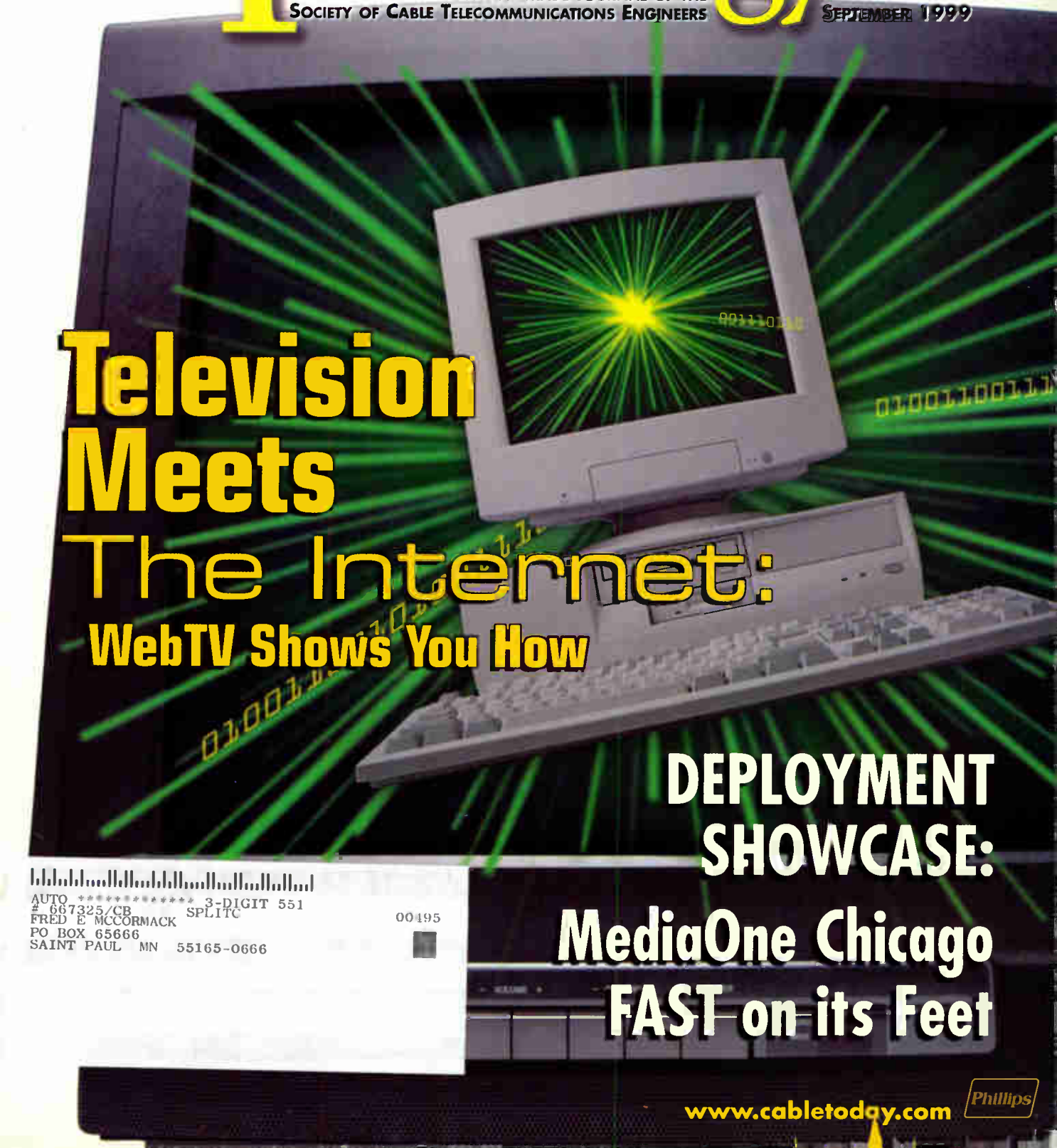
30th 1969-1999

Communication Technology

OFFICIAL TRADE JOURNAL OF THE SOCIETY OF CABLE TELECOMMUNICATIONS ENGINEERS

SEPTEMBER 1999

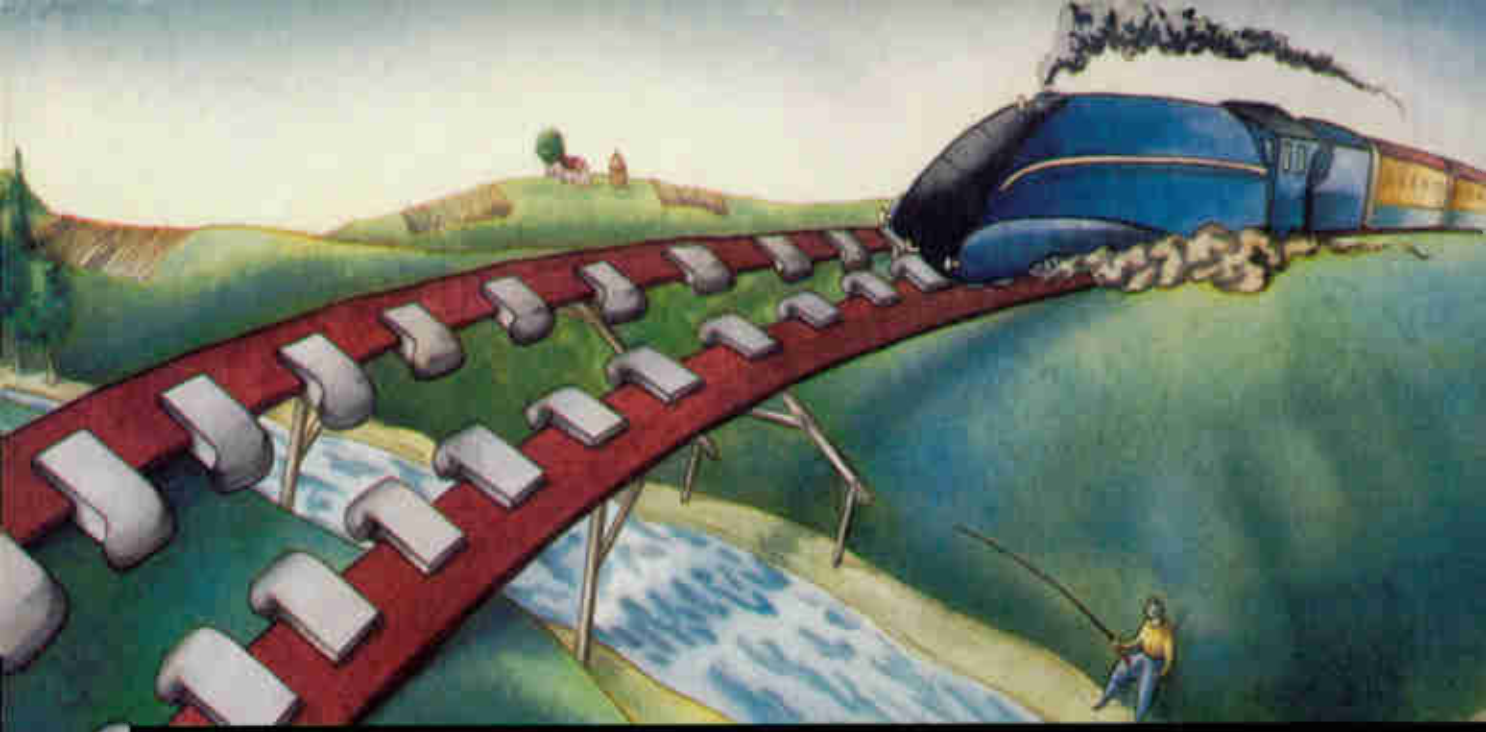


Television Meets The Internet:

WebTV Shows You How

DEPLOYMENT SHOWCASE:

MediaOne Chicago FAST on its Feet



CHEETAH® PULLS YOUR HFC ELEMENTS TOGETHER. A PERFECT FIT.

Trying to manage your multi-vendor HFC elements with one system? Cheetah puts you on the right track.

- Industry-leading status monitoring solutions for multi-vendor plants from CheetahLINK™.
- The Phasor System™ for return path, automated performance monitoring from CheetahTEST™.
- *NetMentor*™, the CheetahSOFT Network Management software system, that pulls it all together, integrating third-party systems and cross-correlating data.

Our Voyager Partners Program™ allows OEM providers of network equipment to apply Cheetah's world leading technologies to their specific strategies, needs, and plans. And our commitment to standards-based solutions will help you evolve your Cheetah System as industry standards are established.

Cheetah: the only company that offers all the pieces *and* the technology to bind it all together into a comprehensive, system-wide Network Management solution.

Watch Us Perform.

For more information on Cheetah Technologies' Network Management Solutions, call 941-756-6000.

Cheetah Technologies
2501 63rd Avenue East, Bradenton, FL 34203 USA
941-756-6000 • Fax 941-758-3800 • www.cheetahtech.com

CHEETAH™ TECHNOLOGIES

Reader Service Number 1

Happy 30th Birthday, SCTE!

Emerging Technologies, Then and Now

The Society of Cable Telecommunications Engineers held its first annual Conference on Emerging Technologies in January 1988 as a conference on fiber optics. Some 412 engineers gathered in Orlando, Fla., to discover how this hot new technology would impact their systems. In 1992, SCTE renamed the conference Fiber Optics Plus, and a year later, the Society expanded the focus still further when it became the Conference on Emerging Technologies.

ET 2000, to be held Jan. 11-13 in Anaheim, Calif., will offer telecommunications system engineers the newest information and most far-reaching concepts available. More than 1,000 attendees are expected.

ET '99: Throngs of attendees at 1999's Conference on Emerging Technologies take in a presentation in January at the Wyndham Anatole Hotel in Dallas.

Built on
Past Success...
Upgraded for
Future Excellence

SCTE®

www.scte.org

SCTE • 140 Philips Road • Exton, PA 19341-1318 • (610) 363-6888 • Fax: (610) 363-5898

SEPTEMBER 1999

contents

FEATURES

Internet-Over-TV • 48

Coax Impedance • 86

Providing solutions before others understand the problem.

It's the difference between innovation and imitation. **The Alpha Powernode.** Industry leading power technology combined to provide maximum power density, unparalleled system reliability and indefinite runtime. All in a single, compact, neighborhood friendly package. Proven solutions based on more than 20 years of powering experience. Find *out more:* **Tel:** 360-647-2360 **Fax:** 360-671-4936 **www.**alpha.com

ALPHA TECHNOLOGIES

protecting the power in communications.

Reader Service Number 2

contents

DEPARTMENTS

NEWS & OPINION

REFERENCE

COLUMNS

Forget the Truck Rolls ... User-Installable Modems.

Tired of expensive truck rolls. All those costly startup and maintenance costs? Terayon has the answer. Put your trucks to better use. And save your dough. Just ask TCA Cable TV. Over 80 percent of their Terayon cable modems are installed by subscribers. That means fewer truck rolls and service calls. And more revenue for building your data business.

Proven, Robust Performance

How does Terayon do it? It's built into the box. Terayon's proven, robust S-CDMA modems provide extra margin. You can deploy your modems faster, over a wider range of conditions. Put your dough to better use. It's a more appetizing way to run your business.

Ready to Install

Terayon's modems come fully packaged and ready to install. About as easy as opening a pizza box. So if you're ready for retail, so is Terayon.

Take it to the Bank

That's not all. The real beauty of Terayon modems is higher revenue sooner. By switching to Terayon, Shaw Communications rolled out modems in half the time. And they reduced startup and operational costs, as well.

Visit Us on the Web

You don't need a truck to find us. Give us a call or visit us on the web at www.terayon.com. Give your techs a break, and let your subscribers install their modems. Tell them to have a slice of pizza on us. Was that sausage or pepperoni?

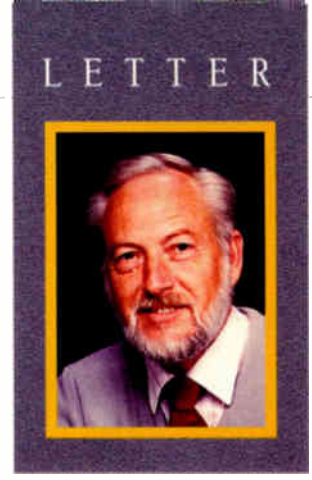
www.terayon.com

TERAYON
COMMUNICATION SYSTEMS

TELEPHONE: 888.7.TERAYON OR 408.727.4400
FAX: 408.727.6205 EMAIL: info@terayon.com

Reader Service Number 3

By Rex Porter



SCTE Board Nominations

The Society of Cable Telecommunications Engineers called on me to chair the nominations subcommittee again this year. I said "yes" without hesitating. This subcommittee is very important and directly affects every member. But we will need your support if we are going to present an excellent slate of candidates next election.

Prior to lining up candidates for this year's election, I received a number of phone calls asking why we couldn't get candidates who would be more closely in contact with the needs of the active members. Why not get candidates who are active in chapters, attend local meetings regularly and understand the daily problems faced by technicians and engineers in the trenches? This seemed like a reasonable request.

So we worked hard to get a good slate of candidates last year—and had the lowest voter turnout in our history!

Not all of the people contacted last year could run. They didn't have time to serve on the board. Their corporate or regional offices wouldn't allow them the time for meetings or help absorb the cost of required travel to meet with their regional chapters. Still, we elected an excellent group of directors this year.

Our next election will be for these regions, presently run by the following listed directors: Region 3 (Norrie Bush), 4 (Jim Wood), 5 (Larry Stiffelman), 7 (Jim Kuhns), 8 (Don Shackelford), 10 (Wes Burton), 12 (John Vartanian), plus one At-Large director (Ron Hranac). Stiffelman, Vartanian and Hranac can't run again because of term limits.

We need volunteers to run for all these seats. Names should come from members in addition to those who wish to volunteer. If you cannot volunteer to run but know someone who would be a good candidate, let us know. We need your help so that we can assemble the best possible slate of candidates.

And, finally, please vote in the upcoming election. Having a fine batch of candidates doesn't mean very much if only 20 percent of the membership actually votes. Our committee is alerting everyone early so, hopefully, we will have a record voter turnout in 2000.

Rex Porter
Editor-in-Chief

Communications Technology

A CT Publications Product

EDITORIAL

EDITOR-IN-CHIEF, Rex Porter (800) 325-0156, ext. 31
EDITOR, Jennifer Whalen (301) 340-7788, ext. 2057
SENIOR EDITOR, Doug Larson (800) 325-0156, ext. 26
MANAGING EDITOR, Ron Hendrickson (800) 325-0156, ext. 19
CONTRIBUTING EDITOR, Arthur Cole
SENIOR TECHNICAL EDITOR, Ronald J. Hranac
TECHNICAL CONSULTANT, Michael Smith
INTERNATIONAL EDITOR, Alex Swan

ADVERTISING/BUSINESS

VICE PRESIDENT AND GROUP PUBLISHER, Nancy Maynard
SENIOR PUBLISHER AND FOUNDER, Paul R. Levine, (800) 325-0156
PUBLISHER, Tim Hermes, (301) 340-7788, ext. 2004
REGIONAL SALES MANAGER, David Gillespie, (800) 325-0156, ext. 35
CENTRAL U.S. & CANADA, Mike Elmer, (800) 325-0156, ext. 34
EAST, James Bohi, (301) 340-7788, ext. 2060
CLASSIFIEDS/CARD DECK SALES, Nicole Bovre, (800) 325-0156, ext. 33
PRODUCTION MANAGER, Joann M. Fato
GROUP ASSISTANT, Cathy Stawson
ADMINISTRATIVE ASSISTANT, Cathy Walker

DESIGN/PRODUCTION

SENIOR GRAPHIC DESIGNER, Tamara Virshup
SENIOR DIRECTOR OF PRODUCTION AND DISTRIBUTION, William Wynne

MARKETING

MARKETING DIRECTOR CABLE GROUP, Marsha Wesley
ASSISTANT VICE PRESIDENT CONFERENCES & TRADE SHOWS, Janet Allen, CMP
ASSISTANT DIRECTOR CONFERENCE SERVICES, Justine Wood
SENIOR CONFERENCE MARKETING MANAGER, Anne Schwartz
EXHIBIT MANAGER, Rick Felperin
PROGRAM MANAGER, Teri Byrnes
PROGRAM COORDINATOR, Meredith Linker
CONFERENCE REGISTRAR, Susan Cuevas

CIRCULATION

CIRCULATION DIRECTOR, Sylvia Sierra
LIST SALES MANAGER, Susan Incornato
REPRINT SALES ASSOCIATE, Laurie Chilek
Subscription/Client Services—(800) 777-5006

COMMUNICATIONS & AEROSPACE GROUP

SENIOR VICE PRESIDENT, David Shaw
VICE PRESIDENT/GROUP PUBLISHERS, Scott Chase, Nancy Maynard, Paul McPherson, Heather Farley, Angela Duff
ASSISTANT VICE PRESIDENT & GROUP BUSINESS MANAGER, Kathleen De Franco
GROUP MARKETING DIRECTOR, Anne Coffey
ADMINISTRATOR, Evie Sanchez

PHILLIPS BUSINESS INFORMATION

CHAIRMAN, Thomas L. Phillips
PRESIDENT, Thomas C. Thompson
SENIOR VICE PRESIDENTS, David Shaw, Edward Hauck, Roscoe Smith, Rich Eichler

CT PUBLICATIONS CORP.

A division of Phillips Business Information Inc.
CT Sales and Editorial Offices
1900 Grant St., Suite 720, Denver, CO 80203
(800) 325-0156, Fax (303) 839-1564

CORPORATE OFFICES

Phillips Business Information Inc.
1201 Seven Locks Road, Suite 300, Potomac, MD 20854
(301) 340-1520 Fax (301) 738-8453
Magazine Group: toll free (888) 340-5075

Website: www.cabletoday.com

Stretching the frequency range to 860 MHz was just the beginning.

You get more than just the convenience and flexibility of a 54-858 MHz frequency range when you install a Standard AVM860 Modulator/Upconverter into your headend.

A lot more.

For example, you get the technology to manage total combined noise for over 110 channels at under 60 dBc and the ability to use the AVM860 as a digital upconverter. You get sensible features such as rotary dials to speed setup and remote access through your computer network. The AVM860 even switches automatically to alternate inputs if you ever lose your video signal.

And in addition to all that, you get complete compatibility with most bandwidth formats and scrambling techniques, a DSP stereo option that allows delivery of Dolby® ProLogic™ signals to your subscribers' multidimensional sound systems, and Standard's famous 7-year Gold Standard Warranty.

All of which is why the AVM860 is the ideal upgrade for your headend.

And that's not stretching the truth, even a little.

Standard Communications

The right technology for right now.

800.745.2445

www.standardcomm.com/satcom

Reader Service Number 7

Certification Support

Dear Ms. Whalen:

In response to your article regarding multiple system operator (MSO) leaders needing to support certification programs, I believe most chief technical officers already do. However, this is not enough. Steve Allen hit it right on the head when he said that it falls apart on the local management level.

I can't help but believe that the Society of Cable Telecommunications Engineers could do more to help out. For instance, they could compile a list of qualified proctors who would be willing to travel to local systems, then give this list to each chapter to administer. There are, I'm sure, large numbers of vendors who are qualified and could incorporate a sales call into, say, an afternoon of proctoring for small rural systems, where it may not always be possible to send people to the regular meetings.

There should be certain criteria set for this, such as a set number of preregistered and prepaid candidates for the testing. With advance notice, it is difficult to imagine anyone in lower management being unable to find time for personnel to take the exams.

Along with this, the MSO CTOs should not only be vocal about certification, but at the same time offer incentives—for example, paying for memberships, registration into the programs and each exam. (Even when I've failed exams, I have learned things.)

System management should also provide a token raise for each level of certification and a sizable raise for full certification. Maybe SCTE could make funds available to each chapter to help purchase and provide the necessary resources (reference materials, mainly) for each chapter to lend to those systems that would be interested in certifying their people.

Of course, this is just my two cents' worth.

Daniel "Doc" Thissen
Advanced technician
TCI of Wyoming

Editor's response: Hi, Daniel—Thanks so much for your feedback on "Return Path." I think many folks will agree with you.

After talking with SCTE President John Clark, it sounds like he also believes SCTE can and will do more to push certification. We look forward to the results of these efforts. Thanks again for writing.—JW CT

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.

CT reserves the right to edit letters for clarity and space.

PDI STEREO MODULATORS

OUT OF THIS WORLD VALUE

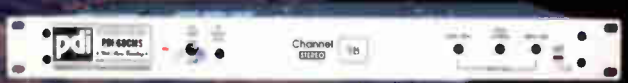
PDI's stereo modulators are nothing less than a symphony of excellence. Our patented, state of the art, super high performance stereo encoder is available for all PDI modulators. This offers the cable operator the widest range of cost flexibility available from one manufacturer.

All PDI stereo modulators provide a minimum of 26 db sound separation as well as pro-logic surround sound. Each unit comes with a **four page test report**, a **five year warranty**, and is Canadian/UL listed.

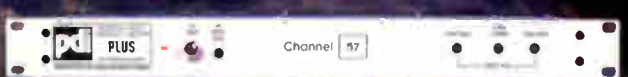
Here's some additional music for your ears. PDI stereo modulators are **hundreds of dollars less** than other high performance stereo modulators.

This exceptional product line has won critical acclaim from a significant number of MSO's nationwide. Won't you call us today for your test and evaluation unit? You will soon determine that PDI headend electronics are truly an out of this world value!

PDI 60MS 550 MHz 60dBmV Agile Modulator



PDI 60CMS 550 MHz 60dBmV Fixed Channel Modulator



MIGHTY MOD™ PLUS 550 MHz 55dBmV SAW Modulator

MIGHTY MOD™ 300 MHz 55dBmV PLL Fixed Channel Modulator

pdi telecommunications

PDI - Boca Raton, Florida
(561)998 0600 1(800)242 1606
Fax:(561)998 0608 www.pdi-elt.com
PDI.Electronics@worldnet.att.net

PDI SouthWest
(210)641-6417
Fax:(210)641-6418
pdi-sw@texas.net

Canadian Distributor
Capella Telecommunications Inc.
1(705)748-3255

Peruvian Distributor
SATEL S.A.
(511)446-2253

Colombian Distributor
ETEK de Colombia S.A.
(571)635-3700

Reader Service Number 9

The company is in its "quiet period" pending the IPO, so top executives couldn't comment on future plans. However, Charter's filing with the Securities and Exchange Commission commented extensively on the company's desire to increase cash flow by beefing up the customer base and drawing more revenue per customer. The filing highlighted a multipronged strategy to achieve this:

- Bring new systems into the Charter fold and increase their profitability.
- Offer an extended array of services.
- Increase bandwidth capacity to a minimum of 550 MHz and introduce two-way service.
- Increase network reliability and customer service.
- Maintain centralized financial control, but encourage local management of individual systems.
- Increase clustering.

NEWS BITES

- Cox Communications' subscriber base will see a 600,000-home jump to 6 million when it completes its planned $2.7 billion purchase of Gannett Co.'s 18 cable operations early next year. The purchase price is about $4,500 per customer, but Cox hopes to recoup its investment fairly quickly, considering most of the Gannett systems are upgraded to hybrid fiber/coax (HFC).
- CableLabs has issued the final set of specifications for OpenCable systems that will allow manufacturers to develop interoperable hardware. The last piece of business for the project is the development of removable point of deployment (POD) security devices. SCM Microsystems has developed a POD interface qualification tool, and CableLabs has begun testing security modules from a dozen or so manufacturers.
- SilkRoad Inc. has introduced the PathFinder 2000 optical transceiver system, capable of transporting multiple digital and analog voice, video and data signals bidirectionally on the same wavelength. The company claims its system can provide not only 16 forward path channels and 20 reverse path, but also can exceed the 50+ km span length of other systems. CT

Fluent in DigiCipher®

Digitrans now offers a fully-compatible DigiCipher II® reception and decryption solution — the DTE-7100 — creating a truly open cable environment.

Talk about advantages

You'll appreciate the 7100's seamless operation with your existing DigiCipher II equipment. Its straightforward menu speaks volumes about its credentials while the single-rack design fits your headend space requirement.

Talk about simplicity

What you'll admire most is the architectural simplicity that eliminates scrolling through interminable menus for even the most basic of operations. And how critical parameters such as symbol rate and FEC are determined automatically.

Talk about reality

After two years in development and successful commercial use, the DTE-7100 is now available to cable networks and program providers worldwide. For more information or a demonstration that will make you more fluent in DigiCipher, call 800-756-3147. Or check our web site at www.digitrans.com

DIGITRANS
DIGITAL TRANSMISSION EQUIPMENT

Digital solutions simplified.

15302 Bolsa Chica Street, Huntington Beach, CA 92649 • Phone: (714) 890-8544 • (800) 756-3147 • Fax: (714) 891-2103
www.digitrans.com

Reader Service Number 14

SCTE UPDATE

2000-2002 Board Seats up for Grabs

Now's your chance to get more involved in with the industry. The Society of Cable Telecommunications Engineers is accepting nominations to fill eight vacant seats on its 2000-2002 board of directors.

The SCTE Nominations Subcommittee wants your recommendations for qualified Society members who demonstrate the leadership skills and industry awareness necessary to become SCTE Board members.

Available positions include directors for:

- Region 3, representing Alaska, Idaho, Montana, Oregon and Washington
- Region 4, representing Oklahoma and Texas
- Region 5, representing Illinois, Iowa, Kansas, Missouri and Nebraska
- Region 7, representing Indiana, Michigan and Ohio
- Region 8, representing Alabama, Arkansas, Louisiana, Mississippi and Tennessee
- Region 10, representing Kentucky, North Carolina, Virginia and West Virginia
- Region 12, representing Connecticut, Massachusetts, Maine, New Hampshire, New York, Rhode Island and Vermont
- One At-Large position, representing the organization as a whole

For a nomination form or more information about the Society's 2000-2002 board election, contact the Membership Services Department at (610) 363-6888, fax (610) 363-5898, or e-mail membership@scte.org.

Shapp Scholarship

To encourage academic excellence and personal achievement, General Instrument and the SCTE offer college-bound students the opportunity to earn a unique scholarship for their higher education.

The Milton Jerrold Shapp Memorial Scholarship, sponsored by General Instrument (formerly known as Jerrold Electronics) and administered by SCTE, was established in 1996 in memory of the company's founder, former Pennsylvania Gov. Milton Jerrold Shapp.

This $20,000 grant ($5,000 per year for four years of college) is awarded annually to a deserving high school senior who is the child of a current cable industry employee.

The scholarship was created to recognize independent thinkers who demonstrate the same ambition, community activism, determination and entrepreneurial spirit exemplified by Shapp's life and accomplishments.

The deadline to submit applications for the 2000 Milton Jerrold Shapp Memorial Scholarship Award is Feb. 1. Interested students can contact the SCTE Finance and Administrative Department at (610) 363-6888; fax (610) 363-5898; or e-mail jshockley@scte.org for application materials. CT

Vendor Shows Offer Educational Opportunities

Throughout the fall, local SCTE chapters will offer industry field personnel unique first-hand learning opportunities about the newest hardware trends through regional training events.

Vendor Shows are a chance to share experiences with peers through networking and "problems-and-solutions" exchanges. SCTE President John Clark said: "Vendor shows help our members to increase their knowledge and experience. This translates into benefits for attendees' employers and customers."

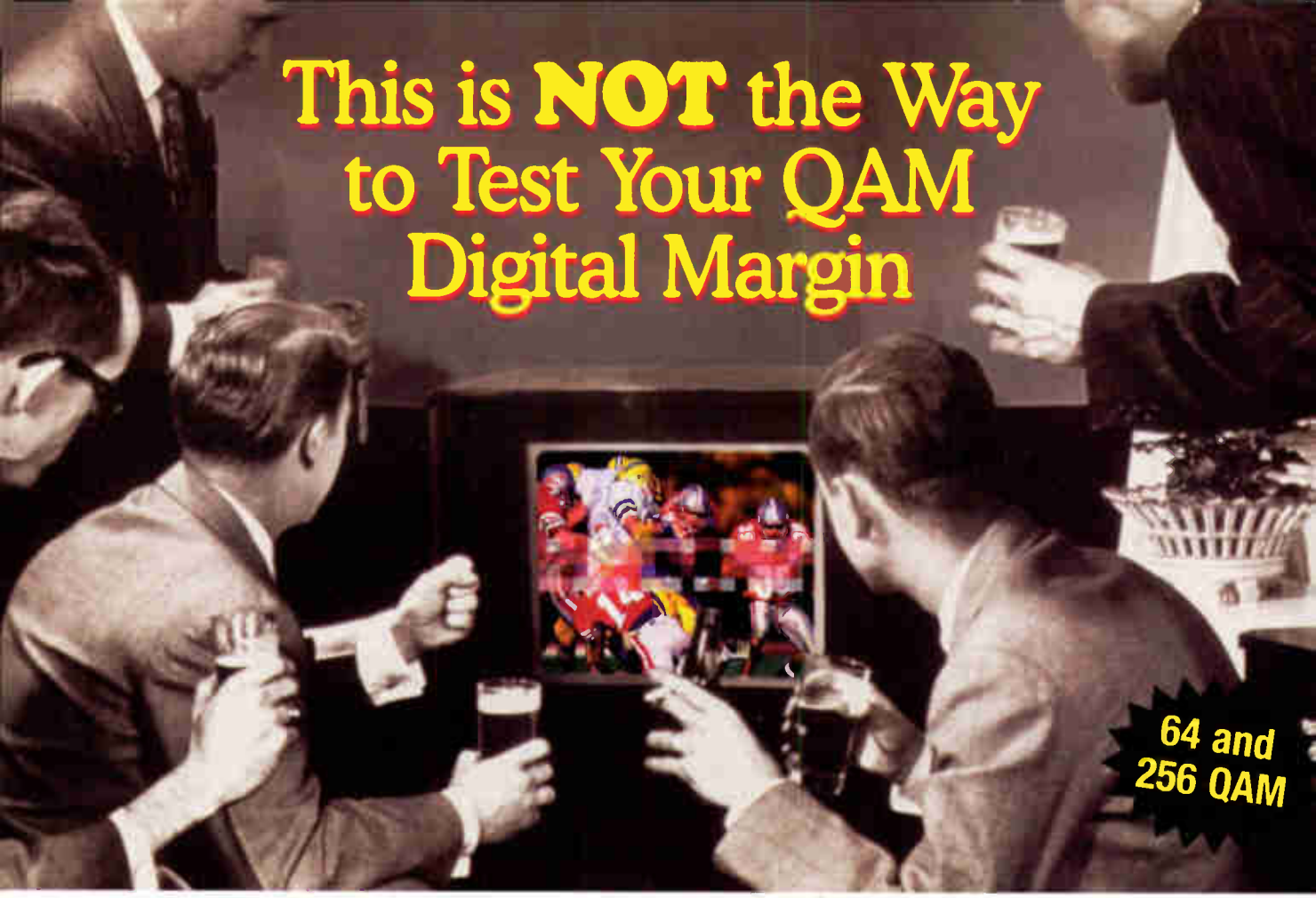
Scheduled Vendor Shows for the fall include:

Sept. 7: Sam Houston Area SCTE Chapter (Houston)
Sept. 15: Oklahoma SCTE Chapter (Oklahoma City)
Sept. 15: Piedmont SCTE Chapter (Winston-Salem, N.C.)
Oct. 5-7: Northwest Area SCTE Chapters (Kelso, Wash.)
Oct. 9: Llano Estacado SCTE Chapter (Lubbock, Texas)
Oct. 19-21 Desert, San Diego and Southern California SCTE Chapters (Norwalk, Calif.)
Nov. 17: Bluegrass SCTE Chapter (Elizabethtown, Ky.)
Nov. 17: Chesapeake SCTE Chapter (Bowie, Md.)
Dec. 6: Ark-La-Tex SCTE Chapter (Shreveport, La.)

These events feature tabletop displays and hands-on demonstrations, plus comprehensive technical training seminars. By focusing on education rather than sales, these annual shows provide a wide variety of learning experiences that allow attendees to enhance their professional knowledge with intensive training that is current and cost-effective.

For more information about these events or to join the SCTE Vendor Shows e-mail list, contact the SCTE Membership Department at (610) 363-6888, fax (610) 363-5898, or e-mail membership@scte.org. Chapter and meeting group information also can be found on SCTE's Web site at www.scte.org.

Vendor Shows are a good place to share experiences and learn.



The Hukk CR1200 QAM Monitor
A Much Better Way!

Digital Video can give your subscribers picture quality unmatched by analog technology. Unfortunately, with digital, there is a very small difference between a channel working and not working at all. A picture that looks perfect, may be only a couple dB away from breaking up. The Hukk CR1200 QAM Monitor can tell you for sure the quality of your installation, so you don't have to learn about it from angry subscribers.

Comprehensive Digital Testing

The CR1200 includes a constellation display, bit error rate testing, average power and signal-to-noise ratio so you'll know the quality of your 64/256 QAM signals anywhere in your network, right up to the set-top converter.

Built in Analog SLM

Built for the field, the CR1200 provides unmatched digital testing capability in a rugged, lightweight package. So you don't have to carry two instruments, the CR1200 even includes an analog signal level meter with automated 24 hour FCC testing.

Call For a Demo

Don't leave the success of your digital implementation to chance, try out a CR1200 in your system today. Your subscribers will thank you, especially during the big game!

Hukk Engineering, Inc.
3250-D Peachtree Corners Circle
Norcross, GA 30092
Phone: 888-236-8948 770-446-6086
Fax: 770-446-6850
Web: www.hukk.com
Email: info@hukk.com

Hukk
ENGINEERING

Reader Service Number 15

DEPLOYMENTWATCH

By Doug Larson

As vendors ramp up production of equipment to enable the rollout of advanced services for cable's hybrid fiber/coax (HFC) networks, research houses continue to crank out revenue and market penetration forecasts for those services. VPNs, or virtual private networks, are no exception. As the name implies, VPNs essentially use public access switching and network facilities in such a way that the customer perceives the network as being private.

The market for managed VPN services—where a customer obtains value-added services in addition to bandwidth from the service provider—is expected to grow to a staggering $19 billion by year-end 2003, according to research from VPNet Technologies. Internet service providers (ISPs) and local and long distance companies are rushing to capture a piece of the market.

IP trial, Texas-style

Boasting some of the fastest access speeds available on the market, cable operators also want a piece of this action. Texas-based IXC Communications, which owns and manages a state-of-the-art nationwide fiber-optic backbone, is in the midst of a six-month field trial with Cablevision of Lake Travis to test Internet protocol (IP) telephony over cable modems.

The test aims to minimize latency and quality of service (QoS) issues plaguing remote access capabilities. The companies are using VPN technology to provide remote workers with guaranteed bandwidth for advanced voice and data communications directly to the home via their cable modem.

The trial involves Cablevision of Lake Travis' HFC network, managed IP access from The ISP Channel, Com21 cable modems, and Cisco Systems' IP-to-circuit-switched gateways and associated equipment.

"A lot of this was in place prior to us getting involved," said Chris Rothlis, IXC's vice president of local access. IXC laid the remote office product set over the top of the existing system, Rothlis explained.

In addition to the equipment, each of the participants also contributed technical support to the project. "Cablevision ... was very interested in getting as far ahead of the curve as possible and was very good about giving us access to the plant to do the things that we needed to do," said Rothlis. "(The ISP Channel) certainly participated very heavily from their remote operations center. Cisco provided a large part of the technology that we used in the trial and a lot of the technical expertise that went into it."

IP telephony ins and outs

The test objective for IXC was simple: "On the voice side, we wanted to have a phone set that was capable of doing full PBX (private branch exchange) capabilities and actually have it tied to the PBX, so that the management and call information was contained within the PBX," said Rothlis. "We were able to meet all of those objectives and get the connectivity from Cablevision of Lake Travis to IXC and demonstrate full PBX capability from a phone set ... and secure private network tunnels into the corporation."

Rothlis described the telephony configuration: "We have IP telephony phone sets that actually have Ethernet cords coming out of them that plug into the cable modem, and we send all of that traffic through the secure tunnel back into IXC's corporate facility."

From there, an IXC call manager and the Cisco gateway take the traffic and interconnect it into the PBX. IXC allocates a block of PBX addresses to the gateway, which IXC is then able to assign to phone sets with the Cablevision system.

Lessons learned

Rothlis said it has been an eye-opening experience for all involved. "This is a whole different way of doing business," he said. "Once we got it down, it flowed pretty smoothly, but it took a lot longer and a lot more resources than we had expected."

Instead of the three weeks originally anticipated, the set-up ended up consuming about six weeks.

Latency, one of IP telephony's big "ifs," ended up being one of the trial's unexpected successes. The 10 IXC employees taking part in the field test are sharing upstream bandwidth with more than 260 ISP Channel cable modem subscribers systemwide, using Cisco packet prioritization for QoS.

"To our surprise, the latency was pretty good. We saw very good quality coming out of the plant," said Rothlis. "Because you are on a shared bandwidth system, you do occasionally get glitches, clicks, pops and things like that on the order of one every 20 seconds or so, but nothing overwhelming."

Rothlis now is interested to see what differences Data Over Cable Service Interface Specification (DOCSIS) 1.1 modems will make in IP telephony service delivery.

"We chose to go out prior to DOCSIS 1.1, and as such, we knew ... where we wanted to learn our lessons was not so much around quality of service or the IP telephony piece of it, but around all of the things that it would take for us to manage in that environment."

Rothlis said the companies instead focused heavily on troubleshooting problems associated with order entry, provisioning and so on. CT

Doug Larson is senior editor of "Communications Technology." He can be reached via e-mail at dlarson@phillips.com.

New!
AVAILABLE NOW!

DOCSIS Cable Modem

Features:

DOCSIS Certified

•

Up to 40Mbps Downstream and 10Mbps Upstream

•

Support for up to 16 PCs

•

SNMP Support

•

Self-Installation Wizard Software

•

Advanced Diagnostics

•

Front Panel Display with Diagnostic LEDs

•

Software Field Upgradable

•

Low Power Consumption at Less than 8 watts

http://internet.toshiba.com
cablesales@networks.toshiba.com
949.461.4840

In Touch with Tomorrow
TOSHIBA

CL CableLabs CERTIFIED

DOCSIS Certified! Toshiba has now made DOCSIS certification a reality. No longer do you have to settle for a 'DOCSIS-compliant' cable modem when you can have the 'real thing'.

Toshiba's DOCSIS Cable Modem has been certified by CableLabs to meet the rigorous interoperability requirements of the DOCSIS standard. It also offers many advanced features designed to make installation and support easier and less expensive, e.g., self-installation software wizard, advanced diagnostics, and fast provisioning just to name a few.

Dare to Compare. We challenge you. Take a hands-on test drive and discover for yourself how well the Toshiba DOCSIS Cable Modem performs. Speed, ease of installation, interoperability, supportability... feature for feature the Toshiba DOCSIS Cable Modem delivers the goods and is available now.

