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JOIN US IN BOSTON

THE ASSOCIATION OF COLLEGE AND UNIVERSITY TELECOMMUNICATIONS ADMINISTRATORS

13th Annual Conference
"A Campus Communications Profile"
August 5-9, 1984
Hosted by Boston University at the
Boston Marriot—Long Wharf Hotel

The 13th annual conference program takes a close look at the impact of changing regulations and technological advancement on the college campus and on the management of the telecommunications function. It is designed to help prepare telecommunications administrators for the important decisions that will be made in an atmosphere of apprehension, confusion, and excitement, as well as to help define the role of the college and university telecommunications professional on campus.

The conference will include a variety of topics and speakers this year. These include:

- The Impact of Deregulation and Divestiture on Telecommunications Management—Jerry Goldstone, Editor & Publisher of "Business Communications Review."

- College and University Owned Telephone Systems—Phillip Beideman, President of Western Telecom Consulting, Los Angeles, California.

- The Evolving Role of the Telecommunications Manager on Campus—Dr. John Fike, Southern Methodist University, Dallas, Texas, President—Communications Enterprises, Plano, Texas.

- The Impact of Data Communications in the PBX Environment—Fred Chanowski and John Powers, Telecommunications Management Corporation, Dedham, Massachusetts.


(Continued on page 3)
President's Message

The month of May was a busy one for me as I traveled about the country representing ACUTA at several very important meetings. The International Communications Association (ICA) was kind enough to invite the presidents of about 14 other telecommunications associations from around the country to attend their 37th annual conference in Las Vegas.

As expected, I found attending an ICA meeting to be a real experience. ICA meetings are very busy, well organized affairs; I found myself on a treadmill the entire time I was there. Besides attending many of their educational sessions and the largest telecommunications vendor show ever assembled, ICA President, Jack Petzer, invited all the telecommunications association presidents to his suite for a meeting to discuss their recent survey on certification and telecommunications costs. Unfortunately, all the figures on these surveys were not complete but the initial indications were that those who filled out the survey were in favor of the concept of certification. ACUTA member Norm Sefton is in charge of this project and will pass along the final information on both surveys as soon as it becomes available.

Leo Anderson, publisher of Telephony and Communications Age, held a breakfast meeting one morning. The discussion topic was "What is the biggest problem facing today's telecommunications managers?" This meeting was of particular interest because it was attended by representatives of all factions of the telecommunications management world: general industry, education, medical, and consulting. The discussion that morning centered around the two often repeated problems; keeping up with technology and getting upper management support. This should not be news to ACUTA members. However, it's nice to know our problems are universal and experienced by everyone in the industry.

Two weeks later Ruth Michalecki and I attended a meeting in Dallas to participate in a telecommunications workshop sponsored by the Association of Physical Plant Administrators (APPA). ACUTA's part of the program was to discuss telecommunications in the current environment.

This was a very important meeting for ACUTA because it enabled Ruth and me to bring ACUTA to the attention of another professional organization who, because of divestiture, has now become very interested in telecommunications. Realizing this, our message then was to emphasize the value of good solid telecommunications management on their respective campuses. They, like everyone else, cannot get enough information fast enough and their enthusiasm indicated many of them would be attending our meetings in the future.

*******************************

As I mentioned last month, the Board of Directors is very interested in having the association data base up and working by the Boston Conference. By this time you should have received a survey form from John Sleasman that indicates the Association needs you to complete the profile on your institution. This has been a long drawn out process that we have been talking about and working on for years and we are now very close to seeing this project become a reality. In order for this project to be a success it is very important for you to take a few minutes time and respond to the survey. Your cooperation is needed to insure the success of the data base project and will be greatly appreciated. (Continued on page 3)

Party Line

...by Ruth A. Michalecki

Telecom Management in Today's Environment

I had the honor of being asked to conduct a Telecommunications Administration class for participants of the Institute of College Business Management Short Courses held at the University of Nebraska-Omaha during the week of June 3rd thru the 7th. The Institute is conducted under the auspices of CACUBO, and had over 140 attendees this year. The purpose of the Institute is to introduce the participants to the overall picture of management in the University/College environment. The attendees represented institutions from all across the country and their job titles ranged from Vice President to a wide variety of mid-management positions found on university/college campuses. Out of the 60 attending my sessions, only three had direct responsibility for telecommunications management at their institutions, and I am happy to report all are ACUTA members.

