NOVEMBER 1995 CED Rebuilds ◆ Piracy prevention ◆ Virtual networks

CED

COMMUNICATIONS ENGINEERING & DESIGN
THE PREMIER MAGAZINE OF BROADBAND COMMUNICATIONS

Telco video: Rethinking the plan

NOW YOU CAN DELIVER THEM ALL IN A SINGLE VEHICLE.
WITH THE SUPER-RELIABLE AT&T 5ESS-2000 SWITCH AND OUR NEW 5E10 SOFTWARE.

When you're adding telephony and data services to your cable system, you need the most versatile, most reliable switch and software on the market.

The AT&T 5ESS®-2000 Switch. And our new 5E10 software.

Only the 5ESS Switch lets you combine landline and wireless on the same switching platform. So you can offer landline features to wireless customers.

It also has Advanced Intelligent Network capabilities. Which gives you the advantage of offering "follow-me" numbers to your PCS customers.

Plus, our new 5E10 software allows fast, easy provisioning of high-speed Internet access. And adds residence features like enhanced Call Waiting, which identifies the calling party before customers interrupt their current call.

And with the 5ESS switch and software your investment is always protected. New services can be offered without upgrading hardware or waiting for a new software release.

All this on the most reliable digital switch in the world. Whose nearest competitor, according to FCC data, had over four times more downtime.

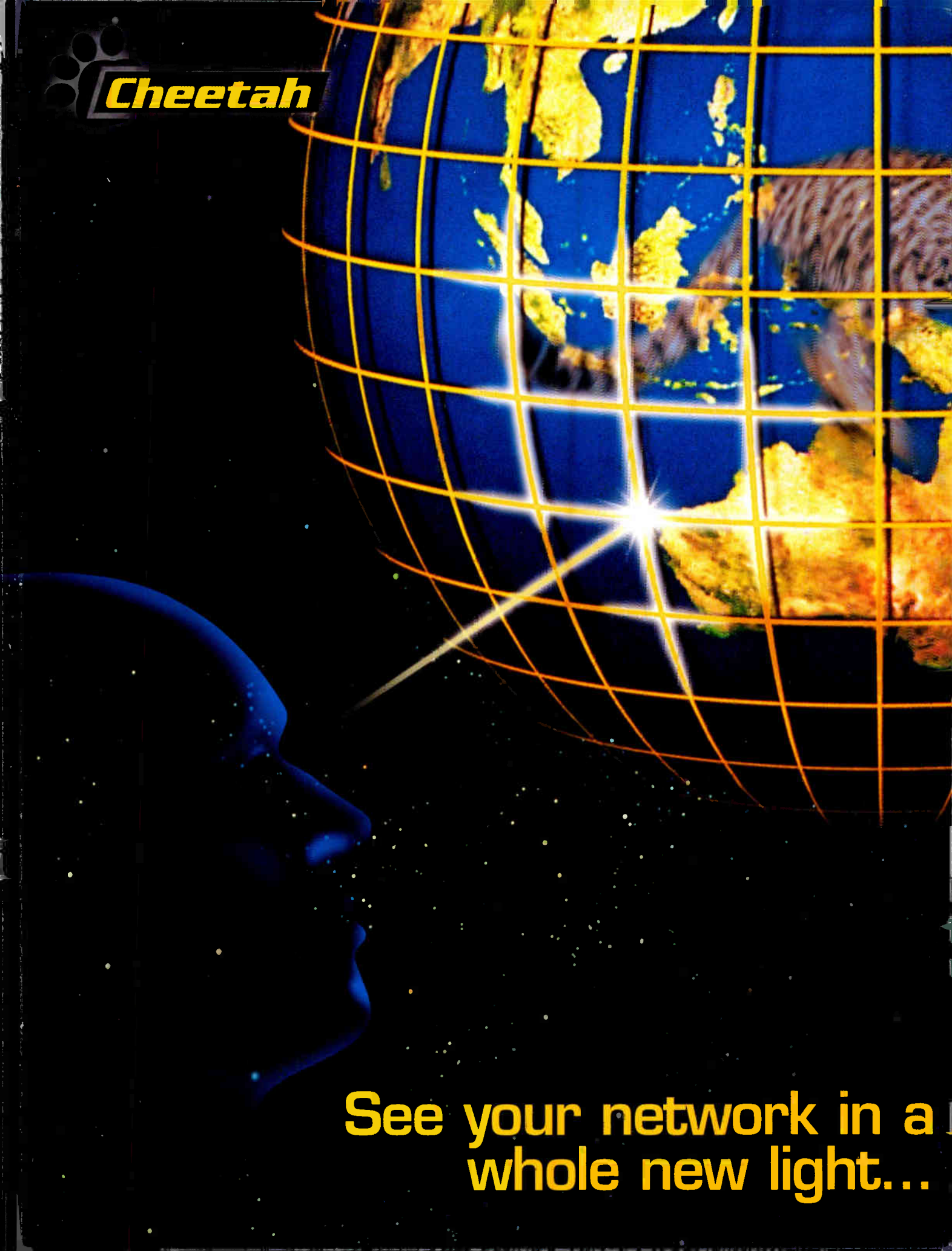
The 5ESS-2000 Switch and 5E10 Software Release are available now.

Call your AT&T Network Systems representative for more information.

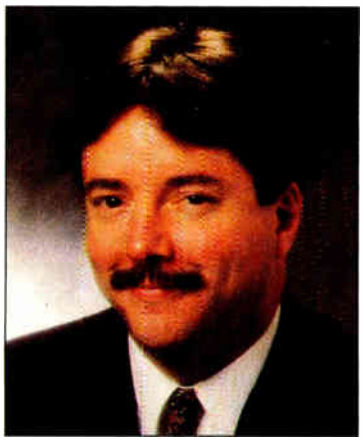
Everything you need. To do everything you want.

AT&T Network Systems

Circle Reader Service No. 1


Cheetah
See your network in a whole new light...

with Cheetah's vision for Network



Is the sky falling? Hardly

Much of the buzz around the water cooler these days centers on the "troubles" broadband equipment hardware manufacturers are presently experiencing. Headlines from the past few weeks have trumpeted layoffs at Antec and General Instrument as those two companies restructure themselves, and a lower-than-expected earnings report from Scientific-Atlanta.

Clearly, there is room for concern, but is this slowdown indicative of a crash in the cable industry economy, much like the one in 1991? For several reasons, I don't think so.

Certainly, the big broadband manufacturers entered into new alliances, added manufacturing capacity and added more staff so they could pronounce themselves ready for the massive additional product orders from the telephone companies–orders that never came. Perhaps GI and S-A, who've successfully ridden the wild economic roller coasters the industry has endured over the years, should have known not to get caught up in the hyperbole put forth by the telephone companies. But in retrospect, they had few choices, faced with an onslaught of powerful new entrants like Nortel, Hewlett-Packard, Tellabs and Motorola, to name a few. And what if those promised purchase orders from the RBOCs had actually come to fruition?

Now that the Bell companies have largely pulled back their aggressive build-out plans, it's natural that the manufacturers restructure and retrench a bit, too. Whereas video-on-demand a couple of years ago seemed promising, today everyone is pronouncing its death. Two years ago, who anticipated the popularity of the Internet and on-line services? In short, applications for broadband networks are changing–and will continue to evolve. Manufacturers have to follow that curve and be nimble enough to make rapid product deployment changes. Putting the right structure in place to make that possible is essential.

Perhaps some companies simply became bloated. As new projects were taken on, new employees were hired for support. In some cases, the work they were hired to do has been completed, and they're no longer needed. Certainly this could be the case with some software engineers. In the case of Antec, which bought several companies last year, it probably took time to properly mesh the cogs to make the wheel run its fastest.

The lynchpin of the future could be the pending telecom reform legislation. With it, there will be a mad scramble for turf, more alliances will occur and even greater hype will emanate from the network providers as they battle for marketshare. Without it, network operators will continue to feel competition, but the sense of urgency will be lessened, and new broadband network deployments will probably continue to be delayed.

Regardless, wild mood swings from network providers–and the ill effect that will have on the equipment suppliers–should be expected. Just as hardware company stocks soared with the pronouncements of massive new buildouts, it's only natural that they adjust for reality. The revolution will still take place, it will just take longer to occur than most people thought.

Roger J. Brown

Roger Brown
Editor

CED MAGAZINE

VP Group Publisher
William McGorry
Publisher
Robert C. Stuehrk
Editor
Roger Brown, Rbrowner@aol.com
Managing Editor
Dana Cervenka
Contributing Editors
Leslie Ellis, Ellis299@aol.com
Fred Dawson

CONSULTING ENGINEERS
Chairman
Wendell H. Bailey, NCTA VP, Science and Technology
MEMBERS
Jim Chiddix, Senior VP, Engineering and Technology, Time Warner Cable
Stephen D. Dukes, VP, Technology, TCI Technology Ventures
David Fellows, Sr. VP, Engineering and Technology, Continental Cablevision
Tom Jokerst, Sr. VP, Engineering, Charter Communications
Earl Langenberg, Executive Director, Growth Division, US West Communications
Dave Large, Principal, Media Connections Group
Robert Luff, Chief Technical Officer, Broadband Division, Scientific-Atlanta
Pete Smith, VP Engineering, Rifkin & Associates
Joe Van Loan, Sr. VP, Engineering, CableVision Industries

Advertising/Marketing Manager
Scott C. Snyder, SSnyderCED@aol.com
Classified Sales Manager
Tim Reeder
800/866-0206
Assistant to the Publisher
Michelle Pazar

Production Manager
Elaine Callahan
Art Director
Don Ruth

Address
600 S. Cherry St., Suite 400
Denver, CO 80222
303/393-7449

Circulation Director
Maria Gottlieb (212) 887-8565
Fulfillment Manager
Shawn Green (212) 887-8564
Subscriber services
CED
P.O. Box 10728
Riverton, NJ 08076-0728
Telephone: 609/786-0501
Fax: 212/887-8493

CHILTON PUBLICATIONS
Leon C. Hufnagel, Jr., President
Donald W. Chestnut, Sr. VP, Ops/Admin.
Christopher M. Savine, Sr. VP Finance
Bill O'Brien, Sr. VP Communications Group

BPA INTERNATIONAL

From the People Who Invented Leakage Detection . . .