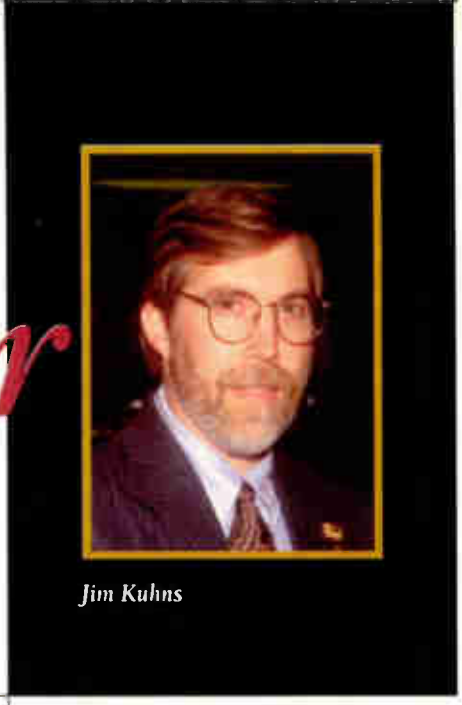
Don't Delay! Give us a call and we'll arrange a personal test drive with the 'real thing', a Toshiba DOCSIS Cable Modem.

But we have to warn you...
you won't want to settle for less.

Interview with a Leader

By Rex Porter

SCTE Chairman Jim Kuhns



Jim Kuhns

Jim Kuhns, the Society of Cable Telecommunications Engineers' chairman of the board of directors, has more than 20 years' experience in cable and broadcast. Besides running the board, he is director of SCTE's Region 7 and senior field applications engineer for Terayon. He has published several technical works and software programs and is a senior member of the Society, as well as a member of the Loyal Order of the 704. He presented the day-long "Transportation" workshop at Expo, and he's certified at both the technician and engineer levels of the Broadband Communications Technician/Engineer (BCT/E) program.

Communications Technology: *Jim, I understand you learned electronics almost before you learned your ABCs. Tell us about your earlier years.*

Jim Kuhns: I was born James Howard Kuhns on Dec. 10, 1953, in Uniontown, Pa. When I was about 2 years old, my parents moved to east Tennessee, to a little place called Cleveland, near Chattanooga. I grew up there attending elementary, high school and taking some college courses.

At about 12, I was bitten hard by the electronics bug and really got involved with electronics. A friend of the family set me up with a correspondence course with National Radio Institute, somewhere out of Ohio. NRI taught radio and TV servicing, and I got involved in that.

I guess I was about 13 or 14 when I had an opportunity to go out and meet with this friend who was the contract engineer for the local AM radio station. I walked out into the transmitter room, and I knew right then: This is what I want to do, transmission work. Radios and TV sets were great, but I wanted to do transmission work.

I asked him, "How do I do that?" and he said, "You have to have your Federal Communications Commission license." I started on working on getting my FCC license and did some work around the radio station and would repair radios and TV sets.

Communications Technology: *When you continued on toward more formal training, were your thoughts about television or radio?*

Jim Kuhns: When I graduated high school, I decided to attend the local college. It didn't have engineering curriculum, but I was majoring in design and drafting, while taking all the electronics courses that it offered.

I started working at that point for a Motorola service station. We did two-way radio repair, installation, pager repair and things of that nature.

It was a lot of fun, but I was really interested in getting into broadcasting. At that time citizens band (CB) radios were big, and I would sit there, and it seemed like all I did was repair CB radios, week in and week out. Broadcasting was what I wanted to get into, and I did through a strange set of circumstances.

I was talking one day to a radio station owner. He said, "I don't have anything right now." I said, "That's all right." Another guy came in, and he was talking about building a radio station. WZDQ it was, out in Soddy Daisy, Tenn. It was an FM 3-kilowatt station.

The station owner said, "Well, here's a guy looking for a job." The guy said, "I need someone who has an FCC license." I said, "I do," and he said, "Okay, let's talk." One thing led to another, and a little bit later that afternoon, I had myself a job building a radio station.

We did everything getting that radio station up, even tiling the floors, because the automation equipment was coming in on a Sunday morning, and the tile man didn't show up on Saturday.

Saturday evening, we were there with some beverages, some tile glue and boxes of tile. We didn't have a clue about what we were doing when we started. We had a 20-foot by 20-foot room tiled by 5 a.m. Sunday morning, and we were good at it.

DX
ANTENNA

It Can Receive Satellite Signals In A Microsecond.

Sending It To You, However, Takes A Full Day.

The DIR-777
DigiCipher® II Digital Satellite Receiver

INTRODUCING DX COMMUNICATIONS QUIKSHIP DIGITAL SOLUTIONS. ORDERED TODAY. DELIVERED TOMORROW.

For years, you've trusted DX for the finest satellite reception products and we've always delivered. Now, with the introduction of our first digital line, DX provides a comprehensive, one-stop solution for all your analog AND digital needs. The DIR-777 represents a powerful addition to your headend configuration— the next generation in a long line of breakthrough products from DX, the world's leading supplier of CATV delivery products. For pricing and vital statistics, call DX Communications now. DX Communications, at the leading edge in digital reception.

DX Communications: 1143 West Newport Center Drive Deerfield Beach, Florida 33442 (888) 293 - 5856

DX Communications is a Division of Itochu Cable Services Inc.

Reader Service Number 17

We could have gotten a job laying tile just about anywhere, I guess.

After that, I handled the engineering duties, but they also put me on the air as a disc jockey. We went through the rating sweeps, and I did really well. They wanted me more and more to get away from engineering and get into announcing, the disc jockey portion. For about the next three years, I did engineering on the side, and everyone wanted me as a disc jockey. By the end of 1980, I wanted to get back into the engineering full-time.

Communications Technology: *So then you went into cable?*

Jim Kuhns: I got married in 1978, and my working all kinds of crazy hours was really tough on my wife, Tina. I decided to make a change. I couldn't find anything in broadcasting, so I left. I took a job in construction. I was building houses on Kiawah Island, S.C., because my last broadcasting job had been in Charleston, S.C.

"I walked into this little building, and I've not seen such a rat's nest of wires and stuff going every which way in my life."

A friend I had worked with earlier now worked at WCSC Radio/TV in Charleston. He came by the house and said: "I've changed jobs to work for Storer Cable, and they're looking somebody to build a studio for them. They need a broadcast engineer."

I wasn't sure that I wanted to do that; in fact, I was very sure I didn't want to stay in cable.

In 1976, I had my first indoctrination in a cable system. I was in Chattanooga, and I received a call from a gentleman in North Georgia. He had a broken leg and couldn't climb his tower, which needed lights changed. I said I would go down and do it. I met him, and we went up on the ridge. I walked into this little building, and I've not seen such a rat's nest of wires and stuff going every which way in my life.

There were some dials that I found out later were temperature, time and, I think, humidity. They looked like they hadn't been dusted in a month of Sundays. He explained that he was running this little system, and people were going to pay him to watch television. I was absolutely fascinated that a grown man would actually believe that someone was going pay him to watch television.

I relamped his tower, and he proceeded to show me some things. He was very proud that he was picking up WTCG, Ch. 17, out of Atlanta. A few months later, WTCG changed its call sign to WTBS, billing itself as The SuperStation.

Communications Technology: *Lots of people get into cable engineering by unusual routes, but that is a novel way of getting acquainted.*

Jim Kuhns: That was my first experience in cable TV. When I was contacted in 1982 about going to work for another cable TV company, my first thoughts went back to that little headend. The only thing about which I was certain when I went in was that I was not going to stay.

I took the job, and oddly enough, I almost ended up not getting the job with Storer. The two final candidates for the job were my wife and me. Before she became a stay-at-home mom, Tina was a broadcast engineer.

They were very worried that if they gave the job to one of us and didn't give it to the other, it might cause problems at home. But for whatever reason, they decided they would go ahead and offer me the job, and they did. As I recall, they actually came back and said, "Which one of you would like to have it?"

At that point, Tina said: "You go ahead and take it because you're better at taking things that are sitting in boxes, putting them together and turning them into something. You did that in radio stations, rewiring stations and that type of thing. You go ahead and you take the job."

Well, I built their studio for them. As I got the studio built, I said, "When we get to the end of the build, what am I gonna do? There's not enough to keep an engineer busy." "Oh," they said, "you'll be busy shooting LO (local origination) programs, taping commercials and all these little public service things." ➤

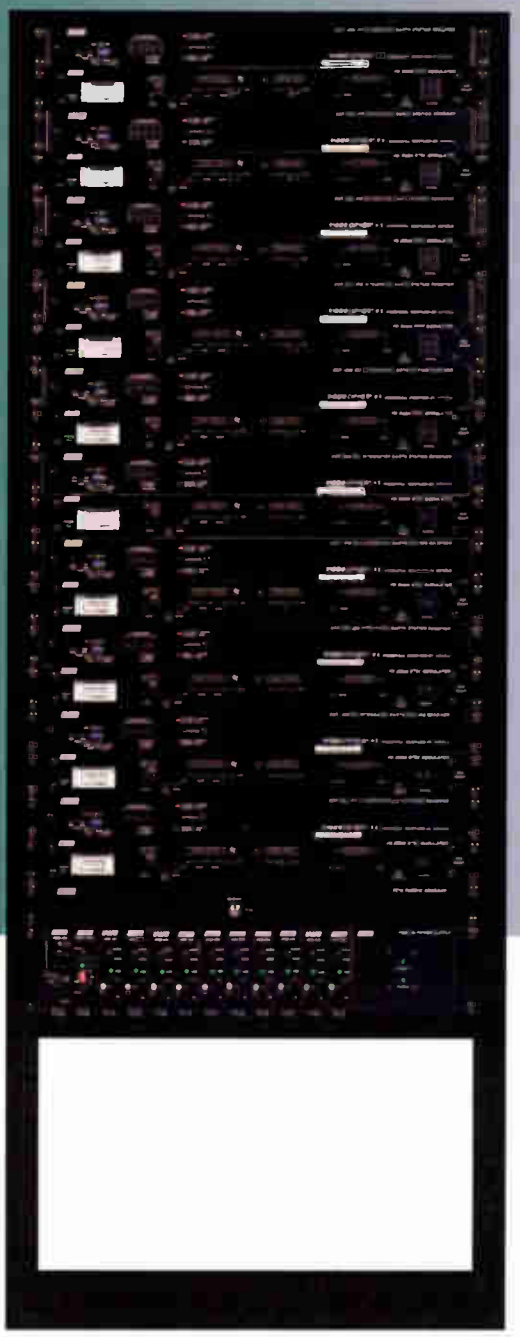
A PARTNER YOU CAN TRUST FOR PROFESSIONAL HEADEND SOLUTIONS...

DRAKE

*Drake offers a full line of professional headend equipment for those who demand **quality** and **value.***

*Every Drake product is supported by a **tradition** of unmatched service and expert advice, so you can feel **confident** about your headend choice.*

Call us today to find out how we can help you match the right products or system to your specific requirements.



The Industry Leader for Professional Headend Equipment and Accessories

Coming Soon - Digital Headend Products.
See our website for details.

DRAKE DIGITAL

R.L. Drake Company
230 Industrial Dr.
Franklin, OH 45005-4496 U.S.A.

PHONE: 513-746-4556 **FAX:** 513-743-4510
WORLD WIDE WEB SITE: www.rldrake.com

DRAKE

I said, "Do you mean a production person?" They said, "Yes." I said: "Well, you don't understand. I come from broadcasting, and I'm an engineer. Broadcasting engineers don't like production people. Production people break the stuff that engineers work so hard to tweak and fix, and I can't see me doing that. How about you let me learn the cable side, and I can maintain your studios that need to be maintained?"

After chewing on that, they decided, "Yeah, that would be a good idea; we could do that." So I moved to the outside.

Communications Technology: *How did you jump from broadcasting to cable and learn so quickly?*

Jim Kuhns: They started me out as a service tech because of my electronics/technical background. They had seen me troubleshoot on maps, which I never thought was a problem. A lot of guys asked, "How can you understand maps when you have never worked in a cable system?"

I always looked at maps as being nothing but schematic diagrams where the components, instead of being millimeters apart on a PC (personal computer) board, were feet or thousands of feet apart out in the field. The concept is still the same: Divide and conquer, checking your various circuit stages.

I rode with this man named Pete MacMillian. For two months, I was in and out of homes repeatedly. He told me: "Your responsibility is to (a) drive and (b) make sure when you get out of that truck and you start to walk toward the house that you have your tool belt on, you have your meter on your shoulder, and a converter box (which at that time was a JSX-3) under your arm. If you do that, when you knock on the door, chances are when you come back to the truck, you're going to be ready to leave." I learned to work very, very efficiently by doing that.

Pete took me out one day, and we stopped on a little road. We were caught up on our work, and he said: "I am going to teach you how to climb. This looks like a pretty good pole, and the ground around it is soft." He put the hooks on, walked up the pole, showed me how to climb safely and said, "OK, you try it." I put the hooks on, took a couple steps up, couple steps down, couple steps up, and he told me I had the hang of it. ➤

REEL Products... REEL People.

At CommScope, our products are just part of the story. Sure – our cable consistently out-performs your expectations year after year. QR®, Fiber Feeder™, UltraHome™ and ConQuest® Cable-In-Conduit are just some of our products building today's HFC networks. Now, after 25 years in the industry, CommScope is still exceeding expectations and setting new standards. From start to finish – CommScope delivers Reel Products built by Reel People.

Reel Service. From our highly trained sales managers to the customer service representative you may talk to every day – CommScope emphasizes the "customer" in customer service. Making and shipping the right product fast – to build the network you need. As long as CommScope is printed on your cable, service is on-going.

Reel Product Deliveries. CommScope is a champion at getting products to you faster and easier than expected. We are the only cable manufacturer that operates our own trucking fleet, with over 88 long-distance trucks and 144 trailers. When you need emergency cable – it's great to know that a CommScope truck will be there in 48-hours. And, our driver will greet you with a smile.

Reel Technical Support. Today, technology is racing ahead and you're running to stay in the race. CommScope understands. You want answers to questions about telephony, data over coax, signal ingress and powering issues. Our Technical Support group is staffed with "techies" who enjoy tough questions! Just call us.

Reel Products. Reel People. At CommScope, it's hard to separate our product from our people. So much of what CommScope does every day depends on the service, technical support, attitude and superior quality work that our people provide. Our people make our products work. Our product makes your system work.

CommScope®
How Intelligence Travels.™

P.O. Box 1729 • 1375 Lenoir-Rhyne Blvd.
Hickory, North Carolina 28603
Tel 800 982 1708 • 828 324 2200
Fax 828 328 3400
www.commscope.com

He said: "I'm going to cut a long lead. I want you to take the meter up the pole—go on! I want you to open up that line extender and take signal level readings." I took the cable and hooked it up to a splitter so he could watch to make sure that I was reading the meter correctly. I shook all the way up that pole, and I came back down.

As a service tech, there were all kinds of things that you could end up doing. We had to go out and meter-balance trunk runs. I hooked up one pole and down and up and down, and at the end of the day I had been up and down 15 or 20 poles. When we got back, Pete walked in and told the chief tech, Mike Dawkins: "He knows how to climb. He's been out there two months; he's ready to go."

But during my first week out there by myself, everything we had run into in the proceeding two months, I didn't run into. And everything that we hadn't run into, I did run into. I was beginning to enjoy it, though. Technicians were on call, and it gave me a chance to go on calls and actually work out in the system, rather than just in and out of the houses.

Communications Technology: *You must have needed training other than on-the-job.*

Jim Kuhns: Well, my boss told me I needed to take an NCTI course, so I signed up for a technician course. He also told me that if I really wanted to succeed in cable, and I was thinking about maybe staying in it, that I should join the SCTE. I joined in 1983. I was really disappointed when my membership card finally came. All you got was a wallet card stating that you were a member. But the SBE (Society of Broadcast Engineers), in which I retain membership, sent you this nice certificate you could hang up.

I continued in the SCTE. I moved from Storer to Kiawah Island, S.C., where I worked for a small construction contractor, Mills Communications. They owned some cable systems and had a franchise to build the cable system on Kiawah Island, a very exclusive resort island. It was S-A, 450-MHz, state-of-the-art, two-way capable, back in the early '80s.

We were going to do security on the return and all these things like PlayCable. That's one you haven't heard of for awhile. With the Mattel TV units, you could download 10 games a month for $9.95. More often than not, it didn't work, but that was because of the way we were maintaining the system. We thought we were doing a good job, but in hindsight it was probably things we were doing.

I had a great opportunity with Mills. There were boxes and boxes of stuff. I learned how to do a little bit of everything at the cable system: wire up a headend, fire up a system, sweep it, rough-balance it—you name it.

After about a year and a half, my chief tech from Storer had moved on to a system in Woodstock, Ga., in the metropolis of Atlanta. He called me up and said: "I need a senior technician, somebody that, while it's an hourly job, can go out and basically be the lead technician out in the field. I know it's really close to home, so we'll have you a couple hours from where you grew up. Would you like to move?" After Tina and I talked it over, we moved to Atlanta. ➤

Communications Technology: *Is this about the point where you became really heavily involved in the SCTE?*

Jim Kuhns: In Atlanta, I met Gary Donaldson, who was with Wometco at the time. Gary, Guy Lee and Mike Aloisi encouraged me, and my bosses to allow me, to run for the board of the Chattahoochee Chapter. I won. ➤

The Guardian RSVP™ Return Path Evaluator

BECAUSE MOST INGRESS IS HOMEMADE

With the Guardian RSVP Return Path Evaluator You'll Identify and Stop Ingress at the Source: The Subscriber's Home

Guardian RSVP

It's simple—most return path problems originate in the subscriber's home. Flawed installation, faulty cabling, and mis-installed or loose hardware can disrupt the return path and your system's revenue stream by admitting ingress.

The Guardian RSVP™ return path evaluator puts you in control of the return path one home at a time because the Guardian RSVP hardens your system with each and every installation and maintenance visit.

Working with a Guardian IsoMeter™ reverse leakage detector in the field and a standard Trilithic 9580™ reverse path analyzer in the headend, the Guardian RSVP analyzes the return path as well as the ingress potential and shielding integrity of subscribers' home wiring.

Test The Entire Return Path: Just press "TEST" and the Guardian RSVP quickly determines whether the reverse signal strength needed is within the capability of the set top terminal or modem, then just as swiftly evaluates the carrier/(ingress and noise) ratio from the set top to the headend, providing the installer with a clear "PASS" or "FAIL" message and full measurement data for troubleshooting.

Test Shielding Integrity: By simply connecting the Guardian RSVP to the subscriber's ground block, your technician can flood the home's cabling system with a calibrated return test frequency that makes all leaks immediately detectable to the Guardian IsoMeter.

The Guardian RSVP return path evaluator will help you protect the value of your return path because with the RSVP you'll home in on ingress before it enters your system.

GUARDIAN™ RSVP
Return Path Evaluator

Call now for a free white paper (800)344-2412

(317)895-3600 (317)895-3613 Fax www.trilithic.com

TRILITHIC

Reader Service Number 24

The first chapter meeting that I attended was held at Showtime's regional offices. They had these black leather seats in their conference room. Everyone else on this board was a coat-and-tie sort of person—people such as Glendell Moore (who at the time was a regional vice president of engineering for Storer), Mike, Guy and Gary.

Prior to my first board meeting, we had a trunk cut and a supertrunk down on Lower Roswell road. I had climbed out of the splice pit covered with Georgia red clay, and I crawled in my truck. I drove down to Showtime's offices. When I sat down in that boardroom, I don't think I ever felt so out of place in my life. After I got up, you could tell right away where I had been sitting because there was a horseshoe of Georgia red clay on my chair seat.

As I walked out, I said: "Fellows, I just don't know. I'm a field guy." Their response was: "Hey, without you field people, we don't have jobs. You fit in. We need you."

About a year and a half after that, I was transferred to North Carolina, just outside of Charlotte. Mike Aloisi, who was the regional director for the SCTE, said, "When you get up there, we have to get a chapter going."

Mike came up after I got established, in about August of '87. We had our startup meeting and formed what eventually became the Piedmont Chapter of the SCTE. I am very proud that I am a cofounder, and I was their charter president. A lot of fine people contributed to that chapter, and they elected me as their first president. I really enjoyed my involvement.

After about a year and a half, some things happened, companies consolidated, and I relocated to Michigan. I went to work for Continental Cablevision, putting together the technical training center in Michigan. I got involved with the Great Lakes Chapter and was elected to its board. I then moved on to Comcast. I was approached about running for the national board of the SCTE. In 1996, I was elected to the board of directors of SCTE.

Communications Technology: *You always seem to be thrilled with your work. Apparently, the SCTE membership and the board of directors have recognized this. After all, you were elected chairman at the last Expo.*
Jim Kuhns: I guess if I had to sum it up, I would have say that the SCTE and my involvement with the SCTE contributed to my career growth. I had become involved in the certification program all the way back in the Chatahoochee Chapter. It just seemed like my involvement in SCTE really made a difference. While I was in Atlanta, people found out that I did some programming, and people on the Chattahoochee chapter, especially Mike Aloisi, saw my program and showed it to Bill Riker. This eventually became the "CATV Wizard" program. The SCTE continued to be a real shot in the arm for my career.

My SCTE involvement began when I was a technician. But people who were established and involved in SCTE programs took the time to say to me, "We want to get you involved." I seriously

Panduit® GIGA-CHANNEL™...
Your Next Generation Copper Cabling Solution

NEW! Breakthrough Technology!

- **Performance Redefined**
  - Meets proposed TIA Category 6 Requirements
- **Lightning Fast Installation**
  - Incorporates GIGA-TX™ Technology
- **Gigabit Ethernet Guaranteed***
  - Cabling Products Designed for the Future

GIGA-CHANNEL MINI-JACK™ Modular Jacks

- Provide superior *installed* performance at the workstation and in the closet
- Meet proposed Category 6 requirements for NEXT, FEXT, Attenuation and Return Loss †

GIGA TX™

Revolutionary Design Speeds Termination

- Simply place all pairs in *GIGA-TX* Twist Preservation Cap at once, separate and bend back pairs – securing each conductor

- After cutting off excess cable, place the *GIGA-TX* Twist Preservation Cap on the jack base and move ***forward*** with channel lock pliers or our new termination tool

Cable Pair Twist Preservation Technology

Conductor untwists are virtually eliminated for superior performance

Visit us at Booth #305 at Networld/Interop

Call 888-506-5400, Ext. 6914
for FREE
***GIGA-CHANNEL* Brochure**

***GIGA-CHANNEL* Patch Cords and Modular Patch Panels**

Patch cords are constructed with Next Generation stranded cable with *GIGA-TX* Modular Plugs and are offered in a variety of convenient lengths. The Patch Panels feature high-performance *GIGA-CHANNEL MINI-JACK* modular jacks in 24 or 48 port versions.

Future-Ready Design

Panduit's *MINI-COM*™ system provides absolute modularity. All *MINI-COM* copper and fiber modules, including *GIGA-CHANNEL MINI-JACK* modular jacks, snap in and out of all *MINI-COM* outlets and patch panels making future system upgrades quick and easy!

Quality by Design

PANDUIT®
NETWORK SYSTEMS GROUP

Tinley Park, IL 60477
Phone: 708-532-1800 • Fax: 708-460-2897
Website: www.panduit.com • Email: info@panduit.com

*Call Panduit for New *Certification Plus*™ System Warranty Program details

Reader Service Number 26

Jim Kuhns speaks with an attendee during his "Transportation" workshop at SCTE's Cable-Tec Expo '99 in Orlando, Fla. in May.

doubt I would have ever become involved on my own because I considered myself to be just a technician. That's interesting. I heard this term not too long ago. Someone told me, "Well, I'm just a technician." I looked at him and said: "You're never 'just' a technician. You're a technician, and you should be very proud of that."

Communications Technology: *So does the memory of that "rat's-nest" headend and all those wires still stand out when you remember your start in cable?*

Jim Kuhns: I'm very proud of the fact that I came up through the ranks, if you will. Yes, I have my war stories of sliding the poles (I can show you the splinter scars), of lessons learned and jumping fences to escape dogs. In my mind, the dogs probably seemed a whole lot bigger than they really were.

Looking back on 16 years in SCTE and 17 years in cable, I am proud to have been a part of an industry that allows you to be all you can.

What I mean is that our industry is a growth industry, rather than one like the automotive industry. You can just move so quickly if you are willing to hustle and put effort into it; there are no limits to what you can do.

I was very fortunate to have people willing to say: "Hey, you can go for it—you're a technician now. But what do you want to be? Where do you want to go?" I honestly believe that the involvement in the SCTE helped to fuel that, the friendships I've made through the years with SCTE, the people and that staff. I got to know people like Howard Whitman.

Back in the late '80s, we were putting "CATV Wizard" together, and I still remember how really neat it was. I talked to him for probably half a year prior to the Expo in San Francisco when we rolled out "CATV Wizard." I had never met Howard in person. How neat it was to walk up and say, "I'm Jim, the guy you've been talking to about the program."

There are just so many things. I got involved with NCTI's technical review board. From there came an interest in some stuff I was writing, and it all ended up as a book. I look back at that and just say, "Wow, I've been so fortunate."

I've never lost my awe for that picture of the 1969 Charter Members. I know some of those people. I guess if I ever reach a point where I can't look back and say, "Wow, I've really been fortunate," it will be time to find something else. Then the excitement I have lived with will be gone, but I don't see that happening.

I think as long as you remember where you came from and how you pulled yourself up, you don't ever have to worry about that happening. So I'm looking forward to the future, looking forward to, hopefully, another 16 years in SCTE and, when it's finally all over, being able to say, "It was fun, and I enjoyed it." CT

Rex Port is editor-in-chief of "Communications Technology." He can be reached via e-mail at tvrex@earthlink.net.

Y2K Issues Hanging Over Your Head?

- **Y2K Compliant**
  - Ensures Against Year 2000 Service Interruption
  - Replaces Outdated Systems
- **Interdiction Return Path Management to Minimize Ingress**
  - Superior Ingress Control at the Drop
- **Complete Subscriber Management System**
  - Remotely Controls up to 56 Headends
  - Controls Interdiction Products as well as Scientific Atlanta Set-Top Boxes
  - Manages Pay-Per-View
- **Remote Access to Data**
  - True Dial up Platform
  - Telnet Access
  - Ethernet Network

iCentral Subscriber Management System can help.

iCentral provides flexible control of off-premise addressable interdiction, as well as Scientific Atlanta's out-of-band set-tops.

Time is short and the installation schedule is filling rapidly! Call now to ensure availability.

iCentral

BLONDER TONGUE LABORATORIES, INC.

One Jake Brown Road, Old Bridge, NJ 08857
1-800-523-6049 x 555 • Fax (732) 679-4353
www.blondertongue.com

Reader Service Number 28

By Ron Hranac

dB or Not dB: That Is the Question

Everywhere the sun is shining,

All around the world it's shining,

But cold winds blow across your mind.

Confusion—it's such a terrible shame

From the song "Confusion," by Electric Light Orchestra, ©1979

"The house amps we use have 15 dBmV of gain." "The line extender's output is 46 dB." "The minimum allowable input to the TV set is 0 dB." Notice anything wrong with the previous statements? In all three cases, our good friend the decibel has been used incorrectly. As ELO's Jeff Lynne would say, "Confusion, I don't know what I should do."

By the way, those three statements should read "The house amps we use have 15 dB of gain," "The line extender's output is +46 dBmV," and "The minimum allowable input to the TV set is 0 dBmV." In other words, gain and loss can be expressed in decibels (dB), and absolute signal levels as decibel millivolts (dBmV), but not the other way around. Read on to understand why.

Once upon a time ....

Long, long ago, in an industry far, far away ... the decibel was born. No, we can't claim the decibel as our own because it supposedly came from the telephone industry. The story goes something like this: Telephone engineers discovered that a particular length of a particular type of phone wire attenuated the wire's signal power a certain amount. The same length of the same type of wire always attenuated the input power by the same ratio, regardless of the actual level of the input signal. They called this ratio the bel, in honor of Alexander Graham Bell.

Like the farad (capacitance) or henry (inductance), the bel was much too cumbersome for dealing with small signal power ratios, so the bel was divided by 10 and called the decibel. Mathematically, it works out $dB = 10\log(P_2/P_1)$. As you look at this formula, you'll note that it does nothing more than describe a ratio between two power levels, P_2 and P_1. In most cases, P_1 is the input power to some device, and P_2 is its output power. That's what decibels are all about: ratios. Nothing more, nothing less.

"It doesn't really matter what the actual levels are, just the ratio between them. That's all decibels are: ratios."

The math of it

Let's look at a couple examples that should help to clarify this.

Assume you have a 50-watt stereo and your neighbor has a 100-watt stereo. How much more powerful, in decibels, is your neighbor's stereo than yours? Simple: To find out, plug the two stereo systems' power levels into the previous decibel formula. I've re-written it slightly to make it a bit easier to use.

$dB = 10 \times [\log(P_2/P_1)]$
$dB = 10 \times [\log(100 \text{ watts}/50 \text{ watts})]$
$dB = 10 \times [\log(2)]$
$dB = 10 \times [0.301]$
$dB = 3.01$

According to my trusty Hewlett-Packard scientific calculator, your neighbor's stereo is 3.01 dB more powerful than your stereo. Here's another example. If your favorite radio station decides to install a new transmitter that will increase its output power from 10,000 watts to 20,000 watts, how much more powerful, in decibels, is the new transmitter than the old one? Again, the answer can be found with the decibel formula.

$dB = 10 \times [\log(20{,}000 \text{ watts}/10{,}000 \text{ watts})]$
$dB = 10 \times [\log(2)]$
$dB = 10 \times [0.301]$
$dB = 3.01$

In both cases the answer is 3 dB (OK, 3.01 dB). How can that be? In the first example, the power difference was 50 watts, and in the second example the power difference was 10,000 watts! How the heck can each one be equal to 3 dB? The answer is not related to the absolute difference between two power levels, but rather the ratio of the two power levels. In both examples the ratio is two. That is, one of the power levels is twice as much as the other. It doesn't really matter what the actual levels are, just the ratio between them. That's all decibels are: ratios.

If you work through a few more examples like these, and the ratio between the two power levels in question is two, the difference between them always will be

Raise your CATV Battery standards with Lectro.

Lectro's advancements in battery technology are taking CATV power reliability to new heights! The new Lectro CPR™ powering system includes a thoroughly rugged and reliable UPS complimented by the most technologically superior stored energy device ever introduced to the CATV marketplace, the Lectro CPR Battery.

The same pure lead-tin battery technology that brought 99.99% reliability to traditional telecom applications is now available for broadband CATV networks in the form of the Lectro CPR Battery. This is the first MSO application of this top-of-the-line battery architecture in the United States and it "raises the bar" in CATV industry powering standards worldwide. It's so advanced, we provide a 5-year FULL non-prorated warranty!

LecTro CPR

For more information, visit our website at:
www.exide.com/lectro.htm
or Email lectro@email.exide.com

Phone: 1-800-551-3790 or 1-919-713-5300

LecTro

BTR
A member of the BTR Group

EXIDE ELECTRONICS
Strategic Power Management

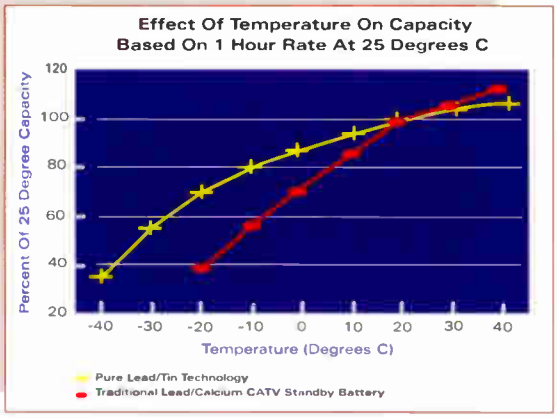
The New Battery Standard

CPR batteries are an integral part of the entire Lectro CPR Powering System bringing unparalleled reliability and reduced cost of ownership to the CATV industry. The batteries are managed by a proprietary "smart-charging" Advanced Battery Management™ (ABM) subsystem in the UPS which also performs an automatic system self-test every 21 days and sends out an alert warning of an impending battery problem *before* it becomes a network issue. Batteries are kept in peak condition, ensuring maximum runtime performance and lengthening the life of each battery. ***And longer battery life means fewer maintenance visits and a reduction in life cycle battery costs by more than 50 percent!***

When used in conjunction with the Lectro CPR UPS, Lectro CPR Batteries have a 5-year full warranty*, a first in the industry! When a weak battery is detected by the CPR UPS's automatic 21-day self-test during the warranty period, the defective battery, or in some cases, the entire 4-battery string, is repaired or replaced by Exide Electronics free of charge, including freight.

Inside the technically advanced Lectro CPR battery is a pure lead-tin electrochemistry, thin plate technology and sophisticated grid material used to ensure maximum performance in the harshest environments. The high purity lead (99.99% pure) results in low self-discharge rates (longer shelf life), higher power densities, faster recharge and much less corrosion. The presence of tin creates a superior battery with higher tolerance for frequent cycling without shortening its life in standby applications. Two sizes are offered - a 40 Amp-hour designed for ZTT/Plus cabinet retrofit applications as well as a 70 Amp-hour for new CPR installations.

Because severe outdoor conditions create special battery requirements, CPR batteries are engineered specifically for the extreme temperatures often found in CATV environments. CPR batteries have a wide operating temperature range and provide excellent performance at both ends of the temperature spectrum.



Powering the Heart of your Network

Register for a free gift from Lectro by visiting our website at:

www.exide.com/lectro.htm
Email: lectro@email.exide.com
Phone: 1-800-551-3790 or 1-919-713-5300
Fax: 1-919-713-5350

**The five-year full warranty applies to new CPR systems deployed in North America. Outside of North America, consult your local Lectro distributor or Exide Electronics regional sales office.*

Lectro/Exide Electronics
Communications Systems Group
8380 Capital Blvd
Raleigh, NC 27616 USA

LecTro

BTR
A member of the BTR Group

EXIDE ELECTRONICS
Strategic Power Management

Introducing Avantron's New AT-2000RQ QAM Spectrum Analyzer (The Smart Choice)

Unique combination of QAM digital measurements and portable CATV spectrum analyzer

High-resolution 6.4"color LCD display is a huge plus when analyzing detailed constellation measurement displays.

In-Service 64/256 QAM Digital testing

Fully portable, lightweight 19 lbs (including built-in battery)

Measurement accuracy only a lab-grade spectrum analyzer can provide.

User-friendly one-button measurement capability

VANTRON AT-2000RQ QAM SPECTRUM ANALYZER

ease request a product sheet for complete specifications and features & benefits

ompliant DOCSIS, ITU-T J.83 Annex B	YES 64/256 QAM
onstellation Display with Zoom	YES
e and Post Bit Error Rate (BER)	YES
odulation Error Ratio (MER)	YES
ror Vector Magnitude (EVM)	YES
aphic Statistics Display	User-selectable Time Period: 1 to 60 minutes Errored Seconds - Severely Errored Seconds - Severely Disturbed Periods - System Unavailability Time
daptive Equalizer Display	YES
verage and Adjacent Channel Power	YES
Optional AT2CATVPAK	100% In-Service CATV measurements and full FCC proof-of-performance capability

Smart because...

"Integrating the 64/256 QAM digital measurements with an affordable field portable CATV spectrum analyzer such as the Avantron AT-2000R is truly a breakthrough from both a cost and performance point of view."

AVANTRON'S AT2000RQ The REALLY Smart Spectrum Analyzer

Avantron Technologies Inc.
The OTHER Spectrum Analyzer Company The MSOs Trust

1-800-297-9726
http://www.avantron.com
info@avantron.com

Reader Service Number 29

3.01 dB. What that should tell you is that any time you double or halve a given power level, the change will be 3.01 dB.

For example

Now think about a two-way splitter. It is, in effect, nothing more than a power divider. The splitter's input signal power is evenly divided between the splitter's two output ports. Mathematically, the loss through a two-way splitter is 10log(2), or 3.01 dB, and the loss through a four-way splitter is 10log(4), or 6.02 dB. "Wait a minute, Hranac, the two-way splitters we use have 3.5 dB to 4 dB of insertion loss, and our four-way splitters have 7 dB to 8 dB of loss, not the numbers you just calculated. What gives?"

What gives is additional loss in the splitters caused by circuit inefficiencies, splitter design and component value tolerances. These factors contribute a small amount of loss in addition to the calculated insertion loss.

So far, so good. But how does this relate to gain? Well, let's look at an amplifier from the perspective of signal power. If the input power is 0.000000133 watt and the output power is 0.0000133 watt, what's the amplifier's gain? Plug the levels into the decibel formula to find out.

dB = 10 x [log(0.0000133 watt/
0.000000133 watt)]
dB = 10 x [log(100)]
dB = 10 x [2]
dB = 20

This says the amplifier has 20 dB of gain. But what if the input and output levels are 1 watt and 100 watts respectively?

dB = 10 x [log(100 watts/1 watt)]
dB = 10 x [log(100)]
dB = 10 x [2]
dB = 20

The amplifier's gain is still 20 dB, even though the levels are different.

What the examples so far show is that gain and loss, which are nothing more than ratios of output power to input power, can be expressed in dB. Think of the decibel as a dandy form of mathematical shorthand.

Now, wait a minute

If you've followed my blather this far, you might be thinking something like, "Uh, we don't measure cable system signal levels in watts. What's this got to do with anything?" Good question, and I'm glad you asked.

Cable system signal levels are almost always expressed as a voltage, generally microvolts or millivolts. If you do a little manipulation with Ohm's Law, signal power can be converted to signal voltage, assuming a constant impedance. One formula to do this is $P = V^2/R$, where P is the power in watts, V is the voltage in volts, and R is the resistance (or impedance in the case of a cable system) in ohms. Going back a couple examples, the signal powers 0.0000133 watt and 0.000000133 watt are 0.003162 volt (3.16 millivolts) and 0.03162 volt (31.62 millivolts) respectively.

Can you imagine how confusing things would be if you had to measure amplifier signal levels as plain old voltages? All those zeros and decimal places would make it pretty tough, not to mention hard to read on your signal level meter's (SLM's) display. Wouldn't it be nice if there was some way to use the decibel to simplify things?

There is! If we define a reference voltage, we can use the decibel to compare signal voltages (for the purists, signal power expressed in terms of voltage) to the reference.

That's where dBmV comes into play. By appending dB with references such as millivolt (mV), milliwatt (mW), and so on, it becomes possible to compare signal levels to the defined reference. While still a ratio, this gives us an indirect way to represent absolute signal levels with our old friend the decibel. How? Unfortunately, I've come to the end of my column's allotted space, so you'll have to wait until next month for the second part of this exciting drama. CT

Ron Hranac is vice president of RF engineering for Denver-based High Speed Access Corp. He also is senior technical editor for "Communications Technology." He can be reached via e-mail at rhranac@aol.com.

Advanced Optical Communications Products and Research

Silicon Valley Communications develops and markets versatile, modularized, high performance optical communications products for broadband video and digital networks.

Advanced Fiber-Optic Transmission and Distribution Products

- Two modular chassis types – 1RU and 3RU
- AC (90–230V) and DC(–48V) Power Supply Modules and +24 volt Chassis backup
- 1310nm and 1550nm Transmitters
- EDFAs (14, 17, 20, 21, and 23 dBm Models); Soft-Fail and Fail-Safe Models Available
- Forward Path Receiver and Dual Return Path Receiver Modules
- Return Path Transmitter Modules and Universal RPT Replacements for all nodes
- 3-Output and 4-Output Scalable Nodes

Advanced Engineering and Development Partner

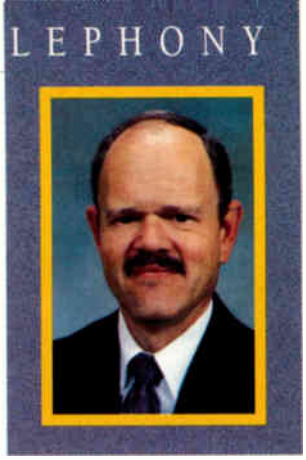
Silicon Valley Communications offers advanced research and development facilities for the design, engineering and manufacturing of custom solutions for integrated data, telephony and video HFC networks. Customers around the world have found SVC to be a valued strategic business partner in developing alternative and effective HFC solutions.

