The Telecommunications Market of today is in transition. The projections for the late 1980s and the early 1990s offer great opportunity for innovation.

A major section of the business community wants to handle video, voice and data on one medium. The remaining sector wants to run its business in the simplest and most economic way...with a personal computer, loaded with some basic programs and tied into a host computer through the telephone line.

The choices of products to handle video, voice and data on one medium are varied and highly specialized for each application. Twisted pair cable has handled voice and some slow to medium speed data for many years. We are now exposed to cable systems that must handle much higher speed data at the rate of 1.5 to 10 megabits per second or more and multichannel video with bandwidths at 400 to 500 MHz.

In a campus environment, the selection of cable is complicated by the fact that cables frequently have to run between buildings in ducts, direct buried, in the walls of buildings, or in the plenums of buildings. As a consequence, the National Fire Prevention Association, in conjunction with Underwriters Laboratories (U.L.), have developed standards for plenum cables to limit the amount of smoke produced and flame spread in cables exposed to fire. The increased use of inside wiring cables of high pair count in risers has necessitated the development of flame resistant cables with low smoke and low halogen characteristics.

Fiber optic cables are no exception. Physically they must adhere to the same criteria as copper conductor cables. Fiber optic cables have a greater bandwidth. They, therefore, have a greater capacity to transmit data than copper cable.

Following is a comparison of the capacity of a twisted pair telephone cable, a coaxial cable and fiber optic cable to handle data. The density of the information transmitted on route and environmental considerations will determine the medium selected.

TELEPHONE SYSTEMS;

Conversations over telephone facilities can be handled as digital or analog information as follows:

--------(1) Twisted Pairs (T1 Carrier)........24 conversations simultaneously.
--------(2) Fiber Optic Cable
Singlemode - e.g. 100 microns, 1344 conversations simultaneously,
Multimode - e.g. 8 microns, 8064 conversations simultaneously.
--------(3) Coaxial Cable ..................1800 conversations simultaneously.
--------(4) Microwave Radio (2Ghz)........2000 conversations simultaneously.

AMPLIFICATION:

The voice signal must be amplified at regular intervals.

--------(1) Twisted Pair (T1)..........every 1.30 miles (2.07km).
--------(2) Fiber Optic Cable..........every 21.75 miles (35.00km).
--------(3) Coaxial Cable ...............every 1/2 mile (0.80km).
--------(4) Microwave Radio (2 Ghz)..every 40 miles (64.37km).

BANDWIDTH:

The transmission of data requires a certain bandwidth, which is the spread of frequency required to send data from terminal A to terminal B. For example:

<table>
<thead>
<tr>
<th>Analog Bandwidth kHz</th>
<th>Digital Bandwidth KBPS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Telephone Conversation requires</td>
<td>4</td>
</tr>
<tr>
<td>Video Broadcast Channel</td>
<td>6,000</td>
</tr>
<tr>
<td>Banking/Credit Systems</td>
<td>4</td>
</tr>
<tr>
<td>Hi-Fi Stereophonic Broadcast</td>
<td>40</td>
</tr>
<tr>
<td>Alarms (Fire/Burglar, etc)</td>
<td>1</td>
</tr>
</tbody>
</table>

Fiber optic cable offers some very exciting opportunities. Its immunity to lightning is one of the many reasons why communication engineers seriously consider using it as a communications link when more than one building is involved (such as in a campus environment). By its very nature, fiber optic cable eliminates many problems associated with metallic conductors.

Inherent advantages of a fiber optic cable link are:

1. Immunity to radio frequency interference.
2. Immunity to electromagnetic interference.
3. Freedom from signal leakage and short circuit problems.
4. Not subject to ground loop or cross talk effects.
5. Comparatively small and light weight.
6. Inherently explosion proof and shockproof.
7. Comparatively flexible and strong.
8. Higher data load capacity due to higher data rate and bandwidth.
9. Provides greater confidentiality for transmission of data.
10. No current flows. Fiber optic cable transmits light, not current, therefore, it is not subject to explosion in the event of failure.

