CED

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JUNE 1993 CED NCTA Show issue ◆ '93 Expo wrap-up ◆ Billing update ◆ What is ATM? ◆ Anti-piracy program

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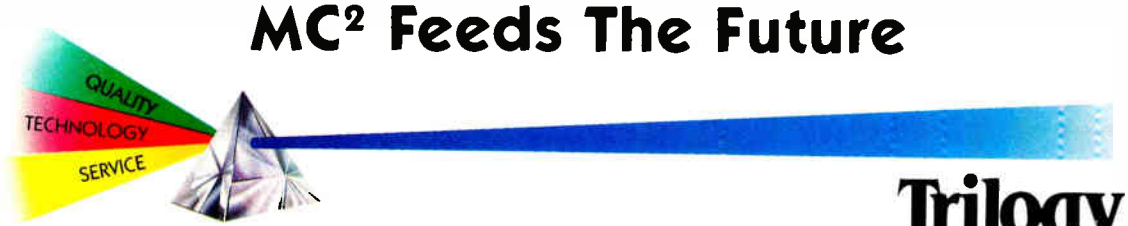

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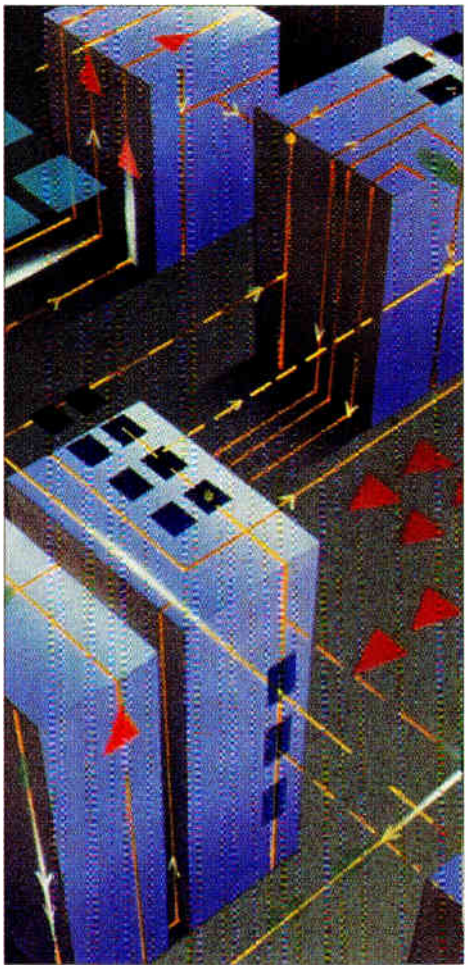

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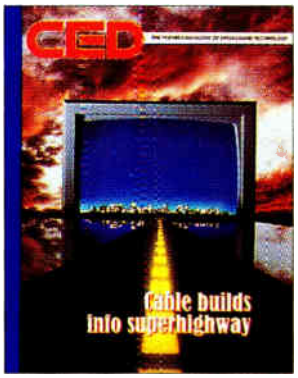

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Welcome to the redesigned CED magazine

By now, you've probably noticed something different about this issue of *CED* magazine.

For months, we have been surveying our readers to find out what they like about *CED* and how we might improve the magazine. We found that you're comfortable with the overall content, but some of you offered some suggestions on ways to improve the product.

We've listened to those comments and, based upon your feedback,implemented some changes in key areas. The goal was to make *CED* more enjoyable to read–all the while keeping in mind that you don't have as much time to read as you'd like.

For instance, we know many readers keep libraries of *CED* on bookshelves. With that in mind, we've made it easier to locate major stories in each issue by placing highlight stories along the left edge of the front cover. This feature makes it easy to locate a specific story–without taking the magazine off the shelf.

Choosing a new typeface was a high priority of the new design, as was a streamlined presentation of each article. Cover stories will now be highlighted with a two-page spread and stories will be formatted to minimize "jumping" over several pages to find the next page of the story.

Larger, easier to read headlines have been added, along with a typeface that reads faster than the old style. We've also upgraded our illustrations and charts, keeping their importance to each story in mind.

The Table of Contents page will help you choose the articles you need to read first while simultaneously providing a more complete overview of each issue.

We've reformatted our popular "Return Path" fax poll to make it easier to read and use. If you haven't already, we encourage you to share your views on a wide variety of industry-related topics each month.

But rest assured *CED* will continue to offer the content that has made it an industry leader since 1975. As with any product, however, refinement is a necessary part of long-term success. You'll continue to see the design of *CED* fine-tuned over the coming months as we strive to provide you with an even more useful publication. As the cable industry grows and faces new competition, we know you'll need every tool available.

To those of you who have called, written and responded to our surveys, we want to thank you. For those of you who haven't yet, we look forward to hearing your suggestions and ideas on how to make Communications Engineering and Design magazine an even more valuable part of the cable industry's future.

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WAVETEK

GI, Microsoft and Intel announce pact, S-A teams with Toshiba for Orlando

Compiled by Roger Brown, CED

Convergence is here. The prophets and pundits who have for years predicted the confluence of the cable and computer industries are finally being substantiated by real actions.

Over the past six weeks or so, both Scientific-Atlanta and General Instrument-Jerrold have announced the integration of powerful microprocessors into their set-top addressable descrambling convertors–the same high-speed microprocessors that have supported personal computers.

First out of the gate was General Instrument, which announced plans to integrate Intel microchips and Microsoft software into GI's next generation of convertors, first though an add-on module but eventually by integrating the technology directly into its new digital set-tops. The module will reportedly cost between $100 and $130. Ports to connect the module will be built into both new analog and digital set-tops, beginning next year.

Jerrold plans to offer a wide range of capabilities, depending upon what functions and features the operator wants to offer viewers. For example, traditional analog devices without the add-on module will support impulse transactions, a rudimentary electronic program guide and some extra memory. However, a full $325 DigiCable convertor with the optional processing module would support interactive home shopping, information access and a plethora of multimedia services.

GI is already marketing the box to MSOs who have already signed letters of intent to purchase digital set-tops. The new units are scheduled for debut next year.

One of the first applications seen for the alliance is an on-screen electronic program guide that will help viewers navigate through literally hundreds of program choices.

Following that, Scientific-Atlanta announced it has allied with Japanese manufacturer Toshiba to create the sophisticated digital home terminal that will be be used by Time Warner in the MSO's Full Service Network testbed in Orlando, Fla.

In addition to in-home terminals, S-A will also provide headend equipment to handle two-way digital video and audio, telephony and other multimedia services based on asynchronous transfer mode protocols. The S-A/Toshiba alliance is an example of the marriage between traditional cable suppliers and companies that have expertise in digital computing.

"We expect Toshiba's involvement to be especially helpful because of its expertise in personal computers, digital compression and other high-speed digital communications technologies, as well as mass production," said Joseph Collins, chairman and CEO of Time Warner Cable, in a prepared statement.

For Time Warner, one of the keys is development of an in-home terminal that conforms to recognized international standards. As such, this product will employ MPEG digital compression technology and will transmit 64 QAM information at 45 megabits per second–which is compatible with standard DS-3 rates adopted for the ISDN environment.

"All three companies are committed to creating a terminal that will allow for open architecture and interoperability," said Jim Chiddix, senior vice president of engi-

neering and technology for Time Warner Cable.

S-A Broadband Communications Group President Jay Levergood echoed those comments: "We are commited to interoperability and open architectures for the next generation of digital technology."

One key feature of the unit will be a powerful microprocessor that had previously been used only in high-end computers for high resolution, three-dimensional graphics. This microprocessor will be used to create a navigation system for viewers to select channels they want to watch.

S-A officials promise a system that will support "a true multimedia interactive environment with video-on-demand, full motion video games, data services, electronic program guides, interactive full-motion video home shopping, educational services and more."

The processing power resident within the new unit goes "way beyond" a 486 personal computer, according to Gary Trimm, president of S-A's subscriber systems division. "I'd characterize it more as a workstation with RISC-type (Reduced Instruction Set Computing) chips."

The new set-top, some of which are scheduled for December delivery, will be significantly larger than today's convertor and represents a "quantum leap" over the capability built into S-A's 8600X box, its latest generation analog set-top, Trimm said. The box will be built at S-A's manufacturing facility in Atlanta.

For Toshiba, the alliance represents a return to the cable industry after nearly a decade-long absence. Toshiba was contracted by American Television and Communications to build the Distributed Subscriber Tap, a complex addressable off-premise signal control system ATC tested successfully in the mid-1980s. Though that test was an economic flop, it was a technical success.

Toshiba is also an investor in Time Warner, having spent $500 million last year to purchase a 6 percent stake in the cable, studio and HBO portions of the company. "This is the one vital area we have been looking for since Toshiba made the strategic alliance with Time Warner," said Takeshi Okatomi, executive vice president and board director of Toshiba Corp.

It's clear that Toshiba expects this alliance to lead to a larger relationship with Time Warner. "We expect that our technical involvement in the FSN (Full Service Network) project will ultimately include a variety of areas such as semiconductors, computer technology, digital compression, switching and mobile telecommunications," added Okatomi.

Wireless ops form R&D center

Five of the nation's largest wireless cable operators have joined together with several equipment suppliers and manufacturers to launch Wireless Cable Laboratories with a stated goal of applying digital video compression technology and interactive communications in those systems.

The intent is to apply compression technology to MMDS systems and offer as many as 300 channels of programs by 1994.

The formation of the Laboratories and the implementation of compression will allow wireless operators to test market video on demand, pay-per-view and other new forms of entertainment, information and educational programming, said Peter Frank, chairman of Wireless Cable Laboratories. Frank is also president of Cross Country Telecommunications Inc., which owns the wireless cable system in Riverside, Calif.

The research and development center for the Laboratories will be located in Philadelphia in the technical complex of the local wireless cable operator. The center will be headed by a technical staff director with assistance from Merrill

Weiss, who will serve as principal consultant.

An advisory panel made up of representatives of major hardware and software development companies has been formed to assist in designing research programs as well as analyze and validate the results of tests.

CATV suppliers General Instrument, Scientific-Atlanta, Zenith and Philips were mentioned in a press release as companies "committed to participate in the Laboratories" but spokesmen from General Instrument and Scientific-Atlanta downplayed their company's role in the Laboratories. A host of wireless equipment vendors were also mentioned as participants.

The Laboratories plans to modify existing technical software and hardware for use in wireless systems. Tests of digital compression systems will be performed in Los Angeles, Tucson, Houston, Orlando, Philadelphia and Fort Pierce, Fla.

Wireless Cable Laboratories will report periodically to the Federal Communications Commission, which has granted experimental licenses for the project and will establish rules for transmitting digital signals. An early objective is to assure that digital transmissions do not disrupt existing analog signal transmissions.

Interdiction boosts system revenues

One of the country's largest roll-outs of interdiction has resulted in dramatically higher buy rates, lower operating costs and increased customer satisfaction–while making it easier to comply with the Cable Act, according to an executive with Greater Media Cable, which installed interdiction in its Chicopee, Mass. system last year.

"Interdiction relieves the operator's headaches caused by the Cable Act," said Bob Gaboury, vice president and general manager of Greater Media's western Massachusetts systems. Gaboury said interdiction satisfies the broadcast tiering and anti-buy-through provisions of the Act and allows for future tiering, including a digital tier.

Greater Media has deployed 1,637 eight-port interdiction devices to serve apartment complexes and 5,038 four-port units for single-family residences. All told, about 18,600 subscribers being served by interdiction.

Outside of the greater pay penetration and revenue (see Table 1) captured by the system, Gaboury said theft of service has been virtually eliminated because the outdoor interdiction units are easily monitored for tampering and customer satisfaction has soared because pay-per-view ordering confusion has been eliminated along with consumer interface problems. Gaboury said pay penetration had been hurt before interdiction "because people opted not to lose those (advanced tuning functions) on their TV sets," he said.

TABLE 1
Interdiction results in Chicopee, Mass.

	Before	After
Basic penetration	80%	83%
Pay penetration	52%	116%
Pay revenue		+ 40%
Additional outlets	39%	47%
Revenue growth		35%
PPV buy rate	*	36%

* Limited PPV as system was not addressable.
Source: Greater Media

Time Warner gives S-A nod

Scientific-Atlanta is coming off as the big winner in Time Warner's Full Service Network sweepstakes, having been selected to provide the headend, distribution and subscriber equipment for the Orlando project that will be operational by the end of this year.

The FSN design will deploy fiber optics to pockets serving 400 homes and will support on-demand digital programming, personal communications services, video phone and computer networking.

S-A will supply Time Warner with custom RF distribution and AM fiber equipment to support a return band between 900 MHz and 1 GHz that allows interactivity. The new technology will be embodied in a new version of the company's modular System Amplifier II and System 60 fiber electronics, which offer status monitoring and automatic switching capabilities.

Time Warner has already announced an agreement with AT&T to purchase that company's ATM switch.

CableLabs offers HDTV views

Interlaced scanning and multi-level vestigial sideband signal transmission are two key attributes of high definition television CableLabs "would like to see" in any new HDTV transmission system proposed by the "grand alliance" of the four remaining HDTV system proponents.

CableLabs made public its recommendations to help guide the advanced television system proponents as they work to merge their technologies into a single HDTV system proposal for adoption as a U.S. standard.

Interlace scanning is seen by CableLabs officials as "the best economic and technical scenario" for the launch of HDTV while offering a upgrade to progressive scanning when that becomes practical. Progressive scanning would be more compatible with computers.

CableLabs also tested Zenith's VSB signal transmission method in both the over-the-air and cable versions and determined the 16-VSB cable-TV version "provides the opportunity to double the transmitted data rate over cable systems to 43 megabits per second, from 21.5 megabits per second in the broadcast application," said Craig Tanner, CableLabs vice president of advanced television projects. He also said that although the 16-VSB version is more complex, it also features better technical quality.

Also, CableLabs hosted a conference on multimedia and potential interactive business opportunities in late April that served as a forum to view interactive services as the "economic and technical locomotive" that drives the next step in the evolution of cable networks, said Dr. Richard Green, CableLabs chairman and CEO.

"The next critical step is to combine computing power with the cable infrastructure to make a fully integrated, two-way broadband network a reality," said Green. "General purpose processors capable of 10 to 20 MIPS (millions of instructions per second) are destined to be quickly added to the home terminal."

JOTTINGS

Out with the old and in with the new . . . Forget the name **InSight Telecast** as the developer of the innovative electronic program guide that caught the fancy of Viacom and some other cable MSOs. The company's new name as of May 1 is **StarSight** . . . He may have retired in God's Country right outside Knoxville, but because of the new must-carry rules, former cable engineer **Roy Ehman** has found renewed interest in a software program he wrote a while back that automatically prints out the location of all TV and LPTV stations within a requested radius, along with a predicted field strength and distance. Interested readers can get a demo disk from Roy by calling (615) 983-2026 . . .

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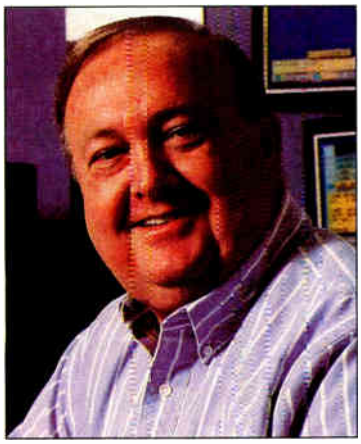


Claude Baggett

Claude 'Consumer Compatible' Baggett

By Leslie Ellis, CED

Compatible. The American Heritage Dictionary defines the word as "capable of living or performing in harmonious, agreeable or congenial combination with another or others."

Not only does the word describe the focus of Claude Baggett, director of consumer electronic systems for CableLabs and the organization's point man on consumer compatibility issues. It also describes the man himself.

Well liked by most everyone, Baggett is an articulate, colorful orator and engineer–he often verbally shoots from the hip, and rarely misses the mark. He believes in "management by walking around," and is quick to offer a word of praise or a friendly greeting. In all, Baggett is quite the likable guy.

And it's a good thing. Armed with these inherent personality traits, Baggett is charged with tackling the many nuances of the consumer interface conundrum.

Fortunately, Baggett has an extensive cable history to tap as he educates Washington and consumer electronics groups about cable television technologies. After receiving his bachelor of science in applied sciences from Louisiana Tech in 1967 (with majors in math and the sciences, and minors in engineering, business and social sciences), Baggett went to work for startup MSO National Cable in the Monroe, La. area. "I started out part-time–you know, 50 to 60 hours a week," Baggett chuckles.

Baggett describes the experience as the ultimate introduction to cable. Involved in construction, franchising, hiring, training, negotiating with equipment vendors, pole climbing and headend location, Baggett was completely immersed with cable.

He took a major career turn, though, in 1969, going to work for the U.S. Department of Defense. The DOD job took Baggett and his family to Ft. Monmouth, N.J., where he started work on a masters degree in electrical engineering at NYU before being transferred to San Diego, Calif. The MSEE was never completed, but the move to the West Coast proved rewarding.

The reward came, ironically, from Gerald Bahr, Baggett's neighbor. "We became best friends, and he also worked for Cox Cable." The friendship quickly evolved from neighborly to business: Bahr got Baggett an interview with Cox's corporate staff, which he joined in 1979 as manager of engineering.

Ciciora's tutelage

Things changed again in 1984, when Baggett left Cox and moved to Denver to work for ATC, under the direction of another consumer compatibility guru, Dr. Walt Ciciora. He stayed with ATC until 1988, working on consumer compatibility issues and new business development.

The Colorado bug, though, had already bitten Baggett. When ATC headquarters moved to Connecticut in 1988, Baggett opted to stay in the Rocky Mountain region. For the next six months or so, he took a brief hiatus–and wrote a political intrigue novel loosely based on his days with the DOD. "The first chapter was bloody awful," Baggett recalls with a laugh. "But I worked at it, chapter by chapter. The next thing I knew, I had 57 chapters." Baggett sent the book off to an agent and was waiting for reply comments when he got the call from CableLabs.

Ultimately, the agent's comments–which were quite complimentary, by the way–have yet to be incorporated, mostly because they arrived the same day Baggett started at the Labs in 1989.He's been focused on consumer compatibility issues ever since."We have from now until October to do everything we can to educate people about cable's portion of the consumer interface," Baggett laments.

Completely focused

To that end, Baggett currently sits on or leads practically every engineering committee on the subject. He serves as secretary of the EIA/NCTA joint engineering committee; the Decoder Interface Subcommittee and the Cable Consumer Compatibility Advisory Group (or C^3AG, as it is referenced within engineering circles). Within that group, Baggett chairs the cable-ready TV and national renewable security subcommittees.

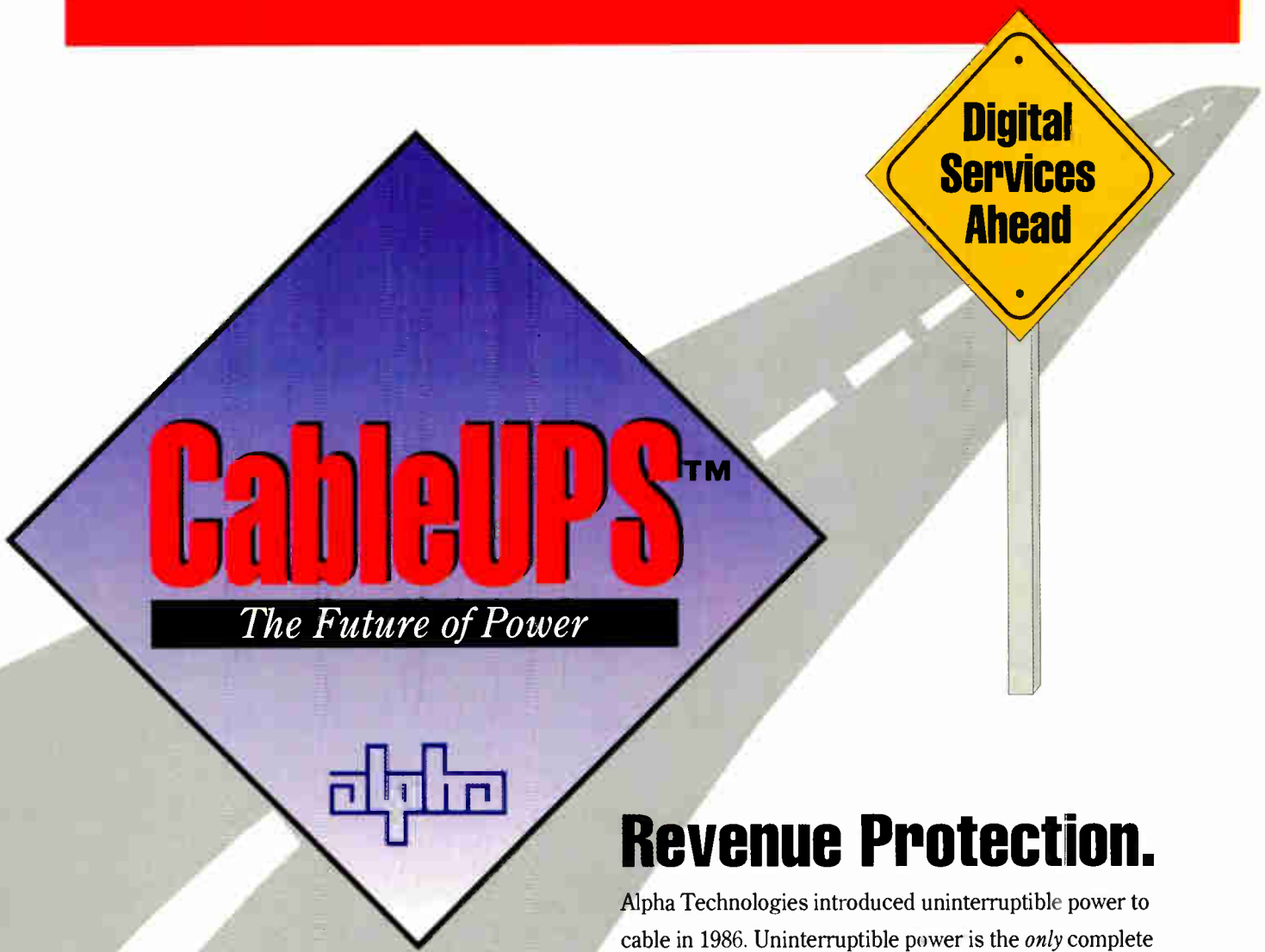
But what makes the work so snarly, Baggett says, is the wide divergence of opinions between cable and the consumer electronics industries. "The EIA essentially wants cable to be emasculated at the side of the house," Baggett says, "where we have no control, and their components have all the intelligence and control features."

All is not lost, however. Baggett says he is uncommonly pleased with the NCTA's reply comments to the FCC on the issue of consumer compatibility. "The work done by the NCTA has been more than impressive. The document they submitted was almost apolitical, as well as being very concise and cohesive."

The NCTA's comments recommend the use of existing technologies to soothe the interface with consumer's in-home equipment. Another possible solution, Baggett says somewhat reluctantly, is the EIA-563.X decoder interface–or a reincarnated MultiPort. "I was not particularly anxious to revisit MultiPort," Baggett admits. "But a revised version of the plug is still the most cost-effective and technically feasible way to go."

When not struggling with consumer compatibility problems, it's not unusual to find Baggett headed for the hills. In fact, on the evening before the interview for this article, Baggett bundled Alice, his wife of 30 years, and two of their children into the car along with a basket full of fried chicken (skinless, of course) for a picnic amidst Boulder's renowned Flatirons. For the Louisiana-bred Baggett, that kind of relaxation is critical, as are church-related activities.

Baggett says that a long-term goal is to continue working on his novel-writing talents. Who knows: maybe a stroll through B.Dalton someday will find Baggett's name among Follett and Ludlum on the "Action/Adventure" shelf. (Then again, maybe Baggett will be in the Psychology/Self Help section. A possible title: *How to Manage Divergence Amid Convergence.*) CED



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The Power to Keep You in Business™

On (not) discarding the baby with the bathwater

By Wendell Bailey, VP of Science and Technology, NCTA

Well, I know it's hard to believe (at least for me it is), but I've been with NCTA for over 12 years. Less than two months after I first joined the National Cable Television Association in April of 1981, I went to my first-ever NCTA National Show (it was in Los Angeles, as I recall). There, I moderated a panel on the use of fiber optics in cable television systems. The panelists spoke eloquently about the potential for fiber to be useful, perhaps as a supertrunk technology. But little, if any, thought was given to any use of fiber technologies in the distribution plant, and many arguments were made about the problems that would be encountered should people attempt to do that.

My, how times have changed.

NCTA '93: Keep your eyes open

Now, fiber is, if not passe, at least not unique enough to be even remarked on by the thousands of people who will be touring the exhibit floor in San Francisco this month. And cable television has become not only a major user, but also an important innovator in this particular technology.

But as you wander around the exhibit floor at this year's Show, ask yourself what technologies catches your attention–and of those, which ones will shake out to become ultimately commonplace and ordinary five to 10 years from now. I'm sure that you will find several candidates, but what is more likely is that something you note will, to your surprise, turn out to be terribly important in the future.

We are truly on the frontier of a new age in technology–and by a happy circumstance, the business that we are in (that being the entertainment video delivery business to the masses) is an important potential player. I say "potential" because the possibility exists that the heavy-handed regulation of Congress and recently, the FCC, threatens to cost our industry a lot–not just in terms of money but also in terms of lost opportunities.

More importantly, these actions could blend to complicate our capabilities and desires to bring new technologies and new services to our customers. In essence, we must do what we can to prevent certain regulatory bodies from throwing out our technological babies with the bathwater.

Will Congress bash digital eve?

All around us, operators are striking deals with software and computer makers. This year's National Show promises several new booths and services touting the potential for a wide variety of interactive services. How ironic it would be if, on the eve of the rollout of digital compression and all this other forward motion, we find that the new rules are so onerous that they sap our spirit of adventure for new projects.

All of this is coming at a moment in time when our architectures are changing significantly for the better. More importantly, our networks are undergoing a metamorphasis that enables a more rational and capable approach to offering customized, individual services packages to a wide percentage of our customer base. Certainly, we will still face the fundamental questions: Have we have come up with a service or an offering that is appealing enough to spark customer desire? And will our customers find that service appealing enough to pay a fair price for it? Because clearly, it is customer desire and fair payment that will cause these services to grow and be supported.

Certainly, the cost of technology and the synergies brought about by the recent joint ventures between a variety of different companies has an important role to play in that very regard. The recent stun factor caused by a punitive rollback in rates, coupled with new rules from the FCC that preclude fairly recovering all the costs of new services, could seriously complicate and delay the potential for us to do all that we could do. (A swift punch in the stomach would have had the same effect.)

Between the poblems that we will all have in figuring out the impact of such conflicting rules as must-carry, anti-buy-through, and compatibility, we must now wrestle with the disruptions that we must, by FCC mandate, inflict on our customers. These new and troubling regulations will, no doubt, be the subject of countless discussions as well as the centerpiece of several formal track sessions.

Rest assured that the business leaders of our industry will be devising ways to minimize the effect of these actions. Upgrading our infrastructure while simultaneously allowing for a fair return on the investment that is necessary will still be a major focus.

Engineers will persevere

I suspect, however, that the engineers in this industry will persevere nonetheless. We will not only see the work of our colleagues on the Show floor in the form of new products and services, but in the technical sessions that we'll all be attending. I am certain that we will all hear of new plans and successes in these sessions, and these tales will give us the ideas and the inspiration to continue into the future–regardless of any of the regulatory hurdles that we must overcome.

This "can do" attitude is paramount. We have all understood for a long time that our primary mission is to determine what it is that our customers want, and then to figure out how we need to go about bringing it to them. Indeed, this way of looking at our challenges has brought us to the point where we are now: poised and ready to change the world of telecommunications for the better.

Our subscribers have responded in the past by asking for more of what we have to offer. Our success now lies in developing our business in a way that allows us to continue to innovate.

A decade from now, when I look back at what I wrote this month, I'll likely recall this time period as one that is decidedly bittersweet. The "sweet" comes from the rich variety of techical innovations that are well within our collective grasp....and I don't think I need to explain the "bitter." CED

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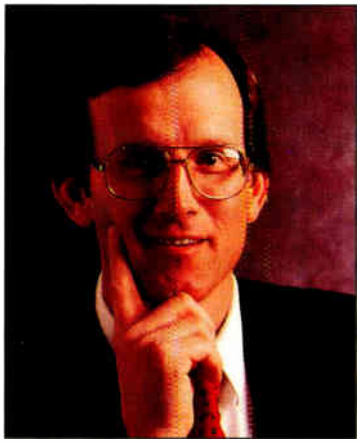

A set-top's impact on overall system design

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

With increased competition on the horizon from the likes of direct broadcast satellite (DBS), multichannel local distribution service (MLDS), multichannel multipoint distribution service (MMDS) and the telcos, some operators have either developed or are considering development of a "whole-house" strategy in which the subscriber is allowed to deploy one or more outlets in the home for a single price.

These trends have placed a considerable burden on the terminal device in the home, from a performance standpoint. Our desire to continually expand the channel capacity of our networks to 750 MHz and beyond, and to convert the set-top from a channel selection/security device into an in-home communications terminal have added to the burden.

The effect of distortions

In keeping with the spirit of this trend, back in January of this year, I wrote a column titled "Set-tops and cable networks."[1] This month, I will expand the analysis to include an examination of distortions such as composite triple beat (CTB) and composite second order (CSO).

As Ron Cotten[2] points out in his excellent series on Cable Systems Analysis, the set-top is really no different than any other active device in our networks today, with respect to the introduction of noise and distortions. As with other active devices, we will need to provide at least some minimum input signal level to the set-top in order to meet a specified carrier-to-noise performance out of the device. This is because the carrier-to-noise out of the device is dependent both upon the noise figure of the set-top as well as the carrier-to-noise ratio at the input of the device. The better the carrier-to-noise ratio into the set-top, the more potential impact that a set-top (with a given noise figure) will have on the overall performance of the network.

Therefore, the minimum input signal level that we should provide into the device will be dictated by both the specified output carrier-to-noise performance and the device's noise figure. This would seem to indicate that optimally, we would like to provide as much signal level as possible into the set-top. Unfortunately, as we increase the input signal level into the device, its distortion performance, including CTB and CSO, could begin to significantly degrade the overall performance of the network.

As a result, we wind up with a "window" within which the input signal level must remain in order to provide the specified output performance of the network. The low-end of the input signal level window will be dictated by the required noise performance, and the high-end will be dictated by the required distortion performance.

As with other active devices, convertor distortion performance is typically specified at a given input signal level and channel loading. Given this information, along with the performance provided by the network at the input to the device, the device's contribution to the system's overall performance can be easily calculated. Let's go through a brief example to illustrate the point:

Input signal CTB	-55 dB
Input signal CSO	-56 dB
Input carrier level	+10 dBmV
Channel loading	80 channels
Convertor CTB	-58 dB at +15 dBmV input signal level
Convertor CSO	-56.5 dB at +15 dBmV input signal level

To perform the analysis, first note that the CTB and CSO performance of the set-top is specified at an input signal level of +15 dBmV. Note also that since we are actually operating the set-top at an input signal level of only +10 dBmV, the convertor's performance will be much better than specified. Recalling that CTB performance, which is a third-order phenomena, varies 2:1 with respect to input signal level since we are operating with an input signal which is a full 5 dB *below* the specified input signal level, we should see an *improvement* in performance for the set-top of 2 x 5, or 10 dB! Thus, at an input signal level of +10 dBmV, the set-top terminal's CTB performance will equal -68 dB (-58 dB - 10 dB). Recalling that the combined CTB performance of the network and the set-top can be calculated (in dB) using *voltage* addition, we have:

$$CTB_{out} = 20 \log(10^{CTB_{in}/20} + 10^{CTB_{stt}/20})$$
$$= 20 \log(10^{-55/20} + 10^{-68/20})$$
$$= -53.25 \text{ dB}$$

In this example, the set-top has degraded the CTB performance from -55 dB at the input to -53.25 dB at its output, a degradation of 1.75 dB.

