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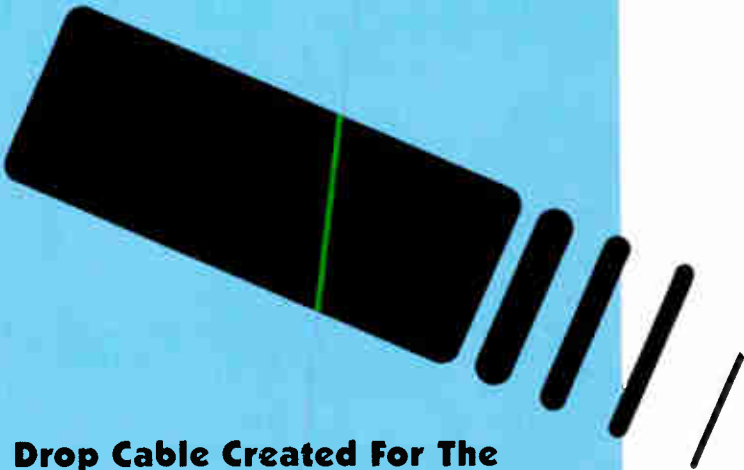
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Circle Reader Service No. 5

Personal Communications Services opens new opportunities 36
 Cable operators and consultants seem to share one common opinion when discussing upcoming PCS services, and that's the notion of partnering up with an established player before venturing in. How does PCS work and what new features will it offer? Those questions are answered by consultant C.R. Baugh and Douglas Reudink of US West NewVector, who have teamed up for this article.

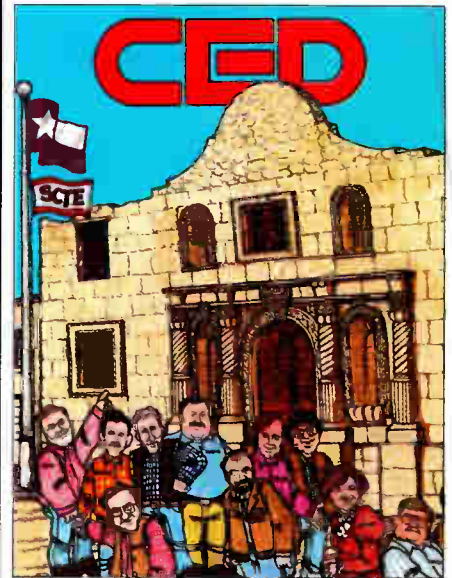
PCS experimental licenses and where they stand today 50
 A healthy smattering of cable operators have stuck their toes into the waters of PCS to check the temperature of that business. What have they found in their FCC licensed tests? *CED's* Leslie Ellis provides a status update on the technical aspects of personal communications services.

Complete National Show technology wrap-up 54
 Last month, industry folks headed to Dallas to check out the latest in cable innovations. *CED's* Roger Brown and Leslie Ellis report on the overall mood at the Show, provide a rundown of new product introductions and technology sessions.

How Cox planned for the future with fiber 85
 Corning's Jon Chester explains how Cox Cable Communications used cost/benefit analysis and a variety of other factors to add fiber to serve its more than 1.7 million subscribers.

Power supplies then and now 90
 Many standby power supplies are generating outputs with wave shapes that are in themselves causing significant picture interference. But there's at least one way to fix the problem. Alpha Technologies' Fred Kaiser and Tom Osterman describe the evolution of cable's power supply business and explain the new developments.

TCI as a technological innovator 99
 Tele-Communications Inc. has never been one to bet on new technologies without being assured there's a low risk factor, but with the giant MSO in the headlines, has that changed? *CED's* Roger Brown analyzes the happenings at the number-one MSO via an in-depth interview of Tom Elliot.



About the Cover:
Recognize these SCTE faces?
Illustration by Rob Pudim.

DEPARTMENTS

Color Bursts 12
 Tech standards, HDTV alliances

Spotlight 18
 Kevin Casey, Continental Cablevision

Frontline..... 20
 Wendell's views on wizardry

From the Headend 22
 Preparing networks for PCS

Capital Currents 24
 U.S. loses at WARC

Fiber Line 26
 Bellcore TR-20 specs

SCTE Product Showcase 55

Ad Index 94

SCTE Focus 102
 Alternate access

What's Ahead 106

Cable Poll..... 108
 Telco entry

In the News 110

Classifieds 115

My View 120
 Tech standards review

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Senior Software Engineer

Pioneer Communications of America

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“Cable” technician or “network” technician?

It's an overused cliché, but the cable television industry is entering a new era. Driven by an unprecedented level of technological change and the convergence of several industries, cable TV from here on out will change in ways only a few would have dreamed of as recently as five years ago.

The addition of optical fiber to what had been all-coaxial, tree-and-branch topologies expanded channel capacity, improved the quality of cable's signals and made two-way interactivity simpler. Video compression promises to provide cable operators with virtually unlimited bandwidth and break the bottleneck that made it uneconomical to offer niche services. Personal communications networks and alternate access pledge to open up vast new revenue streams and perhaps launch CATV into the phone business. Digital television could, among other things, open cable's airwaves to advertisers on a national spot basis. Need I say more?

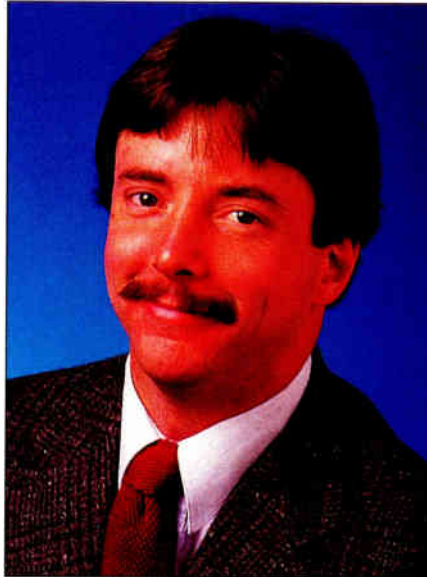
At the same time, cable will be under scrutiny to improve its television pictures to each and every home it serves by boosting the carrier-to-noise ratio it must provide. In addition, voluntary customer service standards are already putting more pressure on engineering departments to keep the network up and running.

These facts, combined with the trend toward a more transactional relationship with cable subscribers, should force a cable system's technical management to rethink the way the staff approaches its tasks. Whereas it was possible during cable's construction phase to get away with hiring marginally competent installers and technicians, the future will demand a more professional approach.

Network maintenance and control could become satisfying careers, not just jobs, for those who dedicate themselves to providing service the way *they* would like it.

As always, self-motivation and continuing education will be paramount to technical personnel who plan to climb ladders within their system and their company. Keeping up with technology will be one of the major challenges of the '90s.

This is where training organizations like local SCTE chapters and meeting groups come into play. Regular, ongoing training in a variety of disciplines—from basic procedures to management tips to emerging technologies—are the cornerstones of a successful SCTE chapter. The smart technologist would be wise to get involved (or *more* involved if he's already a member) with the SCTE at the local level.



Roger J. Brown

Roger Brown
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Editor
Roger Brown
Managing Editor
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600 S. Cherry Street, Suite 400,
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NCTA, cable operators file comments on FCC technical standards for cable

As insiders had expected, the National Cable Television Association and the cities filed with the Federal Communications Commission to clarify and reconsider some points of its Report and Order on cable television technical standards. What seemed to take many by surprise, however, is that they filed *separate* petitions.

The NCTA and the cities—a loose term intended to identify regulatory and association groups including the National Association of Telecommunication Officers and Advisors, the National League of Cities, the U.S. Conference of Mayors, etc.—filed a Joint Agreement on technical standards with the FCC last fall. At the time, it was considered a landmark event that was heralded as a breakthrough in NCTA/city relations, which had often been contentious in the past.

But this time, NCTA and CATA filed a petition for clarification and partial reconsideration and the cities filed a separate petition. While the substance of each group's filing didn't appear to be a source of contention between the two camps, private conversations revealed that feelings at NCTA were clearly hurt by the cities' choice to file separate comments.

All of which came as complete surprise to Susan Hermann, president of NCTOA. "It surprises me greatly," said Hermann. "We have the utmost regard for Wendell Bailey (NCTA vice president of science and technology) and the committee that worked to create the Joint Agreement."

Hermann added that the cities' comments were "probably joint in spirit" but weren't filed that way because they didn't "move off the four corners of the agreement with the NCTA." In fact, Hermann characterized the filing as a request for clarification.

In spite of the political posturing surrounding the process, the FCC has received at least six petitions for reconsideration in the matter, according to John Wong, assistant chief of the FCC's cable TV branch. Petitions were received from Colony Communications, Cablevision Systems, Hughes Aircraft Co., NCTOA and NCTA. In addition, a joint petition was submitted by Intermedia Partners, Sammons Communications, Wometco, Prime Cable and Post-Newsweek Cable.

Wong said most of the technical concerns addressed by the different petitioners were very similar. He refused to comment

on what the petitions would do to the timetable for standards implementation, saying only that the petitions would be put out for public comment.

Specifically, the NCTA petition addressed measurement techniques and locations that were spelled out in the FCC Report and Order. Here are the main points brought up by NCTA:

- Measurements of chroma delay should be made at the headend, not after the signals pass through the cable distribution system;

- NCTA wants to be able to make set-top terminal measurements at the end of a 100-foot drop without having to physically enter a subscriber's home;

- The aural center frequency and rms voltage should not be measured after it passes through a baseband set-top terminal and systems that use heterodyne converters should not have to provide additional information beyond frequency measurements at the headend;

- Visual signal levels should not be tested at the terminal because they have no effect on those levels;

- The frequency response test of set-tops as written would be impossible for all existing addressable converters to meet;

- Hum measurements should be made on just one unmodulated signal at each test location;

- The formula used to calculate the number of test points necessary should be reworked to be more equitable, especially for AML-connected systems.

In addition, the joint petition filed by Intermedia Partners, et al, goes further than the NCTA on some points. The most strenuous is in the area of additional testing. The operators are requesting protection from unreasonable additional testing.

Leading HDTV systems agree to share risk

In what could make the final selection of a North American HDTV standard a simpler, less contentious process, two of the leading contenders have announced an agreement whereby either of the two would share royalties if either of their systems is named the winner.

General Instrument/Massachusetts

Institute of Technology (MIT) and Zenith/AT&T have agreed to share proceeds and work together toward "the best technology for the country."

The two teams represent three of the four all-digital systems being tested by the FCC, which is scheduled to be completed this year. The FCC is slated to select an HDTV broadcast standard in about one year.

Industry observers were quick to point out the merits of such an agreement, noting that the final selection of a standard could come down to a compromise between system costs and technical superiority. Others said that the development increases the likelihood that the FCC will select an American system—something others have said was a foregone conclusion anyway.

Representatives of the teams hastened to point out that the agreement is not a partnership, rather, it's an agreement to reduce and share the risks involved.

Indeed, the word on the street is that the agreement won't affect the FCC testing of each team's system. The GI/MIT and Zenith/AT&T teams are expected to continue to promote the adoption of their respective systems. GI/MIT's "DigiCipher" system has already been tested; the Zenith/AT&T "Digital Spectrum Compatible" system just finished its test; and the MIT/GI "Channel Compatible DigiCipher" will be tested later this year.

That leaves only the Advanced Television Research Consortium and NHK as unaccounted proponents. NHK is considered a long shot because the system is analog. ATRC could be brought into the agreement if it is felt it could deliver the European standard to the group, according to a report in *Multichannel News*.

CableLabs prepares digital data guidelines

As cable operators prepare to embark on their digital and interactive futures, Cable Television Laboratories wants to be sure they don't do it without some guidance. Therefore, CableLabs has launched a program designed to set recommended guidelines for digital transmission of data and other services like program guides, multimedia on both a one-way and interactive basis.

The guidelines will recommend protocol, digital packet structure, bit rate, error

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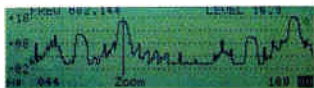
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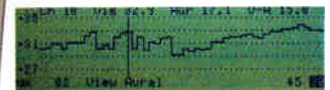
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correction practices and procedures as well as cable transmission parameters such as modulation, bandwidth, channelization and spectral location.

The guidelines will be "evolutionary, not revolutionary," said CableLabs President and CEO Dr. Richard Green. Initially, the guidelines will provide for one-way low bit-rate and narrow bandwidth channels and then will grow to encompass two-way, interactive, high-speed services.

While the details are still somewhat fluid, the plan apparently calls for a 19.2 kilobit-per-second open architecture data delivery channel. Early investigations are pointing to one of two locations for the channel: The 4 MHz of unused spectrum between channels 4 and 5; and the 108 MHz to 117 MHz region. However, getting thousands of cable systems to agree to a single location could be troublesome.

A key early application for the guidelines is the delivery of program guide information. As cable systems grow to 150 channels and more, it will become important that cable operators find simple, unobtrusive methods to inform subscribers what programming is available. Green said he expects to have guidelines for this purpose "very soon."

To help get a real-world spin on the project, CableLabs has contracted with X*Press Information Services and Les Enterprises Videoway to reach "teaming" agreements to jointly research and develop methods to deliver these services via cable.

AT&T offers cable compression

The use of compression to deliver video to cable operators for multichannel pay-per-view and video-on-demand applications has lured AT&T into the market.

During the National Show in Dallas last month, AT&T announced its intention to develop and provide technology and equipment to companies wishing to deliver those services.

The company plans to offer an end-to-end system, according to AT&T spokesman Patricia Stortz. Initially, equipment will be built for the satellite delivery system of signals to cable headends. According to AT&T officials, tests will be conducted before the equipment is made available in 1993. The company is presently exploring partnership opportunities to develop the cable plant portion of the system, including a set-top terminal for decoding and decompressing the video signals.

Galaxy V transponder lineup

TR-1	The Disney Channel (East)
TR-3	Trinity Broadcasting Network
TR-4	Sci-Fi Channel
TR-5	CNN
TR-6	Superstation TBS
TR-7	WGN-TV
TR-8	HBO (West)
TR-9	ESPN (Primary)
TR-10	BSI tba
TR-11	The Family Channel (East)
TR-12	The Monitor Channel
TR-13	CNBC
TR-14	ESRN
TR-15	HBO (East)
TR-16	Cinemas (West)
TR-17	TNT
TR-18	The Nashville Network
TR-19	USA Network (East)
TR-20	Black Entertainment Television
TR-21	Mind Extension University
TR-22	Headline News
TR-23	Arts & Entertainment
TR-24	Viacom tba

Already AT&T has teamed with ComStream Corp. and News Datacom to transmit compressed signals to the headend as well as provide encryption of the programming and process customer program requests. The News Datacom security system features "smart card" technology to prevent signal theft.

AT&T plans to utilize a compression algorithm based on the one that is the cornerstone of the Zenith/AT&T HDTV proposal currently sitting before the FCC.

The technology allows between four and 18 programs to be compressed into a single satellite transponder and between three and 13 channels into a single 6-MHz cable channel.

Galaxy I transponder lineup

TR-1	Comedy Central (East)
TR-5	Showtime (East)
TR-6	Univision*
TR-8	Cartoon Network*
TR-10	The Movie Channel (East)
TR-11	E!/TVN*
TR-13	Country Music Television
TR-14	The Movie Channel (West)
TR-15	WWOR-TV
TR-16	Showtime (West)
TR-17	New Inspirational Network*
TR-19	Cinemas (East)
TR-20	Galavision
TR-21	USA Network (West)*
TR-22	Discovery Network
TR-23	HBO (East)
TR-24	The Disney Channel (West)

* Will begin transmissions from Galaxy I in late 1992.

Galaxy V begins service

If you don't know this already, you're in trouble. But just to make sure you're up to speed on the ever-changing satellite orbital arc, you should be aware that Hughes has retired the old C-band Westar V satellite and inaugurated service on its new Galaxy V, which permanently replaces the last of the Westar retirees. Galaxy V now sits at 125 degrees west longitude.

Cable operators need to stay in close contact with major programmers over the next few weeks and months to stay abreast of dual-feeding plans and potential last-minute transponder changes.

Galaxy V and Galaxy I, located at 133 degrees west longitude, represent Hughes' flagship cable birds.

(See table for transponder lineup for both satellites.)

TV Answer completes hub site

In the interactive TV department, TV Answer announced that it has completed a \$2.1 million satellite hub site at its corporate headquarters in suburban Washington, D.C.

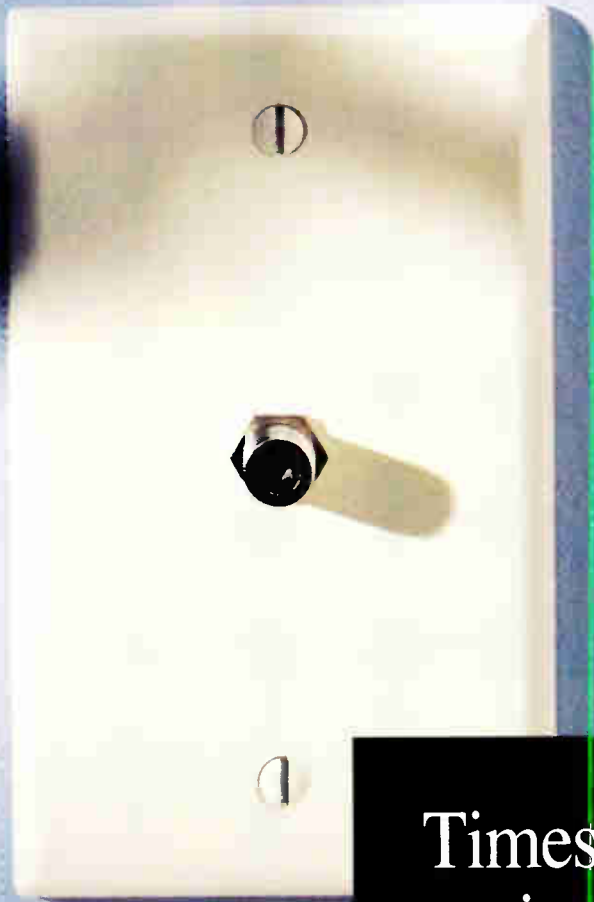
The facility will serve as the central collection point of the company's national transmission system. It will be able to collect, process and transmit information between product and service providers and the local cell sites that will serve urban areas.

The complex includes a 6.1-meter satellite antenna, RF terminal equipment containing high power amps, upconverters, downconverters and an uplink power control system. This equipment is connected to the Network Control Center, which contains baseband and IF equipment, VAX minicomputer, Hughes IllumiNET console and system and event printers.

The hub site is critical to TV Answer because it will receive all information and orders from consumers and then route it to a national switching center for registration. In turn, the data will be then rerouted to the hub site for distribution to order fulfillment houses and/or consumers.

TV Answer intends to be a major player in interactive television as it relates to the FCC's Interactive Video and Data Services ruling. The FCC is expected to begin issuing licenses for interactive services later this year. **CEC**

By Roger Brown



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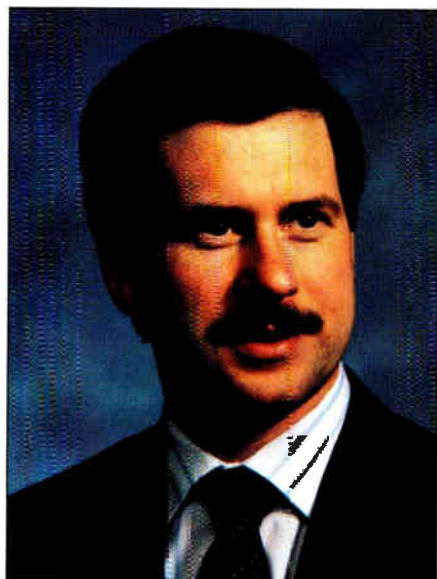
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Kevin Casey

Cop turned to cable

Kevin Casey went to school to study law enforcement. Now, he's the director of engineering for Continental Cablevision's New England region. How in the heck did *that* transition happen? "It was kind of by accident," Casey says. "The best way I can describe it is, when I got out of school, the only policing opportunities out there were either in Texas or New York City. I'm not a cowboy, and I'm not an idiot, either," he says with a slightly camouflaged Big Apple accent.

Casey says he got into cable TV by chance. "My family comes from a telco background, and at that time, cable was really going through its infancy. I happened to get what was, in my mind, a temporary job with Cablevision Systems. I was doing construction work in Long Island." He's been in the industry ever since, and recently completed his second degree from Vermont's Hesser College in business science and electronic technology.

In late 1984, Casey left Cablevision for Continental's Reading, Mass. system, where he filled the post of outside plant manager. He's been there ever since. "I chose to join Continental because I thought it offered more career growth," Casey says.

It certainly did. Within a year, he was promoted to district manager for eastern Massachusetts, where he was responsible for engineering, construction and design of all the systems in

that area.

In January of 1990, Casey was promoted to his current role. "My real responsibility is for strategic planning and technical oversight of all our region's technical operations. Also, I'm involved in new business development."

New focus needed

As a strategic thinker for Continental, Casey has some firm beliefs about the future of cable television. "We can't lose sight of what's ahead," Casey emphasizes, "and we definitely can't look at this business as we did even two years ago.

"Cable is a very dynamic business. Being competitive is the missing element we've had. We've always been focused on growth and the build, build, build philosophy. Now that the very high growth stage is behind us, with respect to core business, we have to get focused on developing new businesses. That means a fundamental change in how we look at the business."

Casey says that change of focus is one of the biggest challenges facing the industry. "We've got a network with incredible capability, and how we manage that network to get into other businesses—that's important."

Along those lines, Casey says there are still a lot of unanswered questions, including how to prepare cable's networks for a broad array of communications services including video, voice and data. "There are markets out there that we've never focused on that we have the capability to serve. Now we just need that focus," Casey emphasizes.

Currently, Casey's project load includes "intimate involvement" with network development, so as to incorporate video-on-demand and voice services through a cable TV network. "That means factoring not just the technical issues, but the many external forces at work that are going to impact our strategy," Casey explains. "All of these factors have to be considered in the development of a long-term strategy. And, quite frankly, that's a large task."

On the technical end of that project, Casey says he is doing some modelling to determine how to deliver VOD services to Continental's subscribers. Specifically, the models aim to answer questions like how to match serving area size with bandwidth, how to "ride that same network" to deliver other services that aren't core cable TV, and how to determine the financial and technical impact of providing two-way plant and

status monitoring.

"Simply expending capital for impulse transactions on PPV does not pay for itself," Casey says. "It has to have other services that you offer to support that investment. That's part of what we're trying to identify."

Alternate access is another area that Casey says he is studying closely. "That's yet another element and part of the consideration process for the network evolution. How do you exploit an infrastructure that clearly looks at core business opportunities and secondly, at opportunities? It's important to me to bring these two together, so that as new businesses identify themselves and become viable for us, the investments also become incremental in the network—rather than having to duplicate the investment to provide some sprig-board type of business," Casey says.

Casey favors an FTF fiber or all fiber-trunking network because "in a broad sense, it's the ideal architecture. You have this huge optical pipe that you can develop new businesses with." Casey's vision is a fully integrated network with all reception facilities connected. "We're probably seven to 10 years away from a fully integrated network," he muses, "but it's a viable goal because of all the new business opportunities."

A return to sports

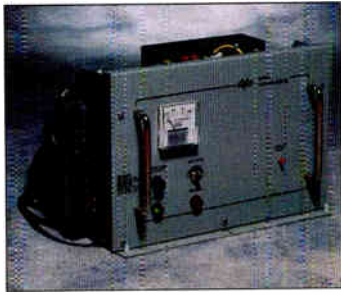
On a personal level, Casey says that the recent completion of his second degree has finally enabled him to even think about his free-time passions, which include woodworking and sports of all kinds: running, basketball, football and baseball. Casey is quick to point out that these are participatory interests, although he says he's an avid sports viewer, as well.

Aside from that, Casey and his wife, Tracy, have three daughters, ages three, six and nine. "They're great kids—and they really keep us busy," Casey laughs.

In talking to Kevin Casey, one thing rises above everything else, and that's his commitment and enthusiasm for cable TV. "I'm bullish about it," he says. "This industry has done a damn good job when you think about what we've accomplished in a short time. We've wired America. And we've done it cost-effectively. From a capacity standpoint, our plant beats any media that's out there—by far."

Those are definitely not the words of an idiot. **CE**

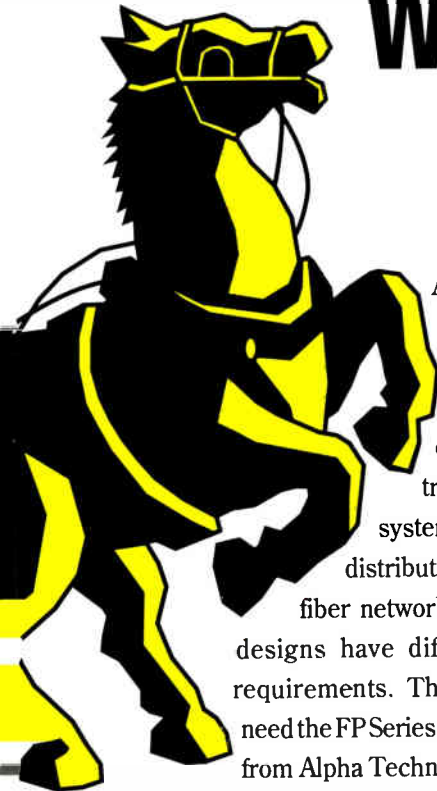
By Leslie Ellis



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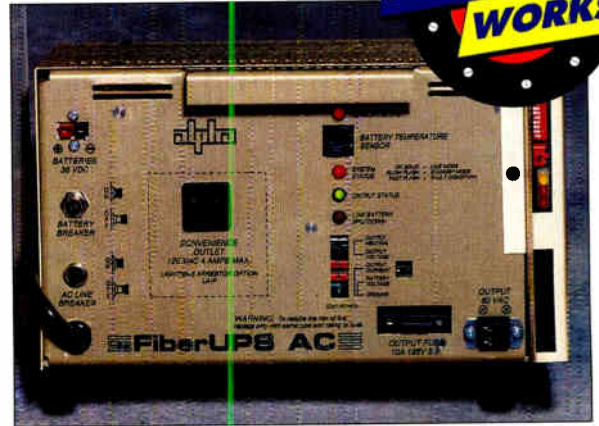
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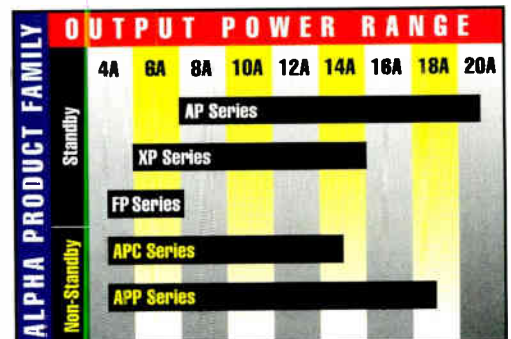
The FP provides uninterrupted AC or DC power with all the important advantages of the workhorse AP Series—reliable single ferro transformer design, regulated output and built-in line conditioning. The AC version provides high efficiency performance in the 4 to 7 Amp range, while the DC Power module allows direct powering at the 7th Port—another innovation introduced by Alpha.

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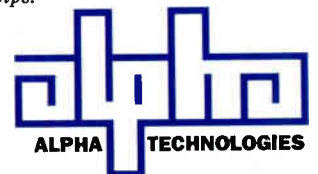


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Cable's techno-playground

In both my mental fantasies and in my actual job I play in a wonderful playground. I am philosophically oriented towards technowizardry (as are most of my friends and colleagues) and, in my secret thoughts and dreams I wish that magic were real. In some ways, the work that engineers and technicians do every day is indistinguishable from magic—"any sufficiently advanced technology is indistinguishable from magic," as Arthur C. Clarke once said.

But of course, the actual effort needed to use and benefit from today's technology—technology that we have helped to develop and made available to the world—is neither easy nor simple. Surely, the practitioners of that particular craft would never mistake either the effort or the results for that more ethereal substance.

Show pizzazz

One only had to walk the exhibit floor of the most recent National Cable Show in Dallas to see a sufficient amount of technology that would have, as few as two years ago, seemed like wizardry of the most wondrous kind. There were no less than six companies showing some form of digital compression. There were 16"x9" television sets in all corners of the exhibit area. There were switches for switching video, boxes for receiving audio and new bangles to sell on shopping shows.

By Wendell Bailey, Vice President, Science and Technology, NCTA

In fact, there were stories and miracles everywhere. Some things, interestingly, are no longer stories. The magic that was new advances in fiber and fiber optic electronics just three years ago is so mundane and normal in terms of benefit versus economics today, no one even comments on it.

Instead, there were vendors hawking their wares, and the fact that each was adding bells and whistles as refinements to the products they sell is a sure sign that technology is at least mature enough to be an everyday tool—and possibly is rapidly becoming a commodity-type substance.

Even the theme of the opening session (including the lecture given by James P. Mooney, president of NCTA) only partially dwelled on politics and legislation. The words that caused most chests to swell and smiles to spread were those about today's cable technologies. Specifically, the grins erupted during discussions of cable's ever-developing new relationships with high-tech firms in other industries, which will bolster our already solid and longlasting relationship with more traditional vendors.

Indeed, everywhere you looked there

The magic that was
new advances in fiber
and optical electronics
just three years ago is
normal and mundane
today.

were signs of joint ventures in technology to improve the lot of the cable television industry in the ongoing telecommunications explosion. As delighted as I was to see all of this on the exhibit floor and to hear debate and lectures on these subjects at the well-attended technical sessions, we all have to be reminded that this technology and these techniques must be deployed in a way that yields the maximum cost benefit ratio to our subscribers and profitable business relationships for us.

The mood at the exhibits and at the tech-

nical sessions was so upbeat that one has to believe that the industry has turned a corner towards improved relations with our customers and between our operators and our equipment suppliers.

But, let us not forget that the very thing that has brought the wrath of Congress down on our industry is the unhappiness of a segment of our customer base. That segment has not been impressed by the amazing feats and near magical capability that we bring to their door. They want to know how to record one program while watching another, and how to read the mysterious words on their monthly cable bill.

International confluence

The number of foreign visitors who were there to kick tires and look at equipment, and more importantly, to talk in depth to cable engineers and operations managers, was most impressive. We, as an industry, can teach those from other parts of the world many lessons about multichannel video delivery.

The first lesson we can teach them is that cable is a good business. We can also teach them that the technology we have developed helps bring programming choices that do more than just entertain. Those programming choices also educate, inform and in many ways, help to change the world.

I am sure that to many of the people from other lands who were in Dallas last month, a lot of the technology that they saw did indeed look like magic. The simple fact that things change so rapidly from year to year as the industry moves ahead must be daunting to some who are just starting this type of business in their areas.

U.S. still learning

Because of that trepidation, we must be sure to teach our international cable contacts that we are trying very hard to learn ourselves. We need to learn that customer relations, in the form of better customer service and more consumer-friendly techniques, can undo everything that our technology is capable of, if poorly done.

There are no cheers or joy when an industry is unloved by its customers. There is no magic and no wizardry to amaze and delight when the day-to-day grind is just to survive.

If we use the magic of our people and the power of the tools that our vendors have made for us, we can show our visitors from overseas what real wizards can do. **CED**

Optical Network

The following highlights are from
Optical Networks International's
quarterly newsletter.

News

■ YAGLink outperforms initial tests

The use of externally modulated transmitters has taken a step forward with the first system activation of a Harmonic Lightwaves' YAGLink by Suburban Cable in East Orange, New Jersey. Boasting field performance of 54dB C/N and 70dB CSO/CTB over 12dB optical loss, the YAGLink has proved in as a significant tool for driving fiber deeper into the cable plant.
(See related story in the Summer issue of ONN.)

■ AT&T debuts NTSC compression system

AT&T's new end-to-end NTSC digital compression technology enables system operators to expand channel capacity by 3-13 times. Introduced at the NCTA show in May, the technology is based on the algorithm AT&T developed for HDTV, and has far-reaching implications for the cable industry.
(See related story in the Summer issue of ONN.)

■ Multimedia coming of age

Multimedia technology offers graphics, data, stationary and moving video, and audio, all on a single computer. What exactly is this technology and what does it mean for cable television? As digital compression advances bring more capacity to cable networks, applications for multimedia could lead to exciting new possibilities for cable.
(See related story in the Summer issue of ONN.)

■ ADSL technology—new hope for twisted pair?

The cable television infrastructure is viewed by many as the key to cable's advantage in providing future services. However, a new technology, asymmetrical digital subscriber line, could allow the telcos to provide video on twisted pair copper wire, and enable them to carry video entertainment services. What does this mean for the cable industry? Will ADSL really equip telcos to compete on their existing networks?
(See related story in the Summer issue of ONN.)

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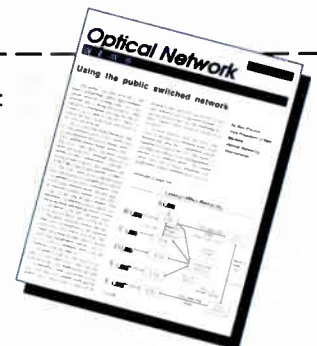
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Architectural considerations for PCN

The promise of the Personal Communications System (PCS) is one possible revenue stream that must be seriously considered. These extremely small, low-power, lightweight, "beam me up Scottie" portable telecommunications systems of the future will offer the user unmatched portability and convenience in a device smaller than the palm of your hand.