Local area networks (LAN), broadband systems, and baseband systems are the conversation piece of almost every data transmission specialist in the business today. One is constantly being challenged to decide what system to use, broadband or baseband. In General Motors the "HAP" system, Manufacturing Automation Protocol Technology, is preferred, and this seems to suit a manufacturing environment. This is a broadband token bus method of moving information permitting computers and programmable controllers to communicate.

The highrise corporate office building seems to be the most easily served by the latest IBM proposed "Token Ring" system. The IBM cabling system utilizes a composite cable with two shielded pairs and a four pair telephone cable. The data channels are designed to operate with a bandwidth of 20 Mbs and the telephone pairs are matched to the Dimension 85 System.

There is no doubt that video, voice and data will frequently share the same plant in the future, but great caution should be exercised if high speed data is transmitted over the embedded base of old or inferior cable.

Local area networks would not be complete without considering renewed opportunities for CAD/CAM, Computer Automated Design and Manufacture. Such a system allows you to make revisions and changes automatically to design or manufacturing criteria, automatically recalculating all implicated system components. The CAD/CAM system needs highly sophisticated software and a transmission medium of high bandwidth. CAD/CAM is a computer for engineering, design, installation and maintenance. A successful communication engineer requires a knowledge of LAN and CAD/CAM principles.

Each local area network system has its own very special application. The IEEE has reviewed these applications. The needs and the special protocols required for each are worked out in a new series of IEEE Standards 802/1-6. These specifications are so new that they are in draft form only and most have yet to be published. However, the following information is available.

The 802.1 is a companion document describing the relationship among the other parts of the standard and the OSI (Open System Interconnection) model in more detail. It also explains the relationship of the IEEE 802 Standards to higher layer protocols, and discusses internetworking and networking management issues.

The 802.2 Logical Link Control specifies protocols to control one or more logical links on a single medium.

The 802.3 CSMA/CD Carrier Sense Multi-Access/Collision Detection specifies an interconnection technique for data stations to share access to a 50 ohm baseband coaxial cable bus. (Such as in Xerox's baseband "Ethernet" or Wang's broadband "Wangnet" system.)

The 802.4 Token Passing Bus, an interconnection technique for devices to share access on a physical topological bus, defines protocols used by the physical and medium access control layers, and interfaces between those layers, to the medium and to higher layers. (Such as in Datapoint's "ARC" baseband system and General Motor's "HAP").

The 802.5 Token Ring, specifies a point-to-point ring topology and a token-passing method (such as Proteon Associates, Inc. token passing on ring architecture).

The 802.6 Metropolitan Area Networks will be used for operating over distances of 5 to 50 kilometers at data rates 1 Mbps or above.

The subject of data communications and broadband networks requires a computer to process in one language and converse with another processor in a totally different language. For example, Wang word processors working into Hewlett-Packard printers or IBM CRT display working in conjunction with Control Data terminals. The combination and protocol conversions are extensive. Computer engineers are tackling these problems and have built sophisticated protocol converters and language translators.

Anixter has been associated with a number of these projects and systems and has supplied cable plant (cable and accessories) for LANs in various environments. Recently cable plants have been supplied for Alcoa and Cleveland Clinic. These projects allow computers in various parts of the campus to talk to computers in other parts of the campus to develop an integrated business system.

The LAN form of networking is not new. What is new, and will change networking from now until well into the 21st century, is the personal computer. Today, using the telephone lines, microcomputers can be lined to one another in a network forming an aggregate computer larger than the earlier mainframes. A current simplistic example of networking is home user networks utilizing CB simulator channels. When users sign on to these networks, users can communicate back and forth in writing similar to talking over a two-way radio. The difference is character communications rather than voice.

The networking concept of personal computers is still in its infancy. Many universities are now insisting that students put personal computers in their dorm rooms so they can make use of the college's data base, word processors and other services of the university. To connect 30-40,000 students' PCs in a state university requires a transmission capacity that only a special broadband cable or fiber optic cable can handle. These broadband systems rely on a 75 ohm characteristic impedance coaxial cable, typically used for CATV transmission. In the case of the IBM 590 token ring system, 150 ohm twisted pair data cable is proposed. The accessories for such systems are extensive and need to be stocked by a distributor such as Anixter in strategic locations.