Second order distortion

Second order distortion, on the other hand, varies in a 1:1 ratio with the input signal level. Therefore, at an input signal level to the set-top that is 5 dB *below* the specified input signal level, we should see the CSO performance of the set-top *improve* by 5 dB. Since the specified performance is -56.5 dB, we should expect the device's performance to actually be -61.5 dB (-56.5 dB - 5 dB).

The performance at the output of the set-top can then be calculated simply by recalling that the CSO performance at the output will be based on the *power* addition of the CSO in to the device and the CSO of the device itself. Therefore:

$$CSO_{out} = 10 \log(10^{CSO_{in}/10} + 10^{CSO_{stt}/10})$$
$$= 10 \log(10^{-56/10} + 10^{-61.5/10})$$
$$= -54.92 \text{ dB}$$

Thus, in this analysis, the convertor will cause a degradation in the overall CSO performance of the system from -56 dB to -54.92 dB, or 1.08 dB.

It's also important to note that increased input signal levels to the set-top will create increased distortion levels in the device, thereby creating a much greater contribution by the set-top to the system's overall distortion performance. CED

References

1. Bowick, Chris "Set-tops and cable networks, From the Headend, *CED* magazine, January 1993, p.18.
2. Cotten, Ronald "CATV System Analysis–The Convertor," Cable Television Laboratories Inc., 1992.

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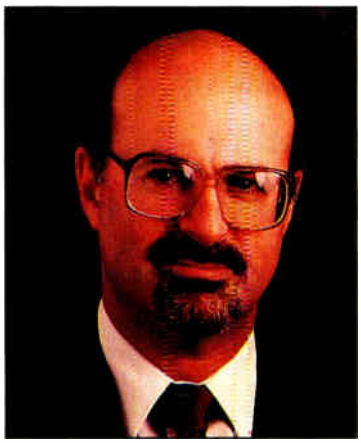

MPEG and video compression Q & A

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

MPEG primer
Jeff Krauss offers up an "MPEG primer" this month in order to bring some simplicity to the complicated international MPEG standards-making process.

Q: What is MPEG?
A: The MPEG initials stand for Moving Picture Experts Group, a joint committee of the International Organization for Standardization (ISO) and the International Electrotechnical Commission (IEC). MPEG is developing standards for digital compression of video and related audio for digital storage applications such as computer multimedia. MPEG standards do not cover transmission (modulation, forward error correction, adaptive equalization) or conditional access (encryption).

Q: Who are these experts?
A: While U.S. companies are members, the committee is dominated by European companies like Thomson and Philips, and the U.S. subsidiaries of these companies.

Q: What's the difference between MPEG-1 and MPEG-2?
A: MPEG-1 is an audiovisual coding standard, adopted in 1992, for digitally compressing and storing low resolution (352H x 240V), progressive scan digital video images; it operates at about 1.5 Mbits/sec. MPEG-1 was intended for computer storage of images, not for transmission of images. A number of MPEG-1 products for the computer industry are already on the market. MPEG-2 is being developed primarily as a standard for compressing and storing conventional (525/625 line) video. It is heavily based on MPEG-1, but unlike MPEG-1 it is also able to code interlace scan signals.

Q: What's the MPEG-2 time frame?
A: A "working draft" of the MPEG-2 video "main profile" was "frozen" in April 1993, subject to minor changes. A "committee draft" covering video, audio and systems issues is planned for November 1993. The expected time frame for adoption as an international standard is late 1994 or 1995. Digital chips to implement MPEG-2 may be available before the final adoption of the standard, however.

Q: What's the relationship between MPEG-1, MPEG-2 and other digital video compression schemes?
A: Both MPEG-1 and MPEG-2 employ a video coding method called motion-compensated discrete cosine transforms. This is the same basic approach used by all four of the U.S. HDTV proponents, and by the DigiCipher II digital coding system developed for NTSC and PAL by GI and AT&T, but the implementation details differ. The computer industry has insisted that MPEG-2 decoders be "backward compatible"–able to decode images that were coded with MPEG-1. Certain modes of the DigiCipher II algorithm will be interoperable with MPEG-2 decoders, but they are not fully compatible.

Q: Who has chosen MPEG-2 for video distribution products and services, and who has chosen the DigiCipher II coding system?
A: Hughes has announced plans to use MPEG-2 with Thomson hardware for its DirecTV satellite service, staring in early 1994. But the availability of hardware might not match the DirecTV launch schedule, so Hughes may have to delay its service or start service with an "MPEG-based" video algorithm. The DigiCipher II system has been chosen by HBO, PBS, TCI and others in the U.S., as well as Rogers (Canada), Multivision (Mexico), PanAmSat (Latin America), Middle East Broadcasting Center and STAR TV (Asia).

Q: What influenced the DigiCipher II choices?
A: Overall system design, availability, performance and cost. The MPEG-2 products won't be available for 1 to 2 years, but some customers needed digital video compression sooner. Since MPEG-2 must be backward compatible with MPEG-1 to satisfy the computer industry, it contains excess functions that increase the electronic complexity but provide no additional benefits for the broadcast and cable TV industries. And MPEG-2 uses a form of motion prediction and compensation (using so-called "B-frames") that requires more memory in the decoder, which raises its cost. For the computer industry, MPEG-2 costs will also be higher because MPEG-2 supports interlace scan images, which are not typically used by the computer industry.

Q: Were there technical considerations in these industry choices?
A: Technically, both MPEG-2 and the DigiCipher II system reproduce pictures with equally good quality. But the MPEG-2 use of "B-frames" for motion prediction introduces additional system end-to-end and channel acquisition delays that may be unacceptable for channel changing in a multichannel television environment. Computer users don't care about this, but TCI and other programmers think their viewers may care a lot.

Q: Wouldn't everybody be better off if there were just a single video compression standard for all industries, instead of separate standards designed to meet the specialized needs of different industries?
A: A single standard might be best if the economies of scale benefits are greater than the extra costs caused by "excess baggage" functions needed by one industry but not the other, but imposed on everybody. A single standard might make it easier to move images between the cable/broadcasting industry and computers, if there is a large demand; but if there is little demand for this capability, then perhaps the people who want the capability should buy format converters, rather than imposing extra costs on all those who don't want it. Marketplace forces sometimes prevent convergence to a single standard. Sometimes optimization of cost and performance is more important than standardization. But sometimes not. CED

Editor's note: General Instrument is one of Mr. Krauss' clients.

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Fiber optic return transmitters for CATV applications

By Nigel Watson,
Philips Broadband Networks

Fiber optic return links are becoming increasingly important in CATV applications, and the use of the inexpensive Fabry Perot (FP) laser as a directly modulated optical source is attractive in these applications because the return band channel loading is low. A return cable path often has only a 5 to 50 MHz passband which can accommodate up to seven NTSC channels. Usually, only a few channels are required and a low-cost FP transmitter without an isolator can be used effectively to transmit the video carriers through a link with excellent carrier-to-noise (C/N) and distortion performance.

FP lasers with external optical isolators have been demonstrated for 42-channel forward band CATV transmission over a short (5 dB) link[1]; however, for a return fiber link the use of an isolator is an expensive addition, and optimization of other system parameters precludes its use.

Return channels sent back to the headend are required to be of high quality, as they are to be transmitted back through the forward cable system. CNRs in the high 50s are generally required for this type of application.

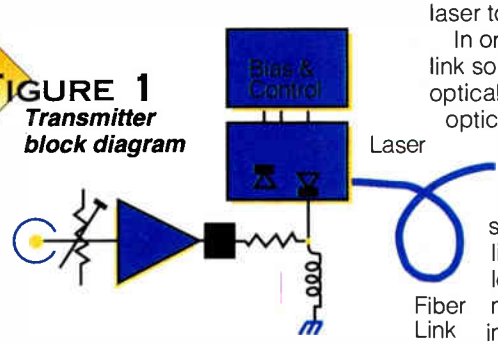
A prototype link capable of delivering two channels through a 7.5 dB link with carrier-to-noise ratios (CNR) of greater than 59 dB with no distortion products greater than -75 dB has been demonstrated. This same link can deliver four channels with 55 dB CNR, -65 dBc worst case CSO and -70 dBc CTB. When the channel loading is increased to seven, 52 dB CNR with -62 dBc CSO and -67 dBc CTB is obtained. This performance is only slightly degraded as the transmitter is temperature-cycled up to +60° Celsius.

In order to achieve this performance, a laser with excellent linearity and fiber coupling must be selected. Also important is that the link it is driving must have minimal reflection back into the laser. Correspondingly, the receiving photodetector in the return receiver, as in the forward optical receivers, must have a high optical return loss–even though the channel loading is low. In the return link, the FP laser–with its characteristic multiple longitudinal mode optical spectrum–is extremely sensitive to reflection.

Prototype link performance

Figure 1 shows a block diagram of a prototype return transmitter using an FP laser with no isolator. The transmitter consists of a return band hybrid CATV amplifier driving a FP laser. Resistive matching is used between the amplifier and the laser, though transformer matching has distinct advantages for return band transmitters. The use of transformer matching will be discussed later in this paper.

FIGURE 1
Transmitter block diagram



Optical power leveling is achieved by means of a differential amplifier which adjusts the bias to the laser to maintain the voltage across a resistor, loading the monitor detector at a temperature-compensated reference level. Figure 2 shows the seven-channel spectrum viewed at the receiver separated from the return transmitter by 7.5 dB loss of fiber.

The distortion products (second order distortion predominates) visible in this plot are both link- and spectrum analyzer-generated. Calculation of their actual levels or use of a preselector filter reveals their true levels to be -62 dBc. Third-order distortion must be characterized using a filter, and worst-case third-order distortion (CTB) was measured to be less than -69 dBc. The return transmitter was fusion-spliced to the link for these measurements.

Optical reflection

With a fiber connector spliced into the link at the transmitter, there was a slope in the noise floor across the frequency band. This slope, when observed over a much larger frequency range, was found to be a periodic peaking in the noise floor of the link over its modulation bandwidth.

This effect is caused by optical reflection from the connector, and is similar to having a secondary resonant cavity external to the FP resonator. The frequency spacing of the noise peaks is equal to the reciprocal of the round-trip travel time of light in the fiber from the laser to the connector interface.

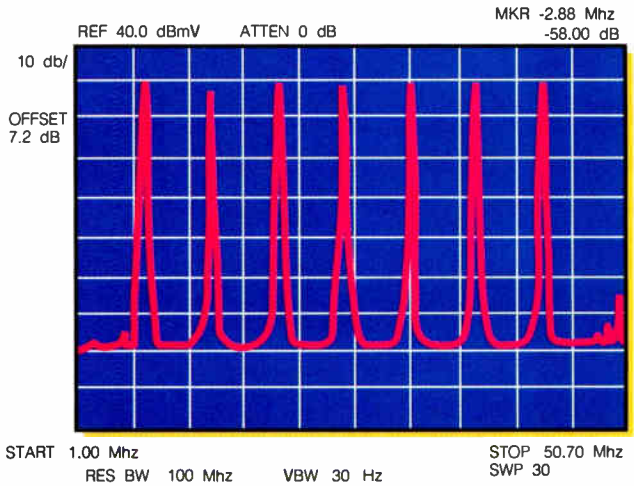
In order to improve the noise floor of the link so that it is more flat, one could use an optical isolator, a laser with a narrower optical linewidth, or a lower reflection fiber link terminated in a better optically matched photodetector. The first two approaches add significant cost to the return fiber link; however, the third is potentially low cost with significant performance enhancement when properly implemented. Using this approach alone, increased channel loading can be accommodated.

CNR calculation

The calculation of CNR for a directly modulated, laser diode-driven link has been treated extensively to date and is covered in most standard textbooks on fiber optics, so the details will not be reviewed in this paper. The FP laser link performance is affected significantly by optical reflection in the link, so an analysis including only laser relative intensity noise (RIN) and receiver thermal and shot noise will predict CNR performance higher than what is observed if an optical reflection such as with a connector is present.

For an FP link with no isolator, a more refined analysis is required. It is useful, however, to consider the achievable CNR without considering reflection, as if an ideal isolator were used at the output of the laser. The received CNR vs. link budget for an FP-driven link with modulation index typical of four-channel transmission is shown in Figure 3. It is assumed that:

FIGURE 2
Seven channel spectrum analysis



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✔ The transmit power of the laser is 2 mW (+3 dBm),
✔ The RIN of the FP laser is -135 dB/Hz,
✔The receiving photodetector works in a 300 ohm load (achieved through a 4:1 impedance transformer from the 75 ohm receiving amplifier input) and has a dark current of less than 1 nA,
✔ The noise figure of the receiving amplifier is 4 dB.

This analysis is actually conservative for a return link. With low channel loading and narrow bandwidth, many of the design constraints of a receiver intended for forward band operation are lessened. Special purpose low noise receivers[2] with increased photodetector load impedance and low noise GaAs FET amplification can be applied and have excellent CSO performance, often a problem in return band links.

In order to more accurately predict the received CNR of an FP laser-driven link, the effect of optical reflections must be modeled. Unfortunately, this is not particularly simple for an FP laser because the optical spectrum consists of a grouping of closely spaced longitudinal modes with wavelengths that are a half integer sub multiple of the FP laser cavity length. Further, there is a combined effect from these modes (see Figure 4). If there is dispersion in the fiber, the calculation of this effect is more than a simple extension of the analysis of reflection in a DFB driven link.

Temperature effects

The optical spectrum of the FP laser is affected significantly by variations in temperature. Not only does the center wavelength of the peak in the mode distribution vary, but the mode distribution can vary significantly depending on whether most of the optical power is in a single, central mode, or shared by several adjacent modes. Often, an optimal operating temperature can be found at which point one mode is dominant and the effective linewidth for the particular laser is minimized. Under these conditions, the CNR and reflection immunity will be improved.

The use of a cooler is not always practical, as they consume large amounts of power (several watts is not unusual if a linear power supply is used). Not using a cooler can limit channel loading and CNR performance as well as the operating temperature of the transmitter, so the choice whether or not to use a cooler is an important one.

RF design of transmitters

The RF circuits associated with the design of a return fiber optic transmitter include the input attenuator and the driver amplifier. Additionally, directional couplers for monitoring the laser drive or for combining auxiliary inputs are sometimes desired.

The primary requirement for the driver amplifier is that the output compression levels must be well above the input levels that distort the laser, so that no significant amplifier distortion is produced and the dynamic range of the link is not limited by RF amplification. Almost any return band CATV hybrid amplifier is capable of driving the laser sufficiently, though improved efficiency through use of a discrete amplifier is favorable for the sparse channel loading required of a return system.

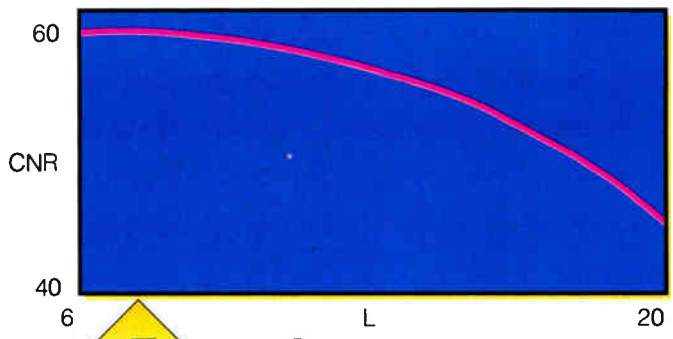


FIGURE 3
CNR vs. link budget

Transformer matching from the output of the amplifier down to the low impedance (5 ohms) of the laser diode is advantageous for narrowband applications, because it reduces the required drive level to the laser. For an ideal transformer, the reduction in required drive level to attain a desired optical modulation depth is 6 dB, though for practical transformers with core loss, 4 dB or 5 dB can be realized. This lessens the output drive level required from the amplifier, thus relaxing the required output compression levels and gain. Less overall power consumption is required by the transmitter if this is properly implemented.

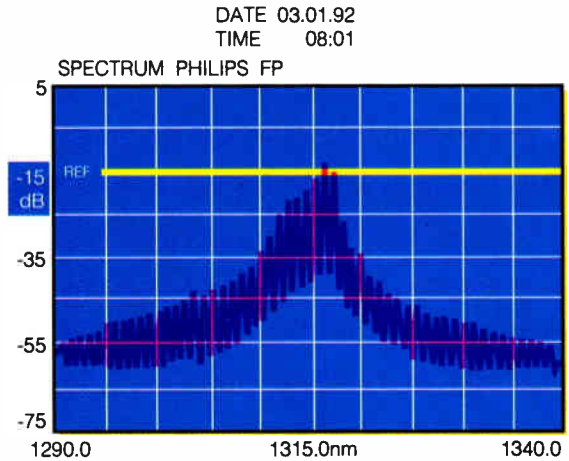


FIGURE 4
FP laser spectrum

Conclusion

FP lasers can be used effectively without an isolator or cooler for return band CATV fiber links, provided the channel loading is low and the link provides a low back reflection optical match to the laser.

Use of coolers and/or isolators can significantly enhance system performance of FP driven laser links; however, the cost and power requirements of the improved performance links are large. CED

References

1. J.Chiddix et.al., "AM Video on Fiber in CATV Systems," IEEE Journal on Selected Areas in Communications, September 1990, Vol. 8, No. 7.

2. N.G. Watson, "Using Push-Pull PIN-FET Fiber Optic Receivers," *CED* magazine, September 1991.

Credits

We Were First In The Industry To Go Down The Tubes.

Loose tube cable, that is. And the advantages of our innovation are so great, it's become the preferred fiber optic cable in the cable TV industry. As a result, other manufacturers have attempted to imitate it. But through the years, no one has offered a better loose tube cable or developed its potential more fully than Siecor, the leading fiber optic cable manufacturer.

Today, our cable meets the exacting performance specifications that make it ideal for use in your cable TV system. Its craft-friendly design is perfectly suited for fiber to the feeder applications. It offers superior lightning protection, and our dual layer buffer tubes provide superior kink and crush resistance. Our single-mode cable is always made with Corning fiber, offering the tightest dimensional tolerances in the industry, meaning lower splice and interconnect losses. And our innovative tapered design option can save considerable splicing time and system cost during installation.

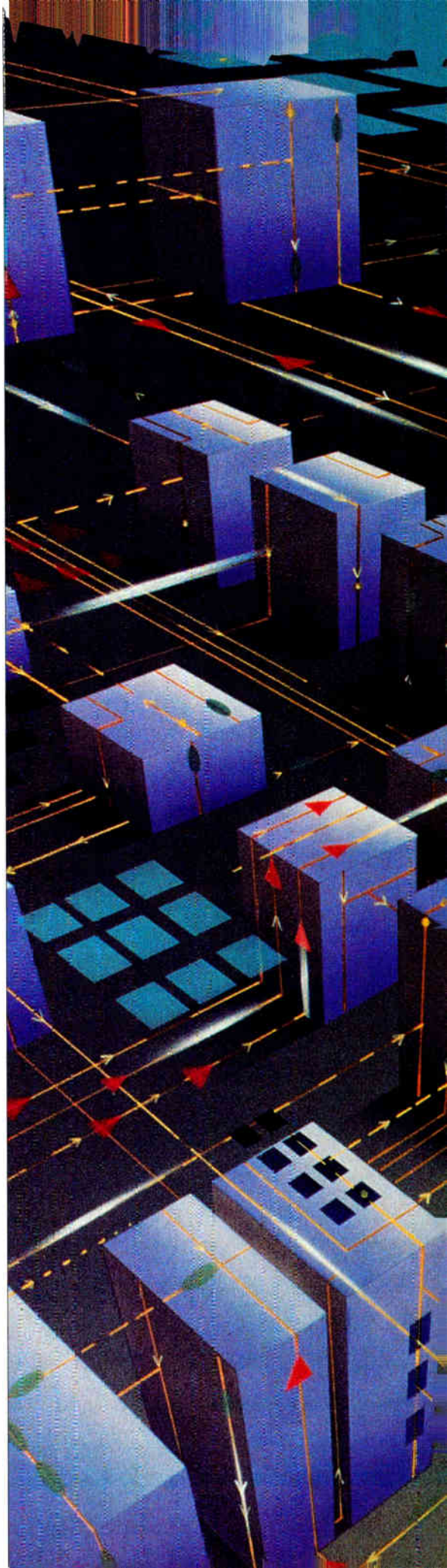
On top of these advantages, you get more than the best quality cable when you come to Siecor. You get support that's recognized industry-wide. You get the backing of our first-rate R&D as well as the largest optical cable manufacturing plant, providing ample capacity for timely response. And you can always count on us to be here with the service and products you need including hardware, splice equipment, training and consultation.

So come to the company that was first to make loose tube cable and that still makes the best there is. Call us at 800 SIECOR 4 Ext. 5998.

SIECOR

Building the info superhighway

Cable poised to be major telecom player



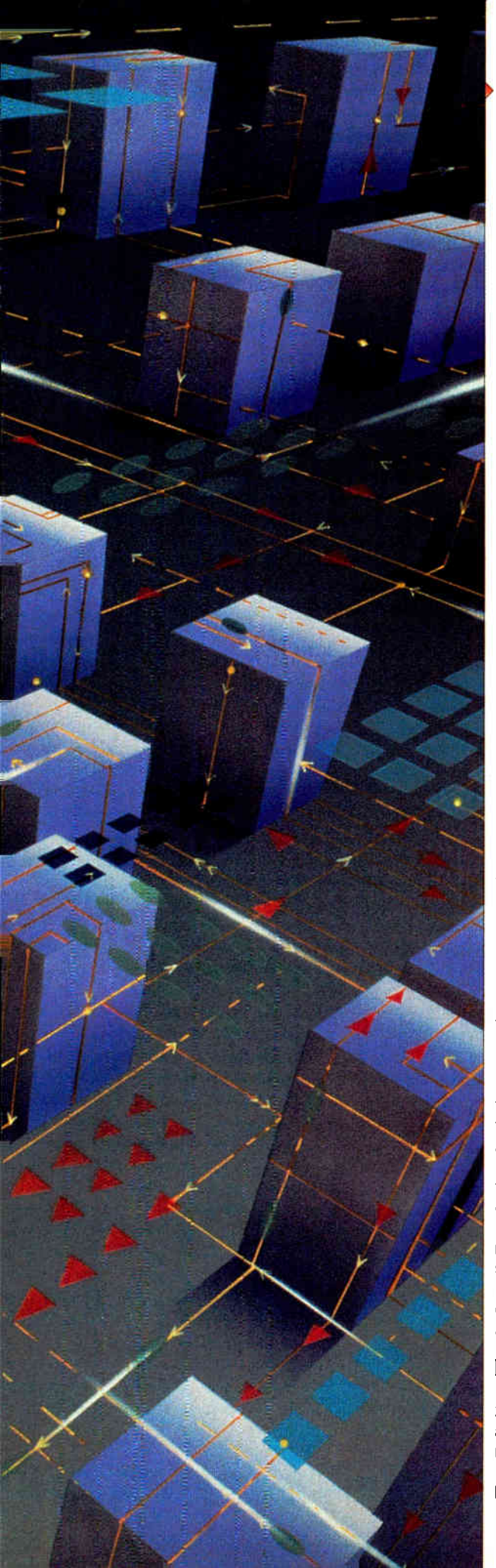
By Roger Brown, CED

Like it or not, often the perception of the cable industry is that it is a low-tech industry plagued by unreliability and poor customer service. But that perception is slowly changing now that cable television is finding a role in the development of the national information "superhighway" that has been placed on a fast track in Washington political circles.

"We're being taken seriously as a telecommunications provider," says Richard Green, chairman and CEO of Cable Television Laboratories. "That's a real breakthrough because in the past there was always a perceived chasm between telcos and cable companies. Now, we're full partners," he adds.

What has happened to change old notions is that cable operators have begun to string fiber from headends to node locations serving as few as several hundred homes. Corning, which closely tracks fiber usage throughout the world, earlier this year said the cable industry is the fastest-growing market segment for fiber optics, having grown more than 100 percent over the past year.

The second key to cable's new image is the advent of video compression and digital transmission of video signals. The additional bandwidth that fiber offers will be filled with a plethora of digital video services. But, perhaps what is more important, these developments open the



door to transmission of digital data, telephony and other services that conform to recognized international standards, including MPEG audio and video, Sonet, ISDN, ATM and more.

Cable will build the superhighway's on- and off-ramps

A new national role

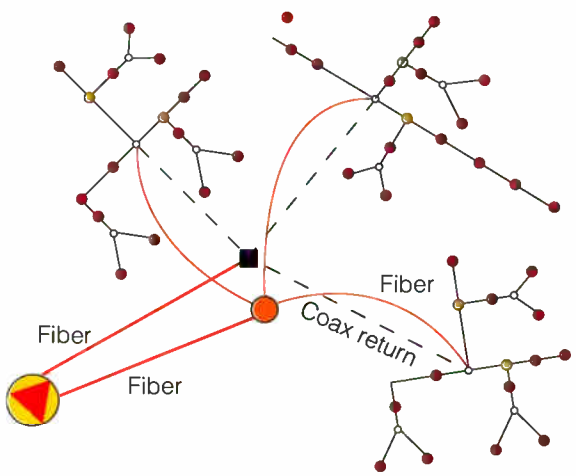
Because the cable industry can usually cost justify the installation of fiber optics and digital technology without making leaps of faith over future revenue streams, it is being perceived as the logical network for local interconnection to the high-speed national fiber backbone known as Internet.

Actually a global collection of interconnected networks, Internet in the U.S. is comprised of, among others, NSFNET (National Science Foundation's computer network), NSI (NASA Science Internet), TWBnet (DARPA's Terrestrial Wideband Network) and ESnet (Energy Sciences Network). There are also regional computer networks, such as NEARNet in New England, SURANet in the Southeast and WESTNet in western U.S.

Partly as a result of Green's recent testimony on the subject, the cable industry is now being invited to participate at national planning meetings, Green says. For example, he's been asked to join the Competitiveness Council, an organization of CEOs to develop methods to improve American competitiveness globally; the Federal Networking Council's Advisory Committee, which oversees Internet; and an unidentified third organization that is coordinating demonstrations of interconnected networks.

Rather than actually building an expensive, high-speed fiber network that spans the continent, cable operators see themselves as building the superhighway's on- and off-ramps that will provide the local interconnects to the backbone. "We're doing a lot of things already that positions us as an integral part of the highway," Green says. These include the installation of fiber, the addition of a return path from homes to central facilities and the development of regional hubs where multiple MSOs can share resources to provide wide area interconnection. And now, computerization is occurring, which leads to architectures with "servers" and "client nodes."

FIGURE 1
Passive cable network architecture



High-speed network applications

The first application of this network computerization is digital advertising, where digital spots are stored on a hard disk then accessed and routed into a cable network.

That application is already underway in the Northeast, in Continental Cablevision's

	Data rate	Channel capacity	Digital delivery	Terrestrial interference	Localized content
CATV	Wide up broad down	80-800	High	Low	Yes
RBOC	Narrow up narrow down	0-4	Medium	Low	No
DBS	None up broad down	100+	High	Medium	No
MMDS	None up medium down	10-50	Medium	Medium	No
Broadcast	None up medium down	1-4	Low	High	Yes

FIGURE 2
Electronic Delivery System Comparison

Massachusetts systems, says Dave Fellows, senior vice president of engineering and technology. Just last month, Continental transmitted the first digitally compressed ad over an Ethernet network operating at 10 megabits per second.

In April, Continental announced a multi-state fiber backbone interconnect that will consist of three "superheadends" and five hub sites located throughout Massachusetts, New Hampshire and Maine. This 2.4-gigabit per second network will be used as a CableLabs test network to determine the best methods of offering regional video services and personal communications services, says Fellows. But the network will also be used to establish a link with Internet.

"I'm excited about tapping into it," says Fellows. "This is becoming something real for me." In fact, Fellows believes the market for interconnecting with other networks wiol come faster than video-on-demand, PCS, and most other commonly mentioned applications.

Needless to say, other operators are also setting their sights on being integral players in national networking. TCI recently announced a huge fiber upgrade program that will result in the deployment of fiber in systems serving 90 percent of the MSO's 10 million subscribers. TCI officials have dubbed its new concept the Infostructure Network.

Technology leapfrog

Meanwhile, Time Warner is leapfrogging other operators and putting in place the pieces it needs to build a switched broadband network known as the Full Service Network in Orlando. Other operators, including TCI, are expected to follow Time Warner's lead by utilizing fast-packet switching methods such as asynchronous transfer mode (ATM).

In fact, TCI and Time Warner are working "in concert" and "sharing information" regarding the deployment of high-speed fiber networks in several locations, according to Larry Romrell, senior vice president of TCI and the person who is overseeing the work on TCI's new architecture.

Parts of those discussions involve common interfaces and ensuring that cable operators are able to interconnect with other networks. "As cable looks at being a two-way network between franchise areas and cities, we've got to have the same standards," Romrell told sister publication *Cablevision* in a recent exclusive interview. "That's the key to our future."

TCI will soon announce a test of a platform similar to Time Warner's FSN that will offer "multimedia" services not yet offered by any other cable system, Romrell says. Another soon-to-be-made announcement will involve inviting Apple, Microsoft, AT&T and other companies to "share ideas and develop systems that interoperate with theirs," Romrell adds.

Full international standards

Because of the need for interoperability, TCI is demanding full MPEG compatibility for its cable networks, right down to the digital set-tops it agreed to buy from General Instrument last December.

Romrell says TCI is "pushing both Scientific-Atlanta and General Instrument toward some of the digital engineering firms in the Silicon Valley that have some techniques we're quite interested in." Romrell is talking about companies like Silicon Graphics and Sun Microsystems, which have extensive digital processing and graphic experience.

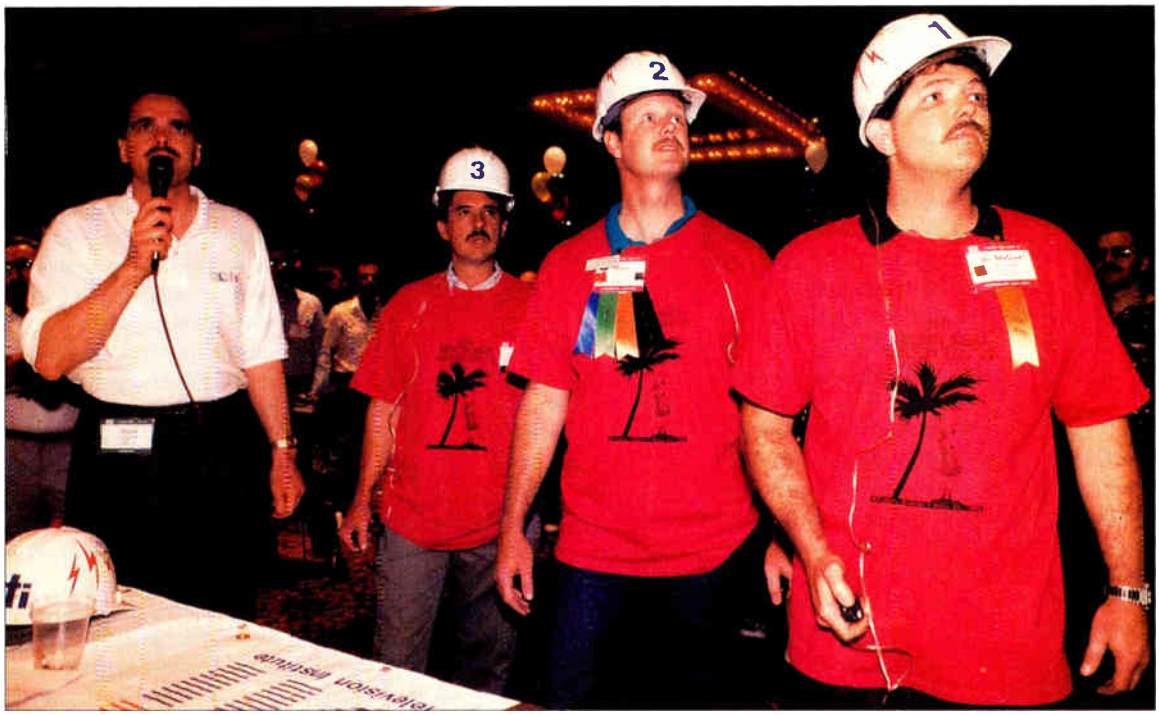
Why? Because TCI is planning to purchase set-tops with "huge computer power," something on the order of 100 to 1,000 times more powerful than today's analog set-top. Romrell termed GI's integration of a 386-type chip into its convertors "a good step," but said TCI will need devices with the power and speed of a 486 or Pentium (Intel's new chip that's twice as fast as a 486).