ComSonics Introduces

SNIFFER SLEUTH™

See it at Western Show Booth 1341

The Most Complete Leakage Control Package Available Anywhere!

- Detects leaks more than 500 feet away!
- Self contained:
  Near-Field Probe, Far-Field Probe, Dipole Antenna
- Detects both:
  Standard Sniffer Transmitter and TV Carrier Signal
- Sniffer I.D. Signal Discrimination
- Frequency Agile (2 Ranges)
- Tunable in 1kHz increments
- Full function LCD
- External Antenna connection
- GeoSNIFFER compatible
- Nickel-cadmium battery (user replaceable)
- Custom-made Holster available
- Docking Station accessory

COMSONICS

An Employee Owned Corporation

COMSONICS,® INC.

We set the standards.

1350 Port Republic Road, P.O. Box 1106
Harrisonburg, VA 22801 USA
(540) 434-5965, In USA: (800) 336-9681 Fax: (540) 434-9847

Circle Reader Service No. 2

ALL GUTS = SUPERIOR ATTENUATION

TRILOGY COMMUNICATIONS, INC. ISO-9001 REGISTERED

Anyway you slice it, manufacturers of foamed cables have been scrambling to attain the superior attenuation characteristics of MC². The attempt means increasing our familiar MC² diameter of .500" to .565" or .625"; and our .750" must become .840" or .860" or .875".

You may still use MC² in one size smaller than the *old* foamed diameters. Even more MC² per duct, and easier handling. In aerial installations, the effects of wind and ice–loading are reduced even further.

And with the superior attenuation of MC² you don't have to clutter your lines with as many amplifiers — about 20% fewer than with foamed cables.

Low-loss MC² is your gain in many ways.

TRILOGY LEADS IN TECHNOLOGY

Trilogy
COMMUNICATIONS INC.

Call or write for a free sample and brochure:
TRILOGY COMMUNICATIONS INC., 2910 Highway 80 East, Pearl, Mississippi 39208
800-874-5649
601-939-6637

Circle Reader Service No. 3

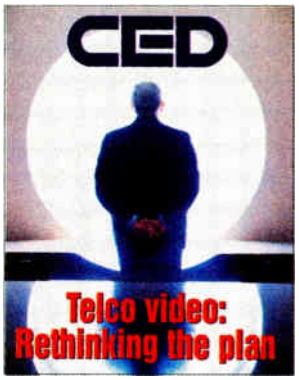
Contents

BY JEFF SMITH, THE IMAGE BANK

Features

SCTE®

CED magazine is recognized by the Society of Cable Telecommunications Engineers.



About the Cover

Marketplace changes have telcos rethinking their strategies. Photo by Steven Gottlieb, FPG International.

Departments

 CED (USPS 330-510) (ISSN 1044-2871) is published monthly except twice in May by Chilton Publications, A Capital Cities/ABC Publishing Group, 825 7th Ave., New York, NY 10019. Volume 21, Number 12. U.S. domestic subscriptions are $48. Outside USA, subscriptions are $69 for surface delivery or $96 for air speed delivery, prepaid in U.S. funds drawn on a U.S. branch bank. Second-class postage paid at New York, NY 10019 and additional mailing offices. CED is published on behalf of the cable television and broadband communications industries. POSTMASTER: Please send address changes to CED Circulation, P.O. Box 10728, Riverton, NJ 08076-0728. MEMBERS OF THE BPA. Canada Post International Publications Mail Product (Canadian distribution) Sales Agreement No. 649945. Printed in U.S.A.

Analog? Digital? Fiber? Copper? HFC? Standard makes a network work.

Putting together or upgrading a headend is more complex than ever. You need technology that will bridge the gap between today's wants and tomorrow's needs.

Standard has all the essential equipment you'll need for a rapidly changing environment.

The cornerstone of the intelligent headend.

For proof, take a look at our Stratum modulator, a self-healing, advanced broadband network modulation system. Stratum combines up to 78 channels in a single six foot EIA rack. Ideal for master headend applications or remote hub operation, Stratum offers exceptional RF performance, complete remote control operation and status monitoring capability. And with the unique automated redundancy module, the system can instantaneously correct detected faults, by internally re-routing video, audio and IF signals to designated back-up modules.

The perfect upgrade solution.

Upgrading your headend? Start with our Agile IRD II integrated satellite receiver/descrambler. With a fully synthesized PLL tuning circuit and microprocessor control over the dual conversion C/Ku-band 950-1450 MHz RF input, it's the preferred choice for the continuous duty cycle CATV master headend environment.

Complete the package.

The TVM550S modulator, with the integrated CSG60 BTSC stereo generator, gives you noise and spurious free RF output, not to mention ultra-stable PLL-synthesized tuning. Perfect for the expansion of channels and upgrading headends, the TVM550S, coupled with the IRD II's advanced headend technology, completes a space-saving CATV package addressing full compliance with FCC part 76 Video/Audio and RF performance standards for future headend requirements.

You deserve a toast.

When you purchase Standard, you've chosen the finest line of headend equipment available. Congratulations! Celebrate your good taste, and good fortune...

The right technology... for right now.

Standard Communications

SATELLITE & BROADBAND PRODUCTS DIVISION

P.O. Box 92151
Los Angeles, CA 90009-2151
(310)532-5300
Toll Free 800/745-2445
Fax 800/722-6329 (Toll Free)
(310)532-6697 (CA & Int'l Only)

Essential equipment.

TVM550S MODULATOR
Cover the broadband spectrum from 54 to 550 MHz with a single unit.

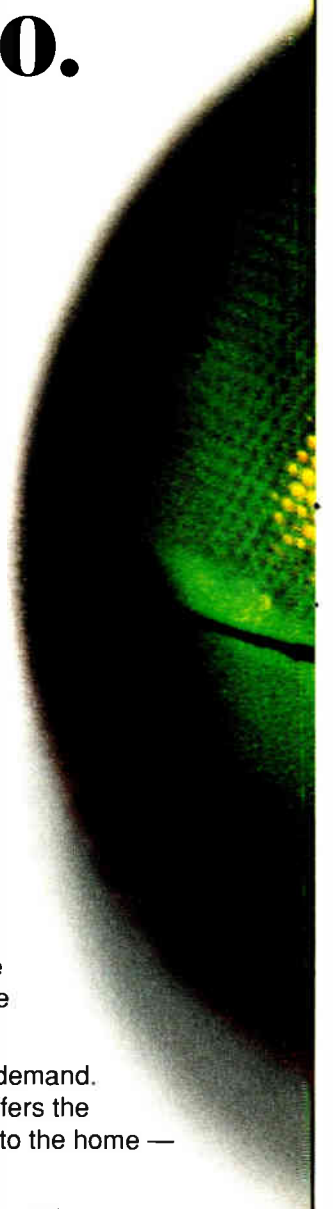
AGILE IRD-II
Cable industry's first RS250 certified broadcast quality IRD.

CSG60 BTSC STEREO GENERATOR
Have it integrated into the TVM Series or get the space-saving two-pack.

STRATUM MODULATION SYSTEM
Put up to 78 channels in six feet of rack space.

Circle Reader Service No. 4

Not everyone out there has a need for interactive video.



But not everyone can see the whole world at once.

Video is big. And not just video on demand, but interactive video. Video games, telecommuting, telemedicine, distance learning, the works.

Fujitsu's Broadway™ line of broadband products meets the demand. Our star architecture was specifically selected because it offers the capacity needed to move signals from the home as well as to the home — the key to interactivity.

It's time to get serious about providing video. Do you really want an architecture that lays all bets on that one "killer" application, like video on demand? Or would you rather depend on an architecture that gives your customers choices?

Ask them. After all, it's an odd creature that doesn't want to interact.

BROADWAY™
THE BROADBAND YOUR AUDIENCE DEMANDS™

1-800-777-FAST ask for "Broadway"

fujitsu_trans@msmail.fnts.com

Circle Reader Service No. 5

FUJITSU

Continental Cable, Boston College bring interactive age to students

Continental Cablevision has installed a broadband communications network at Boston College that allows each student to connect to video and data services in the dorm room, making the school the first to fully incorporate these services throughout its campus telecommunications network.

The network brings the interactive services to 2,500 classrooms, 400 administrative offices and more than 6,000 dormitory rooms. The school has named the network "Project Agora," a Greek term meaning "gathering place."

The project also includes a telecommuting trial for students, faculty and administrators while they are off campus, allowing them full access to the campus network from their homes, including the ability to search the school's library holdings.

"The goal of Project Agora is to create an electronic community where people can gather to exchange information and ideas, not simply connect to the information superhighway," said Bernard Gleason, executive director of information technology at Boston College. In addition, the school wanted to offer incoming students advanced services such as electronic mail and Internet access in a cost-effective and easy-to-use manner.