Designing a local area network for a campus environment is only one step in a three-step process to bring the system into being. The second step is the ordering of components and the third step is the installation. Anixter has positioned itself to provide a readily available stock of components for any LAN, broadband or baseband system, with inventories of LAN cable plant in any of its 60 warehouse locations throughout the United States and Canada.
CABLING SYSTEMS, CONTINUED:

Installation of the system with a complete inventory of components becomes easy, but even then, items are forgotten or become damaged during installation necessitating replacement on very short notice.

Anixter's total service concept could not be provided without a fully computerized on-line entry and inventory control network. Anixter's system is unique and serves customers in North America, 24 hours a day, 7 days a week...."Service is our Technology".

Note from your editor

"Cabling Systems For The Telecommunications Explosion" was written especially for ACUTA News by Roland H. Watkins, Vice President-Wire and Cable for Anixter Bros., Inc. Their address is 4711 Golf Road, One Concourse Plaza, Skokie, Illinois 60076; telephone: 312-677-2600.

ACUTA News wishes to thank Mr. Watkins for taking time to share his expertise in this most important segment of our profession—solving the cable-wiring facilities and plant requirements for telecommunications.

PARTY LINE

.......Ruth A. Michalecki

Several issues ago, I wrote about our automated directory assistance system and what great things were happening to us because of it. We have been able to add our on-line order entry operation to the directory assistance function, so our records of telephone numbers and room locations for our faculty/staff are immediately updated when we make a change in either. One of the benefits I should have discussed more than I did, was the difference automating the directory assistance function made in our scheduling of operators and the number of operators we needed, both before and after automation. This was brought to mind when I was reading an article on the problems of worker dislocation rising from both new technology and the divestiture/deregulation activities of the past year.

The impact is clearly shown in the illustration identified as figure 1. This illustration deals with the operator employment in the telephone industry over the past 30 years. In 1950, operators were 43.5% of total employment in the telephone industry, while in the 1980's, operators were 14.1% of total employment in the telephone industry. Yet, during this same time period, the number of local calls quadrupled and toll calls increased 15-fold.

In our own operation, prior to automating the directory assistance function, we had a total operator force of 11 full time employees and 15 students ranging from 25% FTE to 50% FTE and three chief operators (one for each shift). With implementation of our automated directory assistance, we have been able to reallocate the duties of 2 full-time operator positions, adding one to our billing area and one to our clerical staff. As some of you know, we handle the directory assistance/operator functions for the University, State Government Offices located in Lincoln and for the City/County Government Offices in Lincoln, 24 hours a day, 7 days a week. We serve as an after-hours answering service for many of the vital city/county service functions, such as health department, street and sewer operations, and other emergency services for state, city/county and university. Our telephone operator services are fairly complex and the operators need a wide variety of information at their fingertips. What a difference automating that function made to our department.

Not only have we been able to effectively reduce our operator force by two full-time employees, but we greatly improved our service, and that really what its all about, isn't it.... Operator studies prior to computerized directory assistance capability showed that it took (on the average) from 2 to 3 minutes for an operator to locate the required information for a caller. You must remember, we had to search through directories and information from several sources, not just the university. It was difficult to organize all the data concerning meetings and special events the callers inquired about and keep that information current. Keeping track of the vast population we handle calls for was simply impossible. Now our statistics show that it takes our operators about 18 to 20 seconds to locate the information and respond to the caller. The program had other benefits that has proven quite valuable to us. After using the system for approximately six to seven weeks, it produced a report showing us how the operators should be scheduled to provide us with maximum coverage. We thought we had been fairly effective with determining our operator coverage, but we selected to schedule the operators according to the report generated by our computerized directory assistance program, and we know our service has improved, using fewer operators. The other plus has been the vastly reduced time required for training the new operators.

I really didn't intend to get into this subject as extensively as I did, but it is interesting what a difference computerized directory assistance made in our operation, and what a big difference it, along with the automated TOP positions and the general public acceptance of DDD, has made in the work force of the telephone industry.

I hope all of you have a very Happy Holiday and I will see you next month!
The telephone did it. Until I met my new telephone, I had been a pinball child in a Pac-Man world. I was letting high tech pass me by. I had some nifty gadgets—a two-dollar wristwatch that kept time and told me the date, a VCR that remembered things much better than I did—but I never cared how any of them worked. My telephone had never even piqued my curiosity. It was hard-wired into the wall, as they say, and had not done a single interesting thing in the twelve years it had been there.