Time Warner is already pushing the envelope of convertor technology by asking S-A and Toshiba to develop a set-top with the power of a workstation, a device that is "significantly more powerful than a 486 computer," says Jim Chiddix, senior vice president of engineering and technology at Time Warner Cable. "We want to lead the market by three or four years. We're using ambitious technology because we believe it will be cost-effective technology at that time."

Other operators are getting into the act as well, albeit for different reasons. Adelphia Cable recently developed a new cable topology that eliminates all but one active device between the subscriber and the headend. The new design, which features a lengthy coaxial return link, brings full two-way interactivity without a lot of cost, according to Adelphia officials. The design will be used in Adelphia's Syracuse system.

Clearly, the cable industry is out to prove that previous attitudes about the quality of its networks are outdated. Furthermore, MSO executives are carrying the message that the cable industry is uniquely positioned to provide a ubiquitous broadband network across the country, expeditiously.

"There is no race to build the last mile of the nation's information superhighway because we're way ahead," says Green. CED



It's a bird... it's a plane... no, it's Steve Jaworski, Tom Lockwood, Steve Allen and W. Michael Franke playing the Cable Games.

SCTE Tec Expo: Cable gets back to work

4,000 attendees flock to sunny Orlando

Four thousand technical personnel from cable systems and equipment suppliers–many with their families in tow–descended upon Orlando, Fla. in April for the annual Society of Cable Television Engineers Cable-Tec Expo and Engineering Conference.

As always, the hardware-only exposition drew rave reviews from vendors who were there to show off their latest products to the attendees. And the attendees enjoyed the "hands-on" focus that brought them up to date with the latest information on new technologies and gave them a chance to brush up on real-world skills.

While topics like digital compression and telephony were brought up during the Engineering Conference which preceded the two-day Expo, workshops on signal testing, fiber optic construction practices and technical regulations took in the largest crowds as engineers and techs sought information that would best benefit them.

But vendors came armed with myriad new products ranging from high-tech fiber optic technology to new poleline hardware. And, as always, there were a number of newsmaking events that took place.

Contractors endorse SCTE program

For example, the Cable Television Contractors Council and its parent organization, the Power and Communication Contractors Association, announced its endorsement of the SCTE Installer Certification Program.

CTCC is the industry division of PCCA representing independent cable TV contractors nationwide.

Endorsement of the SCTE program is consistent with CTCC's goals to promote higher standards in construction techniques and safety practices within the cable industry. By mutual agreement, CTCC will refer its contractor members to the SCTE installer certification program for the training of their employees in basic cable installation. SCTE, in turn, will make the program available to CTCC/PCCA members under the standard terms of the program for their own members.

The goals of the Installer Certification Program are to establish minimum skill requirements for installers and installer/technicians in cable TV. Once the basic elements are mastered and an exam is successfully completed, SCTE awards a certificate indicating competence in this area. Certification is performed at the chapter and meeting group level; those applying are charged an annual $25 membership fee.

NCTA files comments

While Expo attendees headed to the annual welcome reception, a legal staffer of the NCTA in Washington, D.C. headed toward the offices of the Federal Communications Commission, laden with multiple copies of the cable industry's reply comments on consumer compatibility. "This is the first time such specificity has ever been laid upon the table," said NCTA VP of Science and Technology Wendell Bailey.

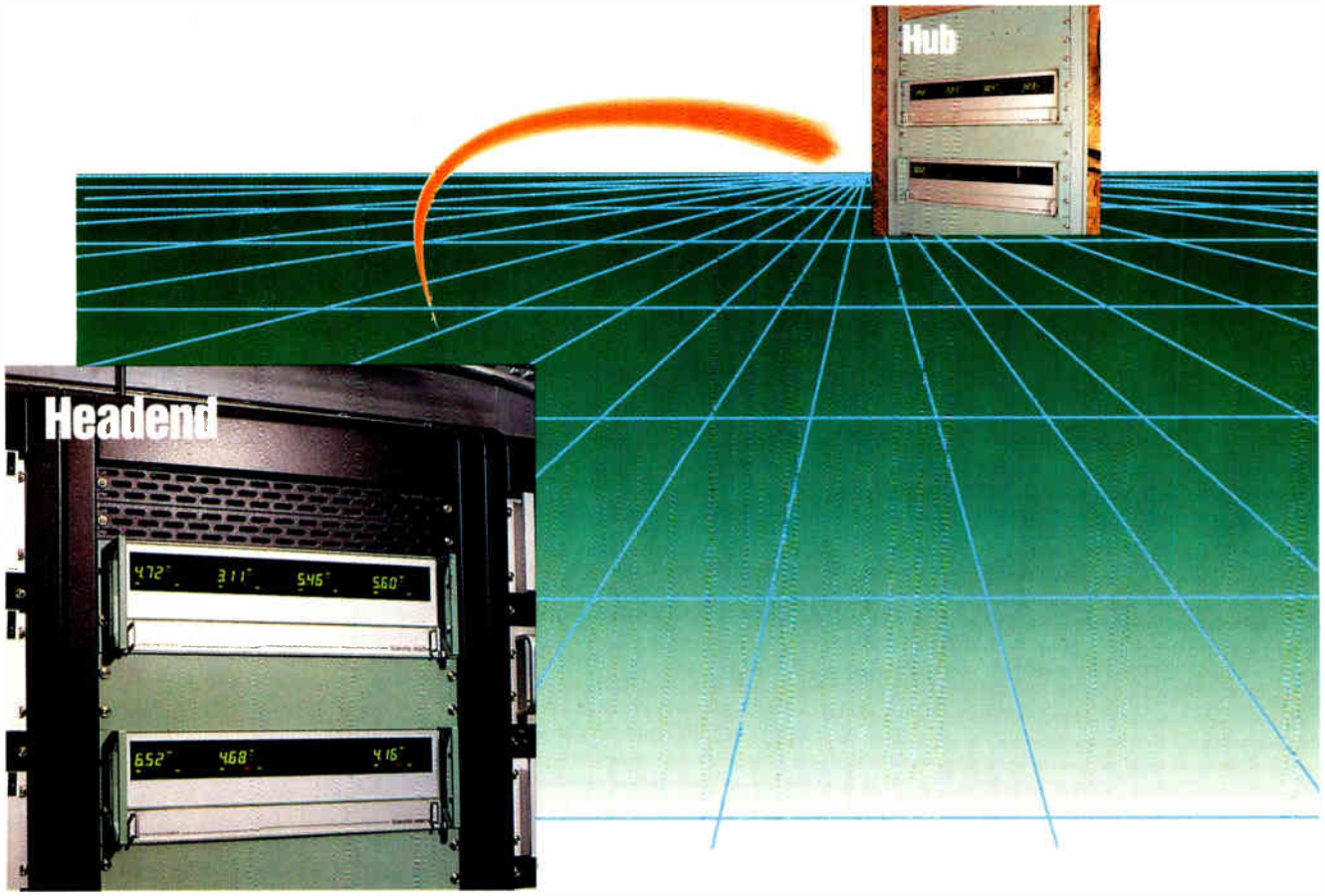
In short, the 25-plus page document suggests various methods by which the cable television industry can improve, but not completely fix, issues of consumer compatibility, Bailey said.

"Because of the huge installed base of various signal security mechanisms, including traps and addressable convertors, there is no single answer to these compatibility issues," Bailey told *CED*. "In other words, this is not a question of one big issue. It's more a question of lots of little issues. It's a very complex thing."

Some of the NCTA's recommendations include the use of set-tops with an RF bypass; a built-in timer to handle various VCR recording requirements; and dual tuners and/or dual decoders, to handle simultaneous viewing and decoding. "A set-top may have one or all of these features, depending on the situation for which it is needed," Bailey explained.

Another NCTA recommendation is the adoption of cable "set-back" boxes that

Digital Fiber Performance at a Fraction of the Cost.



Only Scientific-Atlanta has the Dual Wavelength AM Supertrunk, a low cost, high performance alternative to digital and FM fiber systems.

Simplicity

The Dual Wavelength AM Supertrunk is simple and straightforward. Because it requires no signal conversion, the AM Supertrunk is ideal for digital compression, scrambling and digital audio applications.

And, in terms of size, a 7-tier AM Supertrunk takes up a fraction of the rack space of a comparable digital or FM system. That means less real estate and lower capital costs.

Economy

No signal conversion also means less equipment to buy, install and maintain. So, you can have an AM Supertrunk for about half the cost of competing technologies.

While digital systems deliver only 8 scrambled channels on a single fiber, the AM Supertrunk can carry 20 to 40 channels per fiber. The system is completely transparent to digital compression and scrambling schemes. This gives you significantly reduced fiber costs.

Performance

The AM Supertrunk delivers near headend quality signals to remote hub sites. That makes it well-suited for headend interconnections and remote hubbing in Fiber-to-the-Serving Area (FSA) applications. The modular design of the AM Supertrunk allows you to increase bandwidth without affecting performance simply by adding a single transmitter and receiver.

To find out more about the advantages of the AM Supertrunk, contact your nearest Scientific-Atlanta sales representative, or call 800-722-2009 today.

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Circle Reader Service No. 15

interface with consumer devices which include an EIA-563 plug. (This assumes, Bailey notes, that consumer electronics firms provide the EIA-563 connector in forthcoming TVs and VCRs).

The set-back, as Bailey views it, is a "brick-like" device. In fact, when asked what the unit would contain, Bailey suggested that it is much easier to describe what a set-back box would not contain. "It would have no tuner, no I.R. receiver, no remote control receiver, no buttons and no windows.

"Essentially, the box would look like a brick made of black plastic. The end result is a box that is considerably less expensive."

In its comments, the NCTA suggests that if the consumer electronics industry agrees to the inclusion of an integrated EIA-563 connector, cable operators would then supply the set-back device. The box would be provided without an installation fee for all first-time device installations.

The FCC will collect all of the reply comments, due in from the NCTA, the Electronic Industries Association (EIA) and various other groups, and study them as reference materials. After consideration, the FCC will submit a report to Congress. The report will be submitted this October.

The FCC will then have roughly 180 days in which to issue a Notice of Proposed Rulemaking (NPRM) and complete the cycle of comments/reply comments needed before it can issue rules based on its findings in this matter. Ultimately, though, the FCC will promulgate rules regarding consumer electronics/CATV compatibility, Bailey said yesterday.

The issue is particularly sticky because, for its part, the EIA is recommending that all cable signals be delivered in the clear. As Bailey sees it, there are only four known methods by which to deliver signals in such a manner–with no form of scrambling, with traps, with interdiction-type devices or with broadband descrambling devices.

"In the face of an existing $5 billion per year loss of cable revenues to cable pirates, the first option is just not an option," Bailey says.

"As for trapping, it has limited functionality-and, in fact, existing legislation regarding rate regulation and anti buy-through is leading operators away from the use of traps."

Further, Bailey noted, interdiction devices, while suitable for some applications, do not represent an across-the-board solution because of cost and flexibility issues. And, broadband descrambling devices—which take bundles of scrambled signals and simultaneously descramble them— are still in the early stages of development. "None of these options are attractive across he board," Bailey said.

As always, several new products were announced at the Expo. They follow, in alphabetical company order:

Alpha

Alpha Technologies introduced a new line of cable-TV uninterruptible power supplies, called the FP Series. The new series of supplies feature a single ferroresonant transformer design, regulated output under all operation modes and built-in line conditioning and surge protection. The AC version provides 4- to 7-amp efficiency performance; while the DC power module delivers direct powering of fiber nodes at an auxiliary power port.

Other features include "quick connects" for batteries and power output and a remote temperature sensor for precision charging. Options include automatic and manual self-test, a parallel status monitoring interface and a serial status monitoring interface. Compact 12-inch-wide pole and ground mount enclosures are also available. Circle Reader Service No. 100.

Belden

The Belden division of Cooper Industries announced availability of its "Enviropak" reusable drop cable dispenser, designed to house and protect indoor series 59 and 6 drop cable from harsh environments encountered by cable TV installers.

The Enviropak consists of a high-density, polyethylene case that is "safety orange" in color and includes a molded handle for increased strength. When the cable is depleted, the user can insert a new coil of cable for use.

Also new from Belden is its Series 1000 drop cable, which Belden officials say guarantees sweep testing to 1 GHz on all Belden drop cable manufactured since July 1, 1992. Return loss for the Series 1000 is 20 dB for RG-59, -6, -7 and -11 cables. Circle Reader Service No. 101.

C-COR Electronics

New from C-COR Electronics is its single-channel, digital, fiber optic transmission system. Dubbed the Model 3300, the device is one of several new products augmenting C-COR's existing Series 3000 high-speed digital fiber optic video/audio/data transmission system line.

The new model works by digitally transmitting one video and two audio channels over fiber, with RS-250C short-haul performance. What makes the product different, C-COR officials say, is its pricing, which is competitive with FM analog systems. Additional audio and data channels will be available as options on the 3300.

"The 3300 family was developed for low-cost, point-to-point systems, such as studio-to-transmitter, studio-to-headend and school-to-headend links," says Bob Harris, senior applications engineer for C-COR. "This enables extensive CATV networking in local and regional systems that require remote channel pickup and/or distribution."

C-COR also took the wraps off several Series 3000 products at the Expo that are compatible with RF scrambling. The products, which augment C-COR's high-speed, digital fiber optic video, audio and data transmission system, will be available this fall, and are designed to transport any standard RF scrambled channel. Two RF scrambling options are available, C-COR officials say.

An 8-bit DC coupled codec (model CL3803/3804DC) and/or 9-bit DC coupled codec (model CL3903/3904DC) process demodulated RF scrambled channels for transportation over the digital fiber network.

A 10-bit DC coupled codec (model CL3103/3104DC) and an IF downconvertor/upconvertor (model CL3843/3844) accept and process scrambled channels at video IF for transportation over a digital network.

"The main advantage of transporting RF scrambled channels is that it eliminates the need to install additional RF scramblers at the digital hub site," says Harris. Circle Reader Service No. 102.

Cable Leakage Technologies

Cable Leakage Technologies announced a new product, "Deltawave,"

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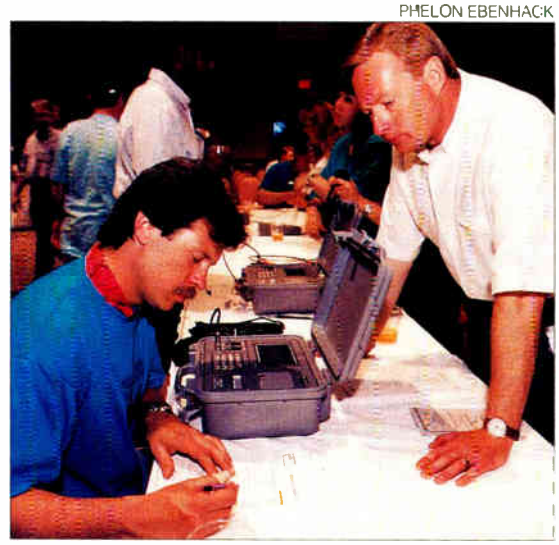
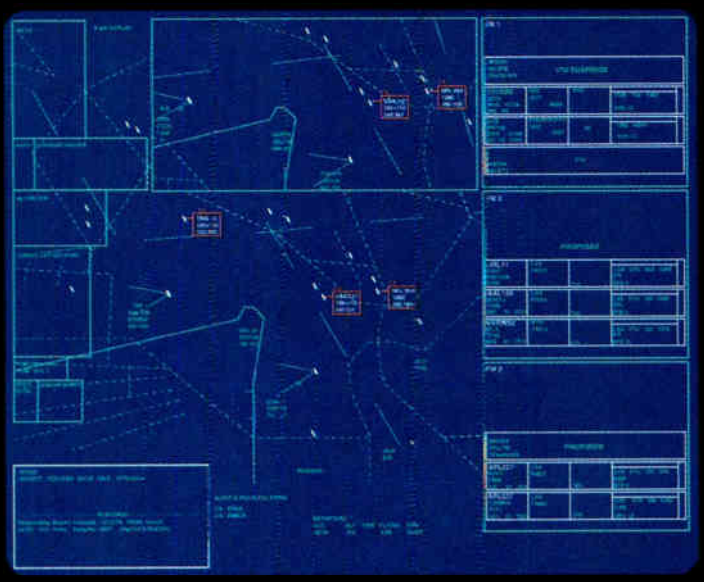


Paul Eisbrener, Columbine Cable of Ft. Collins, Colo.(left), finishes a test equipment segment of the Cable Games under the direction of Duff Campbell, Riser Bond.

FROM "CLEAR TO LAND" TO CLEAR TO SEE!



Efficient, dependable air traffic control demands the latest advances in microwave technology. Hughes AML users get them automatically.

The same microwave technology that is used to make air travel safe has also been transporting video signals for cable television since 1971.

And Hughes has continually advanced this technology since microwave signals began to be used for aerospace guidance and control.

The Hughes AML® family of compact outdoor microwave transmitters is a recent example. State-of-the-art solid state design has produced such major improvements as smaller size, higher reliability, competitive pricing and the added flexibility of being field upgradable.

The new broadband transmitters have 80-channel capability and offer low distortion performance.

Model AML-HCOT-114 High Power Compact Outdoor Transmitter features 80-channel capacity plus attractive pricing and Hughes financing.

There are four transmitters, each one upgradable to the next power unit as your system needs grow.

The highest power model, HCOT-114, can transmit 40 channels over a single 20-mile link, or four 10-mile links, all with 53 dB C/N and 65 dB C/CTB.

And the Hughes Sales Financing Plan permits system operators to pay for Hughes AML equipment through installment payments.

For more information, contact Hughes AML toll free 1-800-663-7902, or write: Hughes Aircraft of Canada Limited, Winnipeg Division, 260 Saulteaux Crescent, Winnipeg, Manitoba, Canada R3J 3T2.

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which lessens inconsistent global positioning satellite (GPS) data attributable to intentional Dept. of Defense degradation of some GPS signals. Intentional GPS signal degradation, known as "selective availability," can be lessened, CLT officials say, via a post-processed correction factor supplied with the Deltawave differential base station. The system includes a PC workstation and a stationary GPS unit. When used in conjunction with CLT's existing Wavetracker product, the system can create user-definable maps, useful in areas outside the U.S. where access to existing maps may be limited. Circle Reader Service No. 103.

Cablematic

New at the Expo was a new assembly tool, the CR-EZT, manufactured by the Cablematic Division of the Ripley Company. The tool was designed for use with Raychem's EZF connectors for 59 and 6 series coaxial cables, and is manufactured with a steel frame with hot-dipped, full cushion handles. Connector sizes are clearly stamped on the tool. Circle Reader Service No. 104.

Cable Pro

Cable Pro, a division of Cable Ready Inc., announced the addition of a new crimping tool, the RTC-360, to its line. The tool takes a standard F-fitting and makes a tapered, 360° crimp, Cable Pro officials say. Company testing of the tool indicates that it provides a pull-out strength two to 2.5 times that of a comparable hex crimp, while simultaneously creating an environmental seal between the connector and the cable. Circle Reader Service No. 105.

Cadix International

Cadix International Inc. used the CableTec Expo to introduce three new workstation products for cable television design applications. Demonstrated for the first time anywhere was the CX-2001, a full feature CATV design system that automates plant design; the AD-4001, an automatic digitizing system which converts manual drawings and maps into computer assisted vector data; and the FX-7001, an integrated drawing management system. Circle Reader Service No. 106.

CaLan

CaLan announced its COMET family of remote line monitoring systems at the Expo, which provide performance monitoring and system control operations over a range of functions and costs determinable by cable operators. The family of products includes devices from Philips Broadband Networks and AM Communications Inc., as well as the integration of software and hardware developed by CaLan.

The COMET family consists of the COMET 1, a signal level monitor that monitors RF levels via workstation control; the COMET 1+, which monitors RF levels under local intelligent control; and the COMET II, a multiple mode monitor and control device that monitors RF levels, frequency response, distortion, and other system parameters and includes AM's F.A.C.T.S. compliance system. Circle Reader Service No. 107.

Contec International

Contec International announced it has developed a "downsized" chassis that houses a standard VideoCipher in half the space originally required. The Shrink Rack unit is designed to make more room in crowded headends.

The company also announced that it is now repairing VideoCipher decoders in its Tampa, Fla. repair center. In addition to repairs, the center will also upgrade any working VideoCipher II to VideoCipher II-Plus, which solves most AGC and/or scrambling circuit problems. Circle Reader Service No. 108.

dB-tronics

dB-tronics announced a two-step attack against would-be cable pirates. In the program, dB-tronics plans to help cable companies track, organize and manage due diligence activities prior to the disposal of surplus addressable convertors/decoders. Here's how it works:

First, dB-tronics has created a nationwide convertor clearinghouse at its Wellford, S.C. location. The clearinghouse serves as a database center which matches surplus equipment with other cable companies needing similar equipment. Security is enhanced because dB-tronics acts as facilitator and submits the prospective buyer's name to the seller, letting the seller conduct his own due diligence.

The second phase of the "sink cable pirates" program is dB-tronics due diligence software, which officials say will be released soon. Circle Reader Service No.109.

R.L. Drake

The R.L. Drake Company, celebrating its 50th anniversary this year, introduced a new, frequency agile, heterodyne channel processor that converts any standard VHF, UHF or cable TV input signal between 54 MHz and 806 MHz to any standard cable TV output channel between 54 MHz and 550 MHz in either HRC or IRC formats.

The HCP2550 features include automatic FCC offsets, A/V ratio adjustment and RF output level adjustment. AFC is active at all times to compensate for frequency drift and delayed AGC provides reception of weak off-air signals. Composite IF loop-through is available at the rear panel.

Also new from Drake is its VM2550 video modulator, which offers 82 channels of frequency coverage up to 550 MHz with front panel channel selection. The unit features output power of 60 dBmV; manual or AGC audio and video control; full front panel metering and level controls; a low noise floor for large, multiple modulator installations; and video low-pass and SAW filtering. Separate audio IF and video IF loop-through connections are available to accommodate varying encryption schemes.

Drake also took the wraps off its new VM2552 BTSC stereo video modulator, which offers expanded chanel capacity (up to 82 channels, or 550 MHz) and BTSC stereo audio. Like the VM250, front panel selection of standard CATV channels is included. With the new unit, either monaural or BTSC stereo operating modes can be utilized. The unit's BTSC stereo encoding incorporates professional noise reduction circuitry to reproduce the BTSC signal with good stereo separation and audio fidelity. Circle Reader Service No. 110.

Ericsson Business Networks

New from Ericsson Business Networks is its EC-4 compact fusion splicer, designed for working with repairs or new installation of fiber optic cable in trunk, local, data or cable television networks. The splicer

features a magnified imaging system with a high-resolution, 3.2-inch monitor with adjustable angles for enhanced fiber viewing. It offers a splicing menu with 10 pre-defined programs for most common fibers for singlemode, multimode and 4-fiber ribbon. Ten personal settings are also available.

The EC-4 works like this: the holder with the fiber is placed in the splicer. Using the monitor, the fibers are positioned with dials and the appropriate splicing program is selected. To splice, a button is pressed. The splicing sequence is performed automatically from that point. Accessories have also been developed for the EC-4, including fiber holders for singlemode and 4-fiber ribbon, a heat oven, battery pack, battery recharger and splice protection sleeves. Circle Reader Service No. 111.

Eagle Comtronics

Eagle Comtronics has developed a new addressable trap wall plate that offers on/off plus control of one tier of programming. The FL trap plate mounts directly over the outlet box and is series powered from a central point. The tier trap may be a single channel negative, positive, Sideband interdiction positive or multichannel negative in addition to a total band cut-off. The unit utilizes the same headend controller and PC software from Eagle's eight-tier addressable single home or MDU trap system. Circle Reader Service No. 112.

Electroline Equipment Corp.

Electroline Equipment Corp. introduced a new subscriber drop amplifier that Electroline officials say has a noise figure twice as good as earlier generation drop amps.

The new DropAmp features a 3 dB noise figure, even though it operates at 1 GHz bandwidth. Company officials say the new device is designed for operators using a Fiber-to-the-Feeder type system architecture. The home-powered unit provides 14-dB output and 23 dBmV output per channel, while meeting a -60 dBc spec for CTB, CSO and crossmod.

Also new from Electroline is its "Dial-A-Vision" impulse PPV system designed for hotel, resort, campus or hospital applications. The system lets customers order movies or other programs instantly by touching keys on their in-room telephones.

An automated voice response unit guides callers through the ordering process, without the need for operator intervention. Statements are automatically generated. Circle Reader Service No.114.

Great Lakes Data

Great Lakes Data Systems has teamed with Zenith Electronics Corp. to develop the "Hub Master," which controls multiple Zenith Event Center controllers via dial-up modem. The PC-based system will intercept RS-232C messages generated by a billing system and/or protocol convertor. With the use of a DigiBoard, the Hub Master can communicate with up to 64 Zenith controllers and upload pay-per-view events, orders and cancellation messages.

Meanwhile, Great Lakes Data announced a new version of its Enhanced Cable Billing software. The new release provides a direct interface to the Scientific-Atlanta 8600 and 8607 (wireless) convertors. The system provides control of the S-A addressable convertors and PPV without the S-A System Manager while supporting on-screen messaging and other advanced convertor features. The PPV system provides an automatic dump of event file information directly to the barker channel.

A new convertor inventory management module was also released by the company. This new module allows operators to track an unlimited number of convertors for each customer. It also allows tracking of all convertors purchased by the system, regardless of status. This module will

be offered free of charge to all existing users.

Great Lakes' optional voice communications package will be released soon. The new module will utilize Dialogic voice card technology and will allow operators to automatically call a pre-selected list of delinquent accounts. The system will then deliver an operator-recorded voice message to customers. Marketing messages can also be delivered to non-subscriber homes or to inactive accounts. The voice system will be interactive, allowing subscribers to request a call-back from a CSR to complete the transaction. Cost of the system is expected to be similar to Great Lakes' PPV and ARU products.

Finally, Great Lakes announced it has also expanded its present line of automatic response units to include an 8-line version. Circle Reader Service No. 114.

Jerry Conn Associates

Jerry Conn Associates (JCA) announced it will distribute a digital impulse noise reducer manufactured by Intelvideo. The signal processing device is designed to remove electrical or ignition-type impulse noise from NTSC color signals, and is also effective in detecting and correcting satellite or FM link threshold noise that appears as "sparkles" or streaks in analog video images.

JCA officials also announced an agreement with Canada-based Photon Systems (formerly owned by Nexus Engineering) in which JCA will serve as manufacturers' representative for Photon's complete line of LT-2000 optical transmitters, DR-2000 optical receivers and SE series forward and return path optical transmitters for analog transmission.

JCA will also represent Photon's DS series, for digital transmission systems. Sales coverage will encompass the eastern portion of the U.S. Circle Reader Service No. 115.

General Instrument-Jerrold

General Instrument-Jerrold announced a 20 percent reduction in the price of its ACC-2000 addressable controller. The PC-based controller for small cable systems is now $7,500 including printer, Intel 486 processor, 52 megabyte hard drive and V/A monitor. Circle Reader Service No. 116.

Just Drop

New from Just Drop is a cable identifier the company is calling the "Identify-Zit," designed to simplify the identification and testing either pairs of wire or coaxial cable. The device is designed to test runs for line breaks, shorts and resistance problems. Circle Reader Service No. 117.

Lectro Products

Lectro Products announced a new version of its two-battery Unimax standby power supply, called the ZTT. The version uses a special, zero-transfer time technique, which Lectro officials say ensures continuous and unbroken power when transferring in or out of standby. The ZTT also features a single ferroresonant transformer, which enables cool running temperatures and consistency from either AC line or battery power. Circle Reader Service No. 118.

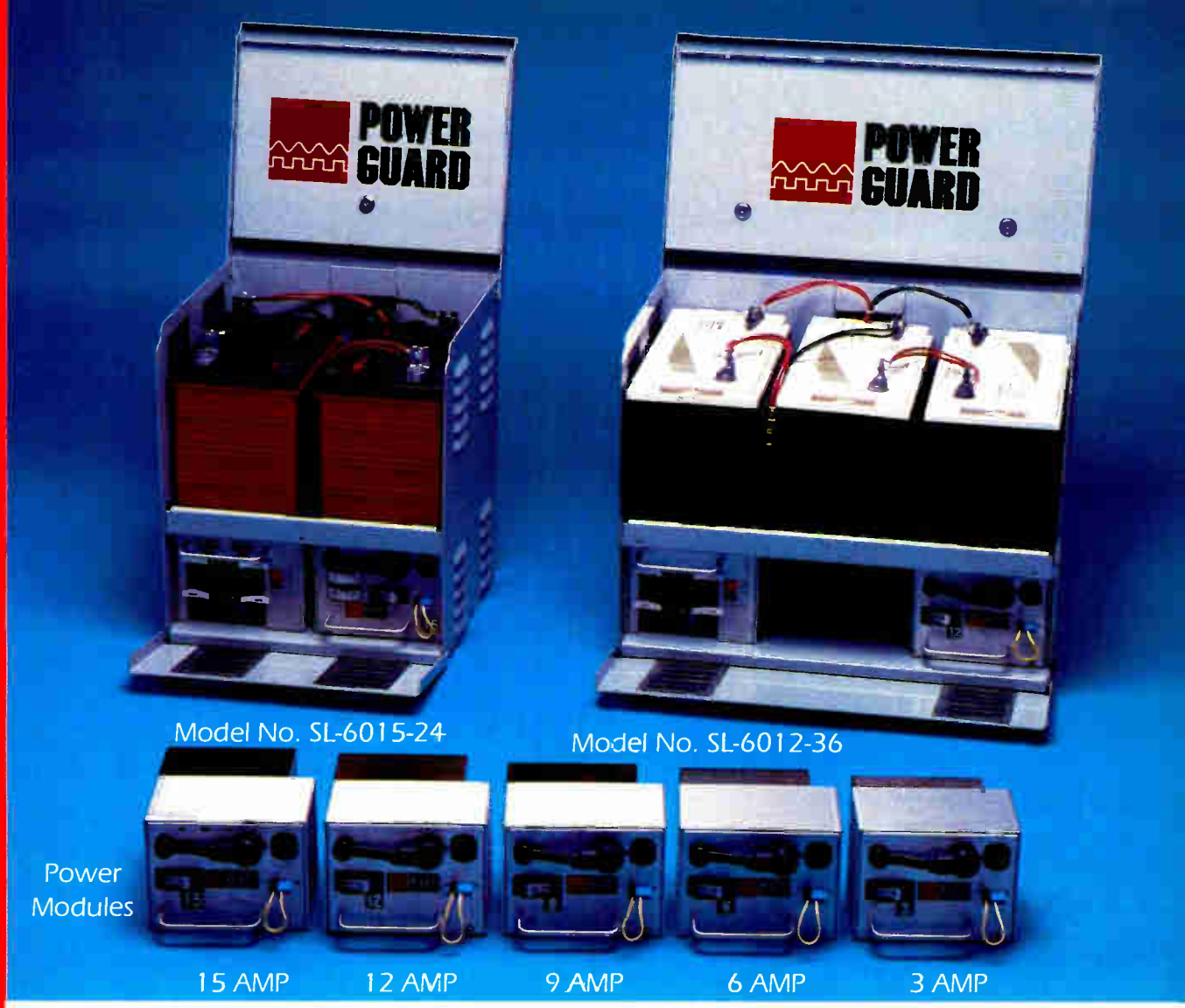
Long Systems

New from Long Systems is its "SIS" (System Inventory System) software, designed to help cable operators track cable service inventory. The package includes inventory software, a handheld computer and bar code printer. Multiple warehouse locations and trucks can also be tracked with the software, as can part allocation for special projects. A purchase order module and project accounting module is also included. Circle Reader Service No. 119.