The BC network involves a dedicated fiber optic ring that emanates from Continental's Network Control Center in Needham, Mass. to an on-campus hub site (see diagram). Eighteen independent fiber nodes are deployed across the campus, each of which feeds drop locations via coaxial cable. Services offered over the network include data transport over an ATM backbone, Ethernet access to residence halls, an 80-channel analog video system that can be upgraded to a 720-channel digital system, and five channels of in-house programming specific to the college community.

In addition, student access to library resources, as well as other students and faculty is delivered over the same network.

DAVIC prepares to release tech spec

Right on schedule, the Digital Audio-Visual Council (DAVIC) is preparing to issue the DAVIC 1.0 technical specification for multimedia services in December, the group reported recently. The spec is the first to encompass a network from end-to-end and supports content and hardware interoperability.

The draft agreement, consisting of some 500 pages, has been signed off on by about 300 engineers who have been meeting every other month in various sites around the world. The most recent meeting was in September in California.

The draft is now being circulated around the world for comment and will be finalized during a mid-December meeting in Berlin.

The goal of DAVIC is to promote global standards for broadband digital services using a variety of delivery media, such as wired networks, satellite and other forms of communication. An aggressive workplan for next year will create standards for wireless services, data and Internet access services through multimedia cable systems and MMDS systems.

The specification defines all system components, including the set-top, delivery systems and servers, from the physical level to the application level, so that products can be used interchangeably, which fosters a multi-vendor environment.

New set-top software will increase utility

Two companies that have competing set-top operating systems both announced new versions of their software systems over the past month or so, designed to improve the utility of the boxes and simplify the creation of software that will run across them.

PowerTV unveiled a new application specific integrated chip (ASIC) that integrates the functions of several chips into a single unit, helping to drive down costs of new digital set-tops for network providers.

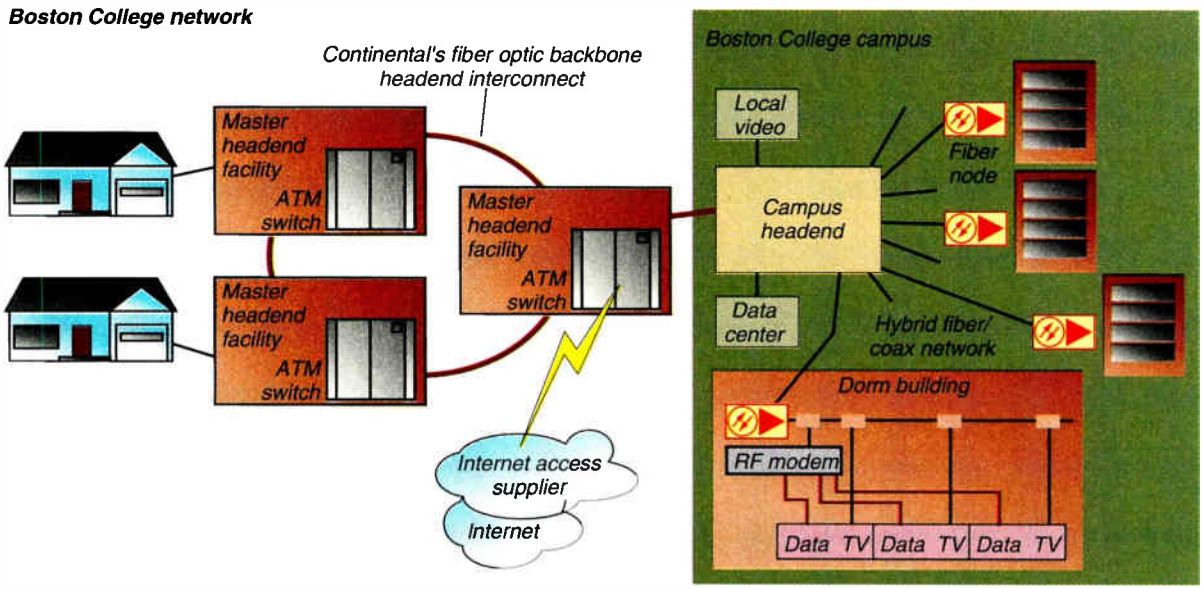
The new Eagle semiconductor, which will be available this quarter for less than $30 per unit, was specifically designed for a television environment and features graphic acceleration, audio mixing, scaling and compositing–all important features to creators of content for interactive television applications.

Scientific-Atlanta, the parent company of PowerTV, is the first manufacturer to license the Eagle ASIC for its set-top terminal.

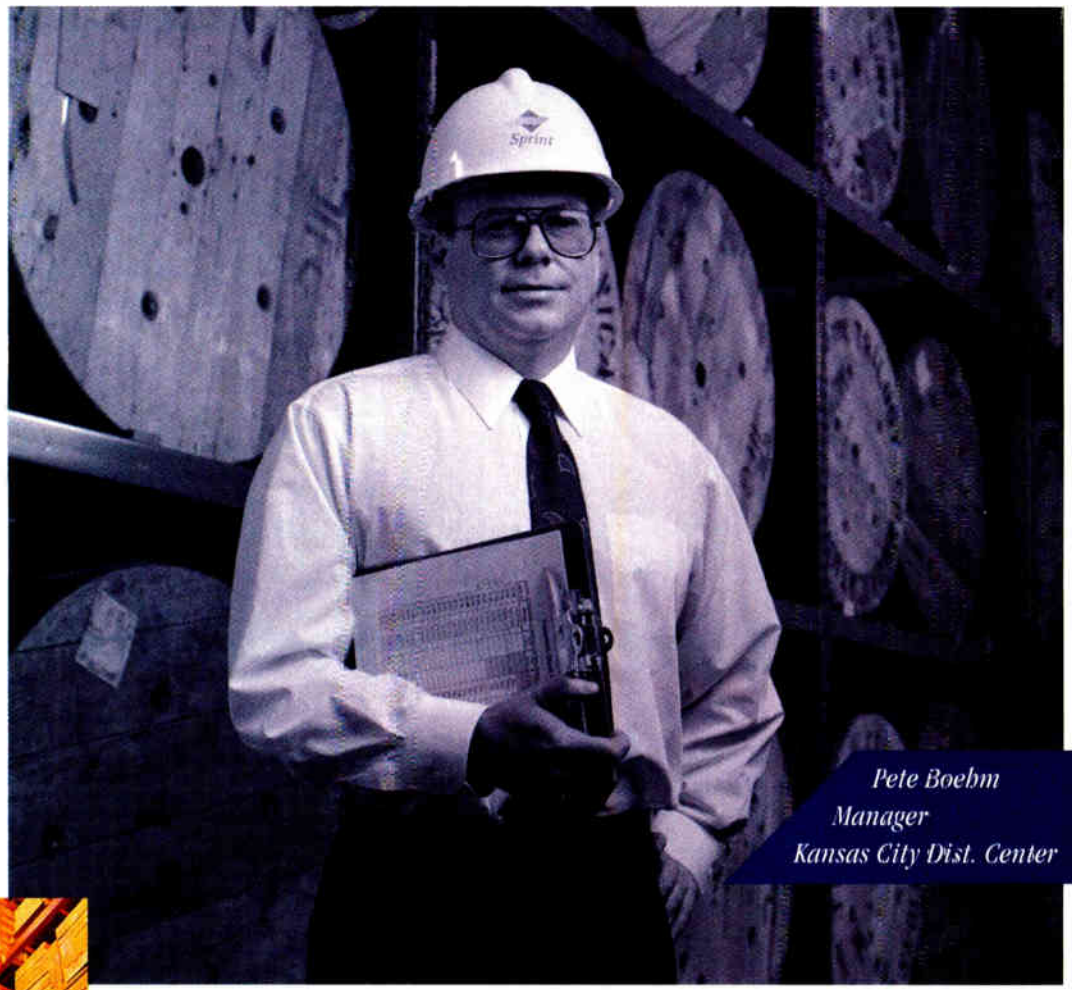
In addition, PowerTV announced immediate availability of its 32-bit, RISC-oriented operating systems for interactive set-tops. Version 1.0 of the software is described as an open-architecture operating system.

The PowerTV OS resides in less than 512 KB of read-only memory, yet supports flash upgrades to allow end users to implement vendor-

Boston College network



Pete Boehm Ships More Than Products With Every Package



Pete Boehm
Manager
Kansas City Dist. Center

You have to get hold of product fast to keep up with changes in the cable industry — so get Pete Boehm on your team. He'll make your job easier . . . with rapid response and accurate shipments from one of Sprint/North Supply's 11 distribution centers. And that's just the beginning of our customer satisfaction commitment.

At Sprint/North Supply, everyone's tuned in to customer service, from our sales and service reps to the teams at our distribution centers. Using our fast, efficient order entry, tracking and shipping system, Pete and his team will process and ship your cable television, telecommunications and data products — the same day your order is received. That fast turnaround is the foundation for our customer service commitment . . . and your key to keeping your system up and running.

Sprint/North Supply's 11 distribution centers cover 1,067,107 sq. ft. of space with 30,000 products from 1,200 leading manufacturers. Located in every region of the United States, our distribution centers are computer-linked to deliver what you need . . . when you need it. With one toll-free call, you can get both products and service. At Sprint/North Supply, your full-line national distributor, we deliver customer service every time we distribute broadband and telecommunications solutions.

FREE CATV/BROADBAND CATALOG. Call and order your FREE 296-page catalog, featuring thousands of products. NO OBLIGATION.