SILICON VALLEY COMMUNICATIONS
A leading edge technology company

SILICON VALLEY COMMUNICATIONS INC.
3515 Monroe St. Santa Clara CA 95051 • Phone: 408.247.3800 • Fax: 408.247.8689
Internet: www.svci.com • E-mail: sales@svci.com

Reader Service Number 31

By Justin J. Junkus



Welcome to the Real World

With Opportunities Come Training Needs

Between looking at the pros and cons of telephony in our industry and digging deep into its technologies, I took a shot at basic telephony installation in my business office. What I found was both enlightening and pertinent to many readers of this column. I hope my experiences help prepare many of you for what lies ahead.

The story is about telephony in a small business establishment, not a residence. Cable telecommunications hasn't elected to serve this market in a major way yet, but someday it will. I'm confident of this because between 40 percent and 60 percent of telephony revenue comes from small business and work-at-home professionals.

Cable executives won't pass up that opportunity, especially as the physical separation between office parks and residential areas continues to diminish. A business passed can be served just as well as a home passed, especially if the return is greater.

Some background

My story is very focused. I'm going to talk only about business customer premises telephone equipment. We'll leave all the issues of premises wiring for another day. Furthermore, I'm also going to limit my discussion to the special type of customer premises equipment known as multiline business phone systems. That leaves out central office-provided Centrex service and large private branch exchanges (PBXs).

Multiline systems still require the subscriber to lease single-party lines from the telephony service provider, but the systems are designed to let the lines work with each other. This type of phone system usually is called a key system. It can have a central controller called a key service unit (KSU), which must be mounted someplace separate from the station sets, or it can be KSU-less. The KSU-less version contains all the functionality of the KSU in each station set.

> "The service provider that can help the customer solve a communications problem, even if the problem belongs to the customer, will win and keep the customer's business."

Station sets for KSU-less key systems thus tend to be more expensive than standard key system station sets, but are easier to add and move. Also, there is no need to find space for a separate KSU. Although KSU-less systems tend to be limited to fewer users than the standard key system, the typical station maximum is more than enough to handle current needs and any planned growth of many small businesses.

With my system, which is a GE Pro-Series 2-9451, I can have up to four line appearances on each station set. Only two of the lines need to be common to each station set, so I can have up to 16 lines into the system. It has intercom capability, which means I can call an associate with a push of a button (without going through the telephone company). I can conference and transfer calls, all within the system. I have hands-free speakerphone ability, and I can attach an optional headset. Other companies make systems with similar features.

Installation woes

Installation of such a multiline system might be challenging to someone who is not familiar with telephony. This is the point of the story for cable personnel. Even though choice of system and its installation technically are the responsibility of the subscriber, if installation goes wrong, the subscriber probably will call the telephony service provider.

This is especially the case now that these systems have become consumer electronics. The office supply store that sold the system can't answer all questions, and the service provider is easier to reach than the customer service department of the electronics firm that built the system.

(By the way, it's interesting to note that the warrantee on most business telephone systems is now only one year, not the 20 years that used to be the norm for telephone sets. Guess who will get the calls after warrantee expiration?)

The first part of the installation is to have jacks for each required line at each desk. In my case, that means all three lines are run to wall jacks at all locations needing a phone. Like many consumers, I have the jacks wired as single lines. My phone system, however, uses a line cord that brings two lines into one jack on the phone. To make it work, I needed to obtain a Y-shaped adapter cord. ➤

Because the Y-adapter cord is not always stocked at consumer electronics stores, some consumers may attempt to improvise a connection with an alternate plastic two-phone jack adapter. The problem here is that the majority of these adapters are for extensions, not separate lines. Using the wrong type will short both lines together.

Even with the proper adapter cord, it's not hard to make a mistake. For two of the lines in the system, each station with a line appearance must have the same service provider line go to the same pins on the station set. If they don't, the system will not function. Crossing the two lines at the Y of the adapter will therefore present a problem, and this could be another case where the service provider would most likely get a call.

Once connected, the station sets must be programmed with their station addresses. If two sets have the same address, the system will not work, and once again, the service provider may receive a call.

Finally, there are always system "glitches" that are unusual situations. In my case, I had a problem with the initial syllables of a conversation being clipped when I used the speakerphone. Here again, a subscriber would likely call the service provider to complain, especially if this were a new installation of both lines and customer premises equipment. (Even I started thinking about the potential for faulty telco echo cancellers.)

It turned out that the problem was a volume control on the phone's speaker being set too high—nothing to do with the service provider. (GE is working on changes to its system to prevent this from occurring.)

Training

The moral of this story is that as cable enters the telephone business, cable telecommunications personnel will need to be trained on more than installation of house wiring and the cable system in front of it. How customer premises devices are connected to the network can affect both the device and network operation.

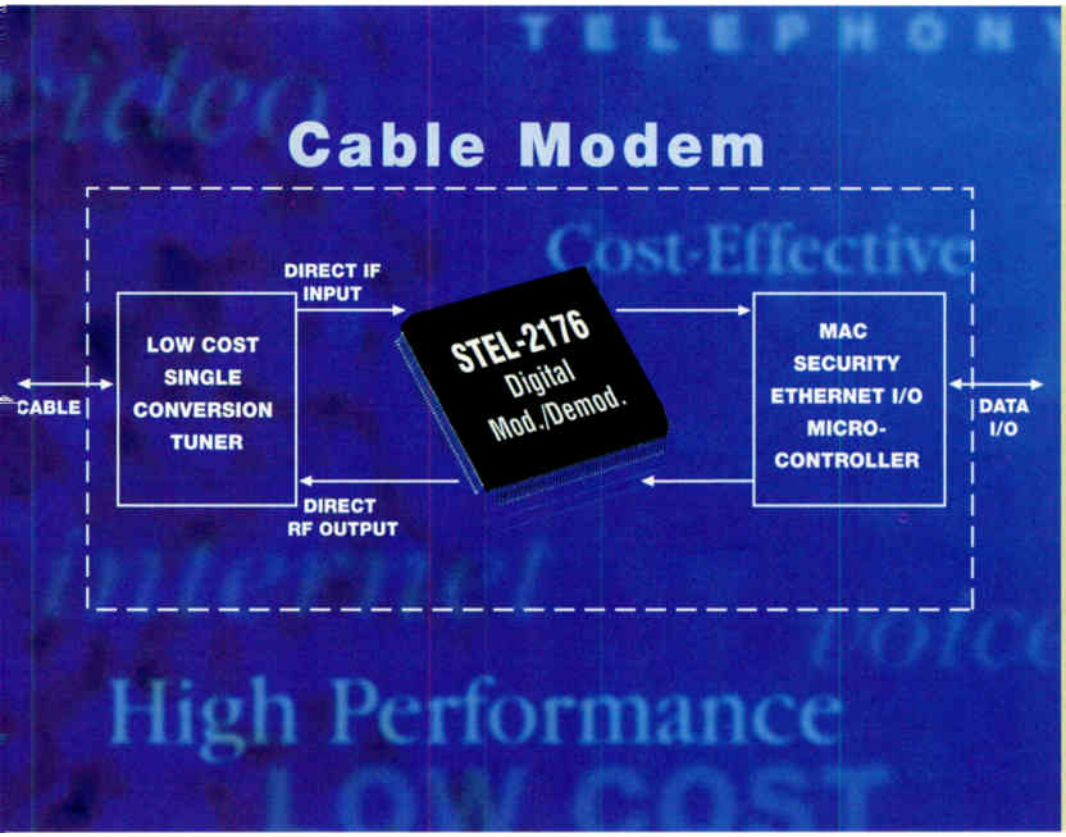
Good customer relations dictate that you don't always answer a subscriber equipment problem by suggesting the customer disconnect his equipment at the network interface and check for good dial tone.

In the competitive telephony industry, the service provider that can help the customer solve a communications problem, even if the problem belongs to the customer, will win and keep the customer's business. Training in multiple varieties of customer premises equipment must be part of the background for both cable installers and customer service representatives. CT

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

Subscriber Modem Chip Available Now

OUR NEW STEL-2176 PROVIDES A *simple* PERFORMANCE-PROVEN *solution* TO COST-EFFECTIVE *modem* DESIGN



Key Features

- 16/64/256 QAM receiver
  - Under 100 ms acquisition time
  - Direct IF input at 36 or 44 MHz
  - ±250 kHz carrier offset tolerance
  - Interference rejection
- QPSK/16 QAM transmitter
  - Direct digital synthesis modulator for broadband RF transmission (U.S. Patent No.5,412,352)
  - Efficient utilization of upstream spectrum
- On-chip 10 bit DAC and ADC
- Selectable FEC modes for Annex A, B, or C
- On-chip PLL accepts low frequency clock
- Low power consumption 0.35 micron, 3 volt CMOS technology
- Compatible with MCNS, DAVIC/DVB, and IEEE 802.14 standards

Combine our STEL-2176 Digital Modulator/Demodulator ASIC with a simple tuner and a single controller ASIC and you have . . . the highest performance, competitively priced, worldwide standards compatible subscriber modem solution available today.

The STEL-2176 is designed specifically for the reception and transmission of data over HFC cable communication networks — receiving 16/64/256 QAM signals and sending QPSK & 16 QAM modulated signals. Extensive testing has proven the STEL-2176 to be superior in performance even when operating under extreme channel impairment conditions. As a companion product, the STEL-9257 provides QPSK burst demodulation at the headend.

Contact us today for complete information on the STEL-2176 modem "super-chip" and other products for HFC Cable Communications.

STANFORD TELECOM®

480 Java Drive, Sunnyvale, CA 94089
Tel: (408)745-2660 Fax: (408)541-9030
e-mail: tpg.marketing@stelhq.com Internet: www.stelhq.com

Reader Service Number 34

By Jennifer Whalen

FCC Says No to Open Access

Though local regulators continue to show interest in mandating open access to cable's broadband pipe, the Federal Communications Commission maintains its commitment to a hands-off policy. The "less-is-better" approach to regulation is having its desired effect, as cable modem deployments have topped 1 million households in the United States and Canada.

In remarks before the Northern California Chapter of the Federal Communications Bar, FCC Chairman William Kennard argued that competition is the best way to ensure the growth of a ubiquitous broadband network. "Right now, the broadband market is fertile but still undeveloped. The future is bright. Indeed, I envision a future in which there are at least four or five facilities-based competitors offering this service: from DSL (digital subscriber line) to cable, from terrestrial to wireless and even satellite," Kennard said. "But this competitive future is still glimmering in the distance. We are about 50 meters into a race that is sure to be a marathon."

Statistics indicate that interest in broadband access to the Internet is growing. Cable modem deployments have doubled since the beginning of the year, reported Kinetic Strategies, which puts total deployments as of the end of June at 1,052,000. (See sidebar.) By comparison, America Online added 2 million new customers in the same period.

Excite@Home and its cable affiliates accounted for 59 percent of the market with 620,000 customers, while RoadRunner and its affiliates captured 32 percent market share with 340,000 installations. In total, cable companies are installing more than 2,500 modems a week, reported Kinetic Strategies.

Critics argue that this rapid growth justifies tighter regulation of cable Internet access, but Kennard disagreed. "Sure, we have seen growth. Around this time last year, less than 100,000 homes had cable Internet hook-ups. Now, close to three-quarters of a million (U.S.) homes do. But this is a fraction of the over 30 million American homes than are on the Internet.

"Indeed, broadband is just a nascent industry. The fact is that we don't have a duopoly in broadband. We don't even have a monopoly in broadband. We have a 'no-opoly.' The bottom line is that most Americans don't even have broadband."

How will the FCC spur broadband deployment? "By letting a competitive marketplace thrive," Kennard said.

Cable Modem Customer Rankings

(as of June 30 for the United States and Canada)

Time Warner Cable	186,000
MediaOne	140,000
Shaw Communications	120,000
Cox Communications	112,000
Rogers Cablesystems	100,500
Comcast	95,000
AT&T	83,000
Other	215,500
Total	1,052,000

Source: Kinetic Strategies

Future regulatory strategy

So what strategy will the FCC pursue when it comes to regulating new services such as broadband Internet access? Jason Oxman, the FCC's counsel for advanced communications, outlined a three-pronged approach in the paper "The FCC and the Unregulation of the Internet." According to Oxman, lessons learned from the FCC's hands-off approach to data networks include:

- Don't automatically impose legacy regulations on new technologies. "New technologies, while perhaps similar in appearance or in functionality, should not be stuffed into what may be ill-fitting regulatory categories in the name of regulation."
- When Internet-based services replace traditional legacy services, begin to deregulate the old instead of regulating the new. "The unregulation of wireless data services should be a model for the wireline world as well .... Any leveling (of the playing field) that may be appropriate in the future should focus on having the Commission examine its existing rules that affect legacy providers and eliminate those that may be unnecessary in view of increased competition."
- Ensure that anticompetitive behavior does not develop, and be careful that any regulatory responses are the minimum necessary and outweigh the costs of regulation. "As bypass networks and new technologies change the communications landscape, the Commission must be ever vigilant to prevent ... bottlenecks that block free and fair access to essential facilities."

In light of this strategy, what does Kennard think of local efforts to mandate open access? "Unfortunately, a number of local franchising authorities have decided not to follow this deregulatory, pro-competitive approach. Instead, they have begun imposing their own local open-access provisions," explained Kennard. "As I've said before, it is in the national interest that we have a national policy. The FCC has the authority to set one, and we have. We have taken a deregulatory approach, an approach that will let this nascent industry flourish." CT

Jennifer Whalen is editor of "Communications Technology." She can be reached via e-mail at jwhalen@phillips.com.

800-331-5997

Modulators
FIXED
AGILE
SCIENTIFIC ATLANTA
SYLVIANIA
texscan
1654-1655
C-Cor
DIPLEX FILTERS
SUB-SPLIT
mid-split
high-split
REVERSE AMPLIFIERS
30 & 40 mhz
Processors
FIXED
AGILE
Jerrold
DEMODS
FIXED
AGILE
Equalizers
Pads
Magnavox
TEST EQUIPMENT

800-331-5997
1605 E. Iola Broken Arrow, Ok 74012
TULSAT

450-550 MHZ

FEED FORWARD
&
POWER DOUBLING

Scientific Atlanta
Sylvania / Texscan
C-Cor
Magnavox
Jerrold

800-331-5997
1605 E. Iola Broken Arrow, Ok 74012
TULSAT

NEW **TRAPS** USED

Over 1,000,000 traps in our warehouses
ALL TRAPS SWEPT BEFORE SHIPMENT
TIERING-NEGATIVE-POSITIVE-LOW PASS

800-331-5997
1605 E. Iola Broken Arrow, Ok 74012
TULSAT

New & Refurbished
Fiber Optics

Nodes
550 Mhz from $449

LAZERS
450, 550 & 750 mhz

550-750 MHZ

SCIENTIFIC ATLANTA SYSTEM II

Triples
Duals
Singles
Quads

System Amp II's
550 Mhz
Singles w/ housing
refurb new
$199 $299

800-331-5997
1605 E. Iola Broken Arrow, Ok 74012
TULSAT

By David Devereaux-Weber

Ghosts in Your Machines

How do you measure a ghost? An SCTE-List subscriber enlists help in describing a reflection problem, with solutions ranging from the simple to the sophisticated.

The challenge

Richard Green of Buford TV said: "We have been fighting problems with double images at a number of our headends on various over-the-air TV stations. To address this problem, we have changed out/realigned down leads, antennas, checked our voltage standing wave ratio (VSWR) on both, leaving only the TV station as the culprit.

"To date, the only response we have received from the station engineers is, 'We don't have any reflections at our transmitter.' It would help if I could describe the delays quantitatively, such as delay in microseconds or some other way. What other options to describe this problem are there? Is there a test procedure that can be used on the HP 8591C or the Tektronix 2714 to make these measurements?"

Option No. 1

I contributed: "One tried-and-true method is the old TV set and a ruler. Assuming the set is not seriously overscanned, the time of a single line, and the full active width of the screen, is 63 µsec. Use metric—no messy fractions. Assuming a trailing ghost, measure the distance from the left edge of the screen to the ghost, then divide by the width of the full screen from left edge to right edge, then multiply by 63 µsec.

"If you have a spectrum analyzer, set the center frequency for the channel carrier, set it for zero span, peak the tuning, select linear instead of logarithmic scale, and speed up the scan rate so that you see the video. Get a horizontal sync pulse on the left side of the graticule, and find the ghost sync pulse. Read the time off the graticule. (Caution—my age is showing;

you may have to wrestle with the newfangled analyzers to get them to do the same thing. Then again, they probably have a routine built-in to do this.)"

Option No. 2

Bill Arnold added: "In addition to making the delay measurements themselves, you might want to check the radiation pattern of the transmitting antenna(e) of the station(s) in question.

"A long time ago in a cow pasture far away, we had a similar problem. It didn't matter what type of antenna was used or at what height on the tower it was placed—we just couldn't get away from a bit of a ghost and lower-than-expected signal level. Station engineers were very cooperative, met with us and gave us a copy of the predicted antenna pattern.

"It turned out to be a result of the directional pattern of the station's transmitting antenna. We were on the edge of a null point on the backside of the antenna. Fortunately, it was a fairly minor ghost because the only cure at the time would have been to move the receive site—quite an expensive proposition."

The final option

This from Ron Hranac: "If you have access to the equipment, you can do a fairly accurate measurement of the delay with a good quality waveform monitor or an automated instrument such as a Tek VM700. This will require a good demod, too.

"The idea is to demodulate the over-the-air signal to baseband, then measure it with the waveform monitor. A spectrum analyzer is a frequency domain instrument, and while an approximate measurement can be made the way Dave described, the waveform monitor (a time domain instrument) will be easier and more accurate. Still, Dave's suggestion to use a TV set and ruler probably is the easiest overall and has been used successfully for exactly that purpose for many years.

"If you run into a brick wall trying to resolve this problem, you may have to resort to electronic ghost cancellation. A few manufacturers have this kind of equipment available, and my recollection is that a couple versions are available: Intermediate frequency (IF) and baseband."

Got a problem? Get an answer

As usual, there were many more responses than would fit here, and these have been edited to fit. However, this shows some of the give-and-take that happens on SCTE-List. CT

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

Get on the List

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

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

do cable

Provides:

Cable TV
Pay-per-view movies

do more

Lets you provide:

Cable TV
Pay-per-view movies
Call Waiting
Call Forwarding
Messaging
Directory Services
High-Speed Internet Access
High-Speed Data Services
eCommerce

New feature attraction on cable (from leader in rapid service deployment). Lucent delivers all the feature-richness of the voice network over cable (with all its reliability). Lucent's CableConnect℠ solution lets you offer call waiting, call forwarding, operator assistance, directory services, high-speed data services, more. Even itemized billing. Think coaxial nirvana (thank our R&D brains at Bell Labs). Call 1-877-534-9182 or visit us at www.lucent.com/cableconnect for the latest cable news.

We make the things that make communications work.™

Television Meets

WebTV Lights the Way

By Rajesh Amin, Jack Miller and Golam Sadiq

With the courtship of the cable industry in high gear, it's no secret that cable's many suitors are aggressively seeking a share of the action. Providers of Internet technology, telecommunications services and content all see digital interactive broadband networks as a golden opportunity to capture a much greater share of the American household's entertainment and communications budget. For cable operators with upgraded systems, the broadband advantage could quickly lead to a doubling or even tripling of today's average revenue per subscriber.

Some of the most exciting applications for near-term deployment involve the convergence of television and the Internet. The industry's shorthand for this group of applications is "Internet-over-TV," generally considered to include Web browsing, e-mail and chat. A closely related category is "enhanced TV" services, such as linking from a TV show to a related Web site or using picture-in-picture features or graphics overlays for simultaneous TV viewing and Internet access.

Internet-over-TV services have excellent potential as a way to blend information on demand with video programming. What level of penetration can operators expect with Internet-over-TV and enhanced TV services? Because the field is emerging so rapidly, there's little solid historical experience that cable operators can plug into their business plans.

The WebTV experience

However, cable operators can gain valuable insights into consumer preferences and behavior from the experience of WebTV. Launched in the fall of 1996, WebTV was the first commercial service

the Internet

Original photos ©1999 PhotoDisc, Inc.

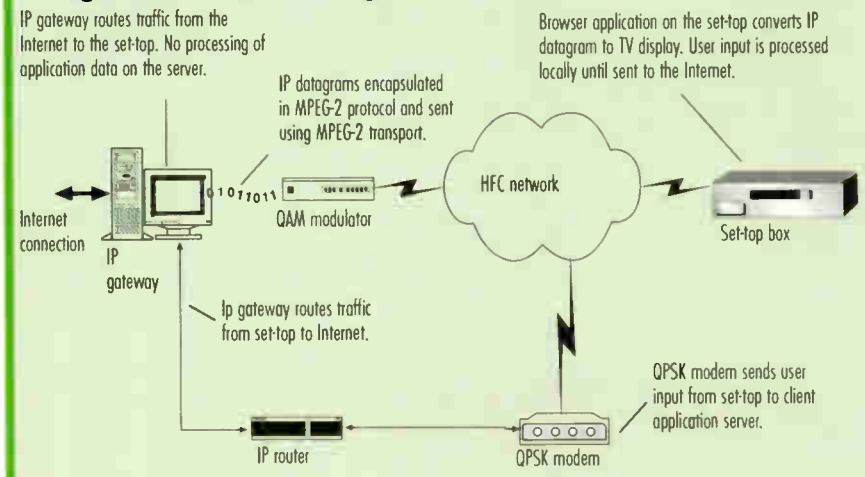
that empowered mainstream, noncomputer users to access information and communicate via their TV sets. The original services—Internet access, e-mail and chat—were expanded by the introduction of WebTV Plus, the second-generation box, which added a variety of enhanced TV features. In response to emerging competitive services to be available via cable, WebTV is providing a version of its services for deployment on advanced digital set-tops.

WebTV's first two years and the opinions of its user base have been documented in a research report by Iacta LLC, "Lessons Learned from WebTV." Iacta's WebTV report may be the most comprehensive research available for future participants in the interactive TV marketplace. We've summarized some of Iacta's findings, as well as those of other industry sources following. For information about the report, visit http://iacta.com/studies.htm.

Five insights

Freedom from hassles: Ease of use, convenience and comfortable, large-screen TV environments are just as important as

Figure 1: IP-based digital network



Source: Scientific-Atlanta

price in attracting and keeping customers. According to WebTV Networks, 71 percent of its users do not own personal computers (PCs), and 59 percent had no prior Internet experience. Customers like WebTV's hassle-free, plug-and-play nature, which requires no training and can be used by anyone in the household.

Activity levels: Internet-over-TV users are active. According to Microsoft, more than half of WebTV's 2 million users log in every day—almost double the log-in rate for all Internet households. Iacta found that one-quarter to one-third of WebTV subscribers are avid users who spend more than 80 hours a month online.

A killer app: E-mail is the "killer" Internet application. PC users share one thing in common with WebTV users: They both use e-mail more than they surf the Internet. For many WebTV users, e-mail was the compelling reason for purchase.

E-mail is the service that keeps users online after the initial thrill of Web surfing subsides. According to Iacta, WebTV users desire to be a part of a community, not just to locate specific informational content. E-mail, Internet access and chat make a good package of closely related services. Through Web browsing, the user looks for communities that he or she values because of the other people found there. The subscribers who find these communities are likely to become active users.

A complete experience: Viewers exhibit more emotional intensity when television is the medium than when a PC shows the same material. Viewers appreciate Internet-over-TV for the complete audio-visual experience and the opportunities it

We've Covered the Spectrum with Targeted DWDM Technology

Introducing SpectraStar

The Technology

GI's DWDM technology allows you to cost effectively target advanced services to reach deep into your network. Our full line of direct and externally modulated transmitters offer an extremely powerful method for increasing your system capacity.

Features

- Economically Targets Serving Areas
- Adds Capacity to Existing Fiber
- Simplifies Architecture
- OmniStar Platform Compatible
- Promotes Headend Space Efficiency
- ITU Grid Compliant
- Capacity to Carry 200MHz of QAM

Contact

For more information contact your GI sales representative or call 800.523.6678. Visit us at www.gi.com

GI General Instrument

Reader Service Number 39

VIDEOTEK™
A Zero Defects Company

Five Year Warranty
ISO-9001 Certified

243 Shoemaker Road, Pottstown, PA 19464 Toll Free: (800) 800-5719 (610) 327-2292 Fax: (610) 327-9295
Visit us on the Worldwide Web: www.videotek.com

Reader Service Number 41

have home computers—may prefer an enhanced TV package or a combination of enhanced TV and Internet-over-TV features. Such services could be tailored to specific groups, such as sports junkies.

The WebTV experience clearly demonstrates a receptive, emerging market for

because text is rendered more efficiently as IP data. Also, IP services allow network operators to leverage off-the-shelf data networking (DNC) products. I-frame is more efficient for images that are graphics-intensive and may include photo-realistic effects, and for set-tops with limited processing capabilities. The optimal approach may be a combination of the two, where I-frame is used for graphics and HTML is generated locally and layered on top.

The hardware cost per subscriber generally is considered to be lower using IP rather than using I-frames, which require more server power for encoding. The IP approach may have client software costs for browser technology residing in set-top boxes.

Application developers have divided into both camps. NCI, WebTV and PowerTV use the IP approach, while WorldGate, Interactive Channel and Peach Networks opted for I-frame. To be able to offer the full range of interactive services available, operators ideally would have an IP-based network—the only network capable of supporting both approaches.

> "Internet-over-TV services have excellent potential as a way to blend information on demand with video programming."

The network

What key attributes of an IP network enable Internet-over-TV?

An advanced interactive digital set-top is required. The set-top is a "thin client" device—an IP-addressable network computer with its own processing power, operating system (OS) and memory. All "stored" information is saved on a server at the headend. At the user's command from an interactive viewing guide, the set-top launches an Internet browser that allows content to be displayed on the TV screen. As the user requests different pages via the remote control or a keyboard, the set-top sends this request to a Web server in the cable system's headend.

The Web server checks to see if it has the page stored locally; if not, it accesses the public Internet over T-1 lines. The server reformats Internet content into a "TV friendly" format, which may involve increasing font sizes, changing colors for better TV visibility and reformatting files to match the capabilities of the browser. The server generally also has a storage component to cache commonly accessed pages and other locally generated Internet content. Depending on which screen data transport approach is used by the application, the server either sends HTML pages as IP data packets to the browser in the set-top or sends pages rendered as I-frames. In the IP approach, the application may utilize the two data paths to the set-top to allow simultaneous Internet access and video. ➤

manage all your assets with

e.merge

THE POWER BEHIND DIGITAL ENTERTAINMENT

e.merge™ is a family of ten integrated, internet enabled software modules designed specifically for managing digital entertainment assets, media and services.

MODULE

- Asset Manager 1
- Marketing Manager 2
- Provider Payment 3
- Event Scheduler 4
- Subscriber Management 5
- Delivery Manager 6
- EPG Analyzer 7
- Work Force Manager 8
- Billing Manager 9
- Data Distribution Gateway 10

Asset Manager, an enterprise wide software solution, delivers exciting new powers to the world of digital media and physical asset management. Templates define data fields and asset groupings and provide automated tracking of metadata associated with assets. No coding necessary! Key functions include global access; easily incorporated business rules to implement processes such as Shipping and Receiving and Quality Assurance; automated sending and generation of emails and forms; and the ability to associate digital with physical assets, i.e. what features/ads/promos are available on which servers. Simply too much to tell here!

Like more detail? Visit IMAKE™ at http://www.imake.com to see Asset Manager and the complete e.merge suite of business tools, the power behind digital entertainment.

IMAKE

Software and Systems Integration

6700 Rockledge Drive
Suite 101A
Bethesda, MD 20817

301.896.9200 voice
301.897.2130 fax
www.imake.com
e-mail: emerge@imake.com

Reader Service Number 45

Additional software and gateway components of the network allow IP data traffic to be inserted into high-speed MPEG paths to the set-top. A digital network control system establishes IP data sessions, monitors network elements and manages downloadable applications.

All of the components in the network, including the set-tops, use IP addressing for compatibility with data networks. A 1.544 Mbps real-time slotted reverse path also allows the system to continue to function reliably as subscriber penetration increases.

TV: A challenger to PCs?

Cable operators have strong incentives to move rapidly in deploying Internet-over-TV applications. Even when PC penetration reaches 50 percent of American households, two sizeable markets for Internet-over-TV remain: all users in the homes without computers, and the non-PC users in the homes with computers.

Only cable can offer all advantages of a broadband network, including:

- High-speed access
- Television's superiority as a medium for converging video, data and voice applications
- The "always on" nature of cable, which enables instant notification of arriving e-mail and instant connection to applications without dialup on a shared telephone line

For these and other reasons, cable TV could challenge the PC as the preferred home vehicle for Internet access. In fact, Iacta says in its report, "Within the next five years, the number of users in the United States accessing the Internet via their TV screens may exceed the number accessing from home via computer." It behooves cable engineers to consider this potentially large customer base when designing their advanced networks. CT

Rajesh Amin, Jack Miller and Golam Sadiq work for Scientific-Atlanta's CreativEdge Developer Program. They can be reached via e-mail at rajesh.amin@sciatl.com, jack.miller@sciatl.com and golam.sadiq@sciatl.com.

BOTTOM LINE

Internet-Over-TV Options

Internet-over-TV services have excellent potential to blend information on demand with video programming. Although this application is just starting to emerge, the experience of WebTV indicates a receptive audience for Internet-over-TV. Deployment of advanced digital set-tops clears the way for cable operators to start tapping this market.

The operator's choice of network architecture strongly influences the selection, deployment and operation of Internet-over-TV and enhanced TV services.

Vendors of Internet-over-TV applications use different methods of transporting reformatted-for-TV screen data to subscribers' set-tops. The two main methods are Internet protocol (IP) and I-frame.

An IP-based network encapsulates Internet data into Moving Picture Experts Group (MPEG) transport streams between a server and the client in the set-top. Hypertext markup language (HTML) browser software on the set-top presents Web pages for display on a TV screen.

I-frame, a method of sending a Web page as a screen capture or video frame, relies on servers to perform the image formatting work in the headend rather than in the set-top.

Each approach has its advantages and disadvantages. Both support Web browsing, e-mail, chat, e-commerce and linking from TV shows to related Web pages. Vendors of Internet-over-TV services are divided into both camps. To be able to offer the full range of interactive services available, operators ideally would have an IP-based network, which can support both approaches.

PUBLISHED AS A PUBLIC SERVICE BY DITEL

FIBERSPACE HAZARD No. 1

Fiberspace is a hostile environment.

Ditel raceway is installer-friendly. Both Lightrax,™ the fastest-growing raceway in the industry, and Fibertray,™ the no-cut plenum raceway, are incredibly easy to work with. Designed with unique features like telescoping sections and pre-punched parts, Ditel raceway minimizes your exposure to the perils of fiberspace.

FIBERSPACE HAZARD No. 2

The wrong raceway choice could really cost you.

Ditel raceway is amazingly cost-effective. First of all, it's priced right. But it also keeps the *installed* cost very low—in fact, no raceway has a lower installed cost than Lightrax. And Fibertray does away with tools, screws, bolts and adhesives. Just think how much *that* will save you.

A GUIDE TO FIBERSPACE SURVIVAL

FIBERSPACE HAZARD No. 3

If you have to wait around for supplies, things could get ugly.

Time doesn't stand still, even in fiberspace. Availability is critical and Ditel's got it. Whatever you need, whenever you need it. In stock, and on time. Even custom orders, made to your exact specifications—turned around faster than you'd imagine.

LIGHTRAX
Our best-selling raceway comes in four sizes and three colors, all made of high-impact UL94V-0 thermoplastic.

FIBERTRAY
Ditel's plenum-rated raceway is made of lightweight aluminum with telescoping sections that let you cut costs, not metal.

FIBERSPACE HAZARD No. 4

No two fiberspaces are the same.

Every installation is different. So flexibility is built into every Ditel raceway product. No matter the configuration, there's a Ditel way to do it right. And we never stop finding ways to make the best raceway in the world even better. *To learn more about how to survive, and prosper, in fiberspace, just call 1-800-555-DITEL.*

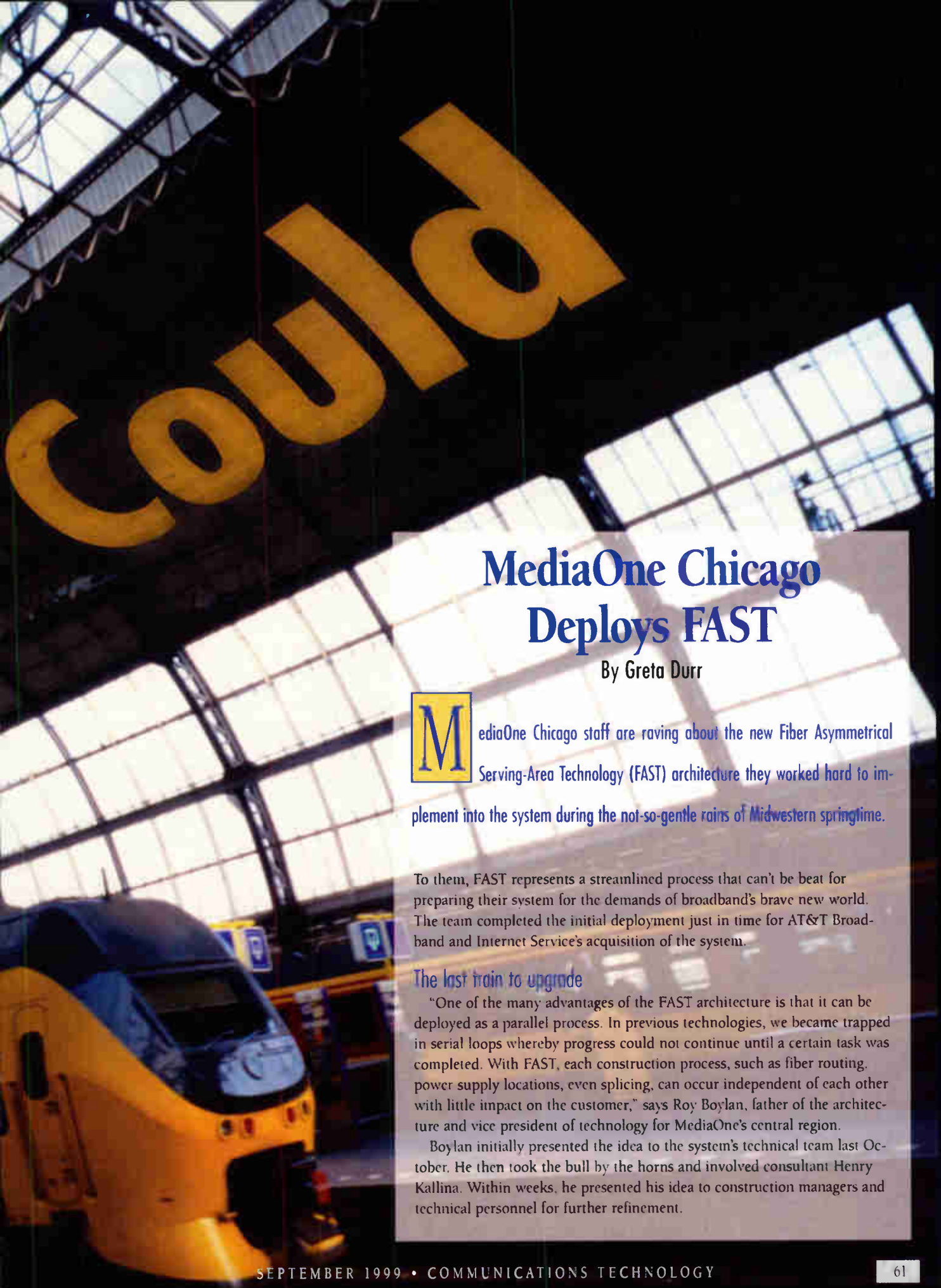
DITEL
Managing fiberspace.

Visit us at www.ditel.net

Come see us at NFOEC, Booth #216

Reader Service Number 47

The Little Architecture That



MediaOne Chicago Deploys FAST

By Greta Durr

MediaOne Chicago staff are raving about the new Fiber Asymmetrical Serving-Area Technology (FAST) architecture they worked hard to implement into the system during the not-so-gentle rains of Midwestern springtime.

To them, FAST represents a streamlined process that can't be beat for preparing their system for the demands of broadband's brave new world. The team completed the initial deployment just in time for AT&T Broadband and Internet Service's acquisition of the system.

The last train to upgrade

"One of the many advantages of the FAST architecture is that it can be deployed as a parallel process. In previous technologies, we became trapped in serial loops whereby progress could not continue until a certain task was completed. With FAST, each construction process, such as fiber routing, power supply locations, even splicing, can occur independent of each other with little impact on the customer," says Roy Boylan, father of the architecture and vice president of technology for MediaOne's central region.

Boylan initially presented the idea to the system's technical team last October. He then took the bull by the horns and involved consultant Henry Kallina. Within weeks, he presented his idea to construction managers and technical personnel for further refinement.

Following a series of winter meetings to clarify technical and financial aspects of deploying the architecture, the stage was set. According to Boylan, Kallina and Network Design Manager Susan Shaffer, the team rejected old ways of thinking and replaced them with logical critical-path thinking. They molded together the processes of "design and then construct." The result is a hybrid of activities previously completed at the end of a rebuild/construction project that could now take place at the start of the project.

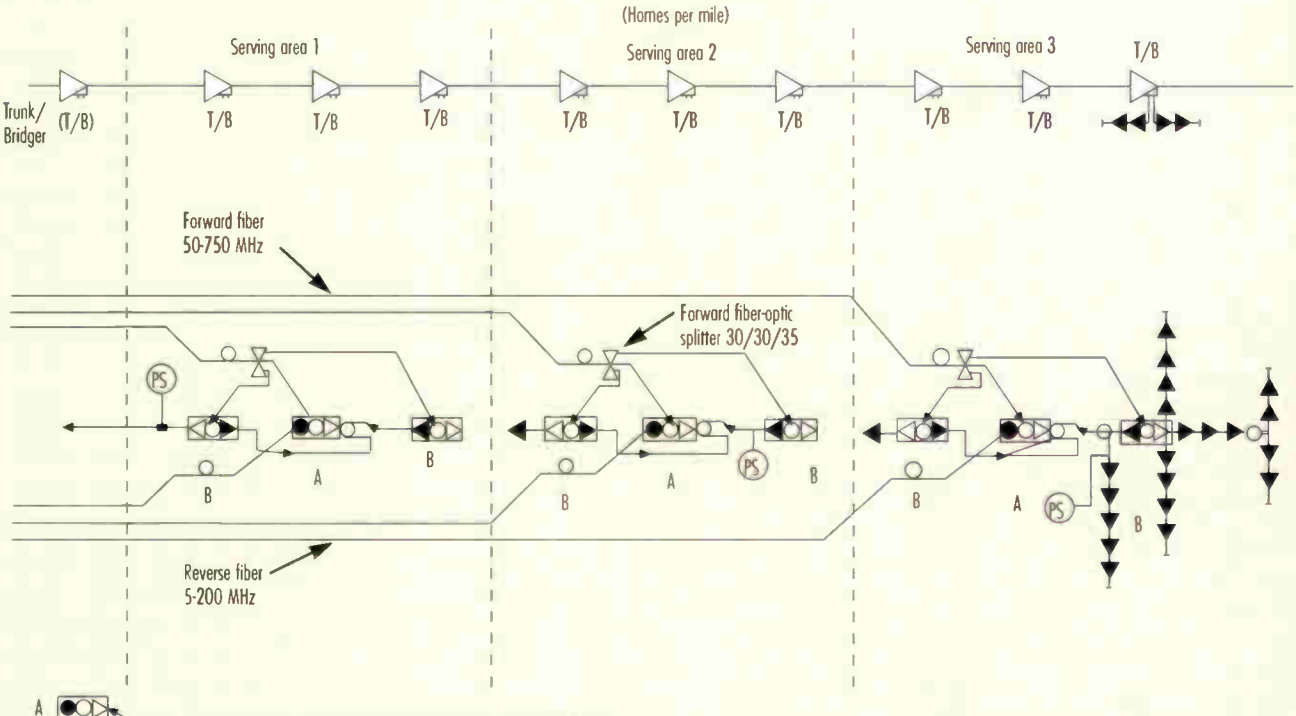
The team scheduled node placement, power supply location, fiber-optic routing and laser ordering at the beginning of the project, allowing the fiber to be constructed months ahead of the architecture's overall deployment.