Mind Extension Institute

Mind Extension Institute announced a new training program designed to help cable operators conduct successful proof-of-performance tests and achieve the new

Power by Design



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ANTEC COMMUNICATION SERVICES

POWER GUARD

Circle Reader Service No. 15

FCC technical standards. The training program, titled "FCC Proof-of-Performance Guidelines," is a 25-minute videotape and workbook course. It is designed for technical managers in systems with more than 1,000 subscribers. Topics covered in the training tape include proof of performance timelines, record-keeping guidelines and procedures, and test point selection.

"We have already tested our proof-of-performance course in systems operated by Jones Intercable and the feedback has been universally positive," comments Connie Buffalo, director, educational product development for Mind Extension Institute. Circle Reader Service No. 120.

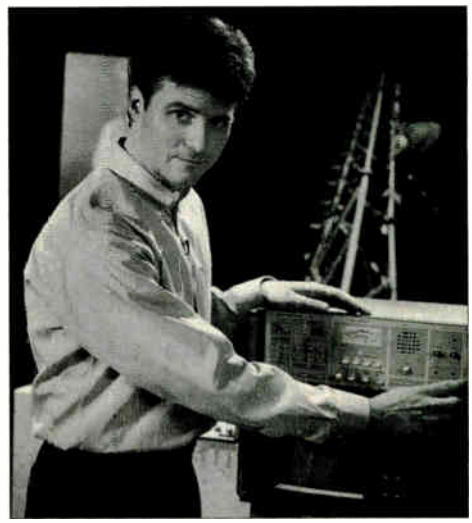
Pioneer New Media Entertainment

Pioneer Communications of America and Pioneer Laser Entertainment have joined forces to form a single entity, called Pioneer New Media Entertainment.

The new company will be headquartered in Long Beach, Calif. and encompasses the Multimedia Systems Division, Business Systems Division, Optical Memory Systems Division and Entertainment Division.

The new organization reflects a convergence of technologies that is "required by our end-user customers, resellers and system integrators" says Pete Imamura, president of the new Pioneer company.

The new company will focus on the development, marketing, sales and technical support of its laser disc players, laser bar code readers, CD-ROM minichangers, cable addressable convertor systems, laser disc PPV systems, and more. Circle Reader Service No. 121.



Saconna Blair of Jones Intercable demonstrates ME/I's new training tape.

Power Guard

Power Guard introduced a newly designed standby power supply with a unique battery compartment designed to extend battery life. The new unit is mounted on an underground vault that contains the batteries, a configuration that reportedly allows for cooler battery temperatures.

The physical form factor is essentially the same as Power Guard's existing non-standby meter pedestal. Battery access is gained via a hinged vault top that swings open; the pedestal housing attaches to the lid of the vault and remains stationary, according to Power Guard officials. Circle Reader Service No. 122.

Pyramid

Pyramid has announced a new series of jumpers, designed to "solve pedestal plumbing nightmares," Pyramid officials say. The Series 11 jumper is available in various lengths and with a a variety of connector options.

All of the connectors in the series are made of solid brass with a nickel/tin plating. The jumper was designed to minimize reflections by eliminating 180° and 90° connectors, and includes heat shrink and lock nuts or pin connectors.

Also, the jumpers can accommodate a maximum of 26.4 amps. Circle Reader Service No. 123.

RMS

RMS Electronics, celebrating its 50th anniversary, debuted a new line of 750 MHz taps and trunk passives and a new cable stripping tool designed for use on RG-7 and RG-11 cable. Also new from RMS: A 1-GHz line, called the HFR series, which includes 2-, 3- and 4-way splitters. The line has an RFI rating of -120 dB and comes with a grounding block. Circle Reader Service No. 124.

Sachs Communications

Sachs Communications announced the release of several new products, including the SC44PT-5 dual suspension bracket, designed for dead-end tensioning of "figure-8" integrated messenger cables at a common end to two aerial spans; SC20-3 drop identification tag with integrated buckle for marking drop cables; SC102G feed-thru grounding bracket for the attachment of a copper ground wire (up to #6 AWG) together with multiple drop cables; SC100G grounding angle bracket; SC101G multitap grounding bracket; SC214 corner suspension clamp made to Bell specifications for securing messenger strand to a pole in a corner location; SC67-1 and SC67-2 J-hooks for securing cables to aerial telecommunications pole-line plant; SC11TGS galvanaized pipe grounding strap and SC11TGC copper pipe grounding strap for customer premises bonding to a ground electrode system; SC07G-185 messenger grounding clamp and SC-271 dual integrated suspension bracket. Circle Reader Service No. 125.

Sadelco

New from Sadelco is its SC600 and SC1000 calibrators, exhibited for the first time at this year's Expo. The units were developed based on Sadelco's patented white noise generator technology. The calibrators are well suited for calibrating signal level meters and checking the response of CATV distribution equipment, Sadelco officials say.

New features of the SC600 and SC1000 calibrators include expanded frequency ranges, increased noise output level, a new precision rotary attenuator, horizontal and vertical sync pulse modes of the continuous wave signal, switchable 1 kHz modulation of the noise and the capacity to input external markers. Circle Reader Service No. 126.

Standard Communications

Standard Communications introduced what it calls the "most bandwidth around" in its new TVM850 series of frequency agile modulators and processors. At the core of the family of devices (the TVM850, TVM850P and TVM850S) is a frequency agile RF output synthesizer, which provides 850 MHz of bandwidth, low phase noise and an artifact-free TV RF signal, Standard officials say.

The TVM850S modulator features a PLL-synthesized, four-stage conversion process, as well as pre-programmed and phase-locked FCC offsets. Its open-ended design enables BTSC stereo integration.

The TVM850P processor features an "all channel in, all channel out" design, which Standard officials submit is the first of its kind. The processor also features front panel selection of input and output channel plans via a numeric, seven-segment LED. Independent PLL-synthesized input and output frequency agile tuning circuits allow any channel in or out configurations. Circle Reader Service No. 127.

Telecrafter Products

Telecrafter Products has taken the wraps off its new, lightweight cable clip gun, dubbed the RB-2. What makes it different than previous clip gun models is its construction: The tool is made of "high-tech plastic," instead of metal. The tool, used in the installation of drop cable, is a second generaton product which is 40 percent lighter, stronger and less expen-

sive than it's predecessor, Telecrafter officials say. Circle Reader Service No.128.

Universal Electronics

New from Universal Electronics is its "big easy Uniwand" universal remote control, which can operate remote-controlled TVs, VCRs and cable set-tops. Features of the remote include on/off, volume up/down, channel selection, stop, record and play. It can be customized with a cable system's logo. Three customized tune-in keys can be reserved for specific premium channel offerings.

The remote control is guaranteed to operate subscribers' TVs or VCRs, or the company will give the subscribers two months of free cable service. Original TV or VCR remote controls are not required for set-up of the remote, because it is programmed with the company's "one for all" library of over 30,000 infrared remote codes. Circle Reader Service No. 129.

Utili-Gard

Utili-Gard, a manufacturer of powering products used for industrial applications, announced a cable-related product, the 120PS-SP, for AC surge protection of standby power supplies.

When used at the disconnect on the load side of a breaker, the unit will stop AC power line transients caused by utility switching and secondary lightning strikes. The unit features an on-line indicator and 850 Joules at 19,500 peak amps of protection. Circle Reader Service No. 130.

Viewsonics

Viewsonics Inc. debuted its new line of miniaturized amplifiers, with a frequency of 45 MHz to 1 GHz. Housings for the amplifiers vary in size, the smallest being the same as a two-way splitter with a single output and 10 dB gain. The amps are powered with a standard plug-in adaptor or can be made in a power-insertion version.

A second level includes multiple (two and four-way) outputs that come in traditional small pattern three- and four-way splitter housings. Circle Reader Service No. 131.

Wavetek

Wavetek announced the addition of three new signal level meters: the SAM 1550, which replaces the SAM 1500; the SAM 3030, which replaces the SAM 3000; and the SAM 1650. All three units feature a new, high tactile keyboard.

The SAM 1500 installer meter performs all the basic functions of its predecessor, but also offers a full channel sweep mode designed to detect when adjacent and overall levels are out of programmable limits. A four-line LCD display, Wavetek officials say, makes the device easier to read and use. The unit is priced at $995.

The SAM 3030 technician meter also supports all functions offered by its predecessor, while additionally supporting hum and carrier-to-noise measurements, and a full channel sweep with limits and multiple channel plans. It is priced at $1,695.

The SAM 1650, on the other hand, was designed for the FCC's mandated 24-hour test requirements. While it performs all the functions of the 1550, it also includes a six-hour interval test with a power-saving "sleep" mode that is activated between measurements. Data from the unit can be printed or uploaded into Wavetek's existing "LawMan" PC software. Wavetek officials say the 1650 can log over 65 intervals during sweeps of 100 channels. It is priced at $1,495. Circle Reader Service No. 132.

Zenith Cable Products

Zenith Cable Products demonstrated its HT-2000 addressable subscriber system, complete with new broadband decoder it says will meet pending FCC compatibility requirements. The "Shadow" broadband on-screen (BOS) decoder allows a single decoder channel to be remixed with broadband cable signals fed to a cable-

compatible VCR or TV set. The BOS decoder features a universal remote control to tune all channels and to control watch-and-record, picture-in-picture features.

Zenith also showed 'Dialog Editor' software that allows operators to create custom screens and screen interoperability. Features include global or individualized promotional messages, personal greetings or payment reminders. Circle Reader Service No. 133.

Fiber Products

A host of new products aimed for use in cable television fiber optic systems made their debut at the Cable-Tex Expo. They include the following:

Alpha

New from Alpha Technologies is a dedicated optical transition node (OTN), an enclosure of sorts which offers a temperature-controlled environment that accommodates fiber optic repeaters, optical to RF transition equipment, and headend consolidation or remote hub sites.

The complete OTN, Alpha officials say, provides a temperature-controlled environment for sensitive electronic equipment, with filtered, fan-forced ventilation and NEMA 3R corrosion-resistant construction.

Standard features of the OTN include front and rear service access, vandal-resistant security, an integrated 24 VDC UPS, a regulated 24 VDC bus, a 19-inch or 23-inch adjustable equipment rack, a battery slide tray, maintenance-free batteries, interior lighting and an insulated aluminum enclosure. Options for the unit include a status monitoring interface, an extended cooling package, an emergency generator powering kit, extended battery run time and external utility metering. Circle Reader Service No. 134.

Amp

Amp announced its universal closure canister, a new fiber-optic closure for butt splicing cable. The canister features an end-cap that can be ordered with pre-cut holes, thereby eliminating special cutting tools. Closures with un-cut encaps are also available, for custom cutting while in the field.

The closure accepts a wide variety of cable diameters, AMP officials said, and is equipped with an external ground. A reusable gasket seals the endcap and allows easy re-entry.

A rack-style splice tray holder is available as an accessory for the closure and offers random access to the nine splice trays. Each closure accommodates up to 216 fusion splices, 108 mechanical splices or any combination of both. Circle Reader Service No. 135.

Antenna Technology

Antenna Technology, a manufacturer of fiber optic remoting links, announced design of a multiple channel fiber optic remoting link, which will enable Simulsat owners to locate any multiple signal antenna several miles from headend facilities.

Antenna Technology officials cite an increased demand for the link because of the "overall popularity" of the Simulsat combined with restrictive zoning regulations and terrestrial interference disturbances.

The link is currently under development, but upon completion the link will reportedly be capable of carrying many IF Simulsat frequencies. Presently, remoting even a partially-deployed Simulsat requires a combination of LNAs and LNBs with several single channel fiber optic link systems. Antenna Technology officials say they're currently evaluating two packaging options for the new link. Under the first scenario, the link transmitter would be

housed in a 19-inch rack-mountable chassis, for installation in environmentally-controlled facilities at the antenna site. The second option is to enclose the system in a compact, weatherproof enclosure that can be mounted directly onto the Simulsat pedestal, eliminating the need for an environmental shelter. Circle Reader Service No. 136.

Advanced Communications and Services

New from Advanced Communications and Services is a 42-channel mini-laser transmission system, dubbed the ACS-1002. The mini-laser, ACS officials say, provides an alternative in those fiber optic installations where laser movement is a problem. The laser offers a transmission distance of up to 3,500 feet. Circle Reader Service No. 137.

AT&T

AT&T announced three fiber specifications for its singlemode optical cable products. One of the new specifications relates to polarization mode dispersion, which surfaced in analog, singlemode cable television systems last year. PMD, in combination with polarization dependent loss and laser chirp, can in some cases cause time-varying second order distortions on the order of +/- 30 dB in AM video signals.

Early on in the PMD investigative process, core glass circularity was suspected as the more significant of the three variables causing time-varying CSO. After lengthy investigation, however, AT&T officials say the relationship between PMD and fiber geometry is "too weak" to reliably predict PMD. "We've concluded the only way to give customers the assurance of a maximum PMD level in their cabled fibers is to characterize the cables by measuring PMD directly," said Jim Refi, a distinguished member of AT&T's technical staff.

PMD causes include core fiber geometry (i.e., a non-circular, or oval core as opposed to a circular core), internal residual fiber stresses captured during fiber manufacturing, and external fiber stresses, including fiber bending and twisting. Because of these many mechanisms, AT&T officials have concluded that no single one is "good enough" to reliably predict a fiber's PMD performance.

To address the problem, AT&T has set specifications now present in all singlemode fiber being shipped. The three specifications include cladding diameter, fiber curvature and cable fiber PMD (in the 1310 nm operating window). The new specifications are as follows:

✔ Cladding diameter: 125 ±1.0 microns (previously 125 ±2.0 microns)
✔ Fiber curvature: 2 meter minimum radius (no previous specification)
✔ Cabled fiber PMD: 0.5 picoseconds/√ km (no previous specification).

Singlemode fibers propagate two modes, with each mode having a different polarization. (Polarization is a property of light relating to the direction of its vibrations.) If a given singlemode fiber is perfectly circular in both geometry and in refractive index, the two polarization modes travel at the same speed, and therefore behave as a single mode.

However, in practice, fibers aren't perfect. Even if they were, AT&T's Refi submits, bending them during packaging into cables or installation would destroy that perfection. As a result, the polarization modes in practical fibers travel at slightly different speeds and arrive at slightly different times at the fiber's output. The difference in the modes of the arrival times is measured in picoseconds (one millionth of a second).

In a related announcement, Comm/Scope (which uses AT&T optical fiber) has announced it also meets the 0.5 ps/√ km specification.

The company has directly measured cabled fiber PMD to show, statistically, that the product CATV operators receive will perform consistently to industry-accepted CSO levels, Comm/Scope officials said.

Belden

The Belden Division of Cooper Industries introduced new fiber optic trunk cables designed specifically for the cable television industry.

The new cables are available in both aromored and all-dielectric versions, and meet Bellcore (TR-NWT-000020) and REA (PE-90) standards. The Belden multiple fiber per tube design consists of four to 240 singlemode fibers contained in loose, gel-filled and color-coded buffer tubes. The fiber tubes are cabled around a dielectric central strength member and the interstices are gel-filled to impede water penetration.

In the armored version, the buffered tubes are surrounded by a layer of aramid yarn, an inner polyethylene jacket and a layer of corrugated steel armor. Reverse oscillating lay (ROL) stranding improves the cable's tensile performance and provides easer mid-span access, Belden officials said. Circle Reader Service No. 138.

Comm/Scope

Comm/Scope announced availability of a new, fiber feeder cable which complements the company's existing Optical Reach fiber optic cable products line. Th new feeder cable was designed specifically for CATV applications to provide a more cost effective link between fiber

trunk and coaxial feeder. Circle Reader Service No. 139.

Harmonic Lightwaves

Harmonic Lightwaves Inc. demonstrated its new YAGLink Plus, which company officials say extends the reach of a standard AM fiber YAGLink transmitter and receiver system.

It does so by transmitting 80 channels of AM VSB video to 50 km with an end-of-line CNR of +50 dB—an increase of 9 km. By leveraging the power and capacity of the YAGLink System, cable operators can deploy the YL +3200 to consolidate headends, eliminate microwave links or increase the reach of a standard YAGLink system.

The YL +3200 outputs complementary-phased optical signals and recombines them into a single output in phase at the receiving end. Harmonic Lightwaves says the technique results in a single "balanced" RF output that can be optimized to increase signal power at a given distance or to improve CNR for longer reach at a given loss budget.

Harmonic Lightwaves also announced that its YAGLink Network Management System is now comopatible with standard cable TV networking products, such as AT&T transmitters and Alpha power supplies.

Using the new Network Management Expander, cable operators can monitor and control equipment in remote headends, hubs and equipment cabinets through the graphical computer display provided as part of the company's network management system, the NMS 500. Circle Reader Service No. 140.

Laser Precision

Laser Precision announced the release of its TD-1000 miniature OTDR, a handheld, dual-wavelength and battery-operated optical time domain reflectometer which can be used to characterize both short and long haul fiber optic cables. The unit includes a 3.5-inch disk storage capability for documenting fiber optic cbles, and an integral power meter for measuring the output power of fiber optic transmitters. The unit also includes single-button operation and a dynamic range of 26 dB. Circle Reader Service No.141.

Moore Diversified

Moore Diversified has announced its entry into the fiber optic market with its Light Management Series, a complete line of fiber optic distribution enclosures and accessories manufactured for both indoor and outdoor use. Single- and dual-chambered enclosures are available in a variety of sizes and for a variety of purposes, Moore officials say, including direct connectorization, splicing, organization and distribution of fiber optic cables.

For aerial installations, Moore introduced its Rollover overlash roller and its OptiRack aerial slack rack designed to allow storage of fiber optic cable on the strand. Circle Reader Service No. 142.

Noyes Fiber Systems

New from Noyes Fiber Systems is its OPM3, full-featured power meter, which offers a reference value storage, 0.01 dB resolution and a microwatt readout, all on a custom, backlit LCD display. The OPM3 can be powered by battery or AC. Circle Reader Service No. 143.

Pirelli Cables North America

Pirelli has announced an expansion of its product line to include 100 kpsi cabled singlemode fiber. Until now, Pirelli officials explained, fibers have been subjected to a minimum 50 kpsi proof testing level. The increased testing load adds assurances to the end user that low stress "flaws" are screened out during the fiber making process. Circle Reader Service No.144.

Radiant Communications

Radiant Communications Corp. has announced availability of its Series DSF aerial fiber splice box, which offers a 12-splice capacity and is made of fiberglass. The box is available for cable diameters ranging from 8.1 mm to 13.9 mm, and can be either pole or messenger mounted. Circle Reader Service No. 145

Tektronix

New at the Expo was Tektronix's TFS3030 FiberMini, a miniature optical time domain reflectometer designed for fiber optic system installation and maintenance. The dual wavelength OTDR features 18 dB of measurement range for a 0.5 dB loss measured within three minutes, officials said, up to 55 km, from the front panel.

Also new from Tek is an option on its

TSG 120 YC/NTSC generator and VITS100 generator/insertor. The Option 02 was developed in coordination with cable MSOs to aid in FCC testing. With it, two generators can perform tests required by the FCC, Circle Reader Service No. 146.

FCC POP PRODUCTS

AM Communications

New from AM Communications is its FACTS (for Fully Automated Compliance Test System) system, designed to help cable operators assimilate and manage the data associated with FCC system proof-of-performance tests. The product offers live and fully-automated measurements for noise, distortion, hum modulation and flatness.

Also, AM has announced a partnership agreement with test equipment manufacturer CALAN Inc., in which CALAN will market AM's performance monitoring system. CALAN will market the system under its "Comet" brand name.

The agreement also enables AM and CALAN to explore other areas for joint product development. Circle Reader Service No. 147.

Long Systems

New from Long Systems is its POP version 2.01 software, designed to document technical standards testing. The new version includes necessary revisions to meet last November's tech standards revisions by the FCC, Long officials say. Features of the software include pass/fail analysis on all proof tests plus the generation of a public record. The software also records subscriber complaints, creates work orders and prints FCC-required aggregate data.

Also new from Long Systems is its SIS Service Inventory System, displayed for the first time at the Expo. The software was designed to assist cable operators in tracking cable service inventory. The SIS package inlcudes software, a h

andheld computer and bar code printer. Multiple warehouses and trucks can be tracked with the software, Long officials say. A purchase order module is also included. Circle Reader Service No.148.

National Cable Television Institute

The National Cable Television Institute (NCTI) announced the availability of a new training course titled "CATV Tests and Measurements," designed not only to help cable technicians understand why and how certain system measurements are made, but how to take measurements in compliance with the recently imposed FCC technical standards legislation.

Like all NCTI courses, the CATV Tests and Measurements course is self-paced and can by used anywhere or at any time to train installation technicians, service technicians, maintenance or headend technicians. The course was developed in conjunction with cable television test and measurement firms.

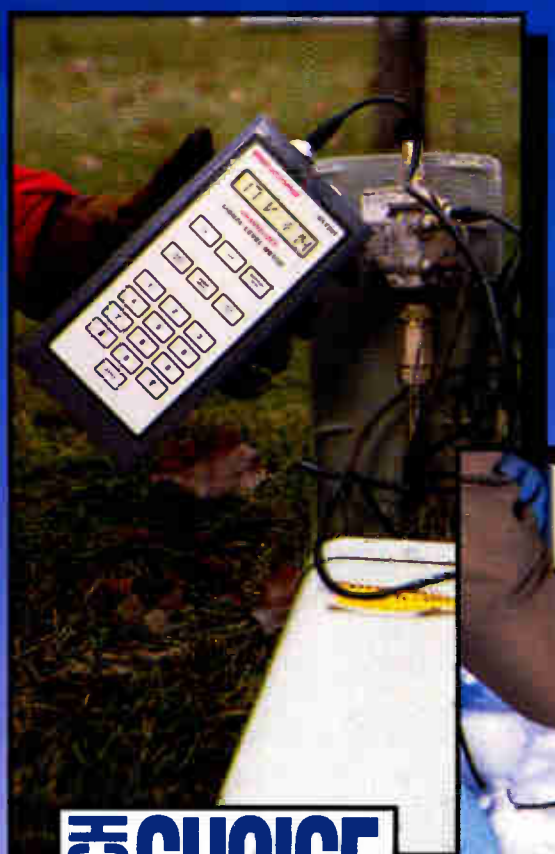
"The course not only takes technicians through testing procedures step-by-step, but explains why that measurement is made," said Ray Rendoff, curriculum development manager for NCTI. "The results of the training go right to the overall system performance and subscriber satisfaction: that is bottom line stuff." Circle Reader Service No. 149.

Wavetek

Wavetek has announced availability of an FCC proof of performance calibration service, in which it will offer a 30 percent discount to operators needing a SAM meter calibration.

If repair of the meter is deemed necessary, the cablibration cost is included. Further, the service provides a five-day turnaround time, at no additional charge. LawMan software is available for $200. Circle Reader Service No. 150.

There Are Three New Ways To Provide Your Customers With Better Service



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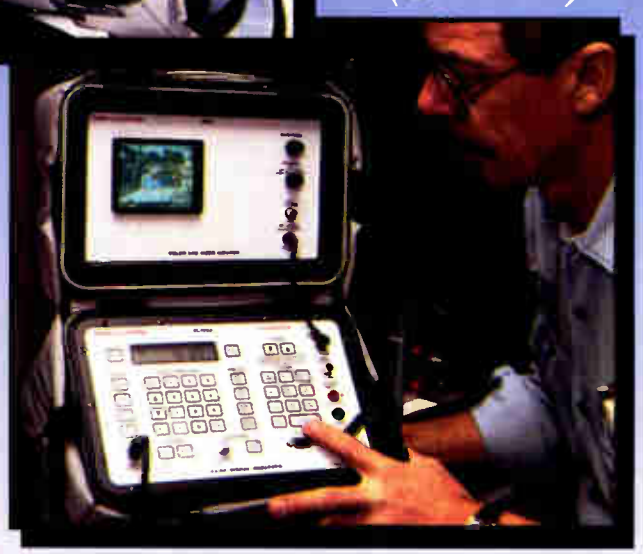

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Circle Reader Service No. 28

Elliot voted new SCTE chairman

PHELON EBENHACK

During the annual Cable-Tec Expo, the Society of Cable Television Engineers' board of directors voted in Tom Elliot as its new chairman. Elliot is vice president of engineering and technology for Tele-Communications Inc.

Elliot, who was elected to the position for a one-year term, said the Society must rededicate itself to training the foundation it has been built upon in the past. "The Society has been tremendously successful over the past few years," said Elliot, "and we should commend the people who have led that growth. I hope to continue the success story."

Elliot said that given the rapid, technology-driven changes that are taking place within the industry today, the Society should be looking for new opportunities to change with the industry. As an executive at TCI, Elliot is keenly aware, and in fact instrumental in, many of those changes. "My insight into some of these issues will help me suggest changes the Society ought to consider," Elliot said. "This is both an opportunity and an honor for me."

Also, the SCTE board elected a new slate of officers for the 1993-1994 term. It is as follows:

4 Western Vice Chairman: Pam Nobles, senior staff engineer, Jones Intercable,

4 Eastern Vice-Chairman: Dr. Walter Ciciora, Ph.D., vice president of engineering at Time Warner Cable,

4 Secretary: Norrie Bush, Columbia Cable,

4 Treasurer: Bill Arnold. Texas Cable Television Association,

4 Additional Executive Committee Member: Wendell Bailey, VP of science and technology, National Cable Television Association.

The current SCTE board of directors consists of:

4 Region 1 Director, Steve Allen, Jones Intercable, serving California, Hawaii and Nevada,

4 Region 2 Director, Pam Nobles, Jones Intercable, serving Arizona, Colorado, New Mexico, Utah and Wyoming,

4 Region 3 Director, Norrie Bush, Columbia Cable, serving Alaska, Idaho, Montana, Oregon and Washington,

4 Region 4 Director Bill Arnold, Texas Cable TV Association, serving Oklahoma and Texas,

4 Region 5 Director Mark Wilson, Multimedia, serving Illinois, Iowa, Kansas, Missouri, and Nebraska,

4 Region 6 Director Robert Schaeffer,

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4 Region 7 Director: Terry Bush, Trilithic Inc., serving Indiana, Michigan and Ohio,

4 Region 8 Director: Jack Trower, WEHCO Video Inc., serving Alabama, Arkansas, Louisiana, Mississippi and Tennessee,

4 Region 9 Director: Hugh McCarley, Cox Cable, serving Florida, Georgia, Puerto Rico and South Carolina,

4 Region 10 Director: Michael Smith, Adelphia Cable Communications, serving Kentucky, North Carolina, Virginia, West Virginia and the District of Columbia,

4 Region 11 Director: Diana Riley, Jerry Conn Assoc., serving Delaware, Maryland, New Jersey and Pennsylvania,

4 Region 12 Director, Walt Ciciora, Time Warner Cable, serving Connecticut, Maine, Massachusetts, New Hampshire, New York, Rhode Island and Vermont,

4 At Large Directors: Wendell Bailey, NCTA; Tom Elliot, TCI; and Wendell Woody, Antec Cable Group.

Other awards

William O. Grant, the affable lecturer, former Jerrold engineer and author of the ubiquitous "Cable Television" textbook, was named SCTE 1993 Member of the Year during the SCTE's annual awards luncheon.

Grant, who was presented with the award by 1992 Member of the Year Ron Wolfe, spent his early years as a lineman and various other capacities for New York Telephone. Following that, he built cable systems and then worked for Jerrold for 12 years. He also helped implement the REA's CATV program. In 1972 Grant joined the SCTE.

Grant is now retired but hardly inactive. In addition to having written "Cable Television," which is now in its second printing, he wrote "Lightwave Transmission" and is a host on the 14-tape video series on SCTE certification.

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Ron Wolfe, Time Warner Cable (left), and SCTE's Bill Riker contratulate SCTE Member of the Year William O. Grant.

Also during the luncheon, outgoing SCTE Chairman Ron Hranac presented the annual Chairman's Award to Hewlett-Packard for that company's outstanding service to the cable industry. Duane Hartley, general manager of H-P's microwave instruments division, and Rex Bullinger, an H-P research and design engineer, accepted the award.

H-P was selected to receive the award because it has continued to provide the cable industry with high-quality testing products, the "Cable TV Measurement

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Diana Riley, JCA (left), and SCTE's Bill Riker welcome a surprised Steve Bell into the SCTE Hall of Fame.

Handbook" and numerous articles in industry trade magazines, said Hranac.

The SCTE Hall of Fame now enshrines seven persons with the addition of Jim Grabenstein and Steve Bell. They join past inductees Cliff Paul, Len Ecker, Rex Porter, Dave Willis and Jim Stilwell.

Hall of Fame award

The Hall of Fame Award was created to honor individuals who have dedicated a lifetime of effort to the advancement of the cable industry.

Grabenstein, who died in August 1991, first entered the cable industry back in the early 1950s and was instrumental in the development of products like FM processors, microwave relay systems, local origination studios and trucks, the feedforward amplifier and a satellite receiver.

Bell began his career as a TV repairman then served as a service rep for General Electric before entering the cable industry in 1961.

He went on to build cable systems in 33 small towns and cities, helped shape cable legislation through lobbying and education, and is a former SCTE board member who helped launch four chapters.

Finally, Mel Welch of Genesis Cable was presented with a first-place field operations award for an auxiliary power supply for amplifiers. Welch was presented a $1,000 check for his idea. Second place went to Dick Hall of TCI and third place went to Enrique Lomas of Times Mirror. Personal achievement awards went to Robert Baker and Charles Nydegger.

TECHNICAL SESSIONS

Voice over cable: Do it within two years

The cable industry has perhaps only two years "to get its act together" and enter into the telecommunications industry before telephone companies are able to offer video as cheaply as cable operators, said Fred Dawson, editor of "The Cable/Telco Report" during a panel session focusing on cable and telephony integration at the SCTE Engineering Conference.

Dawson's presentation focused primarily on ADSL—asymmetrical digital subscriber line—a technology that allows telephone companies to transmit VCR-quality video over copper twisted pair. Because the telcos are bringing fiber to remote terminals that are often located as close as one mile to a subscriber's home, telcos will, within 18 months, be able to deliver as many as four video channels and ISDN voice circuits to nearly every home for about $400 to $500, Dawson predicted.

This gives telcos a revenue stream that they can use to justify an accelerated depreciation schedule on copper plant, said Dawson, which will result in the installation of fiber optic technology on a much faster timeline.

The second half of Dawson's remarks focused on millimeter-wavelength microwave video delivery systems that are presently under development. These systems, which operate around 28 GHz, "will completely change the perspective of the bandwidth bottleneck" that occurs in the "last mile" of a network, Dawson said. This is because cable operators, telcos or any other competitor could use the microwave technology instead of a hard-wire connection to every home, thereby bypassing the slowest and most lossy portion of the network.

The future will be filled with competition, Dawson predicted. "There will be so many opportunities and the ones that get the lion's share of the business will be the people who are there first, with competitive rates and the most expertise," he said.

Also during that panel session, Chris Bowick of Jones Intercable predicted that cable companies and telcos would continue to ally and develop joint partnerships in the future. "I think you'll see a lot more synergies being exploited going forward," he said.

Bowick's presentation was based on the thought processes that enter into the minds of Jones executives as they plan system rebuilds and upgrades. Jones is always looking at its systems with thoughts of one day providing competitive access, personal communications services, interactivity and/or data communications, said Bowick.