But in order for us as an industry to share in any potential revenue associated with this future technology, either as a conduit for the service, or as the actual service provider, we must create a network infrastructure and architecture that is conducive to its growth. In short, we must ensure that as we continue to migrate toward deployment of fiber closer and closer to the home, we need to give strategic consideration as to how best to deploy this fiber in order to create the most optimum personal communications network (PCN) infrastructure possible.

Two migration paths

As I see it, there are really two migration paths that are possible in the deployment of personal communications services, and if we play our cards correctly, we as

By Chris Bowick, Group Vice President/Technology, Jones Intercable

an industry should be able to play in the game, no matter what path the migration takes. The first possibility is a simple migration by the current cellular telephone operators to smaller and smaller cells, called micro- or pico-cells.

This evolution could be made possible by improvements and refinements in both the technology itself (migration from analog to digital), the software and database infrastructure, and in the cost and size of the existing cellular technology vs. time, thus allowing the cellular operator to deploy electronics for each micro- and pico-cell, and allowing the individual to purchase smaller and smaller handhelds that are capable of working within these small cell sizes.

Another possibility is the development of a completely new infrastructure, from the ground up, and in competition with existing cellular operators. I happen to believe that the former is most likely, but in any event, the CATV operator who has prepared for this eventuality in the deployment of his networks, will likely be able to play no matter how it unfolds.

This is because as we examine the many network considerations for the development of PCS, we see a striking similarity to the needs and requirements for many of the other services the industry is examining, including the network requirements for the eventuality of video on demand, education on demand, and demographic segmentation for ad insertion and targeted programming.

All of these services point toward a fiber-to-the-service-area (FSA), or fiber-to-the-feeder (FTF) type of architecture in which small "islands" of consumers can be isolated with their very own fiber optic node. While these islands might consist of something less than 2,000 homes passed today, with PCS, and the resulting cell-radius of something on the order of less than a half-mile, it will be necessary to deploy enough fiber so that we might eventually be able to migrate toward fiber nodes that service fewer than 200 homes (depending, of course, on density), as the market for such services warrants.

Eventually, we will need to interface with the PCS infrastructure of adjoining MSOs, so that a PCS customer in our franchise can call another PCS customer in an adjoining MSO's franchise without having to go through the local exchange (when regulatory barriers fall), or so that he or she may wander (walk) from cell to cell without worrying about having to remain within a specific MSO's franchise area.

This will require serious cooperation and network planning among the MSO ranks. It may also require that at some location in our network infrastructure, we will need to find a place for some expensive switching equipment and/or switch databases. The fact that such switching facilities tend to be very expensive should cause us to consider the possibility of regional headend interconnects in which a "super-headend" is interconnected with other headends via a redundant, self-healing fiber ring.

This same super-headend facility could also house other expensive shared-resource items such as mass digital library storage of movies and educational material for video or education-on-demand.

Reliability will be key

The reliability of our networks will become paramount, as we move away from our traditional carriage of video entertainment, to the transport of data, or what could be safety-of-life communications through the PCS environment. Therefore, the deployment of devices which will help us better understand the performance of our networks, and help us anticipate rather than react to outages will be critical.

This "network telemetry and control" equipment will also be necessary in order to replace our customers as the primary outage reporting mechanism, and as I wrote in last month's column on competitive access, in order to convince our potential new customers such as AT&T that we are serious about their business.

Like the business of competitive access, PCS will also require that we deploy fiber differently than we have in the past. Access to telco central offices (COs) and long distance carrier points of presence (POPs) will be important, as will access to major public areas where people tend to congregate—such as malls, major airports, and sports complexes.

So as we begin to roll-out our future networks in anticipation of future technologies, PCS should be given some consideration. Consider an FSA/FTF structure that can eventually migrate to fiber nodes serving less than a half-mile radius. Consider the possibility of future "super-headend" fiber interconnects with adjoining MSOs, and consider access to major public areas as a distinct possibility.

No matter the migration path, if we have reliable, monitored networks in place to facilitate growth, we can certainly play a key role in the development of PCS. **CED**

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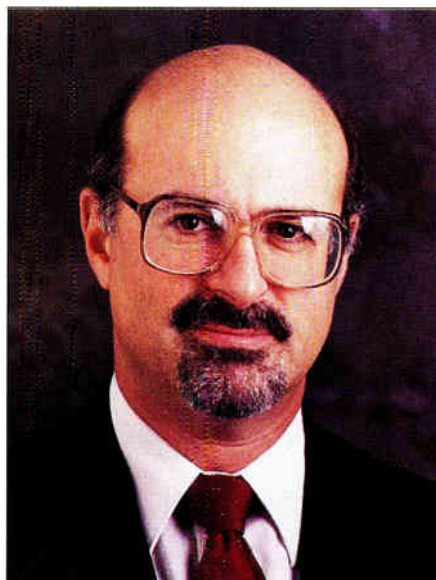
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The 1992 WARC: A major failure

The details of the 1992 World Administrative Radio Conference are now becoming available, and it is evident that the conference was a significant failure for the United States. It dealt with spectrum for four major new services—digital audio broadcasting, mobile satellite services, HDTV and personal communications services—and U.S. negotiators achieved their goals only with respect to mobile satellite services.

What is a WARC?

The radio spectrum is administered internationally by the International Consultative Committee on Radio (CCIR), which is an international treaty organization headquartered in Switzerland. The CCIR periodically convenes a meeting of all the countries in the world to revise the table of radio allocations.

From the United States' perspective, the four important new services on the WARC agenda were:

- digital audio broadcasting, both satellite and terrestrial;
- mobile satellite services, both geostationary and low earth orbit;
- HDTV; and
- personal mobile communications

By Jeffrey Krauss, an independent telecommunications policy consultant and President of Telecommunications and Technology Policy of Rockville, Md.

services.

While most countries favored additional spectrum for each of these services, the U.S. stood alone on the specific frequencies it wanted because the U.S. was trying to protect other existing services from losing spectrum.

Digital audio broadcasting

The original proposal for a new satellite digital audio broadcasting service, both in Europe and North America, was to allocate spectrum around 1500 MHz. A big battle ensued in the U.S. between DAB proponents and the aerospace/defense industry, because 1500 MHz is used to carry telemetry for flight testing of military aircraft and missiles in the U.S. The Defense Department won this battle; the U.S. position at the WARC was to preserve 1500 MHz for telemetry and use 2300 MHz for broadcasting.

At the WARC, the U.S. lost heavily. Even Canada and Mexico sided with the Europeans. The result is that in all of the world except the U.S. (and India, for some unknown reason), 1500 MHz will be used for DAB. In the U.S. and India, 2300 MHz will be used for DAB.

U.S. telemetry users will have to give up a big chunk of their 1500 MHz spectrum so Canada and Mexico can use it for DAB. The U.S. public will be saddled with an inferior 2300-MHz service, if DAB is feasible at all at this frequency.

Mobile satellite services and PCS

In the frequency range around 2 GHz, there was a fight between mobile satellite services and personal mobile communications services for spectrum. The Europeans tried to obtain an exclusive designation of as much spectrum as possible for Future Public Land Mobile Telecommunications Service (FPLMTS), which covers both vehicular and non-vehicular personal communications such as PCS.

The U.S. position opposed any *exclusive* allocation for PCS, saying that the spectrum around 2 GHz is already allocated for both mobile and fixed operation, and each country could make its own decision on whether to use that spectrum for PCS.

In addition to opposing an exclusive allocation for PCS, the U.S. tried to get an allocation for land mobile satellite use for that same spectrum around 2 GHz. This was to support the efforts of Motorola Iridium and the other U.S. land mobile satellite applicants. These non-geostationary satellite systems are de-

signed to cover virtually the entire earth, but the frequencies they need are not allowed for satellite use in most of the world. As it happens, these frequencies overlap to some extent the frequencies proposed for PCS.

The U.S. achieved a worldwide allocation of spectrum around 2 GHz that can be used for mobile satellite communications, but this will not be implemented until the year 2005. Some of this spectrum includes the 1990 MHz to 2110 MHz band, which is undesirable because it is heavily used in the United States by broadcasters for electronic news gathering.

Meanwhile, the WARC agreed to identify the 1885 MHz to 2200 MHz range for FLMPPTS/PCS. This partially tracks the recent FCC proposal to clear the fixed point-to-point microwave users out of the 1850 MHz to 1990 MHz and 2110 MHz to 2200 MHz bands to free U.S. spectrum for PCS.

HDTV

While the U.S. is going forward with a terrestrial HDTV broadcasting service, the rest of the world still thinks of HDTV as a satellite broadcasting service. The 1992 WARC agenda included a proposal to allocate additional satellite spectrum for this service at 21.4 GHz to 22.0 GHz. This band is used for point-to-point microwave in the U.S., and the U.S. opposed this allocation. The U.S. position was that the 12-GHz direct broadcast satellite allocation is adequate for HDTV, because of digital video compression. There is no need for an additional allocation of spectrum.

A "compromise" on this item resulted in a satellite HDTV allocation for 21.4 GHz to 22.0 GHz in Europe, Africa, Asia and Australia, while 17.3 GHz to 17.8 GHz will be allocated for satellite HDTV in North and South America. These new allocations do not go into effect until April 1, 2007. Hughes Communications and Hubbard Broadcasting plan to begin their DBS operations on 12 GHz in a few years, and they will undoubtedly offer HDTV.

The 1992 WARC was largely a case of the U.S. vs. Europe, and we certainly didn't win much. Additional battles can be expected, as the FCC starts to make U.S. decisions to divide up the spectrum at 1.5-, 2.0- and 2.3-GHz for PCS, DAB and land mobile satellite services. Telemetry users will continue to fight against DAB at 1.5 GHz, and PCS, mobile satellite and fixed microwave users will fight each other for the valuable 2 GHz spectrum. **CEC**

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Performance of fiber optic cables in AM CATV systems

Because fiber optics has quickly become an accepted technology in AM CATV applications, the understanding of many component specifications and their impact on system performance has lagged behind. This paper examines current fiber optic cable specifications and how cable made to these specifications can affect the performance of AM fiber optic CATV systems in the field.

It is shown that many of the currently applied telephony specifications are suitable for CATV applications. But some specifications, in particular temperature performances, should be re-examined in order to meet the needs of the CATV AM video marketplace.

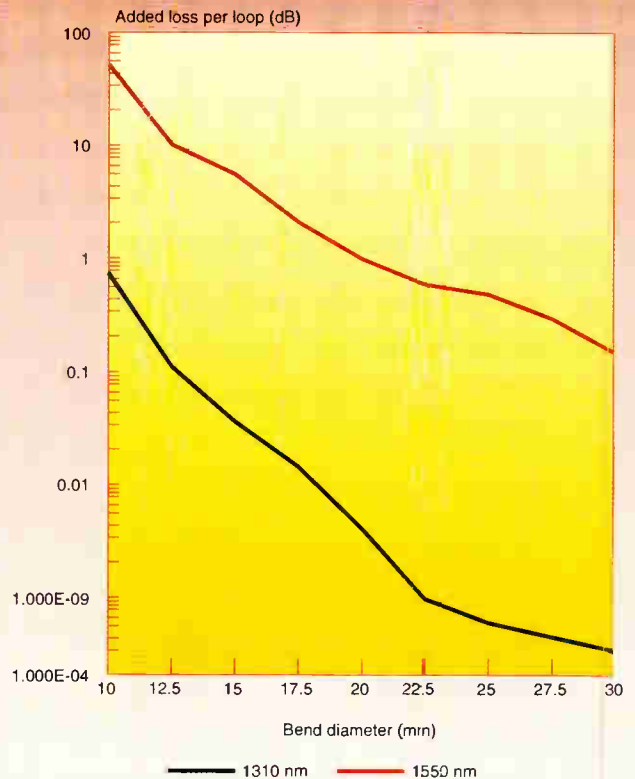
Fiber cable specifications

The most comprehensive and critical specification is Bellcore's TR-TSY-000020, or for short, TR-20¹. This paper investigates how those specifications apply to AM CATV systems.

TR-20 cable specifications are summarized in Table 1. As shown in the summary, the attenuation measurements for the mechanical tests are all performed at 1550 nm. This is because

the fiber is more sensitive to increases in attenuation at 1550 nm than at 1310 nm^{2,3}. The bends that most likely occur during mechanical testing are referred to as macrobends. Macrobends range in size from 5 millimeters to 30 millimeters. Macrobends affect the longer wavelengths in fiber transmission before they affect the shorter wavelengths. The smaller the diameter of the macrobend, the shorter the wavelength that the macrobend affects. But as shown in Figure 1, the effect on 1550 nm is apparent at far larger bend radii than at 1310 nm. When macrobends are the cause of attenuation increases, the effect is dramatic due to the severe slope of the loss curve. For this reason, all systems should be proved

Fiber macrobending (1310 and 1550 nm)



Estimated from previous data reported

Figure 1

into the field at 1550 nm as well as 1310 nm as an operating wavelength.

Sandbox test

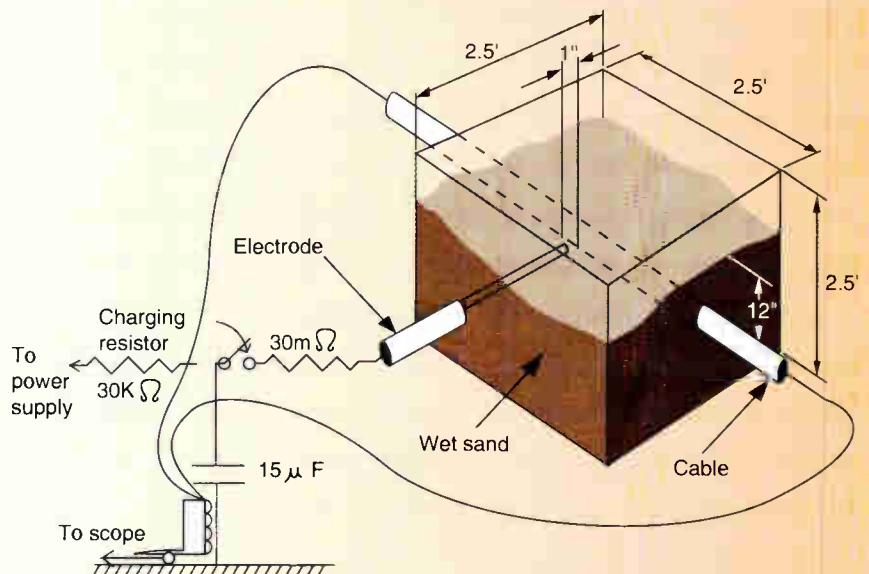
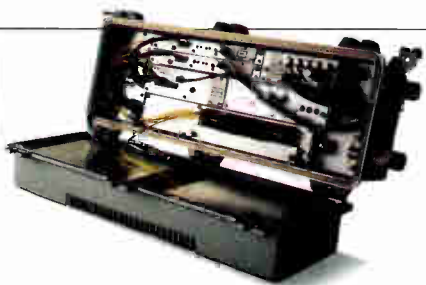


Figure 2a

By John C. Chamberlain,
Comm/Scope Inc. From the 1992
NCTA Technical Papers.

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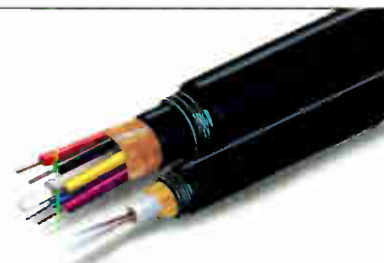
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Modified sandbox test

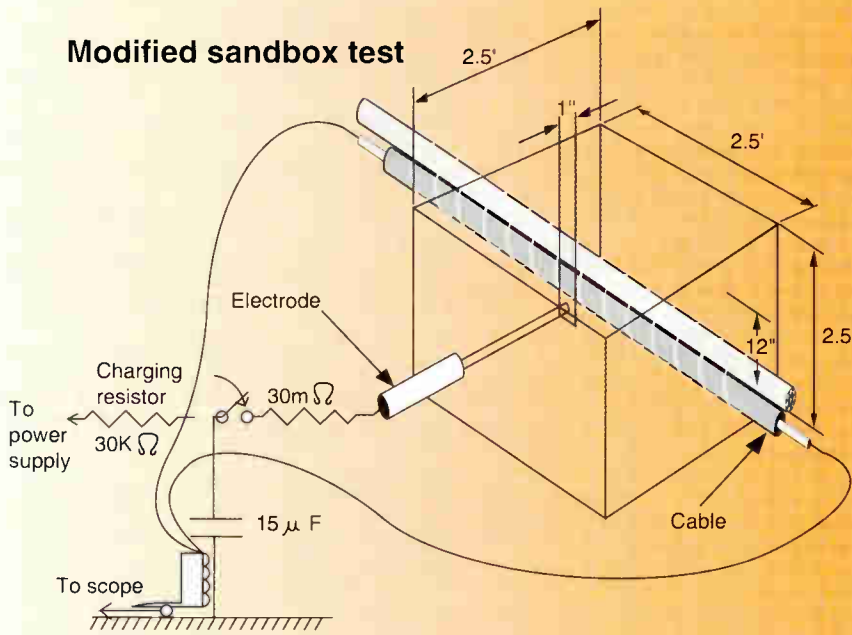


Figure 2b

Potential problems with the long-term stability of a system may not show up in a 1310-nm check-out, but would if the system was checked at 1550 nm.

Mechanical testing

The mechanical tests consist of impact, crush, twist, flex and ice crush, among others. Attenuation is monitored before, during and after the tests. The level of acceptance is 0.1 dB allowable increase in attenuation on each fiber. In general, little or no attenuation increases at 1550 nm are experienced due to these tests; therefore as per the above discussion, 1310 nm operation is not affected at all.

If a field problem subjected a cable to conditions similar to these mechanical tests, a resulting 0.1 dB increase in the fiber attenuation would result in a decrease in the carrier-to-noise ratio (CNR) of 0.1 dB. Because the majority of the noise in an AM fiber optic is created in the transmitter and receiver, CNR varies inversely proportional with increases in attenuation of the passive part of the plant. Therefore, for every 1 dB increase in attenuation in the fiber, the CNR is decreased by 1 dB. In the case of the mechanical tests, a 0.1 dB increase, which, as discussed above is rarely seen, would result in a 0.1 dB decrease in CNR. Distortions are essentially unaffected by an unpolarized, passive increase in system attenuation.

The conclusion is that the performance levels for the mechanical tests in TR-20 are adequate for AM systems as well. Although some consideration

should be given to mechanical tests that are more applicable to an aerial plant. Most of the mechanical tests specified in TR-20 are applicable to buried applications, where the majority of telephony fiber optic cable is installed.

There are no lightning or rodent testing requirements that fiber optic cable must pass in order to meet TR-20 specifications. Although a lightning test must be completed and the results reported, no minimum level is required. The results are reported by rating the cable as passing the test at certain amperage levels^{1,3,6}. As shown in Table 2, the highest TR-20 rating accounts statistically for 95 percent of all lightning strikes in the United States. Based on this information, an all-dielectric fiber optic cable might be preferred in prominent lightning areas. But, before rash conclusions are made, the test procedure should be examined in closer detail.

The test is designed to simulate not only the amperage of the lightning hit, but also the hammer effect of a lightning hit in an underground application. As shown in Figure 2a, the cable is buried in wet sand before the simulated lightning hit is dis-

charged. The question is: How applicable is this information to aerial applications of fiber optic cable?

A modification of the sandbox test has been proposed for aerial applications⁷. The test set-up is the same, except that there is no sand in the box and the cable is lashed to strand (see Figure 2b). All the metallic members in the cable, as well as the strand, are grounded to complete the circuit. Testing under these conditions shows that the strand takes the majority of the hit (see Table 3). Therefore, contrary to some claims, the construction of the cable is of diminished importance to lightning susceptibility in aerial fiber optic cable installations.

On the other hand, the construction is important to lending rodent protection to the cable. The degree of rodent protection a cable has is measured at the Denver Wildlife Center with the assistance of gophers. Gophers are used because of the large amount of damage done to buried telecommunications cable by gophers every year. Although a squirrel test might be more applicable to this industry, no such test exists to date. The results of the gopher rodent testing show that a gopher will chew through a non-armored cable during the seven-day test, but will not penetrate the steel in an armored product within the same seven-day period⁸.

In summary, the choice of construction of fiber optic cable should be made with rodent resistance as the determining factor, with less emphasis on lightning resistance.

The temperature performance specifications for fiber optic cable as per TR-20 (see Table 1) allow an increase in attenuation as high as 0.2 dB/kilometer across the operating temperature range

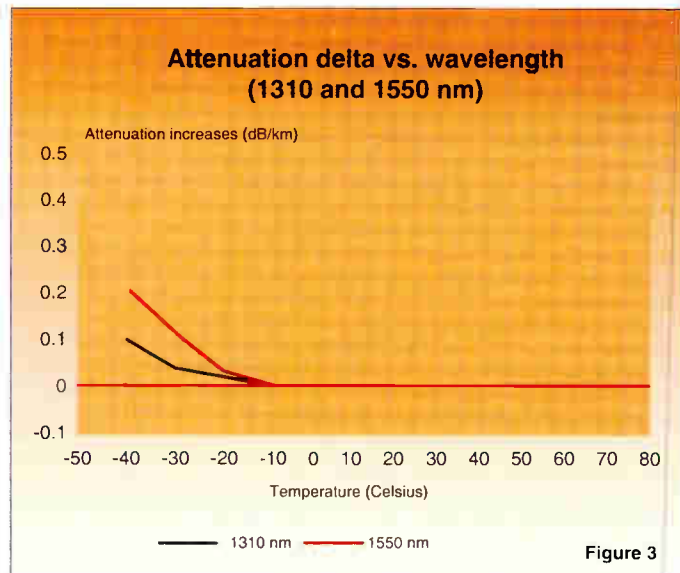


Figure 3

Mechanical & environmental tests

Test	EIA-455 Specification	Mechanical Requirement	Optical Requirement
Tensile	FOTP-33A	600 lbs.	<.1 dB @ 1550 nm
Compression	FOTP-41	1000 lbs.	<.1 dB @ 1550 nm
Twist	FOTP-85	10 cycles	<.1 dB @ 1550 nm
Low Temp. Bend	FOTP-37	4 wraps @ -30 C	<.1 dB @ 1550 nm
Cyclic Flex	FOTP-104	15X cable O. D.	<.1 dB @ 1550 nm
Impact	FOTP-125	25 cycles	<.1 dB @ 1550 nm
Ice Crush	FOTP-98	24 hours @ -2 C	<.1 dB @ 1550 nm
Temperature Cycle	TR-20	-40 to +70 C	100% < 0.2 dB/km 80% < 0.1 dB/km

Table 1

of -40 degrees to +70 degrees Celsius. The reality of the situation is very close to the specification^{14,15,16}. Increases in attenuation are sporadic and non-linear. The specification reflects the inconsistency of the situation. One hundred percent of the fibers must have attenuation increases less than 0.2 dB/km and 80 percent must increase less than 0.1 dB/km. The attenuation increases occur at the low end of the operating temperature range (see Figure 3). Attenuation increases typically begin occurring around -20 Celsius (approximately -4 Fahrenheit). The increase is not the same on all fibers in a cable and also is not linear with respect to temperature. Some fibers may see the full 0.2 dB/km increase at -40 and other fibers in the same cable may see no measurable increase in attenuation.

This temperature-dependent increase in attenuation is due to fiber macrobends discussed earlier. The fiber collapses into these macrobends at low temperatures as the plastics in the cable shrink. The distribution of excess fiber in the tubes is such that the induced bend diameter of the fiber varies at low temperatures.

As shown in Figure 1, the diameter of the macrobend does not have to decrease much in order to show a large effect on the attenuation of the cable. The effect, because it is a macrobend effect, degrades attenuation at 1550 nm before 1310 nm.

The potential effect on AM system performance due to the allowable attenuation increase, per TR-20, is shown in Figure 4^{9,10,11,12}. A 0.2 dB/km increase in attenuation in the fiber corresponds to an identical decrease in CNR at the output of the optical receiver. That means for a 20 km run (12.4 miles), if the fiber were to increase in attenuation the allowable 0.2 dB/km, the net attenuation increase would be 4 dB and would decrease an original CNR at the optical receiver of 54 dB to 50 dB. For lower attenuation increases, there would be a correspondingly smaller change in CNR.

Although these changes are seen at

1550 nm before 1310 nm, this allowable increase in attenuation may not be acceptable for some AM system performance criteria. If the performance specification for the fiber optic cable were cut in half (100 percent less than 0.1 dB and

90 percent less than 0.05), the "proposed specification" curve for AM video fiber optic cable performance shown in Figure 4 would result.

CSO in AM fiber systems

Chromatic dispersion is a general term describing the phenomena associated with pulse broadening of an optical signal in a singlemode fiber. Generally, chromatic dispersion can be broken

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down into two dispersion mechanisms: material dispersion and waveguide dispersion.

Material dispersion is a function of the chemistry used in the manufacture of optical fibers and waveguide dispersion is a function of the index profile of the fiber. They are both types of chromatic dispersion because both spread the optical signal due to the finite spectral width of the optical source. This means different "colors" of light pro-

duced by any real optical source travel and different speeds, creating a signal dispersion effect.

This dispersion effect in the fiber, combined with phenomena known as laser chirp, create a frequency modulating effect in AM fiber optic systems that manifests itself as CSO. This is the reason that CSO, not CTB, is the limiting factor in AM fiber systems.

Laser chirp is defined as the phenomena of the laser optical output wave-

length changing linearly with the AM modulating signal input into the laser. This is why essentially no chirp is experienced in externally modulated lasers.

The telephony specifications for singlemode fiber dispersion can also be referenced when purchasing fiber for AM transmission. Standard singlemode fiber has its zero dispersion point centered around 1310 nm. The dispersion at 1550 nm in a standard singlemode fiber is substantially higher (maximum 18 ps/nm-km). Therefore, in many cases the limiting performance specification in 1550-nm systems is CSO, unless external modulation or precompensation for the chirping effect is used.

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Lighting test levels		
Test level	% of strikes in U.S. below adjacent levels	TR-20 rating
150 Ka	99%	
105 Ka	95%	A
80 Ka	90%	B
55 Ka	75%	C
<55 Ka	N/A	D

Table 2

Time varying CSO effects

There have been isolated reports in the field of unacceptable levels of CSO that develop after fiber optic system installations. These CSO levels can fluctuate wildly over a matter of days or minutes. The effect is caused by a combination of parameters—one being the chirp factor of the laser and the other being polarization maintaining effects of the passive portion of the system, including polarization sensitive loss and polarization dispersion. The passive part of the system consists of connectors, optical couplers and the fiber itself.

The problem occurs when the laser being used has a high chirp factor and there is some polarization maintaining level of the optical signal in the passive part of the plant.

Two polarizations of the mode in a singlemode fiber can be present and have a polarization sensitive loss and a polarization sensitive velocity of propa-

gation. The amount of polarization separation is highly sensitive to external changes on the fiber cable.

Literally, if the wind were to whip a cable in the air, or the outside temperature changes, the amount of polarization separation fiber can change. This change manifests itself as the time varying part of the time varying CSO effect.

The actual CSO level is, in part, due to a frequency modulating effect caused by the laser chirp in conjunction with the passive polarization effects. This frequency modulating effect is like the CSO distortions caused by chromatic dispersion described above.

If the two polarizations continually

than for digital telephony fiber optic cable and should be taken under consideration. **CED**

References

1. Bell Communications Research Inc., "Generic Requirements for Optical Fiber and Optical Fiber Cable," Technical Reference TR-TSY-000020, Issue 4, March 1989.
2. J.A. Dixon, M.S. Giroux, A.R. Isser,

R.V. Vanderwoestine, "Bending and Microbending Performance of Single-mode Optical Fibers," OFC, January 1987, p.40

3. P.F. Glodis, C.H. Gartside III, J.S. Nobles, "Bending Loss Resistance in Singlemode Fiber," OFC, January 1987, p.41.

4. R.E. Clinage, "Lightning Damage Susceptibility of Fiber Optic Cables," International Wire and Cable Symposium, November 1988, pp.200-205.

Lightning test levels lashed to strand	
Fiber optic cable construction	Test level passed
Core tube, armored	200 Ka
Core tube, dielectric	200 Ka
Loose tube, armored	200 Ka
Loose tube, dielectric	200 Ka
Coaxial cable	200 Ka

Table 3

mix and are not separated, low levels of CSO are seen. As the two polarizations become more distinct for longer periods of time, the dispersion levels, and therefore the CSO levels, increase. Time varying CSO in AM systems can be controlled by minimizing laser chirp, polarization dispersion and polarization sensitive loss.

It's clear that at this point in time, there is no better specification to reference than Bellcore's TR-20 for the purchase of fiber optic cable for AM CATV systems.

The major installation method in CATV is aerial and the majority of telephony installations are buried. Because of this difference, some environmental test procedures, such as lightning resistance, should be modified to better simulate application in the CATV industry.

In other cases, such as attenuation increases with respect to temperature and dispersion effects, the requirements for AM video fiber are more stringent

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**Attenuation increase vs. CNR
Calculated for 20 km (12.4 miles)**

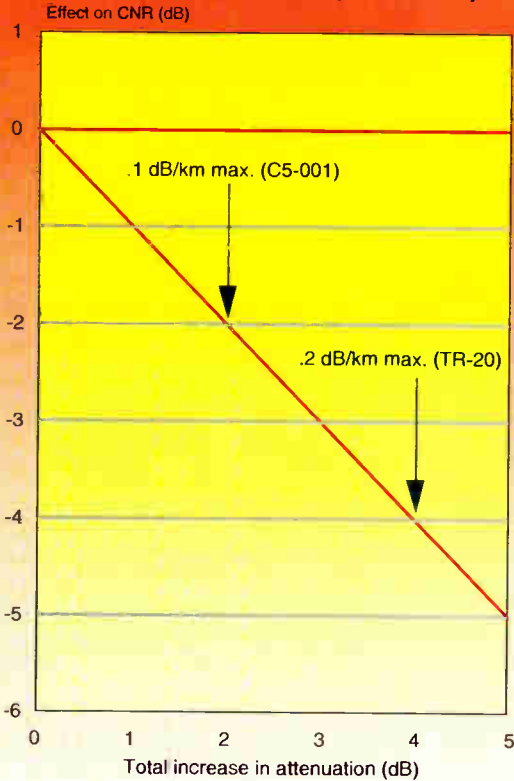


Figure 4

5. D. Fischer, K.E. Bow, W.F. Busch, E.C. Schrom, "Progress Toward the Development of Lightning Tests for Telecommunications Cables," International Wire and Cable Symposium, November 1986, pp.374-383.

6. B.J. Symmons, G.W. Reid, "Lightning Protections of Buried Optical Cables," International Wire and Cable Symposium, November 1990, pp.596-607.

7. P.D. Patel, T. Coffman, "AT&T Aerial Plant Lightning White Paper," not published.

8. M.R. Reynolds, C.J. Arroyo, "Primary Rodent and Lightning Protective Sheath for Lightguide Cable," International Wire and Cable Symposium, November 1986, pp.455-463.

9. C.J. McGrath, "Broadband AM Lightwave Transmissions Systems—A Technology

and Applications Review," SCTE Fiber Optics 1990, March 1990, pp.137-141.

10. C.E. Holborow, "Application of Erbium-Doped Amplifier in CATV Networks," SCTE Fiber Optics 1991, January 1991, pp.167-176.

11. L. Stark, "AM Transmission on Fiber," *Communications Engineering and Design*, April 1988, pp.20-34.

12. D. Grubb III, Y. Trisno, "AM Fiber Optic Trunks—A Noise and Distortion Analysis," 1989 NCTA Technical Papers.

13. L. Williamson, D. Wolfe, "Effects of Chromatic Dispersion on Analog Video Transmission," SCTE Fiber Optics 1991, pp.177-183.

14. P.D. Patel, C.H. Gartside, "Compact Lightguide Cable Design," International Wire and Cable Symposium, November 1985, pp.21-27.

15. P.D. Patel, M.R. Reynolds, "LXE—A Fiber Optic Cable Sheath Family with Enhanced Fiber Access," International Wire and Cable Symposium, November 1988, pp.72-78.

16. C.J. Arroyo, A.C. Jenkins, P.D. Patel, "A High Performance Nonmetallic Sheath for Lightguide Cables," International Wire and Cable Symposium, November 1987, pp.344-349.

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Personal communications networks

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While today's cellular can and will continue to grow, the cost to provide service will grow exponentially. The rapid adoption of handheld cellular telephones and cordless telephones at home and at work demonstrate the public demand for portable and wireless communications. These people not only want all of their features to follow them as they roam, but also want small and light-weight pocket telephones with batteries that will last all day.

However, just as the public starts to rush toward the cellular service, the existing systems are beginning to reach saturation. The service in certain major markets has reached its limits. The systems have reached their capacity. To meet demand, the cellular service providers will have to migrate to a new technology.

Capacity expansion possible

Fortunately, the technology is here to-

By C.R. Baugh, Ph.D., Consultant, and Douglas O. Reudink, Ph.D., Director, Wireless Planning, US West NewVector Group Inc.

day to expand capacity. The technology provides pocket telephones about the size and weight of a deck of cards, yet have battery lifetimes of an entire day. No more brick-size handhelds to carry around. No more pockets full of batteries to keep the portable going all day.