FAST is based on Boylan's vision to migrate fiber deeper into the existing system by means of a main fiber to a splitter located at a primary "A" node or optical transmitter/receiver location. (See Figure 1.) "From the split, fiber would be lashed to the next existing amplifier location where a 'B' node would be located," Shaffer says. The new scenario casts the forward signal traveling across the fiber to the optic receiver nodes with a new twist: The reverse from the "B" node returns to the "A" node across the existing coax. (See Figure 2 on page 64.)

Not as easy as it looks: Steve Garuckas of MediaOne Chicago works on a system map.

By dividing existing plant into serving areas consisting of three existing trunk/bridger locations, with each served by six-count fiber extending from the traditional node, Boylan's plan allows enhanced performance on the forward path, says Kallina. The return signal, he ex-

Figure 1: FAST architecture overview



Source: MediaOne Chicago

DO THE MATH!

ONE HFC PROVIDER + ONE BROADBAND INTERNET ACCESS COMPANY = MORE PROFIT POTENTIAL WITH LESS WORRY

It all adds up to **MORE** . . .

ADD MORE experience in the design, manufacturing and implementation of high quality HFC products. **ADD MORE** expertise in broadband Internet access. **ADD MORE** network management products and services. Then **SUBTRACT** the worry of tying up capital and resources to plan, design, build, activate, operate and maintain broadband network services. **THE RESULT:** a new and unique approach to broadband network life cycle management. Call us and see how you fit into this winning equation.

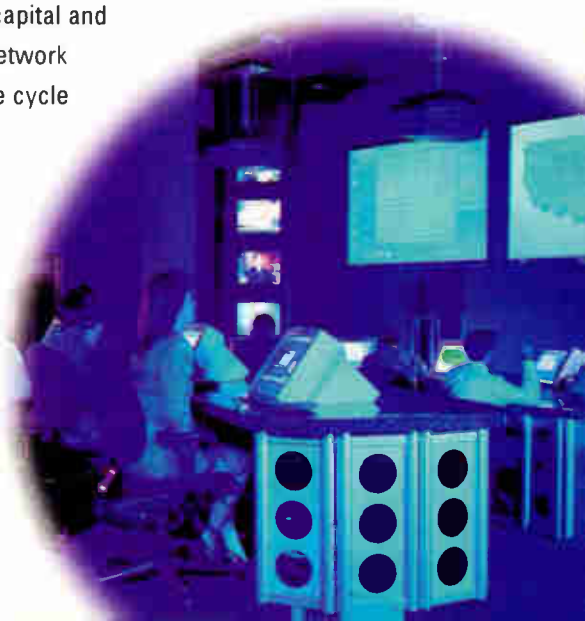
The C-COR & Convergence.com team of professionals...
we know tomorrow's network needs today!

C-COR® ELECTRONICS INC
The Network Company

CONVERGENCE.COM

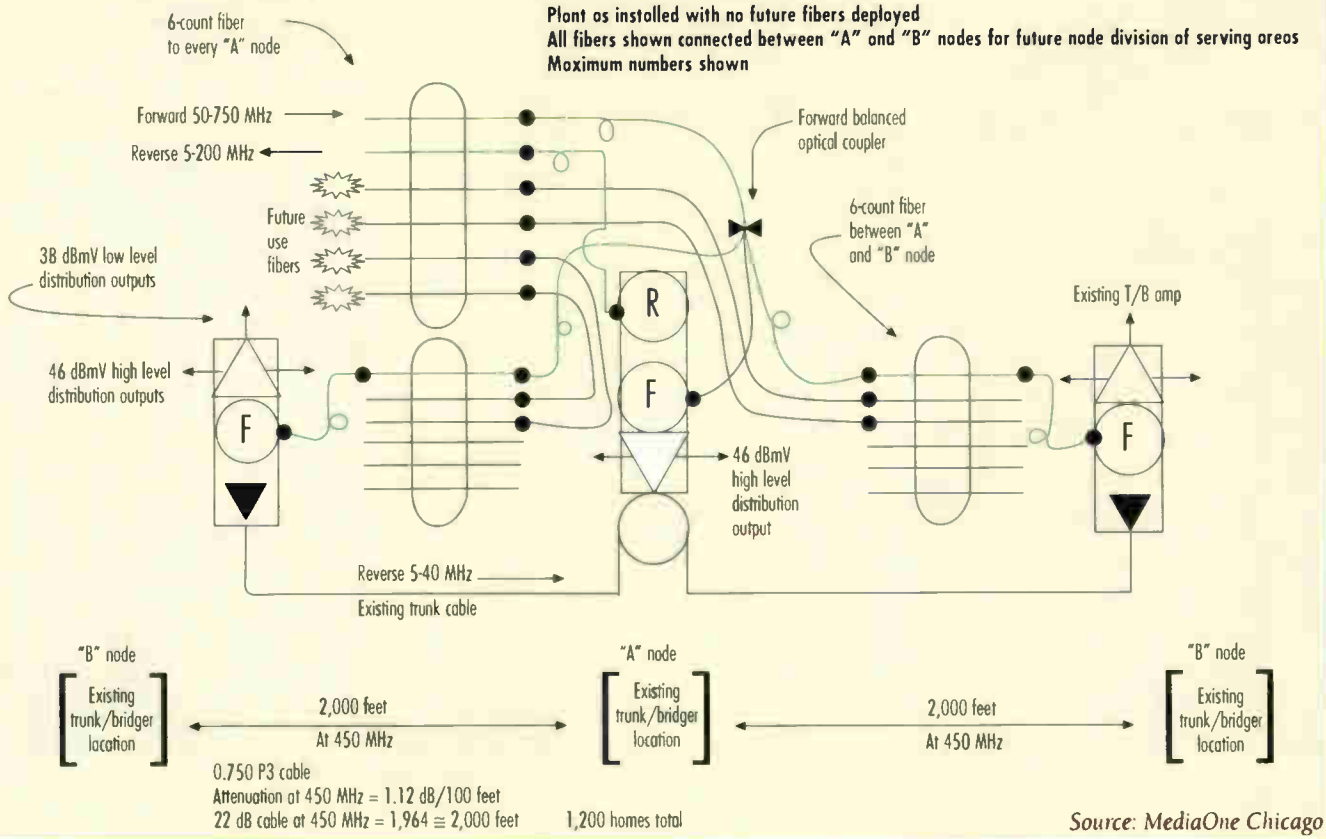
TOGETHER NOW AS C-COR.net!

1-800-233-2267
www.c-cor.com



Reader Service Number 48

Figure 2: FAST nodes placed at existing trunk/bridger locations



Source: MediaOne Chicago

plains, resides on the existing trunk cable. The laser count typically remains the same, but output power values are increased. If further segmentation is required in the return, an additional optical transmitter may be added to the so-called "B" node locations via the six-count optical cable with limited service interruption, he says. (See Figure 3 on page 66.)

According to Kallina, benefits to the FAST plan include the ability to maintain the plant's large pedestal locations' 450 MHz design without modification. The same is true for aerial splicing configurations, he says.

Among the other benefits to FAST touted by Boylan and staff is a reduction in the need for system sweeping and continued utilization of old cable by instead using it as part of the feeder system.

Kallina says this strategy differs from the former model by allowing MediaOne staff with expertise in various areas to make decisions about how these aspects of the architecture would figure into its deployment before it reached the hands of the design house. With those important decisions made ahead of time, more time and money was saved by avoiding excessive revisions to the design often required under the traditional model.

The new strategy, says Shaffer, also allows the construction department the opportunity to choose locations and start other activities prior to the coax design. The change from the traditional procedure has allowed the fiber to be constructed months ahead of the rest of the project's actual deployment, saving MediaOne and its personnel time and money.

Getting it dialed in: MediaOne Chicago technician Barry Twichell works on a FAST node in an aerial installation.

Manufactured in our Florida Facility

New Line of Drop Amplifiers

Capacitively Protected Splitter Ports

6KV Surge Protection on ***ALL*** Ports

Innovative Products Engineered and Manufactured in our facility for the Telecommunications Industry

Viewsonics inc.

Superior Value with High Performance

3103 N. Andrews Avenue Extension
Pompano Beach, FL 33064 – USA
1 (800) 645-7600 or 1 (954) 971-VIEW
Website: www.viewsonics.com
E-Mail: viewson@viewsonics.com

Reader Service Number 49

Meet me at the station

After many meetings and some debate, says Shaffer: "We determined that the outputs could be adjusted to replicate the existing amplifier specifications. This essentially meant that at those locations a laser could be dropped in, creating a cascade reduction node. This also could be completed ahead of coax design being finished."

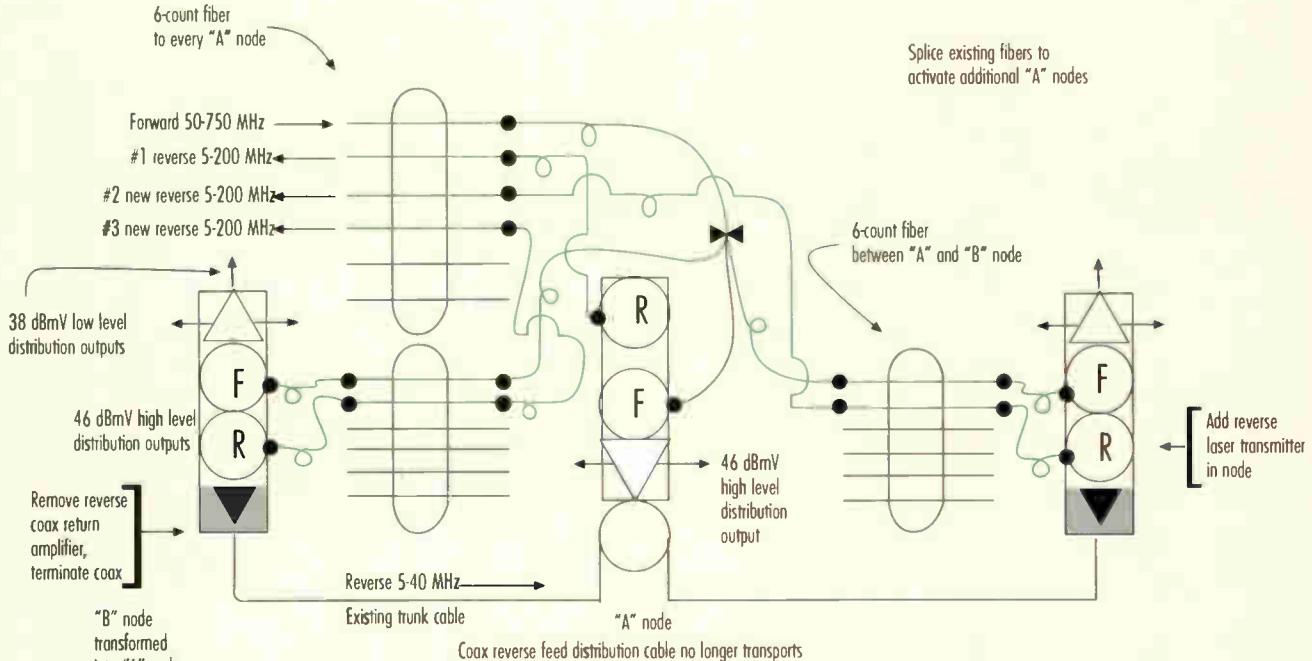
"The new architecture will allow greater flexibility to the plant extensions and new subdivisions being built here at a rapid pace. Because a 'B' node can easily be established, the new areas can be designed without redesign to existing plant," Shaffer explains. "This is both a time- and cost-saving strategy. It also benefits the existing customers who would have, under the old scenario, had to endure the outage associated with reconstruction to accommodate the new extension."

The architecture allows the operations technician to apply existing knowledge to the new system, says Shaffer. "The existing placement of the active equipment and cable routes is utilized in the new design, as few changes in routing are placed into the new design. This reliance upon the existing routing allows the technician to quickly understand the layout of the new design." That way, she says, technicians can more quickly respond to field problems because they don't have to learn as many new active locations or cable routes.

Indoor variation: John Colucci of MediaOne Chicago makes an adjustment to a FAST node.

The initial area selected for the deployment was a small town in the system, covering just six miles. The upgrade process is slated to continue throughout the system this year. Figure 4 (on page 68) represents the FAST design's model for application in a multiple dwelling unit (MDU) environment, says Kallina.

Figure 3: FAST architecture — further serving area node size reduction



Source: MediaOne Chicago

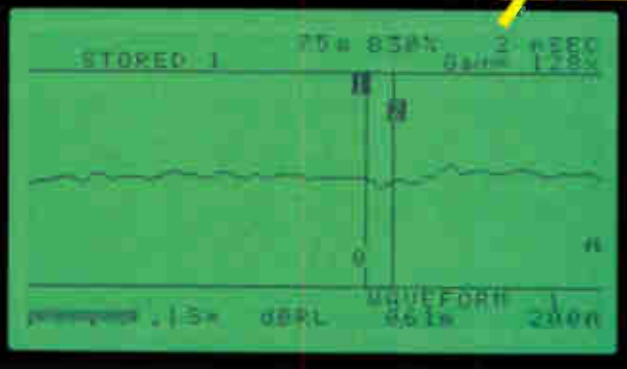
The best TDR just got better!

No smoke.
No mirrors.
No wizardry.

A TDR with a true sub-nanosecond pulse width for superior cable fault location.

A sub-nanosecond pulse width can identify small, often unsuspected faults that can be within inches of each other.

Seeing is believing.



1205C, 2 nanosecond, 128x gain

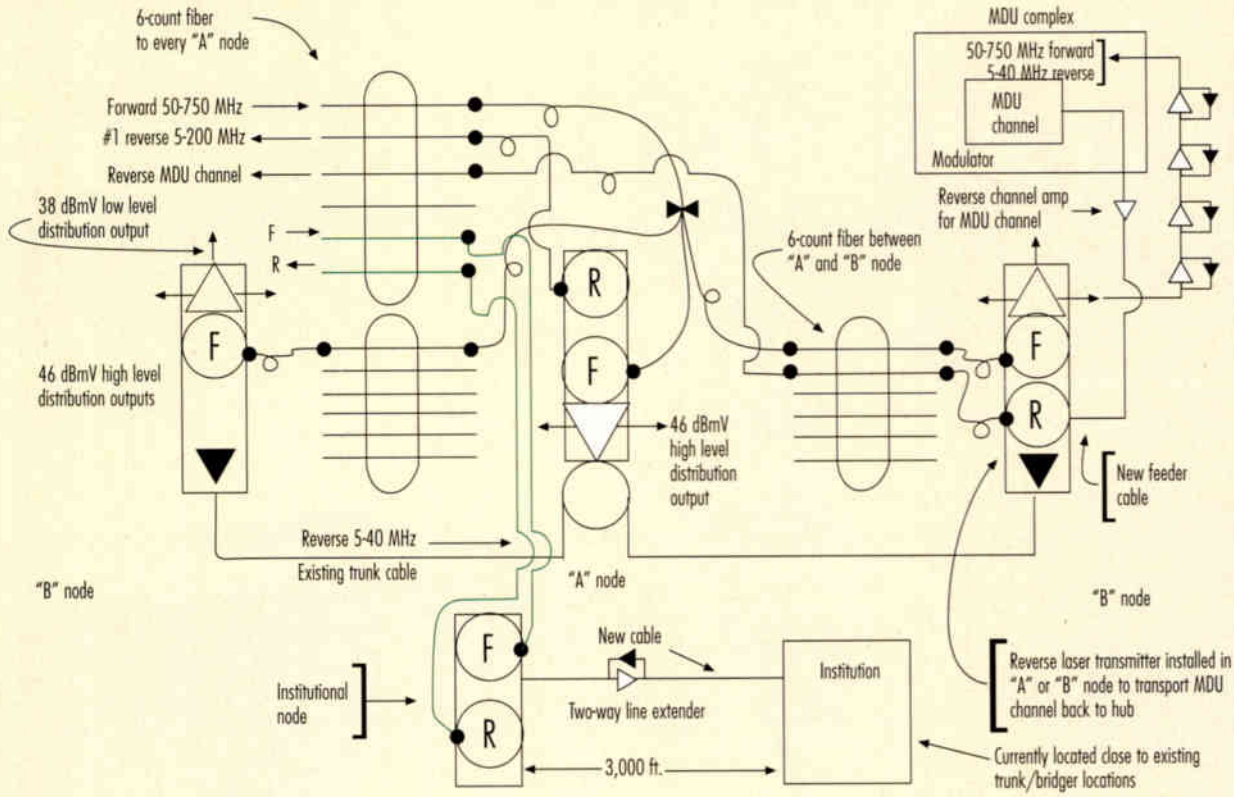
1205CX, sub-nanosecond, 60x gain

Model 1205CX TDR

Toll Free: (800) 688-TDRs
Telephone: (402) 466-0933
Fax: (402) 466-0967
E-mail: email@riserbond.com
Web Site: http://www.riserbond.com

Riser Bond INSTRUMENTS

Figure 4: FAST MDU application



Source: MediaOne Chicago

Made the reservation

"The design department became the hub of all of the new activity. The conference room was converted to a 'war room' office. All those involved in the implementation of the new architecture would bring concerns, problems, questions, ideas or opinions to be discussed. By bringing together all of those people who would be affected by the project, many concerns, problems or other obstacles were overcome," Shaffer says. "Many times others (who might not typically be associated with problem-solving in a particular area) would be summoned to respond to a situation, which had been brought up by a maintenance technician or construction staff member."

Reworking the roles various workers would play in implementing the FAST architecture, although challenging, says Kallina, gave staff the opportunity to streamline the procedures and maximize efficiency.

Shaffer explains that involving field personnel in the project's development and implementation processes has helped them to understand the outside plant obstacles to implementation. "One, a field technician, was given the task of organizing the documentation with various system construction supervisors," she says. "He also prepared the field maps and did checking of node locations. Because he understood what was needed, he was able to assist other construction personnel in node spotting. He was also instrumental in locating power supplies on the maps and in the field."

Don't be slow

"One of the greatest challenges to deployment has been changing the direction of the departments involved in the layout, construction and implementation of the new architecture," says Shaffer. "The people involved, from operations to construction, field, fiber and coax technicians, all needed to be educated on the direction of the project before they could understand how they were going to get there."

Overcoming old procedures and understanding the new has been difficult, but worth it, Shaffer says.

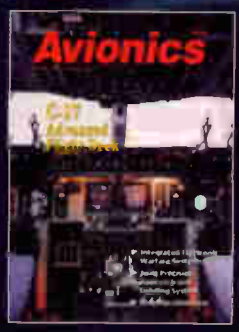
"Having many key people involved in the formulation and implementation of the new architecture helped to overcome this big obstacle," she says. "Tasks which previously had been started later in the construction process are now at the beginning of the process. The best example of this is node spotting and fiber layout. Both are now part of the initial design process."

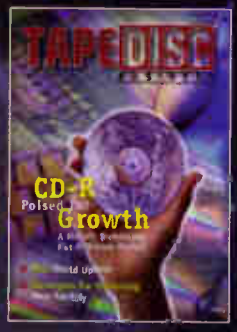
Coming home

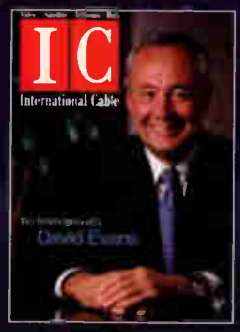
"The biggest change this new architecture has brought about is the abili-

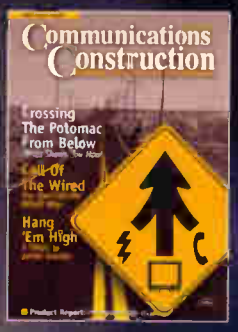
> "The new architecture will allow greater flexibility to the plant extensions and new subdivisions being built here at a rapid pace."
> —Susan Shaffer
> MediaOne

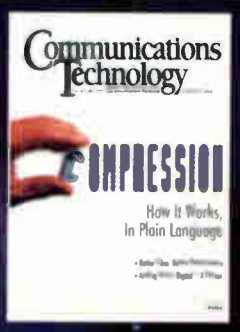
Soar Higher











Phillips Business Information Magazines

Higher-Level Executive Readers • Higher-Quality Editorial • Higher-Value Market Information • Higher-Customer Service and the Highest Technology Solutions in:
Aerospace, Aviation, Wireless, Media Production, Cable and Communications.

A Higher Return on Your Investment

PBI offers the highest marketing and marketplace connections.

Custom Research | Conferences | Training | Directories | Databases | Newsletters | List Rental | Websites | Magazines

Call 888-340-5075 today, and soar to new heights with PBI

Phillips Business Information, Inc. (301) 340-2910 • www.phillips.com

BOTTOM LINE

On Deployment's FAST Track

MediaOne Chicago staff are raving about the new Fiber Asymmetrical Serving-Area Technology (FAST) architecture they say represents a streamlined process that can't be beat for preparing their system for the future.

FAST is based on the vision of Roy Boylan, MediaOne Central Region's vice president of technology. His idea to migrate fiber deeper into the existing system by means of a main fiber to a splitter located at a primary "A" node or optical transmitter/receiver location is a departure from the system's norm. From the split, fiber is lashed to the next existing amplifier location where a "B" node would be located. The new scenario casts the forward signal traveling across the fiber to the optic receiver nodes with a new twist: The reverse from the "B" node returns to the "A" node across the existing coax.

Among the greatest challenges to the deployment, according to staff, has been changing the direction of the departments involved in the layout, construction and implementation of the new architecture. The people involved all needed to be educated on the direction of the project before they could understand how they were going to get there.

Although overcoming the past's procedures and understanding the new sequence of events, processes and procedures has been challenging, staff says the effort has been worth it. Reworking the roles various workers would play in implementing the FAST architecture gave staff the opportunity to streamline procedures and simplify the design and implementation processes.

ty to move construction along at a quicker pace. Prior to this, the rebuild/upgrade construction was being completed in a series of complicated steps," she explains. "Each step was dependent upon the previous step to be completed before starting. Now many of these series steps are now being completed in a parallel-path process." This process allows staff to forge a more compact and well-traveled path in lieu of a string of separate trails.

Because layout and preliminary design have been returned to the in-house designer, important decisions about node and power supply locations, fiber layout and the like are back in the hands of the people who know the most about it, Kallina says. "These are the people who are responsible for the upkeep of the system, so it makes sense for them to be involved from the early stages."

Shaffer agrees. "Addressing of the maps can now be done at the beginning of the project. Previously, it had to be completed after design was totally finished by the outside design house. Because the nodes are spotted and serving areas identified early in the process, this task (addressing maps) is now completed at the beginning of the process." This, she says, creates a longer time frame for the addressing process.

No monkey business

Part of the deployment's success is drawn from considering the needs of staff from early in the design process to implementation. "The needs of construction, operations and the customer were all taken into consideration when developing the FAST architecture," Shaffer says.

"Of all the benefits the new architecture brings to the system in the long term, this ability to easily migrate from old to new is perhaps the most appreciated," she says. "Construction is a frustrating time because changes are constantly being made, and coordination is complicated. But throughout, the impact of change has been kept to a minimum," she concludes, noting that the FAST process has helped MediaOne to concentrate on the system's needs rather than merely to coordinate its future. CT

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

Fewer truck rolls. Profitable cable modems. Happy customers. Come on in.

When you're looking at cable modems, total cost of ownership and return on investment are just as important as technical specifications. At Com21, we've built our modems with these real-world business issues clearly in mind.

The auto-installation and self-diagnostic technologies built into our DOXport™ family of DOCSIS cable modems make it easy for users to get up and running with your service. When you consider that a single truck roll can cost you as much as a cable modem, our advanced usability design starts to make a lot of sense.

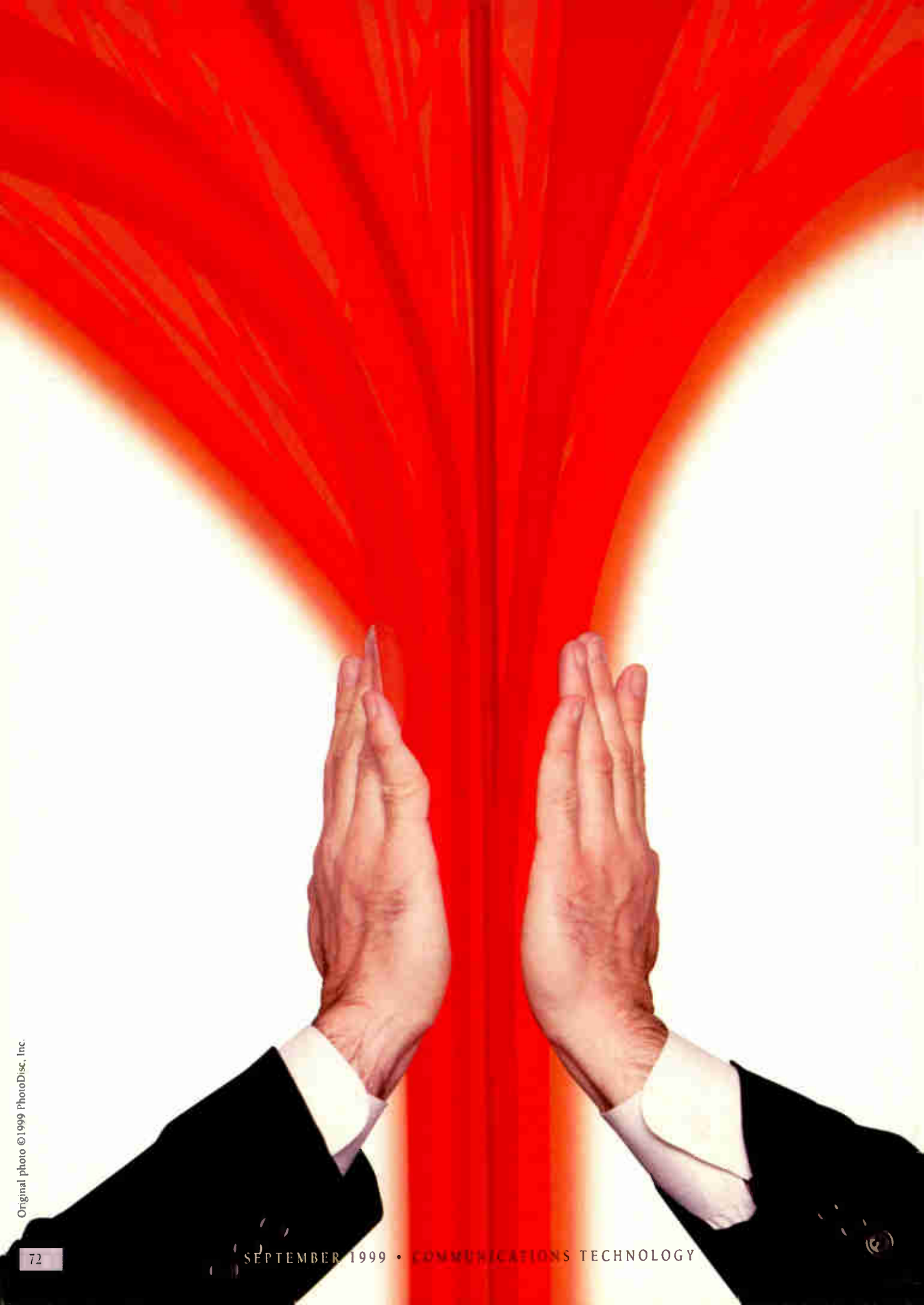
And it doesn't stop there. Our unique RF technology makes our cable modems more robust in noisy cable environments. This translates into fewer service calls, better overall performance, more profit, and happier customers,

To put it succinctly, your business operates in the real world. And so do our modems. For more information, visit www.com21.com or call us at 1.408.953.9100.

COM21™

Imagine the Internet without the wait.™

Reader Service Number 53



DWDM: 10 Pounds of Light Into a 5-Pound Bag

Six Vendors Attack the Problem

By Arthur Cole

Dense wavelength division multiplexing (DWDM) is at the forefront of cable's drive into the optical domain. No fewer than half a dozen vendors are featuring DWDM modules in their network architecture schemes capable of delivering 16 or more channels over a single fiber in either the forward path for video delivery or the reverse path for narrowband data.

According to numerous experts in the field, the core technologies behind each vendor's system are extremely similar. However, various configurations are being used to tailor DWDM systems to different applications, and it pays to do your homework before buying into any particular DWDM product.

There are a number of features to look at when comparing DWDM units. Most obvious is the number of channels the system in question can provide you. Most DWDM modules being installed today offer a relatively modest four channels, but keep an eye on whether the vendor's overall design is upgradeable; you want to be able to *easily* add more modules, and hence more channels, as your capacity needs increase.

It's also important to make sure the vendor is relying on the standard International Telecommunications Union grid of 1,550 nm and 1,310 nm wavelengths.

"Stay on the ITU grid," advises Paul Connolly, vice president of

One Technology, Two Flavors? Marrying Telco's DWDM with Cable's

The merger of cable TV and cable telephony is causing some hand-wringing when it comes to dense wavelength division multiplexing (DWDM) installation.

There are, in fact, two flavors of DWDM. Both are based on International Telecommunications Union grid standards, but the telephony version spearheaded by companies such as Lucent Technologies offers throughput rates in the terabit-per-second range for large carriers such as Bell Atlantic and AT&T. The more recent cable version is tailored to the higher optical levels of the analog cable carrier.

The big question is whether the two types of signals can be multiplexed onto the same fiber, or whether operators have to run separate strands for each service.

Right now, ideas and theories abound, but practical experience is scant.

"In any DWDM system, there is a chance of crosstalk," says Tom Tucker, product manager for headend fiber optics at Philips. "Most operators will have one fiber to carry DWDM telephony. But if you're providing telephony over an HFC (hybrid fiber/coax) network, it will all be in the same piece of glass, most likely. You could put it in the same DWDM module, but I'm not sure it will work. We need to do more research on that."

Others are confident, however, that just by keeping the video portion in baseband digital, any incompatibility problems with telephony can be overcome.

"It's all zeros and ones," says Paul Connolly, vice president of marketing and network architecture at Scientific-Atlanta. "In a SONET (synchronous optical network)-based network, there is absolutely no difference between cable and telecom traffic. It's a unique advantage for us because our system carries SONET-based digital traffic."

Another potential solution is to devote the broadcast portion of the feed to video transport while placing telephony and data services on a discrete narrowcast segment.

Video and telephony are going to be facts of life for most cable operators in the near future. The question is, how cheaply and efficiently can it be delivered?

market and network architecture at Scientific-Atlanta. "The last thing you need is a proprietary system or something that is not upgradeable."

Take a look at what kind of channel spacing a DWDM system offers. This is the amount of space between each wavelength. A wider spacing will indicate less crosstalk between wavelengths. Naturally, the more wavelengths you use, the tighter the spacing becomes.

200 GHz is fairly common with 16-channel systems and below, but advanced filtering techniques are now cutting it to 50 GHz with no increased distortion.

There also is the issue of whether the lasers in the overall optical system are direct or externally modulated.

"In an externally modulated scheme, you have a potential advantage for longer distances without fiber dispersion affects on distortion performance," says Tim Brophy, manager of optics engineering at General Instrument. "With direct modulated sources at high frequency, dispersion in the fiber, combined with line width, can affect composite second order (CSO) distortion."➤

Our braidless cable is so easy to manage, it's destined to set a new trend. It takes an industry leader to make a statement this bold. Our new Pentabond™ coaxial drop cable is an easier to install, longer-lasting cable that will outperform any braided version on the market. Not only is it lighter, but it's also virtually waterproof, thereby reducing moisture ingress and increasing reliability. And, best of all, you'll no longer be tortured by the sharp wires found in conventional braided cable. So, check out our new braidless cable. One installation and we think you'll understand why it's so in vogue. Call 1-800-SIECOR5.

SIECOR®
AT YOUR SERVICE

Also keep in mind that DWDM is only one component of most vendors' turnkey optical network systems, and it's important to look at each vendor's entire product offering. It's extremely unlikely that you'll be able to incorporate a DWDM system into your existing architecture in piecemeal fashion unless you have a lot of experience in optical network integration.

"A DWDM unit is not a plug-and-play device," cautions Harj Ghuman, senior director of product development at Antec. "It has to be carefully designed with receivers and all that. If someone is buying piecemeal, we can't guarantee the performance."

So without further ado, here are highlights of some of the major competing DWDM-based optical network systems available today.

ADC Telecommunications

The latest development at ADC is the introduction of eight-channel DWDM capability to its Homeworx family of headend products. The company offers externally and direct modulated systems. With external modulation in an 870 MHz plant, the company claims it can provide 200 MHz of narrowcast bandwidth per wavelength, enough for 33 digital video channels.

The ADC system uses fused bionic taper (FBT) devices and Fiber Bragg Gratings in its DWDM modules, two of the leading DWDM technologies, providing low insertion loss and very good wavelength isolation.

ADC provides the DWDM components as part of its value-added connector module (VAM) package, allowing users to upgrade the system when the time inevitably comes.

ADC also offers DWDM functionality on its DV6000 optical transport system using four-wavelength modules providing 16 channels each. Each wavelength provides 2.4 Gbps, for a total throughput of nearly 10 Gbps.

> "You want to be able to *easily* add more modules, and hence more channels, as your capacity needs increase."

Antec Network Technologies

Antec is offering up the Laser Link Transplex Transport System, a 16-wavelength, 1,550 nm externally modulated system capable of delivering an 18 dBm signal into the network without incurring backscattering. The company claims that it can push a signal up to 80 km with only minimal amplification. ➤

Return Path Maintenance
(You Can't Beat The System)

GUARDIAN™ SYSTEM

Only Trilithic offers a Return Path Maintenance System.
The Guardian System goes from the subscriber, to the pole, to the headend for complete ingress detection, diagnosis and resolution.

The RSVP™. Just connect the GUARDIAN RSVP in place of the subscriber's two way terminal and press the "TEST" button. The RSVP communicates with a 9580-SST reverse path analyzer located in the headend, tests the return path, and gives the installer a simple "PASS" or "FAIL" message and measurement data.

The 9580-SSR™. Up to six SSR field units can communicate with one SST simultaneously. The SSR displays ingress and reverse sweep information. The 9580 and GUARDIAN products are a complete return path maintenance system designed to test and service the entire return path.

The IsoMeter™. Now there is a fast and easy way to test the home cabling for resistance to signal ingress. The RSVP generates a special 28 MHz test signal. The installer uses the IsoMeter to track down leaks in the cabling. Moving in the direction of the leak causes a rise in pitch, quickly pinpointing its location.

The 9580-TPX™. The 9580-TPX offers a very attractive alternative for monitoring a large number of return test points for ingress at a relatively low cost. The TPX is fully compatible with the 9580-SST, expanding capacity up to 64 test points.

The 9580-SST™. The SST headend unit collects balancing and ingress measurement data from one to eight test points, and transmits updated measurements to the SSR field units, the second component of the 9580 system. The SST operates as an ingress monitor, receiving 80 ingress samples per test point, per second.

Ingress Management Software. Allows the operator to set up a powerful ingress monitoring system for hundreds of reverse path test points. IngressManagR™ compares the ingress spectra measured at each test point to its own user-settable limits, logs data, sounds alarms, calls pagers and initiates other programmed responses if the ingress exceeds those limits.

Call Now For A Free White Paper (800) 344-2412, (317) 895-3600

TRILITHIC
The Engineering Guys

(800) 344-2412, (317) 895-3600, (317) 895-3613 (fax), www.trilithic.com

"Our broadcast transmitters offer 2 dBm more power to launch the system," says Emanuel Vella, vice president of product management for active electronics at Antec.

Antec's line also holds to the ITU grid and is modular and upgradeable. The company also has reduced the size of its amplifiers to fit seven EDFAs on a five-rack-unit (RU) panel, as opposed to the three that would fit within that space in earlier designs.

"The Transplex system is extremely flexible," Vella says. "Operators are able to migrate from four to eight to 16 wavelengths with minimal increases in their capital investment."

General Instrument

GI has just recently introduced DWDM in its SpectraStar product. At the moment, GI is offering only a return path DWDM option using a directly modulated transmitter. Because there is no analog video in the return path, the carrier-to-noise (C/N) requirement is much less stringent than in the forward path, and lightwave distortion is not as big an issue.

GI's Brophy says the company went with direct modulation in the return because the cost is lower and the multiplexed signal does not have to travel as far as in the forward path.

"In the return path, the signals coming in from different areas don't need to get connected until close to the headend," Brophy says.

GI has an externally modulated transmitter waiting in the wings, but it had not been formally introduced at press time. The company says the unit is ITU-compliant and provides 200 GHz spacing in a modular, upgradeable package.

Harmonic

New from Harmonic is a DWDM return path transmitter that can be integrated into the node. Part of the company's PWRBlazer line, the device is able to operate despite temperature extremes at most nodes that normally would lead to stability problems with the wavelength.

The company says a DWDM return directly from the node is more cost-effective than traditional designs.

"Rather than transmitting from the node to the hub and then to the headend, it's much more cost-effective to put an ITU transmitter in the node," says John

MOORE
Blue Diamond

Fiber Optic Innerduct

Polyethylene Innerduct with your Network Project in Mind

- Manufactured to ASTM material and dimension standards
- Diameter range: 1/2" to 4"
- Manufactured in all colors and stripe combinations
- Custom laser printed
- Packaged the way you want it
- Delivered when you need it

The Leader In Construction Products For Telecommunications Networks

MOORE

Moore Diversified Products Inc. • 1441 Sunshine Lane • Lexington, KY • 40505-2918
800-769-1441 • Fax: 606-299-6653 • www.mooredp.com

Reader Service Number 59

The Goods and Where to Get Them

Company	System	Maximum number of wavelengths	Number of 6 MHz channels/wavelength	Forward capacity	Throughput	Transmitter modulation
ADC Telecommunications (800) 366-3891	WAVEWORX	16+	32	3.072 GHz	N/A	external or direct
Antec Network Technologies (678) 473-2000	Laser Link Transplex	16	33	870 MHz	22.6 Gbps	external
General Instrument (888) 436-4678	SpectraStar	8	10	860 MHz	N/A	external and direct
Harmonic Inc. (408) 542-2500	MetroLink	16	33	200 MHz	20 Gbps	direct
Philips Broadband Networks (770) 821-3944	SpectaHub	20	33	3.96 GHz	26 Gbps (256-QAM)	external or direct
Scientific-Atlanta (800) 443-6222	Prisma	16	33	200 MHz	20.064 Gbps	external or direct

Source: *Communications Technology*

Trail, director of product line management for Harmonic's transmitter systems. "That way, you get a single wavelength through the node to the headend."