Why? Because each of those markets represent big dollars. Bowick said interexchange carriers (companies like AT&T, MCI and Sprint) pay about 42 percent of their total revenue to the local exchange carriers for access to the local exchange. Therefore, the IXCs are always looking for competitive providers, Bowick said.

Personal communications is an emerging industry that is based on communications between people, not places. Large volumes are predicted, Bowick said. Cable operators can participate in PCS in a variety of ways, including provision of network services, dark fiber, maintenance services, etc.

Bowick said his staff evaluates every system rebuild or upgrade for suitability to offer competitive access services. First, Jones officials determine locations of LEC central offices, IXC points of presence and large end-users and evaluate their proximity to existing CATV trunk routes. If a market study shows there is interest for another provider, Jones engineers design a system that accommodates potential users, determine rates and then build a system.

But local exchange carriers are searching for strategic alliances with cable operators and interexchange carriers willing to forego account control, Bowick said.

In the meantime, the cable industry is continuing to deploy fiber as soon as possible to virtually any location where there

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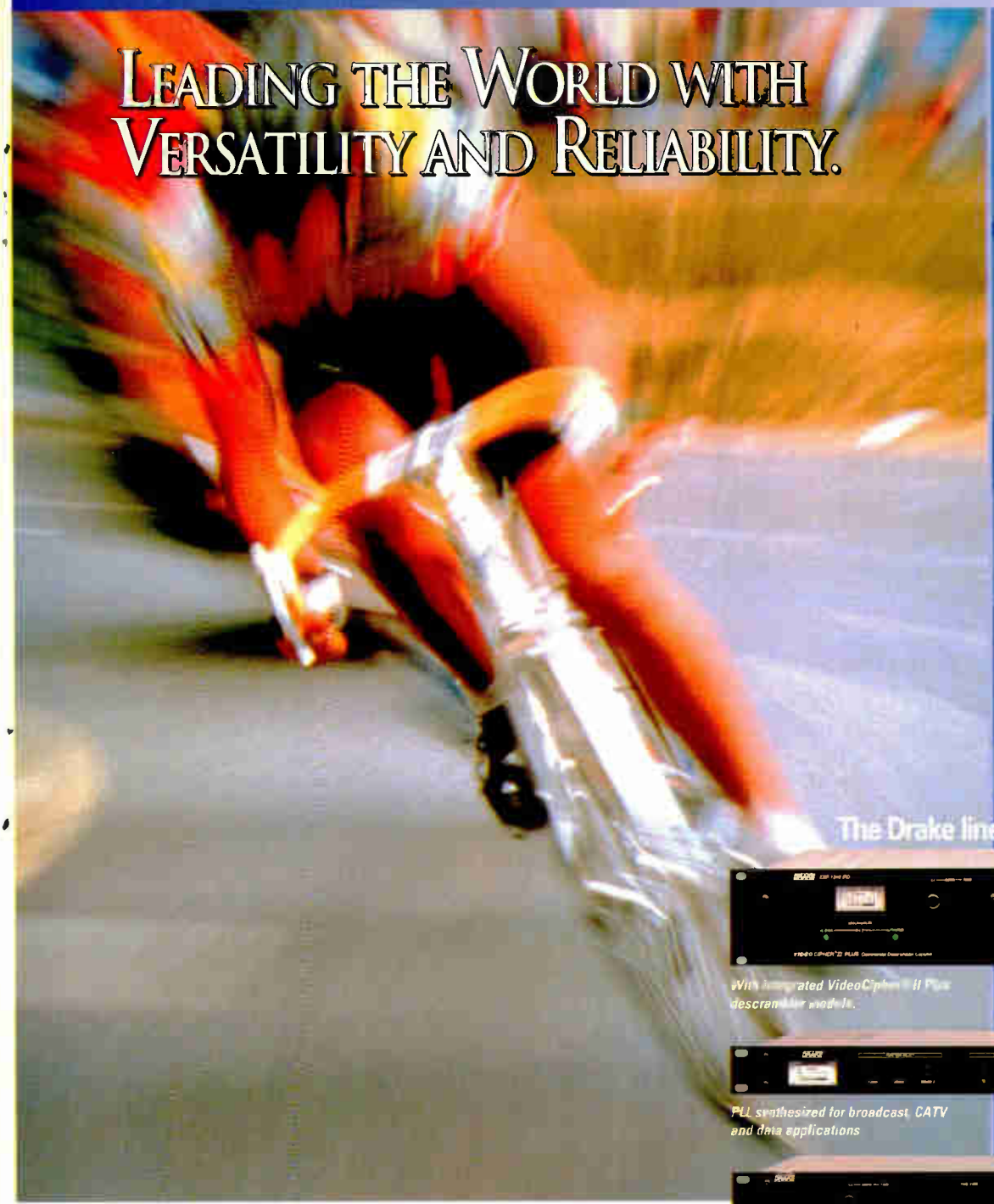

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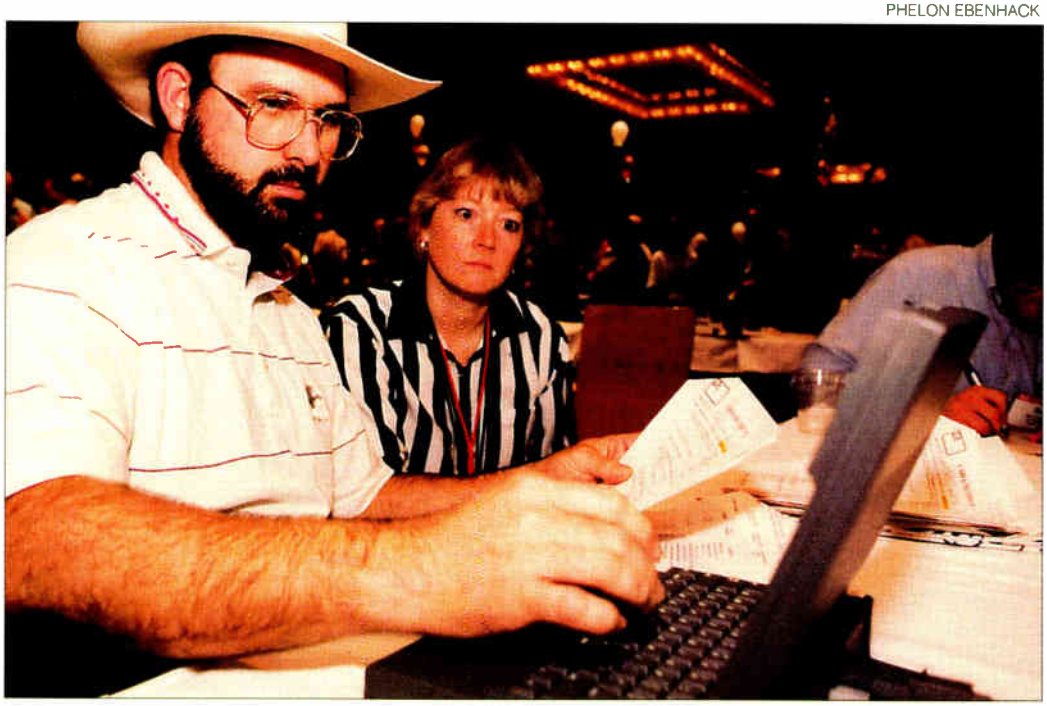

Expo attendee and Cable Games participant Robert Hagan rides herd on a computer problem while Jones Intercable's Pam Nobles supervises.

are revenue opportunities, deploy digital compression to increase plant capacity, develop telephone expertise and "discover the public utilities commission" in every state, Bowick said.

Baggett on consumer interface: "Huge gulf"

Cable compatibility with consumer devices like televisions and VCRs is quickly shaping up to be the headache of the century, according to several sources in attendance at the Expo. John Wong, assistant chief of the FCC's cable branch, told Expo "Tech Re-act" workshop attendees that the Commission will soon begin grappling with the task of defining exactly what "cable-ready" means, referring to the millions of TVs and VCRs described as such in the nation's retail outlets.

But that, Wong said, is just the tip of the iceberg. "Defining cable-ready is just a scratch at the surface," he said. "Needless to say, there are two very distinct—and very polarized—points of view on the issue of consumer compatibility, or incompatibility. The comments we've received to date are quite opposite."

In a session titled "New Technologies and their Effects on the Subscriber," CableLabs' Director of Consumer Electronics Systems Claude Baggett related that consumer electronics equipment—or, as he puts it, "that last little sliver before the eyeball," represents the biggest problem area. "I wish we could say that our hands are clean on this, but, of course, they're not," Baggett lamented.

However, the collective hands of the consumer electronics industry aren't exactly clean, either. Ineffective tuner shielding has historically caused problems with direct pick-up interference, Baggett reinforced Wednesday. "A rule of thumb is that most television convertors offer 100 dB of shielding effectiveness. Most televisions offer shielding in the 60- to 70-dB range."

Other consumer electronic deficiencies, Baggett noted, include local oscillator leakage and backfeed, adjacent channel rejection and tuner overload.

"There is an enormous gulf between us," Baggett said. "Cable would like for the consumer electronics folks to build a monitor, with the intelligence provided by us. They (electronics manufacturers) would like to see clear signals from the ground block into the home, where they provide the intelligence."

In the same session, Jim Farmer, VP of E.S.P. Inc., related that "one size does not fit all" when it comes to curing consumer interface problems. "We find ourselves in a quandary with four branches: MultiPort, whole-house descrambling, interdiction and improved set-tops."

MultiPort, now known as the EIA-563 integrated descrambler, requires a high level of cooperation between cable and consumer electronics vendors. "Its use requires consumers to buy new TVs and VCRs, and much intra-industry cooperation," Farmer said.

An in-home, consumer electronics bus (CEBus) could also help soothe the problem of consumer compatibility, said Jud Hofmann, VP and director of Communications Systems Technology Systems, Panasonic Technologies Inc. In the scenario, which enables multi-room, audio/visual signal distribution (among other things), a coaxial bus can be used to distribute the output of the convertor to multiple rooms within a home.

"It's similar to a semi-point-of-entry," Hofmann said. "It could be a rack in the utility room, or outside, which contains convertor/descramblers. It's not a miraculous fix, but I'm very enthusiastic about it," Hofmann said.

Expo panelists stress PPV planning

The cable industry stands "at the head of the line" to provide consumers with multichannel pay-per-view television, Jerrold Communications' new business vice president Geoffrey Roman told SCTE Cable-Tec Expo attendees.

But, along with fellow "Pay-Per-View Evolution" panelists, Roman suggested that cable engineers must begin to confront layers and layers of network architecture, channelization and digital hardware planning now.

Scientific-Atlanta subscriber products market chief Paul Harr predicted near-video-on-demand—devoting eight or 10 channels to each top movie—will become reality in 1994 and pure, interactive VOD will enter the scene after 1995.

In the meantime, he said, cable operators must make some tough channelization decisions, as well as marshall headend and subscriber technologies to create services easier to use than any alternative.

Roman walked attendees through a number of theoretical channel plans given a 550 MHz fiber system reaching 2,000-home nodes. Even in the analog domain, approximately 25 of 80 channels could be devoted to pay-per-view.

Moving from that baseline, he suggested, operators must plug in their own target numbers for node sizes, penetration, compression ratios and buy rates to rationally ascertain channelization. For example, a 750 MHz system reaching 500-home nodes might use 10-to-1 compression to deliver 16 channels per 100 homes and achieve 800 percent per month buy rates (twice current video store rates).

Terry Wolf, director of addressable technology, said stealing and keeping a

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share of the $11 billion annual video rental business will require more than installing regional video storage/server computers and addressable, digital set-tops. Central computers at the headend, he said, must be configured to manage and coordinate more than a dozen critical functions, from customer service to accounting to headend management. If any of those "spokes" cracks, cable's PPV "wheel of fortune" will fall off its axle.

That future headend will also require integrated receiver-transcoders to convert from satellite to cable modulation schemes, as well as hardware to carry out, localize and control on-screen menu navigation and interactivity schemes.

TCI, Time Warner share Sega vision

"It's really exciting to see TCI and Time Warner are sharing the same long-term vision," Jim Ludington, director of Time Warner's advanced cable systems, told a packed audience at SCTE's Digital Technology panel April 21.

The apparent reference to the TCI/Time Warner/Sega America joint venture, as well as to the two top MSOs' high-profile digital superhighway plans, set the tone for optimistic predictions that cable will soon manage highly intelligent networks with cutting edge computer systems from headend to home.

Fellow panelist Tom Elliot, TCI engineering vice president and newly elected SCTE chairman, estimated that by 1995, mini, micro, mainframe and RISC computers will offer 50- to 200-MIPS (million instructions per second) processing power.

With that kind of power, he said, cable will outrun DBS, wireless cable, broadcasting and telephone companies in terms of data rates and up- and downstream channel capacity by factors of at least 8 to 1.

And that computing power is on the verge of finally winning a significant share of the $25.4 billion TV advertising market for cable, said Scott Bachman, vice president of operations technologies projects for CableLabs. Computers and specialized software will manage every level of cable's ad challenge, from viewer data to standardized billing, he said.

In tandem with the Cable Advertising Bureau, hardware vendors, ad agencies and audience measurement providers, the Task Force is now identifying interconnection protocols in search of "an open systems interconnection model, which is fundamental to all digital discussions," he said.

The emerging architecture includes a PC controller at each headend/server; digital/analog convertors with 120-megabyte storage, and local compressors, typically at the edit suite. The regional central storage and control center must be able to accept spots from various national and local sources, he said.

Adelphia explains all-passive network

The passive cable architecture may be cost-effectively deployed sooner than originally thought, thanks to a new wrinkle added by the engineers at Adelphia Cable. Joe Selvage, manager of systems engineering at Adelphia, led a workshop on fiber architectures and construction practices at the Expo.

Selvage began his presentation discussing the evolution of fiber architectures from traditional coax tree-and-branch networks through backbone, Cable Area Network and fiber to the feeder designs.

Although the vision for many designers was a passive network, that vision has gone unrealized because of the cost associated with the increased number of return lasers and power supplies that would be needed, Selvage said. A passive network brings fiber to receivers that serve half-mile subscriber areas, therefore more power supplies are needed.

Adelphia's Passive Cable Network Architecture, which will be implemented in Syracuse, solves those issues by relying on a coaxial return path that ties together several small serving areas before the information is sent via fiber back to the headend. By locating the power supplies and return lasers at that point, the required number of devices is reduced, sometimes by as much as 60 to 80 percent, Selvage said. "In the forward direction, the system is passive, but the costs have been reduced," Selvage added.

Depending on the length of the coaxial return lines, RF amplifiers could be added in order to deliver return ordering information from subscribers back to the headend. The return path could also be used for status monitoring, Selvage added.

Les Smith, VP of southeast operations for Cable Constructors Inc., followed Selvage and provided the standing-room-only audience with a list of guidelines to follow when installing fiber cable. The key points he emphasized were to: start by understanding the fiber manufacturer's pulling specs; concentrate on proper duct placement, which is key to reducing pulling friction; realize that plowed duct is the most consistent method; and use proper equipment and procedures at all times. CED

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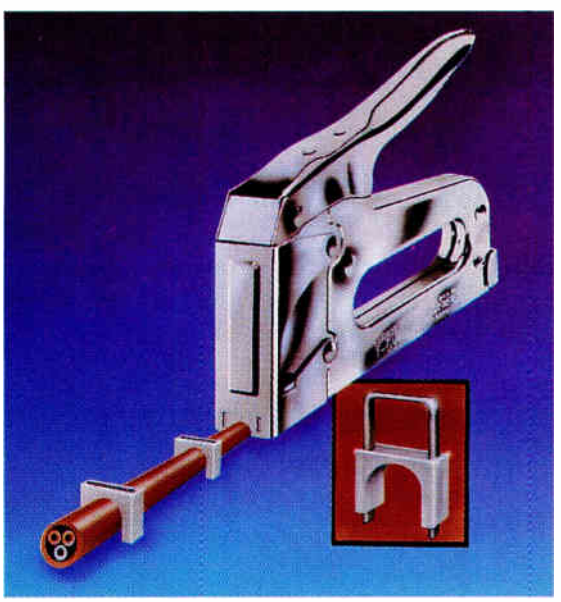

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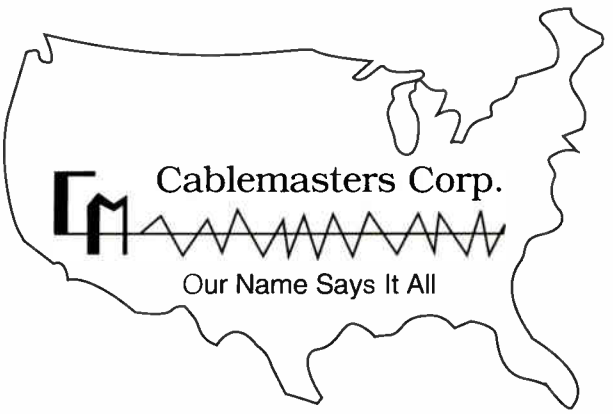

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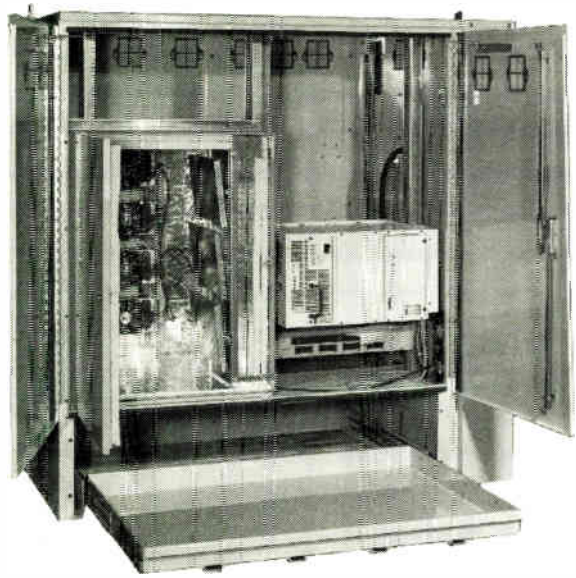

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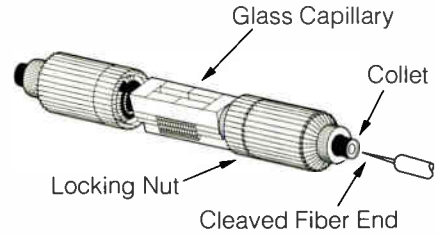

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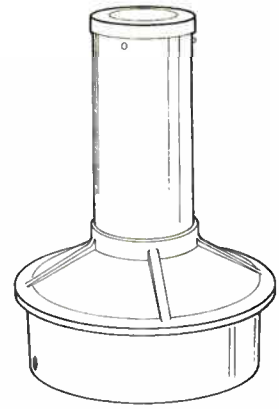

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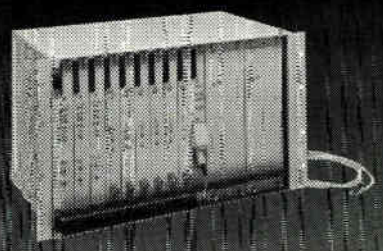

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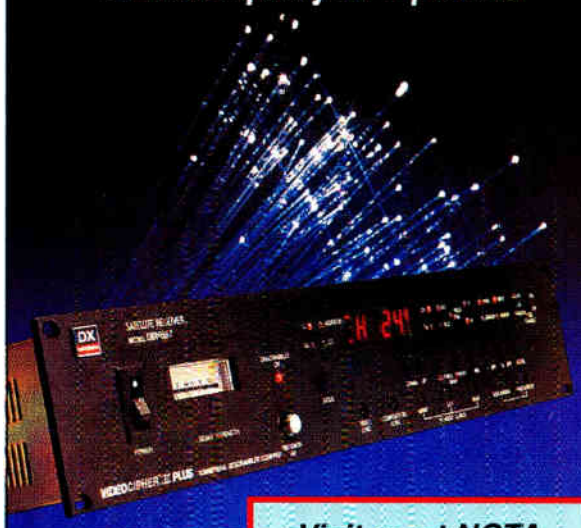

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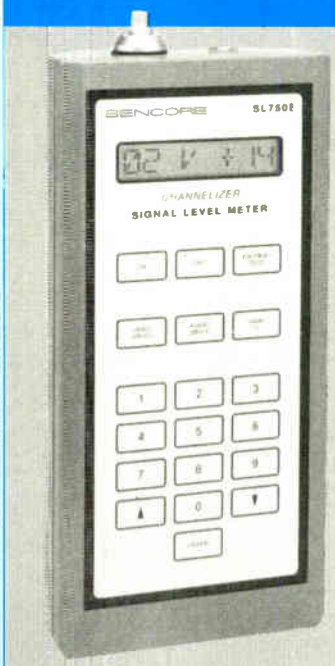

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Circle Reader Service No. 84

Cable prepares for video dialtone

New information service platforms

By Gary Kim, CED

On Aug. 14, 1992, local telephone companies were granted the right to offer video services to customers over their own networks, under a regulatory concept called video dialtone. Though access to the video dialtone network must be offered on a common carrier basis, local exchange carriers (LECs, or local telephone companies) are allowed to own up to five percent of any service transported over the network, and are allowed to offer enhanced services such as billing services, order processing, signal storage and retrieval as well as navigation aids, on a non-common-carrier basis.

Getting transaction-capable

But LECs aren't alone in preparing for common carrier transport of new types of video-based information services. Despite a 40-year tradition of blanching every time the word "common carrier" is uttered in conjunction with "cable TV," operators also are readying new information services (IS) platforms that will allow third-party access to cable networks on a leased-access basis. Just as LECs are building video dialtone platforms, so cable operators are maneuvering into position to create such capabilities for their own networks. Without a doubt, impending upgrades of IS platforms are the clearest sign that such capabilities may be required in the future. As operators ponder a transaction-based future far more complex than today's, they are moving in the direction of sophisticated management information systems, and away from the simplistic "billing system" focus of the past.

At the same time, IS is moving from support for a subscription business toward a business environment keyed to automated transactions that can take place without direct customer service representative intervention, according to Time Warner Cable Group Senior Vice President of Management Information Systems Ed McCarthy. In the transaction-based world of tomorrow, "the price for an event or movie is different on Tuesday evening than it is on Saturday evening," said Carl Scase, Rogers Communications Inc. information technology vice president. "Pricing will be time dependent, volume dependent and possibly linked to other events such as ordering a pizza in conjunction with a movie."

In times past, when the business was stable and subscription driven, executives tended to view MIS as a backroom operation. But not any more. In today's highly-charged competitive atmosphere, IS is a strategic weapon of the highest caliber. The fundamental problem operators face is that some possible new services cannot be offered, even when the network can deliver them, unless systems are in place to capture usage information, for example, said Richard Nortnick, Jones Information Management Inc. president. As is the case for LECs, some fundamental investments in cable's network infrastructure must be made before video dialtone services can be provided. Optical fiber, digital switches, signal compression technology and mass data storage are some of the common elements such dialtone platforms ultimately will require.

Enhancements necessary

At the same time, though, profound enhancements must be made to the IS infrastructure as well, said Donna Pennington, Cable Services Group marketing manager. Traditional cable TV IS could not, for example, track usage of services on a per-minute basis, or do so in real time. That capability may well be a prerequisite in the future. Likewise, today's pay-per-view transactions require assignment of event codes. But it will be impractical to assign codes for all the possible ordering combinations and rates operators may need to track in a highly transactional environment.

Indeed, the entire customer care process may well hinge on the strategic use of the management information system, especially if all competitors have access to the same programming and information services. "Packaging, pricing and provisioning of services will be competitive weapons," said McCarthy of Time Warner.

The example some IS executives point to is the MCI Communications "Friends and Family" program. That plan offers discounts when MCI customers call certain numbers on a frequenct basis. Cable IS execs point out that MCI's competitors were unable to react to the initiative for about nine months, not because of any deficiencies on the part of the network and switching fabric, but because the appropriate software capabilities weren't in place. So despite having no clear idea of all the services that might be provided over the next five-year period, cable IS executives want to make sure that, at the very least, their operations won't be a roadblock, said Viacom Cable MIS Vice President Mike Johnson. For that reason, Viacom is using the new EDS cable MIS package to support its Castro Valley, Calif. new services testbed.

In the future, cable IS must allow any new service to be rolled out on a mass basis, with no impediments from the IS infrastructure, said Tom Reinhardt, Tele-Communications Inc. director of cable information services. In order for that to happen, today's management information systems (MIS) will have to be far more flexible and powerful than they are today, operators are telling IS suppliers. In part, that's because the future services environment will include packet-switched, digital-based offerings delivered over networks anchored by standard telephone industry switches.

U.K. rollout

And suppliers are responding. CableData, for its part, is rolling out this summer in the United Kingdom a fully-integrated MIS system that tracks both video activity and telephone usage, for example, said Bob Crowley, company marketing vice president. "The new system is open, highly flexible, scalable and interoperable," said Crowley. In other words, operators will be able to add new services and fields of data, import data to and from the main database, without the hassles that bedevil such operations today.

'Packaging, pricing and provisioning of services will be competitive weapons'

That's not to say every IS executive is happy with the pace of change. "We always want it yesterday," said one top MSO official. In fairness, though, the current round of software development represents a watershed, a fundamental embrace of sophisticated information technology even before the precise applications can be clearly identified. The new IS platforms also tend to feature the latest in enterprise computing concepts, including client-server architectures, relational database engines, software that runs on multiple hardware platforms and data formats that are easily

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ported to, and manipulated by, off-the-shelf software packages. Such massive changes do require enormous effort and expense.

When the changes are made, though, cable networks will be in a position to offer not only their traditional core of entertainment video services, albeit in flexible packages customers can only dream about today, but a raft of new services not unlike those LECs hope to provide. In this sense, video dialtone is a service paradigm, not a regulatory concept. Though video dialtone in a narrow sense refers to the right of a local exchange carrier to transport video over its network on a non-discriminatory basis, in a broader and more fundamental sense, it refers to a delivery system that gives customers many new types of information sources, and allows them to choose which services they want, when they want them.

A new paradigm

Broadly then, video dialtone is not technology specific. It does not imply a particular type of network (cable TV or local telephone), type of cabling media (fiber to the curb, fiber to the feeder, all-coax or twisted pair networks), type of signaling (analog or digital), use of standard NTSC or compressed signals. Video dialtone instead may represent a new paradigm for entertainment and information systems, a sort of "new media" possibility.

"One thing we wanted from EDS was flexible rating, in a completely unbundled scenario," said Viacom's Johnson. That means the ability to assign a price for every discrete program choice and transaction, taking all other factors, such as frequent buyer discounts, into account, automatically and in real time. Viacom also needs a way to track a single customer's history, for purposes of establishing volume buying discounts, for example, even when a customer has lived at several different addresses within a single franchise area, Johnson said. "We need to be able to do packages at the touch of a key, that's how we market."

Today's MIS systems will have to be far more flexible in the future than they are today

Other MIS executives agree. "Telephony is a given, and metering of services is coming," said Reinhardt. In terms conceptually similar to the dialtone theme, Reinhardt suggested that "we may carry services for other providers. We might be a gateway, a pipe." CED

"Voice follows video"

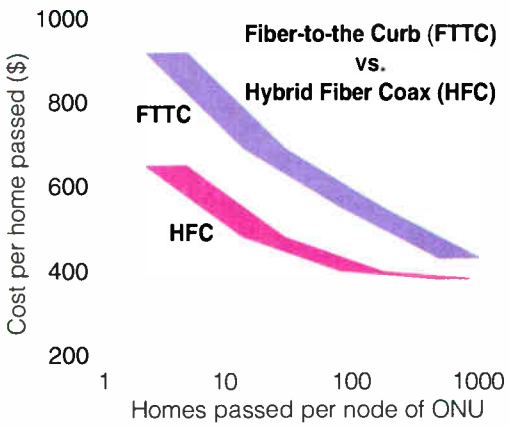
News analysis

By Gary Kim, CED

For anybody who hasn't yet grasped the ineluctable truth of the matter, cable TV providers can be, must be and will be, providers of local access (basic "dialtone") services. Just as certainly, today's providers of dialtone are strategically impelled to offer video and other broadband services. It isn't just that video is an attractive future business. It isn't that video-based information services are a "nice to have" business. To the extent that today's LECs have a future, it is as broadband service providers. Likewise, cable companies that survive the impending telecommunications industry restructuring will be those that grasp the centrality of telecommunications as a core business mission.

Those crucial insights are among the many that must be drawn from the United Kingdom, where cable companies controlled by U.S. and Canadian local exchange carriers (LECs, or local telephone companies) are able to provide both cable TV and local access services. Indeed, the most significant lesson Nynex appears to have absorbed, and which officials indicate must be applied in the United States, is that the provider of cable TV service easily can attack the local access market.

FIGURE 1
Comparison of infrastructure costs



Source: Broadband Technologies

"Nynex is now absolutely convinced that voice follows video, and that the video provider is going to win the customer's voice traffic, almost as an afterthought, in the future," said Nynex Telesector Resources Group General Attorney Mary McDermott, at the recent Supercomm '93 trade show.

She's not alone in that opinion. "If you think the cable companies can't take away your telephone customers you're absolutely wrong," said David Hinshaw, US West Information and Technology Group vice president. "Any time you can bundle a sale, you have an advantage." Both US West and Nynex seem to have been surprised by their success selling dialtone on a cable TV platform.

Despite the fact that Nynex is offering telecom services that come "with some disadvantages," the company still has found an "80-percent take on telephony for the people we sell cable to," said McDermott.

As for US West, "we're seeing three years worth of penetration in six months," said Hinshaw. "We all better understand that the cable industry in the United States can clearly sell against our customers," Hinshaw added. "They clearly can take our customers away."

The cable industry's experiments with asynchronous transfer mode (ATM) fast-packet switching also seem doubly important. Discussing the impending Time Warner Cable Group ATM trials in Orlando, Fla., McDermott said "Nynex worries that that industry (cable TV) will understand ATM switching better than we do by the end of 1994. That's a concern for us."

Along those same lines, McDermott emphasized Nynex's view that a possible paradigm shift in video delivery may be in the offing, and that many cable operators haven't yet caught on. "We don't think a lot of the companies have caught on to that, and are still thinking in a channelized way." The reference there is to switched delivery of material, analogous to a move to packet switching, and away from circuit switching, in the telephone network. More channels, in this view, won't be the ticket to ride, at least not in the future. That role will be usurped by switched, interactive video. "It's a whole new generation of media," said Peter Price, president of Liberty Cable & Television. Liberty is working with Nynex on provision of video dialtone service in New York.

Again, the LECs believe the move to broadband is not optional. "Whether we like it or not, video and broadband is our future, if we're going to have a future," said McDermott. Though it may not be possible, at this moment in time, to define fully all the services customers might want, there's no time to wait until all the issues are fully understood, until all the standards are set, until all the technology is perfect and cheap, McDermott argued.

'We're on the threshold of a change in industry structure, a paradigm shift'

Though moving ahead with less than perfect insight–on the "if we build it, they will come" model–makes LEC executives uncomfortable, there's really no alternative, she argued. "If we wait for all those things, our industry's going to be dead," McDermott argued. On a separate Supercomm panel, Nynex Telesector Resources Group Director of New Product Development Joe DeMauro echoed the same theme.