On Line, On Call, On Time

1-800-639-CATV

Sprint North Supply

Circle Reader Service No. 6

8054D

specific add-ons to set-tops. Vendors who support PowerTV include Oracle, Scala and Sybase. The PowerTV system supports both PC and Macintosh development systems, and a Unix platform is planned for introduction soon.

Meanwhile, Microware announced the introduction of version 2.0 of its DAVID real-time operating system, which provides the ability for an application to be authored once, stored on a server, transmitted across a broadband network and run on any DAVID-based digital network device.

Features of the new release include: an API that supports network specific protocols used for channel mapping, network navigation, session connections and downloading consumer applications; support of application portability across multiple server platforms; a high-speed open graphics interface; and soon, support of Apple Computer's QuickDraw and QuickTime authoring tools.

TI enters LMDS market with complete system

Texas Instruments last month announced its intention to develop a digital wireless transmission system that can be used by network providers to offer video, voice and data services. The company's Local Multipoint Distribution Services (LMDS) business has been set up as part of the company's Communications and Electronics Systems group and intends to deliver a complete system, beginning in 1996.

It is anticipated that the initial product deployments will occur from both cable TV and telephone companies located outside the United States because of more favorable regulatory policies, notes Tom Kilgo, manager of communications systems for the company. Depending on the Federal Communications Commission's ability to allocate spectrum for LMDS services, Kilgo says gear could be deployed domestically by early 1997.

LMDS technology allows integrated, two-way distribution of digital multimedia services, including video, telephony and high-speed data. The network requires a fixed transmitter and numerous transceiver nodes that transmit information to small, rooftop antennas and a small network interface unit that connects to standard twisted-pair and coaxial cable premise wiring.

To create an end-to-end system, TI has forged alliances with as-yet unnamed cable TV and telecommunications equipment suppliers for equipment such as set-tops, telephony switches and video headend gear.

The TI system will be modular in nature, allowing the network operator to offer any combination of voice, video and data services. The system is scalable and is most cost-effective in dense urban areas or in small villages and towns where large number of people are concentrated, says Kilgo. He added that the system can be deployed for less than $1,000 per sub, assuming there is access to a fiber network.

Tele-TV selects Thomson to supply wireless set-tops

In what easily qualifies as the largest single contract for digital set-tops, the Tele-TV consortium has selected Thomson Consumer Electronics to supply up to 3 million digital set-tops for MMDS over the next three years. The per set-top cost is under $400 in the $1 billion deal.

Tele-TV is a New York-based joint venture of Bell Atlantic, Nynex and Pacific Telesis that was created to provide economies of scale for the companies and to help them leverage hardware costs.

Each of the three companies expects to begin offering digitally compressed video over MMDS networks on both the East and West coasts, beginning in late 1996.

The Thomson set-tops are full-featured boxes that offer CD quality audio, a 2400-baud modem for upstream communication, 4 megabits of memory for electronic program guides and other applications, 8-bit graphics, an MPEG-2 decoder and a PowerPC microprocessor. The box will be based on the digital entertainment terminal/network interface module design, but will be compatible with MMDS services only.

According to insiders, Thomson won the contract after a furious bidding war with General Instrument and Mitsubishi Electronics. Observers believe the latter two companies dropped out when the per-box price dropped below $400, making it doubtful that any profit could be made on the deal. Thomson, however, wants to bolster its DirecTv set-top presence in an attempt to become the de facto standard, observers say.

As part of the deal, Thomson will also supply the necessary equipment to encode the video and send it out over MMDS transmitters.

Jottings

StarSight Telecast, the electronic program guide provider, has lowered the price of its standalone, set-top receiver to $100, the company announced. The CB1500 receiver, marketed under the Magnavox brand name, allows any TV or VCR to be used with the service, which provides detailed information of channel lineups and allows one-touch VCR recording of programs. The price reduction is expected to result in higher sales during the upcoming Christmas season . . . **Time Warner Communications** announced its intention to purchase and deploy new products from **Antec** during the company's roll-out of telecommunications services. The equipment consists of pre-assembled and fully integrated packages of digital transmission gear, based on the Sonet standard, that are used to interconnect alternative access systems to local exchange carriers and long distance providers . . . **TCI** has chosen **SeaChange Technology** to provide digital ad insertion equipment in the MSO's Chicago system, in a deal valued at more than $2 million. SeaChange will deploy its Spot Insertion System over TCI's ATM-based network. The video server system uses digital compression, computer storage and networking to provide operators with control of spot advertising. The agreement is the third major deal with cable MSOs. The company has already deployed equipment in TCI's Pittsburgh, Pa. system . . . **MCI, Digital Equipment Corp.** and **Colorado Springs Cablevision** have successfully tested the nation's first large-scale cable telecommuting pilot. The remote LAN access trial connects 26 MCI employees with high-speed data access over cable TV plant in a 62-mile area of Colorado Springs. The trial began in late 1994, and next year, the plant will be upgraded with fiber optics to provide reliable two-way data communications and increased capacity. The fiber will be used to eliminate dependency on the local exchange network . . . **TCI** has formed a new business unit that will focus on the company's entry into local telephone markets through its joint venture with **Sprint Corp.** TCI Telephony Services will be led by Jerry Gaines, senior VP at TCI Communications. Local managers will oversee installation, maintenance and control of the telephony networks. Meanwhile, TCI announced its plans to deploy up to 220,000 **Motorola** CableComm subscriber units over the next five years as the company rolls out cablephone service. The roll-out is supposed to begin in early 1996 in the Chicago area. The agreement also calls for TCI to trial Motorola's CyberSURFR cable data modem and Cable Router system . . . CED

In network monitoring, it's the A.M. of a new age.

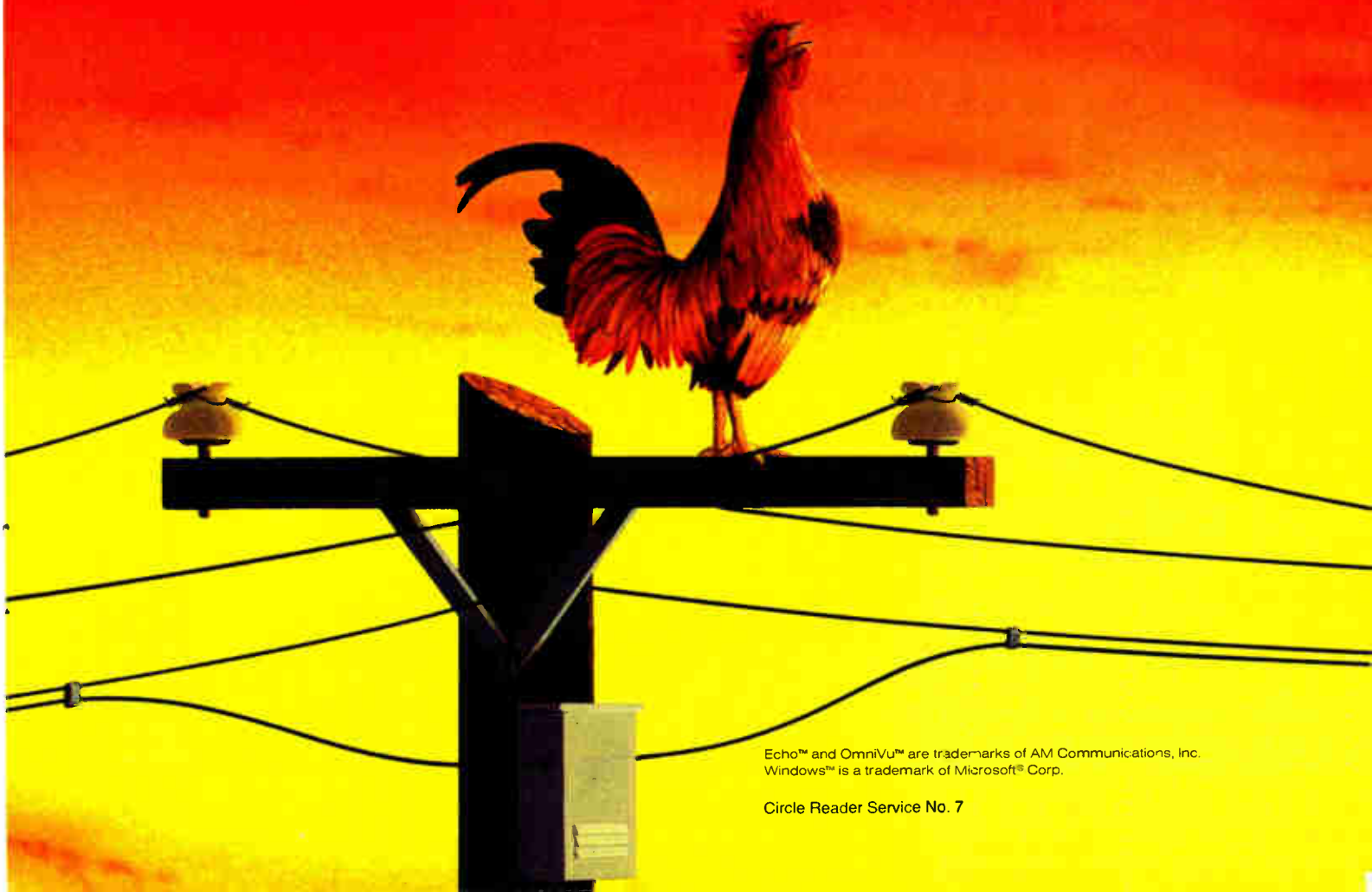
AM Communications offers a decade of experience in cable network monitoring. More than 400 AM systems are at work today, under our own name or within the products of some pretty famous strategic allies.