Harmonic also was one of the first comapnies to deploy DWDM to the cable industry with its MetroLink system, which featured either four- or eight-channel systems.

Philips Broadband Networks

Philips is fairly new to the DWDM game, having just recently announced its SpectraHub architecture at Cable '99 in June. But the company has done extensive testing of its system with MediaOne and claims its offering provides "100 times more transmission capacity than today's prevailing DWDM architectures."

The system combines 33 quadrature amplitude modulated (QAM) channels onto 20 wavelengths. Each wavelength can transmit several digital carriers through to the hub.

"Philips can get 20 wavelengths onto one fiber, and each can carry 200 MHz of targeted service information," says Tom Tucker, product manager for headend fiber optics at Philips. "That's a total of 4 GHz of narrowcast data onto one fiber."

At 256-QAM, a 4 GHz system yields about 26 Gbps.

Integral to the system are what Philips calls a new class of transmitters with improved temperature control and a patent-pending dispersion compensation system providing for greater stablility in the wavelengths used.

Scientific-Atlanta

The newest development from Scientific-Atlanta is the 16-channel Prisma DWDM system. Like the company's earlier four- and eight-channel systems, the new product uses ITU 1,550 nm and 1,310 nm wavelengths.

The system is scalable in modules delivering four wavelengths each, allowing operators to add network capacity over time. The company is looking to break the 16-channel barrier soon. ➤

There are moments when you really appreciate a reliable partner.

When you're deploying a cutting-edge broadband network, you need strong support to reach your goals.

That's where Harmonic comes in. Many of the world's leading cable and telecommunication companies utilize our products in their broadband networks for one simple reason — Reliability.

When planning or expanding a network, every decision is mission-critical. You need equipment you can count on and a partner who can overcome your technical challenges. You need to know that your products will be there when you want them. You need Harmonic. Anything else and you'll never make it to the top.

To find out how we can help you, visit our website or call Harmonic today.

Harmonic

Redefining the Network™

549 Baltic Way
Sunnyvale, CA 94089
800.788.1330
408.542.2500
Fax 408.542.2510
www.harmonicinc.com

Reader Service Number 61

WDM • Digital Video and Data Integration • Forward & Return Path Transmission • Optical Nodes • Network Management

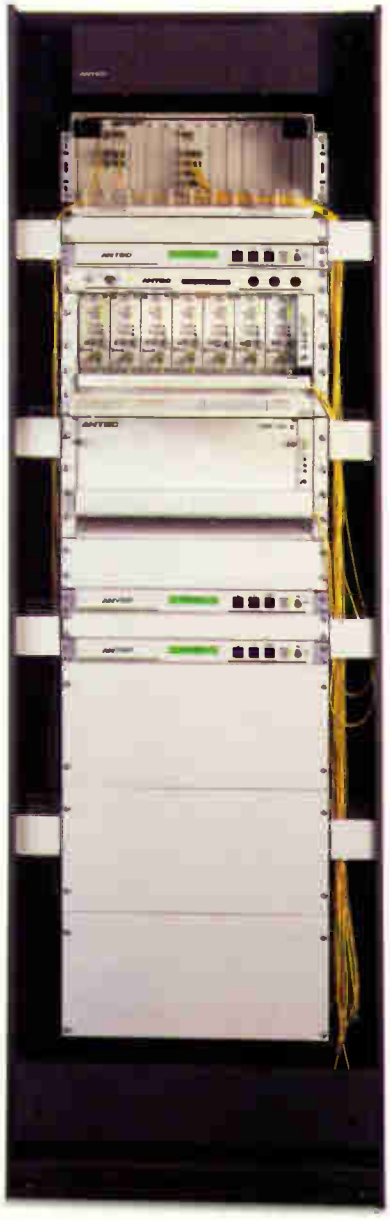
"We anticipate that in the next year, 32-wavelength systems will become economical," says S-A's Connolly.

Scientific-Atlanta probably will see 32 channels in the reverse path first by marrying the Prisma system with the bdr (baseband digital reverse) product line.

For hub-to-headend applications, the bdr system consists of digital encoding and multiplexing units and 1,550 nm and 1,310 nm lasers and receiving units. In combination with DWDM units, the bdr line is expected to deliver 32 reverse path streams with minor signal degradation.

Node-to-hub functionality is achieved by building bdr technology into the Prisma 6940

Dense wavelength division multiplexing (DWDM) solutions such as the SpectraHub architecture from Philips (above) or the Transplex DWDM System from Antec (below) allow cable operators to dramatically increase network capacity without having to lay more fiber.



MEGA HERTZ®
ESTABLISHED 1975

DENVER, CO
800-525-8386
303-779-1749 FAX

ST. LOUIS, MO
800-821-6800
314-429-2401 FAX

SAVANNAH, GA
800-962-5966
770-594-8566FAX

OCALA, FL
800-922-9200
904-351-4403 FAX

PHOENIX, AZ
800-883-8839
602-857-1114 FAX

HURST, TX
800-628-0088
817-354-8445 FAX

PORTLAND, OR
888-999-3766
503-582-8350 FAX

"UNIQUE" PRODUCTS FOR THE 21st CENTURY!

www.megahz.com

LOGO INSERTION SYSTEM

VIDEO DATA SYSTEMS

The LogoSTAR Stores Multiple logo images and is ideal for on-air standby slides, channel identification, auto display of emergency messages, copyright warnings, or display of ony frequently used image.

- Includes PC/Windows Logo conversion remote control software
- Holds 16 256x120 size logos
- 32 Key Levels - 65k Colors
- NTSC or PAL format
- GPI Contact Closure or RS232
- For Cable, Satellite or Broadcast

MEGA HERTZ® ESTABLISHED 1975

☐ Please send me information

www.megahz.com "Unique" Products For the 21st Century!

CT 9/99

Are You Protecting Your Investment and Revenue in Digital Set-Tops and Cable Modems From Lightning and Surges?

- *Transparent to Analog/Digital Bi-Directional Transmission*
- *Return Loss > 30 dB*
- *Insertion Loss < .1 dB*
- *Frequency 5 MHz - 1.5 GHz*
- *UL Listed and Bellcore Tested*

"Call Us For More Information About Tii's Coaxial Surge Protectors!"

MEGA HERTZ® ESTABLISHED 1975

☐ Please send me information

Distributes Tii

www.megahz.com "Unique" Products For the 21st Century!

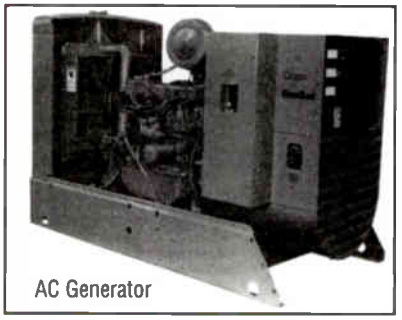
CT 9/99

Onan KOHLER®

GENERAC® WINCO®

STANDBY GENERATORS & TRANSFER SWITCHES

MEGA HERTZ HAS SUPPLIED CABLE TELEVISION OPERATORS WITH STANDBY GENERATOR SYSTEMS SINCE 1980



AC Generator

MEGA HERTZ® ESTABLISHED 1975

☐ Please send me information

www.megahz.com "Unique" Products For the 21st Century!

CT 9/99

Name_____

Company_____

Address_____

City_____ State_____ Zip_____

Phone_____

Fax_____

MEGA HERTZ

6940 South Holly, Suite 200
Englewood, CO 80112

PLACE STAMP HERE

Name_____

Company_____

Address_____

City_____ State_____ Zip_____

Phone_____

Fax_____

MEGA HERTZ

6940 South Holly, Suite 200
Englewood, CO 80112

PLACE STAMP HERE

Name_____

Company_____

Address_____

City_____ State_____ Zip_____

Phone_____

Fax_____

MEGA HERTZ

6940 South Holly, Suite 200
Englewood, CO 80112

PLACE STAMP HERE

Amplifiers
Antennas (Off Air), (Satellite)
Cable
Character Generators
Commercial Insertion
Connectors
Converters/Batteries
Distribution Passives
Demodulators
Emergency Alert Systems
Enclosures/Racks
Fiber Products
Generators/Inverters
Headend Products
LNA/LNB/Block Converters
Modulators
Molding
Pedestals/Apartment Boxes
Power Supplies/UPS/Batteries
Processors
Satellite Receivers
Stereo BTSC/FM Processors
Switching
Televisions/Monitors
Test Equipment
Traps/Filters (Specialized)
Video Products

MEGA HERTZ®

DENVER
800-525-8386

ST. LOUIS
800-821-6800

SAVANNAH, GA
800-962-5966

OCALA, FL
800-922-9200

PHOENIX, AZ
800-883-8839

HURST, TX
800-628-0088

PORTLAND, OR
888-999-3766

Envision the new world of communications!

1999 National Communications Forum

WITH

InfoVision Exhibits & Awards

October 24–28, 1999
Hyatt Regency O'Hare • Chicago, IL

The communications industry is undergoing a revolution in terms of new technology, competition, and deregulation. Gain in-depth understanding of the forces at work in this rapidly changing industry at NCF99-InfoVision

Presented by the **International Engineering Consortium**

OFFICIAL PUBLISHING SPONSOR
America's Network

In a dramatically changing industry, count on NCF99

For detailed information, call +1-312-559-4600, or visit us on-line at www.iec.org

Solutions-packed sessions

- next-generation service providers
- network drivers and architectures
- OSS case studies
- enhanced integrated services
- wireless markets and applications
- broadband wireless and satellite
- convergence of voice, data, and video
- local loop competition
- plus over 50 additional sessions!

NCF99-InfoVision Conference Chairperson

Plenary Session I: The Future of the Internet and Telecommunications

James Barr
President and Chief Executive Officer
TDS Telecommunications

Information Industry Luncheon Keynote Address

Robert Annunziata
Chief Executive Officer
Global Crossing

W.J. Stewart Verge
President and Chief Executive Officer
Bell Atlantic Global Networks

Opening Keynote Presentations

Robert C. Taylor
President and Chief Executive Officer
Focal Communications

David Ackerman
Executive Vice President
Winstar Communications

Two co-located ComForums!

ICP 1999 Integrated Communications Provider ComForum

New! Integrated Communications Provider ComForum

This ComForum is focused on helping competitive communications companies become one-stop, integrated service providers for business and residential end users.

1999 Carrier IP ComForum

1999 Carrier IP ComForum

This unique event is tailored to the needs and challenges of public network providers building or migrating to the enhanced IP–based network of tomorrow.

Plenary Session II: The Future Network: What Is It? How Do We Get There?

Geoffrey Mott
Managing Partner
The McKenna Group

InfoVision: see the innovations changing the industry

Exhibitors include the following: 3Com, Alcatel, Cisco Systems, Harris Communications, Lucent Technologies, Nortel Networks, Siecor, Tekelec, Teradyne, and many others.

and 6944 nodes. This technique doubles reverse path capacity.

The point

One of the chief benefits of DWDM for cable is that it offers a dramatic increase in network capacity without expensive buildouts or costly headend renovations.

So what does it cost to implement DWDM? Hard numbers are difficult to pin down because they will vary depending on the number of households, the length of fiber runs, the number of channels and so forth. But ballpark estimates are between $8,000 and $14,000 per 1,000 subscribers.

Lastly, the big question: Is DWDM a permanent solution or just the flavor of the month?

Based on telcos' extensive use of DWDM and the fact that it offers a real savings over laying additional fiber, it doesn't appear to be a flash in the pan.

As the cable telecommunications industry increasingly branches out into the online, interactive world, DWDM could very well become the means to new revenue streams for years on down the road. CT

Art Cole is a contributing editor to "Communications Technology."

BOTTOM LINE

DWDM: Pick and Choose

Dense wavelength division multiplexing (DWDM) has emerged as one of the leading multiplexing solutions for fiber-based cable plant. A number of installations are taking place this year around the world, and nearly all the major multiple systems operators (MSOs) have DWDM in their sights as the industry-wide upgrade to hybrid fiber/coax (HFC) continues.

At Cable '99 this summer, DWDM product lines were introduced by six leading manufacturers, all claiming to have the most efficient, effective system on the market. But which system best suits your particular plant?

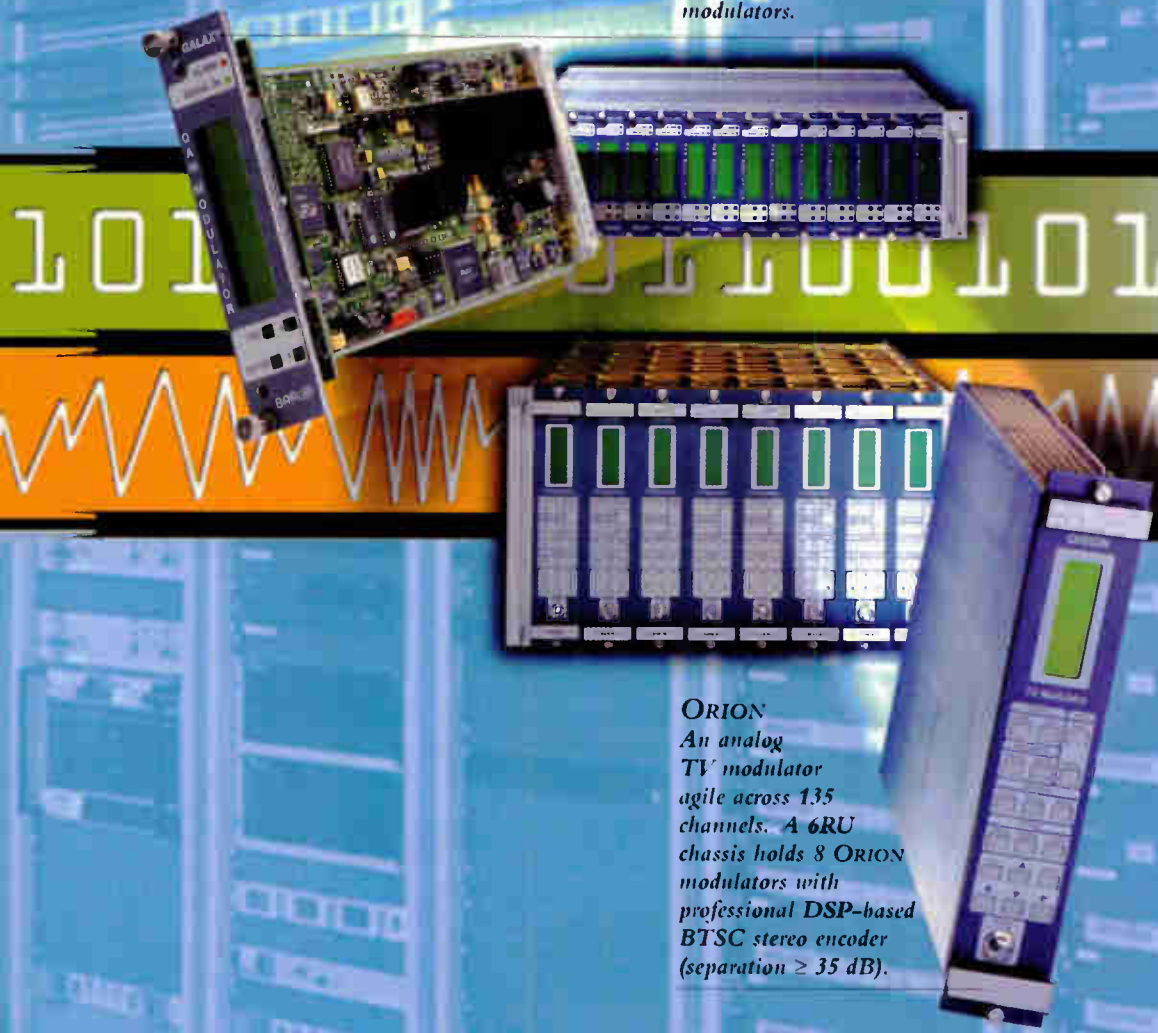
A number of factors should be considered when evaluating DWDM solutions. Among them are the number of wavelengths that can be squeezed over a single fiber, whether the transmitters are direct or externally modulated, the type of filtering being used and the channel spacing being maintained.

Another important factor to remember is that DWDM is likely to be one small part of a complete turnkey optical transmission system. There are a host of other modules, components and transmission schemes that can be mixed and matched to suit your particular needs. The good news is these systems are customizable. The bad news is it can mean a lot of tough decisions on your part.

Vertical space saving Solutions

Optimize use of your rack space. Consider BARCO's family of Vertical Mount Modulators.

GALAXY
An ITU-compliant QAM modulator with user selectable rates and bandwidths. A 3RU chassis holds 14 QAM modulators.

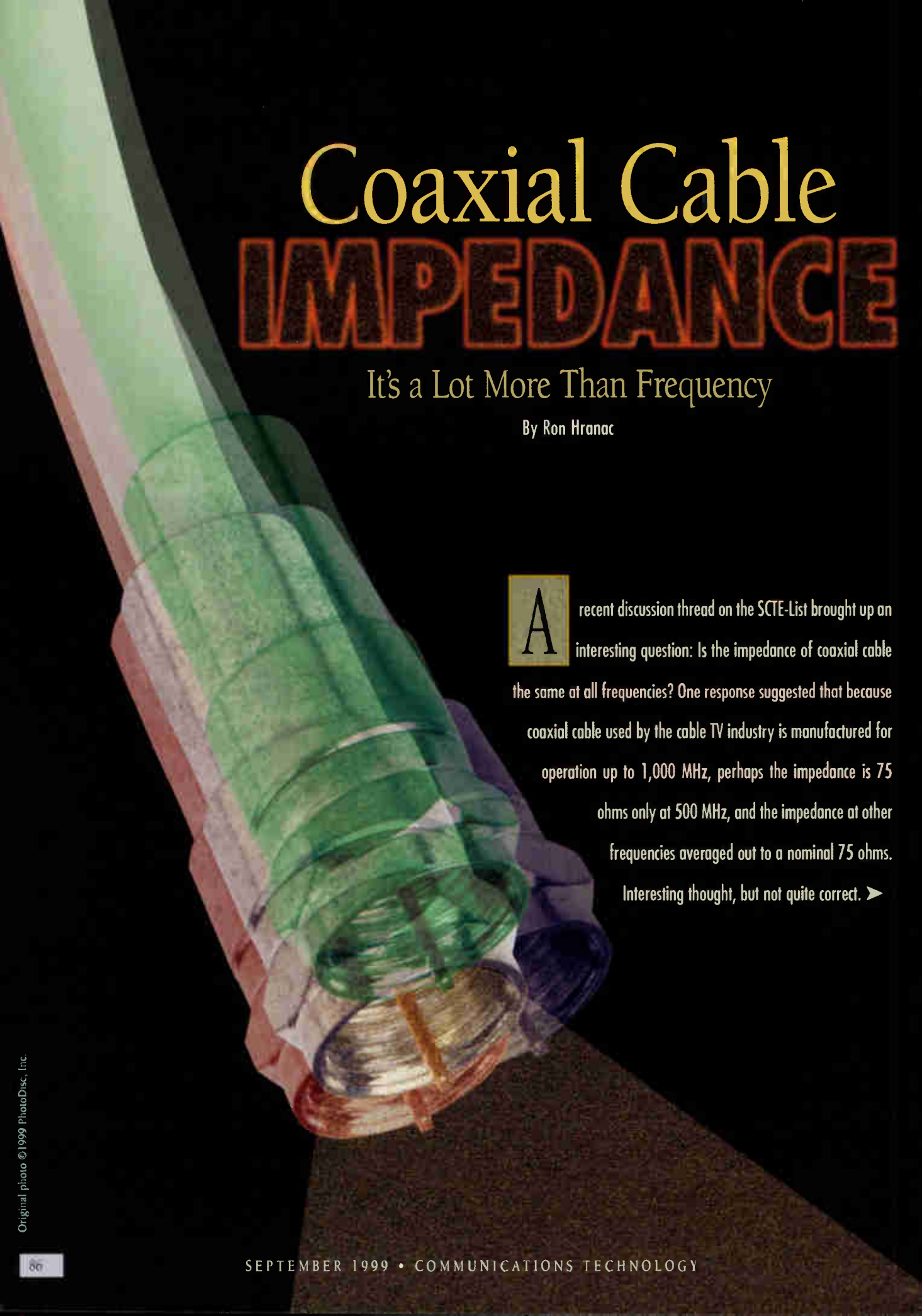


ORION
An analog TV modulator agile across 135 channels. A 6RU chassis holds 8 ORION modulators with professional DSP-based BTSC stereo encoder (separation ≥ 35 dB).

BARCO

Reader Service Number 65

BARCO Communication Systems • Australia tel. +61 3 9646 5833
Belgium tel. +32 56 23 32 11 • Brazil tel. +55 11 822 16 56 • China (Beijing) tel. +86 10 6526 8002
France tel. +33 1 4813 59 00 • Germany tel. +49 2461 6803 0 • Hong Kong tel. +852 2397 0752 • India tel. +91 11 6410 842
Japan tel. +81 3 5950 8100 • Malaysia tel. +60 3 7156 788 • Mexico tel. +52 5 211 64 92 • Russia tel. +7 095 785 52 63
The Netherlands tel. +31 30 247 6030 • United Kingdom tel. +44 118 926 4091 • USA tel. +1 770 590 3600 / 1 800 992 5016
Web site: http://www.barco.com • E-mail: sales.bcs@barco.com



Coaxial Cable IMPEDANCE

It's a Lot More Than Frequency

By Ron Hranac

A recent discussion thread on the SCTE-List brought up an interesting question: Is the impedance of coaxial cable the same at all frequencies? One response suggested that because coaxial cable used by the cable TV industry is manufactured for operation up to 1,000 MHz, perhaps the impedance is 75 ohms only at 500 MHz, and the impedance at other frequencies averaged out to a nominal 75 ohms. Interesting thought, but not quite correct. ➤

FIBER THAT FACES THE facts

WE MADE THIS JUST FOR YOU.

Four versions available:
Steel Armored
Armored Self-Supporting
All-Dielectric
Dielectric Indoor/Outdoor Riser

Cost-effective design carries up to 18 fibers

Triple moisture protection includes no-mess ARID-CORE™ moisture barrier

Visit us at booth #329 during NFOEC, September 26-30, Chicago.

fact: OUR FIBER FEEDER™ FIBER OPTIC CABLES ARE DESIGNED SPECIFICALLY FOR BROADBAND APPLICATIONS. In distribution or loop situations, they're the perfect alternative to bulky stranded loose tube cables. Fiber Feeder's smaller diameter, tight bend radius and lighter weight make them easy to install and terminate. And their **lower cost per installed fiber** makes Fiber Feeder cables easy to specify.

To learn more about our fiber offerings or to reserve your new **HFC II/fiber cable installation guide,** call 800-982-1708.

CommScope®

1729 Lenoir-Rhyne Boulevard • Hickory, NC 28601 • 800-982-1708 • 828-324-2200 • 828-328-3400 fax • www.commscope.com

Reader Service Number 66

I did post a response to the original question, stating something along the line of, "Coaxial cable's characteristic impedance is constant, regardless of frequency." Keep in mind when I refer to the terms "frequency" or "frequencies," the context is in the world of radio frequency (RF), or frequencies above about a few hundred kilohertz.

Let's dig a bit into the world of transmission line theory, ideally without having to get too deep. If your eyes glaze over at the sight of equations, I urge you to skip this article or go get a strong cup of coffee.

Some assumptions

As I go through this very basic (really!) discussion, keep in mind I'm making a few assumptions here. First, the electromagnetic waves propagating through a piece of cable are assumed to be transverse electromagnetic (TEM); second, to keep things simple, forget about standing waves. I'm assuming no impedance mismatches or reflections to confuse things.

That said, what the heck did I just say?

According to classic transmission line theory, an infinite number of electromagnetic field modes can propagate along a length of coaxial cable. In most cases, the dominant mode, or TEM mode, is the one we're interested in because coaxial transmission lines are intended to operate in the TEM mode. Got that? OK, so why call the dominant mode "transverse electromagnetic?" The answer is that both the electric and magnetic field components of TEM mode are what can be described as normal to the direction of propagation. "Normal" in this sense means at right angles, or perpendicular to the direction of propagation. The word "transverse," of course, means "situated or lying across; crosswise."

"Traveling wave" simply means the electromagnetic wave is moving along through the cable as fast as it can. Transmission line theory can get really ugly when standing waves come into play. Standing waves occur when two traveling waves moving in opposite directions—the desired one, or incident wave, and an undesired one, a reflection of the original traveling wave (reflected because of an impedance mismatch further down the line)—interact with each other.

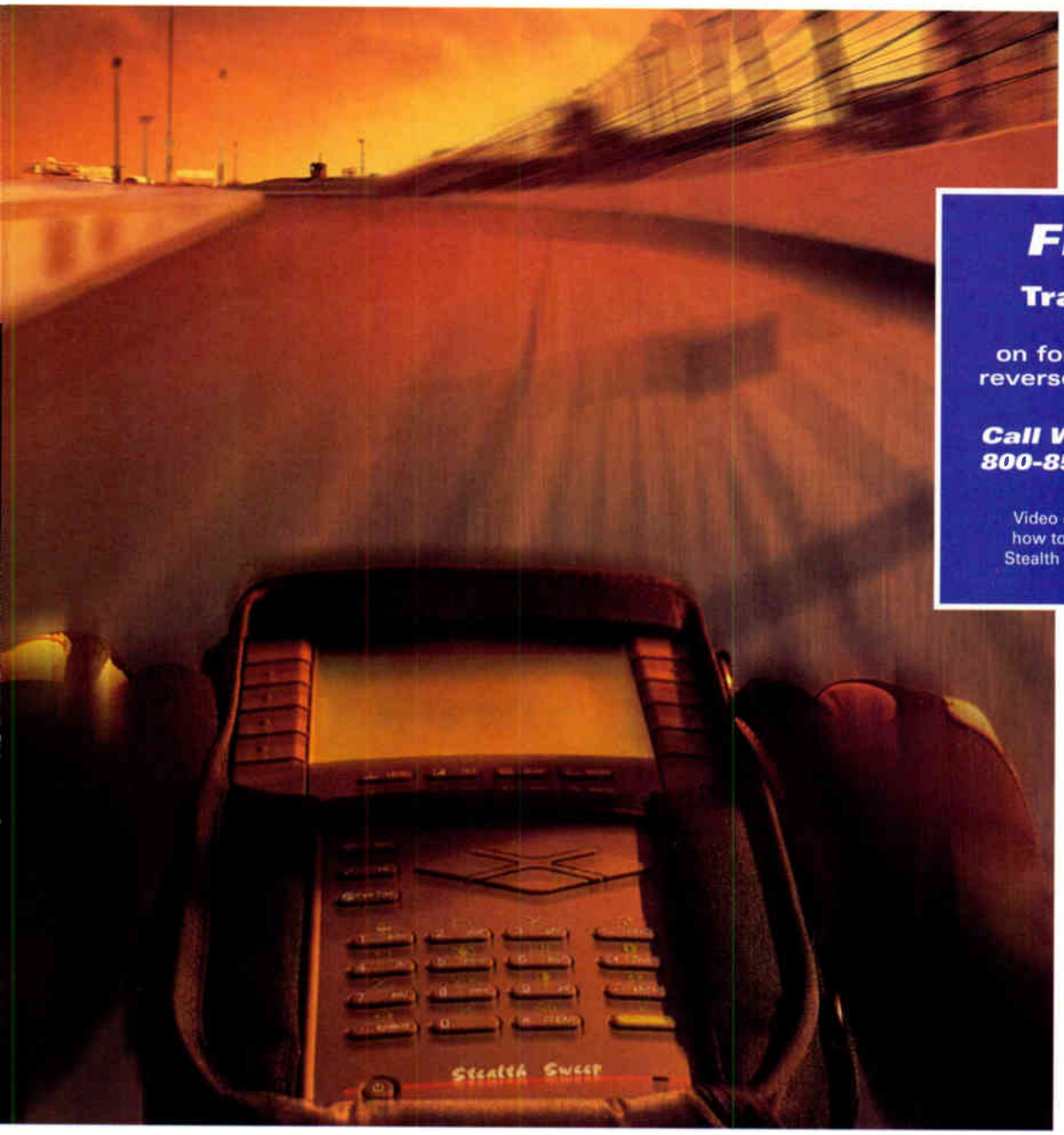
Let the fun begin

So, picture a hypothetical TEM mode traveling wave propagating through a piece of coax. That electromagnetic wave can be characterized in terms of its voltage (E) and current (I) components. The ratio of the wave's voltage to its current is called the cable's characteristic impedance (sometimes called surge impedance), Z_c:

$$Z_c = (E/I)_{\text{traveling wave}} \text{ (ohms)}$$

As is commonly the case when transmission line theory is the hot topic of discussion, the transmission line in question often is assumed to be an ideal lossless one. In that situation, a traveling wave's voltage and current will be exactly in phase. So if we consider our now ideal lossless piece of coaxial cable and imagine that it has perfectly smooth conducting

Speed Kills Ingress



FREE

Training Video
on forward & reverse sweep

Call WWG at 800-851-1202

Video demonstrates how to sweep using Stealth & StealthTrak

Got a problem with ingress and noise? Then run 'em down with Wavetek Wandel Goltermann's (WWG) new StealthTrak™ Sweep Receiver/Analyzer.

It's twice as fast — giving you outstanding accuracy with high-speed performance. Plus, you can now track down ingress. With the Stealth Trak™ , you'll get new standard features, like faster spectrum displays, a built-in low-pass filter and preamp, an impulse noise detector and more data storage. And you'll get new, expanded digital features as well. You'll also like the fact it's compatible with WWG's 3ST and 3HRV transmitters, so you'll save time and money down the road. Let's face it, the new StealthTrak™ is nothing less than a high-performance machine.

So call Wavetek Wandel Goltermann today at 800-851-1202 or 317-788-9351 (ask for your free video), or visit us on the web at www.wwgsolutions.com.

And satisfy your need for speed.

WAVETEK
WANDEL
GOLTERMANN
Communications Test Solutions

Reader Service Number 68

Characteristic impedance equations

$$Zc = \frac{1}{2\pi}\sqrt{\frac{\mu 0}{\varepsilon 0}}\frac{1}{\sqrt{\varepsilon_r}}\log_e\frac{b}{a}$$

$$= (59.95\ \text{ohms})\frac{1}{\sqrt{\varepsilon_r}}\log_e\frac{b}{a}$$

$$= (138.03\ \text{ohms})\frac{1}{\sqrt{\varepsilon_r}}\log_{10}\frac{b}{a}$$

where
$\mu 0$ = permeability of a vacuum, which is equal to $4\pi \times 10^{-7}$ henry/meter
$\varepsilon 0$ = permittivity of a vacuum, defined as an experimental number approximately equal to 8.854×10^{-12} farad/meter
ε_r = dielectric's relative permittivity, more commonly known as the dielectric constant
a = the inner conductor radius
b = the outer conductor radius

The latter equation can be rewritten slightly into the more familiar form (refer to Figure 1)

$$Zc = \frac{138}{\sqrt{\varepsilon_r}}\log\left(\frac{D}{d}\right)$$

where
ε_r = dielectric constant
D = the inside diameter of the outer conductor
d = the outside diameter of the center conductor

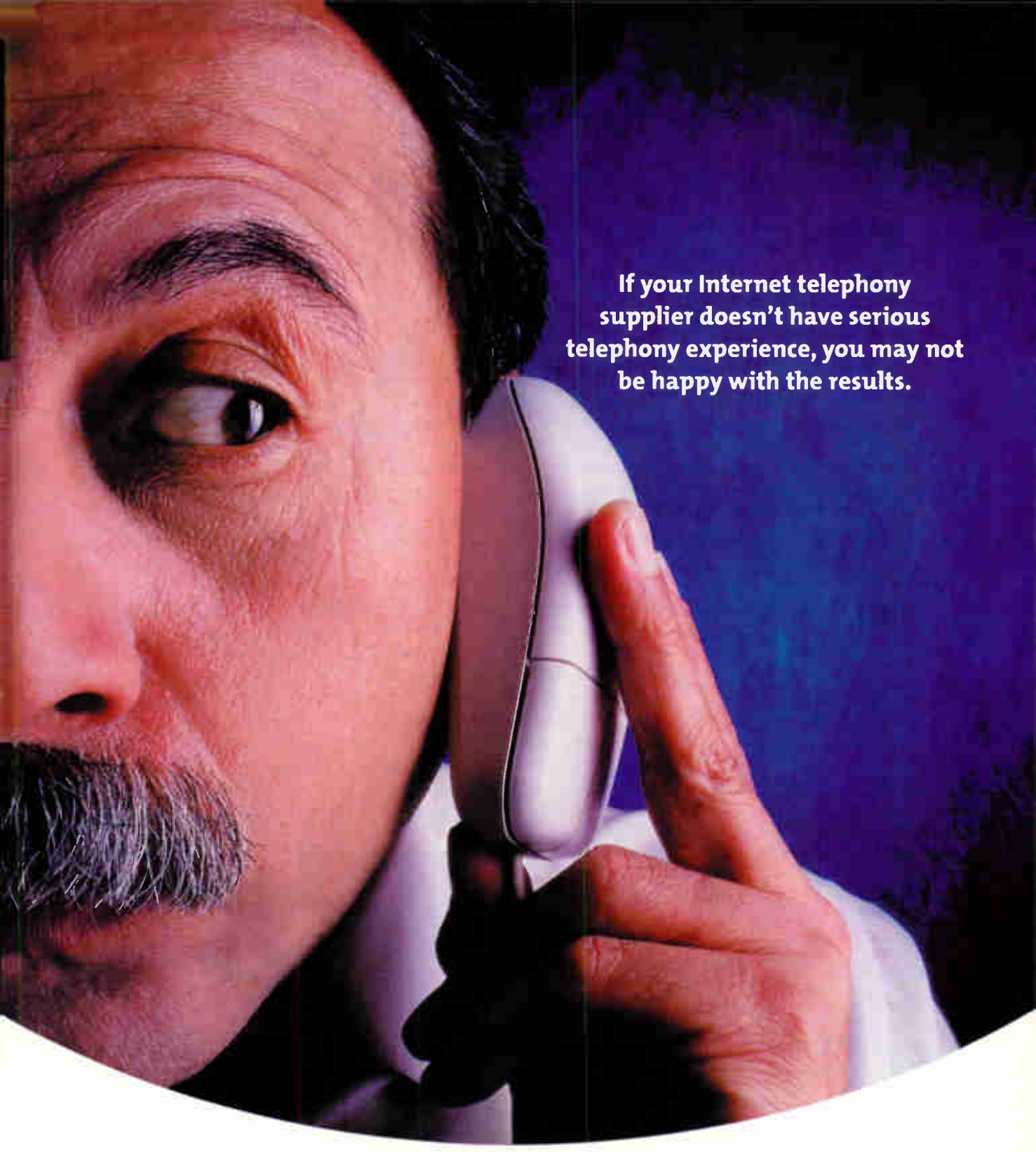
surfaces, its characteristic impedance is mathematically defined in the accompanying equations to the left.

Notice that none of these equations has any reference to frequency. So, let's plug in some real-world numbers and see what we get. According to a recent Times Fiber Communications catalog, the center conductor diameter (d) for 0.500 cable is 0.109 inch, and the inside diameter of the shield (D) is 0.450 inch. (See Figure 1 on page 92.) The velocity of propagation (V_p) is 87 percent, which equals a dielectric constant (ε_r) of about 1.32. For reference, dielectric constant is $1/V_p^2$ or in this case, 1/0.872.

Crunch the numbers

Let's see, where were we? Oh, yes, plugging numbers into the equation. First, do the calculation assuming the cable has an air dielectric, which means the dielectric constant is 1 for all practical purposes. Technically, the dielectric constant for air is 1.00068, but the difference between air and a vacuum (1) is so small as to be considered negligible for this exercise. The calculated impedance with an air dielectric is just under 85 ohms. From this, you can see that adding a dielectric made of something other than a vacuum or air will lower the cable's characteristic impedance.

Now do the calculation with the foam dielectric. You should get 73.96 ohms. This is within about one ohm of a nominal 75 ohm characteristic impedance, and considering that cable TV hardline cable's characteristic impedance usually is specified as 75 ohms plus or minus two ohms, 73.96 ohms is right on the money.



Whether you're evolving your current network or building a solution from the ground up, Nortel Networks™ can deliver it without any surprises. Only we have the experience and the expertise to give you Internet telephony without sacrificing reliability. Only Nortel Networks can deliver the complete end-to-end solution for HFC operators, including high-speed cable access, optical transport and IP networking. Come together with HFC Internet telephony from Nortel Networks. **www.nortelnetworks.com**

NORTEL NETWORKS

How the world shares ideas.

THE Build

Training and Construction Strategies for Evolving Broadband Networks

Fab Four Push for Fiber-to-the-Home

By Reed Miller

While carriers have been delivering fiber-to-the-home (FTTH) on a limited basis for more than 10 years, four carriers have recently taken an influential step to propel growth in that market segment.

BellSouth, British Telecom, France Telecom and Nippon Telegraph and Telephone collectively created a specification the Fab Four plans to push as an industry standard. For the first time in the industry's history, equipment manufacturers would have a blueprint from which they could develop FTTH products—something carriers have lacked but needed for a decade.

The specification is intended to be an improvement over the Full Service Access Network (FSAN), an initiative established by 20 carriers in order to develop asynchronous transfer mode (ATM) passive optical networks.

Initiative members include industry big boys such as Bell Canada, BellSouth, British Telecom, Chunghwa, Deutsche Telekom, Dutch PTT, France Telecom, GTE, Korea Telecom, NTT, SBC Communications, Swisscom, Telefonica, Telstra and Telecom Italia.

"What we are doing is using FSAN compliance as a basis for the specification," said Brian Ford, BellSouth manager of exploratory development. "We took the FSAN specification and came out with a common technical specification based on it. FSAN has two major specifications, the FSAN spec and then the ITU (International Telecommunications Union) G.983.1 specification. We are using both.

"What we are hoping is that we can all start working with the vendors to get a handle on pricing," Ford added. "We are hoping that the vendors will consider the volume pricing of the four carriers buying equipment at once."

The standard likely could spur competition among equipment manufacturers. Rather than developing costly, customized systems for individual carriers, manufacturers could build equipment to the specification, thereby creating a break in price.

The new specification relies on an optical line terminal at central offices. The optical line terminal is a transmitter and ATM multiplexer that transmits an optical signal into the field.

In neighborhoods, passive optical splitters are deployed to split a signal into 32 channels, which then can provide services to 32 individual homes.