While pulling some materials and thoughts together for my presentation, the entire scope of this job started to unfurl. What an exciting field--complex, complicated, demanding, ever-changing, and absolutely vital to the future of our Institutions and to our country.

Just imagine--we have emerged from a telephone industry that for ninety years plus was a monopoly with a single goal in mind, universal service provided at an acceptable low rate. It was considered almost a sacred obligation to provide this service at the same rate regardless of whether you lived next door to the central office or at a remote, isolated location miles from the central office. Obviously the cost of providing service to the two locations was vastly different, but the rate was the same. Rates were controlled by a regulatory body through unrealistic depreciation/amortization schedules causing slow turnover of equipment and through the use of toll revenues to subsidize the universal service concept. The unrealistic amortization schedules prevented the operating companies from modernizing and upgrading their switching facilities and kept the cost of toll services at a much higher level than the cost of providing that service. If universal service was sacred, then the tariff became the absolute truth of the industry. Heaven help the university who requested something not in the tariff, requiring a "special assembly" ruling to handle. During my earlier years with ACUTA, probably the single biggest complaint heard again and again, was the telephone company didn't care--didn't listen--didn't heed the special needs of the universities...the concept of universal service and the tariff reigned supreme!

What has all this to do with telecommunications management? Well, I believe the so-called natural monopoly created a unique problem for our profession, because it made the top administrators view the job of managing telecommunications as a clerical function. After all, anyone could pick up a phone and order a new line or move an existing one. You didn't have to make any management decisions such as selection of vendor (you only had one choice) and you didn't have to barter for the best price (you had the tariff to settle that little matter). And so, in senior management's perception, the job was more than keeping track of inventory, billing for the usage, paying the telephone company for service and supervising the operators. Then along came an...
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- Telecommunications—Vehicle for Office Automation—Ron Brown, Communications Consultant, Coopers & Lybrand, Boston, Massachusetts.
- Local Area Networks in Academia—Hal Webber, Jr., Director of Network Operations, Brown University, Providence, Rhode Island; Dr. William Shipp, Provost for Computing Affairs, Brown University; Jeffrey Lazarus, Associate Vice President for Computing and Communications, Boston University; and John Porter, Director of Academic Computing, Boston University.
- Cellular Radiotelephone
- Financing Your Equipment Purchase—William Dougherty, Assistant Vice President, E.F. Hutton Financial Services.

Other events planned during the conference include: the 13th Annual ACUTA banquet, the new members and conference reception, a dinner cruise of Boston Harbor, and a special spouse/family program.

Make your hotel & airline reservations as soon as possible. Registrations for the conference should be sent in with your payment no later than July 16, 1984. If circumstances prevent early payment, please call 617-353-2097 to make arrangements for late payment.

Remember those dates, August 5-9, 1984. It will definitely be a conference to remember!

President's Message (Continued):

The Boston conference is just around the corner and from all the planning done by Mal Reader on the program and by Jim Shea to coordinate the meeting site, this should be our best meeting yet. Highlight sessions will include the impact of deregulation, a full day seminar on college and university owned telephone systems for telecommunications managers and planners, a session on the evolving role of the telecommunications manager on campus, and a session on telecommunications management information systems. If you haven't mailed your conference registration form and hotel reservation card yet don't put it off another day. Attendance has been very high at all of our seminars this year and from all indications we expect the attendance at the conference to also be a record high.

Sincerely,
Michael A. Toner
President

Party Line (Continued):

opportunity to achieve some truly dramatic cost-savings by providing long distance services through an alternative cost effective network of some design. A truly innovative individual could save the cost of their salary over and over again, and if they were clever, they kept their top administration informed of this activity over and over again.

In fact, I can remember when discussions of least cost routing systems replaced the cost of local telephone directory listings as the hot discussion subject at early ACUTA annual meetings. We have come a long way—we still have a long way to go before we overcome our early image. Let's look at what's ahead.