The new personal communications technology rides on a new set of low-

The obvious relief to this problem is more spectrum. The FCC has tackled this problem and is consolidating over 200 MHz of spectrum for such new services as personal communications. The combination of today's cellular and the new personal communications technologies working together can blanket an entire city—providing mobile telephone service for at least 10,000 people

per square mile; enough capacity to take us well into the next millennium. Even higher densities will be achievable within high-rise office buildings where spectrum reuse in the vertical dimension as well as the horizontal dimension provides for expansion and additional capacity.

Potential PCN services

In personal communications services the user will have a personal telephone number. It will act as a universal identifier for telephone service, paging service and voice mail service. The personal telephone number and the associated telecommunications services follow the person wherever he or she goes. It allows people to make and receive calls as well as have features such as custom calling or voice mail keep up with them. The seamless network, with its automatic roaming capability, will be a key requirement for personal communications services.

The addition of Signaling System 7 to mobile telephone services provides the network intelligence and control needed for personal

communications network services. It manages the automatic roaming and the transportable personal features that follow people as they move about. Even when these evolving capabilities become available within cellular systems, today's cellular systems need to be supplemented in two essential dimensions: capacity and signaling.

The capacity on cellular will not handle all the impending demand. Also,

Assumptions for capacity comparisons calculations

Assumptions	Value
Transmit bandwidth	10 MHz
Receive bandwidth	10 MHz
Digital voice encoding	32 kbps ADPCM
Digital signaling, synchronization, and error control	18 kbps
Frequency reuse in FDM and TDMA	7
FDM channel spacings	30 kHz
FDM signaling	Sub audible channel
CDMA bit energy to noise power density ratio	7 dB

Table 1

power, digital and wireless technology that supplements the existing analog cellular technology. The low-power personal communications architectures provide that huge capacity needed to meet the explosive demand over the next decades. Its low power implies its

Number of voice channels per cell in 10 MHz of spectrum

Frequency division multiplexing	Time division multiple access	Code division multiple access
47	36	27

Table 2

use in denser city areas where travel is less than 30 mph. Hence, it is "walk about" service rather than the "zoom about" cellular service where vehicles travel 65 mph down the interstate.

Personal communications systems are evolving to complement cellular systems, not replace them. Low traffic density and high-speed hand-off situations will remain in the cellular domain.

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the present analog common air interface does not permit both signaling and voice to coexist simultaneously during a conversation. This severely complicates and limits the features that can be implemented. For example, it becomes nearly impossible to create the equivalent of a multiline business key telephone set even though the microprocessor in the handheld unit has sufficient power to manage such complex features. The bottleneck becomes the inability to pass

control information in parallel with the voice information.

Hence, the two major needs of the next generation of technology beyond that existing in the 1970s technology of today's AMPS cellular centers on providing much higher capacity than today's cellular architecture conveniently allows and a rich in-band signaling channel coexisting with the voice channel to support the feature-rich capabilities of the advanced intelligent network.

The new personal communications systems consist of pocket telephones that transceive low-power radio signals with an associated microcell base station transceiver, as shown in Figure 1. Multiple microcell transceivers become linked together into a regional coverage area by a microcell controller. The microcell control in turn connects to the public switched telephone network or to a mobile telephone switching office. The personal communications system uses digital radio technology that combines the simultaneous transmission of both voice and signaling information usually combined with a multiplexing scheme that puts several simultaneous calls on one radio carrier.

Advanced intelligent networks

Because economics drive system architectures to multiplex digital formats, several additional system benefits accrue as attractive features of a digital multiplexed format. The combination of multiplexed voice channels and a signaling channel associated with each

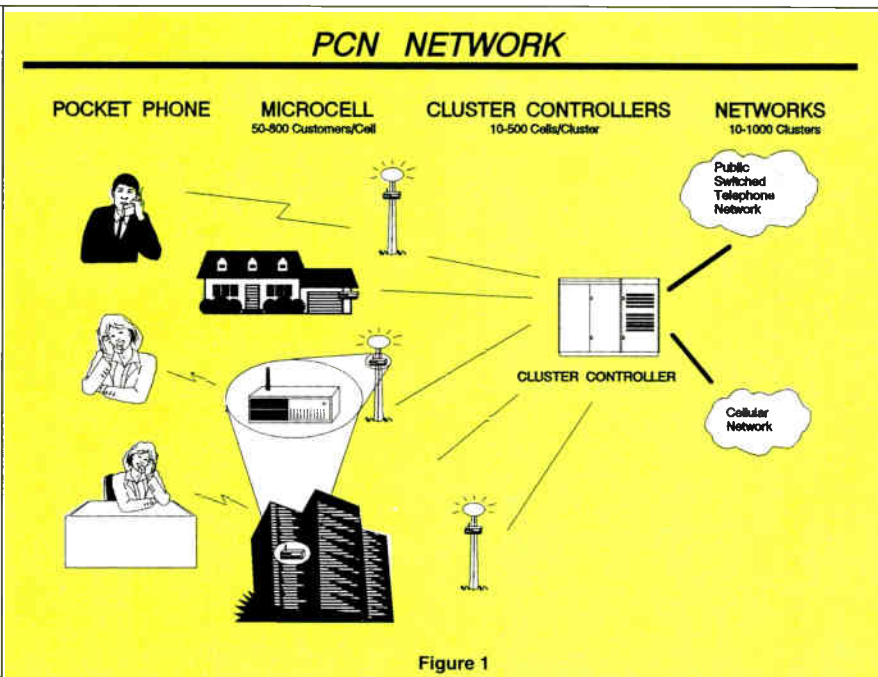


Figure 1

voice channel provide a host of system capabilities ranging from simplified system control to supporting advanced intelligent network services.

The system control becomes a distributed, intelligent architecture because the signaling channel exists be-

While today's cellular can and will continue to grow, the cost to provide service will grow exponentially.

tween the handheld and the radio base station, and between the radio base station and the network. Thus, a control channel exists from top to bottom: from Signaling System 7 to the handheld unit. With such a facility the control network for personal communications can be both distributed and intelligent. A sampling of some of the control capabilities and the features resulting from connectivity to an advanced intelligent network follows.

Priority call alerting

The signaling channel also presents more flexibility in alerting the called party to a variety of classes of incoming

calls. It becomes possible to ring the phone differently for different classes of caller identification groups. In fact, one class of callers can be given no alerting at all so that the called party is not bothered by anyone except the secretary or spouse.

The telephone number of the calling party can be stored during times when the ringer is turned off or the phone is not answered. Thus a user not only sees that someone called, but also gets the calling telephone number.

Hands-free service

Some incoming calls may receive a "hands-free" answer, i.e. a short tone indicates the incoming call gets answered and the call ends up in a speakerphone-type mode immediately.

Thus, one class of callers gets through to the phone immediately. It may be a useful feature where a closed user group wishes to be in an immediate conference call mode with several other people within the same user group. If one member of the group has the phone turned off or is temporarily out of range, once the phone becomes active it will immediately be brought into the conference call.

Distinctive alerting with call waiting

With the signaling channel separate from the voice carrying channel, the basis for feature-rich service is provided. The separate signaling channel presents user friendly alerting options.

For example, when the calling party identification gets passed over the signaling channel along with indication of a call waiting feature while a user is engaged in an call, the handheld unit can easily insert a special alerting tone in the called party's speaker to indicate the class of the user. Because the handheld unit inserts the call waiting indications locally, the other party on the existing call does not hear the call waiting alert.

If the call is from a user-defined high priority caller such as a spouse, boss or secretary, the tone can so indicate



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such a caller. If the caller is a lower priority caller a second and distinct tone gets presented to the called party.

Personal status indication

Another option is the ability to treat incoming calls with different answer treatment as a result of different activities during a day. For example, a surgeon may have a call greeted with "I am in surgery. Please leave a message." The answering message is generated at the handheld after the call is answered by a non-ringing handheld. The handheld then activates a call transfer to the voice mail where the caller then can leave a voice message.

Rather than having to change the messages on the voice mail box each time the user changes status, the handheld unit can store a limited set of pre-recorded short messages. When the user turns off alerting, a message for the caller can be selected.

Status information

The signaling channel could be used in an outbound manner from the handheld to carry low-speed data such as user or system status information.

Suppose the telephone is in an appliance repair truck. Status information such as "arriving at customer location," "completed repair," or "leaving for next job" could all be sent back to the fleet dispatch operation center via the signaling channel without making a telephone call. The data would flow in the equivalent of an X.25 datagram mode. Thus, it becomes practical to have status radios with vehicles or people that only have status information data capability and no telephone capability.

Voice and data co-existence

The multiplexed radio link provides the mechanism for mixing voice and data traffic. Voice channels can just as well be used for data traffic. Some of the voice channels could even be reserved for X.25 data protocols. One voice channel can be subdivided into several very low speed data channels. Conversely, several voice channels can be consolidated into higher speed data channels.

Therefore, a variety of data options become possible by enhancing rather than replacing the common air interface multiplexing format. The enhancements would be the addition of new control messages in the signaling channel that

control new types of calls in the "voice" channels, e.g. data circuits. Thus, new data terminals with various data protocols can be added in the future without disrupting the signaling protocols that exist.

The existing handheld units would simply ignore the new messages, because they would not recognize the new signaling messages. The original handhelds continue to operate with their features independent of the new features and their associated signaling messages.

System control attributes

The system control characteristics of a digital multiplexed system include some key capabilities, the first of which is the "soft hand-off." With multiple

Reducing the cell size is the key driver for dramatic increases in capacity. Capacity grows in inverse proportion to the square of the cell size.

calls on one radio channel, the determination of a hand-off request can be made by the handheld unit.

Soft hand-off

This works as follows: Suppose the conversation takes place in call slot A. Then during call slot B, the handheld can be checking signal strength of other nearby base stations and doing a comparison for the purpose of requesting a hand-off. If a hand-off should be necessary, the handheld can either request a hand-off in the signaling channel in call slot A or can request hand-off of the new base station in the signaling channel of call slot B.

In either case, the existing call continues simultaneously with this system management function. When a hand-off initiates, the call is transferred to the

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new base station by first forming a conference call with the old and new base station. In call time slot A the handheld transmits voice with the existing base station and in call slot B the handheld transmits voice with the new base station. Shortly after the conference call gets set up, the first base station gets removed from the conference, leaving the call on the second base station in call slot B.

With this method of hand-off, the people on the call never experience an interruption in the conversation. Moreover, the hand-off calculation is done in the handheld and does not burden a base station or cellular switch with a heavy computational load. It gets distributed where computational capacity

signal strength from two different receiving antennas and pick the best one for the handheld unit. On a third call slot the handheld can receive the incoming voice and signaling from the base station. On a fourth call time slot the handheld unit sends out a return burst of voice and signaling information on the handheld to base station radio carrier.

It then has six call time slots left to calculate the signal strength of an adjacent base station to check on whether a hand-off needs to be requested. Two call time slots are used to change radio carriers to another base station's frequency, one time slot to make the measurement, and two time slots to return to the home base station carrier with

Time sequence of hand held operations

Serial TDMA digital data format

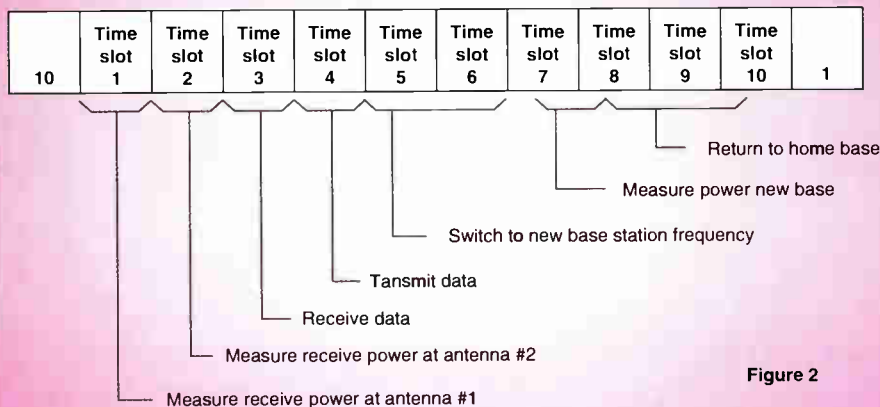


Figure 2

is available.

The concept of a soft hand-off has additional advantages for any voice band data traffic. If the call contains 2400 bps voice band modem signals, the soft hand-off will be much friendlier to existing modem algorithms. Because modems hang up the telephone line when the carrier drops, any long interruption of the carrier will disconnect the modem call. With soft hand-off the carrier will not be interrupted—although it will be corrupted momentarily during the call transfer. Most modem error recovery schemes will automatically recover from such a hit.

TDMA soft hand-off example

The implementation of soft hand-off is important enough to examine a time division multiple access (TDMA) example in much more detail. Suppose the system will support 10 calls on one radio carrier, as shown in Figure 2. Then, during two consecutive call time slots the handheld unit can measure

time to spare before the cycle repeats itself—with the exception that a different neighboring base station will be measured on the next cycle.

The spare call time slot in the frame provides margin so that base stations do not need to be synchronized relative to each other. If one is skewed half of a call time slot with respect to the other, the handheld has time to wait for the call time slot to show up. This eliminates complex mutual synchronization of base stations with each other.

In the case of a code division multiple access (CDMA) system, the fact that multiple calls exist simultaneously and independently of each other provides the same soft hand-off attributes. When the same radio carrier is used in all cells, the handheld unit simultaneously receives from both base stations and calculates the appropriateness of initiating a hand-off at the same time it continues its existing link to the present base station.

To calculate hand-off, the handheld must be able to measure the power of a

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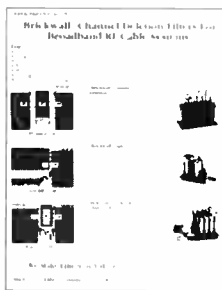
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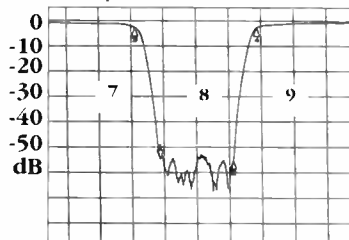
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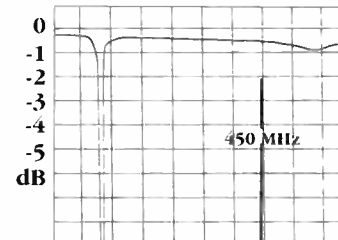
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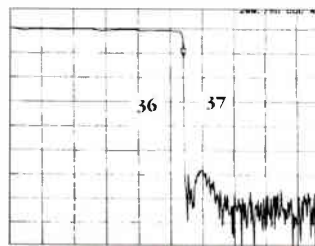
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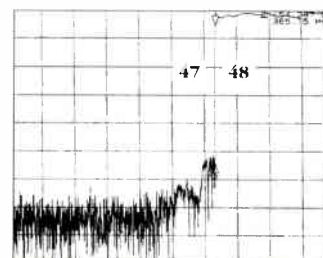
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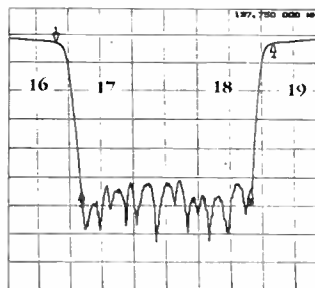
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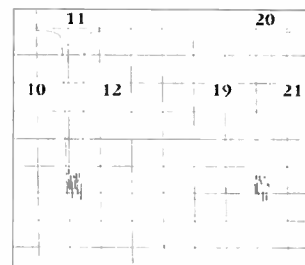
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neighboring base station by decorrelating that particular base station's direct sequence identification code. For the corresponding base station to receive from the handheld unit, the base station must know the handheld's unique direct sequence code.

Synchronized base stations

For the handheld unit to communicate simultaneously with two distinct base stations, all base stations must be synchronized within a fraction of a bit time and all base station and user codes must be communicated to appropriate handhelds and base stations, respectively. These system control issues must be handled appropriately for a robust system design.

over several revenue producing calls. In addition, the radio system becomes much simpler because multiple radio carriers do not have to be combined for one set of antennas with all its associated costs.

Antenna placement

For high-density mobile communications, many calls will exist at each base station. Should the low powered radios be assigned to the 1.8 GHz to 2.2 GHz bands as the FCC has proposed, then the antennas will be small and easily placed in buildings or outdoors on buildings or other structures such as light poles.

Because the power is low and the antennas are small, base stations with eight hours of battery backup can easily

Multiple access methods

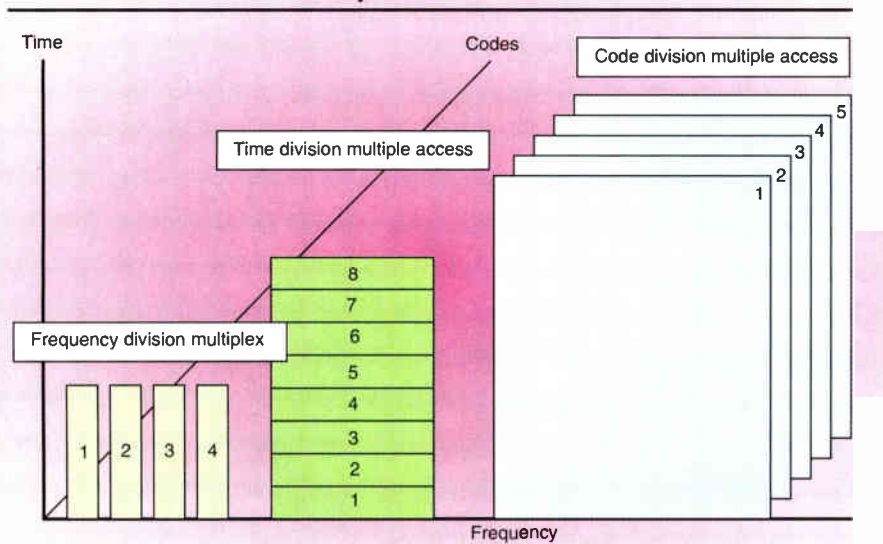


Figure 3

The existence of a dedicated signaling channel aids system operation, administration and maintenance. For example, the reporting of a handheld's received signal being below an established threshold could get reported in near real time as the event happens. If a particular area is suspected to need more robust coverage, a system administration person could be at a terminal watching the call quality behavior of the radio carriers in that area.

The administrator would be watching the calls and the number of times the weak signal threshold is tripped. The alarms would not only detect a potential engineering issue but also help in the diagnosis of the cause of the problem.

When several telephone calls occur on one shared radio carrier, the cost of the radio equipments gets amortized

fit into a small, unobtrusive enclosure that can be mounted without construction of any special facility. The interface requirements may be as simple as a four wire RJ-11 jack for T-carrier transport and a two-wire jack for a low voltage (24-volt) power cord.

PCN capacity

The major competing technologies for personal communications services are FDM (Frequency Division Multiplex, for example AMPs and NAMPs), TDMA (Time Division Multiple Access, for example Digital Cellular, Bellcore's Universal Personal Communications, and the Cordless Telephone Approaches CT-2, CT-3, and DECT) and CDMA (Code Division Multiple Access, for example narrowband spread spectrum N-CDMA

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and broadband spread spectrum B-CDMA). Figure 3 depicts the three different multiplexing approaches used by each of the alternatives—frequency, time or code multiplexing.

Frequency multiplexing takes a unit of spectrum and subdivides it into multiple voice channels. Time division uses a unit of spectrum to provide a serial digital bit stream which is subdivided into multiple time slots each supporting one voice channel. Code division uses a unit of spectrum to provide multiple serial digital bit streams. Each bit stream supports one voice channel and is distinguished from other bit streams by its unique direct sequence code.

Surprisingly, all three techniques provide essentially the same spectrum efficiency when compared on equal terms and when using a simple model for estimating capacity in very rough terms. In examining each alternative, a set of hypothetical parameters that do not attempt to match with any system or proposed system will be used.

In the example shown in Table 1, assume 10 MHz of spectrum for transmit and 10 MHz of spectrum for receive; assume voice is encoded with 32 kbps ADPCM in digital systems; and assume

signaling, error control and synchronization adds 18 kbps, for a total channel requirement of 50 kbps per voice channel in digital systems. Assume FDM has a 3.3 kHz voice channel with an associated sub audible signaling channel and radio channel spacing of 30 kHz.

FDM

The FDM spectrum usage is configured as the current AMPs standard which subdivides the 10 MHz into 333 voice channels of 30 kHz each. Assuming a frequency reuse pattern of seven, the system supports 47 calls per cell since the 333 channels are divided into seven groups of 47 each.

TDMA

The TDMA spectrum usage derives from subdividing the 10 MHz into 25 radio channels each being 400 kHz with 500 kbps of information. The 500 kbps data gets partitioned into 10 voice channel time slots of 50 kbps each. Assuming a frequency reuse pattern of seven, the system supports an average of 36 calls per cell, i.e. 250 voice channels spread

over seven groups.

CDMA

Because the CDMA systems take advantage of the fact all handheld units transmit simultaneously in the same spectrum, the capacity is limited by the energy arriving at a designated receiver that has been generated by all the other transmitters except the transmitter to which the receiver is paired. The capacity derives from the requirements of bit energy to noise power density ratio for an appropriate bit error rate of the receiver.

The number of calls per cell that 10 MHz supports derives from that signal-to-noise ratio. Assume there are M calls within the cell each having a data rate R = 50 kbps in a bandwidth W. Assume

As the penetration of mobile telephones passes through the five percent threshold, the personal communications technology is here to meet the demand.

each call has received power S at the base station. The noise power at the base station is the sum of the received power of all the other simultaneous calls, i.e. (M-1)S.

The performance of the receiver results from the ratio of bit energy E_b to the noise power density N_o , i.e. E_b/N_o . The bit energy can be expressed as the power divided by the data rate for the voice channel (i.e. S/R). The noise power density is expressed as the total noise (all the other voice channel power: [M-1]S) divided by the bandwidth W (i.e. [M-1]S/W).

Therefore, $E_b/N_o = (S/R)/[(M-1)S/W] = (WR)/(M-1)$ and the number of voice channels becomes: $M = 1 + (WR)/(E_b/N_o)$.

For E_b/N_o of 7 dB, the 10 MHz band-

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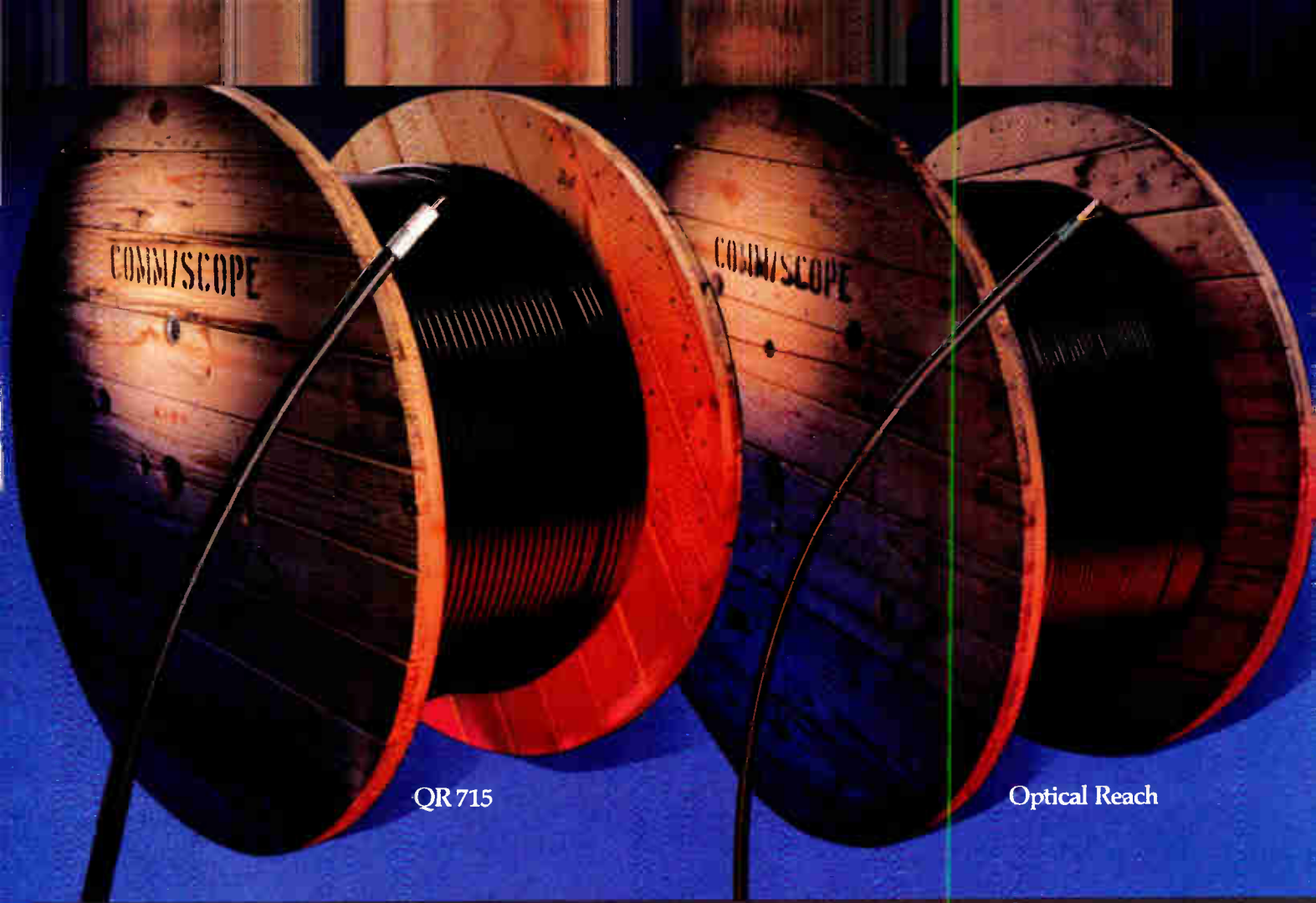
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width supports 41 CDMA voice channels. Since the adjacent cells operate on the same spectrum, margin must be allocated for energy being radiated into the cell from handheld units in adjacent cells.

For example, handheld #2 in Figure 4 resides near the boundary of an adjacent cell and will transmit power toward its own base station B as well as the base station A of the adjacent cell. The power received at the base station A by handheld #2 just outside the boundary of cell A will be nearly the same as handheld #1 just inside the boundary of cell A. Assuming a 33 percent margin to allow for adjacent cell handhelds, the number of voice channels becomes 27.

So, where is the 3-times and 10-times capacity gains claimed by TDMA and CDMA over today's analog cellular? The answer lies in the assumptions used in the comparisons. In this comparison all systems are being evaluated under nearly identical assumptions. The present analog FM systems provide high-quality speech comparable to quality assured by 32 kbps ADPCM. The capacity gains for cellular TDMA and CDMA come in large part from reducing the cell size and in the use of low bit-rate voice encoding.

Options for increasing capacity

If all the cells are of the same area in all three multiplexing approaches, then all of the systems are within a factor of two of each other in capacity. Given the very rough nature of calculating capacity, the systems can be considered roughly equal in capacity. Because the multiplexing approach does not in itself provide a major increase in capacity, how can capacity be increased? Let's examine three candidate factors:

- lowering the data required for voice encoding,
- shrinking the cell size, and
- controlling of power levels of handheld units and base stations.

Voice encoding

In voice encoding, the capacity is directly proportional to how few bits are required to digitize voice. Reducing bit rate degrades subjective voice quality and increases complexity in voice encoding and echo control. Network end-to-end voice quality as determined by subjective mean opinion test scores deteriorates rapidly when encoding rates drop below 32 kbps. The round-trip time delay of codecs of 16 kbps and be-

low is 30 to 150 msec and thus forces the use of echo cancellation.

An additional factor of 2 can come from statistically multiplexing voice since speech is active only in one direction of a voice conversation about 45 percent of the time (50 percent idle while listening to the other party speak and 5 percent idle during speech pauses). The penalty for encoding of 16 kbps and below becomes complexity (voice encoding algorithms, delay and voice band modems), round-trip delay (echo cancellation), and voice quality (network end-to-end mean opinion scores).

In the analog cellular systems, capacity directly relates to channelization spacing. Reducing the 30 kHz spacing to 5 kHz or 10 kHz per voice channel produces a six- or three-fold increase in capacity, respectively. Thus, narrowband AMPS with its 10 kHz channel spacing gives a 3 times improvement in capacity over AMPS. The penalty for narrower channels becomes a lower signal-to-interference ratio because the FM capture in a receiver is related to signal bandwidth.

Cell size

Reducing the cell size is the key driver for dramatic increases in capacity. Capacity grows in inverse proportion to the square of the cell size. More cells mean more reuse of the spectrum. Shrinking the cell radius by two increases the number of cells and associated capacity by four. Cell spacings of 2,000 feet outdoors and 100 feet indoors are practical.

Shrinking the cell size has an even more dramatic impact on the effective radiated power of the base station and the handheld units. Since power in a multipath urban fading environment is proportional to the fourth power of the radius, reducing the radius by four decreases the radio power requirements by 256! The penalty for smaller cells is the need for more cells and their associated trunking network to connect them to the base station controllers. Shrinking cell size will increase capacity equally for both digital and analog multiplexing schemes.


Power control

Reducing co-channel interference or self interference in the CDMA case increases the spectrum reuse and hence the number of voice channels per area. Minimizing radio pollution into neighboring cells helps with spectrum efficiency. The aim is to transmit only

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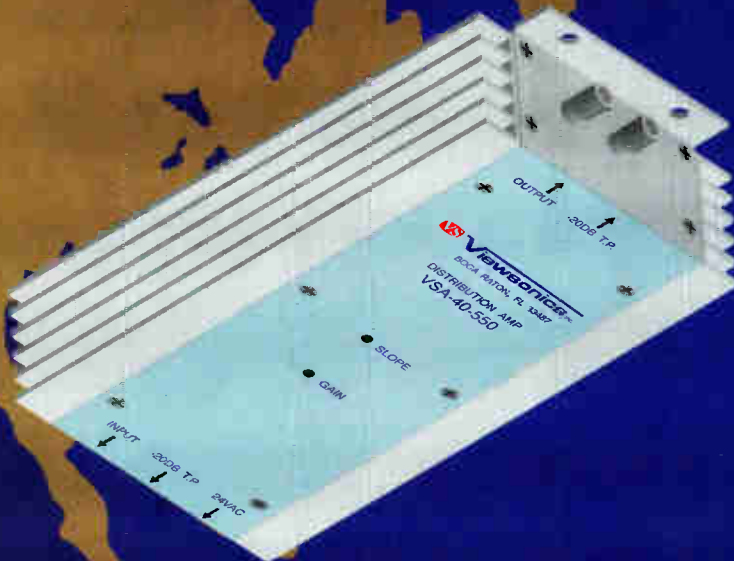
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enough power from both the base station and the handheld to assure the appropriate bit error rate.

Since the increase in system capacity gained by tight control over radio power is a difficult problem to characterize, a variety of research activities are presently being pursued to evaluate the effect of power control on system capacity. The penalty for a power control capability rests in having to provide additional system control over the signaling channel to adjust the power levels.

Choice of system technology

What system will ultimately be used in personal communications? For a high-capacity system the answer clearly favors a digital system. Cost, complexity, and the subtle details of system performance, not simply TDMA or CDMA, will determine which digital system provides best performance for a given application.

Analog systems will not make the grade simply because of the cost of analog multiplexing vs. digital multiplexing. Digital multiplexing eliminates system interconnection costs and thus beats analog. If the voice is digitized in the handheld unit and multiplexed in the common air interface, then the single, simple, and digital interface for 10 voice channels re-

places all the 10 analog line interface cards for each voice channel. In land-line transmission applications, the cost of analog multiplexing exceeded the cost of digital multiplexing.

For all the same reasons, the cost of multiplexing several analog channels is potentially greater than digital multiplexing those same equivalent digital signals.

The fact is that a signaling channel can be added to a digital voice channel essentially free while a sub audible data channel in an analog system further increases the analog multiplexing costs. Therefore, one can safely assume that a digital system will be the personal communications system of choice for high capacity systems.

Conclusions

Obviously, the digital personal communications technology of the 1990s will be a major improvement and welcomed supplementary addition to the successful AMPS cellular technology developed in the 1970s. The capacity and cost structures of the personal communications system architectures will provide the wherewithal to supplement the cellular service to provide mass service.

With cell spacing of 2,000 feet, the capacity will easily begin at a 1,000 voice channels per square mile when assuming 10 MHz of spectrum, a 7-way frequency reuse and 32 kbps ADPCM voice encoding. Given 16 kbps speech encoding and statistically multiplexed voice, the capacity would increase to

basic services and the handheld units that support those features.

Over time, the signaling channel will enhance the message set to include new capabilities without obsoleting the original handhelds. One of the more likely enhanced services will be various flavors of data services ranging from very slow speed statusing and transaction functions to more sophisticated data applications.

Since a viable system can be deployed with as little as 20 MHz of spectrum, it may be that there will be multiple alternate system suppliers of personal communications services.