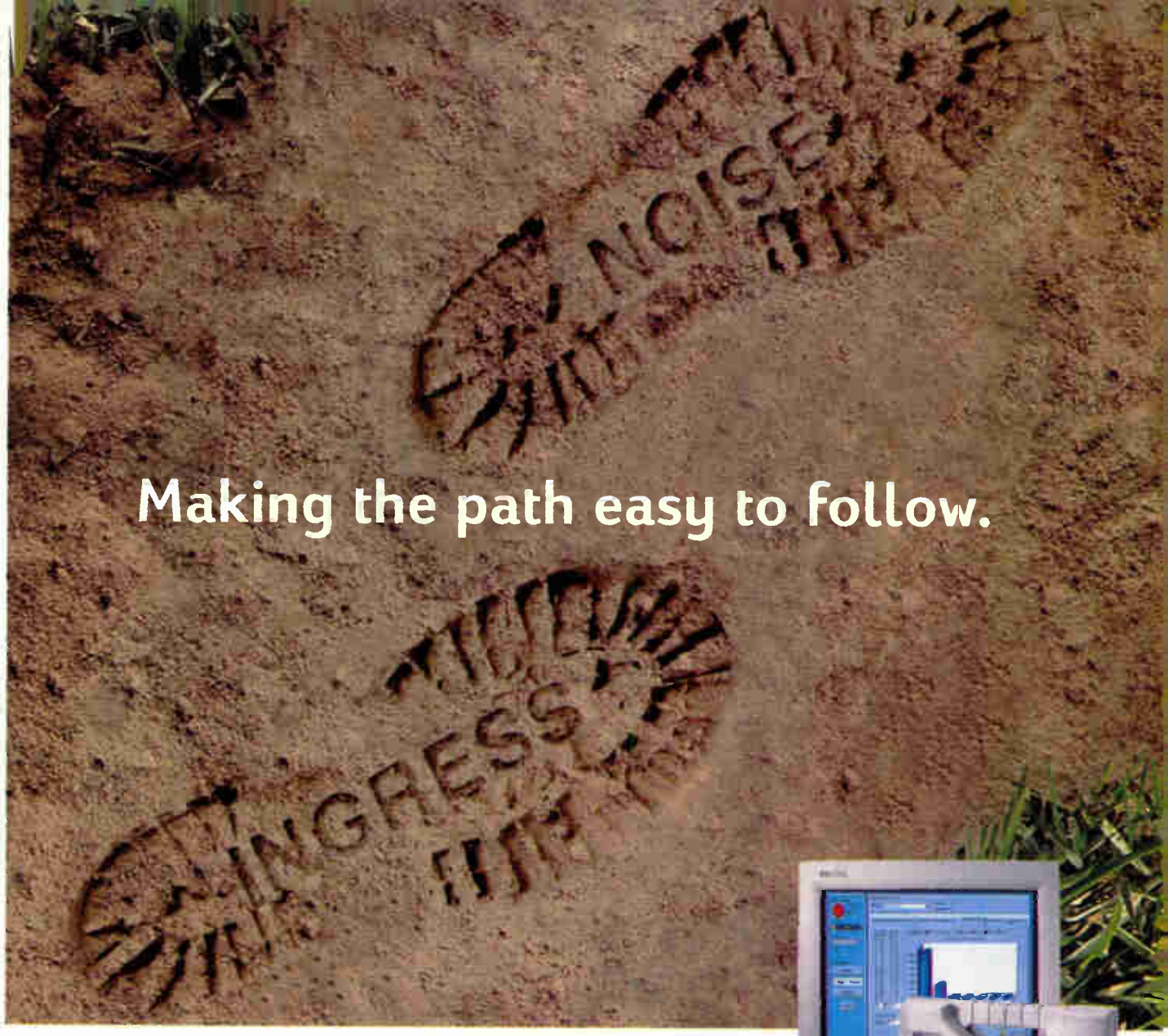
Optical network termination units are deployed at homes to receive the optic signal and convert it into electricity. The electrical signal is run over coax for video, twisted-pair for voice or Category 5 cable for Ethernet.

Of the Fab Four, BellSouth is the only carrier committed to deploying the new specification. The rest are taking a "wait and see" attitude to determine whether pricing really will nosedive for FTTH equipment.

Having the courage of its convictions, BellSouth says it plans to employ the specification in 400 homes in Atlanta during the fall. TB

Reed Miller is senior editor of sister publication "Fiber Optics News." He can be reached via e-mail at rmiller@phillips.com.

[Table of Contents]



Making the path easy to follow.

Now with return path monitoring for return path characterization.

Ingress is elusive. Yet time is short. The rugged, portable HP CaLan™ 3010R sweep/ingress analyzer tracks ingress problems in the field. Its companion HP CaLan 3010H detects, measures and reports on ingress at the head-end.

Use HP CaLan solutions for high resolution forward and return sweep, and rapidly display signal measurements including digital and bursted (TDMA) power.

HP accessCable™ adds return path monitoring to measure spectral power and record maximum, minimum and average power. Count burst events and identify their duration, or use *Smart Scan* to find problems for you. HP accessCable alerts you to problems and reports meaningful data to identify and track ingress faster.

HP CaLan Sweep/Ingress Analyzer

Call 800-452-4844 ext. 6385 or visit www.hp.com/go/catv to qualify for a free gift and receive the latest information on tracking ingress.

Reader Service Number 77

HEWLETT® PACKARD

Expanding Possibilities

More Isn't Always Better

Inventory Management Adapts to Changing Market

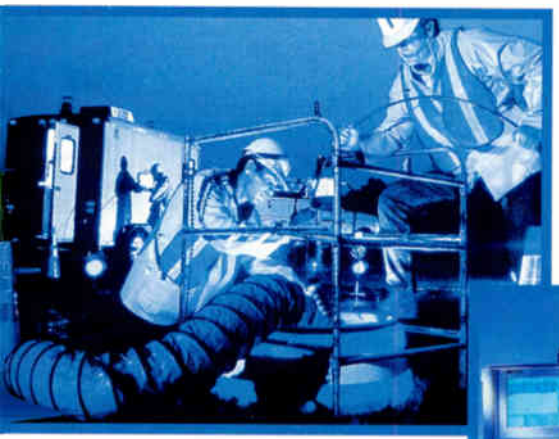
By Doug Larson

In the not-too-distant cable industry past, warehouses were filled to the brim with goodies for our hybrid fiber/coax (HFC) networks. From set-tops to servers to two-way splitters and everything in between, inventory of all sorts sat on shelves and on the books for months. ➤

TIRED OF LOOKING FOR EVENTS IN YOUR FIBER NETWORK?

MAYBE YOU SHOULD LOOK FOR A NEW OTDR INSTEAD.

Whether you're installing or maintaining a fiber optic network, you need information fast. Nothing gives it to you as quickly as HP's OTDR family. Our ultra-high-performance technology reduces your trace acquisition time from 3 minutes to an amazing 10 seconds for a clean trace. And you can test further than ever—with resolution you've got to see to believe.



Our easy-to-operate front panel gives you accurate and automatic pinpointing of events at the push of a single button, making complex measurements easier than ever. Plus, our free trace viewer software makes it easy to document and manage Bellcore™ (.sor)-compliant traces. All of which means your search is finally over.

HP Mini-OTDR HP Rack OTDR HP OTDR

Compare for yourself. Please call **1-800-452-4844,* Ext. 6045,** today for a demonstration of HP's OTDRs **and ask us about our generous trade-in program.** Visit our Web site: **http://www.hp.com/go/lightwave**

*In Canada call 1-800-387-3154, Program Number TMU392

InfoVision

TECHNOLOGY AWARD WINNER 1997

DESIGN AWARD WINNER 1997

Come see us at NFOEC, Booth #1071

HEWLETT® PACKARD

Expanding Possibilities

Reader Service Number 78

Today's new technologies are changing the way the industry buys and stocks equipment, and system clustering and consolidation are creating challenges for managers as they attempt to bring new systems, equipment and practices into the fold—and maintain their sanity in the process.

The "more is better" approach to inventory management today is giving way to more sophisticated systems and procedures. The vanguards of cable TV's materials management revolution are pushing for higher inventory turns, automated tracking systems and centralized control—sometimes relinquishing control of the process altogether—in an effort to reduce operating costs and increase efficiencies. But while most accept the fact that warehouse management practices must evolve to keep pace with the industry-wide technological and operational advancements, turning theory into practice presents its challenges.

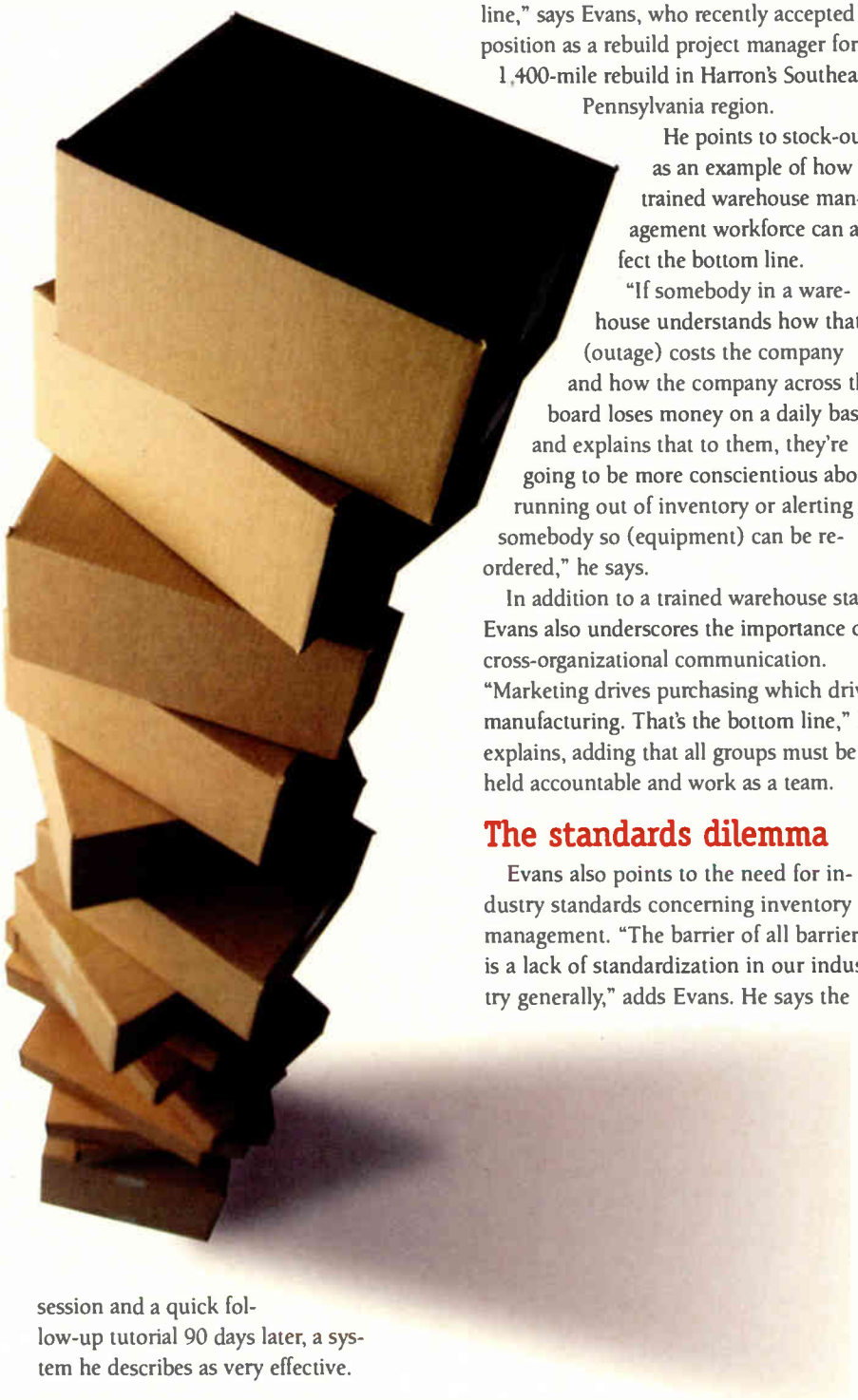
Success through training

It seems as though no one has emerged unscathed from the merger-mania sweeping the industry. Cox Communications is no exception. Dick Wallace, Cox's vice president of materials management, says his company has experienced firsthand the warehouse management challenges created by some of its consolidation activity, starting with its merger with Times Mirror in 1995 and including its recent acquisition of TCA Cable TV. For Wallace, however, these challenges have been a blessing in disguise.

"Recent mergers and acquisitions provide us new opportunities to learn other (inventory management) methods while we train and convert the personnel to our JD Edwards financial package," says Wallace. "Obviously, we encounter the occasional speed bump, but for the most part have been fairly successful converting these new properties."

Wallace cites training as the key to success in absorbing these new properties and the inventory management procedures and systems that come with them.

"Our biggest conversion issue is training, training and more training," says Wallace. "We have to convert all the new acquisition's inventory to our part number system, perform a physical count of their inventory, convert any outstanding purchase orders over to our system and then train the local system personnel on our JD Edwards software package." Wallace says its training program involves a primary session and a quick follow-up tutorial 90 days later, a system he describes as very effective.



Empower your employees

This focus on training is shared by others in the industry as well. Randy Evans, the former director of purchasing at Harron Communications, stresses the importance of an empowered workforce.

"Unless we have a trained, literate, motivated, competent workforce and we give that workforce decision-making authority, we're not going to get satisfied customers, and we're not going to improve the bottom line," says Evans, who recently accepted a position as a rebuild project manager for a 1,400-mile rebuild in Harron's Southeast Pennsylvania region.

He points to stock-outs as an example of how a trained warehouse management workforce can affect the bottom line.

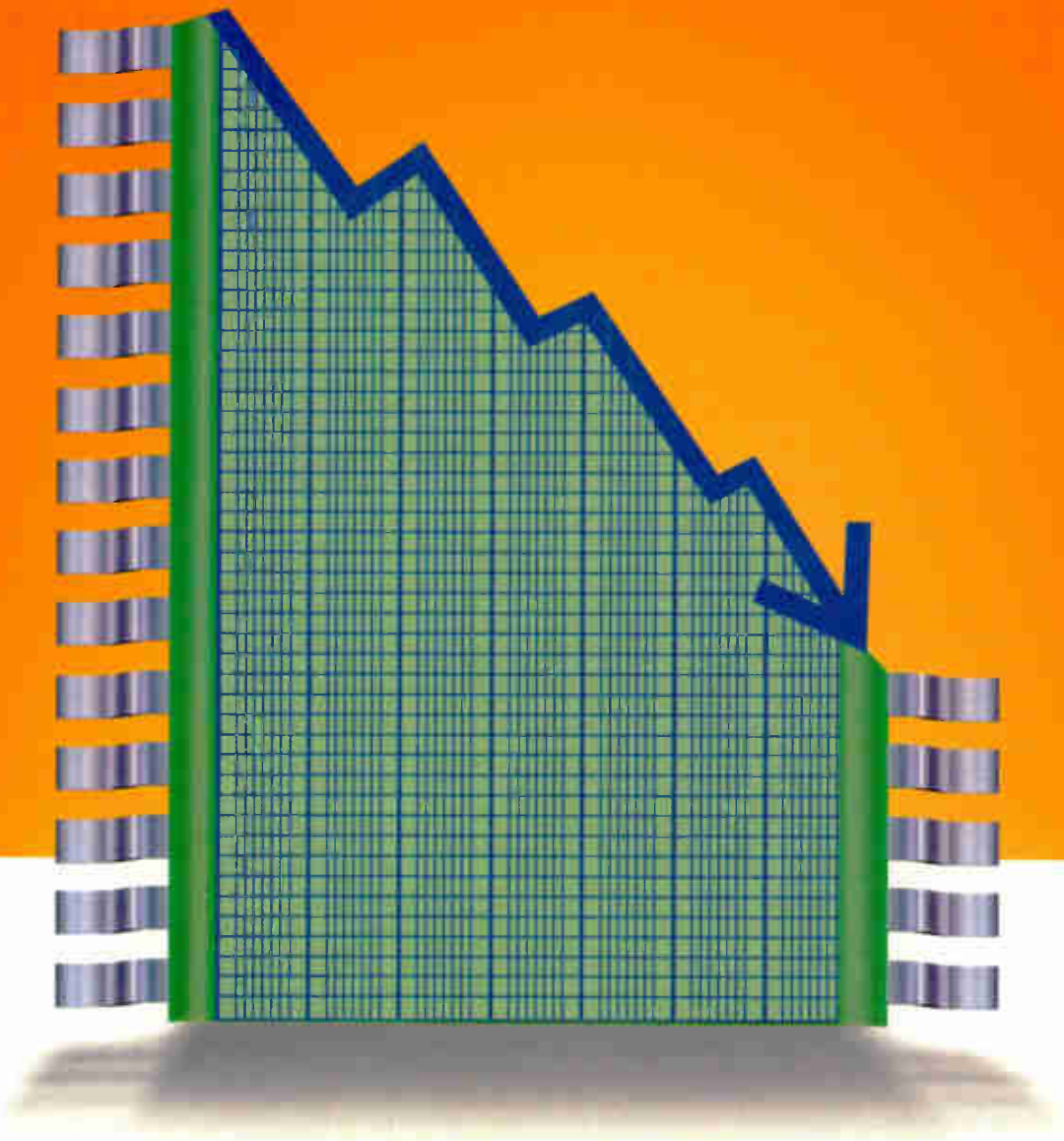
"If somebody in a warehouse understands how that (outage) costs the company and how the company across the board loses money on a daily basis and explains that to them, they're going to be more conscientious about running out of inventory or alerting somebody so (equipment) can be reordered," he says.

In addition to a trained warehouse staff, Evans also underscores the importance of cross-organizational communication. "Marketing drives purchasing which drives manufacturing. That's the bottom line," he explains, adding that all groups must be held accountable and work as a team.

The standards dilemma

Evans also points to the need for industry standards concerning inventory management. "The barrier of all barriers is a lack of standardization in our industry generally," adds Evans. He says the lack of equipment standardization creates problems on the materials management side in systems and operations where more than one manufacturer is used for any single piece of equipment,

CABLE MODEM ICS HAVE REACHED AN ALL TIME LOW!



Low prices. Low noise. Low distortion. Low bit error rate. All these lows add up to high value. And, as you'd expect they're all DOCSIS compliant. Isn't it high time you gave us a call?

ANADIGICS® On Board

35 Technology Drive Warren, NJ 07059 Tel: 908 668-5000 Fax: 908 668-5132 e-mail: mktg@anadigics.com. Website: www.anadigics.com

Reader Service Number 79

a problem compounded by system swapping. You can't just call an amplifier a 450 amplifier, for example, if you have different products from different manufacturers, says Evans.

Consider Adelphia's acquisition of Harron. "You have different equipment, you have different systems, you have different part numbers, and a lack of standards, so you can't just take what we have and roll it over into what they have," says Evans. "It's going to take months."

Evans created a standards committee to help simplify materials management at Harron. He says the company staged a "dog and pony show," in which he involved all of the technical operations managers. They went around the country to visit manufacturers and get a firsthand look at everyone's equipment, which gave the tech op managers detailed information they were not accustomed to receiving on a daily basis.

"So it helps in the decision-making process because you're using empowerment there," says Evans. "It's pretty helpful when you get buy-in from the people in the field, instead of corporate jamming down to the people in the field."

Evans says his committee now standardizes products across the board. "Right now, for three of our regions, we standardize on a hard-line coaxial cable, so that one type of cable (QR715) is used in all of our rebuilds," explains Evans. He says the company uses it for aerial and underground rebuilds in its Michigan, New York and Pennsylvania regions.

To help solve some of the standardization problems, Evans stresses the importance of using only a manufacturer's part number for tracking and warehousing inventory because a distributor may place its own model number on a piece of equipment. Manufacturer part numbers are the only ones that can be cross-referenced in all databases.

A centralized approach

Bruce Mallalieu, the former director of purchasing at Rogers CableSystems and current chairman of the Society of Cable Telecommunications Engineers' Materials Management Subcommittee, says the industry is waking up to the realization that inventory management practices of old cannot meet the demands of an increasingly bottom line-driven market.

"New material management practices are gradually developing in the industry, mainly because senior management is beginning to realize that there are significant savings to be achieved by reducing inventory and negotiating favorable supply agreements," says Mallalieu. He adds that the high cost of new digital equipment such as set-top boxes, and the value proposition they hold for pirates, is forcing the industry to improve its security measures for inventory handling and control.

To streamline materials management, Rogers has centralized its purchasing and inventory management. "We have two regional distribution centers and six warehouses," says Mallalieu. "Rogers is currently implementing a 'tote-box' delivery system that will gradually result in the closure of four of the six remaining warehouses within the next two years."

"Since deploying this process, we have realized annual dollar savings of greater than $15 million." — Dick Wallace, Cox Communications

In this system, a technician carries in his vehicle tote boxes, into which he places any used equipment he removes from the network during the day. At the

end of the day, he places these retrieval tote boxes into a locker and faxes a record of the items he used during the day to his distribution center.

The distribution center consolidates the technician's faxes and then picks and packs the appropriate materials for each technician into a tote box for the following day. These replenishment tote boxes are then shipped out later the same evening to several locations. At each location, the truck driver has access to technicians' lockers and empties boxes containing used equipment from the network and puts replenishment boxes into the lockers. The cycle is repeated the following day.

Mallalieu says this new system and other efforts to centralize control, re-engineer the supply chain and make inventory visible throughout the system have reduced inventory from a peak of $52 million to its current level of $12 million and have improved its inventory turns from 0.5 to between five and nine turns since 1996.

The Cox approach

Cox's warehousing and inventory management is locally controlled by its systems using a JD Edwards financial software package that provides up-to-date data on usage, item quantities, excess available for transfer, total dollars and so on.

"The purchasing function is centralized in that all material requisitions are entered and approved by the local system, but the purchase order is completed by my Atlanta staff of buyers," explains Wallace. "We find this very successful, as we have gained both efficiencies through reduction of required buyers while remaining effective in providing the needed service to our end users."

To help the company realize cost savings, five years ago the company formed a Material Evaluation Committee consisting of system technical representatives and selected corporate engineers. The mission of the committee was to select vendors of choice for many of its material needs, including fiber, drop amplifiers, batteries, pole line hardware and so on.

"The purpose was to standardize our practices where appropriate, leverage our buying power and develop partnership relations with our vendors," Wallace says. "Since deploying this process, we have

realized annual dollar savings of greater than $15 million."

Cox's inventory measurements include annual turns of at least four, periodic "ABC" cycle counts and comparison to accounting values using absolute variance as the determining criteria, where each material type (A, B, C) has its own acceptable error goal from both a dollar amount and quantity variance.

Wallace says his operation faces two major challenges at the moment. The first is to become better at forecasting and matching outflows more closely to inflows. "We're not expecting 'just-in-time,' as we're not a manufacturer, and materials management is not our core competency," says Wallace. "What we do best is provide communications services to end-users and the associated customer service support."

Another challenge arises from the deployment of advanced services and the nonstock inventory, such as digital set-top boxes and cable modems, associated with these services.

"These appliances are tracked through our billing system from receipt from the vendor to assignment to a customer's account," Wallace says. "Although this process is very secure and sophisticated, opportunities exist for error, which may result in lost appliances. It's not unusual to have $1,000 worth of these devices in a customer's home and many times that amount assigned to a technician. We must constantly check and review both our procedures and practices for any flaws."

As for the future, Wallace expects his company to continue to partner with its vendors and explore the Internet for online purchasing, including tracking of deliveries and forecasting requirements.

A helping hand

If inventory management is not a core competency for cable operators, why not outsource this function altogether? Some operators are doing just that and are finding assistance from distributors, consultants and other third-party service providers.

"Companies, especially the larger ones, are deciding they don't need the hassle of trying to keep adequate inventory on hand to satisfy their customers," says Sonny Dickinson, vice president and director of cable TV sales for Power & Telephone Supply. "That's where P&T steps in and is able to offer material management for them. The larger companies are wanting to focus more on the bigger picture, such as getting more business or streamlining their existing business or programs to become more cost-effective."

MasTec Management Team—the project management group of MasTec North America, a leading cable contractor—also offers its customers inventory management services.

Mac Zukoff, an MMT project director, says the value his company brings to a project is its experience and personnel. Moreover, when a project is completed, says Zukoff, the client does not have to worry about absorbing the materials personnel into its existing budget.

"Another challenge faced by an MSO (multiple systems operator) is the control

CARSON

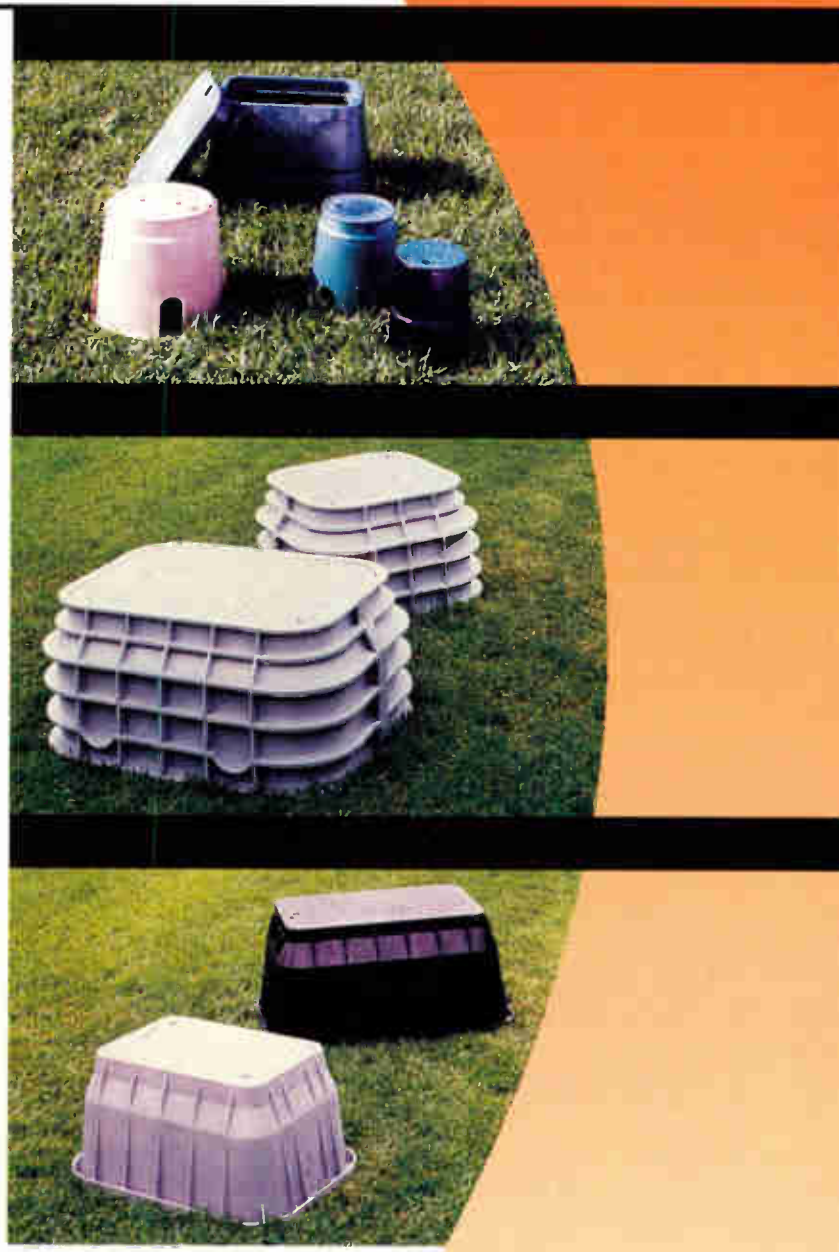
Grade level enclosures.

Engineered and built with a 30-year history of quality and dependability.

No wonder Carson enclosures are specified by more industry professionals than any other vault.

Whatever your telecommunications requirements, Carson has the enclosure for your engineering and construction applications.

Available in a full range of sizes and shapes, Carson enclosures assure you of unparalleled durability and long life. Take advantage of 30 years of engineering experience. Call 800-735-5566. Let us help you select the right enclosure for the right job.



CARSON INDUSTRIES, INC.

GLOBAL QUALITY
GLOBAL SERVICE
GLOBAL COMMITMENT

Corporate Office
1160 Nicole Court
Glendora, CA 91740 USA
Toll-Free: (800) 735-5566
Phone: (909) 592-6272
Fax: (909) 592-7971

European Operations
IDA Industrial Estate
Racecourse Road
Roscommon, Ireland
Phone: 353 903 25922
Fax: 353 903 25921

Manufacturing Facilities
1925 A Street, La Verne, CA 91750
200 St. Charles Ave., Flora, MS 39071
1675 Industrial Drive, Napoleon, OH 43545

Reader Service Number 83

Are you plugged in?

Water, Water, EVERYWHERE

And Nary a Drop on Your Fiber

By Chris Goodwin

Water. It's everywhere. It gives and sustains life. We all need it and depend upon it. But we don't need it disrupting our cable TV service. And in the world of optical fiber, we go to great lengths to ensure that water doesn't stand a chance.

With buried plant, cable is acted upon by many unseen forces—ground heave, frost and nibbling rodents, just to name a few—that put cable at risk of water ingress. Buried optical splices, in particular, must be adequately protected from water ingress. Especially in colder climates, where worst-case scenarios involving water are most likely to occur, protective measures are key.

Blocking technologies

Let's look first at the cables themselves and the water blocking technology that is built into them. Most of the fiber-optic cable currently in use—thousands upon thousands of miles of it—uses a traditional water blocking technology. Should the outer polyethylene jacket be somehow breached, what keeps water from getting on the fibers? Whether the cable contains 12 fibers, or whether it contains 288, water first is met by a flooding compound, a greasy interstitial filling, in which the buffer tubes containing the fibers swim. The buffer tubes themselves are filled, offering further protection from water in the unlikely event that the buffer tubes are breached.

A somewhat newer method for protecting the fibers from water—and a technology that is gradually finding its way into the hearts of cable construction and maintenance personnel everywhere—is known as "dry" water blocking technology. Dry water blocking technology employs su-

Only one seal weathers the elements better.

CABLETYTE™

Fiber Optic Closures With CableLok® Seals

CableTyte™ fiber optic splice closures provide the ultimate protection in aerial, underground or pedestal applications. Versatile and easy to install, CableTyte splice closures have been the closure of choice by CATV and telecommunications companies throughout Europe for over 10 years.

- CableLok® environmental cable seals eliminate the need for a heat torch. Heatshrink seals also available.
- All closures are designed for easy installation and re-entry without any special tools.
- Unique closure designs, including our patented curved splice tray, easily accommodate space-saving application demands.
- Closures are available in various sizes for low and high fiber counts with flexibility for future expansion.
- Durable, weather-resistant, thermoplastic shells offer proven protection and maximum modularity.

Call to learn more about CableTyte closures or visit us on the web to see our entire line of cable management products.

1 (800) 822-4352
Fax: (414) 355-7341
www.tytonhellermann.com

TytonHellermann® CORPORATION

Reader Service Number 88

Photos courtesy of Siecor (left) and Preformed Line Products (right).

Enclosures protect your fiber splices from water ingress. Placing them in vaults enables re-entry.

perabsorbent polymers. These swellable, water-activated materials are impregnated on tapes and yarns inside the cable. You can think of them as a sort of reverse diaper; instead of keeping water from getting out, they block water from getting in.

While both water blocking techniques are very effective, for the person performing a cable splice or termination, the dry technology means less mess. With the older, wet flooding compound, prepping a cable is "a greasy mess," says Terry L. Watts, an applications engineer at Siecor, a manufacturer of cable and enclosures in Hickory, N.C. "You get it all over your hands, all over your clothes and all over your tools."

Jerry Burrow, president of Fiber Optic Specialties Inc., in Merrillville, Ind., especially likes the user-friendly qualities and shorter prep time of the dry blocking. "All my guys love it," he says.

But, as with many new technologies, some view the dry fiber with caution. Skeeter Cope, upgrade project manager for Cable TV Arlington in northern Virginia, has used both types of fiber in the field. Regarding the dry technology, Cope, who's been in the business for more than 30 years, says he'd "like to see it in the field for a while" before trusting it.

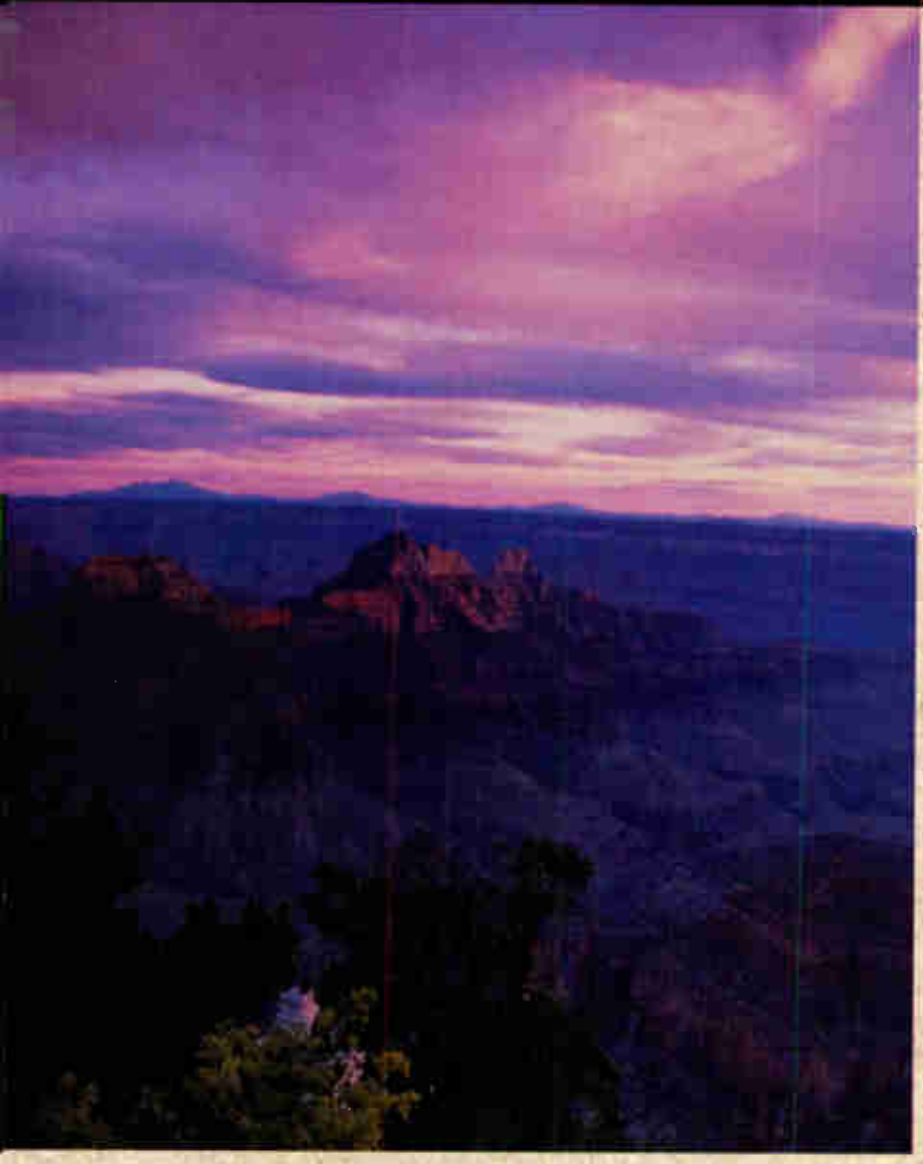
A splice of life

One of the most critical points in a cable network, and potentially vulnerable to water ingress, is a splice. Enclosing your splice properly is key to preventing water ingress, direct-buried or not.

With the relentless pace of technology, fiber networks now are more than ever being expanded and upgraded.

"Re-entry is becoming more and more commonplace," says Bob Whapham, a

Sometimes, smaller is better.



Introducing the COYOTE® RUNT, the closure that goes where others can't. The COYOTE family of fiber optic closures is proud to present its newest member. Under 15" long and designed for node applications in low-count fiber distribution networks, the COYOTE RUNT Closure offers a compact, low-cost closure for use in most environments. It accepts two cables with up to two drops, holds two 12-count splice trays and has two studs for external grounding. To learn how the COYOTE RUNT (or other members of the COYOTE Pack) can answer your call of the wild, call us at (440) 461-5200, or visit our Web site at **www.preformed.com** or e-mail us at **inquiries@preformed.com.**

PREFORMED LINE PRODUCTS

COYOTE®

RUNT CLOSURE

Goes wherever fiber optic cable takes you™

Reader Service Number 91

product manager at Preformed Line Products in Cleveland, Ohio.

This means easy access to cable splices is high on the priority list. Therefore, most splice boxes are put in vaults, on pedestals and in shallow hand holes, and the practice of direct-burying splices is diminishing. However, direct-burying splices still goes on for temporary repairs and often is done in residential areas where aboveground closures are impractical.

"Water can come from essentially three different directions: from within, from above and from below," says John Heery, an applications engineer at Siecor.

Humidity that is naturally present in the air when the closure is sealed can lead to condensation inside the closure with no breach of the seals. The quantities involved in this situation, however, are so minor as to be nearly meaningless.

Rainfall and drainage runoff is a source of water from above. Heery cites highway rights-of-way in particular, which are natural drainage areas for runoff and where optical cable and closures often are buried.

"If a significant amount of water freezes inside a closure where exposed fiber is present, the crushing forces of the ice could damage, and even break, the cable."

Water can reach a closure from below during what is known as "seasonal high water," literally the rising of the water table, typically because of snowmelt and heavy spring precipitation.

"A closure that is buried below four feet of completely dry soil in August may find itself immersed in saturated soil come the following April," says Heery.

Fortunately, splice enclosures these days are built to survive almost anything short of a nuclear blast and, when properly installed, are all but impervious to water penetration. The rigorous testing optical fiber enclosures must undergo to comply with Bellcore (now Telcordia) performance specification GR-771 ensures that this is so. Manufacturers subject closures to all manner of drop tests, impact tests, water immersion tests, thermal cycling from -40° F to +150° F for 30 days, and exposure to chemicals, among several other tests.

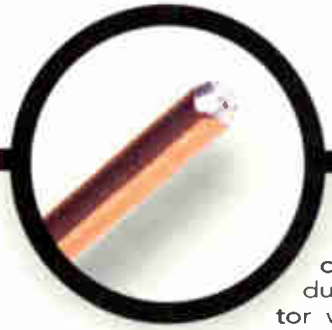
Even if water were to find its way into a splice enclosure, it usually is not in sufficient quantity to cause any harm. A worst-case scenario would involve severe cold. If a significant amount of water freezes inside a closure where exposed fiber is present, the crushing forces of the ice could damage, and even break, the cable.

Check it out

How do you know your closure is sealed tight? Many closures now come with built-in air valves for performing flash testing. This involves sealing a closure, filling it with 10 psi of compressed

Gotta get a Gator

Our Gator® Center Conductor Cleaner



As a manufacturer of cable installation tools, Ben Hughes/Cable Prep was approached by technicians and linemen throughout the industry to produce a center conductor cleaner. The prevailing factor was the need to eliminate cleaning the bonded dielectric from center conductors with knives or other scraping methods without causing installation problems. By listening carefully to the comments and suggestions offered, Cable Prep has responded with the Cable Gator.

There is a beveler that performs the pyramid cut to remove the burrs. If the center conductor burrs aren't removed, damage to the seizing mechanism of the connector can occur. Scoring of the copper-clad coating on the center conductor results in signal loss. In two easy steps the Gator bevels the center conductor and removes the bonded dielectric, leaving the cable perfectly prepared and ready for the connector. A perfect prep means no signal loss and no down time.