Changing the telephone industry from a regulated monopoly into a competitive industry started with the "Above 800" decision and went through the "Carterfone, MCI, Specialized Common Carrier and the Executen" decisions, the "Second Computer Inquiry," and the "modified Final Judgment"...These decisions were not made by accident or in a random order. Instead a philosophy was being developed during this time frame that competition could and would better serve the interests of the public than a regulated monopoly could. No use arguing the merits of that philosophy, it is a fact and we can't go back.

There have been several forces driving the communications industry in the 1980's: the development of digital technology; integration of voice, text, data, image and video technologies; and the break-up of the Bell System. Rapidly changing technologies has led to a virtual explosion in the use of personal computers, smart terminals, user-accessible mainframes, all creating an ever growing demand for faster interconnections. More and more electronic intelligence is being distributed away from the central computer facilities and being placed at the user's fingertips through dedicated workstations, word processors, personal computers, video teleconferencing codecs and a lot of other devices. Each of these has the need to communicate with others or with mainframes.

As end-user devices expand, so does the need for communications. As the need for information grows, so will the need to transmit the information faster grow. The more information and the greater its complexity, the more important communications capacity and speed becomes.

Although communications, data processing and office products have not completely merged, there is today a coming together of technologies that has not always existed. Once upon a time, companies made their fortune in a single field and any merging with apparently unrelated fields was not very likely. However, in today's environment, this merging is essential to sustain revenues required for growth. Communications companies are searching for new revenue opportunities and sometimes the most attractive growth opportunities come from another technology segment. Freed of the regulatory barriers of unrealistic amortization tables and subsidized service, AT&T is now able to enter the office automation marketplace—a position they have desired for over ten years. We are seeing active interest from AT&T in computers, IAN's, varied office automation products and others. And we are seeing an ever-increasing degree of complexity and sophistication in PBX's through the attachment of applications processors.

Competition will stimulate more R&D, which in turn will bring even more goods and services to the marketplace. In fact, divestiture and deregulation will probably do more to contribute to the growth of the telecommunications industry than any other single factor since Alexander Graham Bell spoke his now famous words, "Mr. Watson, come here...."

What does all of this mean to our careers?

Certainly as both the capacity and complexity of telecommunications networks and systems expand in the next few years, so will the need to provide leadership (Continued on page 4)
in managing this function. Our institutions need to gain control over the ever-increasing budget, they need to make sure scarce resources are being utilized in the most effective and efficient manner possible, that technology is being used as a productivity tool and not being considered for "state-of-the-art" fascination and that any plans for integration of technology are being made with full consideration for what "the business of the university is," and will help in reaching its future goals.

We are in place. Most of us understand the voice-side of our business better than anyone else and as Joe Massey recently told the participants at our Orlando Spring Seminar: "You must get control over the voice side or it will absolutely overwhelm you." We can and must learn the data side. We know our image problem and we need to start being more visible.

Dr. Charles Baker of SMU recently said he felt one of the reasons Telecommunications Management wasn't as visible as it should be was because there is no professional society associated with the field, and it is not totally oriented to a specific discipline, but rather is a composite of several. The lack of a professional society of telecommunications prevents it from becoming a recognized discipline in colleges and universities and is one of the reasons so few schools offers a degree in the area. However, he also said it is one of the fastest rising needs in the job market today.

Today's telecommunications manager must be well informed, shrewd, have some technical expertise, business sense, possess strong management skills and have political savvy. You must be able to withstand pressure. You will need to answer things like, why are the bills going up (no relationship with increased usage of course, in the perception of those asking the question); why don't we buy our own switch and save bundles of money; why can't we wire our own campus and avoid paying the telco completely; why doesn't this really neat device work on our system; what do you mean—you need additional staff; why can't we let the students in the halls access the mainframe on their personal computers right now; why can't I get my leased circuit overnight; etc. Probably the most difficult one I deal with, is how do I answer the ever-asked question from the Deans about how to add telephones and lines, providing increased service without adding costs to their operating budgets?