Our new products include not only Echo, a low-cost end-of-line monitor, but also a truly exciting second generation cable network monitoring system featuring easy-to-use OmniVu software. It's a Windows-based, open architecture system that's powerful, rich in features, and distinctly affordable in price.

AM's total monitoring solutions include hardware, software, and technical service that's in-depth and on time. Please call (215-536-1354, 1-800-248-9004), fax (215-536-1475), or write (1900 AM Drive, Quakertown, PA 18951-9004). And give us the opportunity to do a little crowing about what we can do for you.

AM COMMUNICATIONS

GUARDRAILS FOR THE INFORMATION SUPERHIGHWAY



Echo™ and OmniVu™ are trademarks of AM Communications, Inc.
Windows™ is a trademark of Microsoft® Corp.

Circle Reader Service No. 7

Musician, statistician reigning IT guru

Dr. Sadie Decker

While Sadie Decker was playing Bach and Beethoven on the piano and harpsichord, single-mindedly pursuing a master's degree in music, the suits at IBM were breaking down the door to recruit her for their information technology department. IBM? The computer giant?

Not so strange when you consider that IBM was one of the first to recognize the connection between musical talent and statistical skill, recalls Decker, who adds: "Lots of IT people have music backgrounds." As for Decker herself, music–and music theory–came easily to her, as would many other academic pursuits.

Dr. Decker eventually put that statistical talent to work earning a Ph.D. in Communications from the University of Colorado–Boulder, with an emphasis in research and stats. She also holds a B.S. in biology and in chemistry from CU.

Summit by TCI

These days, as Senior Vice President, Advanced Information Technology for TCI Communications Inc., Decker is up to her ears in stats and software. She has dominion over all of the internal voice, video and data networks, as well as computer systems, that make the nation's largest MSO run. But what she's probably most famous for today is her current pet project, a sophisticated software platform now known as "Summit by TCI."

The central task before her is not for the ulcer-prone: the integration of multiple IT systems into a coherent whole, so that the entire body of the company's information can be shared, and utilized, to benefit both employees and customers. The project will tie together databases from customer service, billing, workforce management and other back-office functions.

Adding a little spice to the mix is the fact that Decker is not working with a homogeneous system. As TCI has acquired numerous cable systems around the country, they have brought with them a multiplicity of software platforms.

Significant progress has been made since the Summit by TCI project was first announced to the world at last year's Texas Show. In mid-October, the system officially went on-line in field tests in Greeley, Colo.

Within the framework of the project's integration, Decker has been directly responsible for a number of firsts in the cable industry. She has built the first–and largest–switched digital data network, and the first cable enterprise system, as well.

Another little research project

For those who raise doubts about TCI's ability to manage such a monstrous database, some insight into one of Decker's previous jobs might help. Earlier in her career, she served as a principal investigator with the National Institute of Health, where she spent "eight years chasing genetic diseases down," and in the process, constructed some extremely large databases to analyze diseases like Down's Syndrome. How large? To put it in perspective, consider that scientists have yet to analyze an entire human DNA molecule, a project that would take teams of geneticists years to accomplish. Considering the complexity of a molecule of DNA puts Decker's work in quantitative genetics into its proper framework.

After spending so much time analyzing the minute components of human beings, Decker moved on to working with the whole organism, in the form of astronauts at the Martin Marietta Astronautics Group space simulation lab. While working at Martin, Decker composed the software systems that drove the simulators.

She eventually ended up as CIO at the aerospace company, and would take the lead in representing Martin on the Supercollider project. But when the company wanted to move headquarters to Bethesda, Md., Decker balked at going back East again. As she now notes, "Been there, done that." That's when TCI beckoned, offering up a huge challenge, but in an entrepreneurial environment.

What does she like best about working at the cable giant? "People aren't afraid to make decisions here," notes Decker. "Brendan (Clouston) thinks in the future. That's significant for a CEO."

Roots in Denver

A Denver native, Decker has contributed her technological expertise to both her local community and the nation as a whole.

✔ She has been appointed by Governor Roy Romer as Commissioner for the Colorado Advanced Technology Institute.

✔ She's currently a board member of the University of Colorado College of Engineering.

✔ Decker has volunteered her time to the National Association of Science.

Somewhere in between earning four academic degrees and the rest of her professional life, she has also raised two sons with her husband, David, an architect. One son, who is, in a manner of speaking, following in her footsteps, has a record label and a rock band called "Car." "He graduated from a buttoned-up college, though," notes Decker. Her other son is in the retail business.

As far as her latest professional challenge is concerned, Decker is very confident that the new software platform will give TCI a tremendous advantage over telcos and others who try to adapt to a new telecom world using legacy systems. "Catch me," she challenges. She'll probably wear them out. CED

–Dana Cervenka

Our Standard for Reliable Performance

For more than 20 years, Alpha Technologies has set the standard for reliable communications power. Like the next sunrise, it's a standard our customers have come to rely on. And while our power may not yet match the certainty of the sun, we're getting closer all the time.

ALPHA TECHNOLOGIES

Reliable Power. Nothing Less Will Do.

Sales & service offices throughout the world. For more information, call: ***1-800-421-8089*** *or* ***360-647-2360***

Broadband Power Systems

Batteries

XM CableUPS®

UPS Systems

Argus DC Systems

Circle Reader Service No. 8

Avocations clues to engineers' potential

By Wendell Bailey, VP of Science and Technology, NCTA

Have you ever noticed how many of the engineers in this industry (who, by the way, are some of the best engineers in any industry) share common hobbies and other passions?

For example, I don't know how many are amateur radio operators (hams), but Steve Johnson at Time Warner Cable has, for many years, tried to maintain a list. The last time that I saw that list, there were a lot of familiar names on it. This didn't surprise me, because so many of us found our way into the world of working engineers through the lessons and accomplishments that we enjoyed as young ham operators.

Accidental destinations

As for other hobbies, flying small (and sometimes, not so small) airplanes seems to be another one that many of us share. I have, for many years, kept a sort of ad hoc list of fellow flyers who are also employed in the cable TV industry. Understanding why this particular shared passion should be so common to our ranks is a little more difficult than understanding how hamming fits in.

I suppose that the technical details and the precision that is required to fly as a pilot in command attract us the same way that the effort to build, understand and use radios does.

Lately, I have spent more than a reasonable amount of time playing "www random page hunting" (trust me, dear reader, this will all come together in the end). You know how it goes: call up any web page and click on the highlighted hypertext words. The hunter may go to a different part of the same web site that he is already in, but as frequently happens, he may go to a completely different web site which has more hypertext to try.

If he does this often enough, he will find that he has traveled to places where the discussion is on a subject that has nothing whatsoever to do with what was on the original web page. This is how I recently found myself at a web site on the subject of "magic."

A passion for conjuring

Now those of you who have known me for awhile also know that I have a fondness for the arts of prestidigitation. In fact, I performed my first public display of sleight of hand at a local talent show while I was in the sixth grade, a mere lad of 11.

What you may not know is how many other cable people, in particular, engineers, harbor a secret passion for conjuring. Bob Luff (Scientific-Atlanta), Bill Riker and Ralph Haimowitz (SCTE) are just a few people who readily come to mind.

If you happen to be one of the secret society, then you know that the biggest secret of all (at least for those who have had the nerve to perform in public) is that to succeed, all a magician has to do is believe that no one can see the sleight of hand that he uses to perform his magic. This one act of faith is what liberates all practicing magicians.

If we look at these non-work-related spare time pursuits, it is possible to see what motivates some of these people, and it might provide clues as to what it takes to attract new people to the profession of cable engineer. Those who choose engineering as a career almost always come with backgrounds that are from one of two very different camps.

One group studied their engineering courses, and nothing else attracted their attention while they were in school. That is to say, that they had no hobbies or interests which gave them a chance to enhance and extend the education that they were receiving in the classroom.

I have hired a few of those engineers over the years, and in most cases, they would have been better off working for one of the big manufacturers that has a need for skilled engineers of the theoretical kind.

Predicting success

The second group studied their engineering courses by day, but by night, they made time for other interests.

