Communications Technology

Official Trade Journal of the Society of Cable Telecommunications Engineers

September 1998

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- Digital
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...From Engineers

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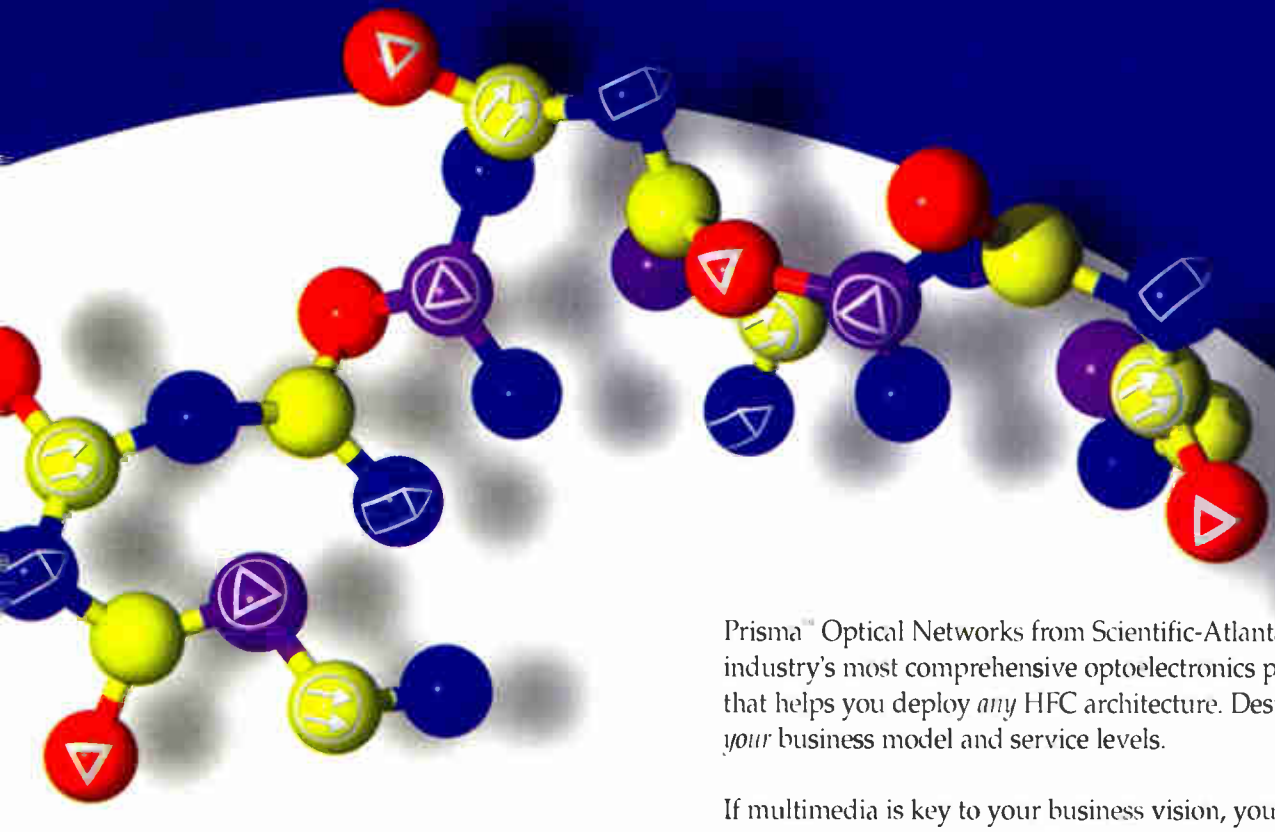

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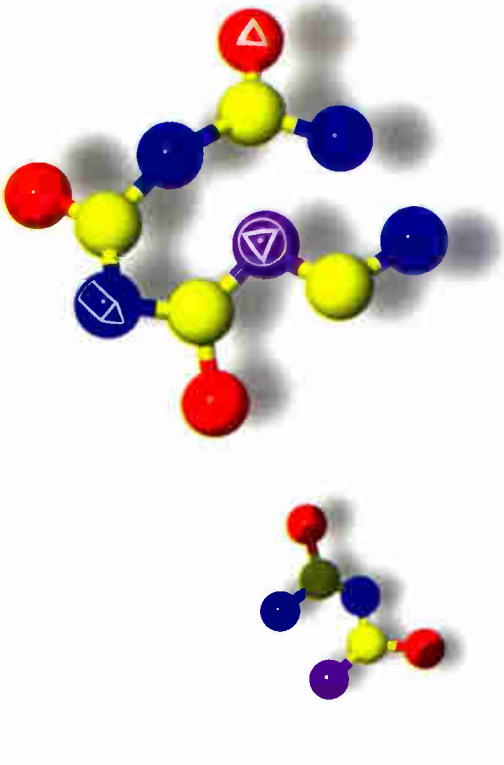

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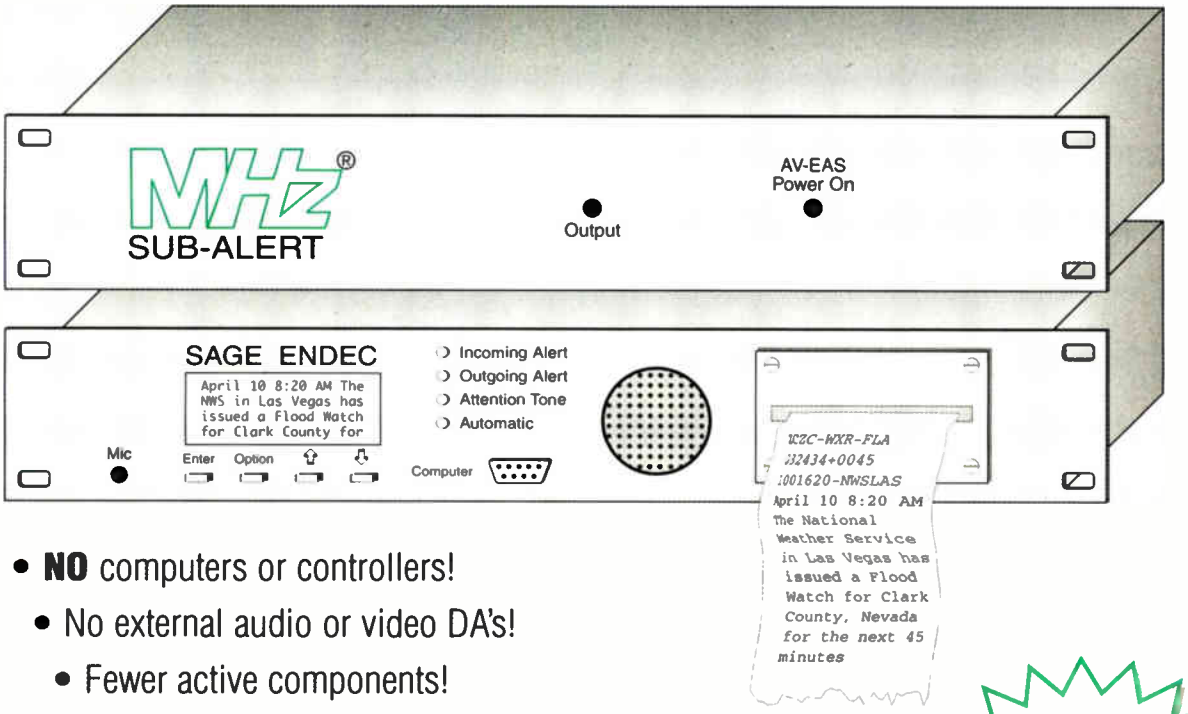

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SEPTEMBER 1998

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The Time is Now • 56

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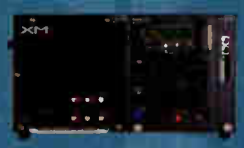

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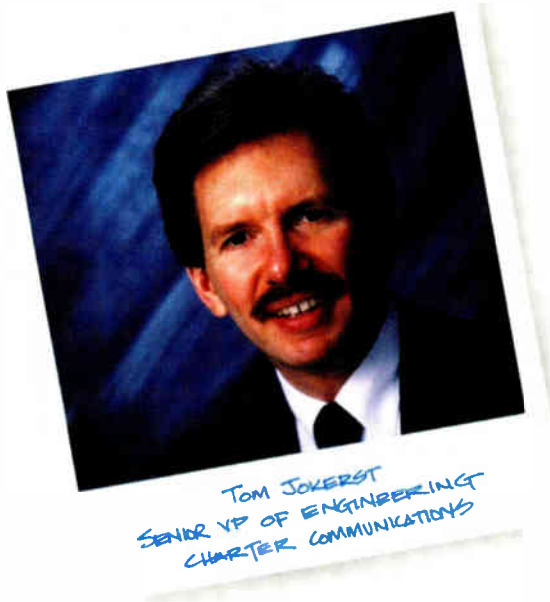

Tom (Actually) Likes It

Folks in the industry know that Tom Jokerst, Senior Vice President of Engineering at Charter Communications, is something of a stickler for quality. Some would even say that he's a bit of a perfectionist.

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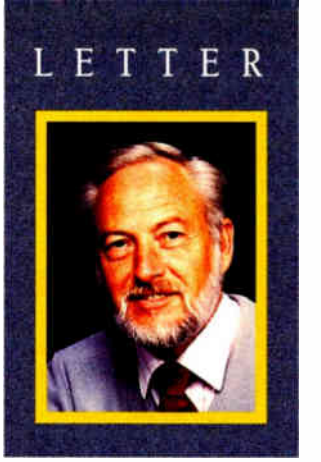
By Rex Porter



CT Visits Microsoft's Campus

What we on the engineering side of telecommunications know about Bill Gates and company generally comes from the national press—news of continued government investigations or second-hand rumors. One would think Microsoft people have horns and tails.

We were welcomed by Judi Meinhalt, account executive with Microsoft's public relations firm, Waggener Edstrom. Judi began her career with Time Warner Cable. Then we met with John Canning. No "horns and tails" so far. John spent a decade at Scientific-Atlanta before joining Microsoft in product development and implementation of cable modem systems. Later, we met Steve Nielson, who showed us through Microsoft's Partner Solution Center Labs. I met people who worked previously with Scientific-Atlanta, General Instrument, Telecom and so on.

Some of Microsoft's cable partners include AlMetrix, General Instrument, 3Com and Cisco Systems. They have joint ventures with Compaq, MediaOne and RoadRunner. I found engineers studying and servicing the needs of one account.

Cable operators already use Microsoft. CableTV Arlington/Montgomery uses the Windows NT Server network operating system and the Microsoft Commercial Internet System to provide service to more than 700,000 households and businesses in Montgomery County, MD, and Arlington County, VA. To tie cable TV, telephone and @Home businesses together, Comcast uses a solution built around Microsoft architecture. And when Time Warner launched RoadRunner online service to its Oceanic Cable division serving Oahu, HI, they chose Microsoft's Proxy Server.

Let's get back to "horns and tails." I didn't see anyone lurking in the shadows, trying to take over our business or steal secrets. Everyone seemed busy developing software to make hardware work better. I remember General Instrument developing VideoCipher equipment and operators worrying GI could control program content because they had the only conversion gear for satellite programming. It didn't happen. Sure, GI made money, but everyone else made more money because of it.

In my days as a system engineer and owner, I was afraid to leave my systems during the Super Bowl because we were sure to have a failure during the playoffs or the big game. In fact, I found little time to relax then. Do we need software? You bet! We need to build a communications system—then enjoy our lives while software directs the signals. That has not been within the domain of cable TV suppliers.

That's the business of companies such as Microsoft.

Rex Porter
Editor

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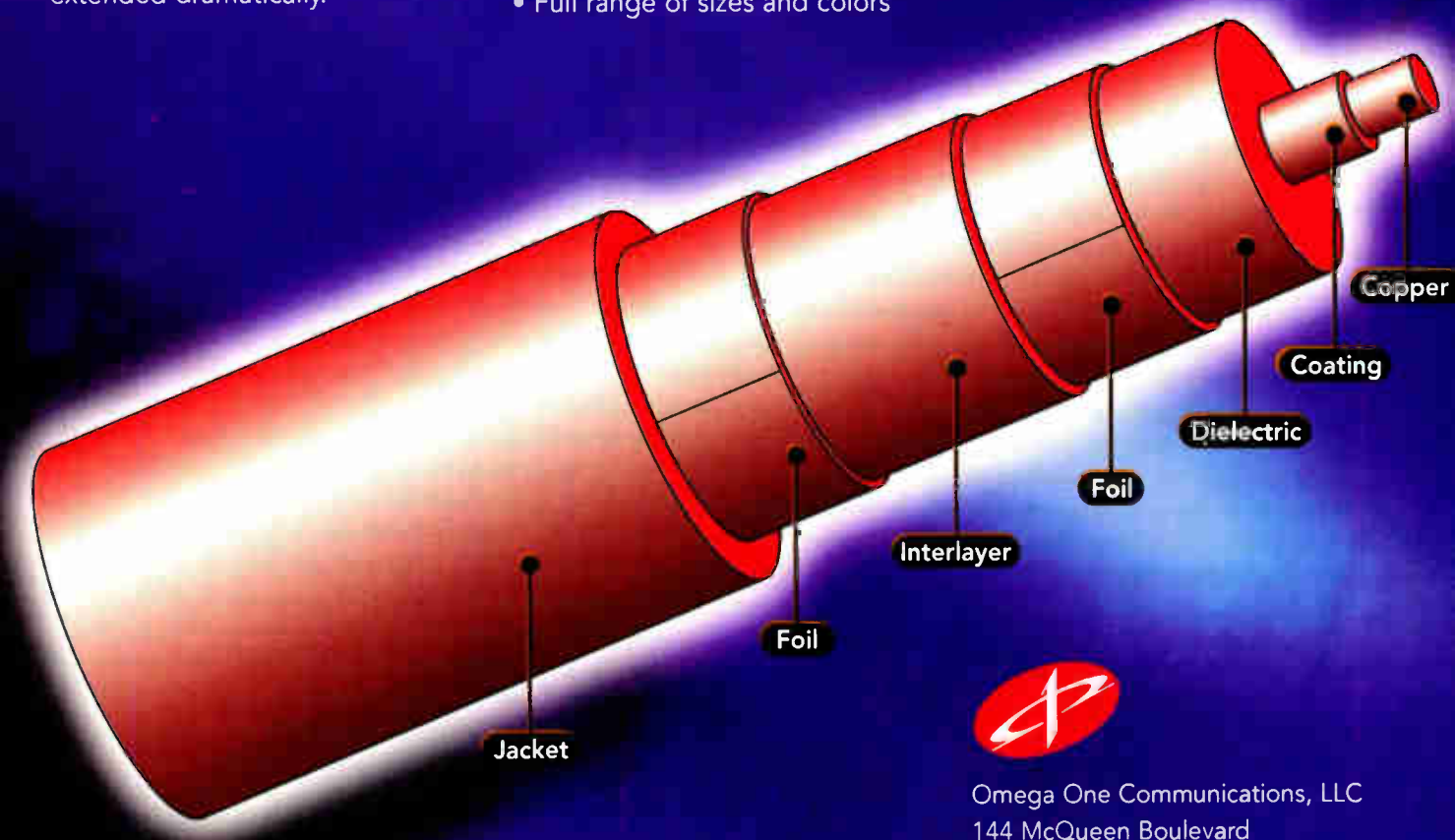

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Reader Service Number 8

By Greta Durr

Mergers Redefine Liberty Media

In a series of moves some analysts say will help bolster AT&T shareholders' confidence about the $37.3 billion TCI acquisition, the MSO's programming arm led by John Malone has aggressively been pursuing structural changes, including mergers with two other TCI entities.

TCI President Leo Hindery will no longer oversee the day-to-day operations of the two companies and has stepped down from the positions of chairman of Liberty Media Corp. and TCI Ventures Group, said TCI officials of Liberty's leadership shift.

Hindery will retain his position as TCI's president and concentrate on the pending merger of AT&T and TCI. Upon that deal's completion, he'll become president of AT&T Consumer Services Co.

Upon successful completion of the AT&T/TCI merger, Liberty stands to receive $5.5 billion in cash from the telecom giant. According to the deal's plan, Liberty will then track Hindery's new company.

TCI Ventures (TCIVA) owns a 39% chunk and a 72% voting interest in the MSO's @Home Corp. The MSO's high-speed Internet services over cable TV powerhouse signed nearly a dozen national and international affiliation agreements in this year's second quarter, piquing the interest of Wall Street, AT&T and other cable operators. TCI estimates that @Home has potential access to half of all homes passed by cable on the continent.

TCIVA also holds an 85% economic stake and a 92% voting interest in TCI International (TINTA), also under acquisition by Liberty Media. Before Liberty announced its interest in TCI Ventures, the company offered to buy whatever shares of TINTA were not owned by TCIVA in an all-stock swap.

Consolidation attempts at TINTA may have helped make the organization more enticing to investors. Earlier, the company announced that by consolidating the ownership and domiciles of its cable assets and monetizing noncore holdings, the group would be in a better position to "grow other enterprises."

Sowing the Outside Plant's Future

A discussion of outside plant (OSP) status monitoring at Cable Tec Expo '98 may burgeon into a Society of Cable Telecommunications Engineers committee on OSP-related standards. Dubbed the OSP Alliance, the group garnered about 50 attendees at its first summit in Vail, CO.

"The intention of OSP Alliance is to form a standards development task force to focus on interoperability in element management or status monitoring transponder products. The purpose of this type of product is to statistically track the temperature, operational hours, mean time between failure (MTBF) and other types of data, so that cable plant management can instantly obtain information," said SCTE standards guru Ted Woo. In a presentation to the crowd, Woo stressed the importance of the Society's due process procedures relevant to establishing an official SCTE committee.

Vendors in the Alliance so far include Alpha Technologies, AM Communications, ANTEC, Barco, C-COR, Cheetah Technologies, CH2MHill, Electroline, General Instrument, Harmonic Lightwaves, Hewlett-Packard, Lindsay Electronics, Philips Broadband Networks, Reltec, Scientific-Atlanta, Triple Crown Electronics, Tollgrade, Wavetek and SilCom Technology.

John Stephen of SilCom Technology has led the charge to reinvigorate the stalled element management spec process, along with Peter Bradshaw of C-COR and Tom Elliot of CableLabs, said Doug Noble, an Alliance co-founder and independent marketing consultant working with SilCom. ➤

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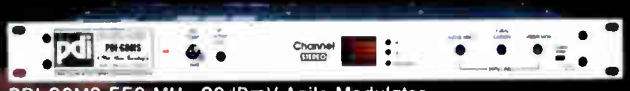

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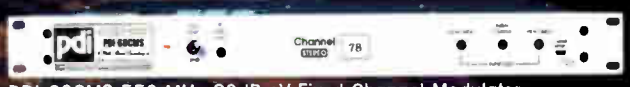

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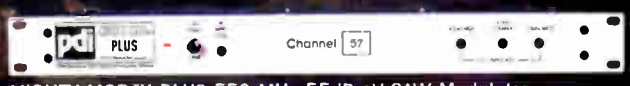

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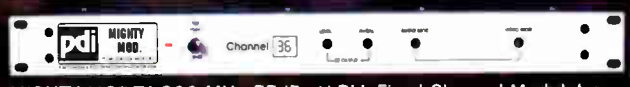

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Reader Service Number 10

"If you're trying to get a standard, then you have to establish a common ground at some point," Stephen said. "I think we need customers telling vendors what they want. Until that happens, the standards won't have any teeth."

Alliance members said that developing system specifications, fostering engineering involvement in product development and honing marketing approaches will lead to true interoperability. The Alliance expressed hope that the resulting scale economics will expedite broad deployment.

"Status monitoring and control will become increasingly important as we move from a subscription business to a two-way interactive business. It is critically important that we solve the scale economic problems involved so we can deploy status monitoring and control ubiquitously," said Elliot, who could not attend the meeting.

Going into what undoubtedly will be an arduous process, Alliance vendors concurred. "By modeling our alliance on the Gigabit-Ethernet Alliance and IEEE (Institute of Electrical and Electronics Engineers) standards groups, we believe that we can accelerate the standards process by moving toward a spec with cooperation from CableLabs and SCTE that will be accepted worldwide," said Noble.

Oscilloscope Recall

Tektronix has recalled several thousand of its oscilloscopes, saying that improper use of them can be lethal.

"If a user incorrectly connects a probe ground lead to a voltage source, or incorrectly touches the ground ring near the probe tip to a voltage source, a circuit board trace in the oscilloscope's electrical ground path may open," Tektronix warned.

Jim Searles, the company's worldwide business development manager, said Tektronix has been investigating issues with the products since February and announced the recall June 22.

Tektronix said that although the product may appear to be functioning normally, improper grounding could cause critical electrical shock for the user.

Searles said that among the greatest challenges posed by the recall is convincing engineers to return the products for modification, "Because most engineers don't exactly plan on using them incorrectly."

Searles estimates that the voluntary recall applies to approximately 60,000 units in 45 countries. Tektronix declined comment on the cost of the project, but said it would have to be absorbed by its first quarter operations.

Tektronix urges users to check their oscilloscopes for the following serial numbers and discontinue use immediately if they fall into the listed categories. Contact Tektronix immediately for important modification information if you are using a recalled product. The following serial numbers apply to the recall.

- TDS210 serial numbers below BO49400 or CO10880
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For more information, call Tektronix at (800) 835-9433, ext. 2400.

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WAVETEK

Reader Service Number 12

board of directors nominations subcommittee is reminding us this month that regional elections are just around the corner. Members are encouraged to make the race happen by submitting nominations by the October deadline and voting.

Because Society rules limit the number of representatives any one company can have on the board to three, Time Warner employees are ineligible to run for office this election.

In Region 1, which includes Hawaii, California and Nevada, Ralph Patterson is up for re-election, pending announcement of his intention to run again for the office.

Steve Johnson is up for the high post in Region 2, which covers New Mexico, Arizona, Colorado, Utah and Wyoming.

Because of SCTE term limitations, Bob Schaeffer will step down upon completion of this, his sixth term, in Region 6.

Similarly, in Region 9, covering Florida, Georgia, South Carolina and the Caribbean, Hugh McCarley also is completing his sixth year in office and stepping down.

Dennis Quinter is seeking another term in Region 11, which includes Delaware, Maryland, New Jersey and Pennsylvania.

As of press date, the subcommittee includes McCarley, Schaeffer, Jim Haig, Rex Porter and Tony Werner or his appointee.

Stay tuned to *CT* for details on further developments as the race heats up. Remember, this is your Society, and a good, competitive match for strong leadership can happen only if you participate.

News Bites

- Jumping into the revenue streams being tapped by @Home and other cable industry Internet providers, Jones Intercable signed an affiliation agreement with @Home. The agreement follows a beleaguered attempt to launch its own version of an Internet services backbone.
- Bay Networks recently acquired voice over Internet protocol (VoIP) network equipment manufacturer NetServe. The combination is aimed at enhancing Bay's Broadband Technology Division's networking capabilities and supporting cable operators' access to VoIP service deployment. CT

Greta Durr is assistant features editor at "Communications Technology" in Denver. She can be e-mailed at gdurr@phillips.com.

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Reader Service Number 15

HEWLETT PACKARD

Thanks From the Member of the Year

Greetings, SCTE Colleagues:
I am writing this note to you in a state of confused euphoria. Euphoric because you've named me 1998 Society of Cable Telecommunications Engineers Member of the Year, but confused because I'm not sure that I am worthy of this designation. I am sincerely honored, deeply flattered and very, very proud of having received this award. I have felt that all the activities I have performed on the SCTE's behalf were the least I could do to repay the Society for all it has done for me.

I noted at the awards ceremony that I would not have been there if it had not been for SCTE training, particularly the education gained through the Broadband Cable Technician/Engineer (BCT/E) certification program that allowed me to expand my technical broadband knowledge and my career.

My participation in SCTE activities would not have been possible without the foresight and support of the companies and supervisors for whom I have worked, who collectively recognized the cost-effective benefits of SCTE training.

Thanks to Lynn Newsom of Prime Cable/GCTV, Ted Williams of Prime Cable/GCTV/Vanguard and John Howell of BellSouth Entertainment. I have also benefited tremendously from being trained by, and eventually serving and providing training myself to, the SCTE Chattahoochee Chapter. The final, and certainly most important, group that has supported my SCTE activities has been my family: my wife, Pam, and sons Marc and Todd. They have put up with nights without me, whether from being out of town for an SCTE meeting or preparing for taking a test or planning a training meeting.