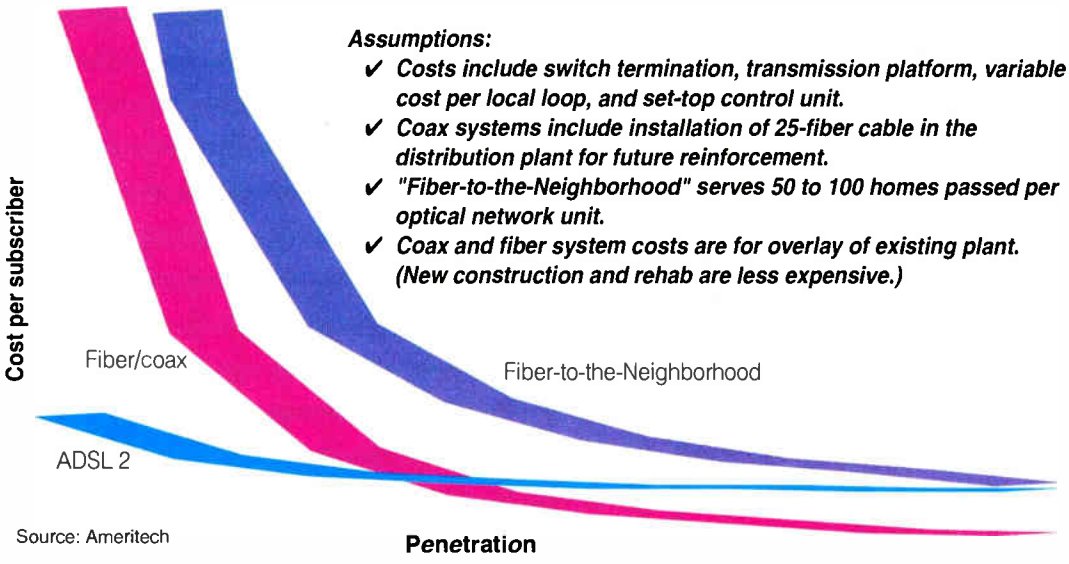
LECs are vulnerable

"We're on the threshold of a change in industry structure, a paradigm shift," DeMauro said. Without a doubt, that shift will be toward a digital, fast packet switched network based on ATM, installed largely to support delivery of switched, video-based services. "ATM is our platform for video in the future," he said. And make no mistake, "video is the major near-term opportunity for ATM switches, by an order of magnitude."

Nevertheless, video dialtone is not, DeMauro emphasized, a technology. It isn't just fiber to the curb, asymmetric digital subscriber line (a way to

FIGURE 2

1998 capital cost of broadcast video plus asymmetric switched DS2 service as a function of penetration

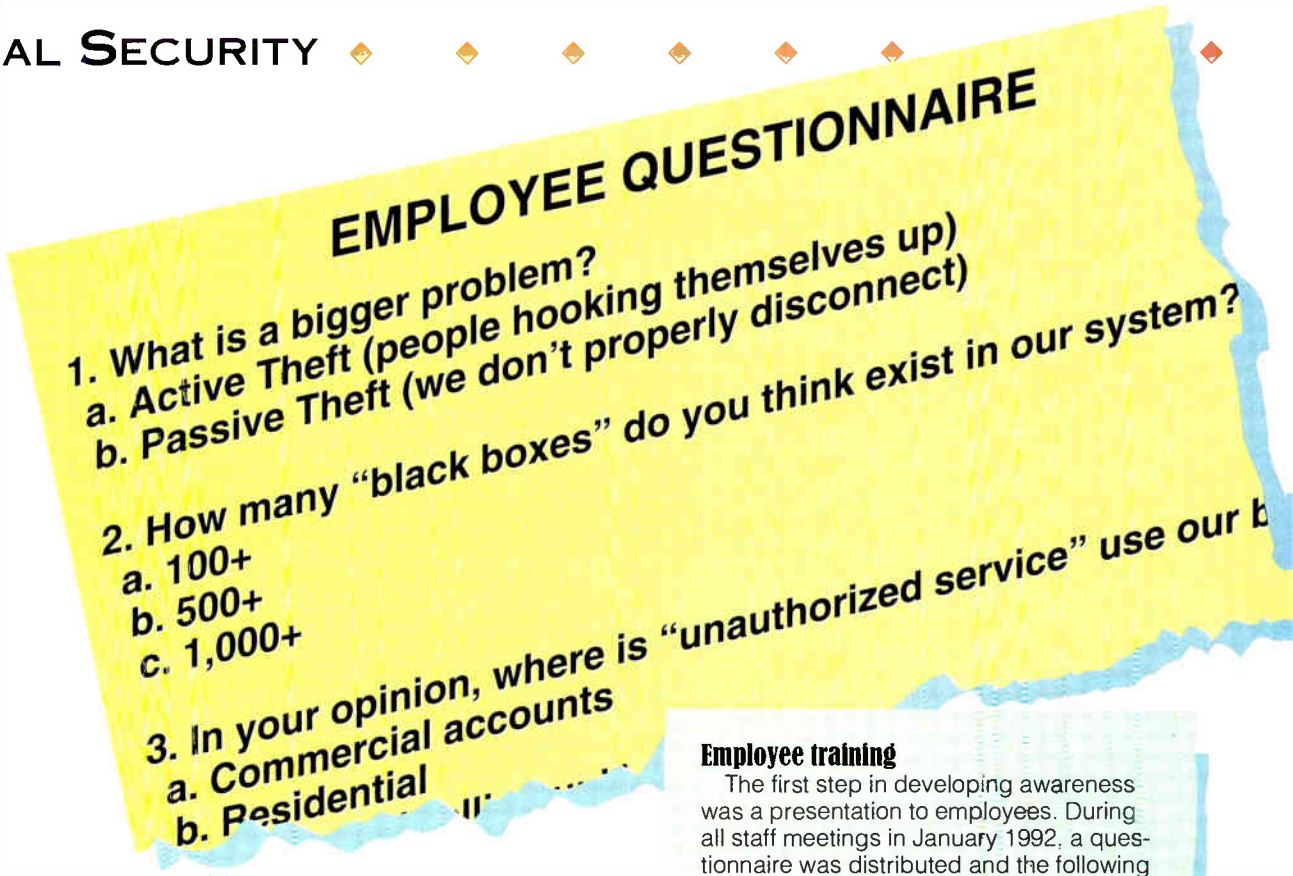


Source: Ameritech

deliver compressed video at 1.544 megabits per second over standard LEC twisted-pair wiring at distances up to 18,000 feet), fiber/coax hybrid networks or all-coax networks, he argued. It isn't necessarily a digital service, though digital platforms will greatly enhance delivery of video dialtone services. It doesn't necessarily require use of store-and-forward technology, either, though video dialtone is the logical precursor of video-on-demand. Instead, video dialtone is "a very great growth platform for us," he said. And, one might hasten to add, a possible prerequisite for marketplace survival.

The upshot is that local exchange carriers seem well aware of its their vulnerabilities–and enormous strengths. They are determined to prosper, not merely survive, and understand the strategic necessity broadband networks represent. They are increasingly aware of the danger cable-provided local access represents, and will not be caught flat-footed. Cable operators who expect to remain a viable part of the telecommunications industry a decade from now have their own choices to make. Barring investments of their own in advanced network technology, digital and switching capabilities, they could well fall victim to cataclysmic changes in industry structure. Make no mistake: Your competitors have an exceedingly clear vision of the future, the absolute determination to survive, and the resources to invest heavily in pursuit of that vision. CED

Ad Index



Building a better mousetrap

Continental Cable's anti-theft program

By John Lamirande
Cable Security Manager
Continental Cable of Western New England

Editor's note:
Every year, the NCTA's Office of Cable Signal Theft sponsors a signal security ideas contest that invites operators to write about successful anti-theft campaigns. This year there were two winners. The second winning article will appear next month.

Continental Cablevision of Western New England operates in 33 cities and towns in western Massachusetts and northern Connecticut. Continental serves nearly 145,000 subscribers with roughly 185 miles of fiber optic cable feeding approximately 3,000 miles of coaxial plant.

A mix of convertor technology is employed in the Western New England district. In the newly rebuilt and constructed systems, Scientific-Atlanta video inversion technology is the primary convertor. Other systems currently use non-dynamic sync suppression convertor boxes.

While theft of service has always been a concern to Continental, the effort to combat the problem was primarily confined to the individual system. The specific approaches varied in effectiveness throughout the district.

In 1992, however, because of declining pay units and an increase in national awareness regarding the magnitude of revenue losses associated with cable theft, Continental established a theft of service department. Its responsibility was to develop a comprehensive program to deal with theft issues.

A strategy was created to develop awareness about the nature and effect of cable theft. Cooperation from customers, employees, issuing authorities, law enforcement officials and the general

Employee training

The first step in developing awareness was a presentation to employees. During all staff meetings in January 1992, a questionnaire was distributed and the following information was presented:

Scope of problem:
national statistics
lost revenue
passive/active theft

Public relations:
advertisements
telephone hotline
press release

Theft of service report:
how to use the report
importance of information

Procedures:
CSRs
field service techs

Legalities/options:
Civil/criminal
settlements

Overhead visual aids were utilized, along with a preview of theft spots to be used as part of the public awareness program. The theft of service manager, district engineer and corporate counsel took part in the presentation.

The response from employees was positive and the questionnaire helped identify the extent of the problem from the employees' view. They were pleased the company recognized the severity of the problem and was committing the resources needed to pursue all illegal issues.

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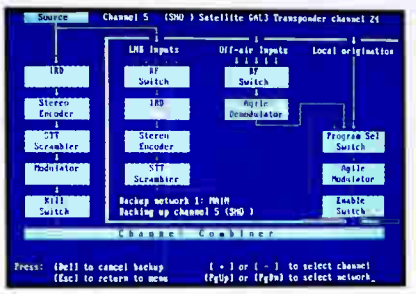

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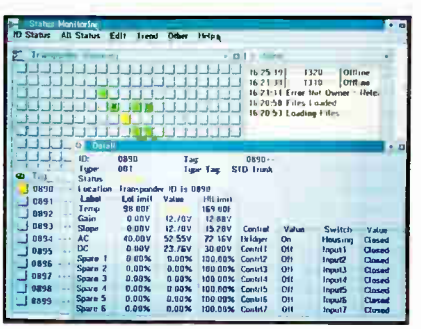

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public was vital to the success of identifying and dealing with illegal users.

A comprehensive theft of service program included the creation and implementation of forms and procedures, the installation of an 800 number to report theft, development of a database program for tracking cases, the promotion of successful prosecutions and the launch of an amnesty program.

Public awareness program

The first step in developing awareness was to educate local authorities, including mayors, selectmen, law enforcement officials and cable advisory members. Letters were sent to the individuals to review what cable theft is, its cost to the community, cable companies and ultimately the legal subscriber. Attached to the letter was a copy of state and federal laws, a glossary of cable TV terminology and a copy of the cable piracy fact sheet produced by the NCTA's Office of Cable Signal Theft.

Because of declining pay units, Continental established a theft department in 1992

In early 1992, a press conference was held for local newspaper, radio and broadcast media. The objective was to provide information on the nature and magnitude of cable theft and its effect locally.

Each attendee was given a press packet that included an agenda, a press release, copies of state and federal laws, cable piracy fact sheet, recent cable theft-related newspaper articles and a glossary of cable TV terminology.

Following the press conference, a public information program consisting of newspaper, radio and cross-channel ads ran for approximately 30 days. By the end of March 1992, more than 300 theft cases had been reported and were under investigation with the help of an investigative agency.

Information received from the telephone hotline resulted in the arrest and conviction of individuals selling or possessing illegal convertor boxes. Other individuals whose crime was of a lesser offense were pursued in small claims court. Judgments for restitution varied from $250 to $4,000. By the end of 1992, more than $26,000 was received from out-of-court settlements.

Project TKO

Another effort to identify cable thieves was conducted during a major pay-per-view event. On November 13, 1992, the Holyfield vs. Bowe heavyweight championship fight aired from Las Vegas. Continental took advantage of this highly publicized event to perform a technically sophisticated "sting."

Four weeks prior to the event, a team from the theft of service, engineering, MIS and marketing groups made the decision to offer a free T-shirt to individuals who illegally intercepted the PPV event.

The engineering group determined the technical means to get this information to viewers using illegal boxes. The marketing group prepared a video presentation so illegal users would think the offer was legitimate and open to all viewers. The MIS group established an 800 ANI number for illegal viewers to call while the offer was displayed. ANI technology allowed all calls to the number to be tracked.

Two weeks prior to the event, the team chose Continental's Enfield, Conn. system to perform the sting because of its channel lineup capabilities. The system has Viewers Choice 1 (channel 14) and Request (channel 15). Both are PPV channels. It was decided to broadcast the fight on both channels when normally the Request feed would be eliminated.

A scroll ran at the bottom of the legitimate PPV event asking viewers to tune to channel 15 for a special offer.

When legal customers tuned to channel 15, the convertor immediately tuned to the barker channel. The barker instructed them to call and receive a free PPV movie. Approximately 20 percent of the legal viewers took advantage of this offer.

When illegal viewers tuned to channel 15, they saw a free T-shirt offer. The offer instructed them to call 1-800-885-4TKO–the ANI number. The in-progress fight was shown on the upper right of the screen, while the T-shirt was displayed in the upper left corner.

The offer was displayed throughout the event. During the first 15 minutes of the offer, 28 calls were received. The number increased as the night went on, finally totaling 265 calls. After analyzing the total number of calls, it was determined 146 separate addresses responded to the offer.

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When a tech finds a tampered Continental convertor box:

1. Verify channels by flipping through convertor.
2. Contact dispatch to verify services and box number.
3. Remove box, informing customer there is a problem with the box, and replace it.
4. Complete a theft-of-service report after leaving premises.
5. Return box to convertor repair supervisor, sign and date evidence tag.
6. Convertor repair supervisor will verify services the box was receiving, photograph the box, sign and date an evidence card and securely store the box.
7. Convertor repair supervisor reviews theft report.
8. Report is forwarded to district office.
9. Cable security manager creates a file on the address, performs an investigation, attempts to convert the subscriber and, if unsuccessful, sends settlement letter.

The next step was to review the telephone numbers that were logged by MIS. Each phone number was referenced through CableData and addresses were verified, along with equipment type and services. Almost all of the addresses followed the common scenario of one pay service with little activity in their history. An illegal user normally subscribes to one pay unit to eliminate the mid-band trap that secures premium services from those subscribing to expanded service only.

The T-shirts were delivered by certified, return-receipt mail, to those who responded. Approximately three weeks later, letters demanding $2,000 restitution were mailed.

At that time, it was decided to send out a press release to local newspapers. The press was quick to respond and showed great interest in the sting. The response was so positive that live news and radio interviews were conducted with local and national broadcast stations. San Francisco radio, San Diego TV news, CNN, St. Louis news, Chicago TV news, Newsweek, CBS radio and TV were just a few that covered the sting. Follow-up stories were conducted by the local newspapers. It seemed that the cable company was no longer known as the "big bad guy" but as a company combating a serious problem.

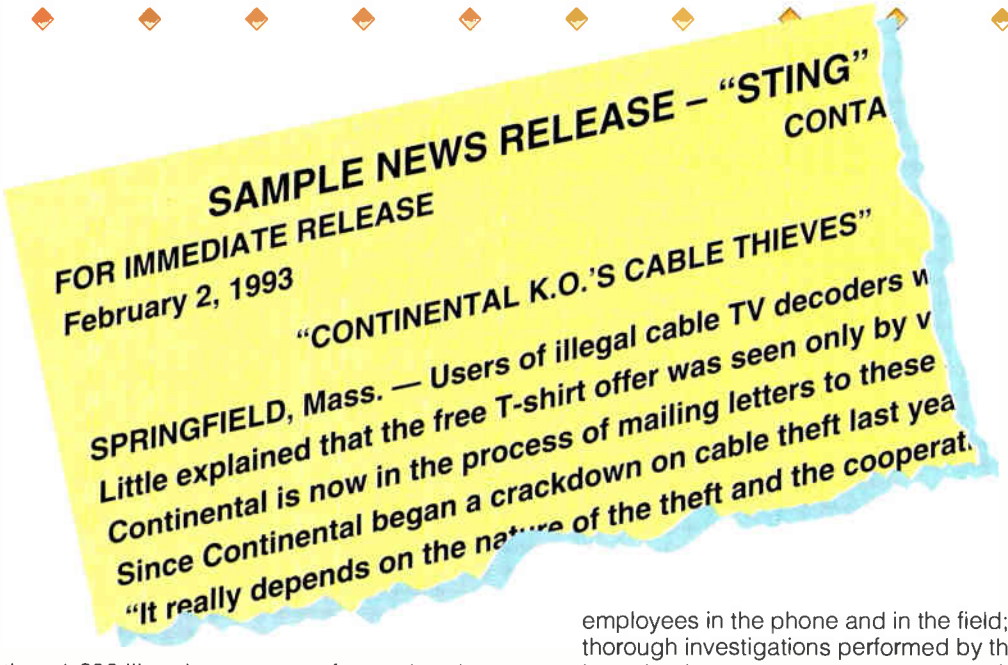
To date, more than $28,000 has been received from individuals who viewed the free offer. Some have given information on others who have illegal equipment. More than 40 individual cases have been forwarded to an attorney and the remainder are being negotiated with or haven't responded. Only those individuals who refuse to cooperate will be sued by Continental.

Amnesty program

An amnesty program was targeted for the summer of 1993, but because of the overwhelming response from individuals who wanted to turn in illegal equipment as a result of the publicity surrounding the sting, Continental launched the amnesty program on March 1. The multimedia campaign ran for seven weeks and ended April 16.

The objective was have any illegal user return the illegal equipment without threat of prosecution or back-billing of services. During the program's first week, more than 80 individuals had returned their illegal equipment or converted to a legal paying customer. The program was expected to elicit 25 percent of the total estimated illegal viewers.

At the end of the seven-week program, more



than 1,200 illegal users came forward and became legitimate customers. Approximately 800 tampered/black boxes were returned during this period. The remaining individuals had either illegal additional outlets or services. Expectations were met with 24 percent responding to this program.

Summary

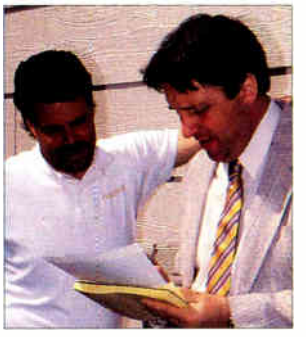
The overall success of the theft of service program was due to several factors: the dedication of employees in the phone and in the field; the thorough investigations performed by the investigation agency; customers reporting cable theft on the hotline; and the commitment made by Continental to supply the resources to combat the problem. Without all these elements, the program would not have been so successful.

Because of such success, Continental will continue to aggressively pursue and prosecute all individuals who are not willing to cooperate and will utilize all technical means needed to combat this serious problem. CED

When a tech finds an illegal black box:

1. Verify channels by flipping through converter box.
2. Contact dispatch to verify services.
3. Try to obtain information about box.
4. Complete a theft-of-service report after leaving premises.
5. Submit the report to immediate supervisor.
6. Supervisor reviews report.
7. Report is then forwarded to the district office.
8. Cable security manager performs an investigation and attempts to convert subscriber.

DON RILEY



Exterior and interior views of CableLabs' test vehicle. Below, TCI State Engineer Jack Arneson (left) briefs Richard Prodan, director of engineering for CableLabs, on characteristics of TCI's Cheyenne, Wyo. system.

CableLabs hits the digital road

How bad is in-home wiring?

By Leslie Ellis, CED

As cable operators scurry about building that ubiquitous "digital superhighway," CableLabs representatives are, likely at this very moment, cruising along a not quite so glamorous asphalt highway. Armed with a bevy of sophisticated test equipment all wrapped up in a 14-foot truck, CableLabs is taking its show on the road in pursuit of data that promises to help shape the future of in-home digital receivers.

And while the pavement CableLabs travels may not match the glitziness of the much-touted digital superhighway, it's safe to say that the Labs' vehicle makes up for any lost grandeur (it even has a built-in coffee machine). Key components within the truck include a spectrum analyzer, network analyzer and link analyzer (see photo, this page). The truck is outfitted much like a mobile studio, except its main purpose is to test some 20 cable systems and hundreds of subscriber homes over the summer months. System sizes slated for testing range from a (whopping) 90-sub system to a 40,000-sub system.

"The intent is to characterize cable systems in combination with a variety of in-home environments," explains Dr. Richard Prodan, director, engineering for CableLabs and the person overseeing the digital characterization project. "In the end, we'll have a database of our findings, which we will release to vendors and our member companies."

CableLabs' digital channel characterization tests include four phases: cable system characterization; home wiring characterization; component characterization; and non-stationary interference characterization. The first two phases will be covered during the summer-long mobile tests; the remaining two will be conducted on an on-going basis both at CableLabs' Boulder, Colo. facility and at member company sites, Prodan says.

Why the tests?

CableLabs' project is both timely and significant. It's timely in light of the current state of technological flux, as cable systems progress rapidly toward digital signal transmission. It is significant simply because no one really knows what the effects of poorly installed wiring and /or in-home components–such as improperly crimped F-connectors and substandard in-home amplifiers–will have on the otherwise robust digital signal of the future. The traveling road tests aim to provide some answers.

"We're particularly interested in the effect of microreflections within the coaxial drop plant," explains Prodan. "Microreflections are especially troublesome with digital transmission, making the transmitted signal so much more susceptible to noise."

Because microreflections could ultimately wreak havoc on digital signals, part of CableLabs' emphasis during the tests is to determine noise, impairment and reflection thresholds that can be used by cable equipment manufacturers to design adaptive equalization algorithms for use in future digital set-top boxes. As the name implies, adaptive equalization circuits will adapt for and correct reflections encountered within the home–and will play a critical role in future set-top box design.

"We want to establish where the line of demarcation is," Prodan says. "In other words, at what point can the adaptive equalizer correct for problems caused within the home–or not?" The alternative to

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channel correction performed by adaptive equalizers is partial or complete re-wiring of the subscriber's home, Prodan says.

CED was on-site for one series of tests, conducted at TCI's Cheyenne, Wyo. system. Following Cheyenne, the truck will travel to Nebraska, South Dakota, Illinois, up through Montreal and Quebec, then down through Rhode Island , Massachusetts and the Washington, D.C. corridor. From there it's on to Georgia before the van turns west toward Tennessee, Missouri and Kansas. Last stop: CableLabs headquarters in Boulder.

The Cheyenne system, as well as the other selected test sites, was chosen in part because it has excess bandwidth (the system is built to 450 MHz, but currently channelizes only to 380 MHz). Extra bandwidth is important, Prodan explains, for two reasons. First, subscribers aren't affected by the testing. Second, the upper portion of unused bandwidth is likely to be the area in which future digital signals are implemented.

The series of tests in Cheyenne started at a headend site, where CableLabs engineers first launched a test signal through the system. To perform the launch, a transmitter is connected to phone lines, and is remotely controllable via a cellular phone within the truck. That way, Prodan explains, any commands to change the transmit carriers to sweep different bands can be accommodated without returning to the headend. The test signal can also be turned on or off remotely as needed.

"We check the signal at the launch point to the system," Prodan says. "It then goes through to subscriber homes in a variety of different ways. Some through fiber, some through coax, and with varying depths of amplifier cascades." Because the 20 field tests will likely vary widely, Prodan developed a pre-test worksheet that defines various aspects of the systems' design, including differentiations for underground/aerial cable plant, signal path, and in-home device types/configuration.

At the headend, Prodan and his staff of five engineers (which will ultimately be whittled down to one, when the digital van takes off for the four-month tour), measured the cable plant for frequency response on the unused bandwidth, the transmitted spectrum, noise characteristics, spurious beats or ingress and composite triple beat (CTB) above the highest used channel.

Two of the homes tested exhibited poor in-home wiring

All of the measurements are conducted via an automated and CableLabs-specific software program that was developed exclusively for the summer-long tests. The measurements are bundled together and stored in individual system files in the on-board PC, for later collection and statistical analysis. Also, Prodan explains, results are plotted to a hardcopy graph, which can be faxed to CableLabs for analysis, if necessary.

The in-home tests

Following the headend tests, the truck (followed by an envoy of about five related vehicles) headed to the home of Jack Arneson, a TCI subscriber–and TCI's Wyoming state engineer. "We want the tests to be as unobtrusive as possible," says Prodan, explaining the most of the subscriber tests will be conducted in the homes of system employees.

At Arneson's home, CableLabs engineers first calibrated the in-house outlet and drop cables that ran from a patch panel located on the exterior wall of the truck to the convertor inside the home, and the drop connection to the tap. "We calibrate the cables used with a network

analyzer on a daily basis, then store the data so that we can bypass complete recalibration at each subscriber's location," Prodan said.

Following calibration, Labs engineers formed a test loop that ran from the truck to the tap, through the in-home wiring and back to the truck, "to look at the frequency response of the home cabling," Prodan says. "If the wiring impedance is uniform, then our analyzer will exhibit flatness–which is good. If there are ripples, there are reflections in the in-home wiring."

The tests like those conducted at Arneson's home are the ones that will ultimately shed light on future digital transmission. "We're also looking at the shielding effectiveness of the cables inside the home," Prodan explains. "We're testing the home as an antenna."

Prodan notes that in the first series of tests, conducted in Fort Collins, Colo., two of the subscriber homes tested leaked–or, as he puts it, acted as antennas. "One of the homes exhibited a -25 dB isolation to external fields. A good in-home wiring environment, by contrast, measures in the range of -80 dB," Prodan says. Further, Prodan says, several of the homes had "pretty nasty" reflections that could require either new drop and receiver cable–or a very expensive adaptive equalizer.

TCI's Cheyenne, Wyo. system passed the tests with high marks

Besides amplitude flatness, group delay and shielding effectiveness against ingress, several other impairments are measured in a series of 10 automated tests per site. These include the noise floor profile, spurious signals of a transient nature, and composite triple beat..

Cheyenne in the clear

TCI's Cheyenne system, by the way, passed the tests with high marks, Prodan says. "It tested exceptionally well. Everything was very tight. The reflections we did find were small and relatively minor." Prodan notes, however, that although performing the subscriber tests within employee homes lessens disturbances to actual cable customers, it may simultaneously miss the mark of the "average Joe" cable subscriber.

Because of that, a recent round of tests conducted at Multi-Media Inc. in Piedmont, S.D. had company officials offering a month of free premium service to those "average Joe" subscribers who happened to live within the portion of the system being tested. At press time, Prodan wasn't sure how many subscribers had volunteered their homes in exchange for free TV.

An interesting development also occurred during testing of the smallest system along the route–Windbreak Cable, a 90-subscriber, 14-channel system located in Gering, Neb. Because the system's headend is located within close proximity to a power substation, its off-air signals are suffering from sparking and ingress. "When we did the tests for noise and spurious components, the spectrum analyzer was picking up stuff hundreds of megahertz wide," Prodan says. But, interestingly, subscribers seemed largely unaffected by the problem. "Bearing in mind that Gering, Neb. is mostly prairie, it proves that one man's ceiling is another man's floor," Prodan says. "The customers there really love their cable TV."

CableLabs will complete its test cycle and data assimilation in July, followed by statistical analysis in August. A full report will be issued sometime in September, Prodan says. CED

Overview of ATM technology Asynchronous Transfer Mode (ATM)

By Tom Staniec, director of engineering, Newchannels Inc.

Virtually every day the cable industry is challenged by a new concept, technology, architecture or player. Trying to keep up is at best difficult and, at worst, seems to be a herculean task. Just when engineers become accustomed to FTF, gears shift and we must investigate the "application" that fits into the "architecture." For instance, compression is an "application" that fits into the "architecture."

Asynchronous Transfer Mode (ATM) is an application communication architecture that fits into a physical transportation system. That transportation system can be copper, coax or fiber. That's a simplistic description, but it should provoke questions, including:

- ✔ What is ATM?
- ✔ How does it work?
- ✔ Where does it fit?
- ✔ Why is it important?
- ✔ How does it work in cable TV?
- ✔ Doesn't it mean "automatic teller machine?"

Telecommunications history

This article represents a loose description of the public switched network, and my perceptions based on telecommunications system built by my company. Since communications systems were invented and built, the desire to push more information through the system has been paramount. How to do that in the public switched network, which was built for voice and where the passband was designed for a specific frequency range, and where copper was deployed from telephone company end offices to some rather significant distances, can really try a person's patience–not to mention mess up the information.

It wasn't long ago that using a computer from a home meant using transmit speeds of 300 or 600 bits per second (bps). Today, it's not very difficult to operate at 9.6 kilobits per second or higher.

In specialized systems, such as local area networks (LANs), speeds into the 100 Mbps range are common, but LANs do not typically cover large areas. Users within a LAN, however, have nonetheless been frustrated when they had to take data out of the LAN to the public switched network (PSN). The reason for the frustration is simple: the PSN just wasn't fast enough, nor was it built for wideband use.

What the telephone companies needed was a way to make their "pipe" bigger and faster. To do that required an attitudinal change about transmission, and an all-digital network.

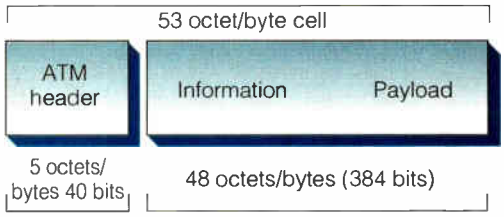
The PSN, then, needed an overhaul, and the phone companies initiated this effort by changing the switching fabric in central offices to accommodate digital switches. They extended the digital switch by way of digital loop carrier (DLC) out from the COs closer to the customers, thereby shortening the copper drop. Further, they interconnected the COs, not to mention the remote DLC equipment, with fiber. All these actions resulted in a system with greater bandwidth and higher transmission speeds.

What does all of this have to do with ATM? A lot, because the network just described lays the foundation for a wideband, high-speed system that can support voice, video and data.

The support mechanism for this digital network was based on the Integrated System Digital Network (ISDN) architecture, and was designed to be ubiquitous across the PSN. Data rates could operate at 64 kbps or higher. Faster data speeds could be achieved by making the base 64 kbps ISDN rate multiples of 64 kbps up to roughly 2 Mbps, as needed by the end customer. ISDN could be supported on the copper drops already in place, because the shorter the copper drop, the greater the available bandwidth.

This changing of the "pipe" and the method of access worked well for the residential customer, while simultaneously providing business customers with greater data speeds.

