic system. This paper is a review of the experience to date of four South Carolina utilities that have installed fiber optic systems and includes a brief discussion of some of the technical and competitive issues.

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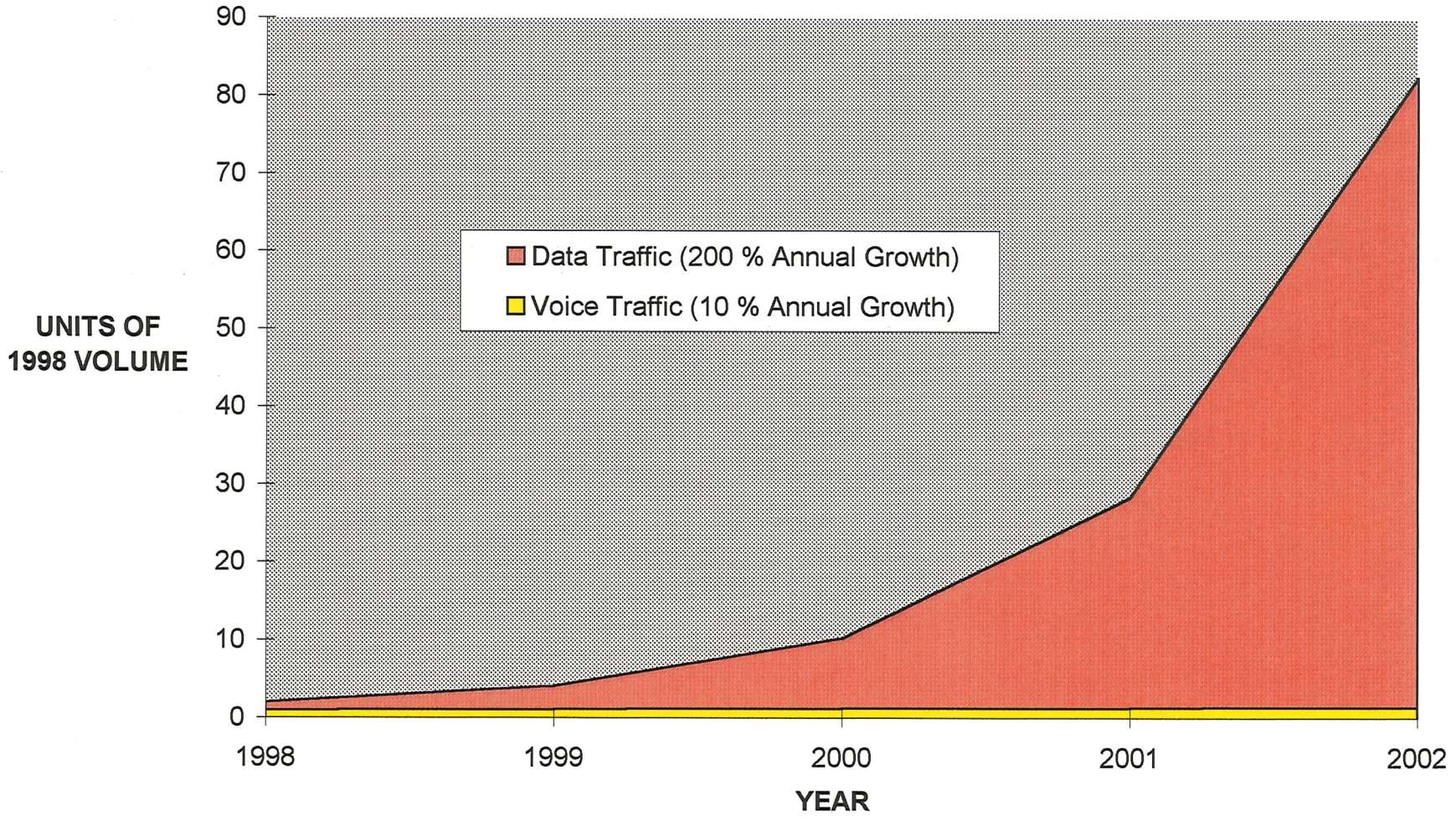
1 Fiber-miles are defined as the aggregate of cable length times fiber count for each cable.
2 Based on a UTEC estimate of an average of $4.00 per foot of installed cost.

FIGURE 1

PROJECTED NETWORK GROWTH



(Growth projection based on article in FORTUNE, May 25, 1998, page 90)

2. SYSTEM PROFILES

Fiber serves a variety of utility and non utility functions in the four municipal systems described in this section: from the sail pace of a 1,200 baud RTU audio modems to the speed of a 310 Mbps ATM network and from functions as diverse as analog RF video signal for remote class rooms to OC-12 switches routing transmission relay data. The topologies include low fiber count radial systems, high fiber count physical rings, and intermediate fiber counts with multiple interconnecting rings. Table 2-1, which follows this page, is a summary of the descriptions of the fiber optic systems included in this section.

2.1 Gaffney

The Gaffney Board of Public Works (BPW) is an elected board which operates the utilities for the City of Gaffney, SC. The Board provides electric service to about 7,100 customers and water and waste water service to about 9,200 customers in and around the City of Gaffney in Cherokee County. The BPW also provides water to nine water districts.

2.1.1 Background

In 1990, the Gaffney Board of Public Works purchased a SCADA (Supervisory Control and Data Acquisition) system. The SCADA system included a master station and four RTUs (Remote Terminal Units). The BPW staff selected optical fiber as the communication media from the central computer to the RTUs.

In 1992, the BPW installed five standby/peak shaving generation units in its electric distribution system. As part of this project, the BPW expanded the SCADA system to include RTUs at each of the generation units. The BPW expanded the fiber system to link each of the new RTUs to the central SCADA master station.

In 1995, the BPW upgraded its SCADA master station and added a remote operator station at the Cherokee Water Treatment Plant. The BPW extended the fiber system from the generation plant at the WTP to the remote operator station in the filter control room of the WTP.

In 1998, the BPW began a project to install a 96 fiber ring around the entire BPW service territory that could be expanded to provide fiber connectivity between the Operations Center (the site of the SCADA master station) and all BPW facilities including elevated tanks, sewer lift stations, and raw water pumping stations.

2.1.2 Existing Physical Plant

The initial fiber system includes three segments of single mode, 12 fiber ADSS (all dielectric self supporting) cable totaling 13,200 feet. BPW line crews installed the fiber on BPW owned poles. Superior Cable (now Alcoa Fujikura Limited) supplied the cable. Preformed Line Products supplied the pole hardware. The system provides a point-to-point fiber connection between the SCADA master