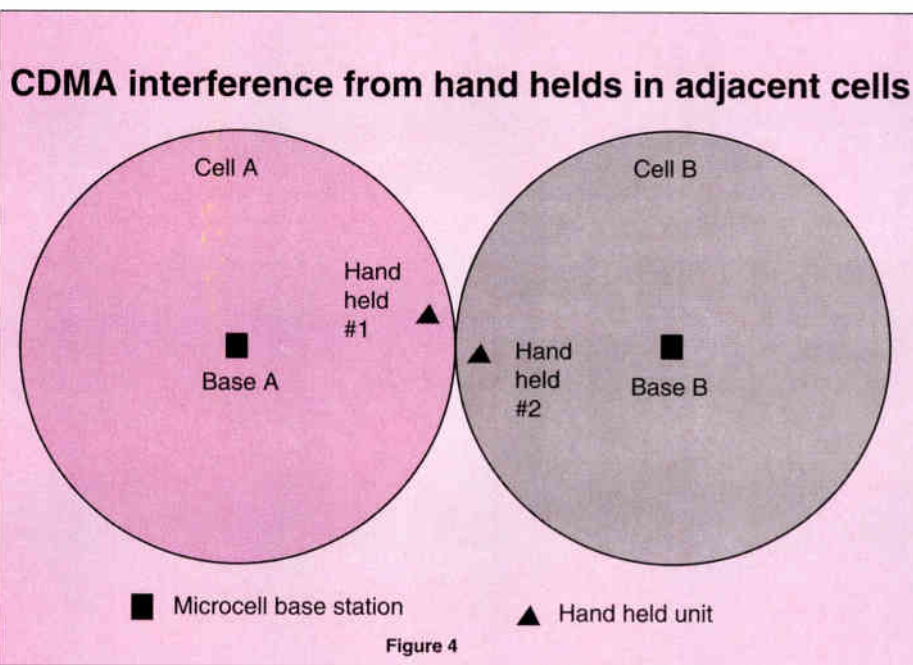
With the FCC consolidating over 200 MHz of spectrum, this could be a real possibility. Firms with in-place infrastructure could be in a position to be service providers. These firms would include cable TV

companies with their in-place coax and fiber cables, electric utilities with their in-place fiber cable, local exchange telephone companies, cellular operators, alternate local exchange companies and inter-exchange carriers. New entrants may emerge as service providers as well.

The cost structures of personal communications systems will provide the opportunity

for low price portable communications in both the private markets where user own and operate their own system and the public service provider markets. The cost structures are such that wireless ordinary telephone service (WOTS) will be attractively priced to the consumer.

Certainly, as the penetration of mobile telephones passes through the magical 5 percent threshold and explodes toward 50 percent penetration, the personal communications technology is here to meet the demand. It is more of a question of when and how the FCC allocates spectrum than it is a question of the viability of the underlying personal communications technology and its associated cost structures. **CED**



4,000 voice channels per square mile. Depending on the traffic characteristics of users that primarily results from service pricing structures, 4,000 voice channels would support as many as 80,000 cellular subscribers per square mile or as few as 12,000 heavy users in private network wireless PBX.

The new features provided by the personal communications networks will be based on the signaling channel that coexists with the voice channel of the handheld unit. The signaling channel not only provides the control and information for the additional features but also provides the capability for enhanced operations, administration and maintenance. The messages-based signaling channel allows the system to start with

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PCS experimental license status update

Two years ago this month, the FCC issued its Notice of Inquiry on personal communications services (PCS). That document triggered much commotion among cable operators, who hastened to apply for FCC experimental licenses to test the new concept. To date, operators like American Television and Communications, Telecable, Cox, Comcast, Cablevision Systems and others have been filing quarterly status reports to the Commission. Most have filed for "pioneer's preference" to the FCC, which will theoretically entitle them to a license in one area because of their R&D efforts in PCS.

What have the technical tests proven? Largely, the tests have served only to dish up more unanswered questions about PCS. "Our conclusions at this point are that we still don't all have the answers," says Steve Johnson, ATC senior CATV project engineer. Specifically, questions remain regarding regulatory implications, propagation effects, cell size and the market itself.

On the regulatory side, it seems as though the answers may be just around the bend. During a breakfast technical session at the National Show last month, FCC chief engineer Tom Stanley said the Commission will most likely put its seal of approval on the 2 GHz band (1850 MHz to 1990 MHz, to be exact) "sometime this year, unless unpleasant things happen in terms of spectrum allocation." Those unpleasant things could include an uproar from the current fixed point-to-point microwave users of that segment of spectrum.

In a follow-up conversation after the convention, FCC staffer Rodney Small affirmed that the Commission will likely be making its pioneer's preference rulings later this summer.

What is PCS?

One of the more difficult challenges facing the Commission (and the industry) has been the rather slippery business of attaching a definition to the ubiquitous concept of PCS. In Stanley's view, PCS is "a broad variety of services for people on the move. We don't

want to get trapped into saying it's strictly voice, or strictly data."

RAD architecture

Many operators seem to be following a remote antenna driver (RAD) test set-up, first introduced by Rogers Engineering and presently under study at CableLabs. In the RAD scenario, antennas are located where radio coverage is needed, separate from base stations. PCS base stations, then, can be collectively located in central points, such as in headends or at fiber nodes. The cable TV plant supplies both the base station

CableLabs and an executive-on-loan from Rogers Engineering, the RAD system is roughly analogous to a converter placed out in the cable plant.

"The RAD picks up all the signals, converts them to sub-low (below channel 2), brings them up to the headend, then converts them back to the original frequency and applies them to all the base station receivers," Hay explains. "The reverse is true in the other direction. It's as simple as that."

Rogers Engineering has applied for a patent on the RAD concept, and has performed numerous RAD trials throughout Canada and British

Columbia. It placed its first PCS phone call over a RAD system in September 1991. Also, Hay says, there are some RADs at work in the CableLabs laboratory. "We made the first U.S. RAD call on April 2," Hay says, "to Richard Leghorn" (who until recently chaired the CableLabs subcommittee on PCS).

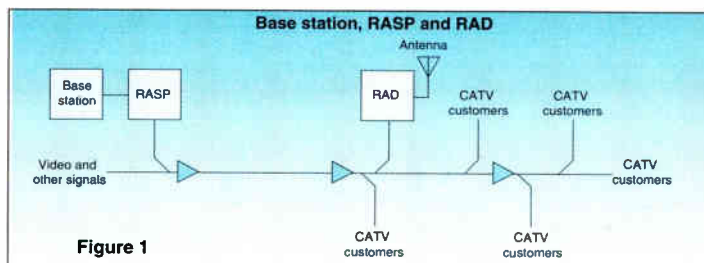


Figure 1

and antenna connections, and the RADs can be powered from the cable.

The advantage, Labs officials and operators agree, is scale economies which can be realized in base station accommodation and sizing.

A typical RAD system would work like this: A base station, which is actually a collection of transmitters and receivers, is connected to the cable plant via a remote antenna service point, or RASP (see Figure 1). The RASP shifts the transmitters to a vacant frequency band in the downstream passband of the cable TV system. The translated PCS signals are carried down on the cable TV system, together with video and other normally present signals.

At any location where PCS coverage is required, antennas are connected to the cable system through a RAD. The RAD re-translates the PCS signal back to its original frequency that was transmitted by the base station. After filtering and amplification, the re-translated PCS signal is applied to the antenna and radiated. The net effect is the same as if the base station were located directly with the antenna.

According to Roger Hay, director of personal communications services for

Technical tests

Another operator who has done extensive PCS testing over the past year is ATC, which has licenses to test in Manhattan and St. Petersburg, Fla. According to Johnson, the intent of the tests was "mostly to determine handset range, optimum transmission schemes and PCS/cable interfaces."

ATC chose St. Petersburg as a test site because it had existing FTF plant there; it selected Manhattan because it's a worst-case scenario, in terms of urban-related interferences, according to Johnson. In New York, ATC conducted a propagation test using continuous wave carriers and signal generators/spectrum analyzers in place of actual handsets. "This test was to see how actual propagation differed or compared to our calculations," Johnson explains.

In the test set-up, a transmitter was located on the top of the Time-Life building, and a receiver was located at the top of the Time-Warner building, some 1,000 feet away. "We started off rooftop-to-rooftop, then moved the receiver site down into the Time-Warner building,"

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Johnson explains. "We found pretty much what we had expected—that the lower frequencies (2.4 GHz range) worked better.

"Also in that test we found that once we moved the receiver to the interior of the building, the signal dropped off rapidly," Johnson says. "This indicates that we would need to deploy many cells quickly in order to have a viable network."

After testing the RAD concept in its St. Petersburg, Fla. system, ATC decided to run a slightly different test in Queens. "The advantage of RAD is that you have the intelligence and more of the electronics centrally located in the headend," Johnson explains. "The other approach is to have a lot of the intelligence and electronics out in the field. We looked at that approach, too."

In the latter test, ATC put the base station in the field, instead of in the headend. The output of the base station was fed into a voice RF modem, which digitized the audio to 32 kpbs. Then a data modem with RF frequencies that were suitable for transport over a cable system was deployed, Johnson explains.

At the headend, another voice RF modem converted the signal back into a telephone line—"we just plugged that into the telephone network," Johnson says. ATC was happy with the results of that approach, but admits is more electronics-intensive than RAD.

Telecable tests

A relative late-comer to the realm of PCS testing is Telecable, which is testing a variation of RAD in its Sparksburg, S.C. and Greenville, S.C. systems. "We're calling it D-RAD, for digital RAD," explains Nick Worth, VP of engineering. The tests will be conducted in the favored 2 GHz band.

"The CT-2 RAD, which has been tested extensively by Rogers, uses one frequency per voice circuit. The D-RAD uses perhaps TDMA (time division multiple access) or even conceivably CDMA (code division multiple access). We're finding that these tests might have to be done in stages, simply because the equipment isn't really available yet," Worth explains.

The main focus of the Telecable tests is to discern effects of propagation and cell size, and "simply to test the D-RAD concept."

"The twist we want to test that's a little different is to allocate a base station to a fiber node. If you look at the numbers, a fiber node covers some 1,500 homes," Worth continues. "Let's sup-

pose you get a 10 percent penetration—that may be 150 customers. The traffic that they will require will be somewhere north of 20 voice circuits. That's a whole base station. So, what we're wanting to do, instead of making the whole cable network into a big antenna, we're trying to make the fiber nodes into antennas."

In the Telecable scenario, the base station would be co-located with the fiber node. Signals would be distributed over coax to the RADs. "The coax would be like the transmission line, the RADs would be the antenna interface, and the whole node—the coaxial cable out of that node would effectively be an antenna array. So you could go anywhere within that node without worrying about a hand-off," Worth explains. "We're doing that because we think you'd need a base station allocated to each node just to handle the traffic."

For its part, TCI's Tom Elliot says his company intentionally didn't apply for any experimental PCS licenses because "we wanted to tell both the cellular guys and the telco guys, 'hey look—we're not trying to get into your business.'" But, TCI did acquire five experimental licenses when the company took in United Artists. "At this point, we've said to CableLabs that we will fill in any test gaps, if necessary.

"By that I mean, propagation has been extensively tested; so have the different modulation techniques," Elliott comments. If there comes a point when more tests are needed in a specific area, we would certainly entertain doing that."

Elliott says that TCI considers personal communications services "a fascinating opportunity." As he notes, some prognostications have PCS accounting for 30 percent of the local connectivity by year 2000. "That seems to me to be pretty aggressive," Elliott says. "Let's say it's only 15 percent—that's still huge. So that's something we're certainly not going to ignore."

Other operators involved in PCS testing include Cox Enterprises, which recently made its historic and well-publicized telephone call from its San Diego, Calif. system to FCC Commissioner Al Sike's office in Washington, D.C.

To facilitate the call, Cox's Bill Killen, VP of planning and analysis, stood in a subscriber's front yard and used a handset that transmitted in free space to a cell site. From the cell site, the signal traveled 2.8 miles on the reverse path of the coax plant, through eight amplifiers, to a fiber node. After reaching the node, it traveled another three miles to the headend, where it joined the telephone network and zipped via the long

distance network some 3,000 miles to Sike's office.

Comcast Cablevision is taking yet another approach to PCS. Because the company also owns cellular interests, it is, not surprisingly, taking advantage of those resources to deliver a PCS signal that marries cable and cellular. "In our system, once you hit a cell site, everything else goes cellular," explains Comcast's VP of strategic planning Mark Coblitz. "That way, we also can provide roaming capabilities to the user."

Because of the Comcast tests, Coblitz says the company is learning more about where to locate cell sites. "Height is an important factor," he says, "because the higher the cell, the better coverage and larger cell you can have."

Coblitz, who also chairs CableLabs subcommittee on personal communications services, says that the group is taking "an aggressive approach to developing a program for cable. CableLabs members need facts about PCS, so we've commissioned an extensive and sophisticated study to determine economic and technical impacts of PCS."


More questions than answers

Hay, whose job is to specialize in the research and design of PCS-type services, admits that since PCS is such a new concept, "there aren't any marks on the road; no stakes in the ground. Because of that, there's quite a broad range of possibilities. The technical possibilities are correspondingly large.

"Right now, we're in that stage of creative richness that happens at the beginning of any major undertaking," Hay continues. "Fortunately, it's starting to come into focus. We should be able to see things a little more clearly soon."

Mostly, Hay says, cable operators need to know whether PCS is a business for anybody, not just cable TV. "By that I mean, just how big is the breadbox?" Hay asks. "Is it a viable business, or not? That's what we need to understand."

Still, amid all the old and new questions, operators are considerably further along in the PCS learning curve than they were two years ago, at least from a technical perspective. And by the end of this year, pending FCC rulings, pioneer's preference grants and the outcome of further nationwide PCS testing, there will likely be more answers to the myriad questions plaguing the industry.

But it certainly doesn't look as though we'll be trashing our wired telephones anytime soon. 

By Leslie Ellis

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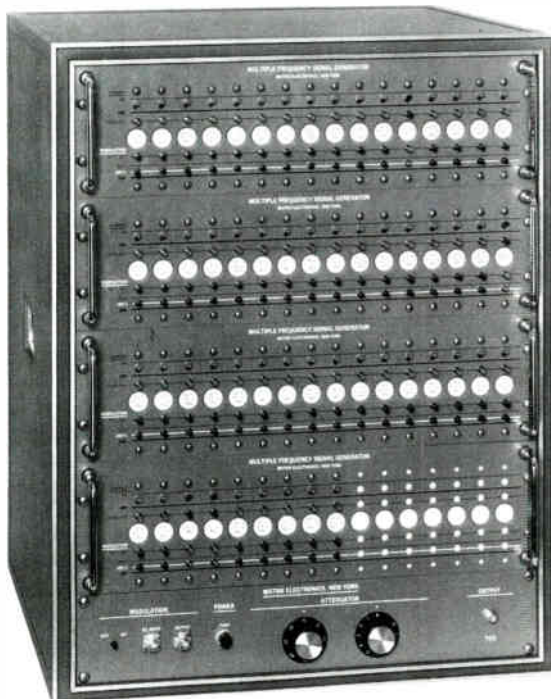
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Poised and ready

Cable industry poised to be a key telecom player

From the opening general session to the final gun, the major theme of the 1992 National Cable Show in Dallas was the future role of the cable television infrastructure and, in turn, its role in the nation's telecommunications industry.

While the technical community has discussed cable's ability to provide services such as personal communications services, interactivity, digital television, alternate access and multimedia for several months now, it's clear those discussions have made it to the board rooms of major MSOs as well as on Capitol Hill, judging from how often they were repeated during NCTA management sessions.

As in years past, Tele-Communications Inc. CEO Dr. John Malone set the tone of the 41st annual confab by moderating a panel on technological convergence, which concluded that cable television is poised perfectly to capitalize on future services to the home, schools and offices.

Lucie Fjelstad, vice president and general manager of multimedia for IBM, noted that cable can do for video what fax and cellular have done for productivity by converging with other industries and breaking down the walls between them.

Malone queried Fjelstad, Colin Watson of Rogers Cablesystems, Wayne Perry of McCaw Cellular and Robert Ranalli of AT&T on standards, multimedia, the global marketplace and telecommuting. The essence of their responses came down to one major point: Invest in plant upgrades and be mindful of the technological breakthroughs taking place in those other areas.

"I think we (cable) are on the right track," said Watson. "We don't want to forget about our core business" while overinvesting in a platform to attract new revenue streams, he added. "We need to work together as an industry to define standards," Watson concluded.

The upbeat theme was echoed by Malone during his concluding remarks: "Cable is the most cost-effective highway to the home" for companies like AT&T and IBM, he said.

The show floor

Technology demonstrations on the

show floor began to reflect some of this new thinking. Several convertor manufacturers showed new products that were capable of interfacing with interactive program guides. New and better fiber optic lasers and receivers made their debut. Digital video compression, while not new, was even more refined. And interactive television was sprinkled in for good measure.

Jerrold Communications' booth touched on all of the above technologies. Its new "Super Starfire" transmitters can reportedly pump 40 to 60

**Cable television is
poised perfectly to
capitalize on future
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channels on a single fiber over a 14-dB optical path with 50 dB carrier-to-noise. Configured as a dual-laser system, 80 channels can be delivered over distances that previously were unattainable, at prices comparable to YAG systems, said David Robinson, Cableoptics director. Jerrold also showed a 750-MHz "digital-ready" transmitter designed to deliver analog signals up to 550 MHz and a tier of digital offerings from 550 MHz up to 750 MHz.

Also new: a "digital ready" DFB laser capable of delivering 80 channels-per-fiber while passing up to 750 MHz of bandwidth. This makes the product attractive to cable operators who plan to configure their systems to deliver a full 550-MHz of analog video with a digitally compressed tier "on top" of that.

On the subscriber products side of the house, Jerrold built its theme around a concept dubbed the "Cable Consumer Convenience Center." The concept embraces the video on demand program, converters with on-screen

menus and program guides, some new remote controls and digital audio services.

Technology demonstrations included a voice-activated remote control manufactured by California-based Voice Powered Technology. The unit can be programmed to recognize four different voices and has a 31-word vocabulary. It's slated for roll-out later this year in Los Angeles and will retail for about \$150. Cableshare, a Canadian interactive TV company, also displayed its capabilities in the Jerrold booth.

In addition, Jerrold introduced a PC-based addressable controller compatible with Jerrold's current AH-4 computers. The ACC-4000 software runs on an IBM PC 486 platform with the Unix operating system. Sporting a graphical user interface, the ACC-4000 is designed to support video on demand requirements.

And in line with Dr. Malone's anecdote about his wife covering their VCR's clock with duct tape because its blinking annoyed her, Jerrold also displayed its new "Cable Clock," a device that electronically controls timers within various in-home devices via the convertor, which is linked to a clock in the headend.

Jerrold also showed the first piece of the digital compression puzzle, known as the DSR-1000 integrated receiver/descrambler. The new IRD will receive digitally compressed signals sent via satellite and features both digital and analog outputs. The IRD is scheduled to be available this summer.

Finally, but perhaps most importantly, the nation's first live carriage of high-definition television signals over two-way cable TV plant occurred during the NCTA convention as signals encoded in the Jerrold Communications booth were piped about seven miles to a local Tele-Communications Inc. node location then turned around and shot back to the convention hall, where the pictures were decoded and shown on a six-foot monitor.

Scientific-Atlanta

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Continued on page 72

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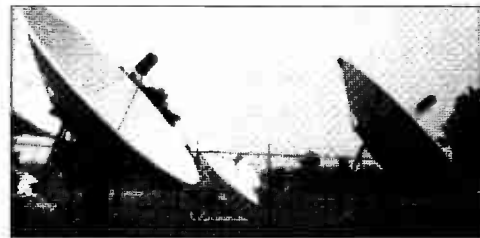
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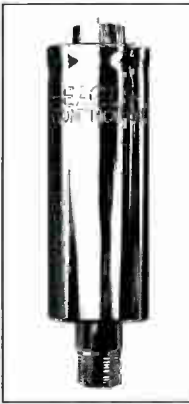
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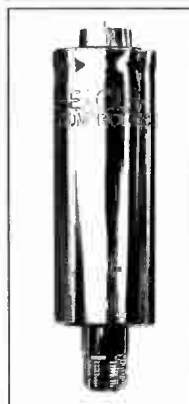
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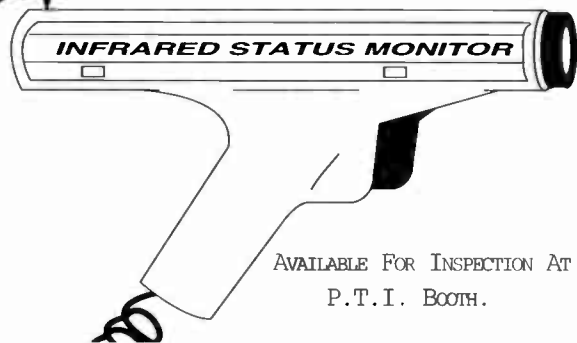
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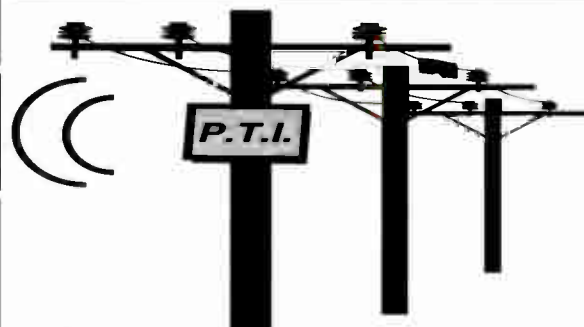
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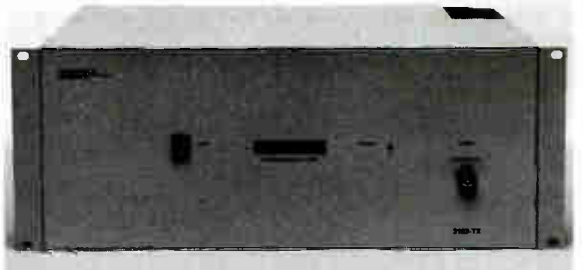
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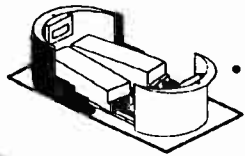
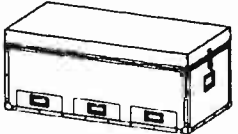
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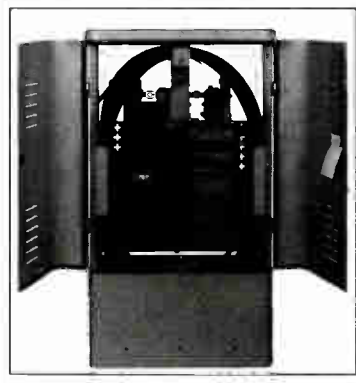
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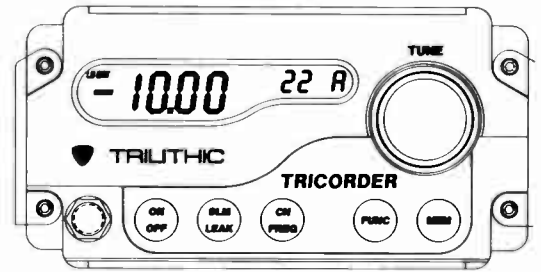
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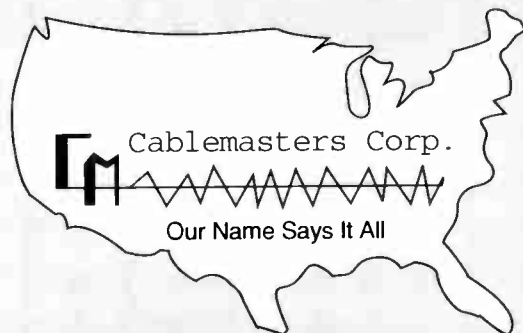
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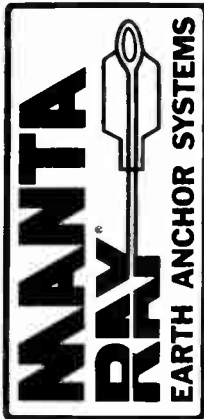
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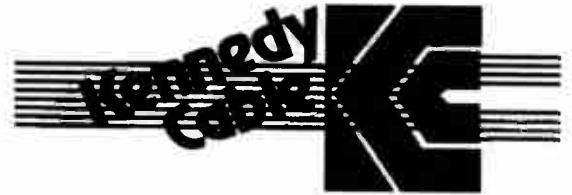


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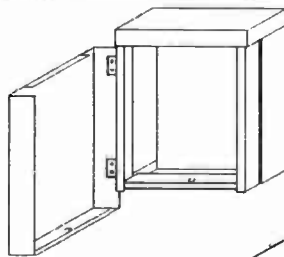
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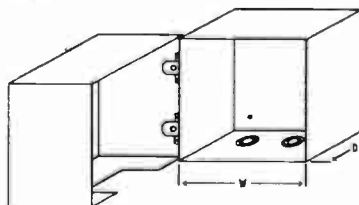
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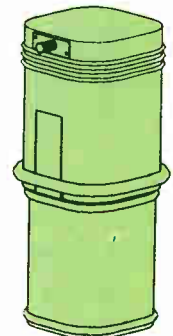
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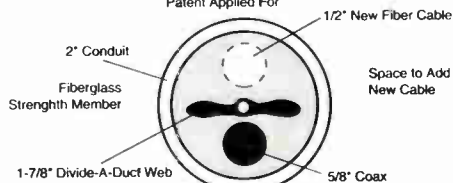
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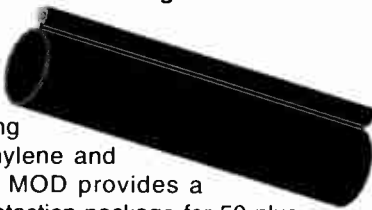
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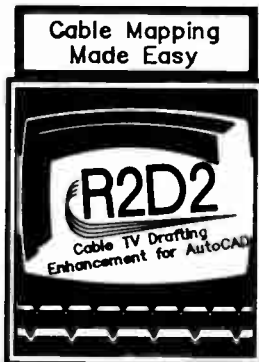


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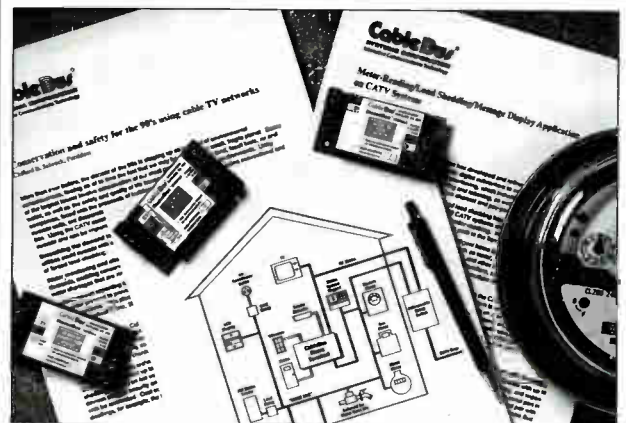
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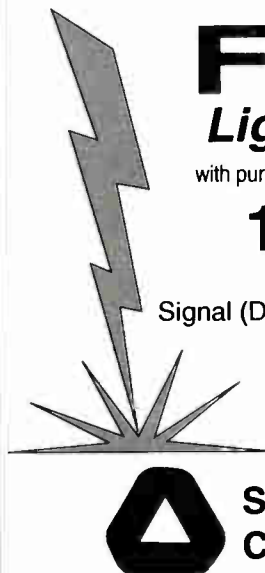
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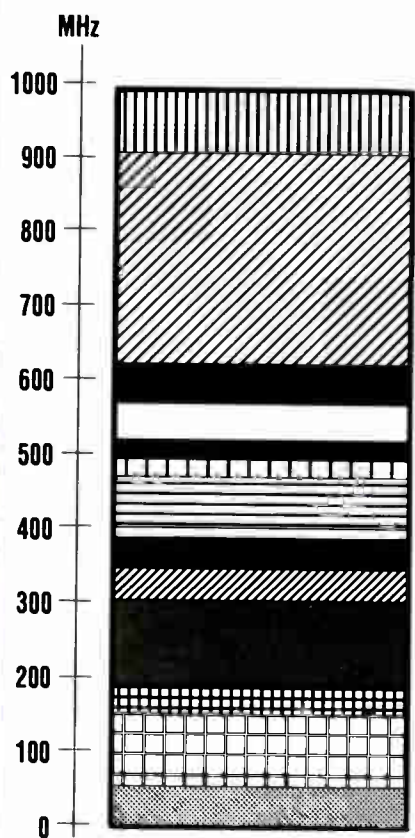
	Page No.	Reader Service No.
ADSCO	10	134
Ad Systems	2	101
American Lightwave Systems	7	120
American Lightwave Systems	1	100
Amherst International	7	121
Antenna Technology	2	102
Arrow Fastener	10	135
ATC	14	147
Authorized Parts	6	117
Avantron	9	126
Cable Prep	11	136
CableBus Systems	14	150
Cable Constructors	14	149
Cable Instrument Services, Corp.	9	127
Cablemasters	11	138
Cable Services Co.	11	137
Cable Technologies	6	118
CALAN	9	128
CATV Data Link	14	148
Champion	11	139
Channelmaster	2	103
Comm/Scope	7, 11	122
Cooper/Belden	12	140
DH Satellite	2	104
Eagle Comtronics	4	112
Flight Trac	15	151
FM Systems	9	129

	Page No.	Reader Service No.
Foresight	12	141
Hughes Microwave	3	107
Integral Corp.	7	123
Jerry Conn	2, 8, 9	105, 106
Kennedy Cable	12	142
Laser Precision	9	130
Leaming	3	108
Midwest Cable Services	15	152
Monroe Electronics	3	109
Moore Diversified	8, 12	124
Newhall Pacific	15	153
Northeast Filter	6	119
Philips Broadman Networks, Inc.	4, 8	113
Power Technologies	5	115
Qintar	3, 6	110
Quality RF Services	4	114
Reliance Comm/Tec	8, 113	125
Riser-Bond	10	131
RMS Electronics	5	116
RTK	13	143
Scientific-Atlantic	3, 5, 7	111
Signal Communications	15	154
Times Fiber	13	144
Trilitic	10	132
Trilogy	13	145
Vikimatic	13	146
Wavetek	10	133

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Circle Reader Service No. 36

Alternate access heats up in Dallas

The topic of alternate access, a.k.a. the business of putting cable's fiber optic networks to the task of providing local access links between big business customers and long distance carriers, drew a healthy crowd in Dallas last month as operators looked more seriously at the fledging business.

In a session titled "Alternate Access: Maximizing Fiber Investments," moderator John Egan, president and CEO of Antec, described alternate access as a "non-video step for cable operators" that is "a rather hot topic."

Rather hot, indeed. According to panelist Tom Gillett, president of Gillett, Lehman and Assoc., the monies that could potentially wriggle into cable operators pockets from providing a local loop link total somewhere around \$1 billion.

So how do cable operators tap into this big-dollar game? Gillett offered two recommendations: First, minimize the impact of alternate access-related business activities on current video services. Second, find partners—like cellular providers—to help in starting and maintaining the business.

"The challenge here is not technical," Gillett explained. "It's a transition from servicing residential customers to servicing business customers." To make that transition, three things have to happen: "RF has to go to digital; one-way plant has to go to two-way; and coax has to go to fiber."

Also, cable operators looking to get into the access business have to be a shade more reliable than existing local access carriers. "If the local access guy is providing 99.99 percent reliability, then you better have more 9s," Gillett said. And, operators also have to provide a price advantage over existing access providers.

From the trenches

Speaking from the trenches of the existing access business, Bob Annunziata, president and CEO of Teleport Communications Group (recently purchased by Cox and TCI), explained that his focus in running the company, which services 27 communities including Dallas, Boston and New York, is "being *not* the phone company."

"The local exchange telecommunica-

tions services are the last bastion of monopoly," Annunziata emphasized. "But look at the numbers—the telcos are grumbling that companies like Teleport and other smaller access companies have eroded their market. But guess how much we've eroded it? From 100 percent to 98.5 percent," he said.

Annunziata also stressed the need for continued pressure on key regulators to make local access a competitive business. "For over 100 years, regulators have nurtured and protected the

"I'm bullish on the access business. It's the first use of our plant for non-core business."

telcos," he said. "In doing so, the telcos have created an illusion that they have competition. That is just not the case. And convincing regulators otherwise takes time and money."

AT&T gives access costs

Next up was AT&T's Tom Herr, who stressed that to AT&T, "access is the largest single line expense on our balance sheet. In some cases, it represents 60 to 65 percent of cost of goods sold—it's a critical business element."

Herr said that in 1991 alone, AT&T booked \$13.9 billion in access expenses. Of that number, 42 percent represented business clients. "But," Herr explained, "our interest is not just on the cost/price side—that's simply not true. It's all about responsiveness. There's no way that we'll undertake any access business if we can't do it with good quality."

Continental's view

Continuing the discussion was Bill Schleyer, executive VP of Continental Cablevision and a guy who clearly believes in cable's future in alternate access. "I'm bullish on the access business. It's clearly a turning point from

plain old cable TV," Schleyer said. "It's the first use of our plant for non-core businesses."

And, Schleyer said, it doesn't take a major league thinking cap to come up with all the various revenue opportunities cable can provide, including HDTV, alternate access and "other emerging applications that we may not even know about yet." Totalled, it's \$200 billion worth of industries, he said.

"We'll start to find these niches if we implement our networks the way CableLabs is suggesting, with fiber. Alternate access is a perfect example, because we can be a low-cost provider of redundancy," Schleyer said.

Schleyer's revenue numbers were a bit more conservative than the other panelists, at \$500 million. "It's a \$5 billion business. If third-parties were to capture 20 percent, and cable took half of that, it rounds out at \$500 million, or about \$10 a sub," he explained. "So, there are very good reasons to venture in, but there are risks."

Risks

Those risks take several forms, starting with normal business and financial risks. "Alternate access is capital intensive with a break-even point several years out. There's no instant gratification here," Schleyer said.