Constant changing in the industry makes planning, budgeting, cost-management a lot harder. You need to be flexible and you need to have control. You must start thinking not only in cost effective terms but you need to view telecommunications enhancements as a productivity tool. We are on a treadmill, going from planning to measurement to fine-tuning and back to planning again. Those in our profession who have a knowledge of networking and who have kept up with the changes in technology have an advantage.

Our institutions will depend on us for making these judgements, for making recommendations and for implementing their final decisions and making it work.

We will often be blessed with inadequate staff, inadequate budgets and we will still have to contend with the so-called lack of mystery in our job. Keep informed, read the journals and newsletters, attend the really valuable seminars and conferences, learn how to present plans that your senior administrators will listen to and above all, keep your senior administrators constantly informed about what is happening and how it will impact your institution. Be active in ACUTA—use our informal network to your advantage. Invest time in making calls to your fellow members, find out what they are doing and why. Share your activities with the rest of us through writing an article for ACUTA News.

The future is bright for the communications industry, with growth predicted to double by 1990. Bright for the suppliers who will reap the spoils of this kind of market. Bright for the end-users of technology who will see their business prosper as a result of quicker dissemination of information. Bright for our universities and for our students as we help guide and educate the future leaders into the information age. Bright for those of us in the profession of telecommunication management willing to make the investment in time and personal commitment that will be required to survive. Exciting opportunity, exciting times and enough challenge for anyone!

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**DIRECTOR OF COMMUNICATIONS SERVICES**
**INDIANA UNIVERSITY**

Individual will manage all aspects of the university's communication department. Must have the ability to develop department into an advanced campus telecommunications network capable of handling voice, data & video transmission. Current system has approximately 11,000 phones. Must be able to develop RFP's, bid specifications, and short & long range planning. Will develop & control all budgets.

Degree in technical communications, engineering, business administration, or closely related field is desired but not mandatory. Previous experience in implementation and administration of large scale voice & data telecommunications systems in the higher education environment is desired. 5-10 years of broad technical and upper level administrative experience in the fields of telephone services, area data networks, computer systems or other electronic communications is required.

Resumes must be submitted by August 24, 1984. Send resume to:
Indiana University
Richard Maze
Personnel Employment Manager
Bloomington, Indiana 47405

Affirmative Action EO Employer.
Time-Compression Multiplexing
Squeezing Digits Through Loops

...by Barry S. Bosik

A NEW data transmission technique, called time-compression multiplexing (TCM), is being tested now in New Jersey.

TCM will enable computer users, for the first time, to transmit and receive high-speed digital data over the public switched network, using the same two-wire loops normally employed for conventional services.

Time-compression multiplexing is a key element of the circuit switched digital capability (CSDC) announced in 1983 by AT&T Bell Laboratories. CSDC is the world's first system capable of sending and switching digital data signals at 56 kilobits per second (kb/s) over the public switched network, on the order of six times faster than the maximum speed presently attainable.

Voice services still represent the largest part of the telecommunications industry's business. Today, however, an increasing number of customers want more sophisticated services; in particular, they want data transport services that enable computers to converse with other computers, and to link terminals to computers.

The data transport service often required by the customer is a full-duplex capability. That means transmission takes place in both directions simultaneously. However, because voice services dominated the network from its inception, there were no stringent requirements for separating one direction of transmission from the other.

This created problems for computer users trying to transmit data at high speeds. Eventually, if the volume of traffic justified the cost, computers were linked by dedicated facilities, isolated from the public switched network so they could be chosen to meet the full-duplex requirement.

However, customers whose data transmission needs were occasional or marginal were limited to the technical restrictions imposed by the analog facilities of the network. Improving the speed of such data transport in a cost-effective manner meant that the same equipment had to be shared by both voice and data transmissions.

The local loop that connects a customer's premises with the serving central office is, most often, a pair of copper wires. Even when other transmission systems, such as digital loop carrier systems, are used, the final link to the customer is over wire pairs. The ubiquity of these wire pairs makes them the media of choice for providing new data transport services.

Although there are several ways to achieve full-duplex data transmission, TCM stands out as particularly simple, efficient and economical. In its first implementation, it uses two integrated circuits at each end of the message channel, processing the digital data signals into bursts that are synchronized to flash alternately in each direction through the lines, without interfering with each other.