Then one day a new telephone took me gently by the hand and led me safely into the new universe of digital switches and remote-system monitoring and end-to-end signals. This telephone made me believe I should resist no longer, that I should become what my husband calls "one of them." Sooner than I ever thought possible, I heard myself asking a phone system technician, Can I program in an internatinal call-forward? Yes, I could. I could forward my calls to any number in the world that could be dialed direct. Indeed, the answer was not nearly so incredible as the fact that I'd been able to ask the question. I was even able to coach my friend the jet pilot, who could fly an F-16 but was afraid to transfer a call. So it came to pass that a Northern Telecom SL 1, a computerized-digitized wonder, made me stand on my tip toes and look over the mountain. On the other side was a silicon chip.

It was not love at first sight, me and this telephone. I was raised in rural Illinois with a black phone that just sat there until you picked up the receiver and an operator said "Number, please." My family would not have paid extra to have one that was trim or pink or called "Princess." Which makes our affair all the more unlikely.

My company had moved to a fancy new building, and there in my new office was this pyramid of lights and buttons—just the sort of telephone sorcery that paralyzes so many people these days. I had two choices. I could walk up and down the hall and complain, as did many of my colleagues. That was my first inclination. But I had work to do and needed it, so I picked up the instruction book and learned how to make a local call. During the call, a red light began blinking and the phone made a mournful honking sound. What does it mean when the telephone blinks and honks?

Things got worse. I looked at the buttons. What is RING AGAIN? CALL SW? CONF 6? Why isn't there any sound when I touched the push buttons? Why don't I have to push them all the way down the way I did my old buttons? And furthermore, why is this telephone honking at me when I'm already talking on it?

Yelling back did no good. So one day I raised the white flag, took my instruction book, and went to telephone class. I stayed after class. I hung out with technicians. I have no idea why I went from dummy to star pupil in phone class, but I did. Somewhere deep inside had been a technology nut waiting to get out.

I toured the switch room—the name is a holdover from the old telephone days—and learned about the "switch," which is now a specialized 16-bit computer. Our telephones, which are really small computer terminals, connect to a main distribution frame that sends out our voices as a series of electronic pulses, each only one eight-thousandth of a second long. The switch handles twenty different features on each of the 125 telephones in our office, 2,500 in all. It could even calculate the cheapest long distance carrier for a call (we subscribed to more than one service) and automatically select the right line for that carrier. In the switch room I saw my own telephone's tiny little "card," a small circuit board, with all its instructions. I met our system's repairman. He's awfully good, and smart, and is on call 24 hours a day, since he lives right next to the switch. He's a computer, too.

The system, I discovered, could take care of itself. Not always, perhaps, but often enough to allay my fear that it was too complicated to function well. Someone, of course, would have to take care of the caretaker. But that thought did not prevent my dawning recognition of what the new phones really mean to us all. The transition might be a little painful, but this is not a fad. We will not be going back to the days of simpler telephones.

The more I learned, the more comfortable I became. I programmed my speed calls—numbers that I could call by touching two buttons. CONF 6, I found out, meant that I could bring together five other people—in different countries if need be—on the same call. RING AGAIN let me know when a busy number was finally free. CALL SW meant that I could go home at night and tell my phone to transfer my calls there, or anywhere I wanted. When the phone honks at me while I am on the line, I learned, it is telling me that another call is waiting.

The HOLD-ON-HOLD feature became one of my favorites. It means that if someone puts you on hold, you can put him on hold right back. You put the call on hold, hang up, and turn the telephone's speaker on, so that you'll know when your caller comes back on. In the meantime you can do whatever you like.

Word got out about my new obsession. One day the man who put in our system told me that if I thought our switch was something, I should see the one at a military communications show up the street. "It's in a semi-trailer and can be driven onto a CSA transport plane, so that if there were a war or disaster we could install a six-thousand-line phone system, anywhere it landed, in seventy-two hours," he said. I had to see this switch.