FEATURES

- Lifetime Warranty on Body
- Produces pyramid cut on center conductor
- Multiple blade surfaces
- Enhanced ergonomic handle
- 1-800-394-4046 on tool

A Ben Hughes Communication Products Company

207 Middlesex Ave., P.O. Box 373
Chester, Connecticut 06412 USA
Phone: 800-394-4046
Int'l: (01) 860-526-4337
Fax: (01) 860-526-2291

CablePrep®
Tools You Trust.™


Pocket TerminX


Hex Crimp


Armor Removal


Strip/Core

air, spraying soapy water along the seals and then waiting. If, after 10 to 20 minutes, any bubbles appear at the seals, you've got a leak and need to reseal the enclosure. Otherwise, you're good to go.

Cope likes to water-test enclosures before deploying them in the field. "We just seal them up and submerge them in water for a few days," he says. He also likes the training offered by manufacturers.

Beyond survivability, splice enclosures increasingly are being built for simplicity and ease of use. Permanent gaskets are replacing the mastic sealants of the past, which required cumbersome re-entry kits. Expandability often is built into closures as well, with future cable entry ports, all of which adds up to time and money saved.

Chris Goodwin is a contributing writer to "Communications Technology."

The Bottom Line

Keep Your Fiber Dry

Water is a fabulous substance—without it, life wouldn't be possible; however, water ingress can seriously degrade the health of a fiber network. Thus, we need good ways to keep this fabulous substance out of our lines.

Fiber-optic cable itself typically comes straight from the manufacturer sporting its own blocking technology. Traditionally, that's been a flooding compound, but dry blocking technologies are becoming more common.

Fiber splices are prime areas for water ingress because they lack the water blocking compounds present in the rest of the cable. A splice closure helps to cover this vulnerability. Always test the seals on your closure before deployment. Time spent performing flash tests means time and expense saved over having to go back and redo it after there's been a breach in the field because of faulty installation.

Rest easy. No matter where you deploy your splice enclosure—on a pole or in a hole—it should be fine, as long as you did everything right.

800-331-5997

TRAPS USED

TIERING
NEGATIVE
POSITIVE
HIGH PASS
LOW PASS

ALL USED PASSIVES ARE SWEPT BEFORE SHIPMENT

NEW and USED

TAPS & SPLITTERS

DE-SCRAMBLERS
STEREO & SAP
MODULATORS
PROCESSORS
RECEIVERS

OVER ONE MILLION PASSIVES IN OUR WAREHOUSE STOCK

1605 E. Iola
Broken Arrow, Ok 74012

TULSAT

800-331-5997

Fiber Lazers Reverse Transmitters Receivers

System Amp II's
550 Mhz
Singles w/ housing
new
$299

550-750 MHZ

SCIENTIFIC ATLANTA SYSTEM II
Triples
Duals
Singles
Quads

Nodes
550 Mhz
from
$449

LAZERS
450 mhz
550 mhz
750 mhz

450-550 MHZ

FEED FORWARD
&
POWER DOUBLING
Scientific Atlanta
C-Cor
Magnavox
Jerrold
Pathmaker

1605 E. Iola
Broken Arrow, Ok 74012

TULSAT

800-331-5997

Reader Service Number 97

Detecting Signal Leakage, Part 2

This month's installment continues a series on detecting signal leakage in the drop system. The material is adapted from a lesson in NCTI's Installer Technician Course. © NCTI.

It is possible to detect signal leakage at several locations in the drop system, seemingly anywhere between the customer's tap and the TV set. Because of the manner in which RF signals propagate along the drop sheath and through the air, any of these locations may cause the detector to read a peak leakage level, but not necessarily at the actual leakage source.

Because many signal leakage detectors can operate with differing sensitivity modes, you can isolate and precisely locate the source of the leak with a careful manipulation of the controls on the leakage detector and by following simple and logical procedures.

Isolating leakage

You can use a couple of different strategies for systematic leakage isolation. First, start at the customer's tap and disconnect the drop in question to confirm it as the leakage source.

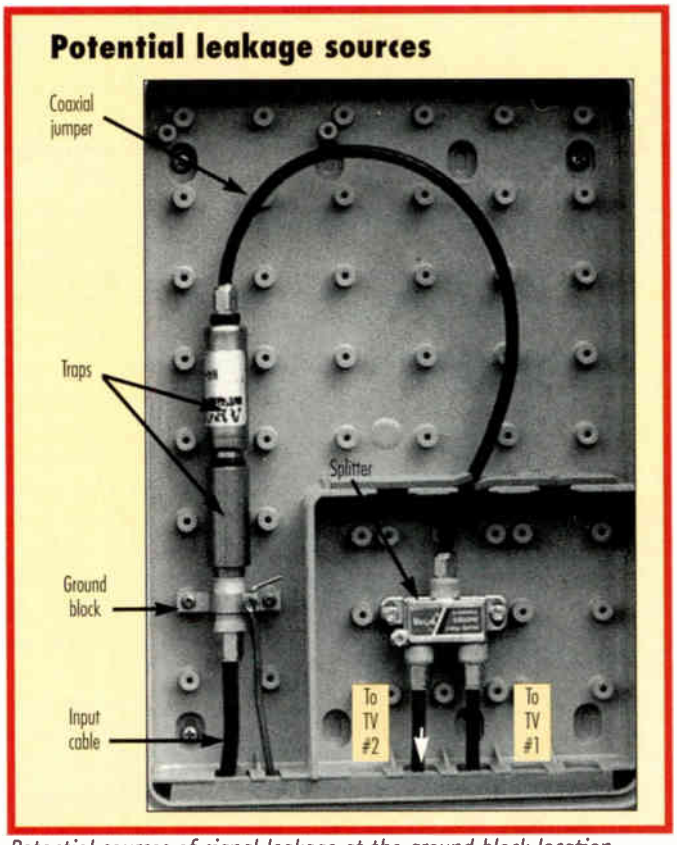
Next, after reconnecting the drop in question, work toward the customer's TV set, disconnecting each part of the drop system to test and eliminate it as a potential signal leakage source.

An alternative method effectively divides the drop system in half by starting at the ground block first. Having all signs of signal leakage disappear when the ground block output is disconnected eliminates the backward route toward the customer's tap as a source. Then you can systematically check the forward route from the ground block toward the customer's TV set.

This alternative method often can save time, especially in troubleshooting an aerial plant.

Detector controls

By adjusting the high/low detector controls for sensitivity, squelch and gain, the detector becomes more sensitive and accurate for further isolating the location of a signal leakage source.



Potential sources of signal leakage at the ground block location

For example, outside the customer premises, begin monitoring for signal leakage with settings on their highest levels (most sensitive). If you detect leakage, switch to progressively lower settings to isolate its source. When monitoring for signal leakage inside the customer premises, keep settings on low.

Once isolated, you can repair the leak or replace the suspect component. Check the manufacturer instructions and procedures to identify the detector controls and how to take advantage of specific leakage detector features.

Isolating leakage at the Ground block and splitter

When you detect signal leakage and isolate it to a customer's drop system, continue to further isolate for the source at the ground block location.

Initially, check for signal leakage coming from the ground block because of loose fittings or a damaged housing. (See accompanying figure.) Perform the same checks with splitters.

After verifying the integrity of F-connectors, ground block and/or splitter, one at a time remove all output drops from their ground block/splitter connections. Temporarily connect 75-ohm terminators on the empty ports. If the detector still indicates leakage, the aerial or underground service drop from the ground block/splitter back to the tap is the likely source, and you need to check it. TB

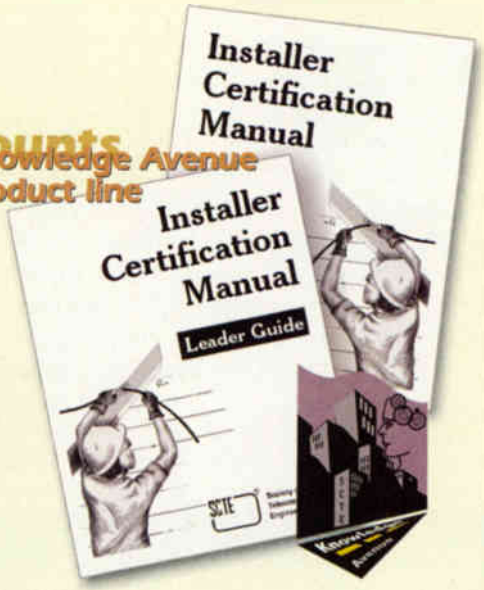
Next month's installment will continue with a systematic approach for isolating signal leakage sources in the drop system.

Invest in Your Staff

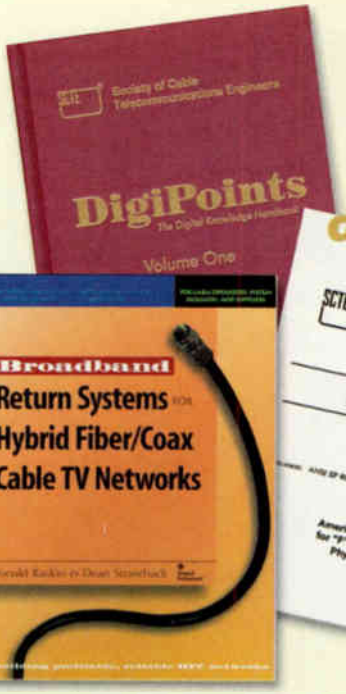
free & discounted industry magazine subscriptions

save $100 Conference on Emerging Technologies 2000 registration

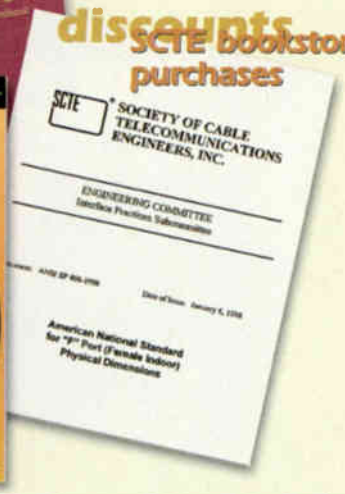
discounts Knowledge Avenue product line



save $100 Cable-Tec Expo 2000 registration



discounts SCTE bookstore purchases



free SCTE Membership Directory and Yearbook

free Interval, the monthly newsletter

$40 SCTE Membership= Benefits for Your Bottom Line

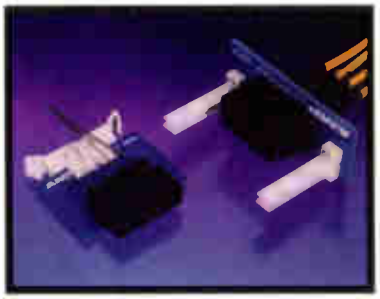
Call 800-542-5040 or visit www.scte.org for more information about SCTE membership.

Bandpass Filter

Microwave Filter Co. has introduced a new RF preselector bandpass filter, model 3278RF(3), for UHF applications. The unit offers three high-Q cavities providing less than 2 dB insertion loss over a 6 MHz operational bandwidth, although two- or four-cavity models also are available.

The filter achieves more than 15 dB rejection at +/-8 MHz from center frequency and more than 40 dB rejection at +/-22 MHz from center frequency. A minimum of 14 dB return loss is maintained in the passband. The filter can be tuned to any 6 MHz channel in the 470 MHz to 890 MHz range and comes in 50-ohm or 75-ohm configurations.

Reader Service #306



Fiber Connectors

Up to 48 multimode or single-mode fibers can be connected through a single housing with AMP's new quad LightRay MPX connector.

Designed for backplane applications, the system houses four MPX multifiber connectors and has float in all directions to provide better blind mating and eliminate backplane loading. Shutters also are provided with the unit for increased eye safety.

Reader Service #307

Notch Filter

Positive VHF superband and hyperband systems have a new notch filter for decoding video channels in the 216 MHz to 450 MHz range in Communications & Energy Corp.'s Model TXPTH-CH#. The encoded signal is attenuated at >50 dB with less than 3 dB loss on the same channel. Passband is 5 MHz to 750 MHz with a typical through loss of 1 dB. The device is available for VHF and NTSC Ch. 23 to 62, as well as harmonically related carriers (HRC), inverted or offset channel formats. Connectors are 75 ohm, type F in male or female.

Reader Service #312

Scan Converter

Communications Specialties' Scan Do Select system converts computer video signals up to 1,280 x 1,024 (at 60 Hz) to NTSC and phase alteration line (PAL) video in composite and Super-video outputs. The package provides 720-pixel-per-line sampling, as well as RS-232 control, image freeze, adaptive computer sync processing and a built-in color bar generator. Also featured are an input zoom processing system that increases resolution while zooming, a three-line flicker reduction system and an internal power supply.

Reader Service #308

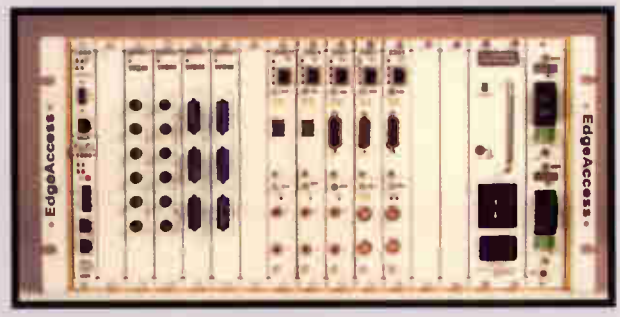
Fiber Connector Cleaner

Speer Fiber Optics' CLETOP fiber-optic cleaner cassette was developed by NTT Labs for use on the Japanese fiber network and now is available here.

The unit's function is somewhat similar to that of an audio cassette tape deck cleaner in that the cleaning material is held in a cassette in the form of tape on a spool, with each spool intended to offer about 450 cleanings.

The unit is designed to eliminate the need for alcohol, solvent, sprays and wipes. Two versions are available: one for FC, ST, SMA, D4 and DIN connectors, and another for MT and Biconic connector styles.

Reader Service #311



Network Systems

Canoga Perkins Corp. has added the Managed T1/E1 modem and λAccess Model 6002 WDM (wavelength division multiplexing) unit to its Universal Chassis System. The Managed Modem is standards-compliant and uses a minimum number of switches and jumpers. Menu-driven screens offer end-to-end configuration, status and control with remote access through an external modem. The 6002 WDM is a passive device that combines 1,310 nm and 1,550 nm wavelengths over a composite single-mode fiber pair, or 850 nm and 1,310 nm wavelengths over multimode fiber. In the single-mode version, two-stage optical filtering and a new counter-directional design eliminates interference between data streams.

Reader Service #305

Optical Receivers

Epitaxx Inc. has developed a new line of 10 Gbps receivers for long-haul and metropolitan dense wavelength division multiplexing (DWDM) applications, as well as single-channel synchronous optical network/synchronous digital hierarchy (SONET/SDH) services.

The units also can be used for short- and long-haul interfaces to other routers, central offices or a DWDM backbone. Sensitivity range is -16 dBm to -26 dBm, typical bandwidth is 10 GHz, and transimpedance gains range from 200 ohms to 2,000 ohm with a standard SMA-compatible output connector, all intended to simplify the interface design to the processing electronics.

The devices use a proprietary photodetector along with custom compound integrated circuits (ICs) based on Gallium Arsenide (GaAs) and silicon Germanium (SiGe) technologies. The optical receivers are packaged in hermetically sealed modules to comply with Bellcore reliability standards.

Reader Service #309

BNC/Switch Connector

The new line of 75-ohm bayonet nut coupling (BNC)/switch coaxial connectors from Amphenol offers a bulkhead, right angle BNC receptacle connector with an integrated switch that actuates when a BNC plug is mated to the unit. If necessary, the connectors can be launched directly from a circuit board to a chassis port to provide a shielding signal and an isolated ground signal for data, video and telecommunications equipment. Their primary use is in systems that require signals to be routed back to a personal computer (PC) board when the port is not in use.

Reader Service #310

Metallic TDR

The Model 1270A combination metallic time domain reflectometer (TDR) from Riser-Bond Instruments combines the sensitivity and length readability of coax TDRs with the multiple testing modes of twisted-pair units. The 1270A holds front panel bayonet nut coupling (BNC) and Banana Jack connectors and boasts a sub-nanosecond pulse width for finding numerous small faults or high frequency problems. Also on tap are a larger liquid crystal display (LCD), a pop-up menu system and an autosearch mode.

Reader Service #304

Surface-Mount RF Couplers

Pulse Engineering has introduced a new series of 75-ohm RF directional couplers intended for use in high-volume applications such as set-tops, line amps and headend gear.

The series of eight devices has an operating bandwidth of 5-900 MHz and temperature range from -40°C to +85°C. Typical mainline loss ranges from 0.8-1.6 dB, with a minimum isolation of 18 dB. The A5800 series is internally terminated, and the A5900 series is externally terminated.

Reader Service #303

The following lists some of the resources currently available by mail order through the Society of Cable Telecommunications Engineers. The prices listed are for SCTE members only. Nonmembers should contact the Society for additional pricing information.

- *CATV System Fundamentals Trainer's Package*—Knowledge Avenue presents the basics of cable TV systems. The package includes the *Cable Television* textbook, nine leader guides and seven VHS videotapes. Order P-125, $695.
- *CATV System Fundamentals Student Workbook Package*—Designed to work hand-in-hand with the *Fundamentals* trainer's package, these nine corresponding student workbooks and the *Cable Television* textbook are included in this package to help increase industry personnel's day-to-day effectiveness. Order P-126, $94.
- *CATV System Impairments Trainer's Package*—These Knowledge Avenue materials are designed to help determine acceptable ranges and identify and correct cable TV problems. The package includes seven leader guides and eight VHS videotapes. Order P-127, $564.
- *CATV System Impairments Student Workbook Package*—Seven student workbooks corresponding to the *Impairments* trainer's package also are available to help personnel improve the service delivered to subscribers. Order P-128, $45.
- *Designing CATV Systems Trainer's Package*—Knowledge Avenue has designed components to help combat environmental wear and tear on a system, both urban and rural, with modern technology. This package includes 10 leader guides and five VHS videotapes. Order P-129, $616.
- *Designing CATV Systems Student Workbook Package*—These 10 student workbooks on systems, power supply and two-way design were created to work with the trainer's package and also are available to facilitate training. Order P-130, $64. CT

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.

To order: All orders must be prepaid. Shipping and handling costs are included in the continental U.S. All prices are in U.S. dollars. SCTE accepts MasterCard and Visa. To qualify for SCTE member prices, a valid SCTE identification number is required, or a complete membership application with dues payment must accompany your order. Orders without full and proper payment will be returned. Send orders to: SCTE, 140 Philips Rd., Exton, PA 19341-1318 or fax with credit card information to (610) 363-5898.

CALENDAR

September

7: Sam Houston Area Society of Cable Telecommunications Engineers Chapter vendor show. Contact William Bartley (713) 895-1214, bart1214@aol.com, www.scte.org/shmg/sctefm/htm

9: SCTE Satellite Tele-Seminar Program Galaxy 1R, Transponder 14, 2:30-3:30 p.m. ET. Topic: "Terminal Devices." Contact SCTE headquarters, Janene Martin, (610) 363-6888, ext. 226, jmartin@scte.org

11: Penn-Ohio SCTE Chapter testing session, Butler, Pa. BCT/E certification examinations to be administered. Contact Michael Giobbi, (724) 283-0925, mgiobbi@agoc.com, www.scte.org/penn-ohio/

14: IPS Test Procedures Working Group standards meeting, Time Warner Cable, Englewood, Colo., 8:30 a.m.—5 p.m. Chairman: Dave Franklin. Contact Dr. Ted Woo at (610) 363-6888.

15: Interface Practices Subcommittee standards meeting, Time Warner Cable, Englewood, Colo., 8:30 a.m.—5 p.m. Chairman: Brian James. Contact Dr. Ted Woo at (610) 363-6888.

16: Greater Chicago SCTE Chapter technical seminar, Holiday Inn, Willowbrook, Ill. Topic: "DOCSIS and IP Telephony." Contact Jim Beletti, (630) 871-2727, beletti.jim@tci.com, www.scte.org/chicago/gccscte.htm

21-22: Kentucky Cable Telecommunications Association fall membership meeting, Holiday Inn, Bardstown, Ky. Call Randa Wright at (270) 864-5352.

24: Oklahoma SCTE Chapter testing session, Multimedia Cablevision registration office, Edmond, Okla. BCT/E certification examinations to be administered. Contact Steve Johnson, (405) 422-2346, sjohnson@cvvt.org, www.scte.org/oklahoma/

28: Convergence '99, Westin Hotel, Santa Clara, Calif. Call (831) 643-2222. CT

Planning Ahead

Oct. 12-14: Atlantic Cable Show, Baltimore. Call (609) 848-1000.

Oct. 12-14: Mid-America Show, Overland, Kan. Call (785) 841-9241.

Nov. 10-11: OSP Expo '99, Fort Worth Convention Center, Fort Worth, Texas. Call (847) 639-2200.

Dec. 14-17: Western Cable Show, Los Angeles. Call (510) 428-225.

Jan. 11-13: SCTE Conference on Emerging Technologies 2000, Anaheim, Calif. Call (610) 363-6888.

Feb. 23-25: 40th Anniversary Texas Show, San Antonio Convention Center, San Antonio. Call (512) 474-2082.

VENDOR CONNECTION

Vendor Connection is *Communications Technology's* resource for up-to-date information on the industry's leading technology suppliers. These vendors have advertised in this issue. Check their ads for products and services that will improve your cable system's reliability, efficiency and capacity.

Alpha Technologies

3767 Alpha Way
Bellingham, WA 98226
(360) 647-2360; Fax (360) 671-4936
www.alpha.com
Baily Shewchuk
Alpha Technologies is a world leading manufacturer of application specific powering solutions for voice, video and data communication systems. Alpha's products include: UPSs, line conditioners, surge suppressors, batteries, and accessories.
Reader Service #2

AML Wireless Systems

260 Saultreaux Crescent
Winnipeg, MB R3J 3T2
(204) 949-2400; Fax (204) 949-5458
www.amlwireless.com
Wendy Lenton
info@amlwireless.com
AML Wireless Systems provide voice, video and data communications in digital or analogue, in multiple frequency plans and two-way capabilities.
Reader Service #33

ANADIGICS

35 Technology Drive
Warren, NJ 07059
(908) 668-5000; Fax (908) 668 5132
www.anadigics.com
mktg@anadigics.com
Tim Blanke
ANADIGICS is the leading worldwide supplier of GaAs ICs for the global communications markets.
Reader Service #79

Avantron Technologies

8596 Pix IX Blvd.
Montreal, Quebec H1Z 4G2
(800) 297-9726; Fax (514) 725-5637
www.avantron.com
info@avantron.com
Bernie Cadieux
Avantron manufactures test equipment for the cable TV Industry. With innovative low-cost high-quality products like the AT2000R Spectrum Analyzer, Avantron is making it possible for a large number of field technicians to have the tools they need to solve today's challenges.
Reader Service #29

BARCO

3240 Town Point Drive
Kennesaw, GA 30144
(770) 590-3600; Fax (770) 590-3610
www.barco.com
info.na.bcs@barco.com
Dianne Edwards
BARCO hardware and software improves the quality and reliability of signal delivery BARCO CATV equipment incorporates advanced capabilities to remotely monitor and control signal distribution system-wide, maximizing up-time and subscriber satisfaction.
Reader Service #65

Blonder Tongue Laboratories

1 Jake Brown Road
Old Bridge, NJ 08857
(732) 679-4000; Fax (732) 679-4353
www.blondertongue.com
cpalle@blondertongue.com
Emily Nikoo (732) 679-4000, Ext. 213
For over 40 years, Blonder Tongue Laboratories, Inc. has been manufacturing professional quality, commercial cable television products. Products include: Reception, Headend, Microwave, Analog & Digital Distribution, Fiber Optics, Interdiction, Test Equipment, Residential and Specialty Equipment.
Reader Service #28

C-COR Electronics

60 Decibel Road
State College, PA 16801
(814) 238-2461; (800) 233-2267
Fax (814) 238-4065
www.c-cor.com
Sally Thiel, Manager, Corporate Communications
C-COR provides products and support to customers as they plan, design, build and maintain complex broadband communications networks, including Internet access with 7/24 Help Desk and Network Operations Center (NOC) services. The company is a global supplier of robust, high quality distribution electronics, network management systems and technical services for two-way HFC networks. CATV distribution equipment includes the full-line of FlexNet® RF and NAVICOR(tm) AM products to 860 MHz. Comprehensive customer services include network design, technical field support and internet-enabling solutions.
Reader Service #48, 84

Cable AML

3427 W. Lomita Blvd.
Torrance, CA 90505-5010 USA
(702) 363-5660; Fax (702) 363-2960
www.cableaml.com;
sales@cableaml.com
Norman F. Woods
Cable AML is the leading provider of broadband, multichannel microwave systems. We manufacture a full line of AM/FM/Digital transmitters, receivers, and repeaters for AML, STL, MMDS, and LMDS applications.
Reader Service #18

Cable Innovations

130 Stanley Court
Lawrenceville, GA 30245
(800) 952-5146; Fax (770) 962-6133
www.cableinnovations.com
Nick Haralson
Haralson@rightmove.com
Cable Line, drop line, and power line surges suppressors. Including the CLPS-3009PI, DLPS-15D and PLS-125. And new from Cable Innovations the UHB-2001 Universal House Box.
Reader Service #100

Cable Leakage Technologies

1200 Executive Drive E. #136
Richardson, TX 75081
(972) 907-8100; Fax (972) 907-2950
www.wavetracker.com
Perry Havens
phavens@wavetracker.com
CLT inventors of automated positional leakage analysis test tools of software for the cable telecomm industry.
Reader Service #58

Cable Prep

A Ben Hughes Communication Products Co.
207 Middlesex Ave.
Chester, CT 06412 USA
(800) 394-4046; (860) 526-4337
Fax (860) 526-2291
www.cableprep.com
toolmaker@cableprep.com
Cable Prep designs and manufactures a full line of hand tools for the broadband industry. New Products include the GATOR for center conductor cleaning, it makes your final preparation a snap. Product line includes the Strip/Core and Jacket Strip Tools for all major coaxial cables; CPT coaxial stripping tools for drop cables 6, 59, 7 and 11; Hex Crimp Tools and accessory items. To find out more information about Cable Prep products please call 800-394-4046. Write or fax us for a full product line catalog All products available through your distributor.
Reader Service #94

Cable Resources

85 "M" Hoffman Lane
Islandia, NY 11722
(800) 537-9995; Fax (516) 234-4436
Maura O'Riordan
Cable Resources offers a new line of test equipment to maintain return networks in the cable TV environment. Simple and easy to implement, the RDU shows the big picture; ingress, noise and carrier levels for real-time analysis of 5-40 MHz return networks.
Reader Service #51

CableServ Electronics Ltd.

1020 Lawrence Ave. W., Suite 201
Toronto, Ontario, Canada M6A 1C8
(800) 668-2033
www.cableserv.com
inquiries@cableserv.com
Ray Hladysh
CableServ Electronics Ltd. is the leader in forward and reverse path upgrade solutions. Our patent pending 5-40 hybrid equipped drop-in reverse amplifiers, along with a full range of CATV accessories for G.I., Phillips and S.A. provides cable operators cost effective alternatives to costly system rebuilds. CableServ also offers a wide range of new and refurbished actives & distribution equipment.
Reader Service #23

Carson Industries

1160 Nicole Court
Glendora, CA 91740
(800) 735-5566; (909) 592-6272
Fax (909) 592-7971
cdtsales@aol.com
C. Dean Taylor
Manufacturer of structural foam plastic products including grade level boxes and vaults.
Reader Service #83

Cheetah Technologies

2501 63rd Ave. E.
Bradenton, FL 34203

(941) 756-6000; Fax (941) 758-3800
www.cheetahtech.com
Gordon Greenfield
gordon.greenfield@cheetahtech.com
Through its internationally established Cheetah product line, Cheetah Technologies provides broadband status and performance monitoring solutions to world leaders in cable TV and telecommunications.
Reader Service #1

Com21

750 Tasman Drive
Milpitas, CA 95035
(408) 953-9100; Fax (408) 953-9299
www.com21.com
info@com21.com
Susie Bodine (408) 953-9735
Com21, Inc. designs, develops, markets and sells value-added, high-speed communications solutions for the bnraodband access market. Com21's products include headend equipment, DOCSIS/MCNS and ATM-based subscriber cable modems, network management software and noise containment technologies.
Reader Service #53

CommScope

P.O. Box 1729
Hickory, NC 28602
(800) 599-9265; Fax (828) 459-5099
www.commscope.com
Gina Foy
Coaxial and Fiber Optic cables featuring New Power Feeder, Cable-in-Conduit, PIII, QR, and a complete line of drop cables including several available in EZ-PAK packaging.
Reader Service #22, 66

Digicomm International

7600 South Vaughn Court
Englewood, CO 80112
(303) 799-3444; Fax (303) 799-9366
www.digicommintl.com
sales@digicommintl.com
Rob Donziger
Distributor of excess new inventory for the CATV industry: Scientific Atlanta, General Instruments, Gilbert, LRC, Regal, etc.
Reader Service #67

Digitrans

15302 Bolsa Chica St.
Huntington Beach, CA 92649
(714) 890-8544; Fax (714) 891-2103
www.digitransusa.com
Clayton Dore; cdore_dte@ibm.net
Reader Service #14

Ditel

913 22nd St. PL SE
Hickory, NC 28602
(828) 328-5640; Fax (828) 324-4738
www.ditel.net
Michael Mattei (516) 979-2994
Ditel is dedicated to the design, development and manufacture of passive fiber optic components and hardware. Ditel currently manufactures a complete line of fiber optic splice holders, splice trays, fusion splice protection sleeves, indoor and outdoor splicing enclosures, termination closures, high-performance cable assemblies, the patent pending Lightrax® Fiber Optic Raceway System and the patented Fibertray® Plenum Raceway System.
Reader Service #47

DX Communications

A Division of Itochu Cable Services
1143 W. Newport Center Drive
Deerfield Beach, FL 33442
(888) 293-5856; Fax (954) 427-9688
www.ics-cable.com/dx_communications.htm
Ken Mosca
kmosca@ics-dx.com
Manufacturer of quality headend equipment. Products include digital satellite receivers, IRDs, satellite receivers, agile modulators, stereo encoders, combiners, FM modulators, LNBs and accessories.
Reader Service #17

Electroline Equipment

8265 St-Michel Blvd.
Montreal, Quebec
Canada, H1Z 3E4
(514) 374-6335; Fax (514) 374-9370
www.electrolinequip.com; info@electrolinequip.com
Joanne Fortin (514) 374-6335, ext. 449
An international leading designer, manufacturer and distributor of integrated solutions for the telecommunications and cable industries, Electroline Equipment Inc. will feature the Test Point Selector which, combined with the CLEARPath product, locates reverse path ingress, the Retro-Plate line, which turns existing passive taps into addressable ones, the EDA downstream and ERA upstream drop amplifiers and the Addressable Tap Systems, which allow instant activation and termination of service to cable subscribers.
Reader Service #109

General Instrument Corp.

101 Tournament Drive
Horsham, PA 19044
(215) 323-1000; Fax (215) 956-6497
www.gi.com
Geoff Roman, Sr. Vice President
General Instrument is the world leader in analog and digital systems that provide video, audio and high-speed Internet/data services over cable and satellite television networks.
Reader Service #39

Harmonic

549 Baltic Way
Sunnyvale, CA 94089
(800) 788-1330; (408) 542-2500
Fax (408) 542-2511
www.harmonicinc.com
info@harmonicinc.com
John Dahlquist
Harmonic is a worldwide supplier of highly integrated fiber optic transmission, digital headend and element management systems for the delivery of interactive services over broadband networks.
Reader Service #61

Hewlett-Packard Co.

Service Test Division
2 Robbins Road
Westford, MA 01880
(978) 266-3300; Fax (978) 266-3350
www.hp.com
Peter Harper (978) 266-3358
peter_harper@hp.com
Hewlett-Packard's Service Test Division is responsible for developing hand-held and light portable instruments for testing the new broadband telephony services used in the local loop.
Reader Service #77

Hewlett-Packard Co.

Test and Measurement Organization
P.O. Box 50637
Palo Alto, CA 94303-9511
(800) 452-4844, ext. HPTV
Fax (303) 754-4990
hp.com/go/catv
hpcatv@aol.com
Hewlett-Packard Co. offers a comprehensive range of test equipment to keep your broadband system at peak performance—from manufacturing through the headend and into plant maintenance.
Reader Service #78

Hukk Engineering

3250-D Peachtree Corners Circle
Norcross, GA 30092
(888) 236-8948; (770) 446-6086
Fax (770) 446-6850
Gene Faulkner
gene.faulkner@hukk.com
Hukk Engineering manufactures digital test equipment for the CATV Industry. This equipment gives bit error rates and other tests for QAM and QPR digital services.
Reader Service #15

IMAKE Software & Services

6700 Rockledge Drive, Suite 101A
Bethesda, MD 20817
(301) 896-9200; Fax (301) 897-2130
www.imake.com
Nancy Simon; (301) 896-9234
nsimon@imake.com
IMAKE delivers custom software development, systems integration services and products to the digital world with expertise in Internet, cable, satellite and telephony delivery systems. Front and back office support specialists.
Reader Service #45

Lectro Products

8380 Capitol Blvd.
Raleigh, NC 27616
(919) 713-5300; Fax (919) 713-5350
www.powerware.com
lectro@powerware.com
Rick Marcotte
Lectro CATV Powering Systems ensure cable television network uptime through an integrated approach to both standby and non-standby solutions. Latest Lectro CPR(tm) Powering System combines more compact design, time-proven Line Interactive Ferro Topology (LIFT(tm)), 3-levels of status monitoring, and Advanced Battery Management (ABM(tm)) when used with the new Lectro CPR 5-Year Long Life Batteries. The Lectro(tm) line of cable-TV (CATV) powering solutions is manufactured and supported by the INVENSYS Energy Systems Group, and ISO 9001 supplier.
Reader Service #N/A

Lemco Tool Corp.