Thus, two data streams traveling in opposite directions can share the same wire pair. Each data stream is partitioned into discrete segments by TCM.

During transmission of the segments onto the wire pair, a 56-kb/s signal is used as a reference to generate a 144-kb/s signal that bursts the data onto the loop. In this way, transmission is speeded up so that each segment occupies less time; that is, the segments are compressed in time.

These compressed data segments from the two directions of transmission are alternately sent on the wires. The incoming and outgoing signals take turns traveling on the wire pair in non-overlapping time periods.

The result is a computer-speed version of the alternating voice transmission that occurs in normal conversation between humans. This bouncing back and forth of the data bursts led to the nicknames of "ping-pong" or "burst-mode" transmission for the TCM technique.

When each data burst enters the TCM equipment, the data stream is expanded (slowed down) and read out of the TCM system at its original rate of 56 kb/s.

The data thereby are restored to their original form, without the customer noticing that this "trick" was used on the local loop to achieve full-duplex transmission.

Simple Circuitry

TCM is not only a technique, it's also a system. The circuitry required to implement the system is relatively simple, consisting primarily of two integrated circuits, one analog and one digital.

The analog circuit connects the TCM system to the loop, while the digital circuit does the digital signal processing associated with the TCM functions.

Although the signals being transmitted into the two-wire loop are digital (having discrete levels), the signals received at the other end of the message channel are analog. The discrete-level signals being transmitted (corresponding to the ones and zeros of digital data) undergo significant attenuation and distortion while traveling through the cable.

By the time the signal reaches the receiving end, it is continuous rather than discrete, and cannot be treated as a digital signal. An analog circuit must compensate for the cable loss, enabling reconstruction of the original digital data.

This function, as well as other associated analog functions, has been implemented in a custom integrated circuit, the TCM regenerator. It permits the efficient implementation of the high-speed analog signal processing circuitry required for TCM.

Burst Operation

Once the signal is regenerated, it can be processed digitally. For this function, a second custom integrated circuit was engineered. Known as the rate change and control (RCC) circuit, it implements the digital functions of TCM, including the primary operation of elastic storage; in other words, the reading of data in at one rate and reading them out at another rate.

For the data entering the system, the circuit reads in at the original data rate, and periodically reads out at a higher rate, thus forming the bursts. This is the time-compression operation, shortening 3 millisecond (ms) segments to 1.389 ms each.

(Continued on page 6)
For the other direction of transmission, in which the regenerated data come from the loop, the circuit reads in at the high rate and reads out at the lower original data rate. This time-expansion operation restores the data to their original form.

The high rate used for burst operation must be at least two times the original data rate to keep transmitted bursts short enough to avoid overlapping. Practically, a burst rate of about 2.25 times the data rate is used; this provides for guard intervals of sufficient duration between the bursts in each direction.

For CSDC, the burst rate of 144 kib/s is 2.25 times the full capacity of TCM, which is slightly more than 64 kib/s. This allows for possible future evolution of the CSDC data rate from 56 kib/s to 64 kib/s.

Just using a high enough burst rate, however, does not ensure that the bursts in the opposite directions will not overlap. The two ends of the system must be synchronized with each other in such a way that they never transmit at the same time.

The synchronization procedure in the TCM system requires that the central office end of the system always initiates the bursting. The customer end ensures proper burst interleaving by always waiting until an incoming burst (whose duration is known) is completely received before transmitting an outgoing burst.

The central office end also monitors the incoming bursts to verify proper synchronization. The logic circuitry for the burst synchronization functions is located in the digital MCC circuit chip.

Thus, the principal functions associated with the separation of the two directions of transmission—time compression and expansion—and burst synchronization are readily implemented using standard digital circuitry. (Although the circuit configuration is custom-designed, the logic elements that form the circuit are standard.)

This is one of the major advantages of the TCM system over other full-duplex two-wire techniques. The net effect is a simple, economical system that allows use of existing cables for high-speed data transmission.