FIGURE 1
ATM cell structure



Header contains:

Flow control	
4 bits	
VPI	*8 bits*
VCI	***16 bits***
Payload type	*2 bits*
Reserved field	***1 bit***
Cell loss priority	*1 bit*
Header error control	***8 bits***
	40 bits a = 5 octets/bytes

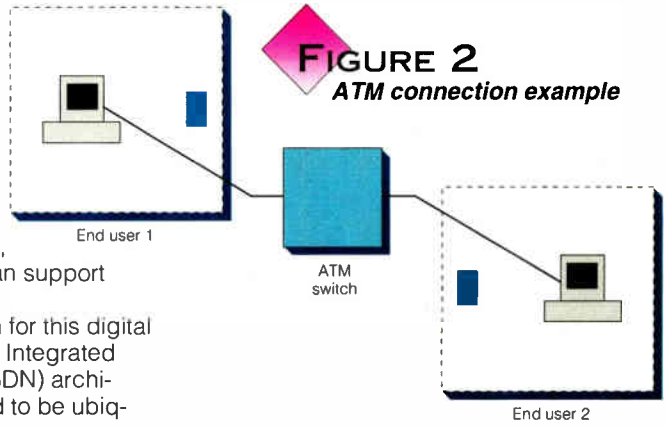
Technology change

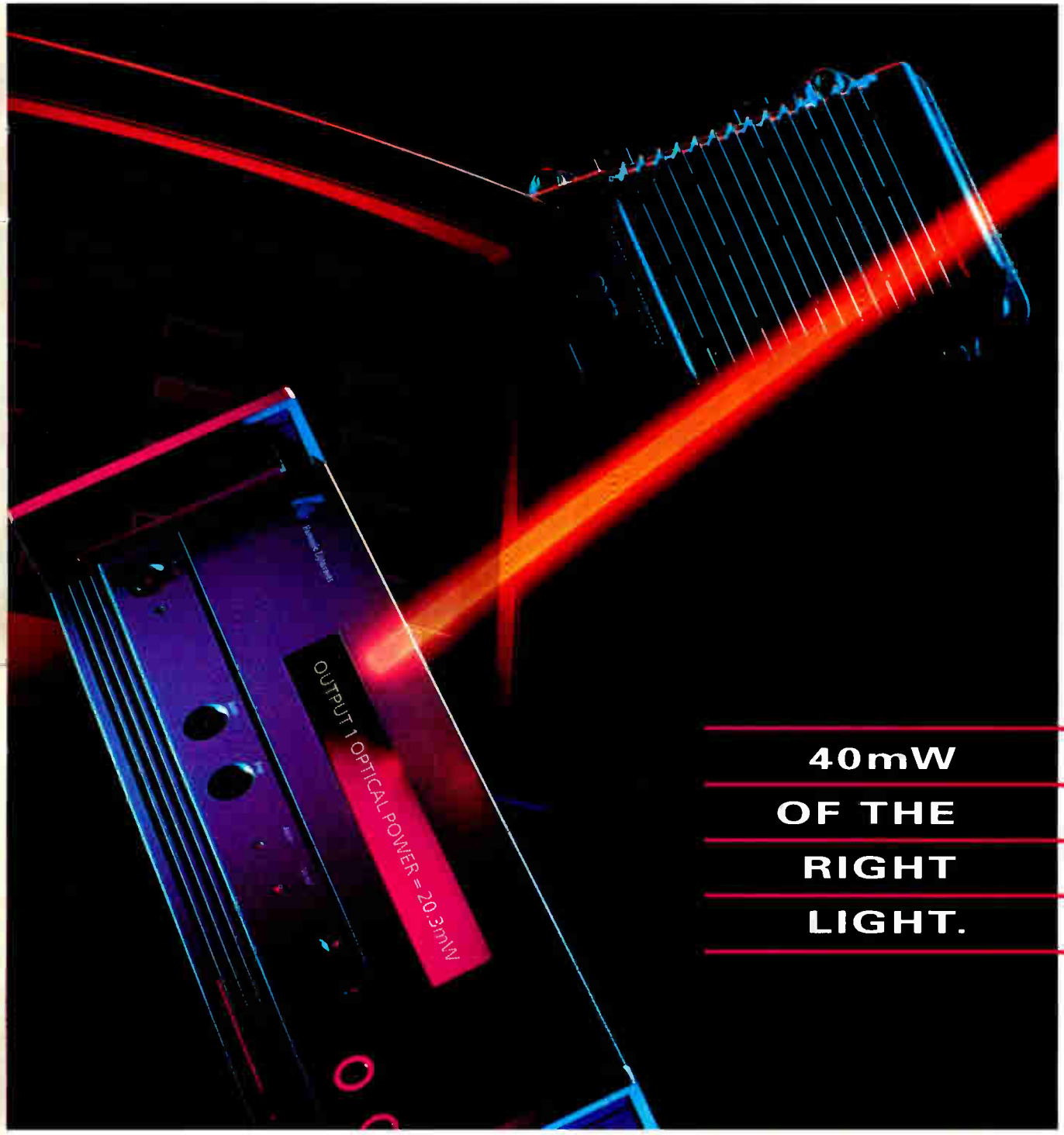
Unfortunately, like time, technology marches on. The guys with the LANs figured out they could have wide area networks (WANs) and metropolitan area networks (MANs), in which individual users could have a 45 Mbps (or telco DS-3) data stream all to themselves. Once again, this meant that the ends of the system were faster than the middle. Conceivably, the MAN or WAN operated, for example, in a college campus or large business user environment–at gigabit-per-second speeds. Given that capability, imaginative software designers dreamed up ways to use that speed to put multimedia applications in desktop computers.

With both technology and demand moving quickly, ISDN (which isn't dead, by the way) in its narrow format (N-ISDN) again needed to be revamped. Enter broadband ISDN. B-ISDN is just what it suggests: It's broadband. But how broad is it? The answer depends largely on who is asked. But for our purposes, let's assume a base of 64 kbps (DS-0) working its way up to 45 Mbps (DS-3).

In the real world, DS-3 is a pretty good speed. With slight compression, it can accommodate broadcast-quality video along with multiple 1.544 (T-1) data streams. That means computer users can develop and use applications like multimedia, which require large data band-

FIGURE 2
ATM connection example





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widths. However, providing DS-3 service to individual end users is fairly expensive. In addition, end users don't always need that much bandwidth. So how does one resolve these incongruent needs? In short, by providing bandwidth on demand–which is the essence of ATM.

ATM defined

ATM is an international standard set by an international body known as CCITT to support voice, data and video in the PSN under B-ISDN. Information in the transfer mode is broken into information cells that are constant in size, and therefore capable of being switched at very high speeds. This network structure transmits all communications synchronously, which enables high data speeds.

Why, then, is ATM described as asynchronous? In a synchronous network, everything happens predictably and repetitively. The "asynchronous" in ATM means that individual cells can occur at any time, or asynchronously.First and foremost, ATM is a switching-based technology–much like X.25 packet switching. That's about as close as the two come, however. Where X.25 has a lot of overhead in the form of handshakes, inband signaling, error checking, large packets and complexity, ATM does not.

The ATM cell is defined as 53 octets of data, five octets of which are defined as "overhead" with 48 octets representing the actual data payload. Error checking exists for five octets of header only, assuming that if the header is correct, then the payload is also correct.

How ATM works

Figure 1 shows the layout of the ATM cell. The five-octet header serves the following functions:

- ✔ Virtual path identification (VPI),
- ✔ Virtual channel identification (VCI),
- ✔ Header error control (HEC),
- ✔ Cell loss priority (CLP),
- ✔ Payload type (PT),
- ✔ Generic flow control (GFC), which is not yet in use,
- ✔ Reserved field (RES).

The VPI/VCI positions in the leader are used for system routing and switching through the network. ATM is a connection-based technique that establishes what, in effect, are point-to-point connections by creating links across the network–as determined by the VPI/VCI header information. These connections remain in place until the session is completed. Because ATM is really the switch, the links are the paths which are determined by the RISC (reduced instruction set computer) intelligence in the switch, for the establishment of the necessary path through the switch fabric toward its destination. That destination could involve link establishment across multiple switches. Figure 2 illustrates a simple example of a connection across a network and the ATM switch.

As can be seen, ATM is a combination of packet switching and time division multiplexing. Unlike packet switching, however, ATM can support time-dependent user applications, such as voice and video. CCITT has defined four classes of service that are handled in the ATM application layer (AAL). They are:

- ✔ Class A: Timing required between the source and destination; a constant bit rate is required in a connection-oriented mode. An example is 64 kbps voice.
- ✔ Class B: Timing required between the source and destination; a variable bit rate is necessary in a connection-oriented mode. Examples include variable rate video and audio.
- ✔ Class C: No time relationship–variable bit rate on a connection-oriented mode. Examples include data transfer in the user environment.
- ✔ Class D: No time relationship–variable bit rate and connections. An example is LAN interconnection traffic.

What we have been discussing is the model of the B-ISDN/ATM protocol,

which uses the physical layer as its base. The physical layer is responsible for correct transmission and reception of bits on the transportation medium. The next level is the ATM layer, which performs cell multiplexing, cell header extraction or addition (depending on routing into or out of the ATM adaptation layer), determination of what VCI is required at the ATM switch modes and a flow control that can be implemented on the user interface.

Above the ATM layer is the ATM adaptation layer, with its class of service definition. Its purpose in most applications is to determine the amount of bandwidth needed by the user for the various service classes. The AAL then places data in the cell header for management, control and mapping of the user.

The last level is broken into two parts: the control plane and the user plane. The control plane is used for channel set-up and correction, while the user plane is used for data transfers. Both are called "higher levels."

Figure 3 shows how ATM fits into the overall network. The diagram is broken down into the maximum data capacity in a channel for a user (values are rounded off).

Cable ATM applications

By now it is quite obvious that the "network" described thus far comes from the telephone company, and is oriented toward a fairly heavy user. The question then becomes: Can B-ISDN/ATM fit into a cable system comprised of optics and RF amplifiers? The easy answer is "maybe."

CCITT did not dictate how terminals should be attached to an ATM network. A star configuration is allowed, as is a shared medium (in other words, a bus structure). While CATV employs optical nodes from a headend that looks like a star, those systems also have a bus structure after the node–an interesting combination not covered by CCITT.

The basis for ATM as it is currently being discussed is a bandwidth availability of 150 Mbps per user. No matter how it's sliced up, that's big. Consider that 8-bit digital codecs (coder/decoder) can be purchased from a CATV manufacturer which can code and/or decode a standard NTSC picture into roughly 95 Mbps. That's probably unnecessary for home uses, but has definite appeal to large business users. In fact, for large business applications, the system would likely be designed differently–even to the point of taking fiber there.

But back to the home user. What speed might be needed? Today, we know that we can get about 30 Mbps in a 6 MHz television channel. that's close to the 45 Mbps (DS-3) speed discussed earlier. The possibility exists to get to 45 Mbps with mild compression into our existing 6 MHz slot.

Going back to the system architecture, the star hub/bus looks as if it can work, but at the same time, a decision must be made as to whether a CATV ATM system stands on its own in a dedicated channel space, or whether it can travel in a compression package where the actual user interface is the compression convertor. Both of those options provide interesting possibilities, and both of these options are currently being worked on.

So how would it work in cable? Because of the shared medium, contention resolution and bandwidth-sharing would have to take place at the ATM node access point–a step that adds some complexity to the overall system. That aspect is being addressed under the IEEE 802.6 standard for metropolitan area networks. It appears that MANs will promote B-ISDN, enabling operators to then offer some form of B-ISDN. The MAN system will require a medium access control known as Distributed Queue Dual Bus (DQDB), which is standardized under IEEE 802.1. Information is transmitted in segments in DQBD, a set-up that looks very similar to ATM.

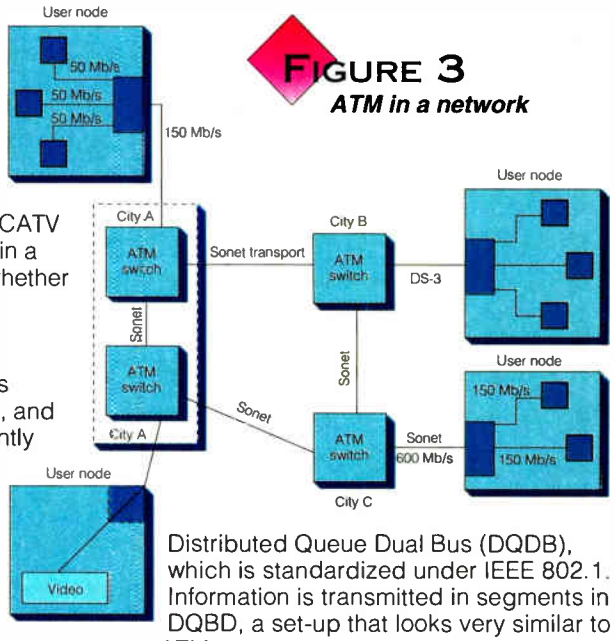


FIGURE 3
ATM in a network

In conclusion, it is important to note that this article is an overview and not a tutorial. A tutorial would explain the ATM switching mode functions, and a greater explanation of packet switching and ISDN. While that would be quite a challenge, it would be better handled by other well-known reference materials. CED

Coaxial signal splitters

A look inside

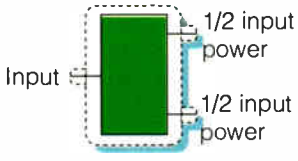
By Michael David Maahs, Chief Engineer, Evolutionary Thermo Dynamics

Mr. Maahs researches, writes about and designs equipment for electronics, home automation and air conditioning.

Signal splitters are produced and used by the millions, but their characteristics and internal workings have rarely been described.1 By far, most splitters are used to distribute cable and master antenna television (CATV and MATV) signals.

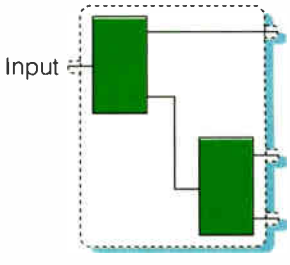
Considerable interest has been generated by the home automation industry in using these splitters in reverse as combiners. This article provides an analysis of the results of using splitters in this way.

FIGURE 1
Foward direction



2-tap splitter circuit

FIGURE 2
Forward direction



3-tap splitter circuit

Forward signals through splitters

All splitters in common use are based on the design of a two-output ("output" and "tap" are used interchangeably) splitter. An ideal two-tap splitter has a -3 dB "loss;" this apparent loss simply reflects the fact that half the input signal power is sent to each of the two outputs. Real splitters come reasonably close to this ideal—typically they show about a -4 dB loss from input to each output over their frequency range of 5 MHz to 600 MHz.

The splitter has an internal transformer that matches the 75 ohm impedence presented by the coax at the splitter input to the output impedence presented by the two 75-ohm output loads being driven in parallel.

Three-tap splitters are the equivalent of two two-tap splitters connected as shown in Figure 2. They send one-fourth of the input power to two of the outputs, while the remaining half of the input power is sent to the third output.

Four-tap splitters are the equivalent of three two-tap splitters, connected as shown in Figure 3. They divide the input power evenly among all of the outputs.

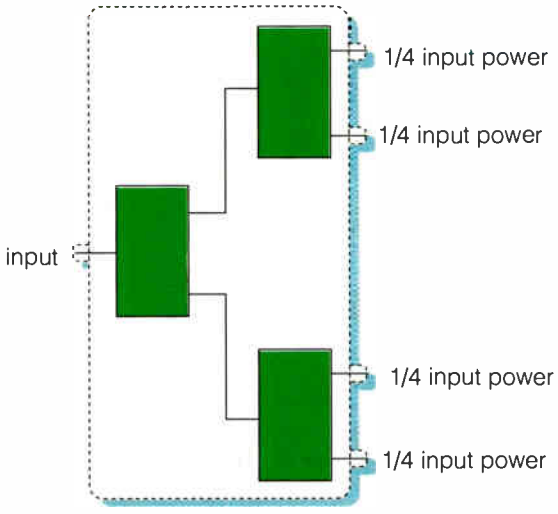
Reverse signals

When a signal enters a two-tap splitter output, the splitter absorbs half the reflected signal internally and sends half the signal out the splitter input. The splitter prevents the reverse signal from being sent out the other output. See Figures 4, 5 and 6.

An ideal two-tap splitter will have a real loss of about -3 dB coupling a signal from one output to the input; although not specified by the manufacturer, real splitters can be expected to have a -4 dB loss in the reverse direction.

Real splitters do a good job of preventing reverse signals from being coupled from one output to another. They have at least -20 dB loss from tap to tap over the 5 MHz to 600 MHz frequency range.

FIGURE 3
Forward direction



4-tap splitter circuit

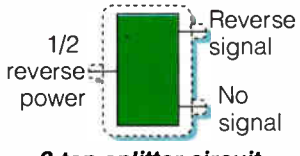
Ideal three-tap splitters have a -6 dB loss resulting from two of the taps to the input, while having a -3 dB loss from the remaining tap to the input. Ideal four-tap splitters have a -6 dB loss from any of the outputs to the input.

Signal power

Splitters can handle signals of at least +70 dBmV. This is not a maximum upper limit, it is simply that splitters can carry any signal level normally found in any residential CATV/MATV system. As the signal strength increases beyond this level, significant increases in signal loss will eventually result.

Splitters are extremely simple devices—as they must be because two-tap splitters sell for less than $1 each. Although components and circuits vary somewhat (depending on manufacturer and the number of outputs), the basic circuit principles are the same.

FIGURE 4
Reverse dirction



2-tap splitter circuit

Splitters have two basic functions:

✔ Impedence-matching transformers on either (or both) the input or the outputs to match the input source impedence to the combined output load impedences;

✔ Isolation networks to prevent reverse signals entering one output from appearing at the other outputs.

It is easiest to understand circuit performance if one widely used splitter is closely examined. In this splitter, the input stage performs the necessary impedence-match with a toroidal autotransformer T1. The input is applied across six turns. A

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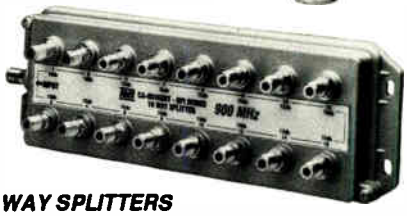

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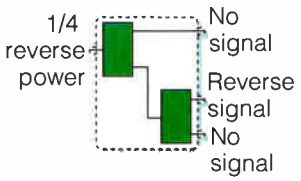
6-to-4 turns ratio yields a 2.25-to-1 impedence ratio.

The signal is then applied to the isolation network consisting of T2 and the 180-ohm resistor. T2 is a center-tapped, four-turn toroidal transformer. A low-valued (0.5-4 pF) capacitor to ground is placed at the node between the two transformers to help maintain the characteristic impedence of the network.

FIGURE 5
Reverse direction



3-tap splitter circuit

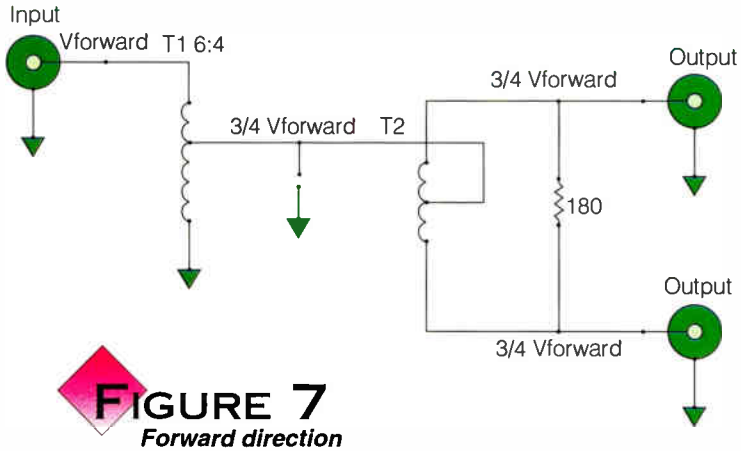


FIGURE 7
Forward direction

How it all works

In the forward direction, T1 matches the 75-ohm input impedence to the 37.5 ohm load presented by the two 75-ohm outputs being driven in parallel, as shown in Figure 7. An exact impedence match requires a 1.41-to-1 turns ratio, which is inconvenient. A 1.5-to-1 turns ratio is used instead, resulting in an effective source impedence on T1's tap of 33.3 ohms.

There is essentially zero voltage drop from the center tap of T2 to each of the outputs. Since the voltage is equal in magnitude and phase at each output, there is no voltage difference across the resistor and the resistor is essentially "not there."

Detailed circuit analysis shows that if one port is left unconnected, an ideal splitter will present a 180-ohm impedence into the input port and about a -4 dB loss through to the connected output port.

In the reverse direction, the circuit is deliberately designed so that when signal is applied to one output, zero signal voltage appears at the other output (see Figure 8). With the correct resistor value, half the signal voltage appears across the driven end of T2 and the center tap; this induces an equal voltage in the turns between the center tap and the non-driven output, reducing the signal voltage at the non-driven output to zero.

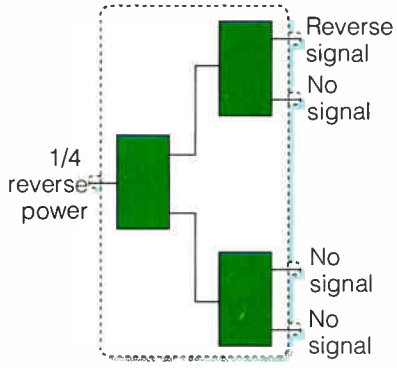
Because half the applied signal voltage appears at the center tap of T2, three-quarters of the applied voltage appears at the input port of an ideal splitter. By this analysis, an ideal splitter will couple half the signal power from one output to the input (a -3 dB loss).

It would seem that because no signal voltage is present at the non-driven output that it does not matter whether or not the non-driven output is connected externally; however, the splitter input return loss will suffer because the splitter's impedence at the input will be about 180 ohms. If the splitter is used as a combiner (in the reverse direction), any reflections coming down from the distribution center will be reflected by this impedence mismatch.

The toroidal cores are typically 0.15 inches in outside diameter, with center holes 0.05 inches across (see Figure 9). The cores are 0.1 inches in length. The windings are typically small gauge (about 30 AWG) magnet wire.

Unlike EMI/RFI ferrite beads of the same size (which are made of lower-frequency ferrites), splitter cores are made of ferrites intended for VHF or UHF applications.

FIGURE 6
Reverse direction

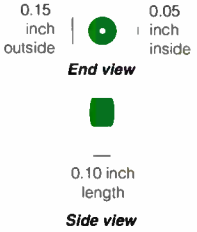


4-tap splitter circuit

Summary

All passive two-tap splitters can be expected to show about the same performance as the sample illustrated. In general, a splitter will have the same loss in the reverse direction as it does in the forward direction. The only significant difference is that in the forward direction, the loss is apparent because it results from dividing the input signal power among the outputs; while in the reverse direction the loss is real because it results from a dissipation of signal power inside the splitter. CED

FIGURE 9
Toroidal transformer core



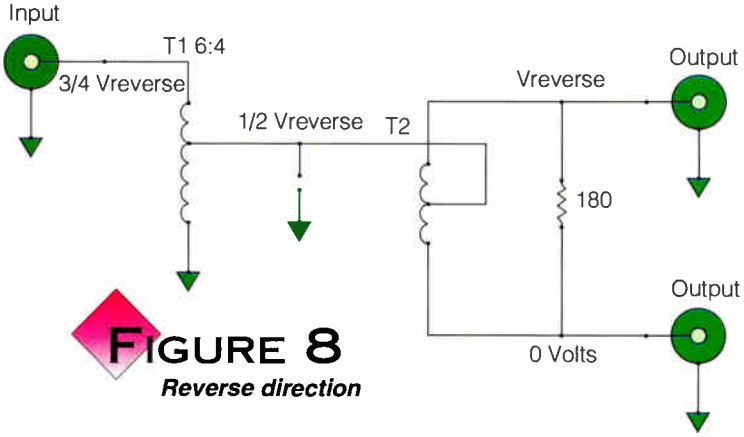


FIGURE 8
Reverse direction

The potential for pay TV in Brazil

Why the market is so small

By Rubens Glasberg, Publisher, Tela Viva

Rafhael Russ (left) of Amtech with George Knapp of Pico Macom, who announced a joint venture for Brazil.

Considering that Brazil is a country of continental dimensions it could be said that the pay TV market is yet to be created. With almost 30 million homes with TV sets and just 100,000 subscribers to pay TV, penetration is a minuscule 0.3 percent.

This means Brazil is certainly the country with the greatest growth potential for pay TV in the world. The reasons for this are simple: In Brazil, television is more than a leisure time alternative–it's a need. In Brazil, retailers sell more TVs than refrigerators. Therefore, in a country with 150 million people, where, according to the latest statistics, 32 million live in total poverty, television is watched a lot. The typical Brazilian adult spends 3.5 hours a day watching TV while children watch about 4 hours a day.

Why then is the pay TV industry almost non-existent? To understand the issue it is first necessary to realize that the so-called Brazilian "middle class" accounts for less than 10 percent of the total population–and that's where the potential subscribers are.

Strong Broadcaster

But this is still not the main reason the pay TV market is so small. Doubtless the main reason is because of the existence of good broadcast networks, namely Rede Globo, which has 83 affiliates and a market share of 70 percent. It is practically a monopoly because the other networks, some of which are almost broke, share the remaining 30 percent of the audience.

However, the picture is about to change because:

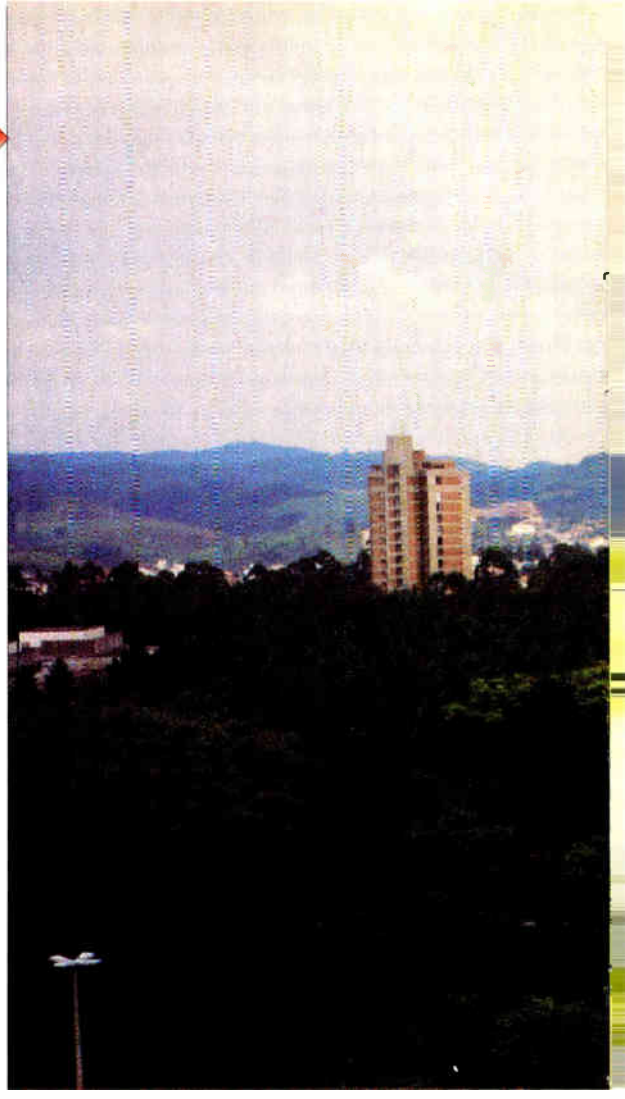
✔ The evolution toward digital technology, especially compression, and the launch of new satellites aimed at Brazil will increase competition. Already, 30 broadcast and subscription channels are available and in another year the number should be more than 40.

✔ Legislation being debated in Congress would result in cable licenses being granted at the local level instead of by the federal government.

✔ Finally, Globo's decision to enter the market may have had influence over the government to open up this market. Rumors are, although no one has ever been able to prove them, that the delay in granting cable licenses was largely due to Globo's influence in the Ministry of Communications.

Remarks

Tela Viva is the only Brazilian independent magazine published for the television market.



Whether the rumors are true or not, the fact is that by the end of 1989, when President José Sarney's term was almost over, almost 100 licenses to operate pay TV systems and 12 MMDS systems were granted. In some cases, including TV Abril (which is associated with the country's largest magazine publisher), UHF licenses were also granted.

Who are the operators?

Most cable operators are relative newcomers to the communications industry. One of the few exceptions is Rede Brazil Sul (RBS), a strong affiliate of Globo in Rio Grande do Sul and Santa Catarina, which obtained 16 licenses. In the city of São Paulo, the largest market in the country, the cable TV licenses were granted to persons who lacked know-how and the financial resources to implement the projects.

Despite their size, the big media companies lack knowledge of the pay TV industry.

Globo itself ignored the licensing process and ventured into a C-band direct broadcast satellite project, spending more than $65 million (U.S.) to get 20,000 subscribers. Abril, on the oth-

er hand, had even bigger losses. Meanwhile the pay TV market was almost at a standstill, and those who held licenses were trying to negotiate them away like blue chip stocks.

Disregarding details that are irrelevant to American readers, this resulted in pay TV licenses being acquired by strong groups (some from Argentina), Globo and Globo affiliates, who came together under an umbrella organization called Net Brasil.

The largest broadcaster in the country (Globo) understood it was impossible to be both a programmer and signal distributor (as it intended to be with its unsuccessful Globosat venture), and it has now become a programmer only.

Besides the Globo group, other companies that acquired cable TV licenses include Multicanal, a company associated with a mining enterprise, and Inbrac, a cable manufacturer that serves the telephone and automobile industry. This is who will install cable in São Paulo, the largest city in South America and a market that should account for more than 40 percent of the country's cable market.

The shortcomings

Despite their size, these companies lack resources and knowledge of the pay TV industry. An executive of NetBrasil/Globosat explains that there are few companies specialized in surveying the regions to be cabled, no social or economic analysis and no one knows what people expect from this new service. In addition, no one yet knows whether the best way to attract customers is via direct mail or door-to-door solicitation.

Brazil is more inclined to develop through a concentration of operators, not by fractionalizing the market. The active companies realize the business they're entering requires extensive capital and they're now trying to avoid predatory competition and reduce costs through joint ventures, mergers and operational agreements.

What became obvious at Brasil Link '93 is that operators want to purchase new equipment and expertise. They also seek long-term credit and low interest rates, such as those offered by Canadian banks for the development of foreign trade. It should be taken into account that in Brazil working capital bears real interest rates of 40 percent a year, no company planning to survive would carry inventory or use local banks.

It became clear that the North American companies that will participate in the Brazilian market are those with local presence, i.e. those capable of immediately supporting Brazilian operators. A good example perhaps would be the cable operators linked to the Net Brasil/Globosat system, which is beginning to assemble several headends with Philips equipment because Philips has reps in Argentina who have penetrated southern Brazil. Distributors such as Amtech and Vuescan also do a good business because they have local inventory. CED

The first cable expo for Brazil

About 50 exhibitors and 1,500 professionals visited Brasil Link '93, held March 24-26 in São Paulo. It was the first big international pay-TV event held in Brazil. Many business contacts were made and the event was considered to be a positive one by most participants, although the business volume that will result from the event is difficult to establish.

The big international manufacturers made a strong showing and doubtless one of the highlights was General Instrument-Jerrold with its DigiCipher system for transmission of digital compression. In a practical demonstration, Jerrold broadcast six TV channels using a single transponder from PanAmSat.

Although they lacked a live demo, other exhibitors such as Scientific-Atlanta, Philips Broadband, Leitch and TV/Com International displayed digital video compression. Amtech showed products from Standard Communications, Times Fiber and Lindsay Specialty Products.

Because of the proximity, equipment suppliers from Argentina were also in attendance. Turner, Deutsche Welle and the domestic TVA and Globosat were among the international programmers who exhibited.

News from the event was dominated by statements from Antonio Athayde, CEO of Globosat and Walter Longo, CEO of TVA, who promised to cease their predatory competitive actions that many believe held back development of the fledgling market.

R.G.

Zenith foils would-be pirates

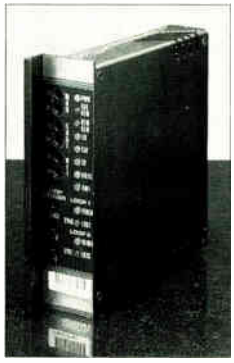
GLENVIEW, Ill.–Zenith Cable Products has announced its SSAVI+ enhanced security system for its HT-2000 decoder, designed to foil would-be cable thieves. The SSAVI+ encryption technology works via the in-band transmission of a dynamic "control seed" to the HT-2000 decoder. The control seed directs the decoder to the location of dynamic scrambling commands that can be located in several places in the vertical blanking interval, and the seed can only be interpreted if the proper decryption algorithm has previously been received through the out-of-band data channel, which normally receives informational data for the on-screen display, Zenith officials explained.

On any channel encrypted with the new technology, the encoder will also send false data, causing non-authorized decoders to rapidly alternate between video inversion and non-video inversion.