I have no idea who nominated me for this award, or particularly why, other than for my support of certification activities. I would like to think that perhaps it was because the rewards and benefits that SCTE has provided me have allowed me to grow personally and professionally using the guidelines of the Society's mission statement, "Training, Certification, Standards."

Consider how you might apply these to your career:

- Training: The most crucial item to advancing, or perhaps even to keeping your job, is to continue the learning process. Whether you train yourself through studying technical journals or are trained by others through attending SCTE meetings or taking college or trade school courses, you must continue to learn, or changes in technology and methods will leave you less and less effective.
- Certification: Prove what you know to yourself and others. Participate in the SCTE certification program that is most appropriate for your knowledge and skills. The Society offers Installer, Service Technician, BCT/E certification programs and a Telephony certification program. If these are not right for you at this time, consider a Federal Communications Commission amateur radio license, state electrical or low voltage license, or television or computer repair technician certification program.
- Standards: Hold yourself, your peers and your subordinates to the highest standards possible in technical ability, professionalism and customer service. Remember that the two worst words in any business are "good enough." "Good enough" ain't. Make it better.

I believe the following law can determine the rewards you will reap from the Society: What you get out of SCTE is directly proportional to what you put in to it. If you invest your time and efforts in preparing for a training presentation for a chapter meeting, you will find you know the topic even better than you did before. If you study for a BCT/E exam, you will learn helpful items that may or may not be on the exam. If you have an idea to improve your local chapter or national SCTE, communicate it. Remember, this is your Society. It is only as good as the collective sum of its members.

I would also like to acknowledge the SCTE staff, particularly the efforts of those who are closest to the chapter training and certification programs, Marv Nelson, Alan Babcock, Steve Townsend and their staffs. It is easy to forget all the work that goes into disseminating and grading exams, communicating chapter meetings and balancing financial records.

The final, and arguably most important, group is one most if not all of you belong to: SCTE volunteers. From SCTE chairman, national directors, local chapter directors, speakers, meeting coordinators, proctors and so on, the Society could not function without you and your efforts. While often not publicly acknowledged, they are greatly appreciated. Indeed, I would not be in the position that allowed me to receive the Member of the Year designation if not for countless hours of volunteerism on the parts of others coordinating chapter and national activities.

In conclusion, I am proud to be a member of a dynamic and responsive Society that is providing critical services to a rapidly changing business. I am even more proud of, and sincerely humbled by, being named SCTE Member of the Year. My only wish is that each of the more than 15,000 members of the SCTE find its activities as rewarding and beneficial as I have and can use the SCTE as the road map to a successful career.

Thanks again for your recognition.

Keith R. Hayes, BCE
BellSouth Entertainment
Conyers, GA

Write to Us

You can contact the *Communications Technology* editorial staff at 1900 Grant St., Suite 720, Denver, CO 80203, or fax (303) 839-1564.

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Reader Service Number 16

DEPLOYMENTWATCH

By Greta Durr

In the wake of AT&T's announced merger with TCI, this month's "Deployment Watch" focuses on how nontraditional services are helping MSOs and other cable TV operators tap into new revenue streams.

Early alignment with new technologies opens a world of potential income for all operators in today's fast-paced and competitive market for broadband services provisioning.

Signed, Sealed, Delivered

A cable-modem venture among Time Warner, Advance/Newhouse, MediaOne, Microsoft and Compaq aiming to provide Internet access to an estimated 27 million homes passed by cable is just the beginning. MediaOne also is busy deploying telephony service in a number of U.S. markets. Time Warner isn't missing the beep as it looks for telephony deals of its own on the horizon.

MediaOne said it has cultivated 10,000 cable modem service subscribers in Florida in the two years since the service was launched in Jacksonville. The big picture also finds the company's telephony deployments painting the landscape for a new era in broadband services provisioning.

The Los Angeles MediaOne network is expected ultimately to pass nearly one million homes, with telephony service over the Homeworx platform from ADC Communications. The service provider is integrating its telephony offering into its existing video transport infrastructure.

MediaOne is already offering telephony service in the Atlanta area. Company executives are optimistic about response to the service in Los Angeles. (For more details, see the article on page 68.)

"We expect this launch to be as successful as the Atlanta network launch, where subscriber take rates have exceeded expectations," said Greg Braden, MediaOne corporate vice president for telephony.

The ADC Homeworx hybrid fiber/coax (HFC) platform is based on orthogonal frequency division multiplexing (OFDM), integrating voice and high-speed data in a single common platform.

Although Time Warner's Modem President Richard Parsons said no specific deals are yet in store, the MSO has been talking with AT&T and other long-distance providers about how its cable systems could be used for local phone service or possible leasing deals.

Intermedia, OSS Team for Data

InterMedia Partners announced an agreement with Online System Services (OSS) to deploy an instant high-speed Internet solution throughout the MSO's territories.

"We expect many more cable operators to follow InterMedia into the Internet business. High margins, unregulated revenues and value-added Web services are strong incentives for operators to move quickly to be the first to market and begin to generate new revenues," said Steve Adams, president of OSS.

InterMedia said plans to launch OSS' high-speed Internet package, called i2u, means they'll quickly reach 1.2 million subscribers. The initial deployment is scheduled for the Knoxville, TN, area. Currently, i2u is available to subscribers in InterMedia's Kingsport, TN, system.

"Because of the success and viability Online System Services demonstrated in our Kingsport system, we are enthusiastic about i2u," said Bill Haggarty, director of subscriber services at InterMedia Partners.

Haggarty agreed that i2u enables broadband operators to generate new revenue from interactive services, including content, commerce and online transactions, by delivering high-speed Internet access and Web services.

Kingsport subscribers were the premiere InterMedia test market in the United States for Wink TV. The digital insertion technique, free to 8,000 InterMedia premium services customers, allows viewers remote control access to a variety of additional information while watching television.

For cable operators affiliated with national service providers such as @Home or RoadRunner, the QuickStart program offers immediate deployment. (For more technical details on the Kingsport system deployment, see "Solutions" on page 42.) CT

Greta Durr is assistant features editor at "Communications Technology" in Denver. E-mail deployment information or comments to gdurr@phillips.com.

Recent Developments: Who's Deploying What

- Cox entered into a $100 million deal with ANTEC to supply Arris Cornerstone cable telephony solutions in several markets.
- TCI is gearing up to deploy interactive TV services via SeaChange International's MediaCluster network system. Services including video-on-demand (VOD) and personal computer (PC) access are slated for 40,000 downtown-area hotel rooms via a redundant fiber-optic ring linked to a new head-end geared for hotel services.
- Since March, Com21 has been testing On Command's hotel room access to Internet and other enhanced services accessible from TV menu screens.
- Tekstar chose Tellabs' Cablespan 2300 cable telephony solution for systemwide deployment.
- Eager operators recently received orders for Samsung's InfoRanger Multimedia Cable Network System (MCNS)-compliant cable modems to provide Internet access over hybrid fiber/coax (HFC) networks.

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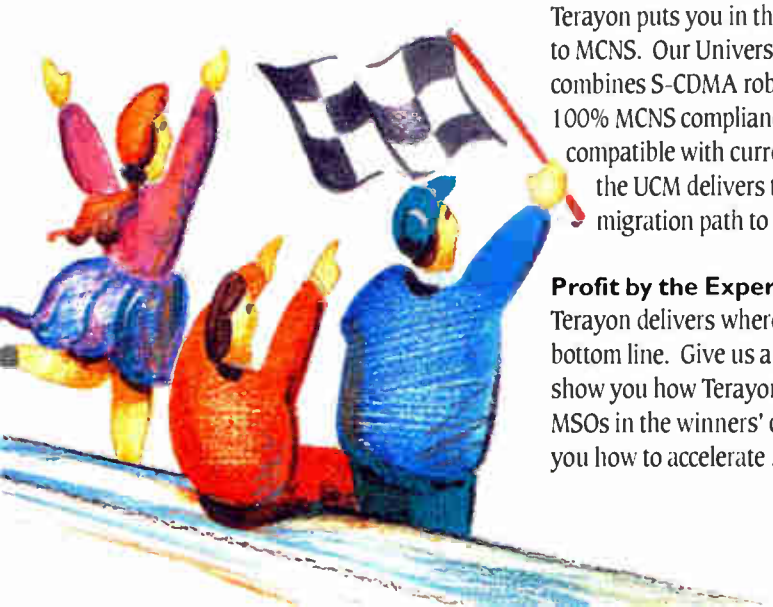

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Reader Service Number 17

SCTE UPDATE

SCTE's "Cable 101" Heads for Indiana

The Society of Cable Telecommunications Engineers, in collaboration with the Indiana Cable Telecommunications Association, conducted its "Cable 101" training program last month for nontechnical professionals in Illinois, Indiana, Kentucky, Michigan and Ohio.

SCTE Director of Training Development Alan Babcock presented an overview of traditional cable systems and new and evolving technologies during the class, which was held Aug. 20 at the Wyndham Gardens Hotel in Indianapolis.

"This program was geared to administrative and operations personnel, as well as system managers," said Babcock. "'Cable 101' helps those professionals understand not only the impact of the decisions they make, but the technology that affects their future decision-making." Topics included the installation process, headends, distribution systems, fiber optics, data-over-cable and digital TV.

ICTA Executive Director Dottie Hancock said recently, "Our association is pleased to be sponsoring 'Cable 101.' This class gave people in nontechnical positions the basics they need to better understand how cable really works." She added that ICTA members have indicated great interest in such a workshop.

For more information about SCTE technical training opportunities, contact Babcock at (303) 768-8667 or e-mail him at ababcock@scte.org.

SCTE Seeks Comment On DTV Interface Standards

The SCTE Digital Video Subcommittee has issued a call for comments regarding standards for the digital TV interface.

In its process of establishing industry-wide standards for the delivery of digital TV services by cable, the DVS requests responses to these questions:

- Should existing standards development, or extension or harmonization of existing standards development, such as work being done by Electronics Industries Association/Consumer Electronics Manufacturers Association R1.1, R4 WG3, and/or R4.7, form the basis for the standard interfaces?
- What features, functions and capabilities should the interface or interfaces support?
- Should SCTE adopt a standard analog component baseband interface for the cable set-top boxes to connect with digital TV receivers?
- Are RGB or Color Difference Signals the appropriate analog component?
- Should SCTE adopt a standard signal interface for the cable set-top boxes to connect with digital TV receivers and other devices?
- Should Institute of Electrical and Electronics Engineers 1394 be an option for the physical layer of a digital interface standard?
- What are the specifications of the user interfaces that will be generated in cable set-top boxes for display on digital TV receivers (such as bit-mapped graphics for on-screen displays or web browsers via hypertext markup language), and what demands do these specifications impose on the interfaces?
- Should SCTE request EIA/CEMA to undertake additional standardization work to define the standard interface(s), particularly with regard to copy management issues?

DVS will utilize this information to ratify a standard or standards for the interface between cable set-top boxes and other consumer electronics products, including digital TV receivers, digital videocassette recorders (VCRs) and other devices. SCTE also will provide input to appropriate standards and policy-making groups.

Responses, including name, date and the appropriate contact information, should be submitted to: SCTE Director of Standards Ted Woo, Ph.D., SCTE, 140 Philips Road, Exton, PA 19341; (610) 363-6888; Fax: (610) 363-7133; or e-mail twoo@scte.org.

SCTE Promotes Cable on Campus

To foster the growing partnership between colleges and their local cable operators, the SCTE recently released a videotape addressing the communications issues facing today's college and university campuses.

"Campus Communications Networks: A Potential Land of Opportunity" explores the economic and educational benefits of a collaboration between local cable systems and some 1,000 college communities nationwide. SCTE developed this program after research indicated that many operators and colleges are unaware of the advantages that administrators, cable systems and students can enjoy from this virtually untapped market.

SCTE Vice President of Technical Programs Marv Nelson said, "This tape was created to raise awareness of cable service opportunities on college and university campuses while helping those schools understand the capabilities of the cable operator." Nelson added that this program also will create a greater awareness among students about career opportunities in the cable industry.

Hosted by cable veteran Alan Hahn of Hickory Mountain Associates, this 40-minute videotape provides a step-by-step assessment of three real-life scenarios in which cable operators have successfully partnered with local colleges or universities.

Topics covered include network cost analysis, campus security, video teleconferencing and downstream video services. Hahn also presents a conceptual design of a 750 MHz hybrid fiber/coax (HFC) network on a hypothetical college campus.

For more information about this and other SCTE training materials, contact Product Fulfillment at (610) 363-6888, or visit the Society's web site at www.scte.org.

The Society of Cable Telecommunications Engineers is a national nonprofit professional organization serving the broadband industry's technical community. SCTE currently has more than 13,500 national members from the United States and 70 foreign countries and offers a variety of programs and services for the industry's educational benefit. SCTE has 72 chapters and meeting groups and has technically certified more than 3,000 employees of the cable telecommunications industry.

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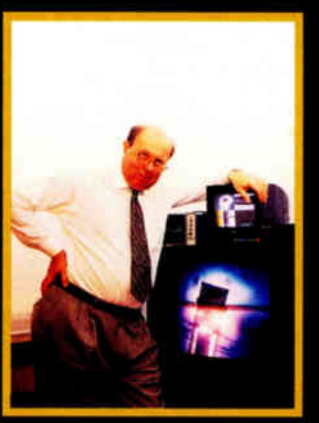
Interview with a Leader

By Rex Porter

Dr. Strangeleak, Mad Scientist Ted Hartson, Part 1



Ted Hartson

Ted Hartson is so well-known in cable that he hardly needs a biographical sketch. From his debut as chief engineer when CableCom General properties were acquired by Cap Cities, Ted moved with other acquisitions and mergers, ending his MSO career as vice president with Post Newsweek Cable in Scottsdale, AZ. Ted's career includes leadership in training engineers and technicians on cumulative leakage index (CLI), chairmanship of the 1995 Society of Cable Telecommunications Engineers Cable-Tec Expo and numerous Emerging Technologies seminars, and induction into the SCTE Hall of Fame in 1995. Following his move from Post Newsweek Cable, Ted formed a research and development company, Scottsdale Television Labs. In this first installment of *CT*'s two-part interview, Ted discusses his early years as a technician and MSO engineer.

Communications Technology: *How did you first become involved in electronics?*
Ted Hartson: Well, I quit school when I was 15 to go to work for a radio shop. And "work" kind of overstates the thing. They let me hang around, and I'd run and get cigarettes and coffee for them.

Eventually, the old man who owned the place allowed me to work on some of the "trade-ins." He put a door across two barrels out in the garage and said, "You go out there and work on the trade-ins, but when customers come in, don't let them see you working on the radios because I don't want customers to think I have kids working on them."

So, that's sort of my entry into the radio repair business. So there I was in the radio shop, and then I worked on television. Actually, the first job I had was in 1966. I was hired by Time-Life Broadcast, and Time-Life Broadcast had three turnkeys. They had a turnkey in Battle Creek, Albion and Jackson, MI, and John Fetzer had a turnkey in Kalamazoo.

Then Fetzer and Time-Life traded some of the properties around because they wanted some microwave tower sites. So they formed a company called Wolverine Cablevision. Wolverine Cablevision was the turnkey operator of the Michigan Bell leasebacks in Battle Creek and Albion.

I was the first systems engineer. We don't seem to have systems engineers any more, but I was the first one for that. Then, I was chief engineer. And, after a while, ATC bought out the interests of Wolverine. I kind of forget how that went, but ATC bought out Time-Life's interest. So then it was ATC and Fetzer together.

I then became a regional engineer for ATC, covering Indiana, Ohio and Michigan. Russ Skinner and Pete Smith were both field techs then, down in Columbus. I had to promote somebody, and I thought they were dead equal. So I promoted Russ Skinner because he had a ham license. Now, Pete Smith is probably reading this after it was forgotten, but that's how it goes sometimes.

We built, supervised, and managed; I was a manager in Battle Creek for a while. And in 1979 or 1980, I decided I wanted to do something else. I wanted to do some consulting, so I wound up doing consulting work for a little start-up in the Detroit market called OmniCom.

This company was started by two guys named John Raines and Leo Hoarty (who is now my father-in-law; cable has always been a friendly bunch). We won a half-dozen franchises, which they sold into

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Capital Cities. I stayed with Cap Cities as divisional engineer.

Then I was director of engineering for Cap Cities. We didn't have too many systems. I guess we had seven or eight systems around the country. Soon, Cap Cities purchased CableCom General, so we had all of their systems, too. To put it mildly, those systems were not in the best of condition. CableCom had some problems keeping their records straight.

One of my first projects was to sort out what was really where. One time, I went out on a bunch of field surveys and found out that most of the towers were in the wrong place, according to the coordinates. And I don't mean just a little bit. Cliff Paul used to tell me that if you went to the right coordinates and looked around, and you could see the tower (even if you had to have good eyes), that you were probably OK. But these towers were a long way away.

So I made up a whole list of this stuff, and I had to go to the (Federal Communications) Commission to get a waiver to stay on the air and get special authority to keep these things running while we sorted it out.

So I went in, and I was speaking to Paul and Steve Ross, and John Wong was there (young John Wong was there), and they said, "Well, explain to us what you mean, 'the towers are in the wrong place.' " So I said, "It's like we have this tower in Santa Rosa, CA, and it's not exactly there." And they said, "Well, where is it?" I said, "It's about 15 miles north." They said, "That's quite a ways. Is that still in Santa Rosa?" And I said, "No, that's in a town called Agua Caliente, and actually why I'm here is I'm in hot water, too!"

We spent a lot of time sorting those systems out, and I think, from my broadcast background, I always had a respect for the Commission. You shouldn't lie to your wife, you shouldn't lie to your dog, and you shouldn't lie to the FCC is sort of my rule.

Communications Technology: *Before you even went into cable, you had some broadcast experience. Tell us how that started.*
Ted Hartson: I started out working part-time in broadcast stations as transmitter maintenance. Back when I was a kid, I used to tell people I could fix any radio that I could get the cover off. And, used to be, there were a lot of radio/TV shops around.

I would go out and people were charging $10 to fix a TV set—they called them Dogs. You'd go in at night, and the old man at the TV shop would say, "I 've got a couple of sets that I simply cannot fix." So, he would pay you $10 for fixing the Dogs. But most everybody that did that was required to have *Sam's Fotofacts*, and *Sam's Fotofacts* cost $3 or $5. So, I used to say, "I'll fix that thing without a *Sam's Fotofacts* for $13." I'd just stare at it long enough, and they'd say, "How do you do that?" And I'd say, "I can see the electrons in there if I look long enough."

It's interesting that all those troubleshooting skills and thinking things through in a step-wise manner, which I thought were wasted on fixing TV sets and radios, are exactly the skills I think are necessary to an engineer in cable TV or engineer in any other electronics discipline. It's

good to know how to troubleshoot.

Communications Technology: *When and where did you get your FCC license?*

Ted Hartson: I got my FCC license when I was 17. I took a Greyhound bus to Detroit, got there in the middle of winter, and it was colder than a well-digger's pick.

There were about 200 people in the room, and our examiner was Dick Cotton. He asked, "What are you here for?" I said, "I'm here for a First Class RadioTelephone License with Ship Radar Endorsement." Cotton said, "Young man, that's a tall order."

By noon, there were 100 people in the room—they had passed the Second Class exam. By 3 p.m., there were 20 people in the room who passed their First Class, and by 4 p.m. there were three guys who got up from completing their Radar Endorsement exam, and I was one of them.

I got up and went to the front of the room, and Cotton just smiled and said, "You still here, kid?" I said yes and asked if he could show me how I did on the Radar Endorsement.

The only reason I took that exam was that, in those days, you always took one more than you planned on getting. And you knew if you got to see that, that you had passed the other elements. But he said, "No, we'll mail that to you in about two weeks." So I walked to the door to head back to my Greyhound bus, and he said, "Hey, kid!" I looked back, and he gave me the thumbs-up sign.

Communications Technology: *So, how about your ham radio license?*

Ted Hartson: Well, I've only had one ham radio license ever, and that's WA8ULG. (That's ugly little germ.) I always loved Ham radios—I'm a technician. My CW (continuous wave, or Morse code telegraphy) proficiency is terrible, but I sure do like to fix radios.

When I lived in Michigan, I bought a 44-foot dish, an old radar dish, and I had that hooked up so I could bounce signals off the moon. That's a picture of it over there on the wall. (Editor: Looks like an old FPS-3 radar antenna.) It is an FPS-3, exactly, FPS-3 search radar. You know FPS-3? I just stopped short of saying FPS-3, but that's the right era. That was the last one they made, the 69th one manufactured. I fixed that up, and I worked about 100 countries, bouncing signals off the moon.

One summer, I went down to pick up my lawn mower at the repair shop, and this kid said, "Mr. Hartson, it's not ready yet, but when it is, I'll bring it to you. Where do you live?" I said, "You go out that way, then you turn over that way, then you head that way." And the kid said, "Oh, you live out by the Mad Scientist." And I said, "I am the Mad Scientist!"

Communications Technology: *Let's talk about "Dr. Strangeleak," a different name you acquired because of your work with egress and ingress problems.*

Ted Hartson: I really appreciated the problem because back in the '60s, most of the cable systems were built a long way from the TV stations, and when I built the systems in Michigan, they were quite close to our own broadcast properties. So,

I had an appreciation for ingress, but I didn't care much about egress.

This might be one of the first times there was ever any leakage detection on systems, and we started thinking about it. I put a little low-power oscillator on the cable system, which operated on my two-way radio frequency. When you were driving around in your truck, listening to your two-way radio, if you heard that, you knew that the cable was leaking.

At that time, we didn't use it so much for leakage; we used it for outage detection. If you couldn't hear that "chirping," then you thought the cable must be off the air. Actually, it didn't chirp; it just whistled. But signal leakage was important.

As I mentioned earlier, we had taken over CableCom, and some of those systems were in pretty deteriorated condition. And, because Cap Cities had broadcast licenses and had a pretty high quality image at the Commission, it fell my responsibility to make sure that no embarrassment would come to Cap Cities through the cable TV condition.

And so I was very aggressive on things such as clearances, grounding, leakage, Commission regulations and doing proofs. From a broadcast background, that just made sense to me, to do periodic proofs on systems.

I spent quite a bit of time dealing with signal leakage about the time the Commission came out with the Report and Order to have the CLI. I had proposed an alternative standard called the "Average Leakage Index," which was published in the National Cable Television Association Proceedings back in the early '80s, about '81 or '82.

The Commission considered and dismissed that. Ironically, the Canadian government adopted it. They call it the equivalent leakage index, ILDI, or something like that, and it follows on the footsteps of the technique that I had proposed for cable operators in the United States.

We were active with the Society of Cable Television Engineers (as it was called then) committee. I have always been involved in doing instruction in some way or other, ham radio instruction, skills of electronics at night school and so forth. I have taught classes at junior colleges that I couldn't take for credit.

I've always been kind of a teacher, so one time I suggested to Wendell Bailey that this was the way to get people in this compliance business with the signal leakage. This was a big problem, and my friend Walt Ciciora says that when you avert a train wreck, there are no sparks. That remark kind of tells the story.

I don't think people appreciate just how close to a "big train wreck" we were, with the Commission, people in Congress, and people in other segments of the government, including the Federal Aviation Administration. Basically, they were taking the position that the FCC was lax on safety because the FCC was lax on cable operators because of signal leakage.

And so, that train wreck was averted to some extent by a series of seminars that the NCTA held, in which I participated. I organized the seminars originally and got to know a number of people within the industry. Bob Dickinson, Bobby Saunders, Par Peterson and others (I'm sure I'm leaving some people out) presented, along with me.

We went around and presented these seminars, saying: "Hey, this stuff is important, and you can do something about it, and it's in your best interest to do it because if you system leaks like a sieve, you've got ingress, and you've got bad pictures, and you've got intermittents. So why not fix it, and the world will be a happier place?" All of that concluded about 1988 or 1989, and about 1990 I won my Vanguard Award for it.