Further, there are competitive risks. "Of course, the real competition is the RBOCs. Today, competitive pricing is all over the map, or you may have more than one third-party in a market. In a capital intensive business, that's a real danger," Schleyer continued. "And the telcos take a real dim view of us being on their poles. That won't change."

Factor in organization risks, to which Schleyer suggests "partnering up," market risks and political risks, and it's clear that the decision to enter the alternate access business can't be made overnight—or, as Schleyer puts it, "it's definitely *not* a no-brainer."

Still, though, Schleyer says Continental plans to enter the alternate access business and commit monies to it. "But to make it work, we're going to need unprecedented cooperation among ourselves," he said. "The cable industry has to focus on who our competition is—and it can't be ourselves."

"The real message here," Schleyer said in closing, "is that if you want to do it, examine the risks and keep your eyes open." **CED**

By Leslie Ellis

Continued from page 54

provider of tape duplication services for broadcast television and radio programming and commercials. The system features satellite delivery of compressed video and local storage and playback. It is expected to be commercially available by early 1993, and promises to eliminate the current broadcast and cable TV practice of compiling spot reels and delivering the tapes by overnight delivery services without any price premium, said officials.

On the set-top front, S-A introduced versions of the Model 8600 addressable terminal compatible with some Zenith Z-TAC and Jerrold RF set-tops. The new terminals allow operators to gradually introduce advanced set-top features when such upgrades aren't timed to coincide with a system rebuild. The new 8600 also is compatible with older RF-based Oak Communications, Eagle, Sylvania and Hamlin scrambling methods.

In other news, S-A announced a new addressable controller, the "System Manager 10," for 8600 systems. The Unix-based system runs on IBM PC 386 or 486 machines. Systems using the 8600 and offering this summer's pay-per-view Olympics also will be provided weekly promotional messages, at no cost, said company officials. The messages will be automatically downloaded to addressable control computers each Monday beginning in May. Also, S-A will be preparing an electronic program guide showing Olympic events on both the NBC and PPV channels, said company officials.

In order to make its interdiction system more palatable in a digital environment, S-A announced it has increased the bandwidth of its addressable interdiction system to 750 MHz, allowing for eventual transmission of digital and compressed video between 550 MHz and 750 MHz.

S-A gave its visitors a glimpse into the future by demonstrating ways a cable TV plant can be used to deliver interactive video games to customers. At its booth, S-A featured a Sega Enterprises "Time Traveler" game, which showed how a videodisc unit and computer at a headend could allow subscribers access to the game using only a joystick and holographic display. The system would require two-way active plant, but demonstrates how expanded bandwidth systems and small optical serving areas could provide the basis for delivery of such new services, said S-A officials.

The company featured a couple of additions to its distribution lineup, too. The new LE-II line extender features a

transformerless power supply to lower power bills and an optional wideband AGC to allow greater cascading of line extenders. Also, a new Slimline integrated receiver/decoder includes a VideoCipher II-Plus descrambler, yet occupies just 1 3/4 inches of rack space. And finally, S-A displayed the Cable Microcell Integrator which was recently tested by Cox Cable in San Diego to transport a PCS phone call over the cable plant.

Alpha Technologies

Alpha Technologies has developed a new "APC" series power supply featur-



At the Show, Malone called cable the "most cost effective highway into the home."

ing a modular transformer and a variety of plug-in options, including an "Amp Clamp" surge protector, LED pilot light and time delay relay, said company officials. Line conditioning, surge and short circuit protection features also are built in. The "FP" series, available in both AC and DC-standby versions, are designed for powering loads between four and seven amps. The FP4005, designed for powering optical receivers, provides 5-amp DC power with eight-hour standby time.

Channelmatic

Channelmatic displayed its new Adcart/D digital commercial and program insertion system which made its debut at this year's CAB show in New York. The 12-channel insertion system consists of an encoding workstation, a file server, a VALET (video/audio Local Electronic Transfer) and the desired number of digital Adcards. The system can be configured to provide Betacam, U-Matic SP or VHS-HQ video quality. The system is scheduled for release by the fourth quarter, said Channelmatic officials.

In addition, Channelmatic now offers the Sony S-VHS tape player as a signal storage option for AdCart line of commercial insertion systems and the CompEdit compiler and editor.

In other news, Channelmatic said the AdCart systems now have three additional features, including an "ROS Event Mode" that allows airing of run-of-schedule advertising without the need for a detailed schedule. An "Electronic Directory Editor" eliminates the need for a separate tape encoding unit. A "VCR Sharing" feature devotes as many as four VCRs to two channels, officials said.

Finally, Channelmatic introduced a spot reel compiler and editor capable of assembling four reels at once, using Super-VHS, Betacam-SP, or three-quarter inch machines. The CompEdit also works with Panasonic's LQ-4000 rewritable laser disc player.

Dynatech Cable Products

A preview of the new Dynatech automated character generator was given during the convention. The DynaGen 400 consists of a set of circuit boards which can produce from one to four character and graphics generators in a standard IBM PC chassis.

Electroline

Electroline Equipment Inc. unveiled its new 862-MHz addressable system, featuring electronic signal jamming. The "Multi-Tier" security system controls two broadband basic tiers and up to 12 premium services on as many as six additional tiers to provide addressable interdiction without high cost.

Electroline officials announced that the 1-GHz "EAS Multi-tap" system now is in full production. The Multi-tap is an outside-the-home addressable system compatible with many forms of signal security, including traps, set-top decoders or interdiction oscillators.

It offers addressable on-off control of all signals and is reportedly transparent to digital compression and HDTV signals.

Finally, Electroline showed an impulse pay-per-view system intended for hotel, motel, hospital and related applications. Customers can order movies using their in-room telephone keypads and are guided through the ordering process by an automated voice response unit.

Electroline also showed its 862-MHz splitter assemblies, designed for "cluster tap" networks favored in Europe. The assemblies come in several versions and can be serially interconnected to create 32-drop, 40-drop, 48-drop, 64-drop or other clusters.

Continued on page 77

"Standby Power Reliability is a Team Effort."



Bob Gruenstern, Engineering Manager for Johnson Controls

Sunny McCormick, Director of Engineering for Alpha Technologies

■ *Bob Gruenstern, Engineering Manager at Johnson Controls Specialty Battery Division, makers of the Dynasty gel batteries.*

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another good example of using the right technology for the application."

■ *McCormick:*

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Circle Reader Service No. 37

How new technologies affect the headend

Most cable engineers agree that the cable industry is currently undergoing as much or more change than it has seen since the development of satellite-delivered programming in the mid-1970s. But how will the convergence of new services affect the headend? That was the question posed at a National Show technical session titled "Headend Operations" last month.

Moderated by Hank Cicconi, VP of engineering for Sammons Communications, the session included panelists digging into issues like technical standards, ghost canceling, videodisc developments and digital commercial insertion.

Speaking on the upcoming technical standards and how they translate to cable engineers was Jim Farmer, technical manager for Scientific-Atlanta. "Most of the signals in the headend are given to you postage-paid from the programmers. That's a useful set of signals," Farmer said. "Of course, you don't want to be—and the FCC says you're not—responsible for signals before they reach you. But in my experience, the programmer's signals are pretty darn good. In general, signal problems will happen in and after the headend."

Some of those problems include certain baseband measurements, which will soon have to be measured in the headend if the FCC's proposed technical standards take hold. Those measurements include frequency response, differential gain, differential phase and chrominance to luminance delay.

Farmer said the absolute minimum setup for observing baseband signals is a TV or VCR with a baseband output, an oscilloscope and a sync separator circuit. A better set-up, he emphasized, is a professional quality demodulator with an agile front end with a waveform monitor and vector scope.

Farmer, who stressed that the FCC's proposed technical standards are "good, but not as good as you can do to improve pictures," also recommends depth of modulation (DOM) measurements and audio deviation tests to make cable headends providers of the best possible signals.

An end to multipath echos?

For example, Uwe Trode, product

manager for Philips Broadband, stressed that after some 50 years of effort, 1992 may be the year that ghosts become a thing of the past. In looking at the scope of the ghosting problem, Trode said that of the 1,500 off-air stations, 2,500 LPTV stations and 8,000 to 10,000 cable systems delivering television signals across the U.S., more than 70 percent of those channels are impaired by some form of ghost.

In fact, in 1991, Philips Broadband conducted a test which reinforced its

**"This year might mark
the time when ghosts
become a thing
of the past."**

hypothesis: "We found that 80 percent of cable engineers and chief technicians polled said, yes, we have a problem with ghosting," Trode recounted at the session.

Trode went on to explain that the ghosts, which are delayed copies of an original signal, take on two forms: A pre-ghost, also known as direct pickup interference (DPU), which reaches the television before the transmitted signal has arrived, and a post-ghost.

Previous efforts to eliminate ghosts have included methods ranging from clumping aluminum foil onto rabbit ear antennas, then moving the antenna to find a clear signal, to stacked antenna arrays, to the current electronic ghost canceling systems under development by various industry groups including Philips Broadband, AT&T, Sarnoff, Samsung and the Broadcast Technology Association of Japan.

The two-part electronic system consists of a reference signal located at the transmitter site, and a cancellation unit located at the receive site. In the process, Trode said, the system first characterizes the channel response, then equalizes the channel through the use of adaptive filters. "It is the ghost canceling reference signal itself that is analyzed to characterize the channel," Trode explained.

How do operators get this technology into their systems? "If you were to go shopping today for an echo canceler," Trode said in the session, "you'd have to go outside the country, except for Philips. Also, some other methods may need modification."

Rogers' ghost tests

Continuing the discussion on ghost cancellation was Gary Chan of Rogers Engineering, a company which pioneered a series of tests on multipath interference. Chan cited test results from experiments conducted in Vancouver, B.C., Kitchener, Ont. and CableLabs tests in Washington, D.C. Highlights of the three tests include:

- AM and FM microwave systems, if not well maintained, can produce non-linearity which can adversely affect ghost cancellation performance and convergence time (the time it takes for a ghost reference signal to be analyzed and recovered into a corrected picture at the receive site).

- In a cable environment consisting of AML distribution and two test channels (channels 2 and 48), Chan sites that the process through the ghost canceler did not affect overall picture quality, and that 89 percent of the 19 test points actually showed an improvement in the picture.

Also, Chan emphasized several factors for operators to take into consideration when specifying ghost canceling equipment. First, Chan recommends reset and by-pass functions on both the front panel display and remote controls of the ghost canceling equipment.

Chan also recommended asking for a function which will automatically freeze the last set of transmitted filter coefficients for use when broadcasters turn the reference signal off (usually during broadcast tests). This will eliminate the receive equipment from entering a state of instability attributable to the loss of the GCR signal.

To prevent momentary loss of signal caused by electrical interference or "impulse noise," (which can be "very annoying," Chan said, if it happens often enough), Chan suggested that operators ask manufacturers for their specifications regarding robustness to electrical interference.

Lastly, Chan said that operators may want to ask for an IF interface option, since ghost cancelers are largely baseband devices.

Shifting the session's focus from

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Circle Reader Service No. 38

multipath interference elimination to hi-tech laser devices, Pioneer's Quintin Williams continued the discussion with a presentation on new, erasable video discs—a concept construed by many to be "impossible" not too long ago.

The new discs use a magneto-optical process which offer users the ability to erase and rewrite over 1 million times without degradation. The discs are made up of layers of magneto-optical, dielectric, adhesive and photopolymer materials. Pre-grooved microscopic "valleys" in the disc's surface allow a recorder to record and play information, to the tune of 57,600 individual frames of video on a 32 minute disc, Williams said.

The new discs vary significantly from replicated discs, Williams explained, in that the magneto-optical disc contains billions of individual segments, each of which can be magnetically polarized. To enable recording, a laser heats a segment of the disc—which changes the magnetic field orientation that indicate the north and south poles of that segment. As the segment cools, recorded information is permanently stored because of the changed orientation.

Erasing is just the opposite, Williams explained. Again, the laser heats a segment of the disc; then a magnetic field is applied which reorients the segment to a north-pole position. All blank and erased disks have this north polarization.

"The important thing about all of this," Williams said, "is its implications on cable's local origination and commercial insertion businesses."


Digital commercial insertion

Yet another set of equipment that resides in the headend are those racks of commercial insertion equipment and VTRs—and CableLab's Scott Bachman addressed the rising awareness of commercial insertion in his presentation on digital commercial insertion platforms. Speaking about the CableLabs subcommittee on commercial insertion, Bachman said that "first and foremost, we need to identify the strategic business objectives. As we all know, today's tape system is inadequate. Reliability is also an issue. And then there's the issue of space—of course, all of you guys out there have huge, 5,000 square foot headends and have lots of room for

new VTRs, right?"

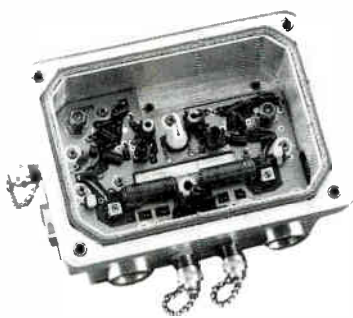
To address the growing list of commercial insertion grumbles, CableLabs is looking at a network migration path it calls CDCINet (for "compressed digital commercial insertion network), which aims to be a comprehensive, end-to-end compressed network that covers the needs of local, regional and national advertisers. "Of course, nobody wants to scrap out their existing system. This clearly has to happen over time," Bachman emphasized.

"We want to build from the local headend up," Bachman said in the session. As such, Bachman said, the headend will be the home base for "intelligent switching" that integrates current VTR technology and new all-digital formats.

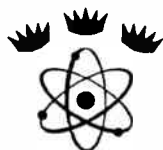
"So this is a call for action," Bachman said. "There are many, many technology challenges at play here. Those challenges include compatibility of multiple compression algorithms, a universal spot coding scheme, and a universal data exchange format—some kind of standard protocols for traffic and billing functions." 

By Leslie Ellis

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Continued from page 72

Nexus Engineering

A new product concept, dubbed the "intelligent headend" was shown by Nexus. The system was capable of automatically tuning a spare frequency agile modulator to the proper channel in the event of a modulator failure. The system can even be configured to tune to a "priority" channel in the event there are several component failures.

Optical Networks International

Optical Networks International announced that it has delivered its first YAGLink transmitter to Storer Cable's Hollywood, Fla. system. The high-power system, manufactured by Harmonic Lightwaves, will supertrunk signals from a Dade-Broward County headend 10 miles to the Hollywood headend, said company officials.

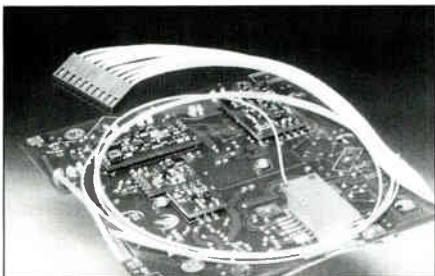
At some point in the future, several other area headends, including facilities owned by Intermedia Partners, Storer, TCI Broward County, and Jones Intercable, will be connected using a digital supertrunk, according to TCI Engineering Director Richard Rexroat. Some 11 additional LaserLink II AM transmitters will be used to trunk signals out to 19 or 20 receiver sites as well, said Rexroat.

ONI also used the convention as a venue to announce that it now sells the Sumitomo Type 35SE fusion splicer, said to reduce sleeve shrinking time by 50 percent. The device is said to shrink a sleeve in 90 seconds.

Ortel Corp.

Ortel Corp. offered a variety of technical demonstrations and new products during the show in Dallas. Heading the list was new 10-mW output DFB lasers, which are now standard production items. Ortel predicts that within the next 24 months, output powers will exceed 20 mW outputs.

In addition, Ortel now offers three new optical fiber systems designed for



Ortel's DFB transmitter board

transport of signals from remote satellite antennas to headends. The systems offer "short-haul" video performance at distances up to 30 kilometers, said Larry Stark, Ortel director of marketing. The systems are designed for carriage of 950 MHz to 1450 MHz signals; 3.7 GHz to 4.2-GHz signals; and dual-band signals at both frequency ranges.

Also, Ortel showed a 860-MHz DFB transmitter designed to feed a single optical cable, designed for European ap-

plications. The product utilizes a proprietary predistortion compensation circuit to extend 550 MHz production lasers for application to 860 MHz

Finally, Ortel demonstrated a "fault tolerant" transmitter that combines the output of two lasers yet still provides two optical outputs. The advantage of this concept is that both outputs will continue to be operational, even if one transmitter should fail. Also demonstrated was an optoelectronic repeater

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which used a prototype 15-mW 1310-nm laser that featured a lower noise figure than an erbium-doped fiber amplifier. Finally, a 1550-nm DFB with an EDFA was demonstrated.

Philips Broadband

In its first major move since adopting its new Philips Broadband Networks Inc. identity, the company announced it has purchased Orchard Communications Inc. Philips Broadband (formerly Magnavox CATV Systems) had been selling the Orchard high-power YAG transmitter systems under its own nameplate for some time.

The purchase allows Orchard's staff to continue focusing on research and development activities while Philips Broadband concentrates on sales and marketing efforts, said Dieter Brauer, Philips Broadband CEO. Orchard's product line includes FM transmitters and AM systems based on both distributed feedback (DFB) and YAG technology.

Also, Philips Laboratories and Sarnoff Research Center (working with Thomson Consumer Electronics) have joined forces to develop a single approach to ghost-canceling technology (see related

story in technical session coverage, p. 74).

Both had been considered leading contenders for a U.S. standard after testing earlier this year. The agreement, however, should combine the best features of both systems, targeting both short-delay and long-delay ghosts, said Jim Carnes, Sarnoff CEO. A product should be available by this autumn.

Philips also displayed a new generation of its interdiction system, which has been re-named "MultiMask." The system has been tested in Pampano Beach and Albuquerque and will be rolled out in larger quantities soon in a system to be announced shortly, promised Philips officials.

Pioneer Comm. of America

Pioneer Communications of America Inc. has developed a playback-only version of its videodisc recorder. Also new is a "play while record" videodisc player used when playback is time shifted up to 32 minutes, said company officials (see related story in technical session coverage, pg 74.)

Finally, a new CD changer aimed at the professional audio market was shown. Featuring two disc players

housed with a rack holding up to 300 discs, the changer can provide seamless playback of up to 9,600 discs with 32 changers daisy-chained together.

Prevue Networks

Prevue Networks announced it plans to market tests its new interactive program guide service in four systems. The "TV Trakker" system will be tested in Gwinnett County, Ga., Omaha, Neb., and in southern California as well as the Northeast. The tests will require add-on interface units to decode the data sent over the cable.

Regal Technologies

Regal Technologies Ltd. has introduced 1-GHz taps "faceplate-compatible" with Regal's 600-MHz products. The new product allows an upgrade to 1-GHz simply by exchanging faceplates, said Regal officials.

The new Regal RMT 10 Series units come in two-, four-, eight-port configurations. They also feature a 0.4-dB better insertion loss compared to the earlier product line.

Continued on page 82

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Ciciora: All-digital "not in my life"

If ATC's Dr. Walter Ciciora, VP of technology, is correct, then "it's an analog world after all." At last month's National Show, Dr. Ciciora hosted a "Basic Introduction to Digital Applications" session, where he was the sole speaker.

Ciciora's "it's an analog world after all" theme was sprinkled liberally throughout the presentation, from beginning to end (in the 20-page hand-out, the seven-word theme was printed 17 times). Why? "Because TV cameras, microphones and display devices use analog outputs," Ciciora said. "That's not likely to change overnight—or even in my lifetime."

Still, digital is an important development, Ciciora said, because integrated circuit design yields more effective signal processing and more robust signal transmission. The transmission is more robust, Ciciora said, because of the innate ability of a digital signal to process noise, regenerate completely and detect and correct errors within itself.

Ciciora noted a scientist, Nyquist, who explained many years ago that "things can only happen so fast." That is why, Ciciora explained, humans can blink their eyes and still drive a car without collision. At the heart of the Nyquist theory is sampling—and with a digital signal, one need only sample at twice the maximum frequency to enable perfect reconstruction with no errors.

The next step in digital technology is to quantize the sample. Quantizing, Ciciora explained, is approximation. Instead of continuous variables, there are a fixed number of approximate values, Ciciora explained. "This does introduce a small error, but the errors average out to zero."

Numeric representations

All digital signals consist of two binary numbers: zero and one. These, Ciciora noted, are called "bits," or "binary digits." Similarly, electrical circuits, Ciciora explained, can be in two states: on or off. These two states can be easily represented as "0" and "1"—and the method is "cheap, easy and reliable."

"It's much easier and more reliable than representing a continuous analog value," Ciciora noted. So, he said,

At the heart of digital circuit design is the integrated circuit. "Integrated

circuits are the main reason why digital is so interesting," Ciciora said. "It's the reason why digital technologies have left the mathematical department and entered the engineering department."

"The principle reason why digital technology is so important," Ciciora emphasized, "is because we can afford

to put a million digital transistors into a high-end set-top in the home. Clearly, there's a lot that can be done with a million transistors. In 10 years, we should be able to afford 10 to 20 million transistors in a cable set-top converter. That says to me that we have an exciting decade ahead of us."

Noise: Digital's enemy

The enemy of all this, Ciciora noted,

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is noise. "Noise is one of the consequences of an analog world. It's the random motion of electrons which contaminates a signal. It looks like snow in the picture, and sounds somewhat like the ocean—a random hissing sort of sound," Ciciora said. "It sometimes becomes inseparable from the signal as it builds up in cascades of amplifiers and other circuits."

That's where digital signal generation comes to the rescue, Ciciora explained. Because every circuit adds noise, digital technologists came up with the concept of signal regeneration wherein digital equipment need only decide whether an incoming data stream is a "1" or a "0", then generate a new, clean "1" or "0" to replace the contaminated signal.

"It's like starting all over," Ciciora noted. "This is something we cannot do with an analog signal."

However, digital does have a point where it completely falls off a cliff, Ciciora said. "In an analog world, things gradually get worse. The signal gradually decays. When a digital signal has reached its threshold, however, things suddenly become intolerable—there's a sudden collapse of performance."

Error detection and correction

To remedy this, error detection and correction circuits exist. The simplest form of error detection, Ciciora explained, is a parity check. With parity checks, bits are grouped into a known sequence. Then, the total number of "1"s in that group is counted. In "even parity," if the total is an even number, a "0" is appended to the bit group. If odd, a "1" is appended.

The parity principle follows a logic in which the likelihood of multiple errors rapidly diminishes. In a two-way system, re-transmission can be requested to correct the error.

"Of course, there are more complex error detection and correction schemes possible," Ciciora explained. "One method is to arrange the bits in a matrix of rows and columns, then apply parity to each row and each column. Because of the way the bits are arranged, I know when I have an error, so I can correct it."

Further, forward error correction methods are available for non-two-way systems with no feedback path to request retransmission.

In this method, a mathematical formula is applied to the message, which generates a new string of detection

bits. "In the receiver, the formula is re-applied and the result is compared to the string of detection bits," Ciciora said. "If the comparison fails, it's likely there's an error. In some cases, though, it's possible to compute the missing information."

Digital compression

In some cases, Ciciora noted, it makes sense to apply compression, called run length coding. "You're telling the receiver, hey, there's 30 zeros coming, or hey, that's the end of it."

The earliest example of such encoding, Ciciora explained, is Morse Code, where short codes were assigned to high probability symbols—like the letter "e." In the English language, that letter occurs frequently, Ciciora noted.

So where does the much-touted HDTV fall into the digital scheme of things? HDTV as a technology offers twice the current horizontal and vertical resolution, freedom from NTSC artifacts and digital audio. But, Ciciora noted, it requires tremendous compression to fit into the FCC's 6 MHz allocation scheme.

"Truth is, everything about HDTV is expensive," Ciciora explained. "The most expensive component is the display, because this is the only thing that doesn't fall under the mass production of the IC technology. HDTV VCRs are also expensive."

"Most likely, it will require viewing only in a darkened room," Ciciora continued, "because it's difficult to make a picture both bright and high in resolution. My guess is, it's likely to be a slow growth market."

To that end, Ciciora emphasized his well-publicized belief in multiple compressed NTSC channels instead of HDTV channels. "If you can squeeze 100 MHz of HDTV into 6 MHz, can't you squeeze multiple NTSC signals? The answer to that is yes," Ciciora emphasized.

Instead, Ciciora favors using digital compression for four possible scenarios: Compression just for impulse PPV; compression for IPPV and pay channels; for IPPV, pay channels and tiers, or to "just go absolutely nuts and digitize everything."

In the first scenario—using digital video compression for impulse pay-per-view only—Ciciora notes that the concept "pays its own way" because there is one decompressor box per home and a decompressor is not needed for the VCR.

The decompressor box in this scenario is a combination analog/digital box, Ciciora said, possibly using ATC's point of entry (POE) concept. POE, as Ciciora puts it, is "that point where our orderly cable system meets the chaos of the home."

In another scenario, digital video compression could allow for compression of both IPPV and pay channels. "This would allow us to clear out channels. At 10:1 compression, you're clearing out three channels and adding 30, so you're netting 27," Ciciora explained.

The decompressor box would be put into all pay channel homes. This presents a potential problem, though, because subscribers will "likely watch the pays and not PPV," Ciciora explained. Ciciora nixed the last two options—digitally compression for IPPV, pay channels and tiers, and digitizing everything—because they would be cost prohibitive.

Red flag: Ad insertion

One red flag Ciciora noted in his session was a "major headache" called digital local ad insertion. "Some of the tiered programs are ad-supported. This would require local compression for the inserted advertisement. But—and here's the problem—the same compression technology as is in the home is not the same as what's currently being considered for advertisements."

"The compression for advertisements was intended for storage systems. To work within a digitally compressed cable system, the same compression scheme must be used. That costs tens of thousands of dollars," Ciciora noted.

Use compression for NTSC

All in all, Ciciora said he feels compression will have "a major impact on our business. We could have 750 movies going simultaneously," he mused. "Then, the real headache becomes 'how do you feed the monster?' Where do you get the tremendous amount of source material required to fill those channels?"

As for all-digital television, though, it seems Ciciora isn't convinced. "I won't live to see it. I think we'll always have some form of NTSC to service the homes in this country. Analog is it. That's where it starts, and that's where it finishes." **CEB**

By Leslie Ellis

Power by Design

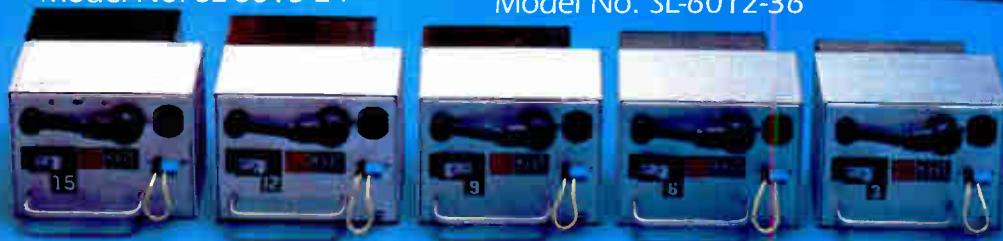


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Continued from page 78
Texscan

Texscan Corp. has developed two new amplifiers optimized for European cable TV networks. The new "Subscriber Service Amplifier" (SSA) trunk amplifier fits inside smaller enclosures and pedestals without requiring any difficult 90-degree cable bends, said company senior vice president George Fletcher. The S-PAL line extender offers the same advantages.

Meanwhile, Texscan has teamed with AM Communications Inc. to build a family of status monitoring and control products to be sold under Texscan's "Vital Signs" name.

The agreement is seen as necessary for the development of command and control systems for Texscan's optical fiber systems.

Texscan MSI

Texscan MSI showed off its laserdisc-based Marquee pay-per-view promotion system, an

automated barker system which allows operators to program their own barker channel.

The self-contained hardware and software system is interfaced to a laserdisc player and allows the user to overlay custom text, graphics and how-to-order info. The system automatically schedules a month of promos.

In other news, the company displayed its new Z series character generator which features improved video resolution, more flexible color palette and a new keyboard.

Zenith Electronics Corp.

Zenith Electronics Corp. and InSight

Telecast Inc. have inked a development agreement that will give Zenith TVs, VCRs and set-top decoders on-screen programming guide capabilities.

The deal gives Zenith exclusive right to offer the InSight on-screen guide with its TVs for one year after production begins in 1993. Zenith will incorporate the guide into its cable TV decoders later this year. InSight is backed by such heavyweights as Viacom International, the Tribune Co., Spelling Entertainment, TV Host/TV Listing and Sumitomo Corp.

The InSight signals are carried by the Public Broadcasting Service over the air in the vertical blanking interval. The electronic guide, considered a mandatory feature for cable systems offering video on demand and other mass pay-per-view offerings, displays titles, start times and program descriptions.

InSight also automates the process of program taping. For example, to record a program, a viewer simply selects the desired title and pushes a "record" button on the InSight remote control.

In addition, Zenith demonstrated the Videoway interactive TV system that has been successfully operating in Canada for several years. Zenith has built more than 200,000 in-home terminals for Les Entreprises Videoway Ltee. Also demonstrated was Zenith's digital video compression system.

Finally, Zenith announced it is developing a new scrambling system with DCE Communications Group plc of England. The "Digicrypt" system employs two levels of line shuffling instead of sync suppression, making it ideal for terrestrial broadcast applications, as well as cable and satellite uses.

Oak Communications

Oak Communications and I.T.M. Enterprises introduced their Select-A-View 9500 standalone impulse pay-per-view system. The system was designed for cable system operator, to provide a turn-key entre into the small- and medium-sized hotel market.

The system is based on Oak's Sigma addressable, two-way decoder and I.T.M.'s hotel software. Designed to be compatible with any cable system, the system includes a window-driven PC-based controller which is expandable.

I.T.M. executive VP John Bergmann explains that the system is ideal for tapping into the 1.5 million hotel rooms—or 51 percent of the U.S. hotel room market—which are currently unapproached by independent PPV providers because of location or size.



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C-Cor Electronics

C-Cor Electronics said at the Show that the company will continue delivery of its feedforward amplifiers in 30 to 45 days. This is important because many operators are experiencing ordering backlogs when trying to buy the devices, which require feedforward hybrids. "Because of our unique approach to feedforward circuitry using a readily-available discreet hybrid and our proprietary Triple S ceramic delay line, C-Cor is available to maintain its on-time delivery schedule for feedforward trunk amplifiers," said C-Cor president and CEO Richard E. Perry.

Tektronix

Tektronix Television Systems introduced its new 2714 spectrum analyzer, designed to make more repeatable RF spectral measurements for cable TV and broadband LAN engineers and technicians.

With the new device, all commonly



Tektronix 2714 cable TV spectrum analyzer

made measurements such as carrier-to-noise and hum/low-frequency disturbance can be made automatically by selecting the desired function from an on-screen cable TV menu. An accompanying PC-based software package enables extended capabilities, including complete measurement configuration, data collection and reporting features.

Gemstar

Gemstar Development Corp., makers of the VCR Plus+ instant VCR programmer, introduced a new device at the Show that will automatically program channel line-ups. Called Autoset, the device pre-programs the VCR Plus+ unit for cable operators' local or regional channelization formats. To use the device, operators input the VCR Plus+ into the Autoset. The device automatically sets the channel lineups, the cable box, the VCR and the clock on the VCR Plus+ within a few seconds. The advantage, Gemstar says, is that cable operators assist subscribers in setting up their in-home devices.

CED

By Roger Brown

Network planning with optical fiber

Sorting through the technological options

With news of advancements in laser transmitters, digital compression and optical amplifiers occurring on almost a weekly basis, it sometimes seems that change is the only constant in cable television technology.

As the industry moves through the 1990s, one thing is certain, however. There's never been a more challenging time to be a cable TV engineer.

Richard Mueller, VP/operations engineering for Cox Cable Communications, has experienced this challenge firsthand as his company makes network planning decisions that will position it for the future.

"Never in my experience has the technological future of the industry been so unclear, and at a time when we are facing so many potential technological challenges,"

Mueller says. "Exacerbating these circumstances, we at Cox are faced with making long-range technological/architectural decisions immediately that will affect 67 percent of our total network miles."

Planning the network

With approximately 1.7 million subscribers, Cox Cable Communications is the country's fifth-largest MSO. Cox an-

By Jon K. Chester, Market Development Manager, Cable Television, Telecommunications Products Division, Corning Inc.

swers several fundamental questions as part of its network planning process, as follows:

1. How many challenges are needed, and how soon?
2. Should fiber be deployed? If so, how

Determining subscriber benefits

By analyzing the results of its annual customer surveys, Cox learned that "quality of reception" and "infrequency of outages" were the two most highly rated system performance attributes (see Figure 2).

As a result, Cox selected two indices that would enable the MSO to understand what benefits its customers would notice for each of the technical scenarios it modeled. For quality of reception, Cox chose the carrier-to-noise ratio (CNR), which Mueller considers a very predictable phenomenon for accurately describing the quality of the received picture.