The downloaded algorithm can be periodically changed with a new algorithm, thus creating what Zenith officials call "renewable security." Circle Reader Service No. 85

Grounded bulkhead panels

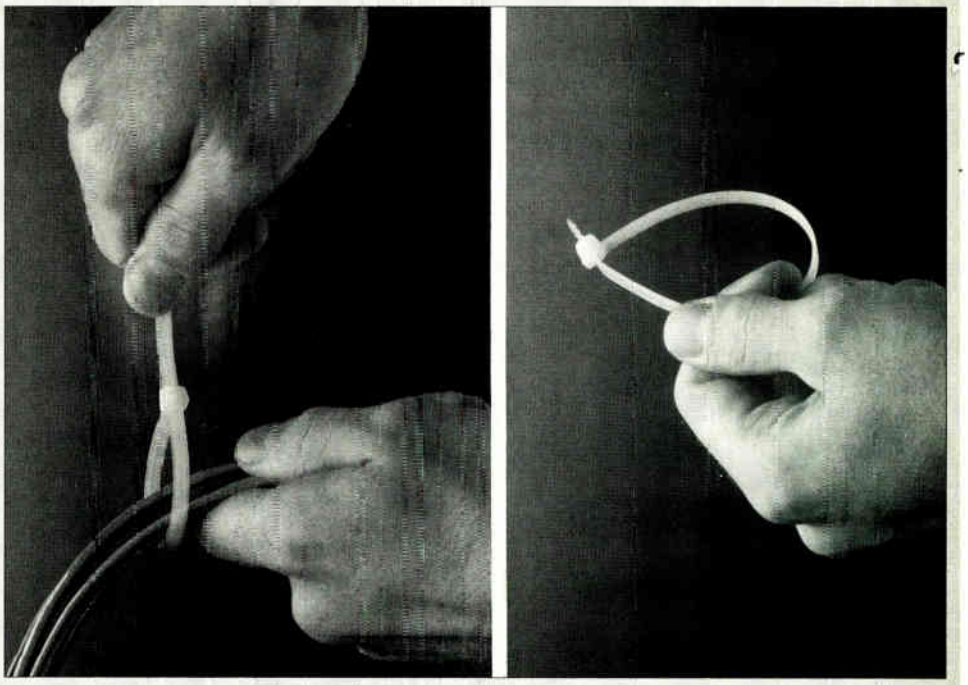
MINDEN, Nev.–PolyPhaser Corp. has announced its new series of grounded bulkhead entrance panels that are designed to facilitate transmission line entry into a communications building. The units feature adjustable clamping support on the inside of each weatherized ports. The support acts as a ground kit and mechanically secures a coaxial or rigid line up to 3 1/8-inches in diameter. The bulkhead panels are available in 3,5,8,16 and 24 port sizes; prices start at $650.95. Circle Reader Service No. 86



PolyPhaser Corp's grounded bulkhead entrance panel

CMI, Hughes Networks agree

LEBANON, N.H.–CMI, a developer of wide are data transport systems, and Hughes Network Systems have announced an agreement to jointly develop and promote an enhanced version of CMI's MLINK product that provides confirmed delivery of data broadcast capabilities over Hughes' VSAT satellite network. The CMI system contains software modules at the host and remote nodes to interface with user applications. Under the terms of the agreement, CMI will modify its current technology to work over the Hughes VSAT network. HNS, in turn, will provide the equipment and network services that enable CMI to continue development. The companies will jointly pursue business opportunities. Circle Reader Service No. 87



Hardware for summertime builds

MEMPHIS, Tenn.–Several new products have been announced by Thomas & Betts, including its Ty-Fast cable tie, weatherproof duplex and underfloor duct..

The new Ty-fast cable tie is a one-piece tie designed to ease application in wire harness fabrication and wire bundling installations. The tie is patent-pending, and features a two-sided grip at the tail-end of the tie. A textured grip holds the tail securely in the tie's head during installation, while a molded-in nylon pawl enables high locking strength with low insertion force, company officials said. Indoor and outdoor black nylon ties are available in lengths from 3.6 inches to

Microwave transmitter

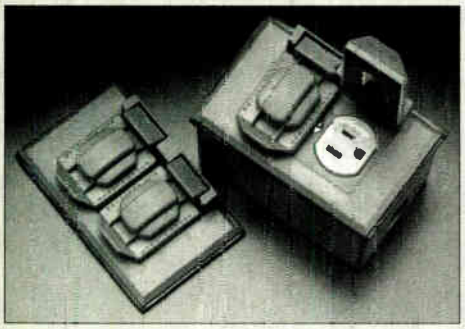
TORRANCE, Calif.–New from Cable AML is a microwave solid state transmitter, an addition to the company's existing line of broadband transmitters. Designated as the Model ITX-015, the transmitter stands 10 inches high but delivers the same output power which previously required an entire, 72-inch rack. The transmitter is designed to transmit up to 80 television channels and can typically feed four receivers simultaneously at distances in excess of 15 miles each (depending on channel loading and climactic conditions).

The unit incorporates Gallium Arsenide power amplification technology and is offered in a double and quadrule redundant configuration. It is rack-mountable and offers output signal monitoring and diagnostic measurements without interrupting operation. Circle Reader Service No. 88

Wireless cable antenna

CAMARILLO–California Amplifier Inc. has announced a new product for the MMDS wireless cable market in its second-generation LNBY. The unit is an integrated, 31-channel MMDS low noise downconvertor and Yagi antenna used for signal

New from Thomas & Betts: Ty-fast cable tie, left, and a non-metallic, weatherproof duplex cover,



14.3 inches.

The company's new non-metallic, weatherproof duplex cover, which is UL listed for wet locations, is a self-closing cover that is available in gray, high-impact thermoplastic. Individual receptacle cap gaskets and box sealing gaskets are pre-punched and pre-attached. It is designed for residential and commercial use.

The company's "Steel City Underfloor Duct Conventional System" provides underfloor power service to multiple locations through a system of duct, couplings and fittings. Labor saving features include single duct support/coupling, in that the number of individual parts an installer must handle are lessened. Circle Reader Service No. 96

reception at subscriber receive sites. Features of the antenna include an operating frequency from 2500 MHz to 2686 MHz, output of 222 MHz to 408 MHz, a noise figure of 1.7 dB and integrated gain (antenna and downconvertor measured together) of either 38 dB or 50 dB. Circle Reader Service No. 89

Wireless cable diplexor

E. SYRACUSE, N.Y.–New from Communications and Energy Corp. is its Model 3500 diplexor, which mixes the video and audio of MMDS/ITSF transmitters broadcasting TV channels in the 2300 MHz to 2700 MHz spectrum. The device is available for U.S., Australian, Irish or South American channels. The RF video and RF audio outputs on the transmitter are connected to separate, type N (50 ohm) connectors on the diplexor, and emerge combined at a third connector. The device is priced at $1,250.

Also new from Communications and Energy Corp. is its Type 3000 combiner, designed to double wireless cable television channels, officials say. The Type 3000 directional filter can combine MMDS transmitters broadcasting adjacent or semi-adjacent channels without the use of channel guardband. This makes it possible to load a full 31 channels to a single, up-tower transmission line and broadcast with the same antenna, company officials say, with a nominal increase in insertion loss. The series comes with individual waveguide main lines with flanges that can be bolted together to form a multiple channel combiner. The combiner is priced at $2,125 per channel, when four or more channels are ordered. Circle Reader Service No. 90

Optical splitter, interconnect

SHREWSBURY, Mass.–New from Fiber Optic Network Solutions (FONS) is its OptiConnect family of products designed for the CATV industry, and the OSI and IMO lines of interconnect hardware for both telco and CATV industries.

The OSI and OMI lines consist of rack-mounted enclosures equipped with cassettes for various configurations of couplers, splitters, WDMs, and high performance cable assemblies with less than -60 dB backreflections to support any configuration of lasers and cable plant, company officials say.

"By packaging splitters, splice trays, pigtails, and adaptors together, installers need only splice their laser input cable and cable plant output cable," said Domenic Romano, director of engineering for FONs. As a result, Romano said, the package saves hours of installation time. Circle Reader Service No. 91

Network status monitor

TAMPA, Fla.–GTE Telecommunication Services has released its NetAlert real-time analysis system designed for telecommunications applications. Company officials call it a "network system watchdog" that maximizes efficient network operations by minimizing service interruptions.

"Today's networks have grown more complex with the combination of diverse switches, microwave links and voice messaging systems, all in remote locations," explained Gordon Quick, VP and general manager of GTE Telecommunication Services. "The challenge for companies is to manage growth and change in their networks, while managing operation resources efficiently."

The NetAlert system features graphics-driven minutes that enable users to see national, regional and local views of their networks to help them quickly pinpoint problems via the keyboard. The system also prioritizes alarms on three levels of severity and monitors remote network equipment from a centralized location on a 24-hour basis. Circle Reader Service No. 92

Joynt starts business

ENGLEWOOD, Colo.–Jack Joynt, former director of purchasing for cable giant Tele-Communications Inc., has left the company to start his own manufacturers' representative company near Denver, named Joynt and Associates. He is currently negotiating with TCI to market their used equipment over the next three to four years, and is working with Patterson Communications in California and Sanchez Communications, a minority distributor in Denver. Joynt hopes to announce "major deals" with Jerrold and other manufacturers in the near future. Circle Reader Service No. 93

Portable radio transmitters

CHALMSFORD, Maine–Microwave Radio Corp. has announced two new portable microwave radio transmitters designed for electronic news gathering and other mobile and field production applications. The models include the ProStar 2T10WB with switchable 10-watt and 3.5-watt outputs and the ProStar 2T4WB with a 4-watt output.

Both systems are 2 GHz radios with wideband performance, and feature synthesized audio subcarriers, optional NTSC/PAL color bar generator, an internal power supply with universal AC range or wide DC range. Circle Reader Service No. 94

ST-FC Adaptors

HINDSDALE, Ill.–New from Storm Advanced Technology Group is a singlemode or multimode ST-FC hybrid adapting sleeve designed to provide precision ferrule alignment, reduce unnecessary mating loss and offer improved test measurement accuracy.

Storm Products' hybrid adapting sleeves

The hybrids are available with or without ceramic sleeves; flange styles are designed for standard patch panel/bulkhead mounts. Circle Reader Service No. 95

What's Ahead

June

Throughout June–Siecor Corp. is offering a four-day, hands-on fiber optic installation, training, splicing and restoration course for cable television applications. The course is recognized by the SCTE as a preparation source for its BCT/E Category III exam. The course costs $1,385 per student and is held at operators sites or at Siecor's Hickory, N.C. location. For more information, call (704) 327-5000.

2-3 Hawaii SCTE Chapter Technical Seminar. Oceanic Cable, Mililani, Hawaii. Call Michael Goodish, (808) 625-8355.

3 Chesapeake SCTE Chapter Technical Seminar. Columbia, Md. Topic: "Video Compression/HDTV." Call Scott Shelley, (703) 358-2766.

3 Great Plains SCTE Chapter Technical Seminar and Testing. Quality Inn Crown Court, Bellevue, Neb. Topic: "BCT/E Review of Category I." Installer and BCT/E exams to be administered in categories I, IV, V and VI at both levels. Call Randy Parker, (402) 292-4049.

8 Ohio Valley SCTE Chapter Golf Outing. Foxfire Country Club, Columbus, Ohio. SCTE/CTAM golf outing. Call Weldon Feightner, (513) 941-7000.

Trade shows

June 1-5 Seoul International CATV Show '93. Seoul, Korea. Call (011) 82-2-551-1141.
June 6-9 National Show. San Francisco, Calif. Call Roanne Robinson, (202) 775-3669.
June 21 TecForum–Cellular. Radisson Plaza Hotel, Alexandria, Va. Hosted by the National Engineering Consortium. Call (312) 938-3500.
June 22-23 ComForum–Fourth Annual Worldwide Personal Communications. Radisson Plaza Hotel, Alexandria, Va. Hosted by the National Engineering Consortium. Call (312) 938-3500.
July 14-16 Rocky Mountain Cable Expo. Snowmass (Aspen), Colo. Call Theresa Hart at (303) 863-0084.
July 31-August 3 Wireless Cable '93. Orlando, Fla. Call Lisa Maffei at (202) 452-7823.
July 21-24 Fotec Fiber Installer's Conference. Sheraton Music City Hotel, Nashville, Tenn. Call Louise Downing, (800) 537-8254.

8 Cascade Range SCTE Chapter Technical Seminar, Wilsonville, Ore. Call Cynthia Stokes, (503) 230-2099.

8 Desert SCTE Chapter Technical Seminar. San Gorgonio Inn, Banning, Calif. Topic: "CLI." Call Greg Williams, (619) 340-1312, ext.277.

8 Sierra SCTE Chapter Technical Seminar. Topic: "Customer Service Training." Call Steve Allen, (916) 786-2469.

8 Southeast Texas SCTE Chapter Technical Seminar. Warner Cable, Houston. Call Tom Rowan, (713) 580-7360.

9 Badger State SCTE Chapter Technical Seminar and Testing. Warner Cable, Greenfield, Wisc. Topic: "Installer Training" with Shaz Shearer of Warner Cable. Installer exams to be administered. Call Brian Revak, (608) 372-2999.

9 Delaware Valley SCTE Chapter Technical Seminar and Testing. Willow Grove, Pa. Topics: "Cable Act of 1992" and "Proof of Performance Testing." BCT/E exams to be administered in categories I and II at both levels. Call Lou Aurely, (215) 675-2053.

10 Satellite Tele-Seminar Program. Galaxy I, Transponder 14. Topic: "SLMs: The Technician's Edge, Part I." Call SCTE headquarters, (215) 363-6888.

10 Music City SCTE Chapter Technical Seminar. Ramada Inn, Nashville, Tenn. Call Dale Goodman, (615) 244-7462.

21 Rocky Mountain SCTE Chapter Technical Seminar. Topic: "Subscriber/Drop Seminar." Call Patrick Kelley, (303) 267-4739.

22-24 The George Washington University in Washington, D.C. is offering a three-day fiber optics technology course that presents an up-to-date overview of fiber technologies without detailed mathematical derivations. Wavelength division multiplexing, optical fiber sensors, singlemode links, applications and their effects on the market will be covered. For info, call (800) 424-9773 and ask about course #1026DC.

22-24 Scientific-Atlanta is offering a hands-on fiber optics training course in Kansas City, Mo. The course is open to personnel from any cable company. Call Bridget Lanham, (800) 722-2009.

28-30 Technology for Technicians II Seminar. Indianapolis, Ind. "Hands-on Technical Training Program for Broadband Industry Technicians and System Engineers." Contact SCTE headquarters, (215) 363-6888.

July

1 OSHA/Safety Seminar. Indianapolis, Ind. Topic: "Training Seminar for System Managers and Safety Coordinators in Maintaining Records and Developing Safety Training Programs." Call SCTE headquarters, (215) 363-6888.

8 Satellite Tele-Seminar Program. Galaxy I, Transponder 14. Topic: "SLMs: The Technician's Edge." Contact SCTE headquarters, (215) 363-6888.

19-21 Technology for Technicians II Seminar. Denver, Colo. Topic: "Hands-on Technical Training Program for Broadband Industry Technicians and System Engineers." Call SCTE headquarters, (215) 363-6888.

The issue: compatibility

This month, we're focusing on the issue of compatibility between set-tops used by the cable industry and consumer electronics devices. The issue has gained wide attention because it is presently the subject of an FCC probe. We'd like to find out what your thoughts are about the whole issue through the following questions. Please feel free to add your own comments at the end.

The questions:

1. Does your system use set-top addressable descramblers?

❑ Yes ❑ No ❑ Don't know

2. Does your system often hear complaints about incompatibility between set-tops and TVs and VCRs?

❑ Yes ❑ No ❑ Don't know

3. Do you personally often hear these complaints?

❑ Yes ❑ No ❑ Don't know

4. Has your system made any effort to purchase convertors that are more compatible with new TVs and VCRs?

❑ Yes ❑ No ❑ Don't know

5. If so, have those efforts been successful in reducing the number of complaints?

❑ Yes ❑ No ❑ Don't know

6. Has your system considered using traps or interdiction to improve the compatibility issue?

❑ Yes ❑ No ❑ Don't know

7. Has the compatibility issue gained the attention of your local city council, newspaper or franchising authority?

❑ Yes ❑ No ❑ Don't know

8. Have subscribers disconnected because of your system's use of set-top descramblers?

❑ Yes ❑ No ❑ Don't know

9. Do you favor an industry shift toward putting decoding circuitry directly inside TVs and VCRs?

❑ Yes ❑ No ❑ Don't know

10. Do you favor adoption of smart card-type renewable security for set-top descramblers?

❑ Yes ❑ No ❑ Don't know

11. Do you believe the cable industry should do more than it is already to become more compatible with consumer electronics?

❑ Yes ❑ No ❑ Don't know

12. Do you think the two industries should act together to solve the incompatibility problem?

❑ Yes ❑ No ❑ Don't know

13. Do you think the government will force the two industries to work together?

❑ Yes ❑ No ❑ Don't know

14. Do you think that as the industry moves toward digital technology, the compatibility problems will improve?

❑ Yes ❑ No ❑ Don't know

15. Is direct pick-up interference a major problem in your system?

❑ Yes ❑ No ❑ Don't know

Your comments:

FAX US

Make a copy of this page and fax it back to us at 303-393-6654, or mail it to CED, 600 South Cherry Street, Suite 400, Denver, Colo. 80222.

We will tally the results and print it in a future issue. Your suggestions for future questions are always welcome.

We also want some written comments from you on this subject. Names won't be published if you request your name to be withheld, but please fill out the name and job information to ensure that only one response per person is tabulated.

Your name and title

_____

_____

_____

System name:

_____

Your MSO:

_____

Location:

_____

Your job function:

_____

RESULTS

Here are the results of last month's survey:

It appears cable operators got through the first round of the FCC proof-of-performance tests, but some fared much better than others.

According to a survey we took in March, most cable operators say they weren't given enough time–or training–to adequately perform the tests, even though most respondents were closely monitoring the FCC's actions or were kept informed of the deadline by their supervisors.

A paltry 27 percent of those who responded said they had enough manpower and the proper test equipment to perform the tests, and half said their systems had to purchase new test equipment specifically to complete the tests.

Once the tests were completed, most who responded said there was a need for the tests and the majority said their systems performed "very well" or "adequately." However, one respondent said his system failed at seven different test points–he said his system needs a lot of work to be brought into compliance.

Perhaps surprisingly, not a single survey respondent said the local franchisor has a staff engineer or technical representative with whom they must work, but one-third reported having a good relationship with the local franchising authority. Finally, about half of those responding said they have been visited by an FCC inspector

The issue: Proof tests

The FCC proof-of-performance tests that took place in January were the first round of tests that have to be completed twice annually for the indefinite future. How did cable operators do? Did they have enough time to complete the tests and were they adequately trained? Here are the results of each question:

The answers:

1: Has your system completed the FCC mandated proof-of-performance test for January?

93 Yes	**7** No	**–** Don't know

2: Do you feel you were given enough time by the FCC to organize your testing procedures?

33 Yes	**67** No	**–** Don't know

3: Do you feel your supervisors kept you adequately informed about the testing deadline?

80 Yes	**20** No	**–** Don't know

4: Did you personally closely monitor the FCC's actions related to the proof tests?

87 Yes	**13** No	**–** Don't know

5: In general, do you believe you had the proper resources (test equipment and manpower) to adequately perform the tests?

27 Yes	**73** No	**–** Don't know

6: Do you think your system personnel had adequate training on how to perform the tests?

40 Yes	**60** No	**–** Don't know

7: Did your system purchase new test equipment specifically to perform the mandated tests?

53 Yes	**40** No	**7** Don't know

8: If so, was it delivered from the manufacturer in time to perform the testing procedures?

33 Yes	**20** No	**47** Don't know

9: Does your local franchisor have a staff engineer or technical representative with whom you must work?

0 Yes	**93** No	**7** Don't know

10: Do you have a good relationship with your local franchise authority's technical representative?

33 Yes	**0** No	**67** Don't know

11: Have you ever been visited by an FCC inspector?

53 Yes	**40** No	**7** Don't know

12: Do you personally believe there was a need for new cable system technical standards?

73 Yes	**20** No	**7** Don't know

13: How do you think your system performed in January?

13 Excellently	**40** Very well	**27** Adequately
13 Marginally	**7** Needs a lot of work	

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Attn: Dan Raynes

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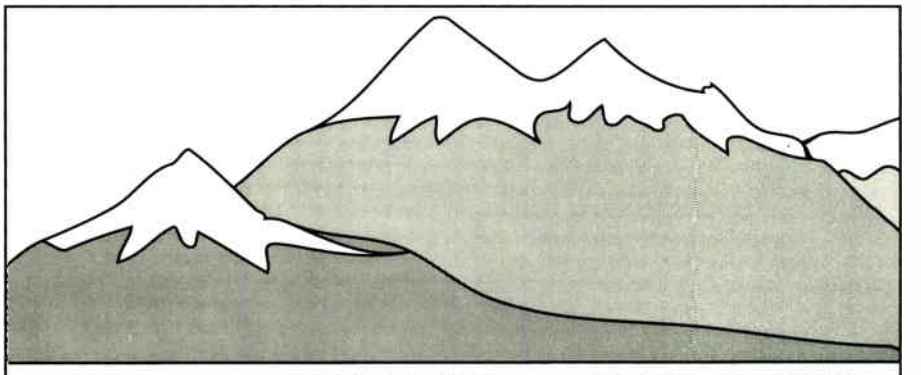

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Message from Cable-Tec Expo '93

By Archer S. Taylor, Director and Senior Engineering Consultant, Malarkey-Taylor Associates Inc.

The signals from the recent SCTE Cable-Tec Expo that was held in the huge Orlando Civic Center are not merely important; they may well mean life or death for some in the cable TV business. Fred Dawson, who spoke during a panel at the Engineering Conference, put it this way:

"The pace of the industry expansion into telecom leaves no room for hesitation within the technical community. The name of the game now is to get up to speed or get left behind."

It goes without saying that Fred's admonition should be heeded, not only by the technical community, but by management, owners, investors, lenders–yes, and even regulators.

Over nearly half a century, we have developed analog RF technology to a high degree of proficiency, for distributing video entertainment and information to nearly two out of every three households in the United States. But we are novices in the esoteric sciences of sophisticated switching systems, full duplex traffic management and technology. And the telecoms are already more comfortable than we with the digital video world of the future.

But the telecoms are equally unconversant with RF technology and coaxial cable which will continue to play an essential role for many years to come. Moreover, they are only dimly beginning to sense the significance of the entrepreneurial economy soon to overtake their deeply imbedded, almost intuitive cost-plus attitude toward the marketplace.

Time is running out, but the trends are encouraging. TCI pledges nearly $2 billion for an infrastructure designed to interconnect most of its nine million subscribers and 15 million homes passed. Time Warner is developing a portion of its Orlando system into a full service, electronic highway. Cox, TCI and others have acquired the New York Teleport, one of the largest alternate access operations. TCI and USWest are cooperating in numerous telecommunication developments.

Whether by cooperation, or competition, cable television will participate significantly in the integration of cable and telephony.

Correction

David Lachenbruch, editorial director of Television Digest, has informed me that the chart in My View, April 1993, was incorrect. I argued, and proved conclusively that my arithmetic was correct. However, I had no choice but to yield to the originator of the widescreen picture tube designations used in the U.S. To avoid further muddling of the matter, the full text of the statement published in the April 12, 1993 issue of Television Digest (page 13) is reproduced here, with permission from Albert Warren, publisher and an old friend:

16:9 screens explained

There's apparently some confusion about widescreen tube and projection picture sizes. Because proportions of widescreen pictures are different from conventional TV displays, we use letter "W" to identify viewable diagonal measurement of widescreen tube.

Adding to confusion is fact that U.S. measures picture tube differently from all other countries, thanks to FTC order dating back to 1950s. U.S. uses "viewable diagonal" measurement (dimensions of picture only) as opposed to "overall diagonal" (which includes thickness of tube walls) used by rest of world.

As result, TV Digest originated use of letter "V" to designate viewable diagonal, system officially adopted by U.S. picture tube industry. In our newsletter, we eventually dropped the "V" because all U.S. tubes use viewable diagonal standard.

All 16:9 tubes currently are made in Europe, by Philips and Thomson. Largest 16:9 is 34W" (called 36" in other countries). That's equivalent in height to 28V"–it can be considered 28" tube stretched out to wider proportions. Here are some equivalents in terms of 16:9 screen sizes–both tube and projection–announced to date:

U.S. Designation	*Other Countries*	*Equivalent 4:3 Display**
26W"	*28(W")*	*21V"*
30W"	*32(W")*	*25V"*
34W"	*36(W")*	*28V"*
50W" (proj.)	*50(W")*	*41"*
55W" (proj.)	*45(W")*	*45"*
58W" (proj.)	*58(W")*	*48"*

** Conventional display (U.S. designation) of same height.*

Note: *To determine diagonal size of 4:3 picture with same height, divide 16:9 picture's diagonal by 1.22.*

Postscript

The Federal Trade Commission has just reminded the television industry of the "Picture Tube Rule" adopted in February 1966, which requires that "any representation of the screen size must be based on the horizontal dimension of the actual viewable picture area.

Any other measurement is unfair and deceptive, unless the method of measurement is clearly and conspicuously disclosed in close proximity to the size designation." FTC is currently reviewing this rule. Perhaps I can be forgiven for mistaking the "W" designation as the horizontal dimension. CED

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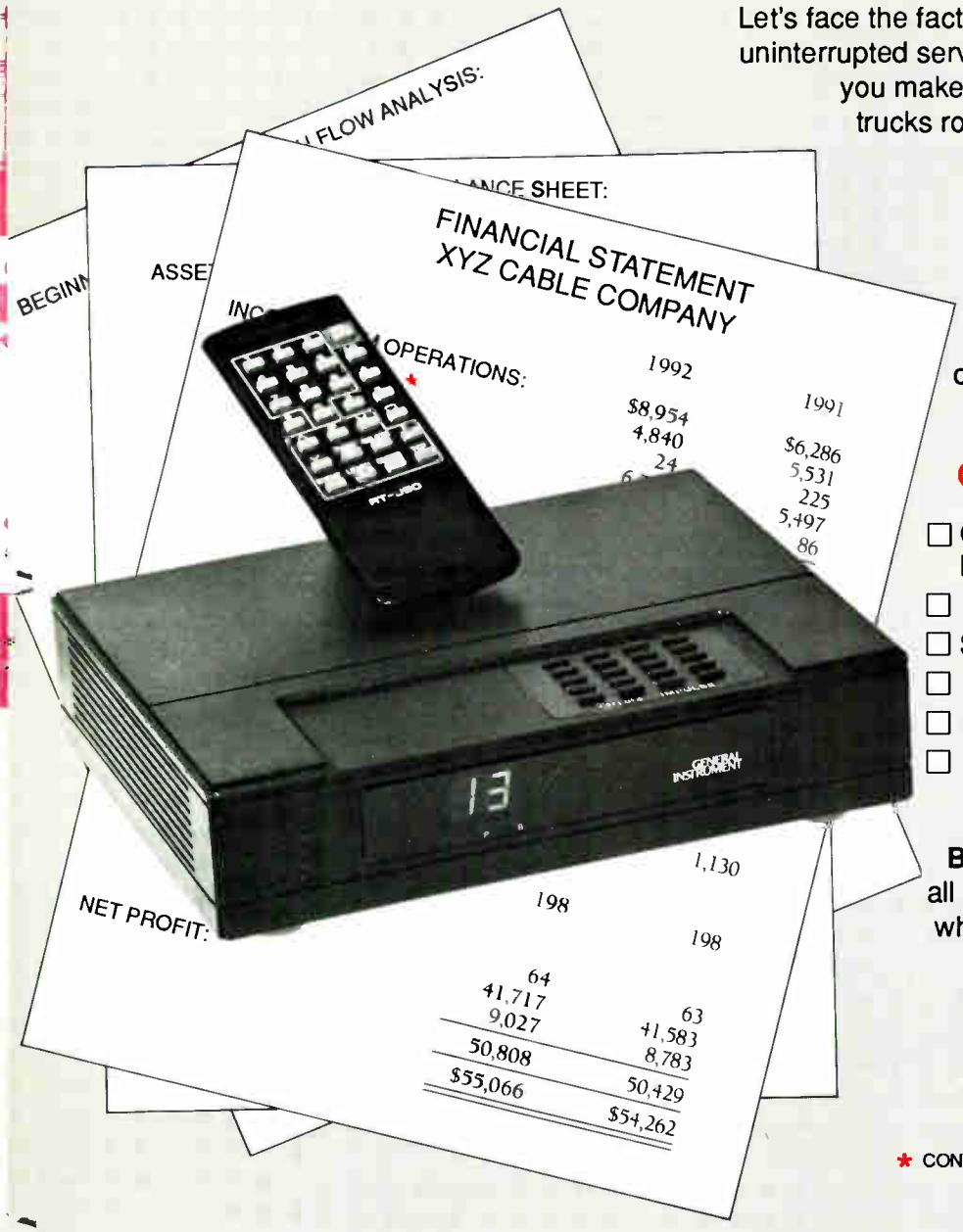

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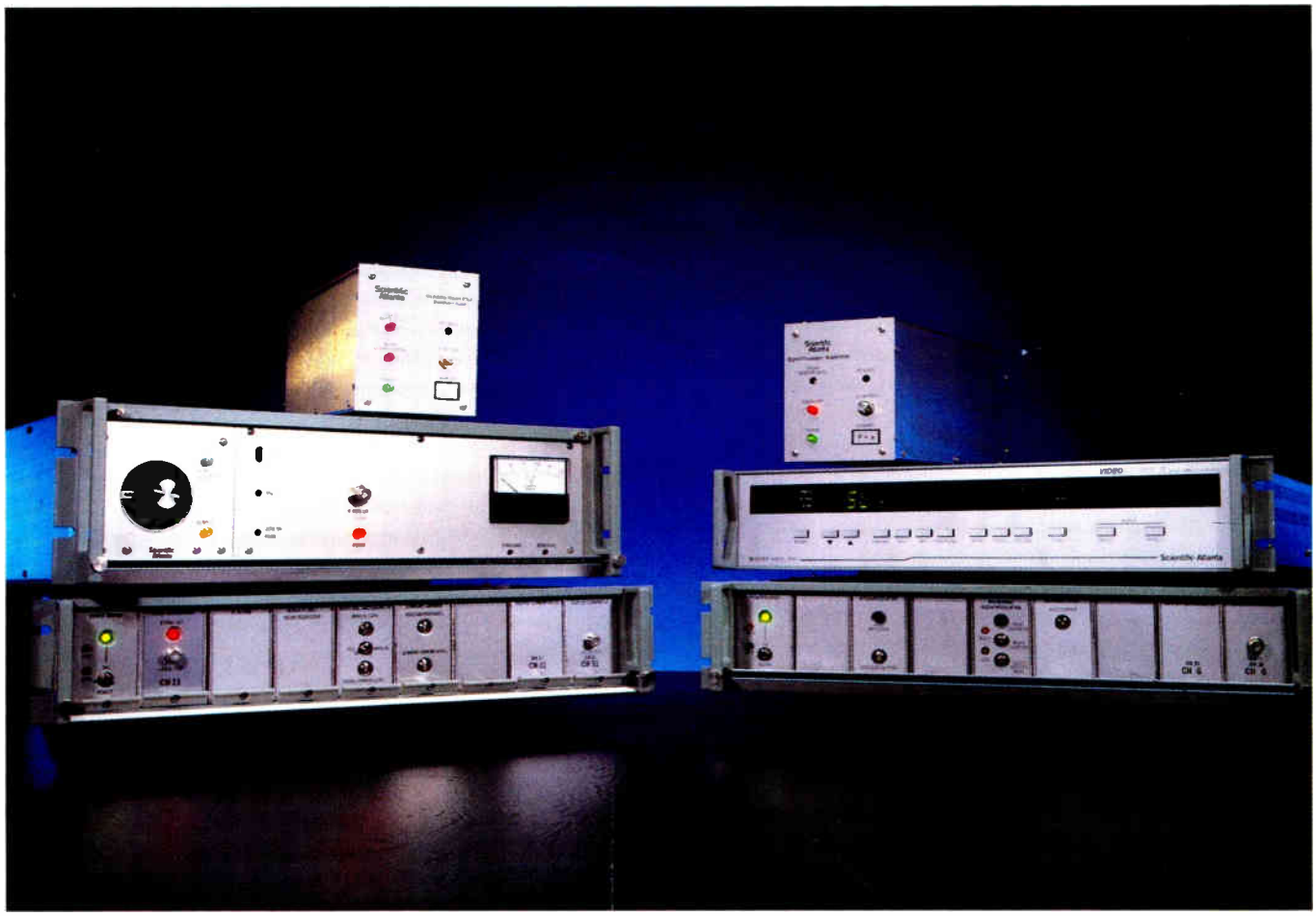

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