Communications Technology: *But how about the title, "Dr. Strangeleak"?*
Ted Hartson: I wrote a paper on signal leakage, which I gave at one of the NCTA conventions. I was trying to think of a good title for it, and there are so many titles like "Incidental Radiators" and all of that sort of stuff. And, about that time, I was watching the movie "Dr. StrangeLove," and I got to thinking about Dr. StrangeLove, Dr. StrangeLeak. So, the paper, as I remember, was called "Dr. StrangeLeak—Or How I Stopped Worrying and Learned to Love The Bomb."

It was in the theme of what I have always practiced. If you have a boring topic, it is extremely difficult to present. A lot of things in electronics are kind of boring,

but if you wrap a little humor around it, it kind of sugar-coats the message.

Communications Technology: *There's no CableCom General or Cap Cities today. How did it get to be Post Newsweek?*
Ted Hartson: When Cap Cities bought CableCom, I guess we all thought we were going to move to Denver and become part of CableCom. But as it turned out, Cap Cities ended up putting their own management team in, so that we ended up running the place.

I was going to put Cap Cities in the MMDS (multichannel multipoint distribution service) business. I spent a lot of time learning the MMDS business and filed a hundred applications for MMDS licenses between 1982 and 1983. We had entered into a couple of arrangements, and I was out on the road, getting ready to build a 16-channel MMDS facility. I got a call from my boss saying, "You know, we're not going to do that," so I thought I must be in trouble.

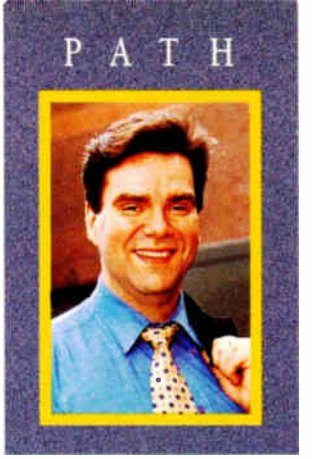
About that same time, my boss was trying to buy Financial News Network, and he received a call from his boss with the same message. One of the operating VPs was trying to buy a system out on the West Coast. I thought, "Well, they're going to sell this place," but it turned out they weren't going to sell—Cap Cities was getting ready to buy ABC, and they didn't want anything else on the table.

In buying ABC, Cap Cities had a choice because the rules at that time precluded a network from owning a cable operation. So Cap Cities decided to sell the cable operations to the *Washington Post*. Because the *Washington Post* owned a TV station in the Detroit market, they decided they would be someplace else, and since most of the CableCom properties were in the southwest, we wound up moving to the Phoenix area.

In 1987, I was made vice president of the *Washington Post*'s Post-Newsweek Cable, which is now CableOne. About 1990, the *Post* did a start-up venture in Scotland. There, I built several cable systems for them. It was interesting, and I got the chance to meet Scotty Flink and Tom Hall (The World's Oldest Cable Guy). CT

Rex Porter is editor of "Communications Technology." He can be e-mailed at tvrex@earthlink.net.

By Alex Zavistovich



Is It a Tower or a 100-foot Cactus?

Sometimes the best place to hide something is right under your nose. Like Poe's purloined letter, some things can be hidden in plain sight if you make them seem ordinary.

Not so when you're dealing with the external hardware of a cable or other telecommunications system. It's hard to overlook a 100-foot tower, and even though utility poles are made of rough wood, they don't exactly blend into the environment.

Tougher standards

That's something engineers are going to have to start thinking about now that everyone's getting involved in telecommunications. Community organizations are cracking down on utility pole hardware for aesthetic and zoning reasons. After all, when you add return path capability to your network, you're basically doubling the number of components people see on utility poles. (Once the AT&T/TCI deal goes through, this will become still more of an irritant to the chronically agitated.)

Eric Wentz, director of marketing for Alpha, notes that easement acquisition has become more difficult to come by in certain communities. What's more, regulations regarding visible hardware on utility poles are more stringent.

How do you get around these problems? I can tell you how not to do it. Don't try to ease into setting up your network. That just won't fly with Joe Homeowner. Think down the road about the services your system plans to offer, and make sure you're set up now to handle as much growth as possible.

Planning and suburbanites

If most of your installations are buried, long-range planning is even more important. Some vendors are noticing an increase in underground system installations, as zoning requirements for

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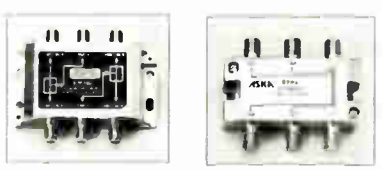

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aerial installs become tougher.

Fine. Just be careful. Build in potential for expanded bandwidth. That's a new trend in system design, according to Todd McCrum, product manager for system amplifiers at Scientific-Atlanta. Even with new systems built for 750 MHz, McCrum says, they still are being designed with a footprint big enough to upgrade to higher bandwidth by adding amplifier capacity as drop-in components later on.

On top of that, you'll need to do some research on the most reliable amplifiers for your particular installation. For some systems, it's hybrid silicon. For others, Gallium Arsenide is the best choice. You need to make the call on that. Remember though, if you think community activists are all in a snit about looking at towers and utility poles, imagine how they'll react if you have to send out a crew to dig up their streets and yards to replace failed amplifiers. You're trying to restore service, and they're red-faced and sputtering, eulogizing the planting bed they just put in with the handy Garden Weasel.

Put a lid on it

Another way around this whole issue is to look at your physical network like getting a bad haircut. What do you do when you get a bad haircut? Put on a hat.

A recent issue of *The Atlantic Monthly* magazine refers to "stealth towers," a term they claim was first coined in the *New York Times*. Some phone companies are starting to disguise antennas in "artificial replicas of local flora."

The Atlantic offers a few examples, such as the stealth tower in Franklin Lakes, NJ, in a fake pine tree about 100 feet tall, "with cables running through its bark and small antennas clustered discreetly in its realistic-looking green boughs." Apparently, Phoenix is considering a "three-story-tall synthetic saguaro cactus."

Towers aren't the only things people are covering. Why do you think pedestals are painted green, if not to blend in with the surrounding environment? Granted, that's not going to win any awards for Most Uncanny Disguise, but I guess it beats something that looks like a machine-gun nest sticking out of your lawn.

Some disguises are more subtle. If you've been by the Multilink booth at some recent trade shows, you've probably seen the "Rock-Ped," a cable pedestal disguised as a big rock. Given the choice, I'm sure some Americans would rather have a big rock in the front yard than a big metal pedestal, no matter how nicely it's painted.

The catch here is, how effective can this stuff be if the average consumer now has a slang phrase for it all? People are getting pretty sophisticated.

"Was that a 100-foot tall rose bush we just passed?"

"Nah, just one of them stealth towers. Rose bushes don't have half as many splice closures on 'em." CT

Alex Zavistovich is consulting editor of "Communications Technology." He can be reached in Potomac, MD, at (301) 340-7788, ext. 2134.

By Ron Hranac

Passive Device Intermod

Just when you thought you were getting the hang of two-way problems, here's another one. How about intermodulation generated in passive devices? No, I don't mean common path distortion. I mean beats generated in drop splitters and couplers, and maybe some feeder passives. Don't hit the panic button just yet. The following is just a "heads up" for a problem that you might experience in two-way systems.

I first became aware of this potential problem from a message posted on the SCTE-List about a year ago. As I recall, the message was posted by a U.K. equipment manufacturer. It briefly discussed the phenomenon and indicated the manufacturer had developed a passive design that was immune to the problem.

I didn't give the idea much more thought until December's Western Cable Show, when I moderated a panel on two-way. During the question-and-answer period, I asked the panelists if any of them had heard of passives creating intermod in two-way systems. The answers were mixed, mostly along the lines of "Well, I've heard something about this, but I really don't know too much about it." Since then, I've been doing a little digging to find out more.

First of all, this is for real. Second, I've seen it demonstrated under controlled conditions. Third, most manufacturers of passives that I've spoken with are aware of it and are working on solutions.

What it is

The problem is this: Under certain conditions, high level reverse path signals passing through, say, a drop splitter on the side of a home can result in the passive device generating beats that interfere with forward path signals in the home. It generally happens if the ferrites inside the splitter have residual magnetism present, and the reverse path signal is very high—on the order of +50 dBmV to +60 dBmV. This combination can generate intermodulation products such as the reverse path signal's second harmonic.

Here's a typical scenario. A subscriber connected to a high-value tap usually will have fairly high reverse levels coming from the home to overcome the drop and tap attenuation, while still providing correct inputs at the closest upstream active. A cable modem or other device in one of these homes probably will operate in the +50 dBmV to +58 dBmV range. That high level reverse signal passing through a drop splitter whose ferrites have some residual magnetism (either left over from the manufacturing process or induced by transients after installation) can generate beats in the ferrites that are 80 dB to 100 dB below the cable modem signal. Under some conditions, the ferrite-generated intermod can be as high as -50 dBc, depending on the amount of residual magnetism and RF levels hitting the ferrite.

> "A combination of high RF levels and residual magnetism drives the splitter ferrites into saturation, where they no longer operate linearly."

Let's assume we have a cable modem operating at 28 MHz. That cable modem's second harmonic will fall at 56 MHz, just above Ch. 2's visual carrier. If the splitter-generated second harmonic is 80 dB below a +50 dBmV cable modem signal, its amplitude will be -30 dBmV. The forward path signals will be in the 0 dBmV to +10 dBmV range, so the second harmonic—which is in the passband of Ch. 2—will be only 30 dB to 40 dB down from Ch. 2's visual carrier amplitude. This is enough to cause visible picture interference. If the splitter ferrites were generating harmonics as high as -50 dBc, then the interference would be at nearly the same level as the forward path signals.

A digitally modulated signal's second harmonic affecting forward path signals in this way looks like intermittent noise in the picture. It's there only when the reverse transmitter is actually transmitting, which for cable modems and similar equipment usually is for very brief periods. Thus, reverse path signals in the 26 MHz to 42 MHz range could affect low band VHF TV channels. Lower frequency reverse path signals could affect higher frequency reverse path signals! For instance, a 10 MHz impulse pay-per-view (IPPV) converter signal might interfere with a 20 MHz cable modem signal or vice versa.

The reason I said don't hit the panic button just yet is that the problem is likely to occur only rarely, at least for now. First of all, it's going to be a problem primarily in homes connected to high-value taps, where reverse path equipment must operate at higher levels. Furthermore, forward path interference will depend on what frequency or frequencies you use for reverse path transmission. Because the

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interference is intermittent and usually brief, subscribers may not even notice it. Besides, someone in the house would have to be watching the affected channel at the same time the cable modem or other device actually transmits. And finally, there aren't that many two-way subs yet.

How to fix it

How can you fix this problem if you happen to identify it? Well, one solution is to replace the splitter with one designed to be somewhat immune to the phenomenon (more on this in a moment), and the other solution is to demagnetize the splitter. The latter can be done with handheld bulk tape erasers. Just pretend the splitter is a videocassette or reel of audio tape, and "erase" the splitter the same way you would the tape.

This will demagnetize the splitter's ferrites, and the intermod problem will go away. At least it'll go away until the ferrites are remagnetized, by either the presence of direct current (DC) on the coax or by an induced transient or spike.

The cause of all of this, as I understand it, is that a combination of high RF levels and residual magnetism drives the splitter ferrites into saturation, where they no longer operate linearly. Nonlinear operation can cause the ferrites to behave somewhat like a diode and generate intermodulation products.

In case you're wondering, this intermodulation problem has nothing to do with a splitter's isolation or return loss specs, and controlled lab tests can demonstrate it with clean (externally filtered) reverse path signal sources. The interference is generated in the splitter or other susceptible passive device.

Jim Jennings, president of Lantek USA, manufacturer of Regal passives, says he is aware of this problem. One partial solution is the use of blocking, or coupling capacitors on all of a splitter's ports. This will keep DC and other stray voltages out of the splitter, although large transients and spikes still can be a problem. Coupling capacitors are not standard in Regal splitters, but can be installed per customer requirements, according to Jennings.

Another partial solution is to pass the splitter through a bulk degausser during the manufacturing process to eliminate ferrite residual magnetism, but Jennings points out this won't prevent transient-induced magnetism after the splitter has been installed at a subscriber's home.

Holland Electronics' Michael Holland also is aware of this problem, and his company has been working on solutions. Holland's line of GHS splitters includes coupling capacitors, and the company is looking at other ways to reduce splitter-generated intermodulation. Holland told me that he has been evaluating different ferrite core material with good permeability at higher frequencies and with a higher magnetization threshold, as well as ways to design splitter circuitry to "bleed off" residual magnetism without affecting RF performance.

Filtronic Cable Communications Ltd., a U.K. company, has supposedly developed a manufacturing technique for cable passives that prevents or minimizes the generation of intermodulation. I attempted to contact the company for more information, but as of this writing had not received a response to my inquiry. If I hear something, I'll pass it along.

Precautions

In the meantime, what, if anything, should you do? Well, I wouldn't get too concerned right now. You might want to do a few experiments on your test bench to confirm what I've been discussing, including the use of a handheld bulk tape eraser and how it can be used as a troubleshooting tool.

I suggest you also maintain a dialogue with the manufacturer of the drop passives used in your system. As new splitters become available that address this problem, you might want to think about having a box of them around for the occasional problem drop, but beyond that, this is just something to be aware of as you deploy two-way services. CT

Ron Hranac is senior vice president of engineering for the Denver-based consulting firm Coaxial International. He also is senior technical editor for "Communications Technology" magazine. He can be reached via e-mail at rhranac@aol.com.

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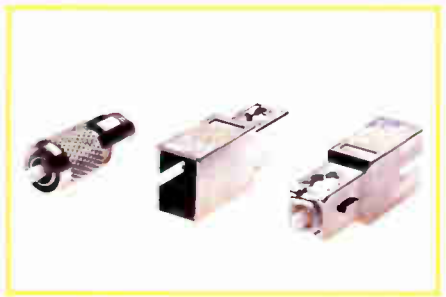

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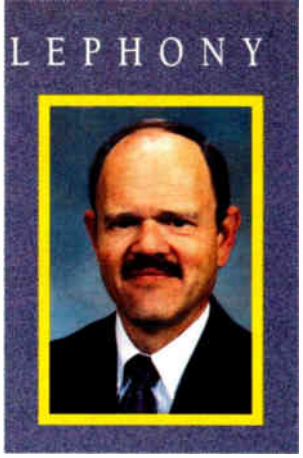
By Justin J. Junkus



Reach Out to Telecommuters

The business market is, as Clyde Barrow said about banks, "where the money is." There's more than one way for cable to bring dial tone to this lucrative market. Last month, we looked at business features that are available on typical, network-based digital switches. This month, I am going to continue to explore how cable might take advantage of opportunities in the business telephony market by providing remote access to a premises-based business telephone system, such as a private branch exchange (PBX).

Besides the financial motivation, there are other reasons we must seriously consider the business market. One is that business parks and residential neighborhoods are moving closer together as population growth continues. This gives cable, which typically serves residential areas, a closer physical presence to the business community. Another is that cable is now thinking of itself as telecommunications, not just television. This broader view opens the door for providing the data services that business requires and for which it is willing to pay. Yet a third reason is that technology changes are in our favor. Internet protocol (IP) telephony is one example where voice, traditionally the domain of the telephone company, moves to a more level playing field for cable, with our high-speed data access.

Business needs

Before we talk about application of IP telephony as a way for cable to serve the business market, it might be useful to look at some business factors outside the cable industry that also drive the need for a closer union of business and residential communications services, and at the available solutions to those needs.

The business world is increasingly wrestling with how to handle both work-at-home and small office/home office (SOHO) applications. Many potential workers do not like to commute, cannot commute, or wish to reduce commuting time. Others need to extend their business productivity by bringing the office home, either part or all of the time.

Work at home began with business executives taking the day's left-over business tasks home in the briefcase. Home even meant, in many cases, vacation and weekend retreats. For upper management in particular, handling the usual office tasks away from the office often required communication beyond written correspondence. To be effective, business executives needed to use the phone in the same way they did in the office. In larger companies, that meant getting access to corporate voice networks, abbreviated dialing, executive override, line pools and so on. One early solution to the problem was a PBX feature called direct inward system access (DISA).

"The business world is increasingly wrestling with how to handle both work-at-home and small office/home office (SOHO) applications."

With DISA, anyone needing remote access to a PBX is given both a dialup access number and a confidential user code. The user dials the access number and the code and receives PBX dial tone, along with access to all the PBX features. Mission accomplished for getting the remote executive connected to the PBX, but unfortunately, the door to the PBX has been opened to anyone who has the access number and can figure out the code.

Without some additional security measures, such as regularly changing the access code, DISA provides opportunities for service thievery. In addition, not all the integrated computer telephony capabilities of the business location can be remotely accessed with DISA, and there is no way to automatically remotely receive incoming calls directed to the PBX.

A way to provide more secure access is to use off premise extension (OPX) lines between the business and the worker's home. These lines are leased, dedicated telephone connections. Because they are dedicated lines, they are secure. The drawback is that they are expensive, especially as the distance between the remote location and the business increases.

For both current and future work-at-home applications, both DISA and OPX lines are inadequate solutions to the problem of remote access. Work-at-home applications have changed. Today, the briefcase has been replaced by computer files, the laptop and a home personal computer (PC). What can be taken home has gone beyond the jobs of executives to include knowledge workers and service workers. Examples are computer programmers and remote customer service representatives.

Providing access to voice lines of a PBX alone is inadequate for these types of

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workers, who need access to corporate data networks. While a dialup data line partially solves the problem, it is slow and also open to security breaches. Cable modem access provides a solution for higher speed access, but by itself does not provide the complete computer-telephony integration needed by certain types of potential work-at-home applications, such as call center positions in a customer service center.

IP telephony solutions

Now, let's look at the role of IP telephony technology. Some telephone companies have attempted to solve the problem of remote location computer-telephony integration by using technology called PBX line extenders. The simplest way to think of this is that it is a mini-version of public switched telephone network (PSTN)-based IP telephony.

Those who are familiar with IP telephony architecture will remember that it includes a gateway to the PSTN. The purpose of that gateway is to translate and route calls through a conventional digital switch in the PSTN. In the case of the PBX line extender architecture, instead of using the Internet to access a gateway in the PSTN, data is passed to a gateway at the PBX location.

A telephone company-provided PBX line extension system consists of matched electronic modules at the business and at the home, which translate the line protocols used by PBX data and voice equipment into protocols and signaling accepted by public network lines. This interface allows a user to plug a digital telephone set into the unit at home and appear to be at the PBX location.

PBX line extenders are available for integrated services digital network (ISDN) and asymmetrical digital subscriber line (ADSL) digital lines at the remote location, as well as for analog lines.

For digital lines, the remote module converts voice and PBX signaling into IP packets, which can be sent and received through a low-end, home-based router to the corporate data network. The IP packets are received by a remote access server at the PBX. The line extension module at the PBX site communicates with the remote access server via an Ethernet protocol and acts as a gateway to convert the packets back to the protocol used by the PBX.

When line extenders are used with analog lines, the architecture is slightly different. In this case, the line extender module at both ends also includes dialup modem capability.

How it affects cable

How does all this pertain to cable? MCK Communications, the company that makes the PBX line extender for the telephone companies and the PBX vendors, is developing a version of their system for cable access. I spoke with Mike Williams, the company's vice president of business development, at Cable-Tec Expo, and he told me of their response to the CableLabs PacketCable RFI, a proposed trial architecture and product plans for the cable market.

The trial architecture is a combination of subscriber units similar to those used by the phone companies: cable modem, headend Internet access, the Internet, and Internet gateway access equipment at the PBX. Like its telephone company cousin, it looks like a mini-IP telephony system. When CableNet is implemented, MCK envisions it replacing the Internet leg of the connection.

In the meantime, the trial architecture suggests a way for cable to move into the business market via a high-speed data interface to a business PBX. While trials are just that, and there probably are several design details that need to be addressed, this approach is another way to expand cable's market in broadband telecommunications. CT

Justin J. Junkus is president of KnowledgeLink Inc., a consulting and training firm specializing in the cable telecommunications industry. To discuss this topic further, or to find out more about KnowledgeLink Inc., you may e-mail him at jjunkus@aol.com.

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By Laura K. Hamilton

One Way to Skin a Data Cat

Virtues of Learning Data With a Telco Return

What's your opinion on deploying high-speed data service via a telco return? If you think that "one-way data" is a dusty model not worth your trouble, you just might want to take a close look at this column.

"My boss and I are Internet junkies. We've been looking to enter this business for some years," says Grant Evans, technical operations manager for Intermedia's Kingsport, TN, cable system. And far be it from anyone to get in the way of a Webhead with a broadband network to back him up.

Evans continues: "The service we are offering today is a one-way telco return. It works very well. Because of the asymmetrical nature of the Internet surfing, you're not sending much data upstream. The downstream direction is where you need the bandwidth, anyway."

What? A telco return data system with the Data Over Cable Service Interface Specification (DOCSIS) for two-way cable modems just around the corner? Why?

Gain experience

"If you're thinking about getting into the Internet business, you're going to have to have the knowledge base to do it," says Evans. "You're not going to do it with regular old cable installers and technicians."

Networking is a complex business. You're dealing with software/hardware in-

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tegration issues, and let's face it, many cable engineers and technicians aren't experts in that arena. So, starting to learn the networking biz now, even if your system isn't exactly two-way pristine, could gain you and your staff valuable experience that you'll definitely be using tomorrow.

Get customers now

Beyond the high-speed data experience he's pocketing, Evans points out that his system is getting Internet customers today via telco return modems that very likely will still be there when it migrates to two-way cable modems.

"It is my belief that there's a lot of people out there that don't know what surfing the Web is all about. If you can get them into some kind of intro package, we can market to them via e-mail.

"Also keep in mind, they've already set their e-mail up with us, and it's a hassle when you change e-mail addresses," says Evans.

> "Starting to learn the networking biz now, even if your system isn't exactly two-way pristine, could gain you and your staff valuable experience."

And he is thinking well beyond telco return when he says: "Over the course of time, we can eventually migrate them up to our premium two-way service, just like we do our cable customers. We get them in at basic and market to them to take pays and try pay-per-view (PPV)."

How Kingsport did it

Intermedia's Kingsport system began by partnering with Online System Services, which markets a package that allows broadband operators to deliver high-speed Internet access and Web services.

Evans credits OSS with getting his system started by installing some basic Internet service provider (ISP) equipment.

"We worked side by side," says Evans. "I was trying to absorb all the knowledge I could by working with them."

And Intermedia's Kingsport system took advantage of OSS's knowledge pretty quickly: "OSS shipped us some very basic ISP equipment, which we outgrew within probably 45 days of starting the service."

Now, Evans characterizes the relationship with OSS as limited.

"They got us started," he says. "They've developed our home page, for example. They developed our billing software. They're assisting us as a partner, but most all the hardware we have now, we've pretty much bought and put in place ourselves."

What about phone line costs?

Well, you're saying, gaining all this Internet experience is great, but what about the phone line expenses?

"Most people don't like the one-way cable modem business because of the cost of phone lines," concedes Evans.

Kingsport found that to avoid busy signals, it had to provide approximately one incoming line per six customers. These incoming lines cost about $45 to $50 per month each.

"If you amortize that over six customers, you're talking seven bucks per month, maybe. So if your customers are paying you $17.95 per month for the service, there's seven bucks right there that goes out the door for expenses."

And what about the costs for additional staffing that an Internet service demands?

"You've got help desk issues, 24/7, which is costly from a labor standpoint. We have a network engineer on staff now. And we have an Internet department head," adds Evans.

"This is a very capital-intense business. Anybody considering it had better really look at their overhead and cost of capital," warns Evans.

He notes that a base of 2,000 customers is about the break-even point for his system, which they were just about at toward the end of July 1998. (The service was established in June 1997.)

Heading into two-way

You might think that a system opting for the telco return option has big problems with two-way. That's not the case with this system.

"Right now, we have about one-fourth of our plant two-way activated. We're implementing impulse pay-per-view (IPPV), so we'll begin to test the integrity of our return," Evans reports.

When asked about service calls stemming from the telco return data service, he says: "Frankly, we haven't had very many challenges. We have very few service calls on data outlets."

"We have had really solid drop replacement/improvement leakage programs in place for 10 years."

Evans also touts the benefits of mounting plastic enclosures on the side of structures, which his system has been doing for the last decade.

"I'm just dumbfounded why everyone in the industry isn't using some kind of weatherproof enclosure on the side of the house. I highly recommend it. If it saves you one trouble call in five years, you've paid for it," he says.

Making a commitment to solid install practices also was a big help.