The show had hundreds of exhibits, including computer switches galore—switches you could sit in, switches you could walk through. There was even a switch resembling a jungle camouflage plane, and there were the phones. Not necessarily the phones of war, but the phones of today's desktops. One office phone had 350 features.
Another told you who was calling before you picked it up; if you didn't want to talk to that person, you could have your phone tell a white lie to the other phone, which would repeat it to the caller. All the action takes place on a little liquid-crystal display screen on the phone. (You punch in your little white lie beforehand.) This same system gives certain phones rank and privilege. If your boss wants to call you and your line is busy, his phone will tell your phone to let you know that you're about to be "overridden," and your phone will beep and the screen will say "override" and you have five seconds to tell your party that he's going on automatic hold.

One phone could actually talk to me. The man demonstrating it pushed a few buttons and I put it to my ear. Suddenly, his phone back in Virginia was talking to him about his messages. It had one of those little synthesized voices--friendly and helpful. It could repeat a taped message, store it, erase it. It hadn't made any mistakes. "This could replace a switchboard operator," I said. "That's exactly what it does," he replied.

I discovered phones that can recognize your voice (voice recognition) and be activated by it (voice recognition). You can teach them to recognize your pronunciation of all ten numbers. Then you just yell: "Hey, phone" (or any other voice code you pick); pause; "five-five-five, one-eight-six-four." And the number will ring. For those in a hurry there is a phone that will let you program the numbers and code them to a person's name. So all you have to do is yell "Hey, phone," pause, "Grandma." And Granny will be on the line.

If Granny is old and feeble, she can wear her phone's remote monitor, a device about the size of a beeper; by pushing a button on it, she can signal her phone to call for help. If she falls down out in the yard, the phone will be ready, and the phone's little voice will call a rescue squad, or a neighbor--whoever is programmed in--and say "medical emergency at..."

Another phone gives you a discriminating unlimited number. When someone calls you, a little voice interrupts and asks the caller for your three-digit-code--in effect, a secret password. The caller then punches in the code on a Touch-Tone phone, or if at a dial phone, says it, and the call goes through. If the caller doesn't know the code, the phone takes a message. "It screens out those telephone marketing calls," one phone expert told me. "You know, those little voice-synthesized advertising messages that come from other machines. It's machine wars."

As I learned more I realized that the telephone is going to change our day-to-day lives more than we think. Soon it and its accessories will become almost like one of the family. "Our phone will no longer be passive," John Peers, one of the optimistic entrepreneurs of the new industry, explained to me. "It will be active."

Very active, if Peers's efforts bear fruit. He is the president of Androbot, a California robot manufacturing firm, and is working on something he calls synthetic animals, or "mechanimals." A mechanimal, which Peers thinks will be in the trial stage in a year or so, will combine the telephone with tiny topographical robots (ones that can scuttle around like small R2-D2s). "After all," he says, "when the phone rings, why should you get up to answer it? Why not just have it come to you?"

The mechanimal in your home will always know where you are, because it detects your body heat with infrared sensors. When the phone rings, it hurries over to you. If there are two people in the room, it stops and its synthesized voice says, "I'm ringing." Since it is programmed to respond to your voice commands, you say "Come here." And it obeys. That's just the beginning. The mechanimal will be able to sense smoke in the house and alert you to a fire. It could hear a pipe burst during the night or let you know that someone was breaking in. "Eventually," Peers says, "your mechanimal will be able to stand by the foot of your bed, monitor your breathing and your pulse rate, and try to wake you if something goes wrong. If you don't respond, it will call for help."

This is not science fiction. Voice activation and voice recognition and voice synthesizers are among technology's hottest fields. Call 800-228-8466 and listen to a Gulf Western Sensaphone monitoring the climatic conditions in a telephone switch room near Philadelphia. The Sensaphone can be programmed to monitor various conditions in your home, business, vacation cottage, or even on your boat. If anything is amiss, it calls you, and its little voice explains the problem. "Attention! This is telephone number 228-8466. The temperature is low! The temperature is 33 degrees! or "Attention! The sound level is high! That could indicate an independent alarm going off, but you'll be able to listen to it yourself, because the Sensaphone will open a mike. If you're not home, it calls another programmed number, then rings up to four--and keeps repeating the cycle. When it gets an answer, it asks that person to acknowledge the warning message by returning a call--to make sure that some answering machine didn't just record the message.