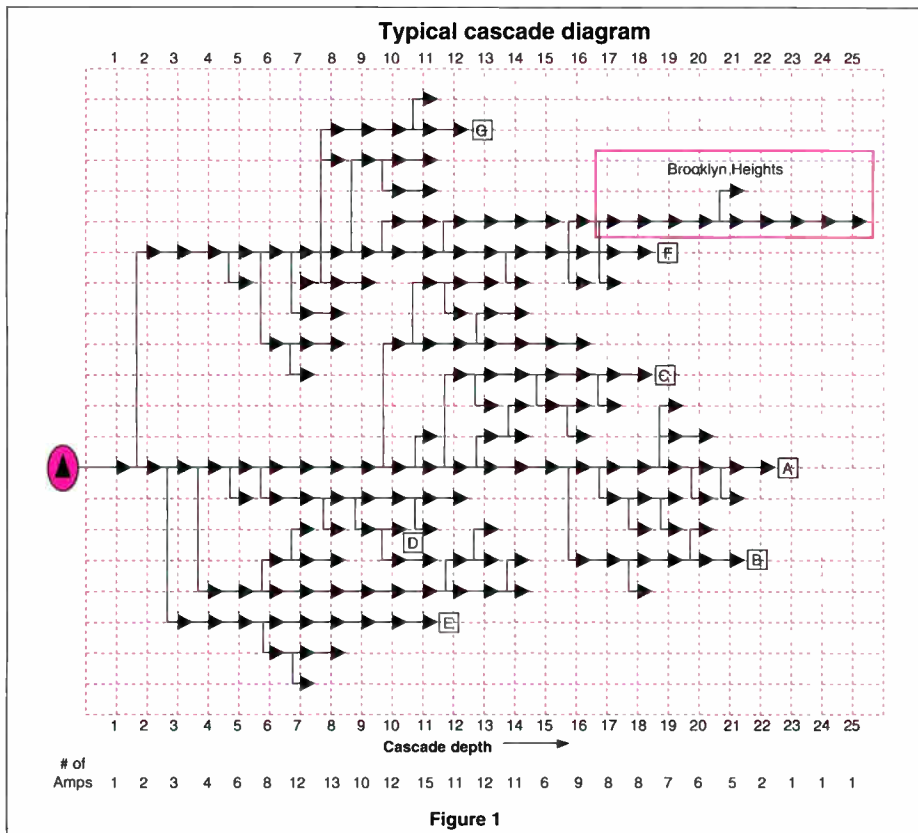
As a way of measuring the frequency of outages, Cox reviewed its customer reliabil-

ity percentage (CR%), an index the cable operator derived from the reliability prediction formula for devices in a series, which details the probability of a customer *not* experiencing an outage within a year's time (expressed in percent).

Exploring fiber scenarios

By defining the indices that are valued by its customers and selecting the appropriate measuring tools (CNR and CR%), Cox network planners then could quantify the potential benefits of a number of fiber deployment scenarios.

Mueller has developed a graphic rep-



much?

3. How soon should fiber be deployed?

According to Mueller, network documentation is the first step in Cox's planning process. As a way of determining the cost/benefit relationship of any contemplated improvements, the MSO prepares a cascade diagram for each of its systems. These diagrams provide the schematic location of every trunk amplifier in every system (see Figure 1).

From there, the schematics are combined into a computer spreadsheet program that enables network planners to quantify not only the costs of every possible degree of fiber infusion, but also the benefits to be derived for each.

Critical service attributes

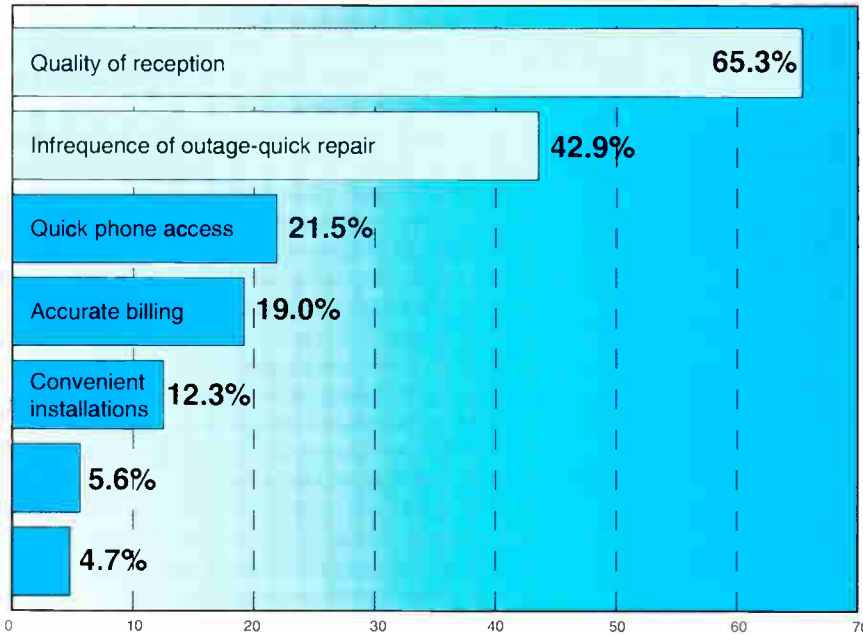


Figure 2

resentation of Cox's entire trunking network defined by a cascade depth from the headend (see Figure 3). The MSO's largest single density of amplifiers occurs at a depth of 15 amplifiers.

From this, Cox calculated the reception quality its overall network is delivering to its customer base by approximating the CNR at each customer's location. Cox network planners operate on the assumption that every amplifier serves about the same number of customers.

Impacts of cascade reduction

Next, Cox measures the impact of each possible cascade reduction to project the relative signal quality benefits for its subscribers. To quantify the reliability of its network, Cox again refers to the graph depicting its overall system cascade depths. Assuming that each trunk amplifier serves approximately the same number of subscribers, the MSO then projects the percentage of customers likely to experience an outage using its worst-case (summertime) trunk failure rate.

With this baseline established, Cox can predict the CR% for various fiber deployment scenarios.

Fiber deployment cost analysis

Armed with the knowledge of customer signal quality and reliability benefits, Cox then estimates the incremental capital costs for fiber deployment.

"The network schematics that docu-

ment our quality benefits now become the basis for developing a cost estimation model," Mueller explains. "These schematics give the serial location of every trunk amplifier in the network. In fact, they allow me to view all the systems within Cox as a single unit for the purposes of cost estimation.

"For each possible depth at which you might choose to insert a fiber node, the quantity of nodes required for my entire network can be determined. One then simply needs to know the average dis-

tance between amplifiers to estimate fiber lengths required to accommodate such a design," Mueller says.

Calculating the number of nodes and the estimated fiber distances required allows Cox network planners to determine the amount of materials and labor to install fiber under a variety of scenarios. With these numbers, planners can estimate costs to construct using various pricing scenarios ranging from very optimistic to very pessimistic (see Figure 4).

According to Mueller, the costs rise very sharply as fiber nodes increase and trunk amplifiers per node are reduced. The charges are especially high when fiber nodes serve seven or fewer trunk amplifiers.

Cox also breaks out the incremental capital costs into costs per subscriber as an additional method of assessing the cost versus benefit of each scenario (see Figure 5).

Cost vs. benefit analysis

By this step in the process, Cox has quantified the benefits of each scenario in terms of quality of reception and the infrequency of outage, as well as the estimated capital cost per subscriber.

To analyze how affordable these benefits can be, Mueller plotted them and their projected costs on the same graph (see Figure 6). "It becomes even clearer that the price of 'improvement' becomes very steep at about seven to eight trunk amplifiers per node," Mueller states.

Current cascade depths
Cox Cable Communications

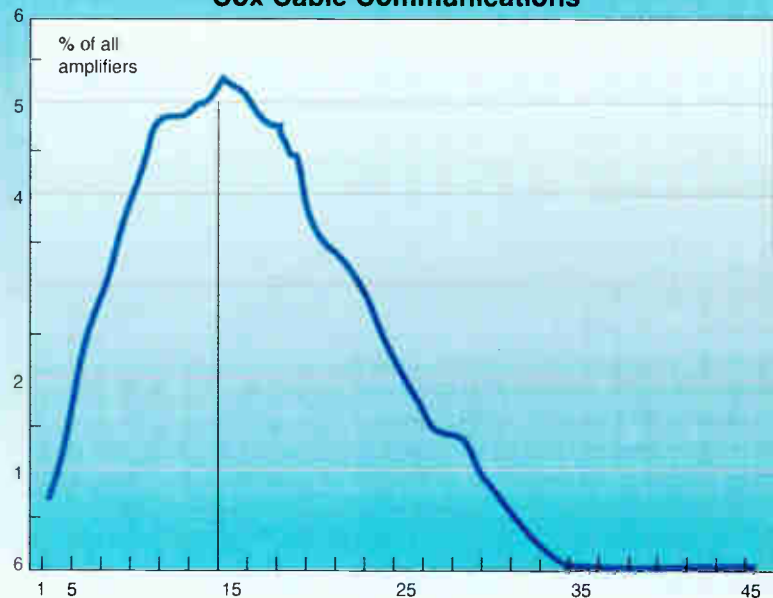


Figure 3



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"For example, the cost per subscriber to gain 1 dB of carrier-to-noise performance is an incremental \$13 when going from 20 to 15 amplifiers, whereas 1 dB of improvement costs an incremental \$80 per subscriber going from five to three amplifiers in cascade."

Viewed from a companywide impact, Cox estimates that 1 dB of improvement could cost anywhere from \$20 million to \$129 million. "At this point, one could argue that the vast majority of customers can't detect the improvement in CNR once it has reached 50 dB," Mueller says. "Therefore, from a strictly CNR standpoint, the extremely costly dBs of improvement beyond this point are probably unnecessary."

Reliability index

Cox makes similar comparisons with its customer reliability index. Mueller believes that a near "fail safe" system could be constructed, but questions whether the MSO's customers would be willing to pay the incremental monthly fee for such an outage insurance policy.

"We can achieve a 10-point improvement in CR% going from 20 amplifiers to 15 amplifiers at a cost of \$13 per subscriber," Mueller says. "An additional 10 points can be achieved going from six to three amplifiers at an incremental cost of \$116 per subscriber. Again—a huge difference."

Fiber network revenue requirements

As an additional measurement, Mueller translated the cost per subscriber parameter into a revenue requirement to offset the incremental investment in fiber (see Figure 7).

Cox made the following assumptions for this analysis:

- Depreciable life of fiber = 20 years,
- Depreciable life on optoelectronics = 10 years,
- Initial investment period = 10 years (with opto-electronics replacement occurring in years 11 through 20)
- Cost of money = 10 percent.

"While this calculation defines incremental revenue required to offset the incremental investment, it's important to realize that from a purely financial standpoint, the same results could be achieved with no incremental revenue but with an equal degree of expense savings," Mueller remarks.

Ultimately, it's likely that a combination of subscriber revenues and reduced expenses will defray the costs associated with fiber deployment. Cox also

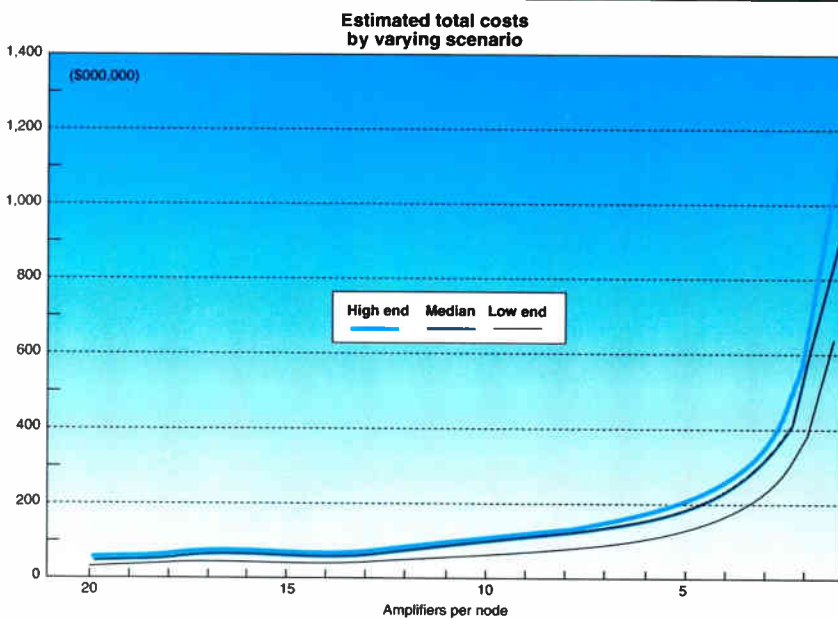


Figure 4

factors in overall network channel capacity in its cost vs. benefits scenario. Recent technology breakthroughs and the potential cascade reduction of optical fiber have made the systemwide bandwidth forecasting difficult.

"We decided more than three years ago that we would upgrade as many of

the future."

Optical fiber selection

According to Mueller, fiber selection also plays an important role in Cox's network planning. "Proper product selection makes our economic modeling a

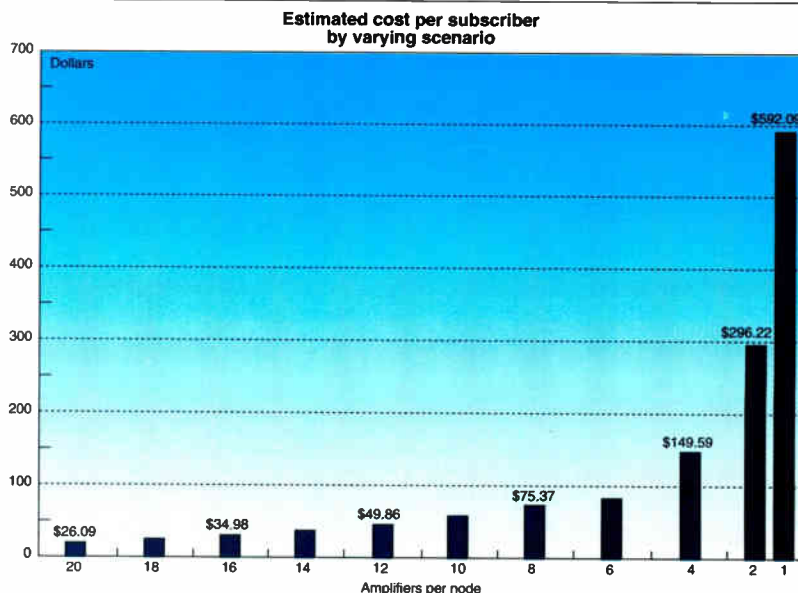
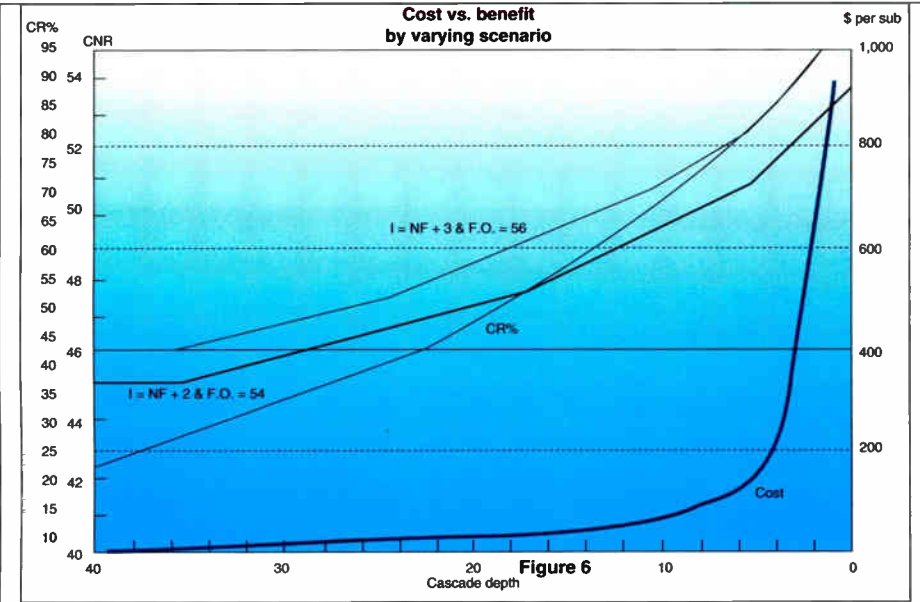


Figure 5

our coaxial networks as possible," Mueller says. "Our instinctive sense is to conserve as much capital as possible on the coaxial plant and invest prudently in the fast approaching fiber optic technology. The decision was a wise one, but it has had a short-term impact on channel capacity as we forecast into

reality," Mueller comments. "Given the magnitude of the investment involved in converting to a fiber-rich network, we decided to work with suppliers that could provide the highest quality products. So we look for quality, not just the lowest price, when making long-term decisions."



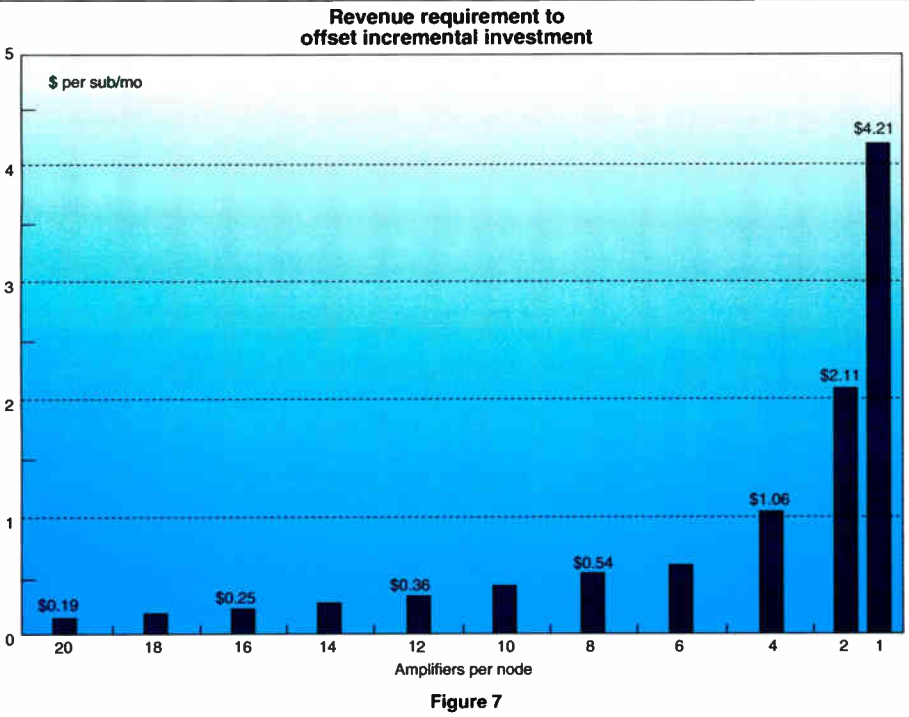
For Cox, network planning is based on the data derived from its actual existing systems, not hypothetical cascades. Its costs were projected from the actual number of nodes required for a variety of fiber deployment scenarios, not on attributed numbers based on past history.

In addition, the MSO has quantified the relative cost of benefits that its customers rate as most important. The result is a comprehensive analysis that takes the complex issue of future networking requirements and boils it down to a study of the most essential criteria.

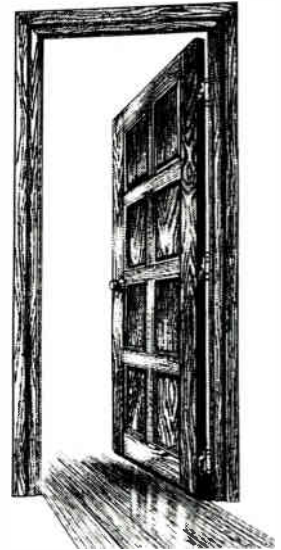
"Ultimately, the consumer has little

interest in delivery technology," Mueller concludes. "To win in our environment, we must provide the right mix of services at the right price, at the desired time, with the right degree of quality and reliability.

"This network planning process has confirmed that we can, and in all likelihood will, push fiber significantly deeper into our networks. The relatively small incremental dollars required for this investment can offer us significant benefits. Our process provides us with a more 'panoramic' view of our options," Mueller says, "and marks our technological path as we continue our journey through this exciting decade." **CEC**



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Moving with the times

Power supplies then and now

Over the past 25 years or so, several power supply manufacturers have introduced and experimented with many different approaches to back-up cable TV power supply design concepts. Many of these early attempts at back-up power supply products failed miserably with very low reliability and substandard performance. There are three basic design concepts that have been engineered and implemented over the years with varying results;

- 1). "Standby/off-line"
- 2). "Dual conversion UPS"
- 3). "Single ferroresonant UPS"

In any endeavor it is important to pursue the best design concept in order to maximize the benefits. The key parameters must include the highest reliability possible combined with high efficiency and reasonable cost. Particular attention should be paid to operating budgets in terms of the cost of energy and maintenance. Other issues such as manufacturing, quality, consistency, environmental conditions and ease of use must not be neglected. It is therefore imperative to start with a sound concept so that future requirements can be accommodated easily and effectively.

This design concept includes two separate power supplies. One module is designed to operate from the AC line

as a transformer/line conditioner and provides 60-volt AC square wave output power to the cable television amplifiers when AC utility power is present. In the event of a prolonged brownout or complete loss of utility power, a relay switches the cable system over to the output of another power module which includes a DC-to-AC solid-state inverter. This module converts the stored energy in the batteries to a symmetrical square wave AC output. This way the cable TV system will continue

to operate until AC power returns or the battery power is depleted (see Figure 1).

Two/module/standby-off-line concept

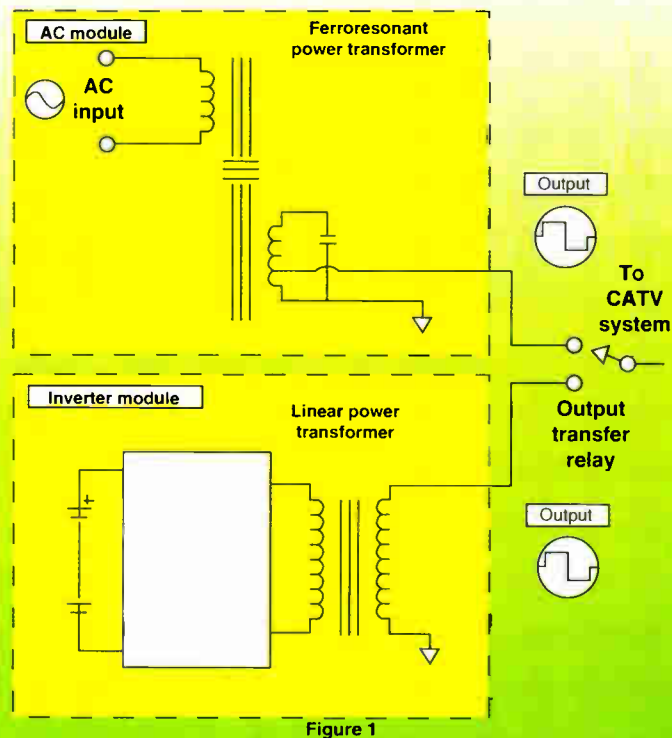


Figure 1

could be at the positive peak half cycle. Suddenly, the relay switches to the output of the inverter module, which could instantaneously pull the cable system the opposite direction to the negative peak half cycle.

This lack of synchronization results in the generation of voltage transients and instability during the switching process, not to mention the long interruption in power output to the cable system which can cause other problems that will be described later.

One of the other disadvantages that has become an issue recently is the wave shape of the inverter output of the two-module "standby/off-line" design. The inverter design, in most products today, utilizes a linear transformer that does not provide any significant filtering or regulation. The waveshape is a symmetrical square wave with very fast rising and falling edges and is often accompanied by an overshoot or ringing on the leading and falling edges (see Figure 2).

According to several system operators and equipment manufacturers, the high frequency harmonic content of this

There are several disadvantages to this design. First, the relay that transfers the cable system connection from the output of one module to another causes a significant delay (as much as 40 milliseconds) in output power to the plant. When the relay switches, it does so in an unsynchronized fashion. This may cause a significant phase shift in the cable plant

when switching from one module to the other. When the power outage occurs, the output waveform to the cable system

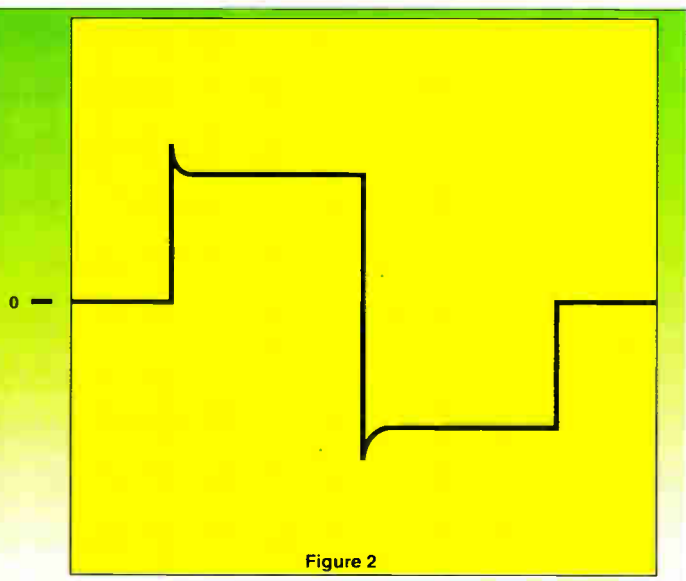


Figure 2

By Fred Kaiser, President, and Tom Osterman, Director of Research and Development, Alpha Technologies Inc.

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waveform could cause significant interference in the subscriber's picture. In the subscriber tap, some of these harmonic frequencies will cause some ferrite-core coupling transformers to saturate. Due to the nonlinearities involved, interfering harmonic energy will be transmitted to the subscriber, causing serious interference. In other words, this saturation of the core is, essentially, a momentary interruption of RF signal flow through the tap to the subscriber affecting all channels (see Figure 3). The observed visual effect in this picture is somewhat similar to hum modulation, as depicted in Figure 4.

This interference manifests itself as high intensity lines that roll through the picture at about a 1-second to 2-second rate. The fast "roll rate" is caused by the operating frequency of the power supply inverter which is typically unregulated and can vary significantly from 60 Hz due to battery voltage, output load and ambient temperature. It is not unusual to experience inverter frequencies as high as 84 Hz with certain types of inverter designs.

Another disadvantage of the two-module standby design is the number of components and their associated cost. Each module contains a large power transformer which doubles the cost of the magnetics required in the unit. The non-standby unit usually contains a ferroresonant transformer and the inverter module contains the aforementioned linear transformer.

Dual conversion UPS

This design originated in the com-

puter industry as a means of providing uninterrupted power to computer equipment to prevent data loss due to power disturbances.

This dual conversion concept is a rectifier/filter stage which converts the incoming AC utility voltage to DC. The DC

the DC current back to AC at the proper voltage and frequency.

The significant disadvantage of this design is the low operating efficiency and reliability. Due to the double conversion steps of AC-to-DC and DC back to AC, the overall operating efficiency is 60 percent to 70 percent.

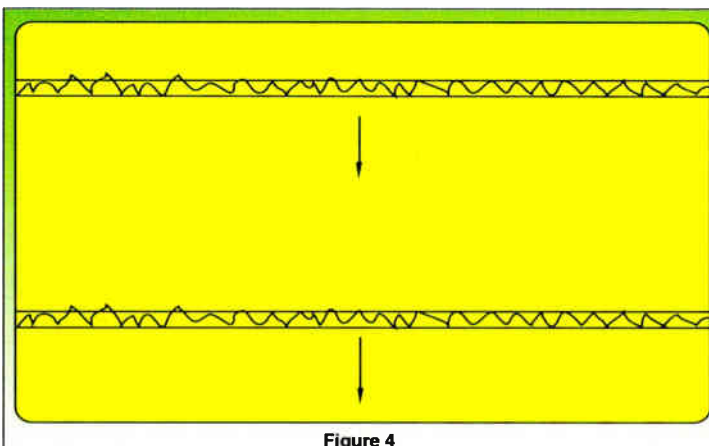
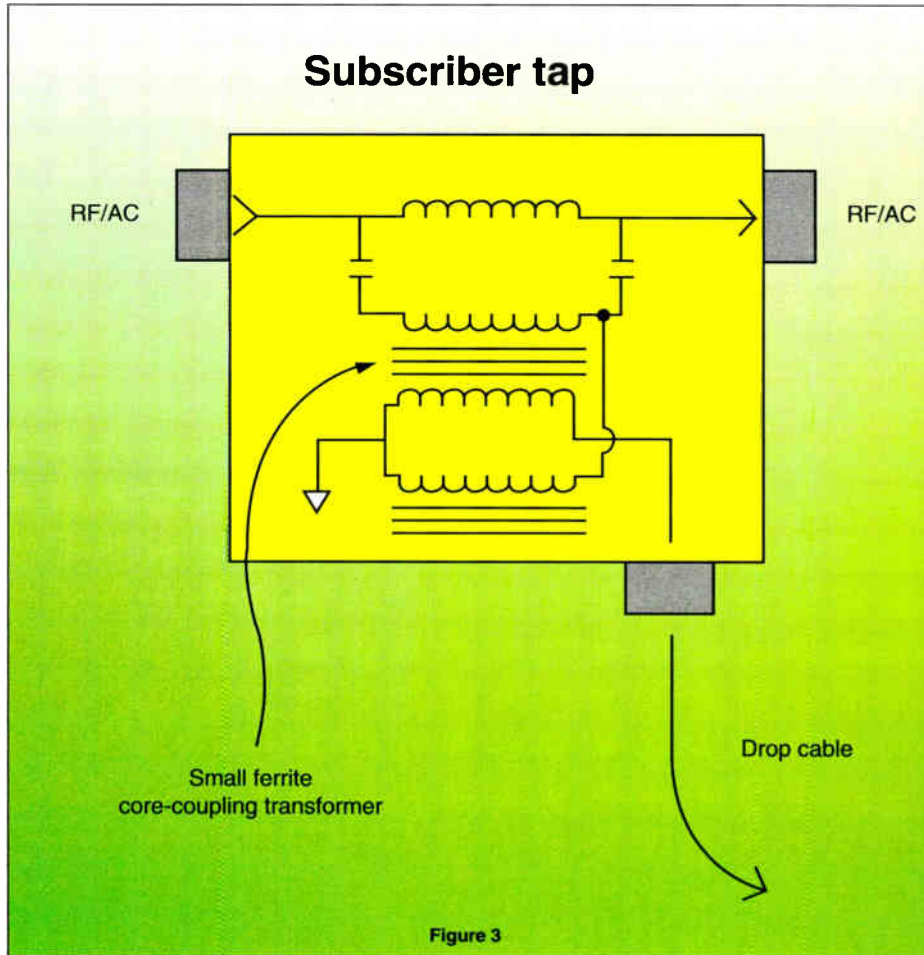
The power that is lost due to conversion inefficiencies is dissipated in heat. This results in a high cost of operation especially in areas with high electricity rates and constant thermal stress on components, which can lead to premature failure. Typical MTBF rates of this concept are 25,000 hours or less.

The other problem with the excessive heat dissipation is the adverse effect on the battery string. In some areas of the country that already have consistently high average ambient temperatures, the excessive heat generated in this design seriously aggravates an already undesirable

condition of high battery temperature. A good rule of thumb is for every 15.0-degree F increase over room temperature (77 degrees F) will effectively reduce the projected battery life by 50 percent. The dual conversion design is also somewhat more sensitive to damage caused by utility transients and may require a bypass switch to achieve acceptable reliability levels.

Single ferroresonant UPS

This design has been used successfully for more than 25 years to protect and back-up computer, telephone and process control as well as cable television equipment. This concept combines the





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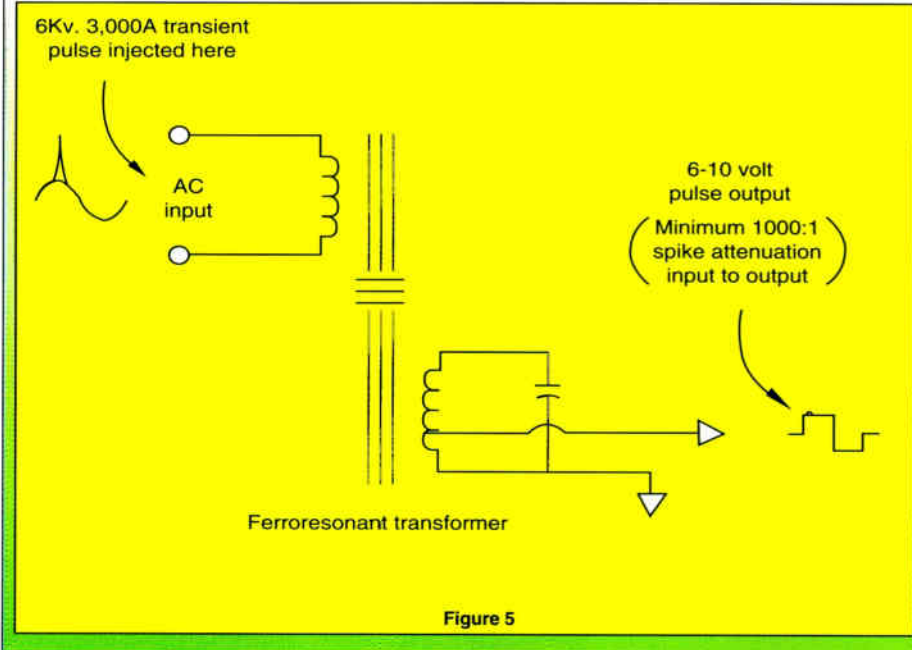
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best features of the other power supply designs without the previously described disadvantages. The description of this power supply design is somewhat self-explanatory. A single ferroresonant transformer is used for both the AC and battery backup modes of operation.

The ferroresonant transformer design is over 40 years old and although simple in appearance, performs several complex power protection tasks with very high reliability. Because of the basic two-component design, the ferroresonant transformer and resonant capacitor MTBF rate in excess of 100,000 hours.

The ferroresonant design provides very good line/load regulation, spike



Category B (IEEE 587-B) 6,000-volt, 3,000-amp test pulse injected at the primary result in only 6 volts to 10 volts maximum measured at the secondary output! (See Figure 5).