In CSDC, the TCM circuitry terminates the local loop at both ends. At the subscriber end, the circuitry is always in the network channel terminating equipment. At the central office end, it may be in an alternate voice/data metallic facilities terminal (VFT) plug-in, a D4 channel bank, or an SLC-96 carrier system, depending on the local access arrangements.

First Application

CSDC was the first application of TCM for digital loop transmission. A technical trial of CSDC began late last year at the New Jersey Bell Telephone Co. switching center in Murray Hill. It uses the stored-program control of the IA ESS switching system to develop the new digital capability.

To place CSDC call, a customer uses a Touch-Tone telephone connected to a terminal or computer. The user dials the desired number, preceded by a unique prefix that tells the IA ESS switch that a CSDC call is being placed. The switch then flags the call so that it is routed through the network in a special way.
Bits & Pieces

...by Ruth A. Michalecki

The following information was shared with the participants of the APPA Seminar held in Dallas, Texas on behalf of ACUTA:

CRISIS IN THE TELECOMMUNICATIONS USER ENVIRONMENT

The implications of the "Telecommunications Revolution" can only be fully realized when viewed from all four directions:

1. Like it or not, we live in a multi-vendor environment.
   - System engineering by "Ma Bell" no longer exists.
   - Local telco can no longer provide customer premise equipment.
   - Almost everything requires more planning, effort, and lead-time.

2. We are in a technological revolution.
   - The world of telecommunications is quickly going digital.
   - Digital metallic pairs and fiber optics transmission will rule.
   - Packet switching will eventually replace circuit switching.
   - Integrated Services Digital Networks will be worldwide.

3. Divestiture/Regulatory issues have diverted U.S. attention.
   - Other developed nations have surpassed U.S. in many areas.
   - It will be another two years before AT&T "gets it together."
   - Standards have taken a back seat with many U.S. users.
   - Our society is more information-oriented than ever.

4. The current competitive environment is extremely unstable.
   - When you don't have to be good to make money, quality suffers.
   - Many "alternative vendors" have no regard for standards.
   - Many current vendors will not be around in three years.
   - Many major investments will be obsolete before depreciated.

Conclusions:

1. More technical evaluation by the user will be required. The user will have to be a lot smarter and more careful, particularly with regard to future concerns.

2. Most institutions are understaffed to handle this function, and it is next to impossible to find qualified personnel.

3. Institutions will have to be innovative in finding both the dollars and expertise required to move effectively into this environment.

Examples of concerns for academic institutions: PBX's, Local Area Networks, Student Telephone Service and Cable-Television.

Repair Records Important

One company which kept detailed records of the repair problems with its telecommunications equipment recently won an important lawsuit against Canadian B.C. Telephone. The records formed a significant basis for its case.

B.C. Telephone was ordered by the Canadian Radio-Television and Telecommunications Commission to refund $21,786 to Vernon Business Services in Vernon, B.C. because of poor service. The case, which sets an important precedent in Canada, was strengthened by the fact the VBS had kept careful records of its dealings with B.C. Tel, including the detailed diary of repair problems.

This incident highlights an issue that deserves serious consideration by the communications manager, especially now that your equipment is disassociated from your actual telephone service. We're talking about the importance of maintaining good records and a detailed repair history in order to maintain control over your telecommunications equipment repairs.

Another example of significant cost savings that can be realized from careful documentation of telephone problems: credit can be obtained for lines "out of service" from AT&T Communications, your telephone company or from other common carriers (MCI, SBC, Sprint, etc.). For example, if a foreign exchange or private line circuit that costs $1000 per month is out for three days, a credit of $100 is due.

Take the following steps now to assure that your breakdowns and repairs are recorded and reviewed on a regular basis:

1) Make one person in your organization responsible for all telephone equipment repairs and follow-up. This person should be the principal contact in the company for all employees to report trouble with their telephone equipment. Since the telephone company will charge for a repair call, if the problem is with customer premises equipment (CPE), a knowledgeable person in charge of repair and familiar with recurring problems can identify the correct vendor before expensive repair calls are made.

2) Design a system for keeping repair records and summaries in one place. The information should be reviewed periodically, to make sure that unusually high incidence of breakage or disrepair is noted in time to prevent expensive replacements. Accurate documentation of your repairs will flag specific problems, and provide you with backup information for the vendor. Replacement of poorly operating equipment should be made under warranty, whenever possible.