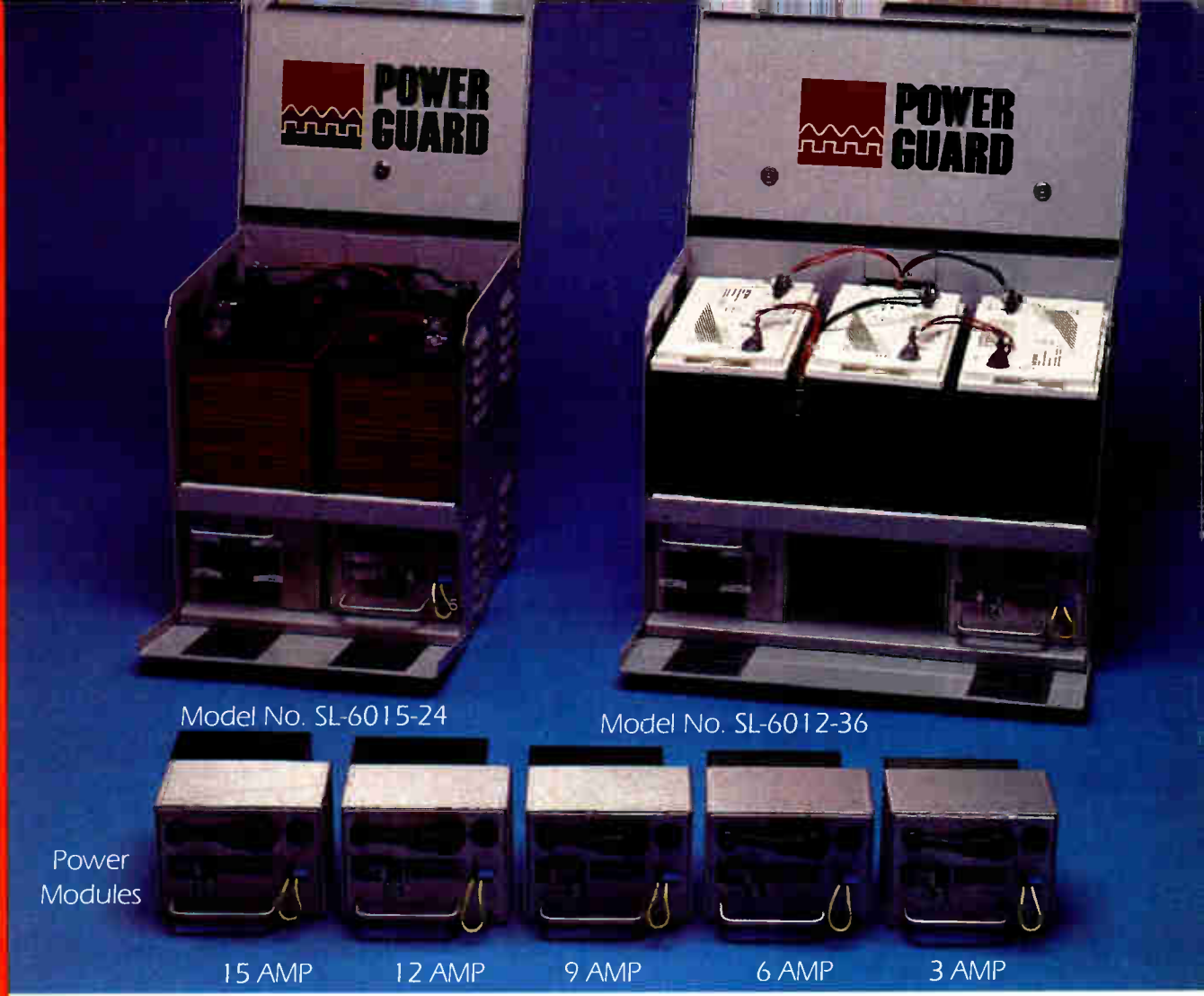
When I have had a chance to interview engineers who have had this advantage, I find hams, pilots, builders of radio control model planes and boats, and magicians. These are the engineers who have helped me run projects, solve customer problems, recover from disasters and develop new products. It was only in later life that I caught on to the connection between engineers who could handle anything that was thrown at them, and the nature and skill set needed to enjoy certain hobbies. That one is a valid predictor of the success of the other is a valuable lesson to learn.

The hobbies that I have mentioned are not the only ones that relate to telecommunications engineering. The range of potentially relevant extracurricular activities is wide and diverse. I remember excellent coworkers who built and rebuilt hot rods, or who collected and restored old radios. Then there were those who recorded, played, sang and mixed music for friends.

In the world that is facing us, with its changes and challenges, we will need all kinds of people. But if I have a choice, I won't make the mistake of hiring or counting on someone who does not show an interest in some subject–or hobby–that takes dedication and care.

That's the same kind of dedication and care that I want in the people I'm counting on to help me make it through the next few years. CED

Power by Design



Standby Power Supplies Engineered for Today's Cable TV Networks

Small Simple Standbys™ from Power Guard will save you money, short and long term.

Since SSS™ is available in two battery (3-6-9-12 or 15 amp ratings) or three battery (3-6-9-12 or 15 amp ratings) configurations, you can maximize efficiency and reduce your power bills and battery costs by choosing the right model for each power supply location. If your power requirements change - simply upgrade the power module. Small Simple Standbys™ will grow with you.

And because our studies have shown that most power supply locations actually use less than 9 amps of power - we strongly recommend that you consider our 24 volt units for those locations. You get an immediate 33% savings in battery costs and still have up to four hours of standby run time.

Small Simple Standby™ - The right product at the right time for the right price. No wonder we continue to be the fastest growing power supply company in Cable TV.

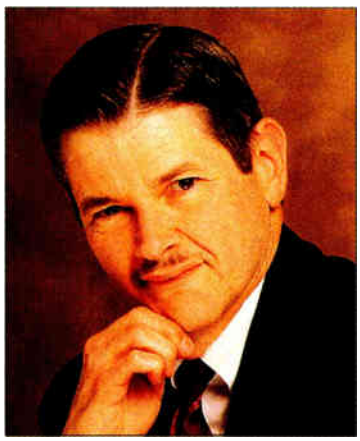
1-800-288-1507

POWER GUARD™

Circle Reader Service No. 9

FAX 205-742-0058

Making peace with the return path



By Jim Farmer,
Chief Technical Officer,
Antec Technology Center

Have a comment?
Contact Jim via e-mail at:
jfarmer@ix.netcom.com

What with the imminent arrival of cable telephony and data, interactive games and headend switched services, the long underutilized reverse spectrum is about to get the mother of all workouts. Considering the problems of the past, what is it going to take to make the reverse path get serious about becoming the killer technology on the cable superhighway?

One big problem is that the return path is dirty. In fact, it's filthy with ingress from short wave broadcasters, amateurs and others who use those frequencies over the air, and from every hair dryer, blender and electric saw in the hands of our customers. How do we improve this in the future?

Nasties in the home

A review of the literature suggests that the major point of ingress is the home. This is where there is essentially no control over what goes on. Many people now believe that the best way to control ingress is to prevent the nasties in the home from getting to the plant. This can be done if we adopt the plan of a box on the side of the house which passes downstream services, but controls the sub low spectrum coming out. If this magic box (let's call it a NID, for network interface device) is to be the gatekeeper for the return path, then it will include a high pass filter or isolation amplifier to prevent signals on the house wiring from getting back on the cable. Then, in order to use the reverse band, the NID must include those services needing reverse path transmission.

For telephony, the NID is a natural place to locate a telephone interface, as the subscriber's telephone wiring already comes to the outside of the house, so operators can conveniently hook up there. Data services can be handled at the side of the house with a modem that connects to the computer with a 10BaseT (a form of Ethernet) connection. 10BaseT connections use a four conductor telephone cable that is easier to install than coax.

If a box in the home must communicate with the headend, a bypass could be provided around the blocking circuitry, for a portion of the return spectrum. Or, the blocking circuitry could be a bandstop filter (similar to a trap). This portion of the spectrum is then declared "off limits" to other users, and the system using that spectrum must find a way to live with the interference. Unfortunately, this is going to lead to bypass filters that are system-specific, and as such, cannot be manufactured in the volume that gets the price down to rock bottom.

Video services, which will likely include some switching at the headend, are a bit less of a slam dunk for an NID. This may require tuners and perhaps decoders on the side of the house. Such an approach would have an advantage over conventional set-top convertor paradigms, in that service to all TVs in the house gets cheaper. On the other hand, the temperature range over which the circuitry must operate is wider, which adds cost.

Cleaning up the drop

The next most important element in ensuring plant integrity is the drop. The industry learned, in the early days of leakage measurement, that cheap drop cable and cheap connectors cost a whole lot of money and pain. Today, MSOs prefer highly shielded drop cable (quad shield, or at least, a good foil and braid), with the best connectors (electrically, not necessarily the easiest to install), installed by highly trained individuals. They are rewarded for a job well-done, and are penalized for one poorly done. And connections should be weatherproofed. Every time a drop is installed or replaced, this should be kept in mind.

A question arose recently as to what specs were needed in the return band to support all of the services coming out of the house. I'll tell you precisely: nobody knows. We do know, however, that we are not at all likely to use the same high density modulation upstream that we use downstream: there are just too many factors that say it won't work.

Most people are talking about using either BPSK (binary phase shift keying) or QPSK (quadrature phase shift keying) upstream. These modulation methods have been around for ages and are pretty well understood. They may not use the spectrum as efficiently as does, for example, 64 QAM, but they work where 64 QAM won't (e.g., low carrier-to-interference ratio).

Hammering out the specs

As robust modulation methods, BPSK and QPSK tend to need less tender-loving care, in such forms as echo reduction (a.k.a. return loss) and signal-to-noise or interference ratio. They also don't need the same flat frequency and delay response. We need to get through more system engineering issues before we have a good set of specs, but we do know that they shouldn't be the same as the specs required in the downstream direction, where the industry goes for broke to cram as many bits into as few megahertz as possible.

Things like isolation amplifiers and taps will need better return loss and flatness in the downstream direction than in the upstream, though cable loss at the high end, where digital downstream signals will be carried, will help mitigate limited return loss.

One way or the other, I'm convinced that we need that return plant now. So we'd better learn to make peace with it. I have seen the future, and it is two-way! CED

NEW Low Price!

THE HANDHELD FLASH MINI OTDR

Portability & Performance

Enjoy true field portability with the handheld *FLASH* fiber optic cable tester. It's small (6 1/2" by 8") . . . lightweight (less than 3 1/2 lbs.) . . . easy to use . . . and performs flash maintenance, fault location, fault analysis, and verifies repairs with the touch of a button.

The field based OTDR *FLASH* is the solution for all your construction and maintenance applications with flexible software tailored to your needs for all stages of test operation. The *FLASH* provides instantaneous link evaluation to reduce repair time and improve efficiency.