People are not only paying $250 for Sensaphones and depending on them, they're becoming attached to them. Gulf Western's Art Silverman recalls getting a desperate Mallgram from a Sensaphone owner in Florida: "Alfie is sick. Alfie is my Sensaphone and he is a faithful servant. He's been watching my bilge pump but now he's sick and we can't live without him..." Alfie's microprocessor had failed, explains Silverman: "He needed a brain transplant." A technician promptly installed a new microprocessor.

The General Electric HomeMinder is another faithful telephone-operated servant. With one end plugged into a telephone jack and the other into your household wiring, the HomeMinder can do little chores--in fact, a hundred of them--while you're out. You simply plug a light or an appliance into a special module, then plug that into a special module, then plug that into an electrical socket. Signals from the HomeMinder flow through your household circuit, activating whatever modules you choose. You can call from any Touch-Tone phone in the country (or use a hand-held tone generator on a dial phone) and turn on your lights, switch on your stereo,
GETTING OVER YOUR TELEPHONE HANG-UPS, CONTINUED:

warm up your Jacuzzi, start your air conditioner or even your bug zapper if you're going to have a barbecue. You can program it to do the same thing every day, or if you're going to be away, to turn on various appliances at random so that your house looks lived in.

While computers perform these marvels, it is the telephone system that makes it all possible. By the time we got to the age of the home computer, we were already wired together by the late great Ma Bell. So there are in this country several hundred million telephones that have access not only to each other, but to gate banks and remote monitors as well. We now live in a wonderful world where we can reach out and touch our stove when we're not home.

Yet this world is not without problems, or critics. "Who needs a phone with three hundred and fifty features?" asks one research engineer. "Most people can only remember about four. We are really hitting mice with sledgehammers." Then there are the glitches. One day I was talking to some electronics company executives on a conference call they had arranged. They were using speaker phones and their own company's long distance system. It was a technological marvel—only we could barely hear each other.

The new telephones do not go dead, as the old ones did, but in computer parlance they "go down," usually without warning. Their microcircuits are vulnerable. They can be damaged or destroyed by environmental factors (heat, moisture), and anonymous gremlins (sometimes a system goes down and comes back up so quickly that technicians never find the cause). But electrical surges and sags are the chief culprits.

Next is phone abuse, wrought by coffee spillers, cord twisters, and people who roll over the cable with the casters on their chairs. Many of these phones can be repaired quickly. Like other modern electronic equipment, they are constructed of modular components, and a good technician can spot and replace an offending component in minutes—if he has the part, of course, and if the company hasn't gone out of business, as some in this fluid new industry already have. Off-brand phones, and phones made in exotic places, may be easier to repair than to replace.

Quite beyond the consumer's problems, the social implications of all of this are enormous. So you have a phone that lets you call home, open a mike and listen in: What if someone at home doesn't want you to hear what's going on? Who overrides whom? And why? How will you teach your bedside mechanism that while some noises he hears in the night should cause him alarm, others are really perfectly okay?

A friend of mine, a computer whiz, considered the potential problems of the new phones and mused, "You know, I think World War III will be started by a telephone." He didn't mean by someone using a telephone, but a telephone itself—some smart telephone of the future that might, like the rogue computer Hal in 2001, try to take command of a situation.

Yet, as a society, we seem ready for a change. More than 31 million new electronic telephones are expected to be sold in the United States by the end of this year. That phone-making giant, GTE, says 50 per cent of its new orders are for phones with a memory feature. Even people who are not quite ready to face new technology are buying phones that merely look different. A Pittsburgh outfit, Specialty Phones, makes one that looks like a duck and quacks when it rings. They have sold 22,000 quacking phones (at $258 apiece).

Talking telephones may be next—and they will certainly be more useful. John Peers of Androbot feels we're fast approaching the day when the telephone and add-ons will be able to talk to us and to each other. Some already do. "When you can talk to your telephone, and your telephone can talk to other telephones, you'll have access to your dialogue (talking computer)," says Peers. "You'll be able to turn around and ask your telephone a question; it will call another phone and ask it to talk its computer, and then it will get back to your phone, which will get back to you. You don't need to be near the computer. You don't need to be near the screen. You do need to be near the telephone."