"We concluded that we would not allow our customers to do their own connections. If you signed up for cable modem service, we would send an installer out to the house, and he would either verify the integrity of the existing wiring or just run new wiring. In most cases, we would run brand-new wiring from the side of the house to the actual computer location," says Evans.

The system also doesn't allow splitters within the houses that receive the Internet service.

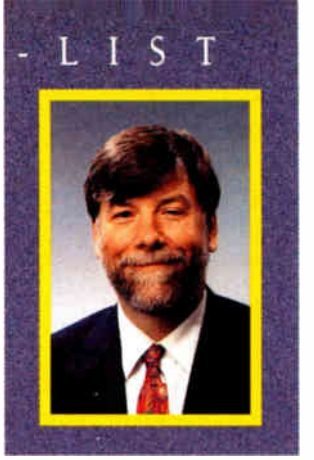
"We simply said, 'None of that.' We want to be absolutely certain in every instance that we have dedicated wire from the outside of the house, what we would call the demarc point, to the computer location," adds Evans.

Evans points out that like many, he's waiting on the soon-to-come DOCSIS nod from CableLabs before he thinks seriously about deploying two-way cable modems in his system.

And all that Internet service experience he's gained with the telco return modem service doesn't seem like it will hurt a bit when that does occur. CT

Laura Hamilton is executive editor of "Communications Technology." She may be reached via e-mail at lhamilton@phillips.com.

By David Devereaux-Weber



Ideals and Fun Drive SCTE-List

For those who aren't familiar with it, the SCTE-List is a way to exchange messages about cable telecommunications technology using Internet e-mail. A computer runs software that copies each incoming message and sends it to all the addresses on the List.

The software also automates the process of adding and removing yourself from the List, which is done by sending commands as e-mail messages to the listserver.

For some time, folks at *CT* have suggested that I write a column to explain the List and present some of its interesting threads of conversation.

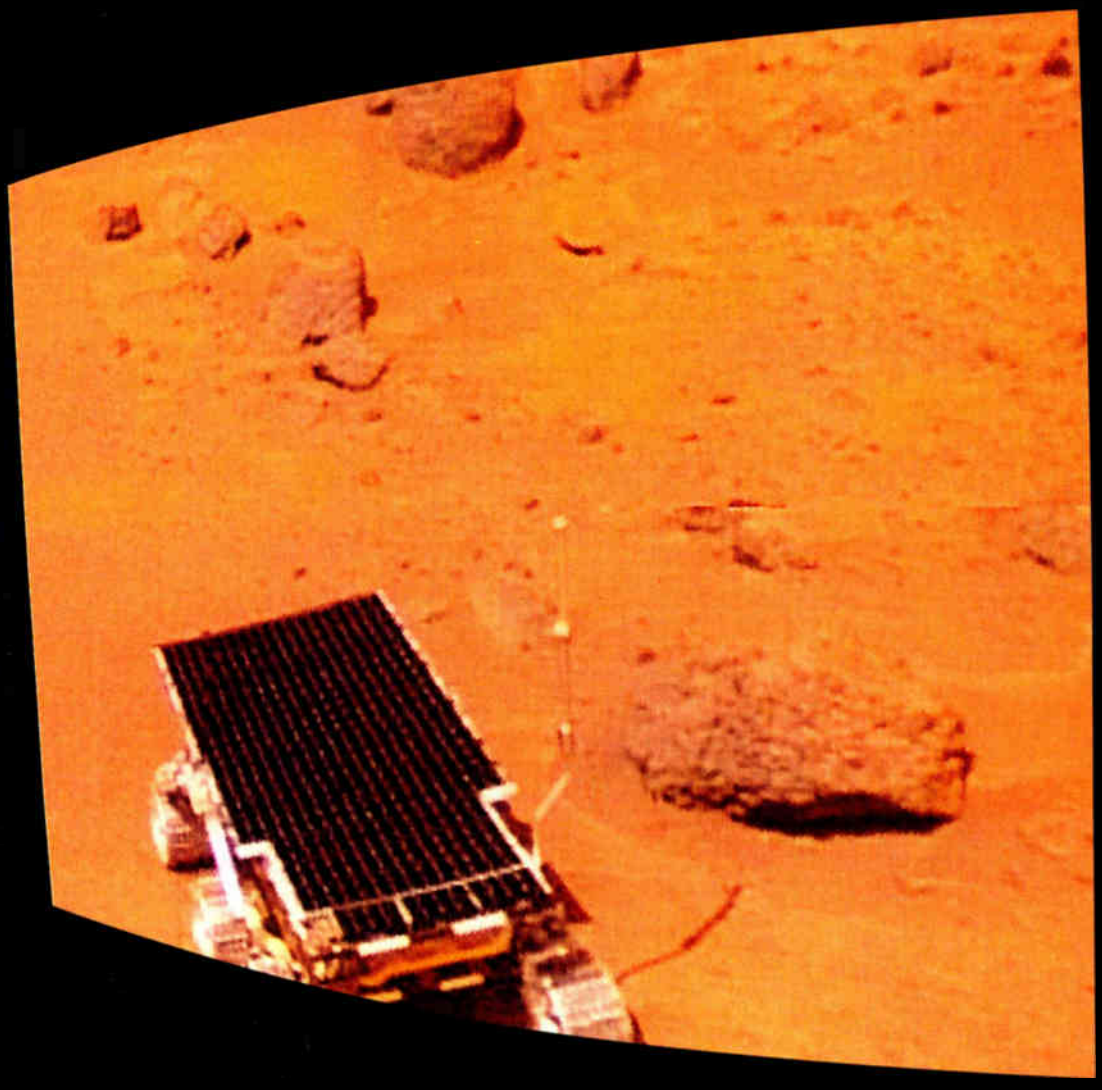
How it began

I started SCTE-List in 1994. Currently, it has about 1,700 subscribers in more than 37 countries, including cable technicians and engineers, vendor salespeople and engineers, and regulators from the federal, state and local levels. Many of the Society of Cable Telecommunications Engineers staff and numerous journalists also are on the List. Subscriptions are free. The List's computers and Internet connection are at the University of Wisconsin-Madison, where I work, and I volunteer my time to keep things running. The List has no official connection with the SCTE.

Why we do it

For the past three years at the SCTE Cable Tec-Expo, we have been having an annual reception for SCTE-List subscribers (and anyone else). One benefit of this get-together is that we can meet the people behind the names on the List.

This year, when I was talking about what I do to keep things running, Lori Kaufman of Cable AML asked me why I do it. I gave her a simplistic answer, but I thought about it on the way home. I've known Lori a long time, and she's always



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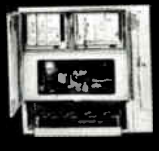

ANTEC

Network Technologies

straightforward in her dealings, so I felt I owed her a more complete answer. So Lori, here's a better answer.

I've been an idealist for most of my life. I've seen things in the world that could be changed, such as discrimination based on gender, race or class. I've wanted to find ways to make things better. I've also seen that communications media such as cable and the Internet tend to encourage values like freedom and equality. The List is a way to make things better.

One thing that helps the List work is synergy. As the cable industry enters the Internet business, what better way is there for cable people to learn about the 'Net and how it works? Synergy comes in because the topic of conversation is technical.

Get on the List

To subscribe to the List, send the message: "subscribe scte-list your name"

If you are Alfred E. Neuman of *MAD Magazine*, you would send the command "subscribe scte-list Alfred E. Neuman" to the address: listserver@relay.doit.wisc.edu

While we share questions and technical information, we learn about the 'Net.

Solving problems via the List can save a technologist weeks of troubleshooting. Vendors can find out what problems their customers are having and improve their products. Regulators can learn about problems and issues affecting the industry. People separated by oceans or time zones can communicate quickly and cheaply, saving time and accomplishing more. Finally, they build a sense of community across the telecommunications industries.

So that's why I spend the time to keep the List running. Now, on to a taste of July's interesting messages.

The AT&T/TCI merger: Will it work? What risks and gains do AT&T and TCI face? How will it change the industry?

Locations for the next SCTE Emerging Technologies and Cable Tec-Expo shows: Canada comes highly recommended.

Grounding and bonding: Several messages appeared about the use of corner clamps on electric meter housings.

Torque wrenches: Steve Allen asks why techs who wouldn't question torquing bolts on a car's head gasket don't use a torque wrench on hardline connectors and amplifier housing bolts.

Care and feeding of storage batteries: To float or exercise?

Ron Hranac and several others write about the Leonid Meteor Storm. Chances of satellite damage are deemed low.

Industry veteran Jim Emerson finds work: Humor plays a big part in keeping things interesting. Jim mentioned his new position, and several other subscribers gave him a good-natured ribbing.

Next month, I'll tell you how to search and browse the List archives. CT

David Devereaux-Weber, P.E., is a network engineer at the University of Wisconsin-Madison. He is a senior member of the SCTE and can be e-mailed at djdevere@facstaff.wisc.edu.

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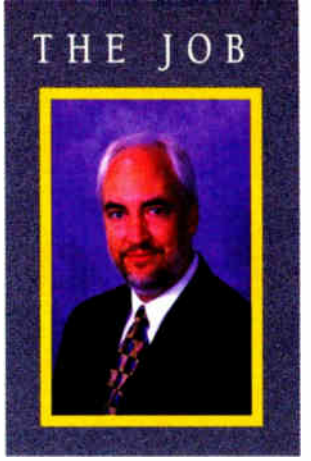
Reader Service Number 42

By Alan Babcock



The Lessons of IVD

Lack of Standards Doomed a Good Idea

Last month, I discussed the use of video in the training environment. Prior to that, I presented some ideas regarding the effectiveness of instructor-led training. This month I want to discuss some of the benefits and problems with one of the early versions of interactive multimedia training. Let's take a look at interactive videodisc (IVD).

IVD is a perfect example of how lack of standards can kill a great idea. More about that later.

How it worked

What is IVD? Generally speaking, IVD marries the best features of video with the power of the computer to create an interactive learning experience. Video segments are shot and placed on a laser disk, and each segment is numbered so that it can be retrieved in any sequence.

A computer program manages the video segments and offers opportunities for the student to input answers to questions. An actor or graphic in the video segment may ask these questions, or text on the computer may prompt responses. The training design is laid down in such a way that student responses entered into the computer cause the selection of a specific video segment for the next portion of the learning.

If a student answered a prompt with a correct response, the video segment to follow reinforced the choice and moved on to the next topic in the training. If an incorrect response was chosen, the video segment selected would return to the previous topic and present alternative instruction to make certain the student grasped the topic. As a student, you had to "pass" each segment before being allowed to continue with new subject matter.

In the late 1980s, most stand-up trainers were convinced their jobs were going to be eliminated by IVD. The military and the automotive industries embraced IVD as the wave of the training future.

For example, Ford Motor Co. created myriad IVD programs for mechanics who needed to be trained on the Ford Probe. IVD gave Ford a way to provide the same training to each dealer location without the need for a trainer.

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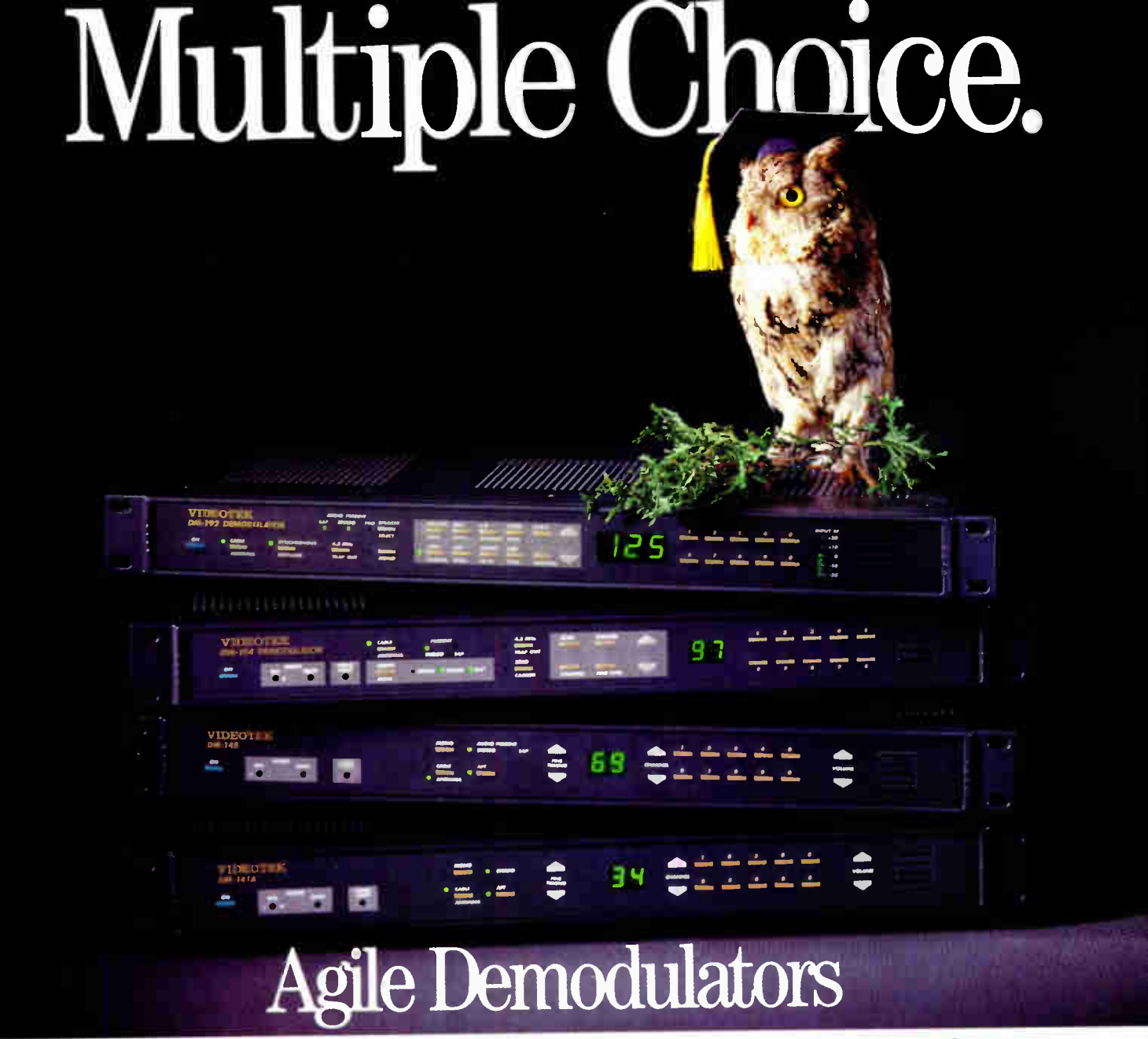

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They figured this would save money and time. Additionally, many professed that the consistency of training and the ability to customize the training for the learner were great benefits. In many circumstances, IVD proved to be a great training solution.

IVD and cable

As a matter of fact, several IVD programs were created specifically for the cable telecommunications industry. The education group at Jones Intercable created most of these, but others such as Time Warner (ATC at that time), Rogers and Viacom got into the picture as well. Many of the Jones programs are still in use today.

So what happened?

> "IVD was doomed to extinction because the vendors creating the platforms refused to agree to work together on interoperable standards."

A minor detail

In a word, standards. Or rather, standards failed to happen. Proprietary systems existed from specific manufacturers for the development and deployment of IVD. Sony had a system, as did Panasonic and others. Unfortunately, nobody standardized the platforms or software tools. Consequently, an IVD program authored for a Sony system wouldn't play on another hardware lash-up.

I worked for ATC in the late 1980s and helped author an IVD program to teach technicians how to troubleshoot noisy and snowy pictures. We created that program to work on a Sony platform, and several systems purchased the hardware to utilize the product.

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Unfortunately, the Sony platform wouldn't play the IVD programs that had been created by Jones because they had been authored for a different system.

Consequently, if an ATC system wanted to use any of the Jones material—such as Installation Training, Safety Training, Customer Service Training and so on—they would have to buy another set of hardware. By the way, each hardware lash-up was approximately $5,000 to $8,000 at the time. If a system invested in the hardware to utilize IVD programs, they were pretty much keyholed into the specific platform and the programs available for it, kind of like the early days of Apple and the IBM compatibles.

> "The concepts of IVD training live on even though the technology has died a slow and painful death."

Lessons learned

IVD was doomed to extinction because the vendors creating the platforms refused to agree to work together on interoperable standards. Some software patches were attempted, and authoring tools were created to try to resolve these issues, but the differences were just too great. Of course, the laser disc player never really lived up to its billing, either, and many people were just too skeptical of the acceptance of the technology.

IVD was (and is) an effective training delivery tool. Many students have benefited greatly from the interactivity and the consistency of this training format. Training developers learned from this experience as well. We learned that our jobs as stand-up trainers weren't going away. But we also learned that the basic concept that incorporates video, text and interactivity through technology was able to provide effective training.

IVD lives on in spirit

The proliferation of computers and CD-ROMs has continued to create the possibility of interactive multimedia training. The concepts of IVD training live on even though the technology has died a slow and painful death.

Next month, I will share some of the current trends in computer-based training (CBT) and CD-ROM training platforms. Both of these grew out of the early experiments with IVD.

Alan Babcock is director of training development for the Society of Cable Telecommunications Engineers. He can be e-mailed at abacock@scte.org.

Deployment Time Is Now

By Rex Porter

Cable TV, as well as the rest of the communications industry, was stunned by the AT&T/TCI announcement, to say the least. Positive shock waves caused stock values to soar for both MSOs and vendors of equipment and services. But one of the biggest positives was the fact that the announcement proved the realization by others in the telecommunications industry that entertainment TV, data, telephony and Internet services could best be provided by cable's hybrid fiber/coax (HFC) networks.

The stock values of Yahoo, America Online and other Internet service providers (ISPs) had already soared throughout 1998. Now, following the AT&T/TCI announcement, cable ISPs such as @Home and RoadRunner begin to look even more attractive to investors. With high-speed cable modems and HFC networks, uninterrupted service and speed will be their advantages.

The engineering slant

But what effect will all of this new attention to cable TV have on its engineering and technical community?

Well, all of a sudden, cable's engineering community has the opportunity to realize an importance that may have been somewhat ignored in the past. MSOs and system owners will begin to refuse to sell systems or MSOs for $2,000 to $3,000 per subscriber. While today's cable system may well be worth these values, that figure is based on customers' buying traditional entertainment each month.

Once subscribers begin to pay additional monthly charges for business data at high speeds, personal e-mail at high speeds, telephone service without a cumbersome receiver, hundreds of superior digital TV signals, video-on-demand (VOD), and satellite technology deployed to provide worldwide linking of such HFC networks, the true value of these HFC networks will be difficult to establish.

The value of knowledge

The duties of technicians and engineers in cable probably will become

Network operations centers (NOCs) like this one represent cable's commitment to deploying advanced services today.

Courtesy of TCI, photo by Cathy Macatee

more defined. Test equipment and software to control the hardware will become more sophisticated. Companies will want to select various experts in distinct fields. While there always will be the need for crews to maintain fibers, cables, connectors and hardware, technicians and engineers who become educated and trained in specific fields will be able to demand top pay.

Those able to design HFC architectures, those knowledgeable in digital testing, and leaders in video streaming, computer interfacing and software, networking, network operations center (NOC) control, headend design, modern power concepts, and so on will be sought in our industry. There will be an explosion of new jobs and career opportunities for those in the technical community who are willing to continue their education, both formally and with in-home studies.

Obtaining Society of Cable Telecommunications Engineers Broadband Cable Technician/Engineer (BCT/E) training and certification will affect career growth more than ever.

As HFC networks become more accepted as the real answer for communications worldwide, remember that it is our HFC networks themselves that are coveted for future value. And you are the technicians and engineers who designed them and maintain them every day.

Making it happen

They operate because you are there to care for them. But the additional services that they will provide in the future will require technicians who understand basic HFC theory in addition to being prepared to deploy the many additional services through the original structure.

So continue your advanced services deployment education right here and now. What follows in this special section of *Communications Technology* is advice from your fellow engineers who've already deployed some of the advanced services we've talked about here. Does real advice from real digital, data, telephony and VOD deployment engineering professionals sound interesting right about now? Read on. CT

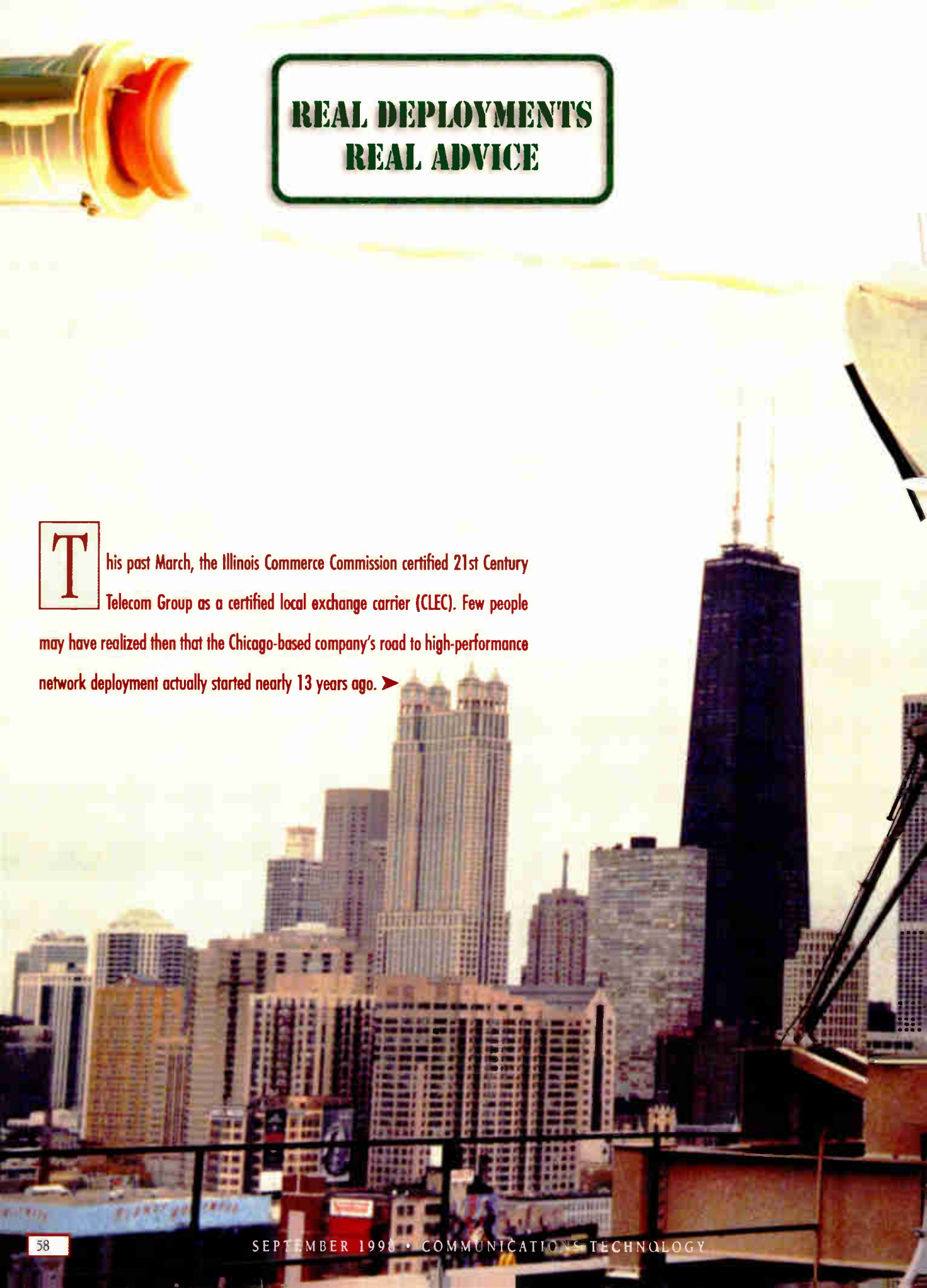
Rex Porter is editor of "Communications Technology." He may be reached via e-mail at tvrex@earthlink.net.

Get the Goods

To get the gear you'll need for your own deployments, you'll need vendor contact information. Turn to page 108 for *Communications Technology*'s Deployment Resource Directory, which is replacing *CT*'s Vendor Connection this month.