Engineered for full OTDR functionality:

- Dual wavelength capabilities - 1310, 1550 or 1310/1550 nm
- Fast acquisition time to analyze attenuation and reflectance
- Automatic injection level analysis
- Automatic ghost detection and cancellation
- Real-time analysis (less than a second)
- Splice location down to 0.05 dB
- PCMCIA memory storage to analyze each trace
- Choose between manual or an auto measurement
- Flexible software solutions for specific applications
- Low power consumption for over 8 hours of field operation
- Simple user interface guides you through the test process
- PC software for data analysis

You'll wonder how we squeezed in so much capability. The *FLASH* provides all the accuracy, speed, and features you'd expect from Wavetek. Get the Wavetek *FLASH*.

Call 1-800-622-5515

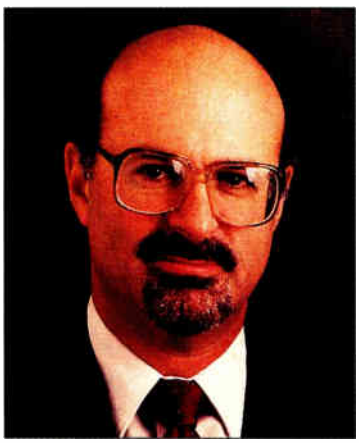
Winner FIBEROPTIC PRODUCT NEWS TECHNOLOGY AWARD WINNER 1994 **Winner**

Wavetek...partners in productivity for over 25 years.

Circle Reader Service No. 10

WAVETEK

An offer you can't refuse: 800 numbers



By Jeffrey Krauss, perpetrator of techno-babble and President of Telecommunications and Technology Policy

A few months ago, I got my own 800 number. Two of them, actually: one for the office and one for home. Why did I do it? Because it was so cheap I almost couldn't afford not to. And that's why we are running out of 800 numbers.

It used to be, in the old days when AT&T had the long distance monopoly, that 800 numbers were very expensive, costing thousands of dollars per month. The charge was a flat rate, independent of usage. AT&T based the monthly price on some cost studies, some economic analysis and some guesses. At one point, AT&T argued that it saved costs by not having to count the calls and provide a monthly listing of calls to the 800 number subscribers.

But business customers eventually figured out that the list of callers was valuable marketing information, and they were willing to pay for it. Competitors began offering different pricing plans, and when the FCC enacted 800 number portability in 1991, it became possible for the 800 number customer to retain his number and move from one carrier to another. With 800 number portability, my 800 number is mine. You can't have it back, Ma Bell.

Today, things have really changed. It used to be that you needed separate phones and local loops for the 800 number to ring to. You had to order phones and loops separately from the phone company, and pay extra. Not anymore. My office 800 number rings on my office phone, and my home 800 number rings on my home phone.

From thousands to pennies

My 800 number doesn't cost thousands of dollars. It costs 18 cents per minute, with a $3 per month minimum. It's almost as cheap as my regular long distance service. And I get a monthly bill, with each call itemized. (I'm not going to advertise the name of the carrier, but if you send me e-mail at jkrauss@cpcug.org, I will give you the name and phone number).

I didn't get an 800 number to let people call me for free. I got it for my own convenience, so I can call my answering machine from a pay phone when I'm out of town and not have to remember the dozen or so digits on my calling card. (And it's much cheaper than using a calling card, which costs about 50 cents a minute.) I got a home 800 number so that relatives or others I designate can reach me from a pay phone without having to reverse the charges.

And of course, everyone has a home answering machine that they may need to call from pay phones or hotel rooms, just like I call my office answering machine.

So how is it possible for a company to offer 800 service for only $3 a month, or 18 cents a minute? It's because 800 service is engineered and carried on long distance networks the same way as long distance service, except that it needs an extra database lookup or two. Long distance companies implemented a new signaling system during the 1980s that created a separate packet switched data network overlaid on the voice telephone network. This is the network that carries the database queries to look up the telephone number that an 800 number actually belongs to. So a variety of services that used to be expensive to implement and administer are now affordable.

800 number auctions?

While 800 service is no longer scarce or expensive, 800 numbers themselves have become scarce. In fact, we're running out. And it's no surprise, considering that the current telephone switching technology has made 800 service widely available and inexpensive. The latest fashion in telecommunications is auctioning radio spectrum, which is also a scarce resource. Maybe 800 numbers should be declared a scarce resource, and auctioned as such.

Early next year, telephone companies will start assigning area code 888 for toll-free calling. This, of course, will result in mass confusion among consumers who will continue to think that only the 800 area code is toll free, not to mention presenting a challenge to the marketing departments of nationwide corporations. And many customer-owned PBXs (private switchboards) probably can't be reprogrammed to treat area code 888 as a toll-free call.

Assigning an 888 area code will initiate the same chaos and confusion caused by the new area codes that no longer have a 0 or 1 as the middle digit. For example, part of Washington state is area code 360, and you'll soon have to dial Scientific-Atlanta at area code 770. Some businesses in these areas are complaining that as many as one-third of the calls to them can't get through, because switches haven't been reprogrammed to recognize the new area codes.

Monopoly pricing

As a sour aside, on my last business trip, I called home on the 800 number from the hotel and found that they treated 800 calls as local calls, charging me 85 cents, much more than the cost of the 800 service itself. Some hotels do this, but others don't. Maybe I'll just refuse to pay these hotel charges in the future. Even after local telephone competition emerges, calling from a hotel room will present this kind of monopoly pricing problem.

Toll-free numbers in the United States have become as much a convenience and as much a necessity as cellular phones. Maybe the next step will be international toll-free calling. I'm looking forward to that. CED

Have a comment?
Contact Jeff via e-mail at:
jkrauss@cpcug.org

LECTRO

Push It To The Limit

The Lectro ZTT Power Supply Ensures Continuous Power

For Your Digital Or Analog Signals...Zero Transfer Time!

The Lectro ZTT

60/90 VAC
Field Selectable
NOW AVAILABLE

LECTRO
A MAGTEC COMPANY

800-551-3790
Lectro Products, Inc.
420 Athena Drive
Athens, Georgia 30603

Circle Reader Service No. 11

The public I-Way comes to fruition

By Tom Robinson, Director of Regulatory Affairs and Technology Development, River Oaks Communications Corp.

"New York City?!?!?!?!" I always get a kick out of that television commercial where the guy tries to palm off some city slicker salsa on his range-tough buddies, but they ain't standin' for it. Well, in a town that certainly does know its salsa, Albuquerque, N.M., I had the pleasure recently of attending and participating in the 15th Annual Conference of the National Association of Telecommunications Officers and Advisors (NATOA). The NATOA Conference focused on a wide range of cable television and telecommunications issues that affect local governments and their citizens. One of the sessions dealt with new forms of institutional networks ("I-Nets").

Fulfilling the promise

Most of us are familiar with the original promise of I-Nets. In some places, shadow-cable still hangs on the poles, waiting to fulfill those promises. But in others, these networks have come or are coming to fruition and are providing governmental and educational services such as teletraining, electronic classroom applications, internal telephony and high-speed data communications. Its salsa prowess notwithstanding, New York City (NYC) is one of those places.

NYC's original intention was to work with what are now the Time Warner and Cablevision systems that serve the five boroughs to develop a coaxial cable I-Net. In fact, Staten Island has a significant coax I-Net in place today. As time progressed, though, fiber optics became a more integral part of cable TV networks; both Time Warner and Cablevision developed alternate access subsidiaries; and other fiber optic system-based competitive access providers (CAPs) sought to implement service in New York. Consequently, it became clear that a fiber optic-based I-Net offered the greatest potential for transporting critical government services.

Accordingly, NYC began to develop an I-Net that was essentially a network of networks combining existing coax resources with new fiber deployment from several different carriers. Once completed, this network will provide connectivity between all five boroughs and span over 270 plant miles.

The beauty of this kind of modular network is that it requires a relatively small amount of incremental infrastructure from each carrier in order to provide a tremendous public benefit. Essentially springing from the provision of dark fibers, the NYC I-Net will have the ability to save the city's citizens/taxpayers/subscribers over $2.5 million a year in service charges alone, serve a potential 606 locations throughout the five boroughs and offer the equivalent of 48 DS-3 circuits, or more than 2 gigabits of data transmission capacity. For maximum utility, the network is also designed to interface with commercial providers at a number of gateway points, including the cable systems' headends and the points of presence (POPs) of several telephony providers.

To implement the I-Net in the most efficient and effective manner possible, the city undertook a detailed needs assessment to select critical sites for the first phase of I-Net implementation. This included review of all the potential service locations, the telecommunications needs of 34 key city agencies, and the potential for enhancing existing and developing new services. The study indicated that the I-Net would have its greatest initial utility if it focused on four applications:

✔ Interactive distance learning–This system equalizes student access to specialized classes, reduces travel required for teacher training and brings NYC's vast educational and cultural resources into a multitude of classrooms. For Phase 1, four high schools, the Borough of Manhattan Community College, Lincoln Center Institute and the Media Lab at the Massachusetts Institute of Technology were chosen as implementation sites.

✔ City-wide training–Phase 1 teletraining implementation includes connections to 50 fire stations covering approximately 600 fire department personnel. Accordingly, one of the critical current benefits of this application is that it reduces travel time for necessary fire training, allowing firefighters to remain on site and react to emergencies during training time if required.