The Sensaphone owner who worried about his sick Alifie may not be so strange after all. If your home phone were there to greet you when you came in the door, gave you your messages, had started dinner, and asked you how your day was, then stayed by your bed at night to guard you, how long would it be before you named it? Before it became sort of a person? Maybe your best friend?

I used to be afraid of all this, but now I'm not. I still respect my old phone at home, but I love my new phone at work. I'm not unusual, one technology expert has told me. I'm in what they call a "phase shift." Something I'd become accustomed to is changing forever. In this case it's the telephone. The telephone is becoming almost alive.

Hello, Alifie.

NOTE FROM THE EDITOR:

"GETTING OVER YOUR TELEPHONE HANG-UPS" was reprinted with permission from the December issue of DISCOVER magazine. The author was Penny Ward Moser and the illustrations were by Steven Guariniello.
You may not be aware of it, but there is an art to "raising Hell." This should not be confused with "Hell raising," which is an entirely different sport (at least it is in Georgia). To continue, the art to "raising Hell" is to do it constructively. To be constructive one has to be able to tell the difference between a situation that may require only "mild indignation," or perhaps a "strong protest" and one that requires a little full blown "raising hell." Also, you should never "raise hell" when you're so angry you could chew ten-penny nails and put your fist through a wall. This is detrimental to your blood pressure.

I have always prided myself on my ability to "raise Hell" with "THE TELEPHONE COMPANY" in a constructive way. After all, "raising Hell," if done correctly, can be extremely satisfying. However, since ONE EIGHTY FOUR I have found myself becoming more and more despondent, depressed and disillusioned. The reason for this sad state of affairs is interesting.

The situations that call for "raising Hell," primarily with our BOC, to be honest, have increased one hundred-fold, while my ability to find an individual within the BOC who can respond to my "raising Hell" and get a problem solved has decreased a thousand-fold. With few exceptions (and I thank God for those folks) I am finding it very difficult to unearth BOC employees who 1) give a damn that I'm having a problem or 2) can do anything about the problem itself. You see my dilemma; you can't "raise Hell" with someone who doesn't care in the first place, and can't do anything anyway in the second.

It seems not to matter how high up the administrative ladder one carries one's "raising Hell," the response is generally the same - "Connie, I understand your problem, but...." So, eventually one just doesn't bother to ask, "Is this any way to run a railroad?" and goes out and purchases one's own railroad.

I know that there are competent, capable, caring individuals in our BOC. What I don't understand is, even under the strictures of divestiture (may Judge Greene suffer from in-grown toenails!), why these people can't/won't/don't/aren't allowed/ to provide the level of help the customer requires.

Common sense, as well as customer service, appears to have become the innocent victim of this divestiture mess; "the operation was a success, but the patients/patience died."

In the meantime, I console myself with the knowledge that installation of our new SL-100 will get underway shortly, and then I will have a completely different set of folks with whom I can "raise Hell." I can hardly wait.

On a more pleasant note, I really enjoyed the ACUTA seminar in Madison. It was great to see so many friends that I haven't seen in the past two years and to benefit from such a timely and well presented program. It was just as great to see so many new ACUTA members and to meet new "friends." I feel the need to preach to those new friends for just a minute and it wouldn't hurt a few of you older members to take note. The ACUTA motto, IF IT IS TO BE IT IS UP TO ME, should be tattooed somewhere upon your anatomy (o.k., maybe that is a little drastic!), so that you will always keep in mind that ACUTA needs your talents and abilities and your willingness to contribute to your organization. ACUTA is going to be what you make it. Let Ruth or your Region Director or any other Board member know that you want to get involved....you'll never regret it! End of sermon, end of column!

See you next month...
Cornell University has recently signed a contract with AT&T Information Systems (AT&T-1S) for a System 85 to like telephones and thousands of computers in laboratories, classrooms, dormitory rooms, and offices throughout the Ithaca campus to the rest of the world. Installation will be immediately underway and expected to be completed by the Summer of 1986. Cornell will own and operate all the telephone, video, and computer lines and equipment on its Ithaca campus.