In the ferroresonant UPS concept, there are two primary windings and one secondary winding. The secondary winding is inductively "decoupled" from the primary windings by about one inch of steel lamination core (see Figure 6). Unlike a linear transformer with

and surge attenuation as well as output short circuit fold back protection. Typical attenuation of voltage spikes primary to secondary, is better than 1,000:1. Electrical noise and RF attenuation in normal mode is typically 60 dB. Tests with the ANSI C62.41-1980

its primary and secondary windings wound in close proximity on the same core tube, the ferroresonant transformer primary and secondary windings are wound in separate core tubes isolated from each other. This results in very low capacitive coupling of spikes or high

AD INDEX

	Reader Service #	Page #		Reader Service #	Page #
AM Communications.....	4	6	Microwave Filters.....	26	42
ATC.....	20	34	Midwest CATV.....	25, 27	41, 43
Advanced Comm. International.....	58	113	NCTI.....	57	111
Alpha Technologies.....	11, 37	19, 73	Nexus Engineering.....	6	9
Anixter Cable TV.....	62	122	Panasonic Office Automation.....	33	51
Antennas for Comm.....	60	114	Philips Broadband.....	23	39
Atlantic Cable Show.....	56	107	Pioneer Communications.....	7	10-11
Avcom of Virginia.....	55	104	Power Guard.....	43	81
Budco.....	24	40	Ripley.....	44	82
Cable Leakage Technologies.....	45	83	Riser Bond.....	19	34
Cable Prep.....	30	46	Siecor Corp.....	21, 47	35, 87
Cable Services Co.....	32	49	Standard Communications.....	13	23
CALAN.....	9	15	Sumitomo.....	15	27
Channell Commercial.....	18	33	TG Industries.....	28	44
Comm/Scope.....	29	45	TEA.....	53	103
Çontec International.....	41, 61	78, 121	Tailgater.....	59	114
Dovetail Surveys.....	51	100	Time Mfg.....	46	84
Dynatech Prods.....	49	91	Times Fiber.....	10	17
Eagle Comtronics.....	38	29-30, 75	Trilogy.....	5	7
FM Systems.....	17	32	Triple Crown.....	39	76
Hewlett Packard.....	40, 42	77, 79	Universal Electronics.....	50	93
Jerrold.....	22	37	Viewsonics.....	31	47
Lectro Products Inc.....	1-3	3-5	Wavetek.....	8	13
Matrix Test.....	34	53	Wegener.....	14	25
Meson Design & Develop. Inc.....		29-30	Westec.....	52	101
			White Sands.....	54	29-30, 104

Ferroresonant transformer construction

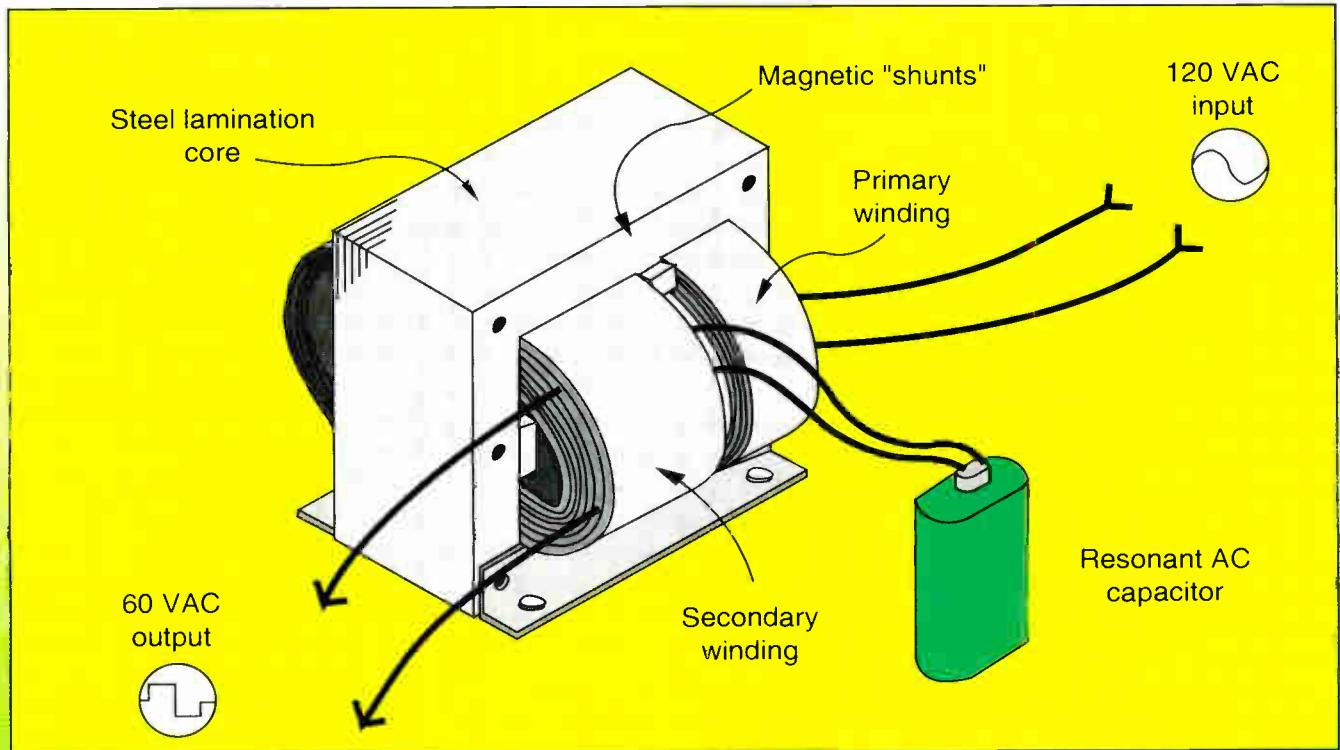


Figure 6

frequency noise from input to output which can be a significant problem in linear transformer designs.

Because the resonant secondary winding circuit controls the wave shape of the output to the cable system, there is no difference in waveform appearance, frequency or voltage between AC or inverter operation. Unlike the two-module standby/off-line design in which the cable plant is switched from one source to another, ferroresonant UPS transfer is virtually uninterrupted while transfer is very fast, in-phase and consistent in voltage and frequency (see Figure 7).

The AC line primary winding provides AC input to the transformer for normal operation. The energy is coupled to the resonant tank circuit secondary winding and out to the cable system. The inverter/charger primary winding provides energy to the temperature compensated battery charger circuit that maintains the proper float charge to the batteries during AC operation.

When a brownout or blackout occurs, the inverter/charger primary converts to inverter operation from the previous battery charge mode and the AC line primary is disconnected from the utility line to prevent the backfeed of power to the utility while the power supply is operating in standby.

Because the cable system is always connected to the resonant tank circuit/secondary winding, the circulating energy in this tank circuit can continue to provide power to the cable system during the transfer from the AC line primary to the inverter primary and vice-versa. The result of this configuration is smooth, in-phase, uninterrupted power flow to the cable system during transfer. The output voltage, waveshape and frequency are consistent in both modes of operation (see Figure 8).

Present technology

The right concept has been in use for a long period of time with excellent results in cable systems worldwide as well as computer and telephone back-up applications. As with all technologies, there is ongoing development and improvement that continues to make a good thing even better.

There are some new developments in ferroresonant technology that provide an improvement in performance over the existing designs in several areas. With a proprietary new transformer

technology, the performance of ferroresonant-based UPS for cable television applications could be improved.

The previously described waveform interference problem in the subscriber tap can occur under certain conditions even with the quasi-square wave output of ferroresonant transformers (see Figure 9). Although the visible interference is an order of magnitude less than with the two-module standby/off-line concept, the standard ferroresonant transformer output waveshape can cause some visible interference that is the same in AC operation and standby.

The new ferroresonant design provides a modified waveform output that reduces voltage "slew rates," therefore eliminating visible interference caused

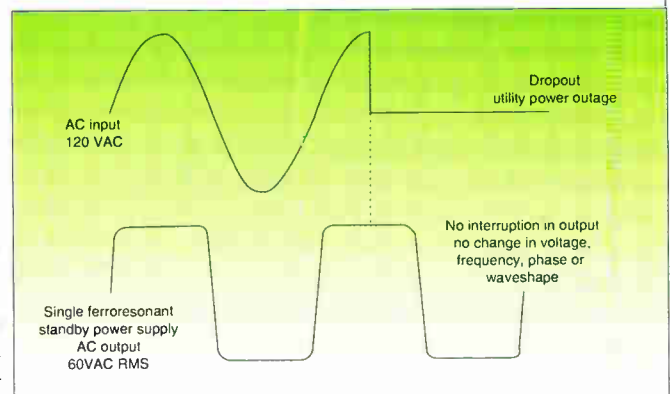


Figure 7

Other significant benefits of this new technology are:

- Transformer operating efficiency of 95 percent or better is now achievable.
- Audible noise generated by the ferroresonant transformer is virtually eliminated.
- Output voltage regulation can be better than ± 1 percent over the entire range of input voltage and output load conditions.
- The reliability of the transformer operation is not compromised in any way; in fact, it is improved by cooler operating temperatures.

Another significant advantage to this new design is the improved efficiency range over 50 percent load to full load. Traditionally, older ferroresonant transformers were most efficient at or near the full load rating. In reality, most cable systems intentionally operate power supplies at an initial design load of 70 percent to 80 percent to allow for future equipment expansion (ie; power doubling, new actives, two-way, etc.) and for a safety margin for sheath current effects, temperature related resistance changes, etc.

These are all good reasons for intentionally loading the AC power supply at less than the full load rating. Not because the power supply cannot safely or reliably operate at full load (in fact, some designs can operate reliably above the full load rating), but because it is advisable to have some extra capability available for the previously mentioned reasons.

Misconceptions

There has been a misconception in the industry about the use of multiple output rating ferroresonant power supplies for efficiency optimization. The argument is for use of 2-, 4-, 6-, 10-, 14-, 18-amp etc. transformer modules depending on present load conditions. The theory is that the use of a 4-amp power supply for an existing 3- to 4-amp cascade load requirement will provide maximum efficiency. When the load changes due to the addition of new devices, the operator is expected to also change the

power supply.

There are several fallacies with this approach:

- Load conditions are not static. De-

"Two will do"

With the new ferroresonant transformer technology only two transformer output ratings are necessary for all possible power requirements: 8 amps and 14 amps. Transformer efficiency of these units is better than 90 percent from 50 percent load through full load.

For example, the 8-amp model can operate down to 4-amp load with 90 percent efficiency or better, and below 4 amps with better than 85 percent efficiency, anything else is negligible. The same is true with the 14-amp rating—down to 7 amps load with better than 90 percent efficiency. This will simplify the choice of power supplies, minimizing warehouse requirements and training personnel as well as maximizing plant efficiency.

Future outlook

Cable system operators are planning for new technologies and services beyond the existing entertainment network. As such, it is more important than ever to implement the right concept for standby power. New services such as NVOD, PCN, digital compression and data networking require increased powering reliability and quality.

Several operators are concerned about the effects of power interruptions as brief as 20 milliseconds on the timing of digital signal delivery systems. Even brief power dropouts have been known to cause data errors, loss of synchronization and interruption of PCN calls in progress.

Conclusion

As system operators venture into competitive new revenue opportunities, the use of the right concept for power reliability will be even more important than in the past. **CED**

The author wishes to thank Greg Zediker and John Kilcrease for their assistance with this article.

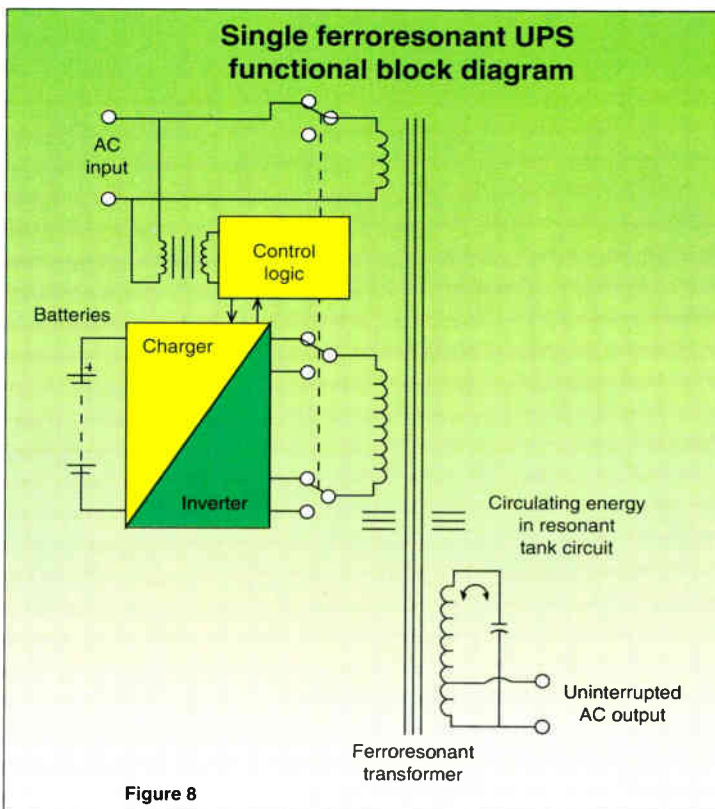


Figure 8

pending on temperature, sheath current influence, and amplifier power pack characteristics, it is not advisable to under-power the cascade by using a power supply that is only capable of existing requirements.

- When modifications of the systems are being implemented, the power sup-

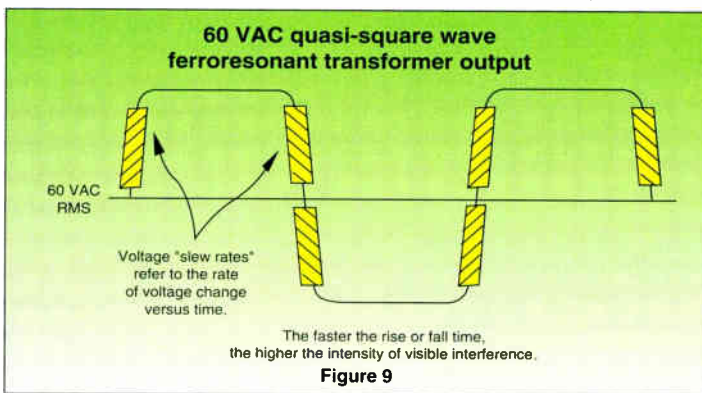


Figure 9

ply may often be overlooked, causing serious operational problems such as burned up power supplies, before an overload condition is detected.

- Multiple rated units must be stocked in the warehouse and on each truck! The overhead cost for maintenance has now increased several times.

TCI: Leading the way in new technology

Like the cable television industry in general, Tele-Communications Inc. seems to be undergoing a transformation. Suddenly, it seems, TCI has metamorphosed from a wait-and-see company to one that's driving emerging technology and exploring the merits of partnerships with former adversaries.

But has TCI really changed from the company that in previous years was given the nickname: Technology Considered Insignificant? Or could it be that the addition of optical fiber to its systems and the accompanying shift toward a "star" topology has simply made new transactional services easier and more cost-effective to implement?

Changing environment

TCI VP of Engineering and Technology Tom Elliot swears that nothing has really changed at TCI. He says the company's well-publicized forays into new services and technologies is simply a function of a changing environment. "Both ourselves and the industry find ourselves in an evolving environment," Elliot says.

Elliot even takes issue with the assertion that TCI wasn't willing to invest in technology in the past. "We were selectively aggressive," Elliot prefers to say. "We never bet the company on technology that didn't seem to have a business platform."

A perfect case in point is pay-per-view. Some industry pundits said PPV revenue would someday account for 80 percent of gross cable system receipts. TCI stuck its toe in the water with an early experiment that launched 140 addressable systems on the same day, Elliot says. But TCI never felt it had the proper platform to milk a service like PPV, so it pulled back. The company took a lot of heat for that.

But the irony is that TCI might have been right. "History has proven us largely to be correct," says Elliot. "We were better positioned (for the success of PPV) than most people—we had a national addressable center."

But it's the assertion that TCI doesn't understand technology and its benefits that gets Elliot's dander up. "I've always been a little bit baffled about people saying we don't understand tech-

nology. I think we've always understood technology very well. I think we've applied it differently."

A conversation with Elliot is, in some ways, like speaking with an economist. Inevitably, a drawing of a market demand curve is produced, showing how the cable industry has historically responded directly to that demand. There are discussions of supply curves, consumer choice and market evolution. It becomes clear that TCI doesn't bite on new technology unless it pays for itself in short order.

Today, TCI is biting—and biting hard—on emerging technology. To name a few projects, TCI is:

- Rolling out addressability nationally to systems serving as few as 2,000 subscribers in anticipation of the summer Olympics, which will be carried on a pay-per-view basis.
- Investing in alternate access through the purchase of TelePort.
- Looking into the "pay-per-event" business via a joint market test with US West and AT&T in suburban Denver.
- Market testing personal communications services with McCaw Cellular.
- Pushing the envelope of compression technology to launch a PPV platform served by as many as 40 channels of video.
- Experimenting with the transport of data for telecommuting in California and Colorado.
- Looking into the delivery of multimedia via cable networks.
- Setting up a nationwide hardware and software system to facilitate participation in the spot advertising market.

So what's changed? Why is TCI now so enamored with technology that it is arguably the leading technology innovator in cable television?

The answer is really a series of answers, according to Elliot. Cable infrastructures are changing, making it more feasible to offer two-way services based on transactions with consumers. Computer processing power is getting cheaper and better. Competition between industries for the consumer's dollar is getting more intense. Consumers are demanding more choice and more in-home services with more flexibility.

Poised perfectly

The result is that cable system's are uniquely positioned to upgrade their networks cost-effectively for traditional video entertainment uses with fiber and simply add on these other services as the market dictates.

So, was it good fortune or dumb luck that put the industry in this position? "I guess I'd like to take credit for some of this," says Elliot, speaking for all of TCI and perhaps the cable engineering community in general. On the other hand, he says it's been intense pressure from the financial side of the business that's largely responsible.

Because a cable television operator's profit margins are so low (often on the order of 3 percent or less, says Elliot), they often delayed capital expenditures as long as they could. Consequently, coaxial cable stayed the medium of choice and capital was poured into improved components every six or seven years. This enabled cable operators to expand channel capacity without scrapping their existing plants. The result has been that cable systems ended up with efficient broadband entertainment networks that can now be easily enhanced with fiber to offer new services.

"As an engineer I'd like to take credit for the design of these networks, but the truth is, I was responding to financial pressure," admits Elliot. "It turns out that we have an extremely efficient broadband network in place today because we were able to upgrade it very fast. We were fortunate, but I don't think it was accidental. What we've done is respond to the marketplace."

In Elliot's view, the future marketplace will be dominated by ever more intense competition. As such, cable's relationships with other industries will become much more complex.

For example, cable operators will find themselves simultaneously partnering and competing with the telephone companies, Elliot predicts. He says that the nature of the two networks are "complementary" and says it would be prudent to encourage both industries to "work together to serve the American communications requirements" without re-wiring the telephony network.

How would that work? Elliot foresees

a future of video-on-demand, ordering of goods via TV, home banking, etc.—services based on numerous transactions with each subscriber. To handle that, a lot of information will have to be moved between consumers and service providers. The cable network, traditionally good at downstream delivery, needs to be upgraded to make that work. But the telco network could fit the bill. “I think the best of all worlds is that you do a combination of both,” Elliot says.

Why not place a CATV node in a telco customer service area? That would allow for information to seamlessly move off one network and on to the other.

On the other hand, TCI executives believe telcos need to be encouraged by regulation to cooperate with cable instead of compete head-to-head in all areas. “They’d just buy us if they were turned loose,” predicts Elliot. “If they didn’t buy us, we’d go out of business anyway because they’d put us out of

business.” Therefore, TCI believes telcos need to be restricted from offering video service in the same areas where they offer voice services.

Some might find it easy to scoff at Elliot’s predictions, but history has shown him to be remarkably insightful, especially when it comes to outside influences. Back in 1987, TCI filed comments with the FCC that urged restraint in the HDTV standard proceeding. Instead of developing an analog HDTV system, argued TCI, the government should encourage enhancement of NTSC and wait for a digital process for true HDTV.

That argument was based on Elliot’s investigations into the microprocessor industry. His research into display sizes, memory and processing costs, storage use and the like led him to believe that within 10 years, a digital standard would emerge, making analog obsolete.

John Sie, then senior vice president of TCI, took Elliot’s research public, calling it “process digital.” “He had his head handed to him,” recalls Elliot, remembering industry criticism of the idea. “He’d keep coming back to my office saying, ‘Tom, what have you done to me?’ I said to John, I think it’s going to work. TCI can take full credit” for determining where that process stood at that moment in time, Elliot says.

As it turned out, General Instrument surprised nearly everyone and developed an all-digital approach just a couple of years later. “In this case we probably knew more about what was going to happen than anyone,” Elliot adds proudly.

Awareness of what’s going on around the cable industry is what is necessary to make sure the industry remains competitive in the years to come, warns Elliot. “An awful lot of things you see going on in the world today are really driven by processing power and cost.”

Another test of that hypothesis is digital video compression. By examining what was happening with the consumer electronics equipment (digital TVs and VCRs) as well as in the headend (computers becoming more powerful), Elliot got an inkling that compression would someday be possible. “By looking at what’s going on in other industries, you could see all this happening.”

Consequently, video compression has caught the attention of the world and promises to revolutionize the industry the same way satellite program delivery did back in the 1970s. “What I think is important is that the cable industry step up and take credit where credit is due,” says Elliot. “I mean, we started this—in a commercial sense.” **CEd**

By Roger Brown



SIGNAL LEAKAGE FLYOVERS



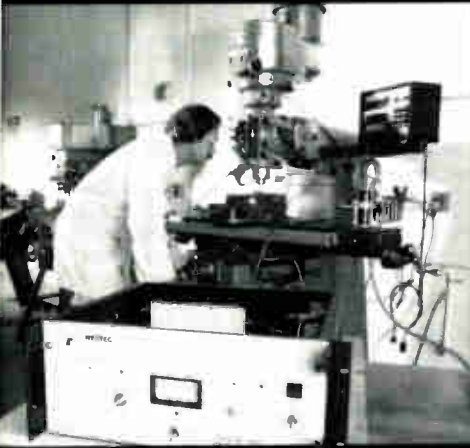
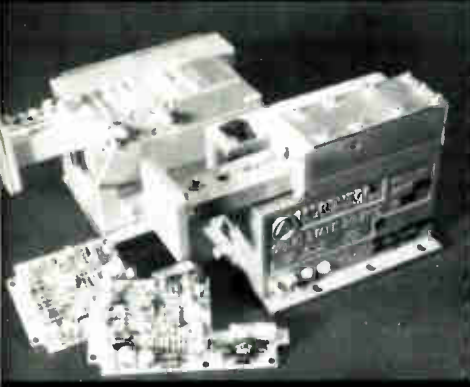
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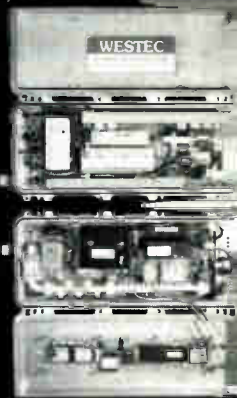
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nance philosophies drove the need for this standard, called SONET, or Synchronous Optical Network.

Why SONET?

SONET was developed to standardize system design, bandwidth administration and network maintenance. Once finalized, SONET could provide a solution and achieve multi-vendor compatibility through standardization of the following:

Optical characteristics such as interface power levels, pulse shapes and spectrum width.

OC (optical carrier) signal rates and multiplexing schemes to map payloads (all information carried, including overhead) into SONET signals.

Providing standard definitions of overhead channels to support operations, administration, maintenance and provision (OAM&P) functions.

SONET is based on a 51.84 Mb/s building block signal called the synchronous transport signal level one (STS-1). All SONET optical signals are made of byte-interleaved STS-1 signals, creating a hierarchy based on integer multiples of the 51.84 Mb/s rate (e.g.,

OC-3 rate is $3 \times 51.84 \text{ Mb/s} = 155.52 \text{ Mb/s}$).

Currently, fiber optic facilities are primarily used to carry DS3 signals. However, because a DS3 path contains a combination of DS0s and DS1s multiplexed into a DS3 rate, the rates of the signals are not directly compatible. Because bit-stuffing synchronization techniques are used in asynchronous multiplexing, an asynchronous DS3 signal must be completely demultiplexed in order to access and cross-connect the lower DS levels.

SONET eliminates this back-to-back multiplexing/demultiplexing by providing "add/drop" capabilities. Thus, SONET cross-connections and add/drops can be accomplished easier than asynchronous signal formats.

Using an AAV

There are several motivations for an end-user to choose an AAV over LEC services:

- Technical quality of service—reliability and redundancy.
- Maintenance.
- Response to customer needs.
- Financial resources to provider.

- Experience of the company.
- Reputation of the company.
- Price.

Combined, these reasons offer the end-user an attractive business alternative. Initially, the AAV should be prepared to offer lower costs for essentially the same service provided by the LECs. If the AAV can offer this reduction in cost, and provide a highly reliable, redundant route to end-users, the opportunity exists for new business revenues.

For 1992 and a few years beyond, the opportunity exists for cable operators to enter the alternate access business. However, the window for entry will not remain open long.

Conclusion

This paper has provided a basic overview of the access business and its infrastructure. For those interested in pursuing access further, additional studies are highly recommended concerning the product, the scope of business and regulatory issues.

Only when a full understanding of the business and technical infrastructures are complete will an operator be ready to take advantage of this new business opportunity. **CED**

White Sands

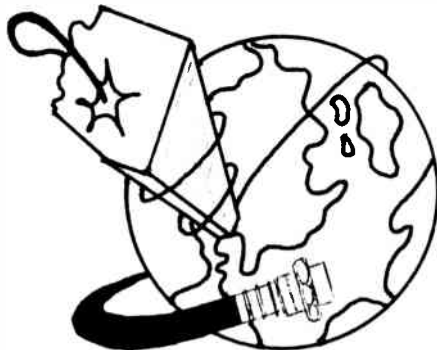


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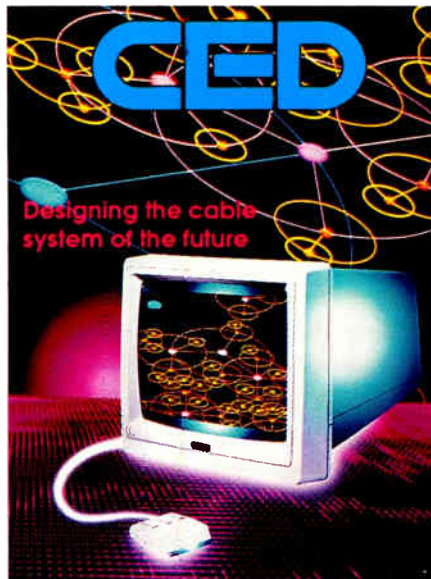
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CT

Optical Fiber Conference	March '92	No Coverage*
ATC's POE Interface Concept	April '92	No Coverage*
GI's HDTV Demo	April '92	May '92
Annual Raychem CATV Symposium	April '92	No Coverage*
'92 National Engineering Consortium ComForum	May'92	No Coverage*
Digital Commercial Insertion Debut at CAB Show	May '92	No Coverage*

Take The Lead With CED



* No editorial coverage as of May 1992 issue



Following is a list of SCTE technical seminars with contact name. If available, location and seminar topic are also listed.

June 8 Upper Valley Chapter "Microwave Theory," with speaker to be announced. To be held at the Holiday Inn, White River Junction, Vt. Contact Matthew Alldredge, (802) 885-9317.

June 9 Desert Chapter "CLI: Do you know what it is?" Contact Chris Middleton, (610) 349-1312, ext. 258.

June 10 Delaware Valley Chapter "Fiber Optics." To be held at Williamson's Restaurant, Willow Grove, Pa. Contact Louis Aurely, (215) 675-2053.

June 11 Chesapeake Chapter "Cable Technology for Non-Technical Personnel." To be held at the

Columbia, Md. Holiday Inn. Contact Jennifer Wardrop at (410) 461-7017.

June 11 Satellite Tele-Seminar Program Video and Audio Measurements, Part One produced by the SCTE's Wheat State Chapter. To air from 2 p.m. to 3 p.m. Eastern time on Transponder 6 of Galaxy I.

June 11 Music City Meeting Group "Think Hot," presented by Nashville Electric Service. To be held at the Nashville, Tenn. Ponderosa Steak House. Contact Dale Goodman at (615) 244-7462.

June 12 Miss/Lou Chapter To be held in Biloxi, Miss. in conjunction with the Mississippi Cable Television Association Show. Contact Dave Matthews, (504) 923-0256, ext. 309.

June 14-17 SCTE Cable-Tec Expo, National Confer-

ence To be held at the San Antonio Convention Center, San Antonio, Texas. Contact SCTE headquarters at (215) 363-6888.

June 17 Snake River Chapter "Installation Procedures and Troubleshooting," installer certification exams to be administered. Contact Ron Kline, (208) 376-0230.

June 20 Central California Chapter "Installer Certification Program." Contact Sarah Hanks at (209) 722-8542.

June 24 San Diego Chapter Contact Kathleen Horst, (310) 831-4157.

June 25 New Jersey Chapter "Fiber Construction and Restoration." Contact Jim Miller at (201) 446-3612.

July 7 Rocky Mountain Chapter "Troubleshooting." Contact Patrick Kelley at (303) 267-4739.



Optical Networks International has announced its June and July training dates for "Fiberworks '92," a five-day comprehensive training course designed for technical personnel desiring a hands-on, interactive ap-

proach of optical technologies. Topics for the course range from defining light transmission through actual restoration of a cut fiber. Classes are held at the ONI training and development center in Englewood, Colo.

The summer dates are as follows:

- June 1-5**
- June 15-19**
- July 13-17**
- July 27-31**

For more information call (800) FIBER ME.

TRADE SHOWS

June 14-17 SCTE Cable-Tec Expo '92 Annual convention, San Antonio Convention Center, San Antonio, Texas. Contact SCTE headquarters, (214) 363-6888.

June 23-25 Digital World Conference and DemoCenter Beverly Hilton Hotel, Beverly Hills, Calif. Contact Seybold Seminars at (800) 777-6650 or (310) 457-8500.

July 26-28 Wireless Cable '92 Annual convention, Marriott Orlando World

Center, Orlando, Fla. Contact Robert L. Schmidt at (202) 452-7823.

July 29-July 31 Wyoming Cable Television Association Annual convention, Jackson, Wyoming. Contact Jeff Rankenberger at (307) 733-6030.

September 8-11 OE/Fibers '92 hosted by the International Society for Optical Engineering. To be held in Boston, Mass. Call (206) 676-3290.

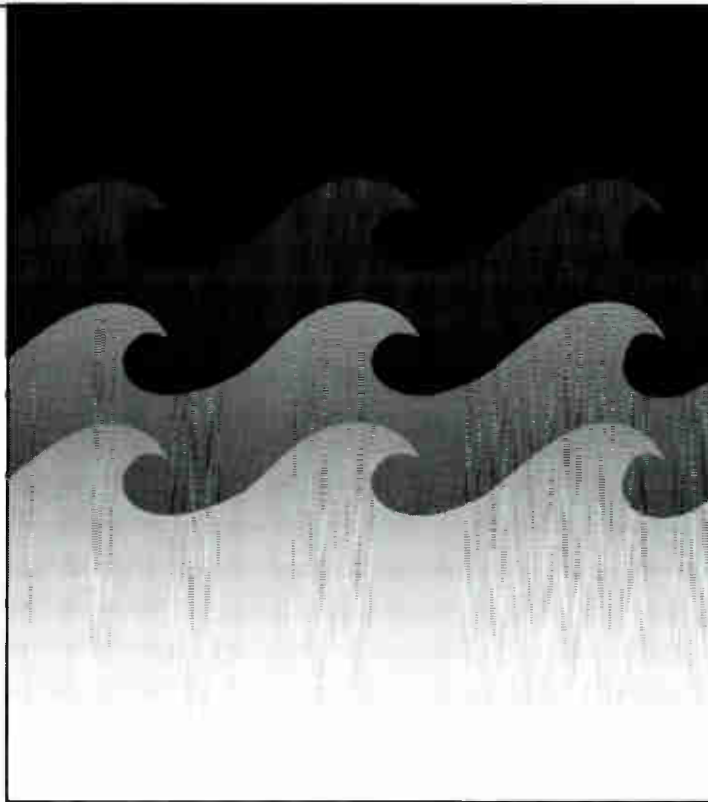
September 9-11 Eastern

Show '92 "The Right Connection," Annual Convention, Inforum, Atlanta, Ga. Contact Southern Cable Television Association Headquarters at (404) 255-1608.

September 23-25 International Conference on Data Transmission, hosted by IEE, the Association for Computing Machinery, Special Interest Groups COMM and OIS. To be held in London, England. Call (212) 869-7440.



If you have an upcoming technical seminar or event you'd like to put in this space, send all information to **CED**, 600 South Cherry Street, Suite 400, Denver, CO 80222, Attention Leslie Ellis.



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The CABLE POLL

Midwest CATV • CED • Cablevision

Ops not worried about telco entry, but do think it will happen after 1995

As MetroVision's Victor Gates once said, telephone companies will likely "partnership their way" into cable television territories. Perhaps that approach—a partnership, implying a mutually equitable alliance—is what's fueling the latest batch of Cable Poll® responses from 205 system managers across the U.S.