REAL DEPLOYMENTS REAL ADVICE

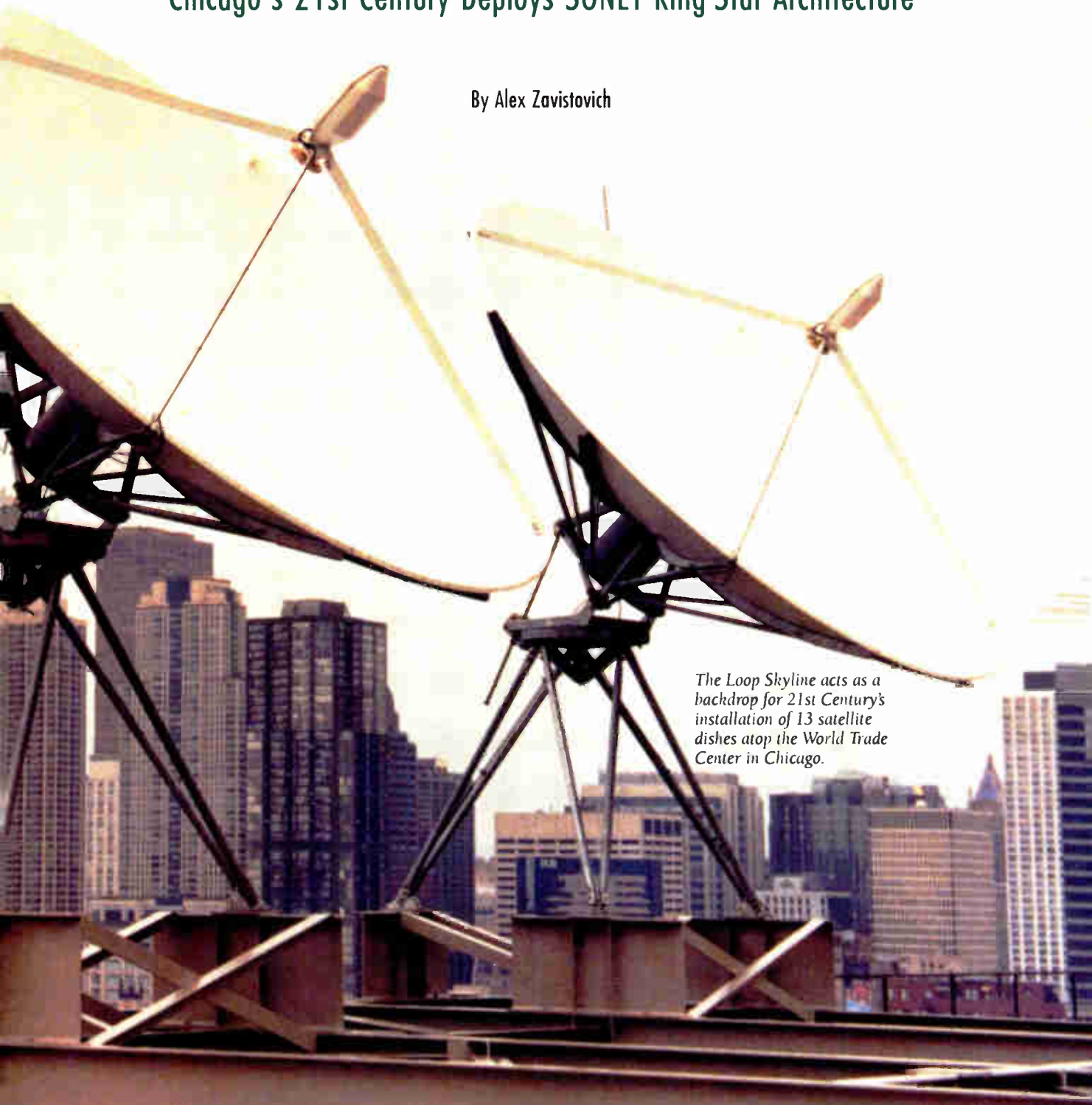
This past March, the Illinois Commerce Commission certified 21st Century Telecom Group as a certified local exchange carrier (CLEC). Few people may have realized then that the Chicago-based company's road to high-performance network deployment actually started nearly 13 years ago. ➤



A Network for the New Millennium

Chicago's 21st Century Deploys SONET Ring-Star Architecture

By Alex Zavistovich



The Loop Skyline acts as a backdrop for 21st Century's installation of 13 satellite dishes atop the World Trade Center in Chicago.

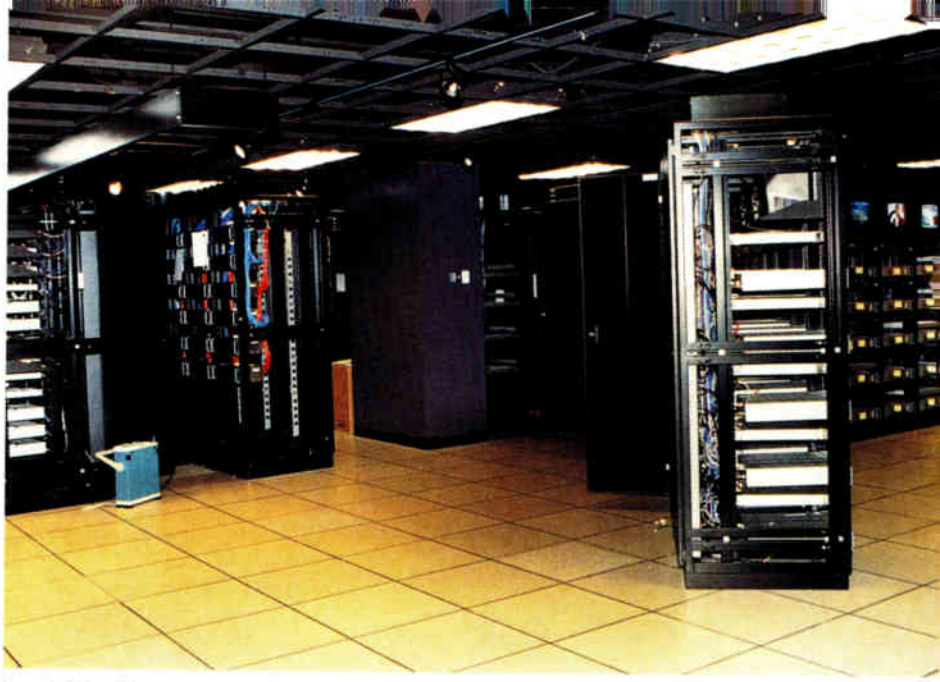
Back in 1986, the only full-time employee of the company was founder and Chief Executive Officer Glenn Milligan, a former executive with the Disney Channel. Milligan recalls that he, a contract engineer and a contract secretary were able to amass 24,000 video service subscribers under contract, competing head-to-head with TCI, the franchise holder for the area. The company was the first to use audio/video transport service from what was then Illinois Bell Telephone to facilitate transmission of cable TV signals from a central headend to multiple dwelling unit (MDU) buildings.

That 24,000 subscriber number did not sit well with local incumbent TCI—which Milligan says encouraged the city to file suit against 21st Century. Immediately embroiled in a five-year litigation, the fledgling company had only 2,000 subscribers connected at the time of the suit, having lost the other 22,000 contracts. "We won the battle as far as litigation was concerned because our decision was the basis for the FCC's (Federal Communications Commission's) video dial tone decision," Milligan explains. "But we lost the war because we lost the other 22,000 subscribers."

In 1992, Milligan began application proceedings for a 15-year franchise, which the company won in 1996. The four years took their toll, Milligan concedes, noting ruefully, "If I had thought it would take four more years on top of the preceding five, I probably would have decided to do something else for a living."

Stephen Lee, the company's senior vice president of Internet and data services, adds that the franchise proceeding was "the longest legislative bill that ever stayed in the Chicago City Council." In addition to the franchise, 21st Century secured an innovative arrangement with the Chicago Transit Authority (CTA) to deploy the network's high-capacity fiber backbone on the CTA's strategically located private right of way. Both are 15-year agreements.

For Lee, a key near-term goal is future-proofing the network against competition. "By city ordinance, only four attachments are allowed per utility pole in Chicago. The first three are cable, electric and telephone. We're number four. Since we're occupying the last available spot on the poles, 21st Century's presence has created a substantial barrier to any future prospective facilities-based competitors."



Inside 21st Century's network operations center (NOC).

One-stop shopping

Company Chief Technical Officer Jay Carlson explains: "21st Century has positioned itself as a competitive communications provider. We don't see ourselves as a traditional overbuilder; we look at ourselves as a one-stop shop for telephony, cable TV and data. We also look at our network's horsepower as an enabler for mobile services, capable of providing backhaul for PCS (personal communications services) and other wireless applications.

"Our strength is providing the best service offerings in each of those areas," Carlson adds. "We'll be successful if we have achieved a reasonable penetration in all three domains, rather than having the lion's share in telephony, CATV or data alone."

To that end, Carlson and his team have developed a distributed ring star synchronous optical network (SONET) topology. A truly full, robust self-healing SONET distribution network, the system uses OC-48s for distribution locations, supporting dedicated OC-12 outlets. Carlson explains the advantages.

"In a distributed ring star architecture, we essentially have 36 central offices, so we can distribute the logic you typically find in an operations center closer to the customer," he says. "A lot of the line provisioning and traffic you'd find in a traditional central office environment has been brought closer to the customer; we can manage the aggregation of return path traffic more effectively."

In developing this topology, Carlson tried to assemble what he says are the best technical minds in the industry. John Brouse, formerly of Jones Communications, is vice president of network operations. Internet expert Lee comes from Metropolitan Fiber Systems, and coming from Nortel is Director of Network Operations Tony Daniels.

Pirelli provided fiber for the network, says Brouse. "We're using dry cable instead of water-blocking gel fill under the jacket, and water-blocking tape." The combination has dramatically decreased construction time and cable preparation, Brouse says, and reduces potential for mistakes.

Nortel provided the transport backbone and telephony portion of the company's interactive broadband network, Brouse notes. The vendor is supplying a full suite of switching, transmission and access equipment, including the DMS-500 local/long distance switching system, AccessNode and AccessNode Express platforms and S/DMS TransportNode OC-48 and OC-12 systems.

"We're using OC-3s in the OC-12 frame to get out to the actual access nodes," adds Lee. "Off the access nodes, we can get onto the Express nodes." Stripping a port off the OC-12 for a multiprotocol switch enables Lee to do multiplexing for broadband applications.

Transport rings

Dynamic elements of the system include the transportation rings and campus rings. The transportation ring is a point-to-point

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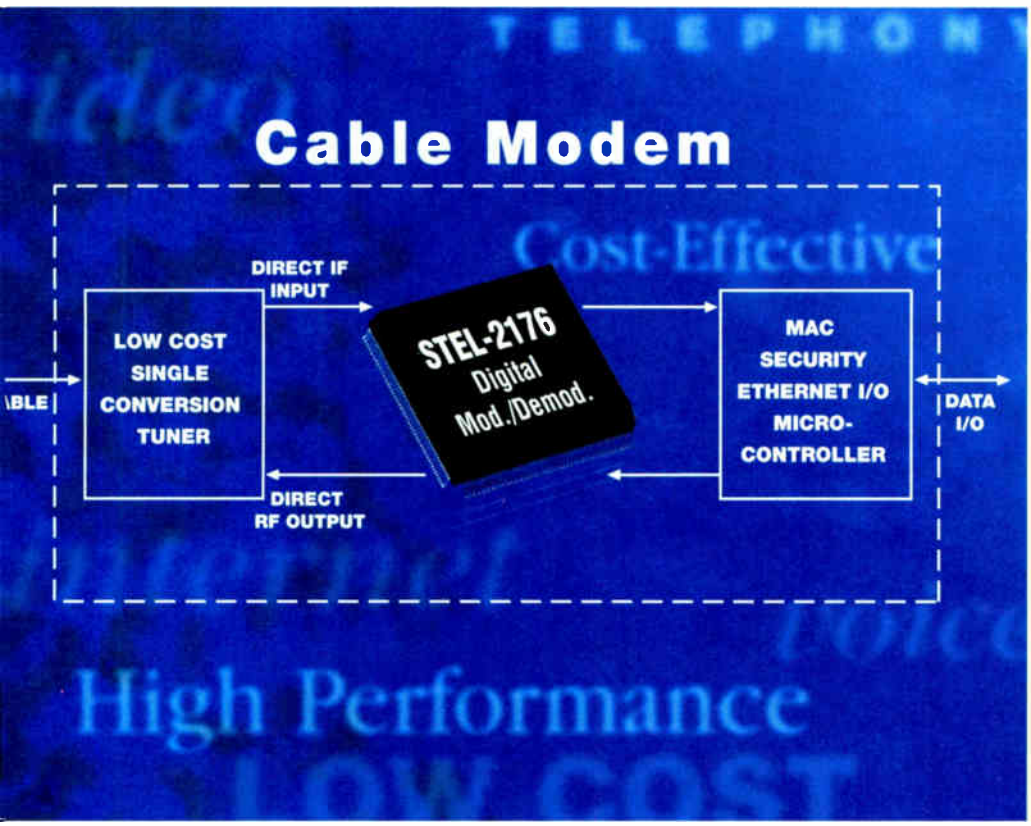

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Members of the operations team and headend technicians celebrate the launch of 21st Century's NOC.

OC-48 supported broadband network, says Carlson. The system employs dedicated OC-48s at strategic locations on the ring and provides a drilldown to four OC-12s for demarcation of transportation hub locations. Two transportation rings essentially run north-to-south along a CTA route. "We have access on CTA right-of-way along above-ground railway and subway," Carlson explains. "The subway mirrors the above-ground route, so the network has built-in route and circuit diversity."

The transportation ring has self-healing attributes, with route diversity offering physical protection from faults and circuit diversity for protection from equipment failure. Campus rings share the same self-healing attributes as the transportation ring. It is here that 21st Century has tried to bring signals closer to the customer. Unlike the transportation ring, combining of signals takes place at strategic campus hub locations.

In 21st Century's service area, according to Lee, "We have 300,000 residents and 500,000 business outlets. Of the 300,000 residential consumers, 88.2% are in MDUs. Our telephony model is very much addressing that marketplace."

Carlson elaborates: "Our strategy for the first three years is to take a narrowband SONET-based approach to significant MDUs. We'll provide an access node, capture the Category 5 wiring at each MDU, and bring it over to our distribution frame." Cable-phone, Carlson says, is reserved for single-family dwellings. "The technology is not currently where it needs to be for our business case. However, we will be conducting tests with the cornerstone products this fall, and we plan to have a cable-phone solution within 12 to 18 months."

Campus hubs

The star distribution scheme is particularly important at campus hubs. "The customer is never more than three-quarters of a mile from a central office," Carlson says.

According to Lee, each hub employs optic frames, SONET frames and wave division multiplexing (WDM). At the campus hub, an optical 1,550 nm system enters a fiber management terminal, then an optical splitter assembly, where the signal is wave division multiplexed. At the OC-12 transport node, an OC-3 is stripped off to a Cabletron multiprotocol switch. The switch supports transceivers that prepare 100BaseT signaling for broadband 6 MHz transport.

Data is modulated at 1,310 nm, and video is multiplexed at 1,550 nm, Lee explains; in that way video and data are effectively segregated. "Only when you make the commitment to WDM can you have all services on one fiber," Lee says. The system is replicated four times to accommodate four discrete channel lineups.

Opto-electronics for the 21st Century network are supplied by Harmonic Lightwaves. Included in the network are POWRLink distributed feedback transmitters, MAXLink 1,550 nm transmitters and optical amplifiers, NETWatch element management system hardware and software, as well as optical nodes and return path equipment.

From the hub location out, 21st Century brings 24 to 36 fibers to 500 home cell sites. "Any building we serve that has 125 units or more gets its own optical node," Carlson explains. "Even though you have 500 homes, you may have as many as six nodes in that particular area." The company still relies on coax distribution for smaller buildings.

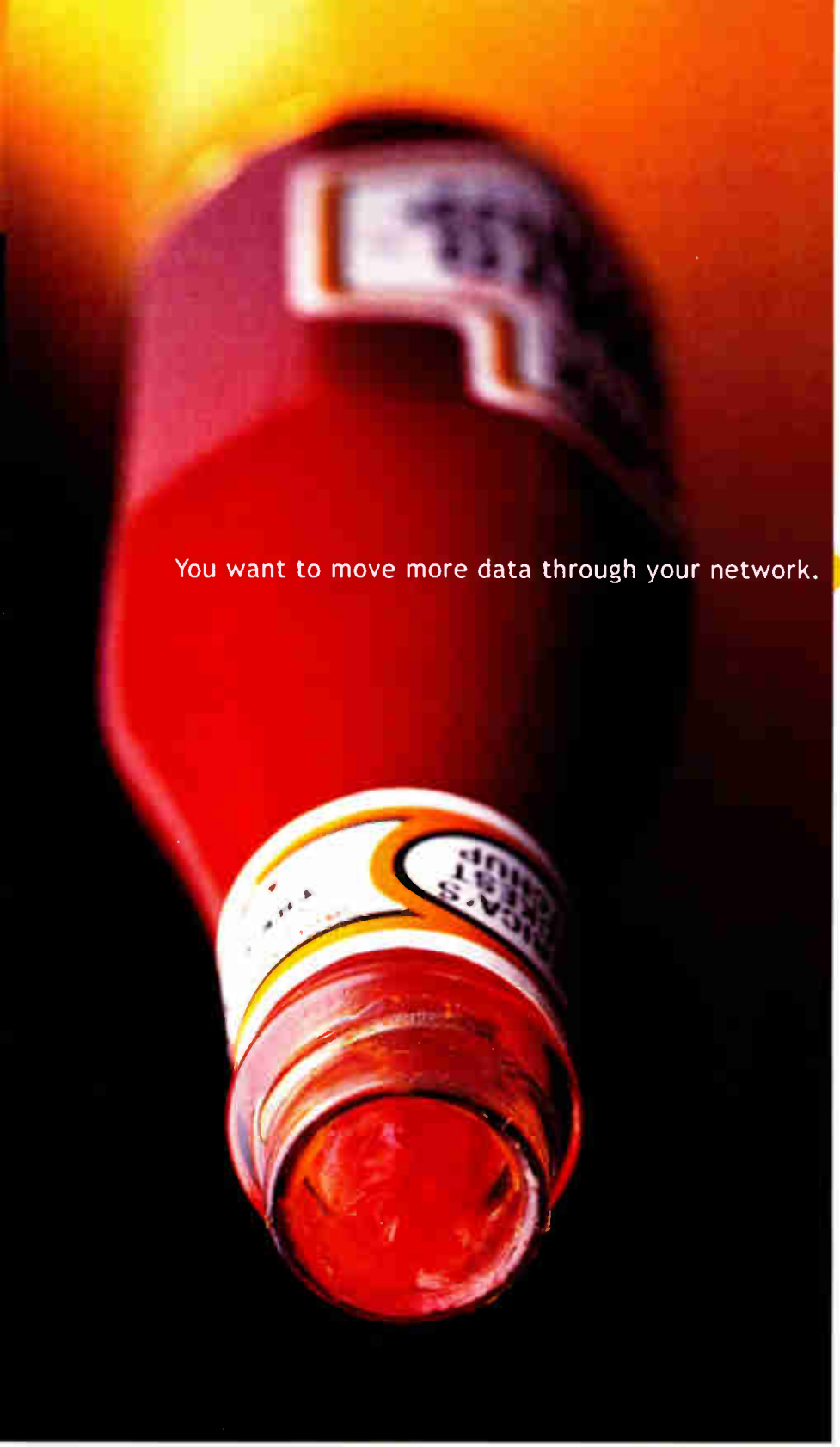
At each cell location, which 21st Century's technical team calls a Fiber Distribution Center, star fiber terminates and bus fiber connects to different buildings. As previously mentioned, four discrete channel lineups are provided, comprising 150 analog channels.

"We found ourselves in the peculiar situation where you're not going to be able to home-run wire each of these buildings," Carlson says. "In a traditional loop-through system, you could find yourself providing service to 15-40 residents in series. We've restricted the number of residents in series to five."

Traffic management

The transportation ring for the system is fed off the system's network operations center (NOC), providing a bus for transportation hubs. The engineers manage the traffic from the hubs. The system does not use asynchronous transfer mode (ATM) at this point. "There's no need," Carlson explains. "Since we're using OC-48 for point-to-point transport, we don't need to aggregate."

The communications industry has yet to create a unified network management



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ADC Telecommunications

Unlocking Network Potential

solution that would allow 21st Century to monitor, manage and control the performance of its systems from a central office or remote location. The company, however, has created a custom designed graphical network management system that allows for total monitoring, management, control and provisioning of its video, voice and data services. Daniels explains, "We've unified systems from Nortel, Cheetah and Harmonic Lightwaves, to name a few, and we've had these systems integrated by Harris Network Management."

Carlson concedes that one of the greatest challenges is network management on the return path. "The problem with the industry's approach to cable modems is that it's relying on an HFC (hybrid fiber/coax) transport that has not managed the aggregation of return path traffic," says Carlson. "When we're sending traffic back, we have to deal with the phenomenon of aggregating all customers back into main transport, giving restricted bandwidth (5 MHz to 40 MHz). Unless you've brought your fiber pretty deep into the network, you have an aggregation issue that will bring even a 10 Mbps system to a screeching halt."

Lee elaborates. "The majority of modem vendors take an approach similar to a cable operation: Put everything at the headend, so you either broadcast out or broadcast back. That's where you get hit with reverse contention problems." He thinks 21st Century has the answer. "By putting the transceiver close to the customer at the node level, aggregating it on the SONET, you get away from that problem. You're not sharing that small amount of bandwidth over multiple subscribers.

"By placing components, routing cable and associated management tools closer to the customer, we can manage the service better," Lee adds. "I can do SNMP (simple network management protocol) management all the way to the customer premise equipment now. I don't have to worry about individual segments comprising thousands of users, but tens and hundreds of users instead."

The router used for this purpose is essentially a nonblocking bridge, which looks at the media access control (MAC) layer address, does some basic filtering, and passes the packet. "It can be Ethernet, IP, SNA (systems network architecture); it doesn't matter," Lee enthuses. "It enables me to convert to Ethernet early on in the network and transport it over SONET. I can do all the things in the data world that aren't usually available over cable, things like measured bandwidth."

As a result of this approach, downstream and return path speeds are high. The gating item, according to Lee, is the PCI bus, which is typically 1.5 Mbps. "We're maxing out Netscape's browser's buffers, which have a throughput of 768 kbps. We're seeing that kind of speed both up and back."

What's allowing that to happen is 21st Century's cell size of no more than 500 homes, says Carlson. "As soon as we get back from the home, we're stripping the data off the broadband and putting it on the SONET. If the 500-homes-passed area requires additional traffic management, we can add additional 6 MHz blocks. Secondly,

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because we have 36 fibers terminating, it's easy to cut that cell size to two 250-home areas. So we have a physical drill-down approach and a bandwidth approach."

Cable modems

In October 1997, 21st Century announced plans to purchase up to 40,000 Zenith HomeWorks modems and other electronic components for broadband Internet access. 21st Century's high-speed Internet access service is priced at $49.95 per month for unlimited access, including the HomeWorks cable modem. According to press releases from 21st Century, "Significant discounts are available to customers if this Internet service is purchased in combination with 21st Century's cable television or other telecommunications products."

A 10BaseT network interface card connects the personal computer (PC) and cable modem; this is where signal conversion between Ethernet and RF occurs. The signal is transported at 1,310 nm to the node. From the node, the signal is converted back from RF to 10BaseT signal using a Zenith transceiver and remodulator. At each of the campus hubs, as previously described, a Cabletron Enterprise 6000 box (essentially a 24-port Ethernet switch), is fed by an OC-3. As a user accesses a Web site, the signal is converted to an optical signal to minimize return path contention issues.

A Netscape video proxy server installed at the headend can cache up to 250 of the most popular or most frequently hit Internet home pages. If the request for information is outside the network, it is passed through one of two Cisco 7507 routers to a DS-3 line for connection to the gateway provided by UUNet or over four T1 lines to MCI's gateway.