The cost of the $17.4 million University-owned system is expected to be recovered in about eight years, mainly in savings from existing and new systems. AT&T-1S will receive $12 million for installing the major portion of the system; the balance is for building renovations, engineering, consulting, an emergency power facility, a contingency fund, and other charges.

Cornell's new telephone system will include more than 11,000 phones and will be the most up-to-date and convenient one possible with today's technology. The communications capability will help turn microcomputers into terminals associated with on-campus and external networks. It will be one of the largest, fastest, and most adaptable data networks of any American university. The new system will give students, faculty and staff the opportunity and challenge to expand the use of personal computers and work stations into the daily work of the University.

Without a University-owned system, Cornell's bill from New York Telephone for the existing Centrex 1 (C.O./crossbar) could have been at least $4.1 million a year before 1986. With the new system, that amount is estimated to be around $800.00. Retained savings of about $3.3 million a year will help repay the cost of the new system. Initially, the University will finance purchase and installation of the telecommunications system with bonds sold through the New York State Dormitory Authority.

By installing a system now, Cornell's network will take advantage of the most recent technological developments although it may not handle the explosion of data traffic and information management technology in five years. The number of personal computers on campus "explodes," the architecture of the communications system will allow Cornell to expand. This will hopefully allow a graceful evolution into whatever direction is appropriate.

Voice communications, computer data, and video images will travel through multi-purpose system made up of optical fiber lines, coaxial cable, and conventional copper wire. Existing copper wire will be replaced for improved quality and speed of transmission. Cornell's WATEBOX, which has provided least-cost routing and call detail recording since 1976, will be retired and its functions performed by the System 85.

As convenient and economical as the new telecommunications system will be, the most noticeable potential for change in the University's instructional and research activities will come from the data transmission system which will include:

- A backbone network, made up primarily of optical fiber and coaxial cable lines, which can interconnect at high speeds with Cornell's mainframe computers, departmental mini-computers, and personal computers and will be accessible to any computer user on the campus;
- Small networks in the dormitories through which students with microcomputers in their rooms can take advantage of shared facilities, such as printers and disk storage equipment;
- Links from dormitory to larger campus networks to incorporate a students' microcomputer into the more comprehensive University computing system, which could allow communication by electronic mail and provide access to centralized facilities such as data bases, high-speed laser printers, and modem pools. Furthermore, faculty or students on one side of campus could use the telecommunications system to control a one-of-a-kind computer device in a laboratory on the other side of campus.

AT&T-1S was chosen from 10 vendors that submitted bids for the project. AT&T's System 85 is capable of transmitting both voice and data simultaneously and is compatible with most voice and data equipment in today's marketplace. It is expected to gracefully accommodate technological growth into the 1990's and beyond.

Preparation for this endeavor began several years ago. The Request for Proposal (RFP) was written by Cornell's Department of Telecommunications and mailed on June 30, 1983. In August, a bidders' conference was held to answer questions on the RFP and bids were received on September 30.

Three committees were formed to oversee the selection process: a technical review group, a financial review group and an executive review group. Months of research, site visits, and evaluation culminated in a recommendation this past May to begin contract negotiations with AT&T-1S for the System 85.

In early October, Cornell signed the contracts and the real work began. Site surveys are underway and our department is "bustling with activity" or "dying from the overload," depending on your perspective. Hal Craft, George Gillespie and I are all glad to finally see the work begin...and, undoubtedly, will be glad to see it end.

As if the system installation weren't enough to keep us busy, we are erecting a new building to house our switching center and departmental offices. We're also trying what we think is a novel approach to the survey work and we'll let you know what it is after we prove it works! This shouldn't be thought of as trying to reinvent the wheel, but rather how to get more mileage out of the one we already have.

We look at this as a unique opportunity to improve the telecommunications system as well as the underground plant, the billing systems and campus morale. The next 12-18 months will be busy ones and we'll keep you informed as to our progress.

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NOTE FROM YOUR EDITOR:

The above article "CORNELL UNIVERSITY" was written by ADITA member Patricia Paul - Telecommunications at Cornell University. Pat is certainly excited about the new project and we are pleased she has promised to keep us informed. Thanks Pat for an excellent article--keep them coming!