RR2 Box 330A
Cogan Station, PA 17728
(800) 233-8713; Fax (717) 494- 0860
www.lemco-tool.com
lemco@mail.csrlink.net
Michael R. Miller (714) 494-0620
Drop installation tools include: CLI preventing torque wrenches; hard-line coaxial splicing tools perform one-step cable preparation; Aerial construction tools for safe and productive system deployment.
Reader Service #82

Lindsay Electronics

50 Mary St. W.
Lindsay, ON K9V 4S7
(705) 324-2196; Fax (705) 324-5474
From USA (800) 465-7046
www.lindsayelec.com
sales@hq.lindsayelec.com
David Atman
Focused on the last mile, our revolutionary new technology creates communication equipment to solve system problems before they become subscriber problems. This is achieved through applied ISO continuous improvement disciplines, innovation, and strict attention to details.
Reader Service #69

Lode Data Corp.
7120 E. Hampden Ave.
Denver, CO 80224
(303) 759-0100; Fax (303) 759-0214
www.lodedata.com
Mike Springer Mikes@lodedata.com
Mary Garcia Maryg@lodedata.com
Lode Data Corp. produces software used for CATV design and drafting. Our software's speed, power, flexibility, and accuracy combine to create the most effective production design and drafting programs available.
Reader Service #44

Lucent Technologies
600 Mountain Ave.
Murray Hill, NJ 07974
(877) 534-9182; Fax (908) 582-7419
www.lucent.com/cableconnect
Gail Logan (908) 582-5311
A leader in global communications with 126 years of networking experience, Lucent's cable solutions offer delivery of full telephony voice, data and video over a single cable connection, including hardware and software support.
Reader Service #37

Main Line Equipment
20917 Higgins Court
Torrance, CA 90501
(800) 444-2288; (310)-715 6518
Fax 888-4-mainline (310) 715-6675
www.mle.com
mainline@worldnetatt.net
Mark Lipp
Buy, sell and distribute, new, excess, and refurbished fiber optics, active electronics, converters, and passives. We manufacture a complete line of replacement pads, equalizers and plug-ins for most major manufacturers that meet or exceed original factory specifications.
Reader Service #32

MEGA HERTZ
6940 S. Holly Circle, Suite 200
Englewood, CO 80112
(303) 779-1717; (800) 525-8386
Fax (303) 779-1749
www.megahz.com
stevegrossman@megahz.com
Steve Grossman
MEGA HERTZ represents or distributes; off air or satellite antennas; character generators; commercial insertion products; emergency alert systems; fiber Tx/Rx; stand-by generators; headend electronics; satellite electronics; stereo processors; test equipment; custom traps and filters.
Reader Service #10, 12, 21, 27, 30, 38, 52, 54, 60, 71, 73, 76, 81, 96, 102

Molex Fiber Optics
5224 Katrine Ave.
Downers Grove, IL 60514
(630) 512-8750; Fax (630) 512-8777
Renee Mousavi
Molex Fiber Optics, Inc. a leading worldwide supplier of fiber optic products, offers a full range of active and passive solutions, serving the CATV, Telecommunication and Data-communication markets.
Reader Service #

Moore Diversified Products
1441 Sunshine Lane
Lexington, KY 40505
(606) 299-6288; Fax (606) 299-6653
www.MooreDP.com
mooredp.com
Gia Phelps and Bob DeMuth
Moore diversified Products, Inc. is a manufacturer of metal and plastic products that store, organize and protect fiber optic and coaxial cable in outside plant construction.
Reader Service #59

Multilink
580 Ternes Ave.
Elyria, OH 44035
(440) 366-6966; Fax (440) 366-6802
www.multilinkinc.com/multilinkinc
mulink@ix.netcom.com
Steve Kaplan
Multilink is a leading manufacturer of cable television supplies. Multilink manufactures plastic enclosures, metal enclosures, and splice closures as well as fiber optic, and telecommunications products.
Reader Service #110

National Cable Television Institute (NCTI)
801 W. Mineral Ave.
Littleton, CO 80120
(303) 797-9393; Fax (303) 797-9394
www.ncti.com
Yolanda Gonzales
30 Years as a leader of independent broadband training with comprehensive distant learning courses. Technical & non-technical courses available.
Reader Service #40

Nortel Networks
5405 Windward Parkway
Alpharetta, GA 30004
(770) 708-4000; Fax (770) 708-4434
www.nortelnetworks.com
cheatham@nortelnetworks.com
Brian White, VP of Sales
Nortel Networks delivers value to customers around the world through Unified Networks solutions, spanning mission-critical telephony and Internet Protocol (IP)-optimized networks. Customers include public and private enterprises and institutions; Internet service providers; local, long-distance, cellular and PC communications companies, cable television carriers, and utilities.
Reader Service #70

Panduit Corp.
17301 Ridgeland Ave.
Tinley Park, IL 60477-3091
(708) 532-1800; (888) 506-5400
Fax (708) 532-1811
www.panduit.com
info@panduit.com
Mark Armamentos
Reader Service #26

PCI Technologies
20-520 Westney Road S.
Ajax, ON L1S 6W6
(800) 565-7488; Fax (905) 427-1964
www.pcitech.org
sales@pcitech.org
Erin Kusluski (800) 565-7488, ext. 234
Designs/manufactures innovative products for the telecommunications industry with the best price-to-performance ratio available. Bandpass, Channel Deletion, and Diplex Filters, Test Equipment, Traps, custom designed filters, Accessories, and Splitting/Combining Networks.
Reader Service #56

PDI-Electronics for Telecommunications
6353 W. Rogers Circle #6
Boca Raton, FL 33487
(561) 998-0600; Fax (561) 998-0608
www.pdi-eft.com
PDI.Electronics@worldnet.att.net
Jonathan Edelman (561) 998-0600
PDI manufacturers and distributes every product that any type of cable system may need. From high tech headend products to passives and tools, PDI has it all.
Reader Service #9

Power & Telephone Supply Co.
2673 Yale Ave.
Memphis, TN 38112
(901) 320-3080; Fax (901) 320-3082
www.ptsupply.com
Mary Bowen
Provides material distribution services to the communications, network, and CATV industries. Full-line stocking of cable, fiber optics, hardware tools, and CATV industries.
Reader Service #99

Preformed Line Products
P.O. Box 91129
Cleveland, OH 44101
(440) 461-5200; Fax (440) 442-8816
www.preformed.com
Michelle Weninger
Preformed Line Products is a leading supplier of high quality cable anchoring and control hardware and systems, overhead and underground splice cases, and fiber optic splicing and high speed cross-connect devices. Serving electric power utility, communications and CATV customers worldwide.
Reader Service #91

Quality RF Services
850 Parkway St.
Jupiter, FL 33477
(800) 327-9767; Fax (561) 744-4618
www.qrf.com, sales@qrf.com
Jerry K. Thorne
Quality RF Services manufactures RF amplifiers and equalizers for bandwidth upgrades of CATV systems, laser drivers and isolation amplifiers for the Headend, high-quality amplifiers for the MDU, hotel/motel industry and the home. CATV repair service is our specialty.
Reader Service #43

R.L. Drake Co.
230 Industrial Drive
Franklin, OH 45005-4496
(513) 746-4556; Fax (513) 743-4510
www.rldrake.com
Andy Ruffin, Sales Manager
CATV@rldrake.com
The R.L. Drake Co. is a prime manufacturer of CATV headend products featuring a broad assortment of modulators, demodulators, channel processors, combiners, satellite receivers, signal level meters, and related products. Drake has manufactured communications products for numerous markets for over 55 years.
Reader Service #19

Riser-Bond Instruments
5101 N. 57th St.
Lincoln, NE 68507
(800) 688-8377; Fax (402) 466-0967
www.riserbond.com
John Rasmus (402) 466-0933
jrasmus@riserbond.com
Riser-Bond Instruments is a leader in manufacturing TDRs with unique and exclusive features to quickly and easily locate and identify faults and conditions in any metallic two conductor cable.
Reader Service #50

Sadelco
75 W. Forest Ave.
Englewood, NJ 07631
(800) 569-6299; International (201) 569-3323
Fax (201) 569-6285
www.sadelco.com
sadelco@aol.com
Mr. Leslie Kaplan, V.P.
Designs and manufacturers signal level meters and calibrators.
Reader Service #101

Siecor Corp.
P. O. Box 489
Hickory, NC 28603-0489
(828) 327-5000; Fax (828) 327-5973
www.siecor.com; info@siecor.com
Lisa Crawford (828) 327-5378
Siecor, recognized as a telecommunications technology leader, specializes in the development of fiber optic cables, interconnect hardware, connectors, cable assemblies, splicing and test equipment as well as training programs for voice, data and video communications applications.
Reader Service #55

The Siemon Co.
76 Westbury Park Road
Watertown, CT 06795
(860) 274-2523; Fax (860) 945-4225
www.siemon.com
Katherine Karter (860) 945-4380
The Siemon Co. is a world-class manufacturer of telecommunications cabling systems. The Siemon Cabling Systems provides standards-based structured cabling for voice, data, and image technologies. High performance products for UTP, ScTP, optical fiber and coaxial cabling, combined with a global network of certified installers, enable The Siemon Cabling System to support both current and emerging networking applications including TP-PMD, 100BASE-T, Gigabit Ethernet, and 155Mb/s and 622Mb/s ATM. ISO 9001 and 9002 certified.
Reader Service #36

Silicon Valley Communications
3515 Monroe St.
Santa Clara, CA 95051
(408) 247-3800; Fax (408) 247-8689
www.svci.com, sales@svci.com
Ed Feghali (408) 245-8800
Silicon Valley Communications, Inc. offers the most comprehensive line of optical transmission products including 1310 and 1550 nm transmitters, high performance optical amplifiers, indoor/outdoors receivers, and Network Management System.
Reader Service #31

Standard Communications Corp.
P.O. Box 92151
Los Angeles, CA 90009-2151
(310) 532-5300; Fax (310) 532-7647
www.standard@standardcomm.com
Bob Cunningham
Standard Communications Corp. is a global manufacturer of complete cable system solutions offering analog and digital satellite receivers, frequency agile modulators, BTSC generators, and the STRATUM Modulation System.
Reader Service #7

Stanford Telecom
480 Java Drive
Sunnyvale, CA 94089
(408) 745-2685; Fax (408) 541-9030
www.stanfordtelecom.com
William Patton
Bill.Patton@stelhq.com
Stanford Telecom produces modulator and demodulator ASICS and assemblies for transmission and reception of return path data in HFC systems. Included is a subscriber modem modulator/demodulator in HFC systems. Included is a subscriber modem modulator/demodulator on one chip.
Reader Service #34

Telecrafter Products
12687 W. Cedar
Lakewood, CO 80228
(800) 257-2448; Fax (303) 986-1042
mail@dropsupplies.com
Ronnie Cox and Jim Marzano
Supplier of drop installation products for CATV, DBS, and wireless operators, including drop cable fastening products for single or dual cable, cable identification markers, residential enclosures, and more.
Reader Service #4, 8

TeleWire Supply
94 Inverness Terrace E.
Englewood, CO 80112
(1) 88-TELEWIRE; Fax (303) 643-4797
www.telewiresupply.com
Mark Howard
TeleWire Supply is ANTEC Corp.'s logistics and distribution channel. A leading international supplier of products needed to build and service a broadband communications network.
Reader Service #5

Terayon Communication Systems
2952 Bunker Hill Lane
Santa Clara, CA 95054
(408) 727-4400; Fax (408) 727-6205
www.terayon.com
John Hamburger
Terayon's S-CDMA-based cable modem systems deliver fast and cost-effective two-way data services over any cable plant. Their advanced QoS capability supports both business and residential data services.
Reader Service #3

Tii Industries
1385 Akron St.
Copiague, NY 11726
(516) 789-5000; Fax (516) 789-5063
www.tii-industries.com
C. J. Meyerhoefer (516) 789-5000, ext. 419
Tii is a manufacturer of lightening and surge protection products for the CATV, telecom, data, AC, and wireless industries.
Reader Service #85

Toshiba
9740 Irvine Blvd.
Irvine, CA 92618
(949) 583-3000; Fax (949) 583-3597
www.internet.toshiba.com
fred.berry@tais.toshiba.com
Fred Berry
Toshiba offers MCNS modems and MCNS gateway solutions, plant and market analysis, system design, installation and maintenance. Toshiba's systems are operating in 6 major markets actively servicing over 12,000 cable subscribers.
Reader Service #16

Trilithic
9202 E. 33rd St.
Indianapolis, IN 46236
(800) 344-2412; Fax (317) 895-3613
www.trilithic.com
Bob Jackson (317) 895-3600, ext. 152
bjackson@trilithic.com
Trilithic designs and manufacturers: Portable HFC test equipment; ingress monitoring systems; EAS compliance systems; RF and microwave components.
Reader Service #24, 57

Tulsat
1605 E. Iola
Broken Arrow, OK 74012
(800) 331-5997; Fax (918) 251-1138
Mark Schumacher and David Chymiak
Tulsat is stocking distributor for Blonder Tongue, Drake and California Amplifier. 70,000 Square feet of complete repair facility and warehousing. Refurbished headend and line equipment, taps, traps, pin connectors and cable.
Reader Service #35, 97

TVC Communications
800 Airport Road
Annville, PA 17003
(800) 233-2147; Fax (717) 838-3432
www.tvcinc.com
tvcinc@aol.com
Stephanie Musto
TVC Communications is a full-line distributor for all the products needed to build and maintain your telecommunications network. TVC delivers the future of communications today.
Reader Service #62, 64

Tyton Hellermann
7930 N. Faulkner Road
Milwaukee, WI 53224
(800) 822-4352; Fax (414) 355-7341
www.tytonhellermann.com
tyton@tytonhellermann.com
Terry Tuttle (414) 355-1130
A global manufacturer of a wide range of cable management products including the NEW CableTyte fiber splice closure line which offers efficient, easy to install solutions for protecting fiber splices.
Reader Service #88

Unique Broadband Systems
181 Don Park Road
Markham, ON L3R 1C2
(905) 474-0091; Fax (905) 474-1563
www.uniquesys.com
sale@uniquesys.com
Lotha James
Unique Broadband Systems, Inc. is a recognized world leader in the design, development and manufacture of broadband wireless and other wireless solutions that serve the service provider, telecommunications and broadcast industries.
Reader Service #42

Videotek
243 Shoemaker Road
Pottstown, PA 19464
(800) 800-5719; (610) 327-2292
Fax (610) 327-9295
Vic Melis
Located in Pottstown, Pa., Videotek is a leading manufacturer of test and measurement equipment, video demodulators, routing and production switchers, color correctors and processors, and related equipment for the professional video and television broadcast markets. Videotek is committed to Zero Defects and is ISO-9001 certified.
Reader Service #41

Viewsonics
6454 E. Rogers Circle
Boca Raton, FL 33487
(561) 998-9594; Fax (561) 998-3712
www.viewsonics.com
media@viewsonics.com
Peter Chunka
Designer & manufacturer of more than 200 products for the CATV & MMDS industries for over 23 years.
Reader Service #49

Wavetek Wandel Goltermann
Cable Network Division
5808 Churchman Bypass
Indianapolis, IN 46203
(317) 788-9351; Fax (317) 614-8307
www.wwgsolutions.com
Philip Joosten
Wavetek Wandel Goltermann is a leading manufacturer of communications test solutions for customers in the areas of traditional voice and data transmissions, new multi-service networks, local and wide-area network infrastructures, cable television, digital video broadcast, mobile telephony and data. As the world leader in CATV test, WWG offers signal level, leakage and home wiring meters, sweep systems, return path monitoring monitoring, and bench sweep equipment.
Reader Service #11, 68

AD INDEX

RR#	Advertiser	Page #
95	Advance Fiber Optics	116
2	Alpha Technologies	5
33	AML Wireless	40
79	Anadigics	101
5	ANTEC TeleWire Supply	9
-	Atlantic Cable Show	112
29	Avantron	35
65	Barco	85
28	Blonder Tongue	33
71	Budco	92
48, 84	C-Cor Electronics Inc	63, 106
18	Cable AML	24
100	Cable Innovations	122
58	Cable Leakage	78
94	Cable Prep	115
23	CableServ	28
83	Carson Industries	105
1	Cheetah Technologies	2
53	COM 21	71
22, 66	Commscope	27, 87
67	Digicomm	88
14	Digitrans	17
47	Ditel	59
17	DX Communications	23
109	Electroline	139
6	Fiber Instrument Sales	10
39	General Instrument Corp	51
61	Harmonic	81
77, 78	Hewlett Packard	97, 99
15	HUKK Engineering	19
45	IMAKE	57
92	Jack Moon	114
82	Lemco	104
-	Lectro Products Inc	Insert
69	Lindsay Electronics	90
93	Line Ward	114
-	Lode Data	56
37	Lucent Technologies	46-47
75	M&B Manufacturing	95
32	Mainline Equipment	39
10,12,21	Mega Hertz	14,16,26
27,30,38	Mega Hertz	32,36,50
52,54,60	Mega Hertz	70,74,80
74,73,76	Mega Hertz	94,93,95
81,96,102	Mega Hertz	103,116,124
25	Molex Fiber Optics	30
13	Monroe Electronics	16

RR#	Advertiser	Page #
59	Moore Diversified Products	79
110	Multilink	140
-	NCF99	83
40	NCTI	52
70	Nortel	91
26	Panduit	31
9	Passive Devices	13
-	PBI Customer Service	103
-	PBI List Sales	93
56	PCI Technologies	76
99	Power & Telephone Supply	121
91	Preformed Line Products	113
43	Quality RF Services	55
20	Rifocs Corporation	26
50	Riser Bond Instruments	67
19	R. L. Drake	25
80	Rycom	102
101	Sadelco	123
-	SCTE	119,125,130
55	Siecor Corporation	75
36	Siemon Company, The	44-45
31	Silicon Valley Communications	37
7	Standard Communications	11
34	Stanford Telecommunications	41
89	STB Systems	112
4, 8	Telecrafter Products	8, 12
3	Terayon Communication Systems	7
85	Tii Industries	107
16	Toshiba	21
24, 57	Trilithic	29, 77
46	Triple Crown	58
35, 97	Tulsat	43, 117
62, 64	TVC	82, 84
88	Tyton Hellerman	111
42	Unique Broadband	54
41	Videotek	53
49	Viewsonics	65
11, 68	Wavetek Wandel Goltermann	15, 89
-	www.CableToday.com	108-109,120

Reprints	(301) 340-7788, ext. 2009
List Sales	(301) 340-7788, ext. 2026
Customer Service	(800) 777-5006
Merchandise/Back Issues	(800) 877-5188
Editorial	(303) 839-1565, ext. 43
Advertising	(301) 340-7788, ext. 2004

Communications Technology

To request and receive product and service information fast with LEADnet, log onto the Internet to www.leadnet.com, enter code AXCT, and you'll head for the Communications Technology link with further instructions. It's that simple.

September 1999 Issue

Please answer all questions, sign and date the card.
Incomplete forms CANNOT be processed.

To receive a free subscription to *Communications Technology* please sign below.

Signature _____ Date _____
(Signature and date required by U.S. Postal Service)

Please Print:

Phone _____ Fax _____

E-mail Address _____

Name _____ Title _____

Company _____

Address _____

City _____ State/Province _____

ZIP/Postal Code _____ Country _____

A. Please check your company's primary business: (check only one)
- ☐ 04. Multiple System Operator (MSO) (operates more than one cable system)
- ☐ 03. Independent System Operator
- ☐ 98. Telecom Network/Carrier (RBOC, LEC, CLEC, Long Distance Provider.)
- ☐ 19. Public/Private Utility
- ☐ 20. System Contractor
- ☐ 21. Hardware/Component Manufacturer/Dist.
- ☐ 18. Other (please specify)

B. Check the TITLE that most CLOSELY matches your current position: (check only one):

Corporate Management
- ☐ 31. CEO
- ☐ 32. President
- ☐ 33. Owner
- ☐ 34. Vice President
- ☐ 35. Partner

Operations Management
- ☐ 36. General Manager
- ☐ 37. Business Manager
- ☐ 38. Operations Manager
- ☐ 39. Product Manager
- ☐ 40. Purchasing Manager

Engineering Management
- ☐ 41. Engineering VP
- ☐ 42. Engineering Manager
- ☐ 43. Director of Engineering
- ☐ 44. Engineering Supervisor
- ☐ 45. Corporate Engineer
- ☐ 46. Senior Engineer
- ☐ 47. Regional Engineer
- ☐ 48. Divisional Engineer
- ☐ 49. Plant Manager
- ☐ 50. Installation Manager
- ☐ 51. Network Manager
- ☐ 52. Construction Manager
- ☐ 53. Field Services Manager
- ☐ 54. Technical Manager Engineering
- ☐ 55. Engineer
- ☐ 56. Headend Engineer
- ☐ 57. Const. Engineer
- ☐ 58. OSP Engineer Technical
- ☐ 59. Headend Technician
- ☐ 60. Line Technician
- ☐ 61. Bench Technician
- ☐ 62. Sweep Technician
- ☐ 63. Other Technical Title (Please specify)

Installation
- ☐ 64. Installer
- ☐ 65. CSR
- ☐ 66. Other Installation Title (Please specify)

E. In the next 12 months, what cable equipment do you plan to buy?
- ☐ 35. Amplifiers
- ☐ 36. Antennas
- ☐ 37. CATV Passive Equipment including Coaxial Cable
- ☐ 38. Cable Tools
- ☐ 39. CAD Software, Mapping
- ☐ 41. Compression/Digital Equip.
- ☐ 43. Connectors/Splitters
- ☐ 45. Headend Equipment
- ☐ 46. Transmission/Switching Equipment
- ☐ 47. Networking Equipment
- ☐ 48. Vaults/Pedestals
- ☐ 49. MMDS Transmission Equipment
- ☐ 51. Receivers and Modulators
- ☐ 52. Cable Modems
- ☐ 53. Subscriber/Addressable Security Equipment/ Converters/Remotes
- ☐ 54. Telephone/PCS Equipment
- ☐ 55. Power Supply. (Batteries, etc.)
- ☐ 58. Video Servers

F. What is your annual cable equipment expenditure?
- ☐ 57. up to $50,000
- ☐ 58. $50,001 to $100,000
- ☐ 59. $100,001 to $250,000
- ☐ 60. over $250,000

G. In the next 12 months, what fiber-optic equipment do you plan to buy?
- ☐ 61. Fiber-Optic Amplifiers
- ☐ 62. Fiber-Optic Connectors
- ☐ 63. Fiber-Optic Couplers/Splitters
- ☐ 64. Fiber-Optic Splicers
- ☐ 66. Fiber-Optic Patchcords/Pigtails
- ☐ 66. Fiber-Optic Cable

H. What is your annual fiber-optic equipment expenditure?
- ☐ 70. up to $50,000
- ☐ 71. $50,001 to $100,000
- ☐ 72. $100,001 to $250,000
- ☐ 73. over $250,000

I. In the next 12 months, what cable test & measurement services do you plan to buy?
- ☐ 74. Audio Test Equipment
- ☐ 75. Cable Fault Locators
- ☐ 76. Fiber Optics Test Equipment
- ☐ 77. Leakage Detection
- ☐ 76. OTDRs
- ☐ 79. Power Meters
- ☐ 80. Signal Level Meters
- ☐ 81. Spectrum Analyzers
- ☐ 82. Status Monitoring
- ☐ 83. TDRs

J. What is your annual cable test and measurement expenditure?
- ☐ 84. up to $50,000
- ☐ 85. $50,001 to $100,000
- ☐ 86. $100,001 to $250,000
- ☐ 87. over $250,000

002740

L. 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

M. Do you plan to rebuild/upgrade your system in:
- ☐ 95. 1 year
- ☐ 96. more than 2 years

N. How many miles of plant are you upgrading/rebuilding?
- ☐ 97. up to10 miles
- ☐ 98. 11-30 miles
- ☐ 99. 31 miles or more

CT0999
X9H202

Circle Numbers for Free Information

1	25	49	73	97	121	145	169	193	217	241	265	289
2	26	50	74	98	122	146	170	194	218	242	266	290
3	27	51	75	99	123	147	171	195	219	243	267	291
4	28	52	76	100	124	148	172	196	220	244	268	292
5	29	53	77	101	125	149	173	197	221	245	269	293
6	30	54	78	102	126	150	174	198	222	246	270	294
7	31	55	79	103	127	151	175	199	223	247	271	295
8	32	56	80	104	128	152	176	200	224	248	272	296
9	33	57	81	105	129	153	177	201	225	249	273	297
10	34	58	82	106	130	154	178	202	226	250	274	298
11	35	59	83	107	131	155	179	203	227	251	275	299
12	36	60	84	108	132	156	180	204	228	252	276	300
13	37	61	85	109	133	157	181	205	229	253	277	301
14	38	62	86	110	134	158	182	206	230	254	278	302
15	39	63	87	111	135	159	183	207	231	255	279	303
16	40	64	88	112	136	160	184	208	232	256	280	304
17	41	65	89	113	137	161	185	209	233	257	281	305
18	42	66	90	114	138	162	186	210	234	258	282	306
19	43	67	91	115	139	163	187	211	235	259	283	307
20	44	68	92	116	140	164	188	212	236	260	284	308
21	45	69	93	117	141	165	189	213	237	261	285	309
22	46	70	94	118	142	166	190	214	238	262	286	310
23	47	71	95	119	143	167	191	125	239	263	287	311
24	48	72	96	120	144	168	192	216	240	264	288	312

• For Free Reader Service mail or fax to 413-637-4343 • To subscribe via Internet, send e-mail to CT.Subs@Reply.Net •

Communications Technology

To request and receive product and service information fast with LEADnet, log onto the Internet to www.leadnet.com, enter code AXCT, and you'll head for the Communications Technology link with further instructions. It's that simple.

September 1999 Issue

Please answer all questions, sign and date the card.
Incomplete forms CANNOT be processed.

To receive a free subscription to *Communications Technology* please sign below.

Signature _____ Date _____
(Signature and date required by U.S. Postal Service)

Please Print:

Phone _____ Fax _____

E-mail Address _____

Name _____ Title _____

Company _____

Address _____

City _____ State/Province _____

ZIP/Postal Code _____ Country _____

A. Please check your company's primary business: (check only one)
04. Multiple System Operator (MSO) (operates more than one cable system)
03. Independent System Operator
98. Telecom Network/Carrier (RBOC, LEC, CLEC, Long Distance Provider.)
19. Public/Private Utility
20. System Contractor
21. Hardware/Component Manufacturer/Dist.
18. Other (please specify)

B. Check the TITLE that most CLOSELY matches your current position: (check only one):

Corporate Management
31. CEO
32. President
33. Owner
34. Vice President
35. Partner

Operations Management
36. General Manager
37. Business Manager
38. Operations Manager
39. Product Manager
40. Purchasing Manager

Engineering Management
41. Engineering VP
42. Engineering Manager
43. Director of Engineering
44. Engineering Supervisor
45. Corporate Engineer
46. Senior Engineer
47. Regional Engineer
48. Divisional Engineer
49. Plant Manager
50. Installation Manager
51. Network Manager
52. Construction Manager
53. Field Services Manager
54. Technical Manager Engineering
55. Engineer
56. Headend Engineer
57. Const. Engineer
58. OSP Engineer Technical
59. Headend Technician
60. Line Technician
61. Bench Technician
62. Sweep Technician
63. Other Technical Title (Please specify)

Installation
64. Installer
65. CSR
66. Other Installation Title (Please specify)

E. In the next 12 months, what cable equipment do you plan to buy?
35. Amplifiers
36. Antennas
37. CATV Passive Equipment including Coaxial Cable
38. Cable Tools
39. CAD Software, Mapping
41. Compression/Digital Equip.
43. Connectors/Splitters
45. Headend Equipment
46. Transmission/Switching Equipment
47. Networking Equipment
48. Vaults/Pedestals
49. MMDS Transmission Equipment
51. Receivers and Modulators
52. Cable Modems
53. Subscriber/Addressable Security Equipment/ Converters/Remotes
54. Telephone/PCS Equipment
55. Power Supply. (Batteries, etc.)
58. Video Servers

F. What is your annual cable equipment expenditure?
57. up to $50,000
58. $50,001 to $100,000
59. $100,001 to $250,000
60. over $250,000

G. In the next 12 months, what fiber-optic equipment do you plan to buy?
61. Fiber-Optic Amplifiers
62. Fiber-Optic Connectors
63. Fiber-Optic Couplers/Splitters
64. Fiber-Optic Splicers
66. Fiber-Optic Patchcords/Pigtails
66. Fiber-Optic Cable

H. What is your annual fiber-optic equipment expenditure?
70. up to $50,000
71. $50,001 to $100,000
72. $100,001 to $250,000
73. over $250,000

I. In the next 12 months, what cable test & measurement services do you plan to buy?
74. Audio Test Equipment
75. Cable Fault Locators
76. Fiber Optics Test Equipment
77. Leakage Detection
76. OTDRs
79. Power Meters
80. Signal Level Meters
81. Spectrum Analyzers
82. Status Monitoring
83. TDRs

J. What is your annual cable test and measurement expenditure?
84. up to $50,000
85. $50,001 to $100,000
86. $100,001 to $250,000
87. over $250,000

002740

L. 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

M. Do you plan to rebuild/upgrade your system in:
95. 1 year
96. more than 2 years

N. How many miles of plant are you upgrading/rebuilding?
97. up to10 miles
98. 11-30 miles
99. 31 miles or more

CT0999
X9J203

Circle Numbers for Free Information

1	25	49	73	97	121	145	169	193	217	241	265	289
2	26	50	74	98	122	146	170	194	218	242	266	290
3	27	51	75	99	123	147	171	195	219	243	267	291
4	28	52	76	100	124	148	172	196	220	244	268	292
5	29	53	77	101	125	149	173	197	221	245	269	293
6	30	54	78	102	126	150	174	198	222	246	270	294
7	31	55	79	103	127	151	175	199	223	247	271	295
8	32	56	80	104	128	152	176	200	224	248	272	296
9	33	57	81	105	129	153	177	201	225	249	273	927
10	34	58	82	106	130	154	178	202	226	250	274	298
11	35	59	83	107	131	155	179	203	227	251	275	299
12	36	60	84	108	132	156	180	204	228	252	276	300
13	37	61	85	109	133	157	181	205	229	253	277	301
14	38	62	86	110	134	158	182	206	230	254	278	302
15	39	63	87	111	135	159	183	207	231	255	279	303
16	40	64	88	112	136	160	184	208	232	256	280	304
17	41	65	89	113	137	161	185	209	233	257	281	305
18	42	66	90	114	138	162	186	210	234	258	282	306
19	43	67	91	115	139	163	187	211	235	259	283	307
20	44	68	92	116	140	164	188	212	236	260	284	308
21	45	69	93	117	141	165	189	213	237	261	285	309
22	46	70	94	118	142	166	190	214	238	262	286	310
23	47	71	95	119	143	167	191	125	239	263	287	311
24	48	72	96	120	144	168	192	216	240	264	288	312

• For Free Reader Service mail or fax to 413-637-4343 • To subscribe via Internet, send e-mail to CT.Subs@Reply.Net •

Please send *Communications Technology* to the following individuals in my company:

Name_____ Title _____

Name_____ Title _____

NO POSTAGE NECESSARY IF MAILED IN THE UNITED STATES

BUSINESS REPLY MAIL

FIRST-CLASS MAIL PERMIT NO.788 PITTSFIELD MA

POSTAGE WILL BE PAID BY ADDRESSEE

Communications Technology

PO BOX 5360

PITTSFIELD MA 01203-9190

Please send *Communications Technology* to the following individuals in my company:

Name_____ Title _____

Name_____ Title _____

NO POSTAGE NECESSARY IF MAILED IN THE UNITED STATES

BUSINESS REPLY MAIL

FIRST-CLASS MAIL PERMIT NO.788 PITTSFIELD MA

POSTAGE WILL BE PAID BY ADDRESSEE

Communications Technology

PO BOX 5360

PITTSFIELD MA 01203-9190

Manager, Telecommunications Analyst. Train/oversee technicians in international satellite direct to home digital television and manage multimedia software development projects. Degree + experience required. Send resume: Raymond Lekowski, V.P., Galaxy Latin America Inc., 2400 E. Commercial Blvd., Ft. Lauderdale, FL 33308

HiQ Communications Inc. Is seeking experienced CATV people to work on our many projects throughout the U.S.. We currently have openings in our CA, MI, FL, & GA locations. Positions to be filled are as follows:

- Sweeps/FCC Proof Technicians
- Ingress Technicians
- Power Supply/Status Monitoring Technicians
- Splicers/Activators

Send resume to Director of Operations
HiQ Communications Inc.
2619 Exposition Blvd.
Los Angeles, CA 90018
fax: (323) 735-1171,
ydeleon@hiqcommunications.com

COME JOIN OUR SALES TEAM!

Mega Hertz is the leading Marketing Distributor of technically "Unique" products in the Cable Industry!

We are seeking qualified individuals with a strong technical background in Cable Television electronics to fill two openings as Regional Sales Manager in the Northeast and North Central U.S.

Mega Hertz offers competitive Salary plus an outstanding Commission Program along with Medical/Dental and 401k programs.

If you are a motivated self-starter interested in an outstanding career opportunity, send, fax or e-mail your resume to:

MHz MEGA HERTZ

c/o Dave Showalter, Vice President of Sales
1469 Sheffler Drive, Chambersburg, PA 17201
Fax: 717-263-1159
e-mail: daveshowalter@megahz.com

Since 1975 Leader in the Placement of Cable TV Professionals

JOBS GALORE!!

Technical • Sales & Marketing • General Management

JY JIM YOUNG & ASSOCIATES
Holland Creek • 1424 Clear Lake Rd. • Weatherford, TX 76086
Call 817-599-7623 • FAX 817-599-4483 • E-Mail jyoung@staffing.net

SCTE Sustaining Member

Peter Froehlich & Co. Executive search

P.O. Box 339 Weatherford, TX 76086
(800) 742-4947 FAX (817) 594-1337
email: pfsearch@flash.net
web: http://www.flash.net/~pfsearch

All levels of Technical Positions - Corporate to Hourly. Operators and Manufacturers Call or Write. Fees Paid.

WHITE MOUNTAIN fiber optics cable CONSTRUCTION CORP.

A leader in the Telecommunications Industry, based in Epsom, New Hampshire.

W.M.C.C. currently has major construction and maintenance projects throughout the U.S. With the enormous growth we have experienced over the past year, we continue looking for dedicated, hard-working individuals for various projects throughout the U.S.
With offices located in:

Orlando, FL	Charlotte, NC	New England Region
(888) 877-8709	(704) 708-5124	(800) 233-7350

Experienced Supervisors, Foremen, Linepersons, Splicers and Sub-Contractors call the number nearest you for more information.
W.M.C.C. offers competitive benefits and compensation.

tesinc
Engineering and Technical Services
for telecommunications and information systems

2150 East Highland Avenue, Suite 212
Phoenix, Arizona 85016
(602) 956-4401
FAX (602) 956-4664
resume@tesinc-inc.com

CATV IMMEDIATE OPENINGS

RF ENG's
LODE DATA/FOCUS
MDU

INSPECTORS
AERIAL UG
MDU

INSTALLERS

DRAFTERS
TRUCK & TOOLS
AUTOCAD/MICROSTATION
CATV & TELEPHONE

TECHNICIANS
HEAD END
SWEEP/FCC PROOF
SERVICE

An Equal Opportunity Employer

Call Richard: 1-800-800-7886 or Fax: (602) 956-4664

for Serious results

in Classified Advertising

Call Nicole Bovre at 303-839-1565 ext. 33

By Paula M. Jones

And the Winner Is ....

Imagine you were nominated for an award. Wouldn't you be pleased? All of us certainly can use a pat on the back at some point, and we all know someone who deserves recognition. Perhaps it is a respected colleague who has gone the extra mile for his or her company, the Society of Cable Telecommunications Engineers, or the industry as a whole.

If you're not the type to "toot your own horn," why not do it for someone else? SCTE provides the opportunity with its programs to award and recognize members. All it takes is a phone call to request a nomination form and a few minutes to explain why you think a coworker, colleague or friend deserves recognition.

Award opportunities available

The prestigious Member of the Year Award recognizes an SCTE member who has made the most significant contributions to the Society through active participation in its programs and efforts during the past year. Anyone can be nominated. Do you know someone who goes the extra mile for the Society? Someone who is a walking SCTE encyclopedia? An SCTE cheerleader? This award would give that individual's efforts the opportunity to be recognized.

Designed to identify and acknowledge the achievements of individuals within the cable technical community who have demonstrated significant personal and professional growth, the Personal Achievement Award is open to any active SCTE member. This award is for anyone who has made progress within his or her job area; whose efforts have resulted in an increase in knowledge, skill and professionalism; and whose community or professional involvement has enhanced the perception of the cable industry.

The Field Operations Award recognizes the efforts of people who develop or improve tools or procedures to enhance the work performed by installers, technicians and line personnel. This category is terrific for those who always are thinking up original ways to make their jobs and those throughout the industry easier and more efficient.

The Safety Recognition Award is based on a company's Occupational Safety and Health Administration rate, as determined from the OSHA 200 log. It has three tiers of award recognition: one for multiple systems operators (MSOs); one for contractors; and one for systems, regions or divisions. If your system qualifies, it will automatically receive this award.

SCTE inducts members who have made extraordinary contributions to the professional development of the Society and the broadband industry into its Hall of Fame. This award looks at the course of an individual's career to determine eligibility.

Sponsored by SCTE, Women in Cable and Telecommunications and *Communications Technology* magazine, the Women in Technology Award recognizes women in leading technology positions within the cable and telecommunications community. This award is presented at the Western Show each year.

Chapter Awards spotlight the significant contributions local groups make to the industry through training and certification, communication programs, collaborations with other associations, and leadership. Award categories include: Chapter of the Year, which recognizes chapters that significantly exceed the Society's requirements for its local affiliates; Leadership Circle, which honors exemplary volunteer leadership; and the Towering Achievement Award for outstanding efforts in educational programming, promotions/communications and effective partnerships.

Membership status recognition

The Board of Directors has created two additional membership levels to recognize deserving members. The elevated member status levels include Senior Member, for those members who have demonstrated and documented significant performance as professionals in the cable TV industry.

Fellow Membership is bestowed on Senior Members who have made outstanding contributions to the broadband telecommunications industry, achieved a high level of seniority, professionalism, technical competence and met Broadband Communications Technician/Engineer (BCT/E) certification requirements. Candidates for Fellow Membership are nominated for elevation.

From the board

Other awards include the Chairman's Award, which recognizes the outstanding efforts of a company, organization or individual who has given exceptional support to the Society during the current chairman's administration.

Nominations needed

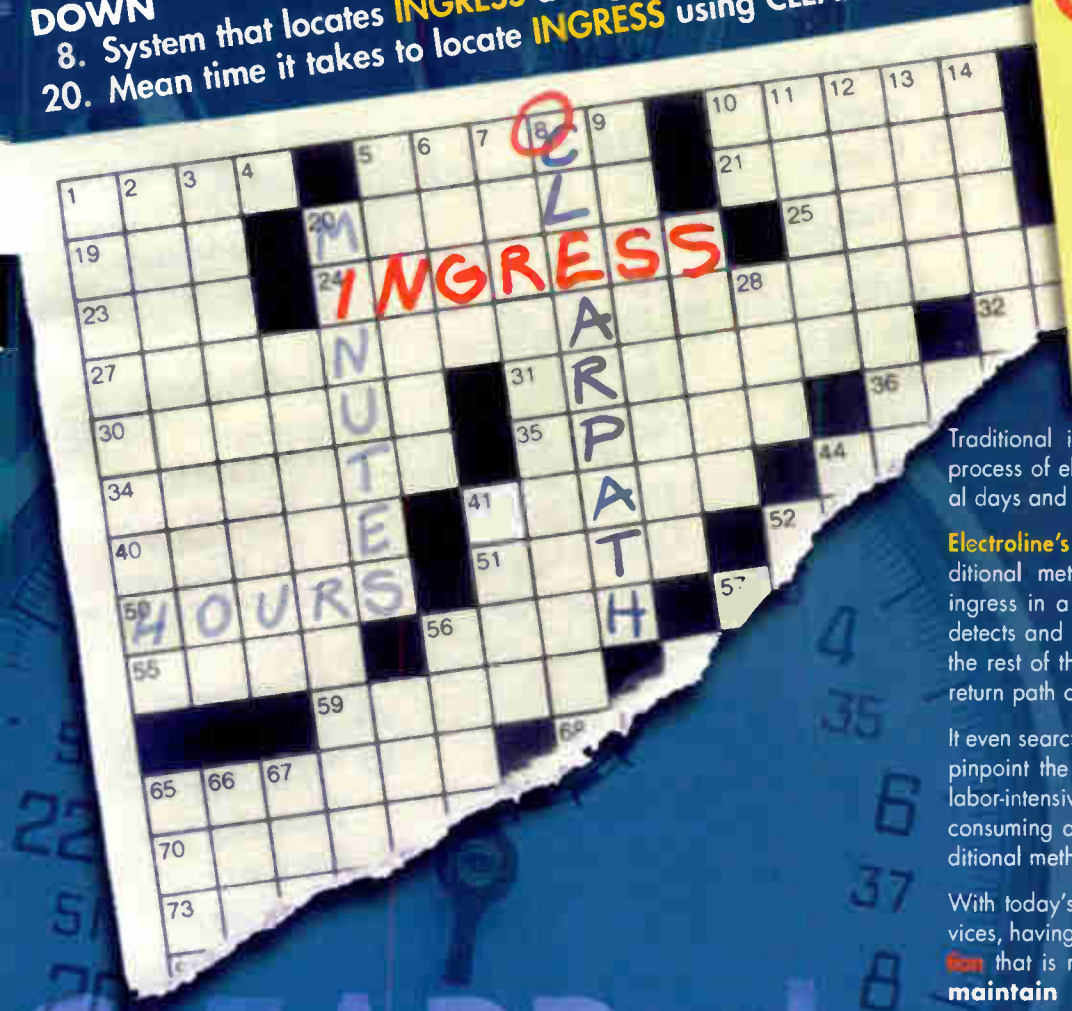
Each year, SCTE holds the Annual Awards Luncheon at Cable-Tec Expo to recognize the winners. SCTE is accepting nominations now for award recognition for 2000. Eligibility requirements and application procedures vary for each award and honor. Contact the SCTE Membership Services Department at (800) 542-5040, fax (610) 363-5898 or e-mail membership@scte.org for complete information and applications. CT

Paula Jones is manager of membership services for the Society of Cable Telecommunications Engineers. She can be reached via e-mail at pjones@scte.org.

Stop wasting time chasing INGRESS

ACROSS
24. Cause of major service disruptions in the return path
50. Mean time to locate **INGRESS** using traditional methods

DOWN
8. System that locates **INGRESS** and goes BEYOND THE NODE
20. Mean time it takes to locate **INGRESS** using CLEARPath™



8 DOWN is CLEARPath

ELECTROLINE

(800) 461-3344
clearpath@electrolinequip.com
www.electrolinequip.com

Traditional ingress finding methods rely on a process of elimination that at worst, takes several days and at best, hours.

Electroline's CLEARPath™ Solution beats all traditional methods by monitoring and locating ingress in a matter of **MINUTES**. CLEARPath™ detects and isolates the offending segment from the rest of the cable network while keeping the return path clear and the network operational.

It even searches deeper into the cable network to pinpoint the source of ingress, thus eliminating labor-intensive, technically frustrating and time-consuming activities usually associated with traditional methods.

With today's levels of expectation for cable services, having a highly reliable management solution that is remotely operated, is paramount to **maintain customer satisfaction** and **to guarantee impressive returns on investment**. CLEARPath™ is the only proven system that effectively addresses the challenge of ingress management.

Join others already using Electroline's CLEARPath™ Solution and you will also find better ways to use your time.

CLEARPath™

Another proven technology from Electroline's pioneering team of professionals, also the makers of the **Original** Addressable System and Drop Amplifiers.

CONTACT clearpath@electrolinequip.com

TOLL FREE • NORTH AMERICA (800) 461-3344 GENERAL INQUIRIES info@electrolinequip.com

ELECTROLINE EQUIPMENT INC. 8265 ST-MICHEL BLVD. MONTRÉAL, QUÉBEC CANADA H1Z 3E4

ELECTROLINE

www.electrolinequip.com

Reader Service Number 109

ADJUSTABLE SNOSHOE®

Plastic Fiber Optic Storage Bracket

There is more than one way to store your slack

- 90° locations
- Manholes
- Wall mount
- Rack mount
- Building entry
- Where storage runs are under calculated

Multilink™

Technologies Group

Phone (440)366-6966 **FAX** (440)366-1033
Internet: www.multilinkinc.com
E-mail: sales@multilinkinc.com
24 Hour Voice Messaging
Worldwide Distribution

Member SCTE

BiCSI

www.multilinkinc.com

Reader Service Number 110