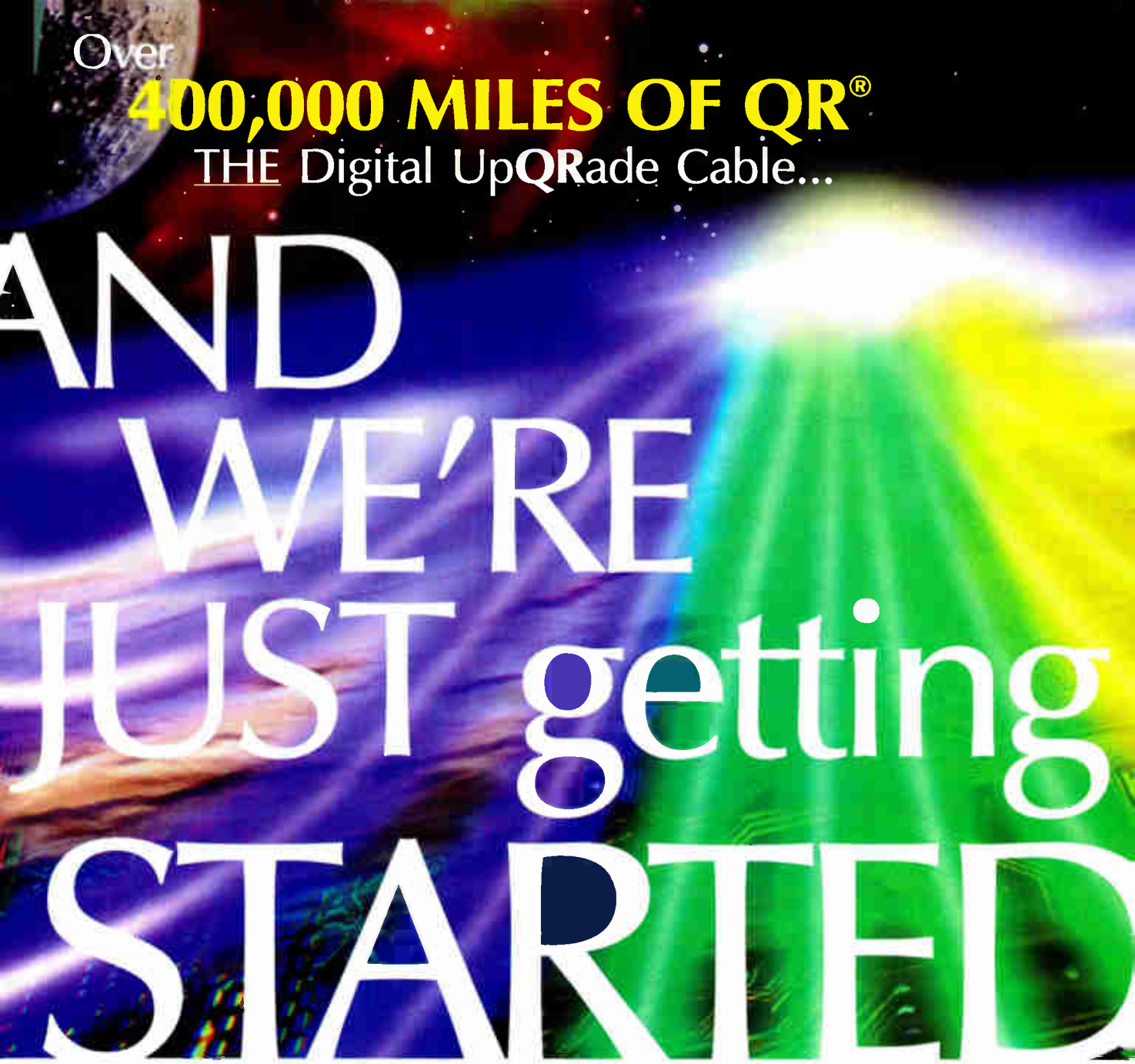
Silver lining

So nearly 13 years after he first took on the challenge, Glenn Milligan is decidedly upbeat about the future. "I like to look for a silver lining in every cloud. We have the premier franchise in the country.

"We're not going out in the market with coaxial street grid system, we're going out with one of the most advanced networks," he says. "This is truly a first-class telephone network that also carries video and high-speed data. If there was an advantage to the decade of agony we were subjected to, it's that we're now able to compete, not as a cable overbuilder, but a full-service communications provider."

As Milligan explains, "The franchise we have helps facilitate our mission. We have the requirement to build the ubiquitous platform in the residential area, and we have unlimited access to the public right-of-way in the commercial area. Chicago is the second largest business and financial area in the United States. This gives us the opportunity to make an economic feasibility decision on a building-by-building basis as to where we'll deploy our network." CT

Alex Zavistovich is consulting editor at "Communications Technology." He can be reached in Potomac, MD, at (301) 340-7788, ext. 2134.



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REAL DEPLOYMENTS
REAL ADVICE

Telephony Tips from the Front Line

Advice From Two Cable Systems That Have Done It

By Andrew Morris

AT&T's plan to gain entry into new local markets through its proposed buyout of TCI has brought renewed attention to the world of broadband telephony. However, cable operators have not just been asleep at the wheel until now. Some MSOs such as MediaOne have deployed telephone service over cable during the past year and gained valuable experience in the hybrid fiber/coax (HFC) telephony arena.

"We are in the midst of rolling out and launching telephone services over HFC networks," says Greg Braden, vice president of digital telephone services at MediaOne. "We currently have HFC delivery systems in Atlanta and Los Angeles. We expect to deploy these services in at least one other city in 1998 and will continue to roll out these services in the future."

Super Headend

Braden explains that MediaOne currently is deploying circuit-switched telephony over these HFC networks and is using Lucent 5ESS switches for the switching fabric.

In its Atlanta system, the 5ESS switch is located in what MediaOne calls a Super Headend. Atlanta is receiving a complete rebuild and is consolidating headends into two buildings that will contain all of the Scientific-Atlanta video gear, the Lucent switch, and potentially data routers and servers for high-speed Internet service via MediaOne Express.

Redundant synchronous optical network (SONET) rings transport the broadband signal from the headend to the hub (see the accompanying figure on page 70) with each hub passing between 20,000 and 30,000 homes. A host digital terminal (HDT) that serves as an intelligent interface between the Lucent switch and the HFC network eventually will be located at each hub.

From the hub, the signal is distributed to fiber nodes, each of which passes approximately 500 homes. At the node, the optical signal is converted to an RF signal and is delivered to the home via standard coaxial cable that terminates in a network interface unit (NIU).

It is the NIU that puts the telephone signal on the coax and also takes that signal off the coax. The electronics in the NIU split the video from the telephony, and the telephone signal is distributed to the home on standard twisted-pair while the video is cross-connected in the NIU to the coax drop into the home.

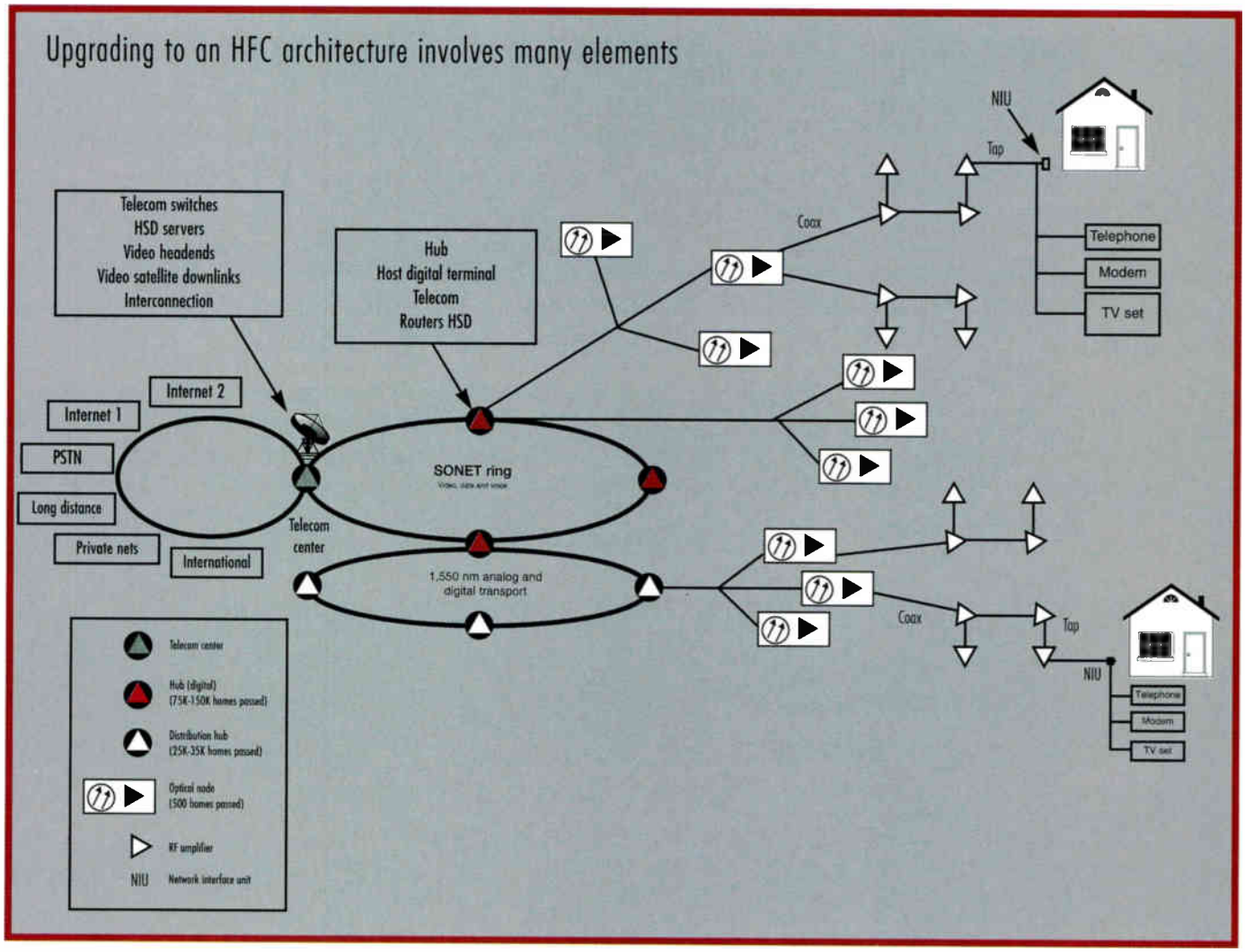
Just like the PSTN?

"From the switching point of view, the system is just like the public switched telephone network (PSTN)," explains Braden. "The new piece is delivering the telephone signal from the hub to the customer premise where we add and subtract voice signals to and from the coax. The fiber, the SONET ring, the switching, and the digital cross-connect are all similar to existing telephone infrastructure."

OFDM

ADC is providing equipment for MediaOne's Atlanta cable system. The ADC Homeworx platform uses orthogonal frequency division multiplexing (OFDM) and can provide up to 240 DS0s (240 64 kbps channels equivalent to 10 T-1s) in a 6 MHz channel. Overhead data for signaling (such as on hook/off hook, ringing), call processing, diagnostics and status monitoring are handled within that same 6 MHz channel.

ADC's Doug Smidl, vice president of marketing of the Access Platforms Systems Division, emphasized the greater capacity available through ADC's use of OFDM and through the use of traffic modeling techniques. "Homeworx can provide approximately 1,400 lines in one 6 MHz channel to a node through these techniques. Of more compelling interest is that we provide 240 DS0s of bandwidth in one 6 MHz channel in



the upstream where bandwidth is really limited."

Smidl explained the role of the HDT and the NIU (called an ISU or integrated service unit by ADC) in the HFC architecture. "The HDT is really the brains behind the system, and it enables the capacity, flexibility and variety of services available on the Homeworx platform. This includes plain old telephone service (POTS)-based service as well as data services."

ADC offers a home integrated service unit (H-ISU) that features two POTS lines that can be expanded up to four POTS lines. In the near future, the H-ISU also will be configurable to provide up to two POTS lines and 512 kbps of two-way symmetrical data. Access to data from the H-ISU would be via 10baseT Ethernet using Category 5 wiring. ADC is not yet shipping the data option.

Cable's advantage

Braden discusses the advantages a cable system has in deploying broadband telephony. Braden estimates that it costs MediaOne $800 to add a phone customer, while it costs a regional Bell operating company (RBOC) $1,000 to $1,200 to add a new telephone line for each customer. "Furthermore, $800 is telephony across a broadband pipe with multiple lines of service across that pipe," adds Braden.

The $800 per phone customer is derived from a cost of approximately $400 for the broadband upgrade, which includes the cost of upgrading a system from 450 MHz to a reliable, fully capable two-way 750 MHz network. This includes the headend electronics, the HFC design including the HDT, the addition of the telephone switch and Internet access equipment (servers and routers), as well as an appropriate powering scheme to maintain dial tone if the house loses power. Adding phone service for each subscriber costs MediaOne an additional $400. This includes the cost and installation of the NIU.

Power

In MediaOne's systems, the network provides power to the network interface. In Atlanta, power is provided over the coax center conductor, while in Los Angeles, power is provided over a separate conductor in a Siamese cable that also contains the coax feed to the home.

In very densely populated areas, power is backed up by natural gas-fired refrigerator-sized generators. If commercial power is lost, a battery backup provides power until the generators come on line.

In less dense areas, MediaOne uses a distributed power scheme. Four-hour battery packs are used in the field, and portable generators are deployed if the power outage continues for a significant period of time.

MediaOne installs telephone service in a customer's home in Atlanta. This was the MSO's first community to receive telephony via its hybrid fiber/coax (HFC) network.

Benefits

Jack Armitage, vice president of telephony and high-speed data for MediaOne in Atlanta, explained that the Atlanta cable systems benefited from offering traditional telephony services to both the business and residential markets prior to the current broadband HFC-based services.

"A lot of things need to be in place to offer phone service," says Armitage. "We had to have some fundamental things in place like operator service, directory assistance and the ability to process 800 numbers as well as third-party and collect calls."

In January 1998, MediaOne entered the residential single family market with telephony over HFC. Armitage states: "Getting a 750 MHz two-way system in place and getting it certified is a big challenge and is a fundamental building block for offering telephony services. When we rebuild to 750, we put 750 video in service for at least 30 days before adding telephony."

Education and reliability

Armitage also explained that it is necessary to train technicians to operate differently in a two-way HFC environment than in a one-way video environment.

"With an HFC architecture, you cannot take everybody down when a technician tweaks an amplifier. We have had to offer strict guidelines and tolerances and retrain our cable representatives for a two-way environment. It's a whole new bag of tricks."

Armitage states that all of Atlanta will be rebuilt by the end of 2000 or early 2001. At that point, MediaOne's Atlanta system will have the capability to offer telephony to nearly one million homes.

"It's a huge effort at a huge cost by the time all existing cable plant is upgraded," says Armitage.

In response to questions regarding cable system reliability, Armitage states, "We must have a reputation of reliability equal to or exceeding BellSouth in order to compete."

ADC's Smidl says: "Technology is no longer an issue. Platforms like ours put the reliability question to rest. It's now up to the cable operator to market it, manage it and drive it."

Even a little share is good

Certainly, MSOs have great financial incentives to add telephony to their service mix. "The market for telephone service is huge," concludes Braden. "National spending on cable service totals between $25 billion and $30 billion. In contrast, MediaOne alone passes

BOTTOM LINE

Position Yourself for Telephony

Greg Braden, vice president of digital telephone services, states that MediaOne is selling telephone service to its cable customers in Los Angeles and Atlanta at levels that are five times greater than anticipated. It is experiencing installation backlogs and is adding installers quickly.

Asked about BellSouth's response to MediaOne competition in the Atlanta telephone market, Jack Armitage, MediaOne Atlanta's vice president of telephony and high-speed data, responds: "What is Bell South doing? We haven't seen anything yet. They are competing with us in video with multichannel multipoint distribution system (MMDS), but as for residential phone there has been no reaction."

Armitage does point out that BellSouth still has 99% of the wired telephone market.

Looking beyond circuit-switched telephony, we find packet-based Internet protocol (IP) telephony. Cable operators offering high-speed data and traditional telephony services today (or in the near future) will find themselves in an excellent position to take advantage of that technology should it take off in the future. Those cable systems will have both the back-office telephone infrastructure (billing, call processing, provisioning, status monitoring) and the high-speed data network in place.

households that spend $22 billion on telecommunications, and that does not include wireless telephony.

"A little share of a big market is quite good. Achieving a modest 15% to 20% market share gives us a great financial lift. We can move to a $1 billion to $1.5 billion revenue stream with relatively modest take rates," Braden says. CT

Andy Morris is a freelance writer based in New York. He may be reached via e-mail at amorris@msn.com.

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REAL DEPLOYMENTS
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Prepare Your System for Video-on-Demand

A Six-Step Program for HFC Networks

By Chris Patterson and Del Heller

More than one and a half years of field experience with an operating, two-way interactive, digital video-on-demand (VOD) service has revealed that extraordinary effort is not required to ready a hybrid fiber/coax (HFC) cable system for VOD, *if* quality design, construction and operational practices are adopted and adhered to.

The first critical steps are related to network device selection, system design and construction.

Device selection

Although construction cost always is a major consideration, the quality of the network components chosen should take equal priority. Most major optical and RF components today are relatively similar in general performance and overall cost, but some of the more esoteric yet critical performance data, such as mean time before failure (MTBF) and mean time to repair (MTTR) are not readily available unless specifically requested.

Considerable time usually is devoted to the selection of quality network components until it comes to the drop system and other less-expensive, yet critical, components. These include distribution and feeder connectors, drop cable, F-connectors and subscriber-drop passive devices.

Everyone should know firsthand the ongoing effort required to keep signal leakage under control, yet the same components usually responsible for signal leakage are the ones where quality and cost considerations are tempting compromises. The failures of these same components will be the ones that will contribute to your even larger battle with signal ingress and the eventual deterioration of your return system.

Pin-type feeder connectors, drop cable with high shielding characteristics, compression type F-connectors and drop passives with high shielding effectiveness are all critical decision points.

Do It Right

1) Select quality network components, from headend to TV set.
2) Execute a quality network design.
3) Develop a complete construction manual, hire a good contractor and inspect its work on a continual basis.
4) Appoint an in-house team to perform both contractor inspection and the final network performance proofs.
5) Begin your personnel training program early in the rebuild process so that your field staff is fully capable of assuming network maintenance upon plant activation.
6) Review and adjust all of your system practices and policies in order to ensure that they now reflect the realities of a two-way communications network that must operate with a high level of reliability.

System design and supervision

A quality system design is the next critical step. Accurate base maps, including all potential dwellings and businesses passed and their addresses, are a must. The physical placement of active devices, both optical and RF, for maximum servicing convenience is critical for high network availability and quick repair time.

The final step in the network preparation process, the selection of a rebuild contractor and how the network turn-up and proofing is accomplished, is where the biggest risks can occur. This step can either enhance or degrade all of the painstaking decisions you have made up to this point and will determine the ultimate reliability of your network.

Without adequate in-house supervision, even the best contractor can deliver an inferior product. Employee churn in the contractor market is even greater than that of a cable system. Many contractors

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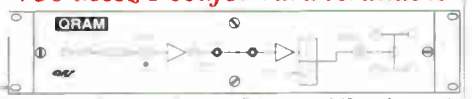

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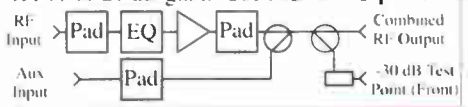

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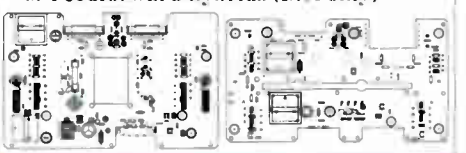

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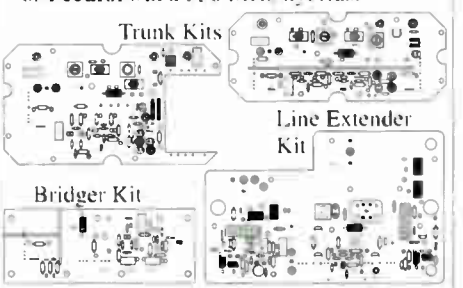

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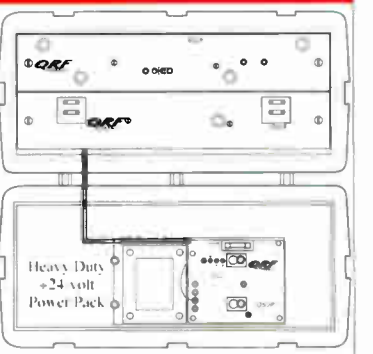

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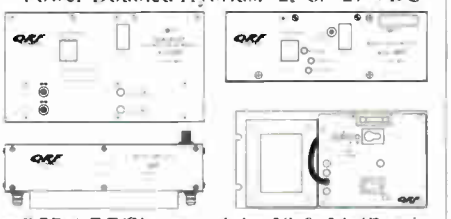

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have inadequate training programs for their employees, and the only guarantee that you have that you will ultimately get a product you are satisfied with is to supervise the work very closely.

The final agreement with your chosen contractor should include a detailed construction specification outlining all of the workmanship and installation requirements for your rebuild. This document will serve as the final arbiter when quality and workmanship issues arise.

Your in-house inspection and quality control program should include direct inspection of each contract employee's work on an ongoing basis, through random spot checks, as well as performing initial forward and return system sweep and the final end-of-line proof and technical performance tests. These inspections should occur within a relatively short time after the work has been completed, in order to find and correct improper workmanship or behavior.

Testing

A significant learning step has been that the usual battery of analog performance measurements, such as carrier-to-noise ratio (C/N), composite triple beat (CTB) and composite second order (CSO), do not necessarily provide absolute certainty that your plant is ready for digital services. This would include not only VOD, but also other digital services. Bit error rate (BER) testing with actual or simulated digital signals is

BOTTOM LINE

Get Ready for VOD

You may not realize it, but you already know how to prepare your system for digital services, including video-on-demand (VOD).

Remember the last analog system upgrade or rebuild that you completed? At its conclusion you may have said to yourself, "Everything came out pretty good, but boy, if I would have had just a few more dollars to spend or a little more time to do it in, I could have made it perfect."

You're now being asked to ready your network for digital services. If your network upgrade or rebuild is already completed and you didn't or haven't considered the issues outlined herein, you may have some unpleasant surprises in store for you.

If you haven't begun your network upgrade yet, have a helping of the basic recipe outlined in the accompanying article. You will probably find the taste extremely familiar.

The only thing that you need to do differently this time is to spend a few more dollars and invest a little more time, and your network will be almost perfect.

The server/headend of a video-on-demand (VOD) demonstration system.