3) Examine your current service and maintenance agreements. Perhaps a comparison of those you have now with others available on the marketplace will indicate you need to make changes.

4) A company with a large communications system and the need for constant maintenance may find hiring a trained repair person an economical alternative. Training is available for your personnel from most major equipment manufacturers. If an analysis of your repair record shows a very high level of repair, you may even want to consider purchasing new equipment better able to handle the volume and conditions in your company.

(Continued on page 8)
Wanted, Telecom Pros

In a recent article on the increasing importance of corporate telecommunications managers, the Wall Street Journal tells the story of a New York concern (without a communications manager) which underestimated its own demand for telephones so badly that it outgrew a new telephone system in just 30 days.

And in Telephony not too long ago, Ronney L. Harlow wrote about a businessman who installed a new telephone line but could find not one to connect it to his key system unit. And when he finally did get it connected, he realized he really didn't need it. This, and other horror stories illustrate what Harlow calls, "the growing telecommunications management gap." In Harlow's words, "As U.S. corporations grapple with a bewildering array of new technologies, new telephone rates and new telephone options, they find it harder and harder to make effective decisions about which of these new choices are right for them.

Changes in the communications industry resulting from deregulation and divestiture have highlighted the telecommunications management gap, and you'll probably notice more articles like those in Telephony and the Wall Street Journal as the need for professional expertise in the field intensifies.

Personnel Resources International, Inc., the New York based placement firm which specializes in the telecommunications industry on a national basis, recently released their Fifteenth Annual Telecommunications Salary Survey. Reported in the survey: demands for planning engineers and managers for both engineering and marketing from independent suppliers hoping to compete with AT&T Technologies. Also in demand, radio design and development personnel for the cellular radio business; engineers with backgrounds in packet switching, fiber optics and other new technologies; critical shortages in technicians, design and systems engineers, advanced networks planners and telecommunications software development personnel. Educational requirements often include a BSEE degree with a MBA or MSSE.

Clearly there are opportunities for anyone interested in pursuing a career in telecommunications. A new book, Dream Jobs: A Guide to Tomorrow's Top Careers, includes a chapter on telecommunications which offers one of the best summaries of the field that we've seen recently. Authors Robert W. Bly and Gary Blake have done a very thorough job of researching educational requirements, job descriptions and career possibilities for the telecommunications professional. The focus is on careers with companies using telecommunications, where the demand for professionals is very high.

Here's what the authors have to say about the field:

"We believe that telecommunications is the 'sleeping giant' of the corporate world. Under-publicized and little known to most job-seekers, it offers high pay, challenging careers, and a rare chance to contribute directly to a company's profitability early in your career." They tell us that the average company worker for every $1 million spend on telecommunications.

Blake and Bly tell you how to get started, where to get the education you need, where to look for breaks into the field, and what you can expect in terms of salary.

WANTED, TELECOM PROS (Continued):

(a telecommunications director for a large corporation can earn $75,000 annually). You get some good tips on what to include in a resume, and a pointed list of questions to ask prospective employers. Included for reference are colleges and corporations offering training programs in telecommunications, professional associations, and good bibliography, leading U.S. telecommunications equipment manufacturers with addresses and telephone numbers, and a glossary of terms.


("Wanted, Telecom Pros," is reprinted from the February 1984 issue of TELEPHONE ANGLES.)

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*Highest figures indicate top range for New York Area. For most areas outside NY salary ranges are in the middle of the figures shown.

For a copy of the Fifteenth Annual Telecommunications Salary Survey, contact Personnel Resources, 342 Madison Avenue, New York, NY 10173 (212) 662-2030.

Repair Records (Continued):

5) A sample Telecomm Repair Log has been designed by TELEPHONE ANGLES. If you are interested in a copy of this log please write to: Ruth Michalecki, University of Nebraska, 211 Nebraska Hall, Lincoln, NE 68588 or phone: 402-472-2000.

(REPAIR RECORDS IMPORTANT," is reprinted from the February 1984 issue of TELEPHONE ANGLES.)

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