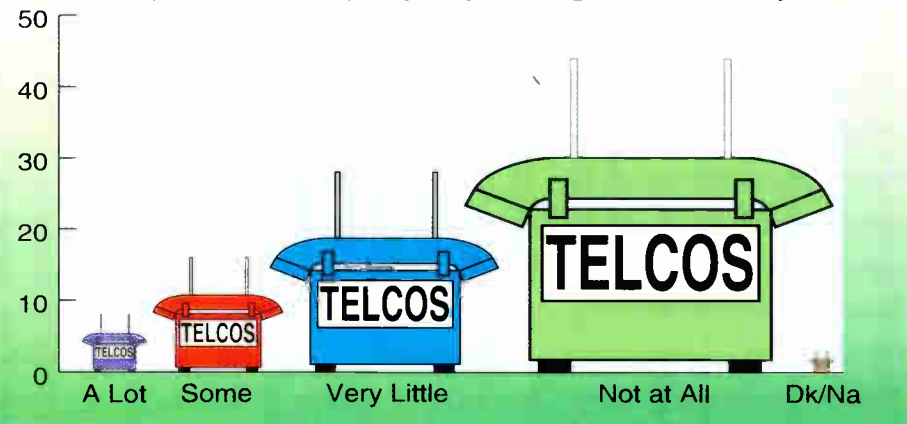
Apparently, GMs aren't worried about regional Bell operating companies as potential competition. In fact, 45 percent of those polled said they were "not at all" worried about telco entry. Twenty-eight percent cited "very little" potential threat, and 16 percent admitted feeling "some" danger of lost business to telcos. Only eight percent said they felt "a lot" of competition from their regional Bell operating company.

Most of the 45 percent "no worries" majority represent the top 25 MSOs, at 50 percent. Those GMs citing "a lot" of potential telco competition come from systems low on the MSO ranking list.

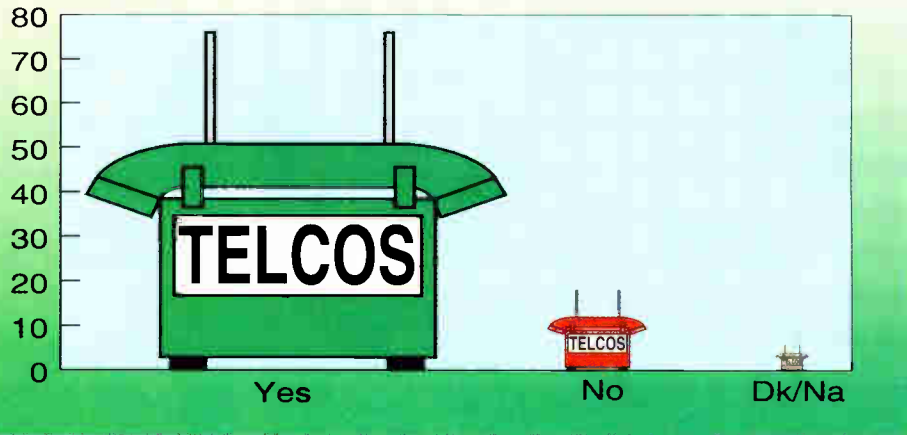
Perhaps the carefree nature of GMs regarding potential telco entry is fueled by their impressions on when it will become a reality. Although a whopping 76 percent of the GMs polled replied that, yes, they believe the U.S. Congress will eventually allow telephone companies to own cable systems or engage in programming/information services, most of them—at 31 percent—don't know when it will become a reality.

In fact, indecision about "when" the Bells will jingle into cable TV seems to be the name of the game. The biggest decisive answer, at 21 percent, is that tel-

Thinking about telcos...To what degree do you view the Bell operating company in your region as a competitor?

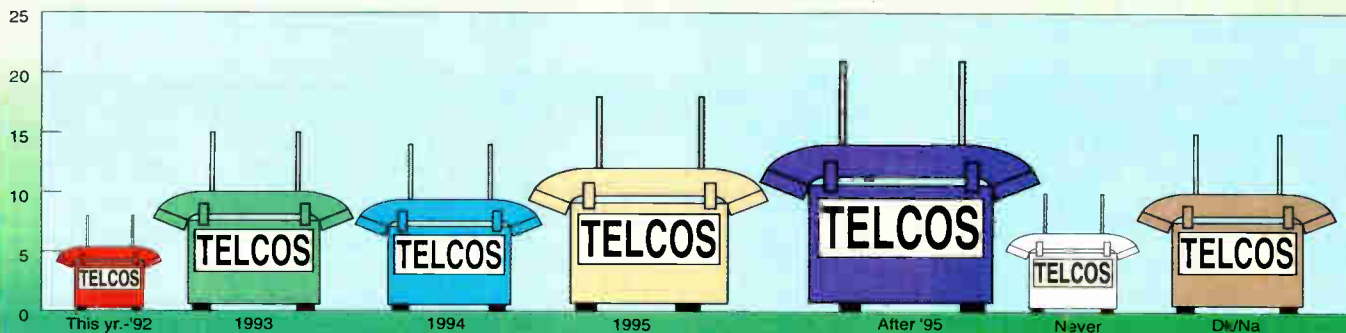


Do you believe the United States Congress will allow telephone companies to own cable systems or engage in programming/information services?



CABLE POLL

When do you believe the US Congress will allow telephone companies to own cable systems or engage in programming/information services?



co entry will occur in 1995 "or later." Few, at eight percent, think telco entry will happen this year. Some think telco entry will pass in 1993 or 1994, at 15 percent and 14 percent, respectively. A daring 20 percent say it will "never" happen. But the majority, at 31 percent, simply don't know.

More research needed?

Interestingly, though, the majority of GMs polled said that Boulder, Colo.-based CableLabs should definitely receive a budget increase to explore and develop the information services telcos expect to offer consumers. Twenty-four percent say no, CableLabs doesn't need more fuel for exploration. Twenty-three percent don't know.

And when the 205 system managers were asked how seriously they would consider a telco proposal for a joint venture with their cable systems, indecision, again, was key. Forty-eight percent said they didn't know how seriously they would take it.

The majority, at 27 percent, said they would give a telco proposal "no consideration whatsoever." Most of those anti-telco GMs come from low-ranked MSOs (101 ranking or higher) with less than 10,000 subscribers. Twenty percent said they would give a telco proposal "somewhat serious" consideration; 16 percent would give it "somewhat indifferent" consideration; and 14 percent would take a "very serious" look at a proposed joint venture.

Apparently, GMs would be most interested in a telco partnership that offered shared information or interactive services. That option ranked in at 28 percent. Most of the interest in that category came from low-ranked MSOs (101 ranking or higher), at 58 percent.

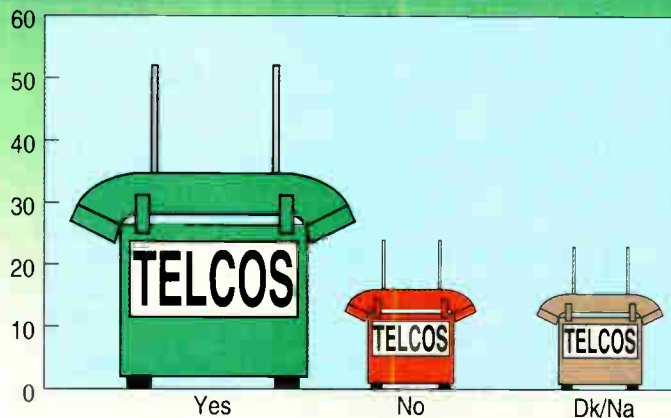
Another 24 percent said they'd look at cooperative local programming. Eighteen percent, consisting mostly of the top

25 MSOs, at 28 percent, would be most interested in joint system ownership. Another 15 percent would take a serious look at shared ordering systems. The rest, at 14 percent, didn't know what they'd be most interested in of the choices offered.

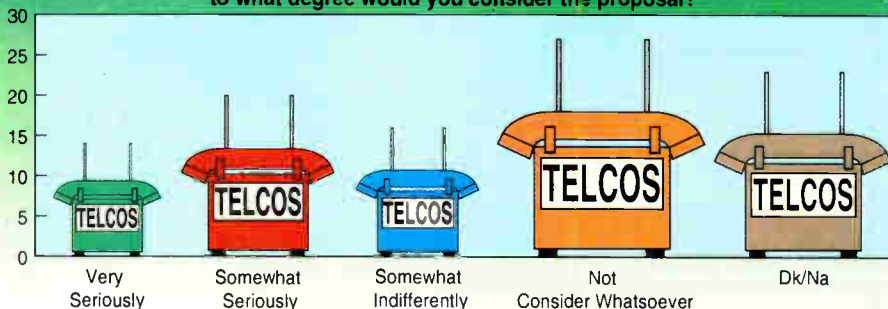
By Leslie Ellis

CEC

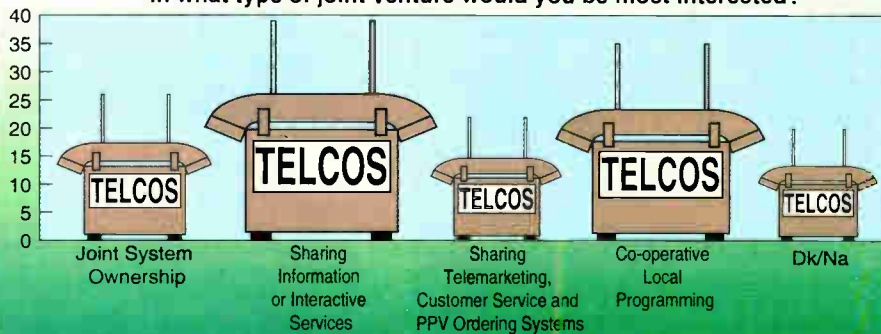
Do you believe CableLabs should receive a budget increase to explore and develop the information services the telephone companies expect to offer consumers?



If a telephone company approached your company with a proposal for a joint venture, to what degree would you consider the proposal?



In what type of joint venture would you be most interested?



New products

Fiber optic news

ONI sells first YAGLink transmitter

Optical Network International has announced delivery of the first **Harmonic Lightwave** externally modulated YAGLink transmitter.

The HLT 6000 transmitter will be used in **Storer's** Hollywood, Fla. system to pick up signals from its Dade-Broward headend and transmit them to the Hollywood headend, some ten miles away.

The system began the fiber upgrade in December, 1991 and expects completion in July, 1992. The 380 mile upgrade will take the system from 300 MHz to 550 MHz, passing 32,000 homes. Activation of the YAGLink is expected this month. ART

Fiber connection/media facility swap

The **New York City Department of Telecommunications and Energy (DTE)**, a Lower Manhattan-based agency responsible for granting franchises for use of city streets for telecommunication services, has announced it will provide a fiber optic connection to satellite feeds to the **Borough of Manhattan Community College (BMCC)** in exchange for use of the college's media facilities.

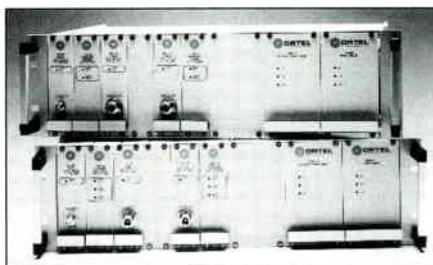
The exchange will enable the college to both expand its collaborative projects with city high schools and enable faculty and staff to interact with other universities around the globe.

For its part, the DTE and other city agencies will be able to use BMCC facilities for special events and activities and for the production of special video projects for the city's new three-channel cable network, *Crosswalks*, which transmits city-wide to all cable TV subscribers.

The deal marks the first use of fiber optic cable made available to the City of New York under a 1990 franchise agreement with Metropolitan Fiber Systems.

Ortel unwraps new links

Ortel Corp. has added three new TVRO transmission links to its System



Ortel's new TVRO transmission lines

10000 line. The links are used to transmit satellite downlink signals up to 25 km at L-band (950 MHz to 1450 MHz, Model 10025A) and up to 15 km at C-band (3.7 GHz to 4.2 GHz, Model 10035A).

Also available is the Model 10036A dual band link, which transmits both C- and L-bands. The links meet signal-to-noise (S/N) specifications for video short haul performance.

"Previous models satisfy the needs of many of our customers, but some were asking for either higher performance within the reach of the existing product, or longer reach at the same performance," explains Larry Stark, director of marketing for Ortel.

For more information on the transmitters, call Ortel at (818) 281-3636.

Optical isolator

New from **Optics for Research** is an



Optical isolator, new from Optics for Research

optical isolator designed to configure bidirectional communications using a single wavelength within a single fiber. The device also improves the efficiency of simultaneous communications systems, erbium-doped fiber amplifiers, OTDRs and other fiber optic instruments.

The isolator is polarization-independent with three coupling ports and uses optical isolator technology to provide insertion losses as low as 1 dB per channel, officials say. When used with an erbium-doped fiber amplifier, the isolator reduces transmission losses—

thereby lessening the need for high pump energies. And, when incorporated into an OTDR, the device can improve signal strength as much as 3 dB to 4 dB, which translates to an average increase of 15 kilometers in probative range, officials say. For more information, call (201) 228-4480 or fax inquiries to (201) 228-0915.

ONI offers new training course

Optical Networks International's Tests, Measurements and Restoration (TM&R) group has announced the formation of a digital networks training course.

The five-day course, held at ONI's Denver training center, is designed to prepare cable TV personnel for the onslaught of digital technologies. The course covers all aspects of digital technology, including technology applications and equipment. For more information or to register, call (800) FIBER-ME.

Also new from ONI is **Sumitomo's** new type 35SE fusion splicer. The splicer reduces sleeve shrinking time by 50 percent and features an enhanced user interface as well as automatic atmospheric arc compensation, electrode monitoring and self-diagnostics.

The unit's new high speed heater, located on the top of the unit for easier access, enables sleeve shrinking in 90 seconds. Another new feature enables the 35SE storage for up to 100 splice loss estimates.

The splices are date and time stamped for later documentation. Lastly, the splicer features a new swivel LDC screen—the swivel nature of the screen compensates for varied lighting situations and thereby avoids screen glare.

Fiber optic inspection microscope

New from **Noyes Fiber Systems** is a fiber optic inspection microscope, the OFS 300, which offers 200x precision optics for viewing of polished fiber optic connectors or cleaved fiber ends.

The microscope uses a universal adapter mount to interface to all commonly available fiber optic connectors. Other features include backlighting, battery operation or AC adapter input and a tripod mount. For more information, call (603) 528-7780.

Also new from Noyes is its OPMI optical power meter with three wavelength calibration. The OPMI-2B germanium and OPMI-3B InGaAs fiber optic power

meters are now available at 850 nm, 1300 nm and 1550 nm.

Pricing starts at \$349. For more information, call (603) 528-7780 or fax inquiries to (603) 528-2025.

PC-based OTDR

New from **Antel Optronics** is a PC-based OTDR that uses any IBM AT compatible desktop or laptop PC as the OTDR mainframe. OTDR hardware is housed on interchangeable PC cards, which officials say offers significant cost savings.

The unit, called the AOC10, contains a laser source, receiver and data acquisition components. For more information, call Antel at (314) 690-5200.

Dual cable clamp

New from **Diamond Communication Products** is a fiber optic dual cable clamp, designed for use in aerial installations to secure fiber optic cable to the pole or at buried splice locations. The clamp may also be used on buildings for dual cable runs.

For more info, call Diamond at (908) 789-1400 or fax inquiries to (908) 789-7975.

Polarization-fade eliminator

New from **Optics for Research** is a new line of Faraday Rotator Mirrors (FRMs) for use in the elimination of polarization-induced signal fading in various fiber optic sensors.

Until recently, OFR officials say, only dedicated polarization controllers—which are costly and complex outside a laboratory environment—have existed as solutions to the fading.

An FRM combines a dielectric mirror with a bismuth iron garnet faraday rotator element. The device provides non-reciprocal 45 degree rotation of the signal's polarization state each time light passes through it.

Upon recombination with the reference signal, the polarization states become perfectly aligned and therefore stable in time, regardless of the birefringence of the fiber.

In using FRMs in place of Michelson interferometric sensors, it is possible to compensate completely for any environmental birefringence perturbations within the fiber, regardless of the state of the polarization, OFR says.

Both 1310 nm and 1550 nm models are available. For more information, call OFR at (201) 228-4480 or fax inquiries to (201) 228-0915.

Enclosures

New metal cabinets from Moore

Moore Diversified has introduced a new line of metal cabinets designed specifically for cable TV. The cabinets range in size from 24x24x12 to 54x54x24 and can be ordered with a variety of

options including unique shelving requirements, weather tightness, RF shielding and cooling units. The units are manufactured of heavy gauge aluminum or steel and are coated in a powder applied polyester finish. For more information, call Moore officials at (606) 299-6288.

Two new pedestals designed specifically for the Scientific-Atlanta interdiction system have been announced by

Continued on page 113

"NCTI's courses complement our in-house training, Installer Certification and BCT/E exams. Combined, they are an effective, cost-efficient technical training program."

**– Rich Henkemeyer
Technical Trainer
Minnesota Region
Paragon Cable and
SCTE Region 6 Director**



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Promotions and additions

Zenith Electronics has appointed two senior operating executives to its board of directors: **Gerald McCarthy**, senior VP of sales and marketing, and **Albin Moschner**, senior VP of operations. McCarthy has been president of Zenith sales since 1983 and was appointed to his current position last November. Moschner joined Zenith last October.



James Slade

James B. Slade has been named national sales manager for the cable systems division of **Pioneer Communications of America**. In his new role, Slade will formulate sales strategies and directly supervise regional sales managers. Slade most recently served as marketing manager for the video communications division of Panasonic Communications. He holds a bachelor's degree in electrical engineering from Syracuse University as well as a master's degree from Fairleigh Dickinson University where he concentrated in micro and mini computer systems.

Dean Long has joined **Television Technology Corp.** as an RF product design engineer. Long was previously a design engineer and group leader at EF Johnston Co.

Martin Roberson has joined **Budco** as controller of the company. Roberson will be responsible for all accounting, tax, finance, treasury and budget functions as well as purchasing and inventory control. Roberson joins Budco from Martin Roberson Inc., an independent accounting firm.

Reg James has joined **Digital Cable Radio** as applications engineer for its southeastern United States region.

In his new role as installation liaison to southeast cable systems, James will provide sales support, conduct site surveys, training and education for DCR customers. Before joining DCR, James was a partner and senior engineer at Cable Systems Engineering Inc., where he provided systems engineering services.

Rob Kragelj has been appointed VP of sales and marketing for **Nexus**



Rob Kragelj

Display Systems. Kragelj was previously director of corporate communications for the Nexus Group of Companies. **Fred Hoeflok** will replace Kragelj as **Nexus'** new director of corporate communications.



Fred Hoeflok

R. James Kelso has been named technical operations manager for advertising sales at **Cox Cable Communications**. Kelso joined Cox in 1988 as an ad insertion technician and

was promoted to technical supervisor in 1989. Since then he has served Cox as production/technical manager and field technical coordinator.



Richard Tyler

Richard Tyler has been appointed to national sales manager for **Noyes Fiber Systems**. Previously, Tyler was Noyes's eastern regional sales manager. Tyler will be responsible for all domestic sales in the telecom, datacom, CATV and related markets.

Laurent Seciniaz has been named VP, communication products sales for **Andrew Corp.** In his new role, Seciniaz will direct worldwide sales in the company's communication products group. Seciniaz holds a degree in electrical engineering from the City College of New York.



Laurent Seciniaz

Nina Bondarook-Belofsky, former editor of **Cable TV Business**, has been named marketing



Nina Bondarook-Belofsky



Stephen Jaworski

support specialist for the **National Cable Television Institute**. And, **Stephen Jaworski** has joined NCTI as a training representative. In his new capacity, he will assist with sales of NCTI's self-

study courses, sales of regional and on-site management, safety- and operations-related seminars. He will also serve as account executive for NCTI's Colorado accounts.

Rick Segil has been promoted to director of sales and marketing for **General Instrument's DigiCipher Division**. He will be responsible for selling DigiCipher uplink products and services, with a main focus on existing C-band customers.

Also at **General Instrument's DigiCipher Division**, **Jim Shelton** has been promoted to the newly created position of VP, programmer services. In his new role, Shelton will be managing the company's satellite video center, which delivers PPV services.

Mark Bressack has been added to the staff of **A.F. Associates** as director of sales, cable television systems. Bressack will be responsible for marketing AFA's systems to the cable industry. The company designs and builds turnkey systems.

Colleen Feely has joined the international executive search firm of **Media Management Resources**. Her focus will be on sales, marketing and operations positions within the cable television and cellular industries.

Jim Orwick has been appointed VP of national accounts for **Contec International**.



Jim Orwick

Orwick has served on the board of several state and regional cable TV associations, including the Texas Cable TV Association, the Mid-America Cable TV Association and the Indiana/Illinois Cable Association.

In his new role, his primary responsibilities will be developing MSO accounts and directing the company's field sales efforts. **CEO**

Compiled by Leslie Ellis

Champion Products. The Champion CATV 8360-SAI is a 360-degree access pedestal with a special mounting stake for the S-A model 9504.

The pedestal features extra room to allow the cover to be fully opened and space in the lower portion of the enclosure for taps, splitters and other devices for mounting. The pedestals also offer locking capabilities for all standard locking schemes including padlocks.

For more information, call Champion officials at (417) 736-2135.

Tools

Gap wrench

A new racquet wrench, developed with suggestions from cable linemen and installers, has been announced by **Budco**.

The wrench helps reduce signal leakage in cable installations, says David Allen, sales manager, because a torque-limiting feature addresses the sensitivity which must be used to prevent crushing coaxial connectors during installation.

Audible and tactile signals inform a user when the desired torque has been reached, which in turn reduces signal leakage by ensuring proper F-connector and coaxial cable contact. For more information, call Budco at (918) 252-3420.

Drop wire clamp

New from **Diamond Communications** is a drop wire clamp, designed to support both ends of messengered drop wire (all sizes) at pole, mid-span or house/building. The clamp has flared, trough ends which allow for unabraded cable movement.

Also new from Diamond is a long "P" house hook for premises constructed of aluminum, vinyl or steel siding. Similar in function to standard "P" house hooks, Diamond's wrenchable hook is designed to accept a standard 7/16-inch hex socket to assist in screwing into hard places.

And, Diamond has unveiled a meter box ground clamp which functions as a ground for CATV system drop wire runs at a customer's meter box.

The clamp mounts vertically or horizontally on any rectangular or square meter box and does not restrict cover operation. Two adjustable sizes are available.

For more information on Diamond's new products, call (908) 789-1400 or fax inquiries to (908) 789-7975.

Deals

Wholesale VideoCiphers available

The **VideoCipher Division of General Instruments** has announced a new distribution policy that makes VideoCipher RS satellite programming descrambler modules available at the wholesale level to any parties meeting minimum purchase requirements.

Previously, modules were available only as part of an integrated receiver/descrambler (IRD) through licensed manufacturers. The new plan, says VideoCipher division president Ken Kinsman, was made to reflect the changes taking place in the marketplace. "There is strong industry-wide demand for permitting modules to be sold separate from IRDs, enabling customers to seek receivers with the latest product features," Kinsman explains.

RMS to sell off CATV division

RMS International has announced it will sell the company's CATV division. President Joseph Bradway says the sale will "make RMS more profitable in the future." The company will

retain its remaining divisions, Color Optic Displays and American Fiber Optics.

UT to spin-off optical unit

United Technologies Corp. has announced the formation of **United Technologies Photonics**, a subsidiary of the corporation. UTP will design, build and sell integrated optic components, modules and subsystems for cable television signal distribution (among other industries). The subsidiary was originally a venture unit of UT's Research Center in East Hartford, Conn. The Center will continue to carry out advanced photonics research, company officials say, which may be transferred to UTP.

TTC acquires test system

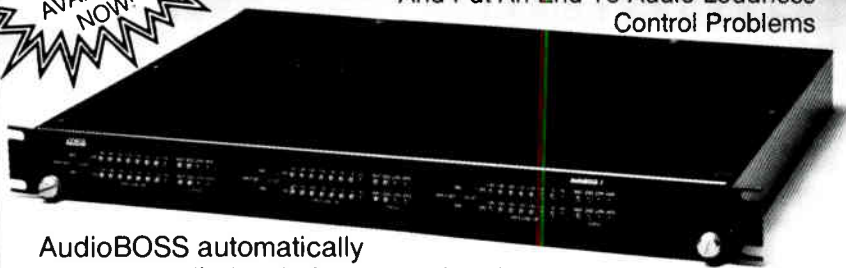
Telecommunications Techniques Corp. (TTC), a subsidiary of **Dynatech Corp.**, has announced the acquisition of the DSC DEX Network Test System from DSC Communications Corp. in Plano, Texas. The acquisition provides TTC with a communications test system platform to address the "growing market demand" for centralized, automated

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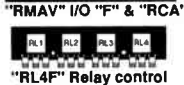
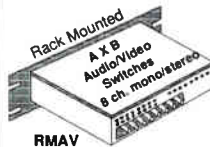
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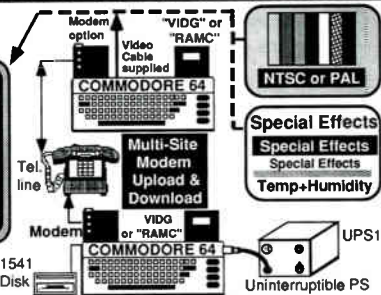
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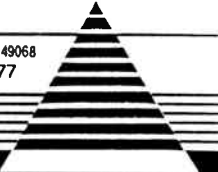


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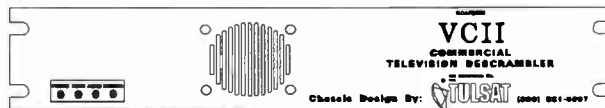
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Broadcast quality

Part 73, Subpart E of the Rules and Regulations of the Federal Communications Commission (FCC) includes a host of rules and standards governing three categories of technical operation of television broadcast stations:

1. Providing for reasonably equitable cultural and geographic distribution of television facilities and reception.
2. Defining and limiting interference between stations.
3. Ensuring that TV signals from any broadcast facility can effectively be received by television receivers within the service area.

It is especially noteworthy that the Rules and Standards for television broadcasting make no pretense of defining the basic technical quality of the broadcast television service the public is entitled to receive.

Of course, the quality of reception is considered implicitly, based on various published and unpublished experiments and field tests. But nowhere is it explained that the field strength required to be exceeded 90 percent of the time has been calculated to provide 30 dB C/N (at 6 MHz B.W.) at 70 percent of locations for Grade A, and 50 percent for Grade B.

By contrast, the Report and Order in Docket 91-169, recently released by FCC, specifically notes that: "These new standards [for cable TV] shall serve to define the basic technical quality of

By Archer S. Taylor, Senior Vice President, Engineering, Malarkey-Taylor Associates Inc.

service cable subscribers are entitled to receive." (Introduction, paragraph 1)

Signal-to-noise ratio

Take signal-to-noise ratio, for example, widely acknowledged as the primary criterion of quality for analog television reception. Section 73.682(a)(16), under the heading "TV Transmission Standards" specifies 5 percent combined "hum, noise, and low frequency response" (26 dB S/N), but goes on to say: "This provision . . . will not be enforced pending further determination thereof".

This provision has not been changed since its adoption in 1954. Compare the unenforced "5 percent" with the present 43 dB cable TV standard, representing 0.7 percent noise, and 3 percent hum or low-frequency disturbance.

Differential gain and phase

The widely held notion that the FCC Rules include specifications for differential gain and phase is based on a misleading interpretation of Section 73.682(a)(20)(vii):



The new technical standards are substantially more stringent with respect to signal quality.

"The angles of the subcarrier measured with respect to the burst phase, when reproducing saturated primaries and their complements at 75 percent of full amplitude, shall be within ± 10 degrees and their amplitudes shall be within ± 20 percent of the values specified above [subparagraph iv] . . ."

This section describes the tolerance boxes at the ends of the six vectors in the vectorscope display of standard color bars. Differential gain and phase are not even defined in the FCC Rules for TV broadcasting. Measuring the phase angles of the subcarrier at the color bar amplitudes is only a subset of the more comprehensive standards now applica-

ble to cable TV. The errors described in the broadcast rule represent differential gain and phase distortions only at the color bar brightness levels.

Amplitude response

Section 73.687(a)(1) regarding amplitude response specifies that sidebands must be attenuated at least 20 dB at the channel boundaries, and that the out-of-band lower sideband of the color subcarrier must be attenuated by at least 42 dB. For vestigial sideband transmitters, no in-band amplitude response characteristic is specified. For UHF transmitters with less than 1 kw output power, double sideband transmissions are permitted, with 8 dB attenuation allowed at the color subcarrier frequency, and as much as 12 dB at 3.5 MHz above the visual carrier.

Envelope delay

Then there is the well-intentioned but pernicious 170 nano-second sound-notch delay pre-correction specified in 73.687(a)(3). While meant to compensate at the transmitter for what was thought to be the delay characteristic of an "average" TV receiver in 1953, this standard is at least as likely to degrade the technical quality actually received.

Voluntary standards

All of this may appear to be insignificant quibbling and nit-picking. In a sense, it is. But it is important for cable TV technicians and engineers as well as non-technical personnel, when dealing with the public and local authorities, to recognize that the new technical standards for cable TV are substantially more stringent with respect to signal quality than the standards for TV broadcasting.

To the credit of the broadcasting industry, there are other voluntary standards, enforced primarily by a certain pride in high quality workmanship, rather than by FCC or local government. It is unfortunate in the extreme that the cable industry is effectively prevented from establishing its own difficult to achieve but desirable technical quality goals by fear that its aspirations might be turned into a scourge by local authorities.

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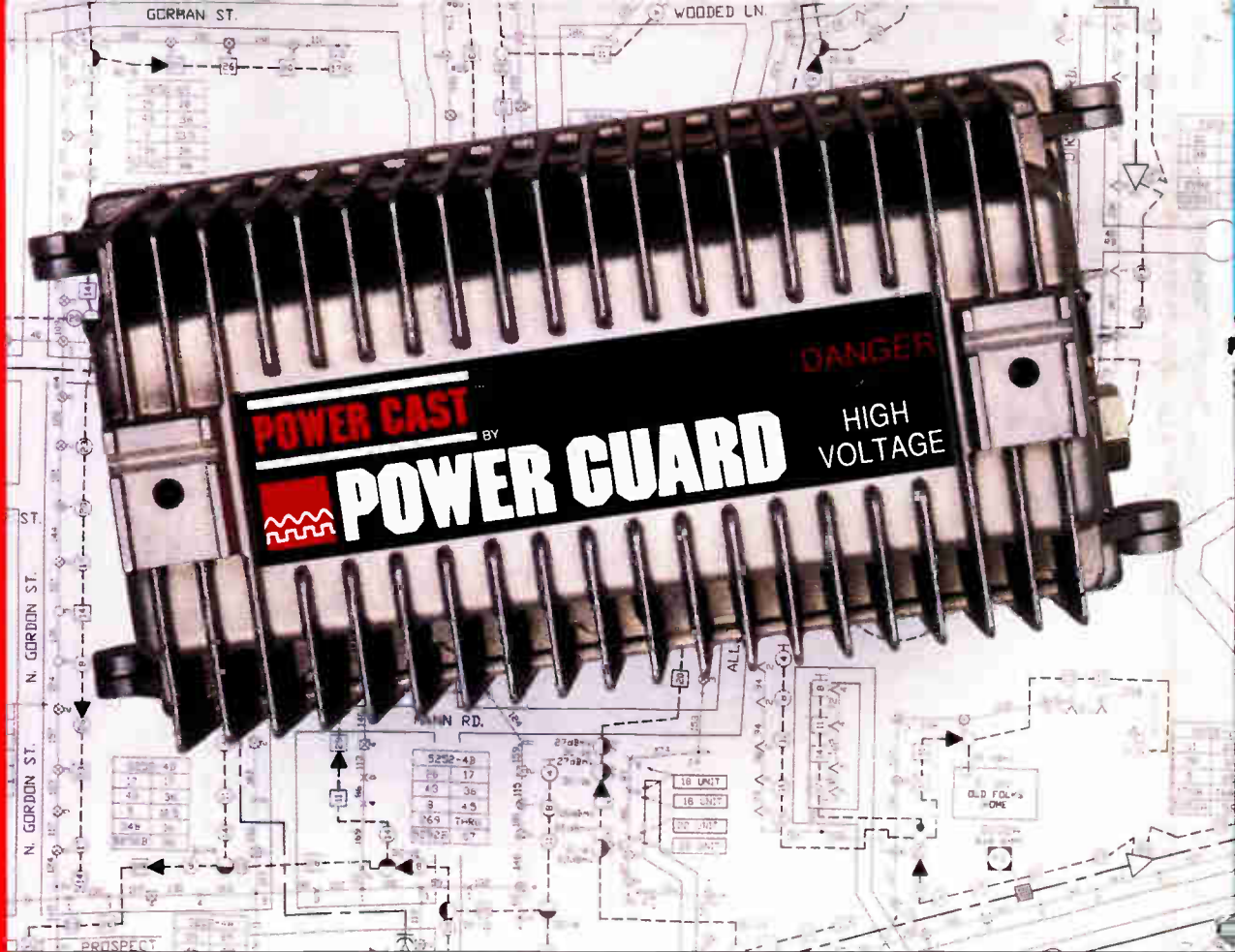
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