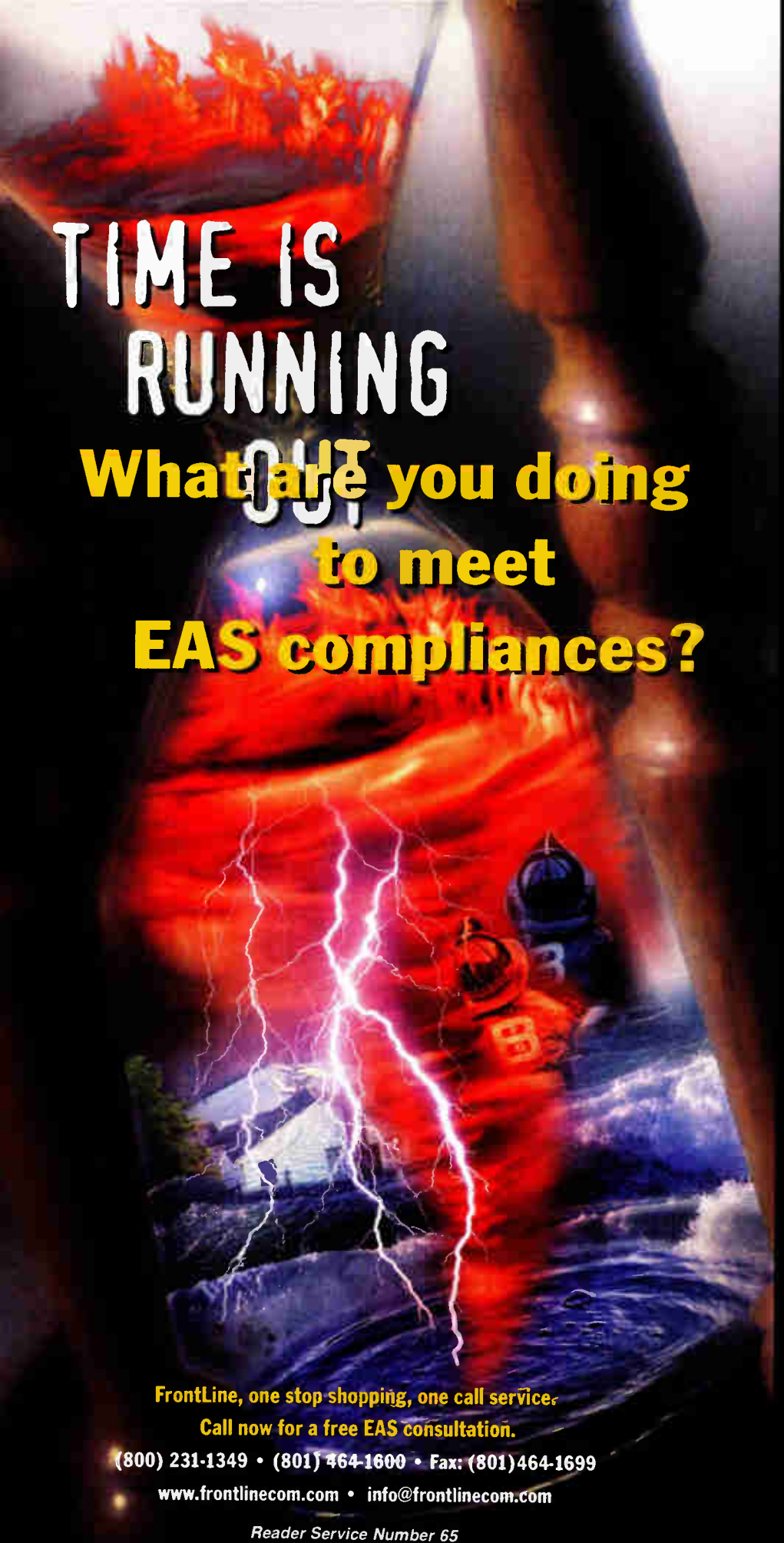
highly recommended as a final adjunct to your analog tests.

For VOD services, a 64-QAM (quadrature amplitude modulation) or 256-QAM signal generator, capable of simulating video streams, along with a frequency upconverter, is required at the headend. We recommend placing the digital test signal somewhere within the general frequency spectrum intended to be used for VOD.

At the field test location, a QAM demodulator, appropriate software and a data analyzer capable of displaying uncorrected bit errors and constellation displays is required. There are a number of integrated data demodulators just now being introduced to our market that are capable of demodulating raw data streams and displaying uncorrected BERs and constellation displays of various types of digital signal formats.

VOD transmission systems should be able to tolerate and correct for uncorrected BERs approaching 1×10^{-5}. Numerous field measurements have shown that a well-performing HFC system can produce uncorrected bit error rates, at customer tap locations, exceeding 1×10^{-8} or 1×10^{-9}, over a 10-minute measurement window.

Some common problems found with a BER test setup include marginal optical



The winds of change are upon us. On December 31, cable and wireless operations must be in compliance with the new Emergency Alert System requirements. For you, it means more work and some new equipment.

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Reader Service Number 65

REAL DEPLOYMENTS
REAL ADVICE

Planning for Digital's Day-to-Day Impacts

By Richard D. White

Now that digital TV has been deployed in many cable systems, we know that the technology will work reliably with normal system maintenance. Conditioning the hybrid fiber/coax (HFC) network to handle high-speed data, telephony, and wireless personal communications service (PCS) has prepared the plant for digital as well.

The overall benefit is improved quality in existing analog services and system reliability. The greatest demand on systems deploying digital video services has been more operational than technical.

All areas of the business are affected by the introduction of digital TV. Marketing

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BOTTOM LINE

What to Expect In Digital Deployment

Today we know that digital TV technology works reliably with normal system maintenance. Conditioning hybrid fiber/coax (HFC) networks to handle high-speed data, telephony and wireless personal communications services (PCS) has conditioned the plant for digital as well. The overall benefit is improved quality of existing analog services and general system reliability. The greatest demands on systems deploying digital are more operational than technical.

Marketing has more services to sell, and customers have more choices. However, technicians, engineers, MIS operators, customer service representatives and installers face a steep learning curve. The increased time, resources and training required to deliver digital video can place a sizable burden on day-to-day system operations.

Knowing what to expect will help cable operators address these operational issues well before launching digital video, ensuring successful deployment.

has more services to sell, and customers have more programming choices, new services and new features—all definite pluses.

Technicians, engineers and MIS operators on the other hand, have more channels and services to monitor and maintain, while customer service representatives and installers have new services and technical requirements to learn. The increased time, resources and training required to deliver digital video can be a sizable burden.

Operations

By far, the greatest impact on day-to-day operations is time. Headend technicians/engineers, access control operators and installers will require more time to complete their daily routines.

Headend: The digital headend is quite different from the analog headend in that the integrated receiver transcoders (IRTs) must continuously listen to the access controller for program authorizations for services they receive.

These authorizations are stored in the IRT's queue, which holds about two days of programming. The communications between IRT and access controller must take place whether the system is using local access control or HITS (Headend In The Sky) national control. Loss of communications with the access controller will result in loss of video at some point.

To gain warning of a potential loss of service or loss of communications with the controller, headend technicians or engineers need to monitor the queues in all IRTs to verify that they are being updated, which will demand more headend technicians' time. How much time depends on the number of IRTs and locations.

Daily monitoring of 100+ digital channels also can eat a fair portion of a headend technician's day, depending on how long it takes to evaluate each channel. Besides having more channels to monitor, surfing digital channels is much slower than analog because of the time it takes to acquire and build the picture.

For systems using RF return for communications with the set-top, the reverse path data receivers' bit error rates (BERs) also should be monitored daily to determine the quality of reverse path signals. A BER that starts to deteriorate indicates potential plant problems. Armed with this warning, plant personnel can correct problems before they affect customers' service. This daily monitoring also demands more headend technicians' time, again depending on the number of receivers and locations.

Access controller: The access controller is the heart of the digital video system, whether it is at the cable system or remotely located as with HITS national control. The access controller, modulators, IRTs and application servers are all one system with constant communication between them. Systems using HITS will not see the same impact in controller operator time as systems using local control, since

most of the work will be done at HITS.

For systems using local control, controller operators' duties increase significantly. Some duties are not necessarily new to systems already using analog access control, but because of the sheer volume of additional services, there will be a drain on controller operators' time.

Some of the daily activities associated with the digital controller are:

- Daily backup of the database
- Verifying pricing and packaging
- Uploading purchases to the billing system
- Posting pay-per-view (PPV) orders
- Checking impulse pay-per-view (IPPV) error reports and correcting errors
- Polling set-tops

Weekly activities also include database maintenance, cleaning tape drives, weekly reporting and so on.

The greatest demand on the controller is handling IPPV events. With 45 channels of IPPV, the billing system will download between 300 and 400 events twice a day, more than 16,000 events a month. Though this information is electronically transferred to the controller, operators must check it and make some manual corrections. This process takes at least a full day for one operator.

Installation: The greatest impact on system operations is in installation. The time required to upgrade a customer from analog to digital is approximately 1.5 hours, which is roughly the same whether the system uses RF or telephone return to communicate with the set-top.

If RF return is used, the installer must identify the drop, verify its quality and internal wiring, and correct any discrepancies. The installer also must verify proper signal levels to the set-top and filter those portions of the drop plant that do not require an RF return path, if high-pass filtering is used.

If the system uses telephone return, the installer must run the additional phone line, which can take considerable time, depending on the location of existing services and access to their connections.

Once the physical install is complete, communications with the set-top must be established and the operating system and guide data downloaded, which can take seven to 15 minutes, depending on set-top model and authorization procedures. Cable operators should evaluate authorization procedures and modify them as necessary to minimize the time required for this portion of the install.

The capabilities of the set-top coupled with advanced stereo systems and home theater systems now found in many customers' homes add greatly to the complexity of the install. The "one touch record" feature in the set-top requires identifying and downloading the proper infrared remote (IR) codes for that particular videocassette recorder (VCR). If the customer has an old or off-brand VCR, finding a useable code can be a challenge. Picture-in-picture, RF bypass, and baseband vs. RF vs. S-video choices also add complexity to

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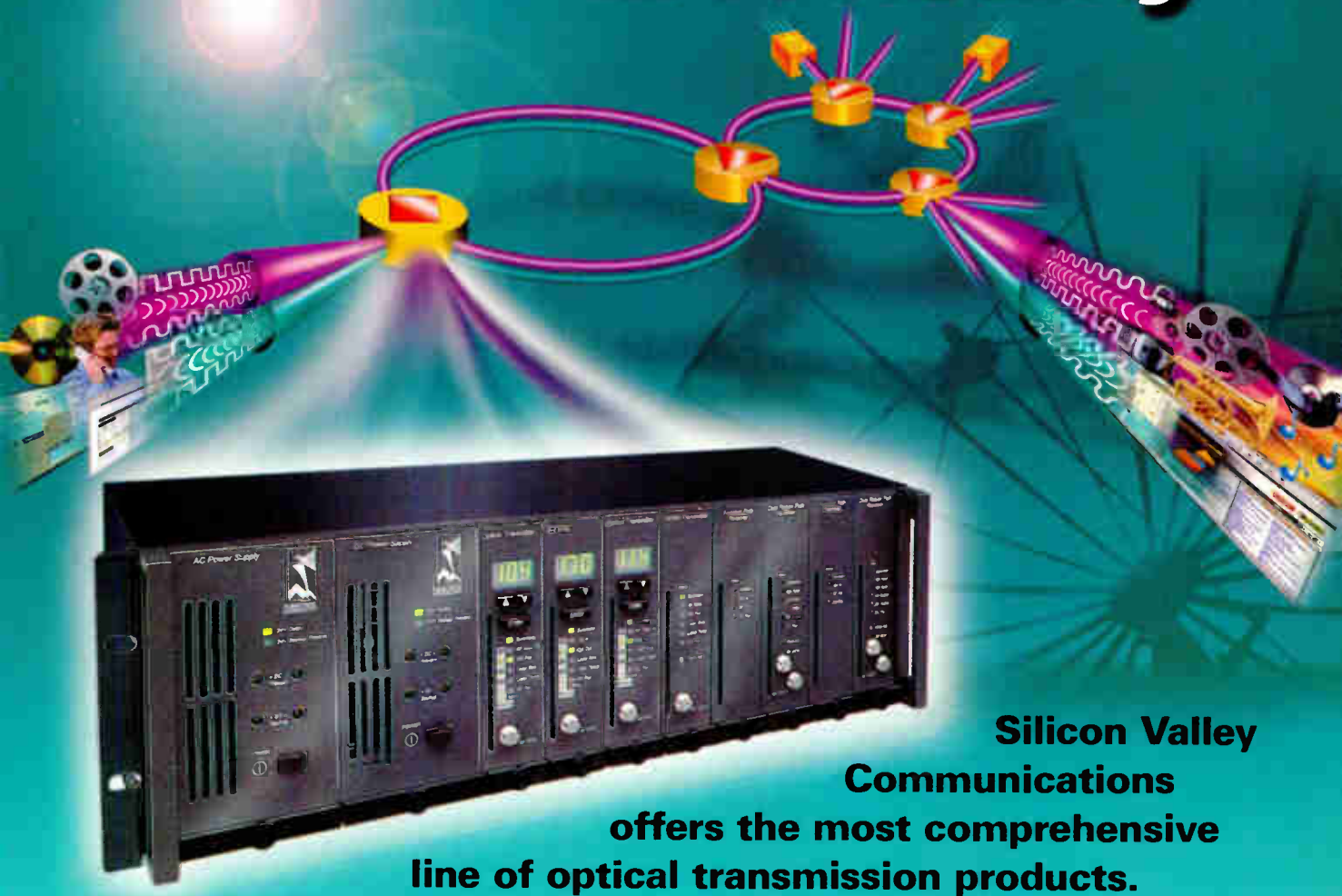

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Reader Service Number 74

the install, not to mention the new audio sources. While additional training can address many of these issues, sorting it all out for the best possible hookup will consume a large amount of time.

Finally, the largest contributor to the increase in install time is customer education. With the new functions and capabilities of the digital set-top, customer education can take 30 minutes or more. Often, return educational trips to a residence are necessary because the customer present at the install is not necessarily the primary user. Leaving a videotape with the customer that demonstrates how to use the box helps reduce education callbacks.

Training

The deployment of digital video requires additional training in almost every department, so everyone needs the product knowledge associated with the digital services and set-top. Employees should have the boxes in their homes for at least 30 days before launching to become as familiar as possible with their operation. This is especially true for employees who interact with customers daily.

Headend: Digital video brings with it a whole new world of expertise. The Moving Pictures Expert Group (MPEG-2) transport stream, transmission control protocol/Internet protocol (TCP/IP) communications, quadrature amplitude modulation (QAM) and controller interaction with headend equipment are some of the challenges in store for headend technicians. Much of the training required for digital is available from equipment vendors and is a must for understanding the operation, troubleshooting and maintenance of this equipment. Headend training sessions last three to four days, either at the vendor's facility or at the system if space and equipment are available.

Headend technicians should attend training just prior to installation of the equipment. If they train too far in advance, they will forget much of the training since they will not have had a chance to use it. Additional training usually is conducted in the system, while the equipment is being installed or just after installation.

An in-depth, bit-by-bit understanding of MPEG-2 is not needed to operate a digital headend, but a basic understanding of MPEG helps. This is especially true for systems doing local encoding or add/drop multiplexing, since this equipment manipulates the MPEG-2 data stream.

Testing and test equipment: Along with this new headend technology comes new test equipment and measurement techniques. Headend technicians must become familiar with new test parameters and procedures, what they mean and how they are measured. This is essential for accurately setting the headend levels and monitoring their technical performance.

Proper operating levels are critical to stable digital operation. Any new test equipment should be purchased in advance so ample time may be given to

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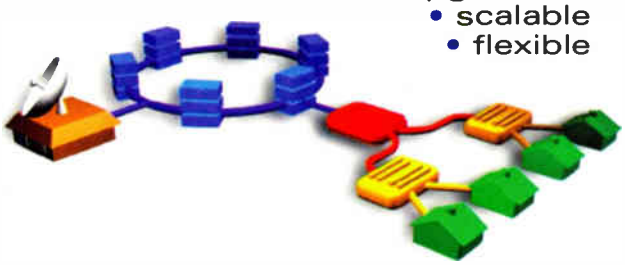

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Reader Service Number 76

learning its operation. Time also should be allotted to learning new measurement techniques on existing test equipment.

Access controller: Since the digital access controller is the heart of the system, its operators must know its operation thoroughly, as well as the operation of the billing system it communicates with. Again, the vendor can supply this training, which takes three to four days at the vendor's facility. Like headend technicians, controller operators should attend training close to the equipment-install date to retain as much information as possible.

In many cases, the billing system needs changes in its code to support the digital access controller, so operators need to work with the billing system vendor to identify any changes necessary and arrange for any needed training.

Installation: The installation and service group will require training in several areas because of the new technical requirements of the set-top, plus the features and services that come with it. Installers and service technicians also need a basic overview of what digital is, how it works and how its signal differs from analog, so they will understand what they are installing. Other areas for training include:

- Operational parameters
- Installation procedures
- Digital signal measurement
- Box authorization procedures
- Setting up VCR codes for "one touch record"
- Various TV set and VCR RF and baseband hookups
- Home theater systems and high-end stereo systems

Home theater systems and high-end stereo equipment are becoming more prevalent, introducing more challenges to set-top installation. These systems are capable of delivering higher resolution video plus various types of multichannel surround sound.

Digital set-tops can provide some or all of the signals required for these systems. Installers and service technicians must understand what these systems are, the differences in the various sound systems, and how digital set-tops support them. Dolby has a Web site at www.dolby.com that gives a good explanation of the various types of digital and surround sound audio systems.

Installation training takes at least two days, with more hands-on training as installers begin putting boxes in employees' homes. Again, install the digital product in employees' homes prior to making it available to the public so employees can learn about the product and its operation. This also gives the system a chance to fine-tune and work out any operational or technical issues prior to launching. CT

Richard White is equipment evaluations manager for Cox Communications in Atlanta. He can be e-mailed at rich.white@cox.com.

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Reader Service Number 78

Power Trip!

Tips for Planning Your Broadband Powering Strategy

By Eric Wentz

Centralized powering is becoming an increasingly common method of supplying the required power to new or upgraded broadband networks. The term "centralized" is used in various industries to illustrate various forms of powering topologies. In its simplest form, a centralized approach to powering a communication network consolidates otherwise independently located power equipment (distributed powering) into strategically located common installations.

Although distributed powering still represents a proven and effective approach to powering traditional cable TV networks, it is clear that centralized powering can bring many benefits to operators planning to offer additional and/or expanded services.

Integrated nodes

Centralized powering uses integrated power nodes to provide all of a service area's power requirements. This approach makes future expansion easier, allows more flexibility and reduces the number of power supply locations and their asso-

BOTTOM LINE

Power for Today, But Accommodate the Future

As today's networks become increasingly complex, designing network powering for optimal reliability is critical. It is important to consider both present and future system requirements and plan for power accordingly.

Centralized powering can offer the increased reliability, efficiency and cost-effectiveness required for today's systems. It provides power to support the services offered today, while accommodating future expanded services and their associated power requirements through simple power upgrade strategies.

Centralized powering can be more efficient and reliable because of reduced component count, N + 1 redundancy capability and extended backup from fewer locations. It can be an economical choice as well, reducing both initial investment and long-term operating and upgrade costs.

Planning for a centralized powering topology takes considerable forethought. Selection of sites, power requirements, added services and other changes should be considered early in the design stage.

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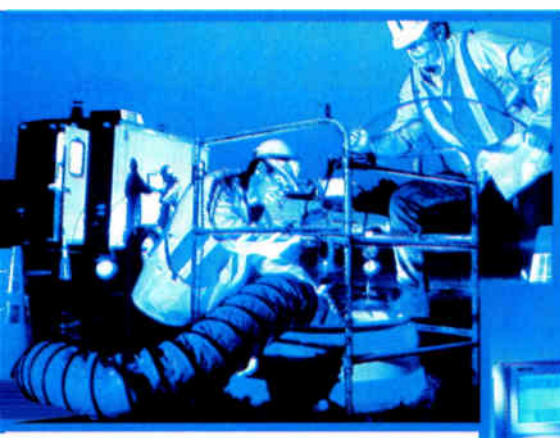

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Expanding Possibilities

ciated installation and maintenance costs. Leveraging these potential benefits can greatly enhance the efficiency, functionality and performance of a delivery network.

Centralizing power at each fiber node, along with other distribution hardware, can cut costs and improve service. The power node provides power to the fiber node, as well as standby power to endure utility outages, brownouts and grid switching glitches. All of this usually is done from a single enclosure, housing the power supplies, batteries and generator.

Centralized powering offers increased reliability and efficiency for several reasons:

- Fewer components: Reliability is inherently higher as the number of system components is reduced.
- N + 1 redundancy: Combining several power supplies into a single centralized power system makes N + 1 redundancy a more reasonable consideration, since a single additional power supply can back up multiple power supply modules.
- Extended standby power: Logistically, backup generators are more justifiable, since one may back up an entire node from one location. Extended backup is necessary for areas with a high incidence of extended utility outages.
- Balanced loading: Higher overall operating efficiency can be achieved through balanced loading.

A single power location also may reduce installation and operating costs. Some potential economic benefits include:

- Lower installation costs: When all node hardware is at one site, installation is simplified. The number of required easements and utility installations can be significantly reduced.
- Added redundancy at a lower cost: With fewer locations, N + 1 redundancy becomes economically feasible. Multiple modules may be supported with only one additional power supply.
- Fewer environmental control expenses: Environmental control for batteries and system components can be time-consuming and costly in areas with extreme weather. A single location requires less attention and expense.
- Lower overall operating expenses: Balanced loading may be used to generate higher overall operating efficiency, thus reducing overall operating expenses.

Another benefit of centralized powering lies in simplified maintenance. A few primary considerations include:

- More sophisticated status monitoring: Status monitoring is vital in any power system, and more advanced status monitoring is available for centralized power systems. Without status monitoring, power could go into standby mode and deplete the backup source before the operator is aware of the problem.
- Fewer service requirements: Maintaining a smaller number of larger installations is logistically easier than servicing many smaller ones.

Naturally, in a centralized design, the

WHEN IT COMES TO

RETURN PATH MAINTENANCE

CAPTURE INGRESS

With the sheer multitasking power of the Guardian 9580 SST Return Path Analyzer, you'll capture and locate ingress events as short as 12.5 milliseconds on individual nodes or expand your monitoring configuration to any number of nodes by combining 9580 SSTs with 9580 TPX Test Point Expanders. Ingress Manager PC Software runs the show, detecting and recording ingress outbreaks and monitoring alarms.

BALANCE AND HARDEN YOUR DISTRIBUTION SYSTEM

The advanced Guardian system puts more diagnostic muscle in the hands of your technicians. The battery powered Guardian SSR transmits reverse sweep signals to a 9580 SST in your headend, displays reverse sweep graphs and calculated values for GAIN and TILT pads, even shows you ingress spectrum graphs. All measurements are updated every 7/10 of a second, even with up to 6 SSR's accessing a single SST.

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The Guardian RSVP Return Path Evaluator stops ingress where it starts: the subscriber's home. Up to 200 RSVPs can communicate with each Guardian 9580 SST in the headend to verify that the return path meets requirements. Working with a Guardian IsoMeter Reverse Leakage Detector, the RSVP verifies the shielding integrity of the home wiring, hardening your system against ingress with every installation and maintenance visit.

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Headend Drop Cable

TFC headend drop cable from Times Fiber Communications is intended for installation in headends where cable may be subjected to tight bends and mechanical abuse. It's available in 14 different colors to help differentiate individual cables.

Reader Service #308

MDU Switch

With the ability to switch between tiers, as well as turn off up to eight individual subscribers per unit, Monroe Electronics' Model MDS 636 multi-dwelling unit (MDU) apartment switch allows service calls to be handled without a truck roll. Its frequency responses (>48 dB isolation at 959 MHz, with a return loss of <15 dB) provides trouble-free integration, according to the company. A total of 256 or more units may be controlled in each system, with a number of protocols available for control.

Reader Service #309

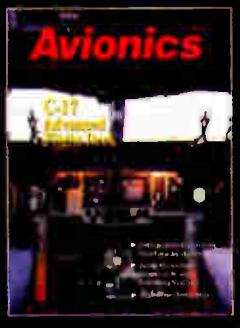
Cable Lube

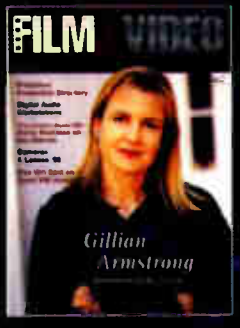
American Polywater has announced Polywater PJ pourable cable pulling lubricant, a less viscous version of Polywater J. It offers J's performance in areas such as lubricity, cable compatibility, dried residue combustibility, drying time and cleanliness, yet pours more freely.

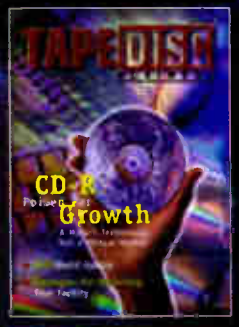
It's intended for long, horizontal pulls and allows for easier distribution throughout the conduit. The liquid helps eliminate the mess of hand application by pouring directly into conduits and is well-suited for pumping.

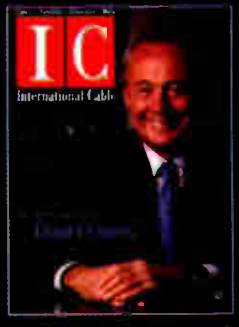
Reader Service #310

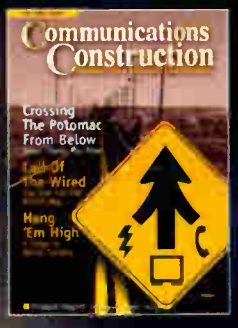
Soar Higher

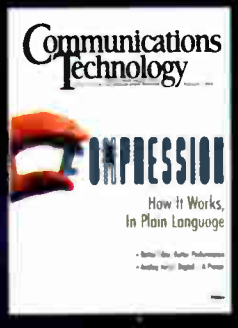












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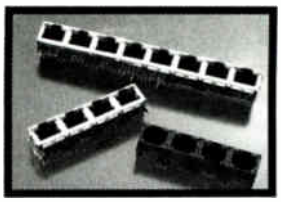
18 GHz Transmitters and Repeaters

Channel Master is producing low- and high-power 18 GHz amplitude modulated link (AML) Micro-Beam transmitters and repeaters that range from 100 mW to 10 W in power. The lower-powered products are intended for street-crossing applications, and the higher-powered products are used for AML hub applications or longer path distances. At a maximum noise figure of 3 dB, Micro-Beam's 18 GHz, 72-channel AML receiver also offers a low noise figure, and all Micro-Beam products meet or exceed Intelsat IESS-308/309 specification for all digital compression formats, according to the company.

Typical SSB phase noise at 10 kHz is 100 dBc/Hz, and typical group delay nonlinearity in 6 MHz is 0.7 nanoseconds.

Reader Service #311



LED Jacks

AMP has introduced inverted modular jacks with light-emitting diode (LED) indication. The LEDs are integrated directly into the jack to save panel and printed circuit board space. The technology also saves the cost of additional subassemblies such as LED arrays, separate personal computer (PC) boards and ribbon cable assemblies.

The jacks have short contacts for reduced signal crosstalk and less electromagnetic interference (EMI), resulting in easier board design for Category 5 applications. Up to two LEDs are available per port in various colors and combinations depending on the application.

The jack contacts are plated with 50 microinches of gold in accordance with Federal Communications Commission Part 68, and the jacks are surface-mount compatible. Because of the LEDs, the jacks should be soldered with a wave soldering process, not infrared (IR) reflow soldering. The company's non-LED jacks can withstand IR soldering.

Reader Service #312

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The SCTE Installer Certification Program was created to establish minimum skill requirements for CATV installers and installer/technicians. Participants in the program must successfully complete practical examinations in the areas of cable preparation and meter reading, as well as a written examination on general installation practice. The program is being administered by local SCTE chapters and meeting groups under the guidance of SCTE national headquarters. All candidates for certification in the program are recognized as SCTE members at the Installer level, and receive a copy of the *SCTE Installer Manual*.

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19	45	71	97	123	149	175	201	227	253	279	305
20	46	72	98	124	150	176	202	228	254	280	306
21	47	73	99	125	151	177	203	229	255	281	307
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23	49	75	101	127	153	179	205	231	257	283	309
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26	52	78	104	130	156	182	208	234	260	286	312

A. Are you a member of the SCTE (Society of Cable Telecommunications Engineers)?

01. ___ yes
02. ___ no

B. Please check the category that best describes your firm's primary business (check only 1):

Cable TV Systems Operations

03. ___ Independent Cable TV Syst.
04. ___ MSO (two or more Cable TV Systems)
05. ___ Cable TV Contractor
06. ___ Cable TV Program Network
07. ___ SMATV or DBS Operator
08. ___ MMDS, STV or LPTV Operator
09. ___ Microwave
10. ___ Telecommunications Carrier
11. ___ Electric Utility
12. ___ Satellite Manufacturer
13. ___ Satellite Distributor/Dealer
14. ___ Fiber Optic Manufacturer
15. ___ Data Network
16. ___ Commercial TV Broadcaster
17. ___ Cable TV Component Manufacturer
18. ___ Cable TV Investor
19. ___ Financial Institution, Broker, Consultant
20. ___ Law Firms or Gov't Agencies
21. ___ Program Producer or Distributor & Syndicators
22. ___ Advertising Agencies
23. ___ Educational TV Stations, Schools and Libranes
24. ___ Other (please specify)_____

C. Please check the category that best describes your job title:

Technical/Engineering

25. ___ Vice President
26. ___ Director
27. ___ Manager
28. ___ Engineer
29. ___ Technician
30. ___ Installer
31. ___ Corporate Management (Chairman, Owners, Presidents, Partners, Executive/Senior Vice Presidents and Treasurers)
32. ___ Management (Vice Presidents, General Managers, Systems Managers & Directors)
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D. In the next 12 months, what cable equipment do you plan to buy?

37. ___ Amplifiers
38. ___ Antennas
39. ___ CATV Passive Equipment including Coaxial Cable
40. ___ Cable Tools
41. ___ CAD Software, Mapping
42. ___ Commercial Insertion/Character Generator
43. ___ Compression/Digital Equip.
44. ___ Computer Equipment
45. ___ Connectors/Splitters
46. ___ Fleet Management
47. ___ Headend Equipment
48. ___ Transmission/Switching Equipment
49. ___ Networking Equipment
50. ___ Vaults/Pedestals
51. ___ MMDS Transmission Equipment
52. ___ Microwave Equipment
53. ___ Receivers and Modulators
54. ___ Cable Modems
55. ___ Subscriber/Addressable Security Equipment/Converters/Remotes
56. ___ Telephone/PCS Equipment
57. ___ Power Supplies. (Batteries. etc.)
58. ___ Video Servers

E. What is your annual cable equipment expenditure?

59. ___ up to $50,000
60. ___ $50,001 to $100,000
61. ___ $100,001 to $250,000+

F. In the next 12 months, what fiber-optic equipment do you plan to buy?

62. ___ Fiber-Optic Amplifiers
63. ___ Fiber-Optic Connectors
64. ___ Fiber-Optic Couplers/Splitters
65. ___ Fiber-Optic Splicers
66. ___ Fiber-Optic Transmitter/Receiver
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H. In the next 12 months, what cable test & measurement equipment do you plan to buy?

74. ___ Audio Test Equipment
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76. ___ Fiber Optics Test Equipment
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78. ___ OTDRs
79. ___ Signal Level Meters
80. ___ Spectrum Analyzers
81. ___ Status Monitoring
82. ___ System Bench Sweep
83. ___ TDRs

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84. ___ up to $50,000
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86. ___ $100,001 to $250,000
87. ___ over $250,000

J. In the next 12 months, what cable services do you plan to buy?

88. ___ Contracting Services (Construction/Installation)
89. ___ Repair Services
90. ___ Technical Services/ Eng. Design

K. What is your annual cable services expenditure?

91. ___ up to $50,000
92. ___ $50,001 to $100,000
93. ___ $100,001 to $250,000
94. ___ over $250,000

L. Do you plan to rebuild/ upgrade your system in:

95. ___ 1 year
96. ___ more than 2 years

M. How many miles of plant are you upgrading/rebuilding?

97. ___ up to 10 miles
98. ___ 11-30 miles
99. ___ 31 miles or more

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87. ___ over $250,000

J. In the next 12 months, what cable services do you plan to buy?

88. ___ Contracting Services (Construction/Installation)
89. ___ Repair Services
90. ___ Technical Services/ Eng. Design

K. What is your annual cable services expenditure?

91. ___ up to $50,000
92. ___ $50,001 to $100,000
93. ___ $100,001 to $250,000
94. ___ over $250,000

L. Do you plan to rebuild/ upgrade your system in:

95. ___ 1 year
96. ___ more than 2 years

M. How many miles of plant are you upgrading/rebuilding?

97. ___ up to 10 miles
98. ___ 11-30 miles
99. ___ 31 miles or more

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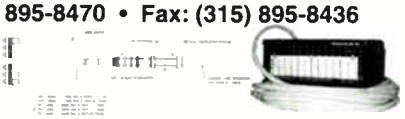

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BOOKSHELF

The following is a listing of some of the books and videotapes currently available by mail order through the Society of Cable Telecommunications Engineers. The prices listed are for SCTE members only. Nonmembers must add 20% when ordering.

- *Meeting Tomorrow's Technical Training Needs*—Featuring Pam Nobles, Bill Nash and Society of Cable Telecommunications Engineers Manager of Chapter Development Rick Bechtel. Are you visual, auditory or kinesthetic in your learning technique? Since people learn in different ways, training must be geared to various learning styles to succeed.

This program provides useful guidelines to help you develop an effective training program. In addition, it provides an overview of SCTE training programs and tools that are available, as well as a discussion of how TCI is utilizing various media to establish its training programs. (58 min.) Order T-1158, $45.

- *The Terminology Explosion*—What does it mean to you and your business? Alan Hahn, an SCTE senior member and communications engineering consultant with more than 30 years of experience in communication system design and management, presently advises both cable TV and telephone companies. This videotape draws on Hahn's ability to provide a "down to earth" introduction to new technologies impacting broadband communications, how they work and how they will impact our future business plans.

Topics covered are: video-on-demand (VOD), near-VOD (NVOD), pay-per-view (PPV), video servers, VOD penetration, pulse code modulation (PCM), standard TV, digital TV, analog vs. digital bandwidth requirements, digital transmission bit rates, quantization, digital compression, Moving Pictures Expert Group (MPEG) and asymmetrical digital subscriber line (ADSL) strengths and weaknesses, time division multiplexing (TDM), asynchronous transfer mode (ATM), 64-bit QAM (quadrature amplitude modulation), quadrature phase shift keying (QPSK), synchronous optical networks (SONET) and other common terms. Order #T-1169, introductory price $15.$C_T$

Note: The videotapes are in color and available in the NTSC 1/2-inch VHS format only. They are available in stock and will be delivered approximately three weeks after receipt of order with full payment.

Shipping: Videotapes are shipped UPS. No P.O. boxes, please. SCTE pays surface shipping charges within the continental U.S. only. Orders to Canada or Mexico: Please add $5 (U.S.) for each videotape. Orders to Europe, Africa, Asia or South America: SCTE will invoice the recipient for additional air or surface shipping charges (please specify). "Rush" orders: a $15 surcharge will be collected on all such orders. The surcharge and air shipping cost can be charged to a Visa or MasterCard.

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CALENDAR

September

4: Oklahoma SCTE Chapter testing session, Edmond, OK. Broadband Communications Technician/Engineer, Service Technician and Telephony certification examinations to be administered. Contact Tom Heddlesten, (405) 348-5750, ext. 312.

8-10: Philips Broadband Networks' Mobile Training Center, Detroit. Contact Sarah London at (800) 448-5171, ext. 2273.

10: SCTE Satellite Tele-Seminar program, Galaxy 1R, Transponder 14, 2:30-3:30 p.m. ET. Topic: "Outage Reduction Techniques II (Part Two)" and "Signal Processing Centers, Location and the Physical Facility." Contact SCTE national headquarters, Janene Martin, (610) 363-6888, ext. 220.

15-16: Northwest Vendor Show, sponsored by SCTE chapters in Oregon and Washington State. BCT/E certification examinations to be administered. Contact Linda Pyles, (503) 230-2099, ext. 236.

18: Lake Michigan SCTE Chapter vendor show, Holiday Inn, Mount Pleasant, MI. Contact Mike Heinze, (517) 543-1245, ext. 115.

19-20: SCTE Regional Seminar, SCTE Vice President of Technical Programs Marvin Nelson will present the "Data Technology for Technicians" program. Contact SCTE national headquarters, (610) 363-6888.

21-23: Philips Broadband Networks' Mobile Training Center, Chicago. Contact Sarah London at (800) 448-5171, ext. 2273.

22-24: Great Lakes Cable Expo, Chicago. Call (317) 845-8100.

25: Wheat State SCTE Chapter testing session, Great Bend, KS. BCT/E certification examinations to be administered. Contact Joe Cvetnich, (316) 262-4270.

28-Oct. 1: 3rd Annual ISPCON, San Jose, CA. Call (303) 235-9510.

30-Oct. 1: Private and Wireless Show, Dallas. Call (713) 975-0030. CT

Planning Ahead

Oct. 7: International Engineering Consortium IP Telephony ComForum, Chicago. Call (312) 559-4600.

Oct. 13-15: Mid-America Show, Kansas City, MO. Call (913) 841-9241.

Oct. 16-18: Fiber U and Wire U, Las Vegas. Call (800) 537-8254.

Oct. 26-28: Eastern Cable Show, Orlando, FL. Call (404) 255-1608.

Oct. 29-30: Communication Design Engineering Conference, San Jose, CA. Call (415) 538-3848.

Nov. 4-5: OSP Expo '98, Cincinnati. Fax (847) 639-9542.

Nov. 17,18: International Engineering Consortium Wireless Engineering ComForum, Richardson, TX. Call (312) 559-4600.

Dec. 1-4: Western Cable Show, Anaheim, CA. Call (510) 429-5300.

must-see SCTE

SCTE's Cable-Tec Expo '98, held in June in Denver, was the Society's BIGGEST AND BEST EVER.

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T-1233 *Return Path Ingress Mitigation*

T-1234 *Excellence Through Customer Service*

T-1235 *Return Path Testing*

T-1236 *Return Path Design, Components and Alignment*

T-1237 *Digital Video Deployment*

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TRAINING

By the NCTI

Troubleshooting Tap Problems, Part 4

This month's installment concludes a series on troubleshooting tap problems. The material is adapted from a lesson in NCTI's Installer Technician Course. © NCTI.

The previous installments in this series covered service-related problems found at a customer's tap and troubleshooting incorrect tap port levels, a backward spliced tap, loose seizure screws, feeder cable contraction and broken or cracked tap ports. Water/corrosion problems in taps are examined this month.

Water inside a tap can cause a decrease in RF signal levels and an increase in amounts of hum modulation. Any of the following symptoms may be present: 1) hum modulation with *normal* signal levels, 2) hum modulation with *low* signal levels and 3) *no* hum modulation with *low* signal levels.

Fig. 1

Hum bars from abnormal hum modulation

Abnormal RF signal level loses

A decrease in RF signal level and snowy pictures on channels 23 (J) and higher can be caused by water or corrosion at the tap's input connector, the tap's output connector or within the tap itself. Water can get into a tap at the input and output ports, the seizure screw ports or the faceplate cover. Water or water damage could cause a 4 dB decrease in signal level at 450 MHz and no change in signal level at 55 MHz, as indicated in the accompanying table. However, severe corrosion increases attenuation at all frequencies and to a greater degree at the higher frequencies.

Hum modulation

Hum bars at the customer's TV set (Figure 1) can be caused by a tap with internal water or corrosion build-up (Figure 2). An abnormal amount of hum modulation is usually caused when the feeder lines' AC voltage and the cable system's modulated RF signals mix together in a water-saturated electronic component on the tap's internal circuit board.

Remove the tap's input and output port caps to see if there is water or corrosion build-up without removing the tap's faceplate. To correct the hum modulation or low signal level problem at the customer's TV set, replace the tap's faceplate and carefully clean any moisture from inside the tap housing. Replace the tap housing if corrosion is present inside the tap housing.

Hands-on performance training

Proficiency objectives: Successfully troubleshoot a drop to determine if water/corrosion in a tap exists and repair the tap as necessary.

Ensure that you have enough signal level meters (SLMs), test TV sets and workstations for the number of students to practice troubleshooting. Each workstation should have a live broadband signal feeding a tap. If possible, install taps with water/corrosion damage in some workstations and others with known good taps, and have students rotate among stations.

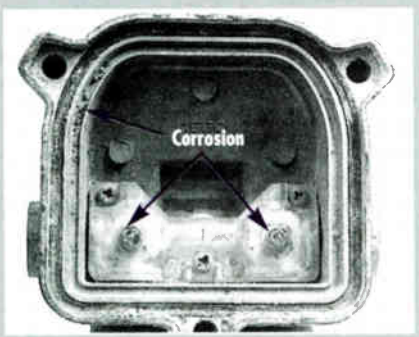
Demonstrate how to perform SLM measurements and identify impairments on a TV set to determine if water/corrosion exists in a tap.

Demonstrate how to inspect a tap to determine if water/corrosion damage is present and repair a defective tap. Discuss your system's policy for feeder line/tap repairs.

Have students practice troubleshooting/replacing taps with water/corrosion problems.

Verify that each student can successfully troubleshoot a drop to determine if water/corrosion in a tap exists and replace the tap faceplate/housing as necessary. CT

Fig. 2



Water-damaged tap

Possible signal level effects from water damage at tap

Normal tap port levels	Tap port levels after water damage
15 dBmV @ 450 MHz	9 dBmV @ 450 MHz
11 dBmV @ 55 MHz	11 dBmV @ 55 MHz

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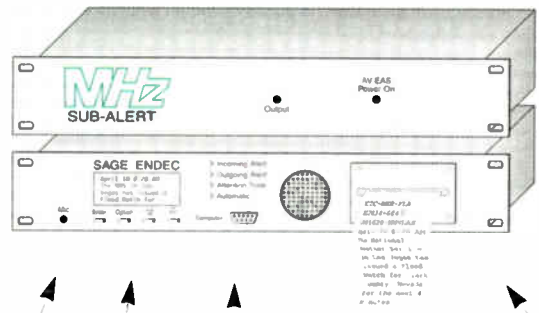

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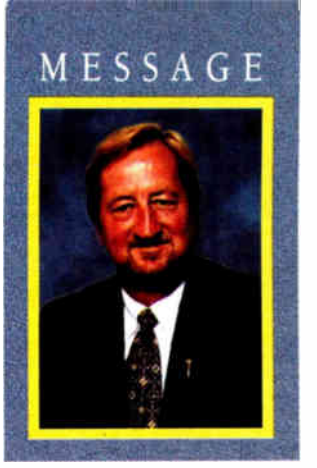


Getting Back to Grass Roots

When I became chairman of the Society of Cable Telecommunications Engineers board of directors, one of my first initiatives was to adopt an open communications policy with the membership. Those who know me know that I'm candid when it comes to issues directly affecting the Society and its members. In turn, I'd like you to exercise the same straightforward approach in conveying to the board and SCTE staff the factors, whether positive or negative, that affect your decision to participate in Society programs and services.

One challenge I'd like to undertake during my term is member participation at the local level. Attendance at chapter and meeting group events has been dwindling. While this may just be a reflection of the times, we should evaluate why local participation has been declining and what we as a Society can do about it.

Changing times

First, dramatic changes in cable telecommunications are on the way as we move into the 21st century. This translates into a greater push for professional certification and quality technical training for all broadband employees as multitasking becomes the standard for effective job performance. This is a plus for SCTE because we still are the only industry-related organization providing these services to cable's most valued resource: the employees.

On the other hand, as your job becomes more demanding, you may not have the extra time or resources to participate in your local chapter. Having been involved with the Chattahoochee Chapter for some time and having served the group in various capacities, I understand the opportunity cost of volunteering. Getting involved means sacrificing work or even leisure time. And let's face it, organizing and managing any volunteer group seldom is easy, especially with a full-time career, family and other interests.

SCTE, too, understands that chapters and meeting groups are only as good as the people who support them. We are doing everything we can to increase the visibility of the Society and enhance our support of local groups.

That's why we've adopted a "Three-C" principle: Commitment, Cooperation and Connection. We are committed to encouraging national members and nonmembers to participate in the Society's local activities, fostering cooperation between national and local SCTE by creating new partnership opportunities, and connecting with chapters by developing programs to meet their needs.

Reaching out

For example, as I mentioned in last month's "Chairman's Message," we will be participating with the National Cable Television Association in an industrywide initiative called "Cable Technology Week" in late September. Created to promote and demonstrate the benefits of broadband technology to the global marketplace, this program gives chapter leaders ample opportunity increase meeting attendance by hosting activities to generate interest in our industry and the Society. The alliance between national and local SCTE on such a project will serve not only to increase public awareness of our organization, but also to showcase the educational benefits that our chapters offer.

Another example of this partnership is our "1999 Member-Get-A-Member" campaign, to be launched in January. By signing on new members, you'll not only open yourself up to new perspectives and ideas that may help you perform better in your own job, but you'll also be helping your peers get the training they need to succeed. Our goal is to generate interest in the chapters' networking potential.

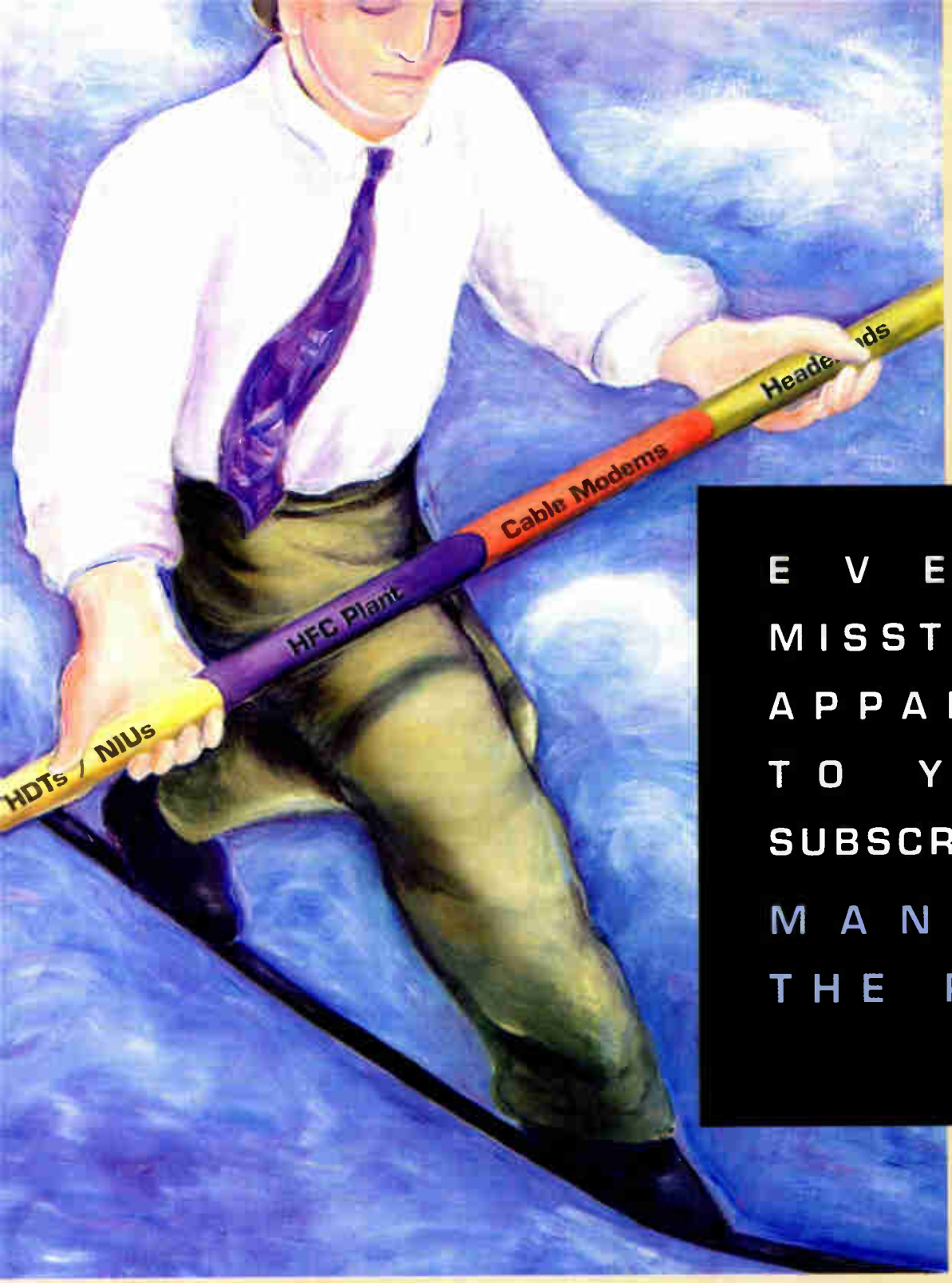
Building strength within

You may also know that we introduced several awards programs earlier this year in a continuing effort to recognize innovation, commitment and leadership in our chapter and meeting group volunteers. As part of the "SCTE Partnership Program," these awards spotlight the significant contributions local groups make to the industry through training and certification, communication programs, collaborations with other associations and leadership. Such awards exemplify the difference our local volunteers make in shaping broadband telecommunications.

Finally, we have developed programs such as "Train the Trainer," in which chapters can benefit their local systems by promoting professional training for employees. The three-day event, open to anyone interested in learning effective training methods, instructs attendees on how to use the Society's educational materials to conduct successful training sessions on-site, and includes a discussion of learning theory.

While the collective value of these programs speaks for itself, I hope that I have persuaded all of you to take another look at what your local chapter or meeting group has to offer. Time spent getting to know your peers will be well worth it. T

Hugh McCarley is chairman of the Society of Cable Telecommunications Engineers board of directors. He can be reached via e-mail at hugh.mccarley@cox.com.



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