✔ Criminal justice video–This system allows arrest processing, routine court appearances and inmate interviews with attorneys and probation officers to be done remotely. It reduces arrest processing time and streamlines case processing, thus increasing the amount of time police are able to spend on patrol, which enhances public safety.

✔ High-speed, Sonet data communications–Sonet implementation provides a wealth of benefits, including reduced communication cost, enhanced reliability, spare capacity to support new applications, significant network management and control and minimal cost expansion. Implementation to date has increased the flow of information between city agencies and allowed a significant sharing of resources. The largely fiber-based I-Net is perfectly suited for expansion of the Sonet system to all facilities connected to the I-Net, ultimately allowing implementation of a city-wide Sonet ring.

Initial assessment of Phase 1 implementation indicates that the I-Net is having a significant effect on city operations. It is increasing productivity, cutting operating costs, improving service delivery and increasing inter-agency communication and coordination.

These are significant benefits for any local jurisdiction and its citizens, so the logical question is, are new forms of I-Nets workable in other places? The answer is yes. Today there are I-Nets operating in localities large and small. Just as implementation of fiber makes sense in a telecommunications system 1/100th the size of that covering NYC, so, too, do targeted fiber or HFC-based I-Net applications.

New York City? It's the real deal, and a good example, when it comes to I-Nets. CED

Discover The Best Trade Route To The New World.

Bon Voyage. Cable operators your ship has come in. Motorola's engineers have colonized the new world of the information superhighway and claimed it for cable. With CableComm™ technology you now have the most direct route into interactivity for your subscribers.

This conquest is made possible by Cable Router, part of the CableComm family of technologies. Cable Router provides the interface between a hybrid fiber/coax transmission system and local and remote TCP/IP networks. Residing in a headend or central office, it concentrates traffic from cable modems and manages all data communications bandwidth in the HFC system.

Cable Router allows operators to safely navigate through the perilous upstream noise problems inherent in HFC systems. It also provides superior bandwidth and spectrum management and delivers high throughput and efficiency for high speed data communications. The scalable architecture of the Cable Router suits present and future broadband network requirements. All these capabilities leverage the financial investment in existing HFC systems when deploying high speed data services.

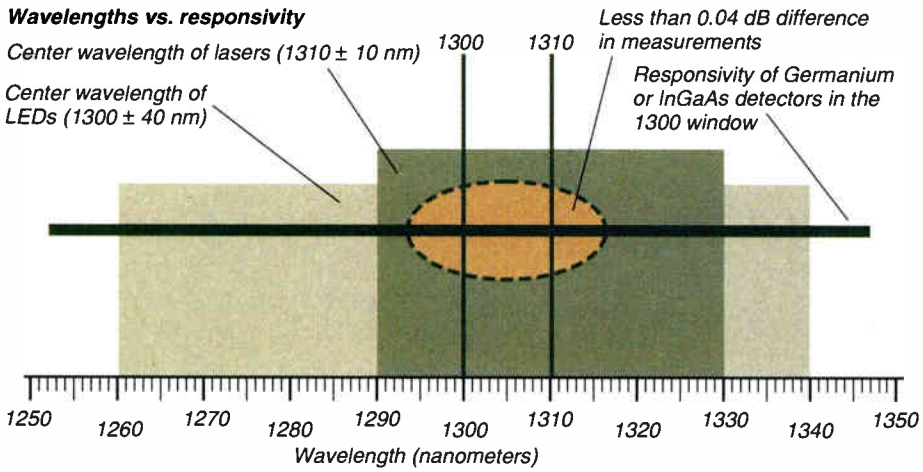
Vision and determination were the hallmark of the ancient explorers. An outlook which Motorola has embraced throughout it's history. And like the bygone age of discovery there are those today who harbor doubts about the uncharted world of interactivity. Motorola is here to dispel those doubts and prove to cable operators that this new world is anything but "flat". We invite you to come on board with Motorola's CableComm technology. There's a bright new world just over the horizon waiting for you and your subscribers. Call to book your passage with Motorola today.

MOTOROLA

Multimedia Group

1475 W. Shure Drive • Arlington Heights, IL 60004
1-800-2WAY-HFC • 708-632-3409
Circle Reader Service No. 12

1300 vs. 1310 nm measurements



The difference in responsivity between 1300 and 1310 nm for most optical power meters is less than one percent.

There is some confusion in the industry regarding optical power meters calibrated at 1300 nanometers (nm) and 1310 nanometers. Does the meter really need to be calibrated at both wavelengths? No, and here's why.

First, there are two basic types of light sources: Light Emitting Diodes (LEDs) and lasers. Generally, LEDs are used for testing multimode fibers, and lasers are used for testing long distance, singlemode fibers. LED manufacturers commonly specify the center wavelength of the devices as 1300±40 nm, meaning, the peak wavelength can be anywhere from 1260 to 1340 nm. Lasers are typically specified as 1310±20 nm, giving a range of 1290 to 1330 nm. Unless the user has a spectrum analyzer handy, the exact center wavelength will be unknown.

Most optical power meters incorporate either Germanium or Indium Gallium Arsenide (InGaAs) photodiodes. The difference in responsivity between 1300 and 1310 nm for these devices is less than one percent. Responsivity is how much electrical current the photodiode generates from a given amount of light at the specified wavelength. A one percent difference yields only a 0.04 dB change in reading on the meter.

Second, the change is only valid for absolute power (dBm) readings, such as verifying the output of a transceiver card. During loss measurements, once the reference level is subtracted from the measurement level to obtain the loss value, the 0.04 dB potential change is subtracted out and eliminated.

Example: dBm - dBm = dB

and (dBm + 0.04) - (dBm + 0.04) = dB

Therefore, since the source wavelength is unknown (and can be anywhere from 1260 to 1340 nm, which covers both 1300 and 1310 calibrations), and any change is eliminated during a loss measurement, having an optical meter that is calibrated at only one of these wavelengths makes no difference at all.

Ryan Irving
Technical Support Specialist
Noyes Fiber Systems

Reader's recollections

Your piece in *CED* saluting the pioneers was very enjoyable. It was very nice to recall so many of the events and remember the individuals who were instrumental in shaping them.

I was surprised that (on page 4A) you wonder whether "...the engineers at HBO had any idea of the magnitude of their efforts and wisdom."

As director of engineering for HBO at the time, I can assure you that I was well aware of the magnitude of the effort. It was quite obvious that the 10 meter antennas (at an *installed* cost of closer to $200,000, in 1975 dollars) would not proliferate to a great extent. Efforts were made to get feeds of the HBO signal to surrounding cable systems via microwave. This was before the days of clustering, and at a time when cable operators were competing for franchises. These attempts didn't bear much fruit, and also looked as if they would take a great deal of time. The obvious answer (for those fools who go where angels fear to tread) was to use smaller, lower cost earth stations and convince the FCC that this was a valid approach.

To set the record straight (page 13A), it was not just HBO and Scientific-Atlanta that worked on the task of getting the FCC to approve a ruling granting the use of small earth stations for satellite reception. I set up a meeting of many different vendors at HBO in New York in an attempt to develop an approach to petitioning the FCC. After preparing a technical and legal submission, many companies and organizations, including the NCTA and CATA, submitted supporting documents. Many days were spent walking the halls of the FCC and knocking on doors. In fact, it was at that time that I first met Bob Luff.

Through the cooperative efforts of a great many people, the FCC granted the petition, and the rest was surely history.

Bob Tenten
NY Choice TV Inc.

COMMENTS?

Do you have a comment about a recent article or editorial? An opinion you'd like to voice on a timely industry issue? We'd love to hear from you!

Our policy is to print letters on a space available basis. Please include your name, title and company affiliation with your submission.

Send your letters to: Editor, CED magazine, 600 S. Cherry St., Suite 400, Denver, CO 80222
Or fax to: 303-393-6654

[IT TAKES THE "STALL" OUT OF "INSTALL."]

The Deltec® Cable Support System from Thomas & Betts can make a real difference in your installation time. It installs with just a single wrap. Saving you time *and* money.

Here's another difference -- it's not metal, it's homopolymer acetal. A material that has more than proven itself in 20 years of harsh outside plant testing.

What's more, the Deltec System has no sharp edges or points. So it's easy on your hands. Easy to hold on to. And easy on coaxial, fiber optic, and twisted pair cable. All of which makes the Deltec System easy to work with. And of course, it's fast, too.

Last but not least, the Deltec System is versatile. It supports cable either horizontally or vertically.

For more information, just call 800-685-9452. We'll try to keep it brief, because we know how valuable your time is.

Deltec®

ISO 9000 Registered

Thomas&Betts

Circle Reader Service No. 13

A hybrid active passive design for Fiber closer to subscribers HFC networks

By Stefhan Sherman, Manager, VSB-AM Product Management, Nortel/Northern Telecom

Cable TV companies, telephone companies and other service providers are approaching an era in which they will be allowed to offer a sophisticated set of voice, data and multimedia services to their subscribers. In order to be competitive, they must build high-capacity networks with an extraordinary degree of network reliability and signal quality for all services—a difficult challenge with today's basic network configurations. Given that fact, many are installing hybrid fiber/coax (HFC) backbones, which extend fiber into the neighborhood.

Consider, for example, a network that takes fiber even closer to the subscriber than current HFC solutions.

In spite of a wide range of advantages, the approach at first appears to be more costly than installing a traditional HFC network. This is true if the HFC network is being installed purely for cable TV transmission, or if it is providing a short-term solution. But if a company is looking to become a multi-service provider, this new network approach is not only more efficient, but more cost-effective—and essential—over the long term.

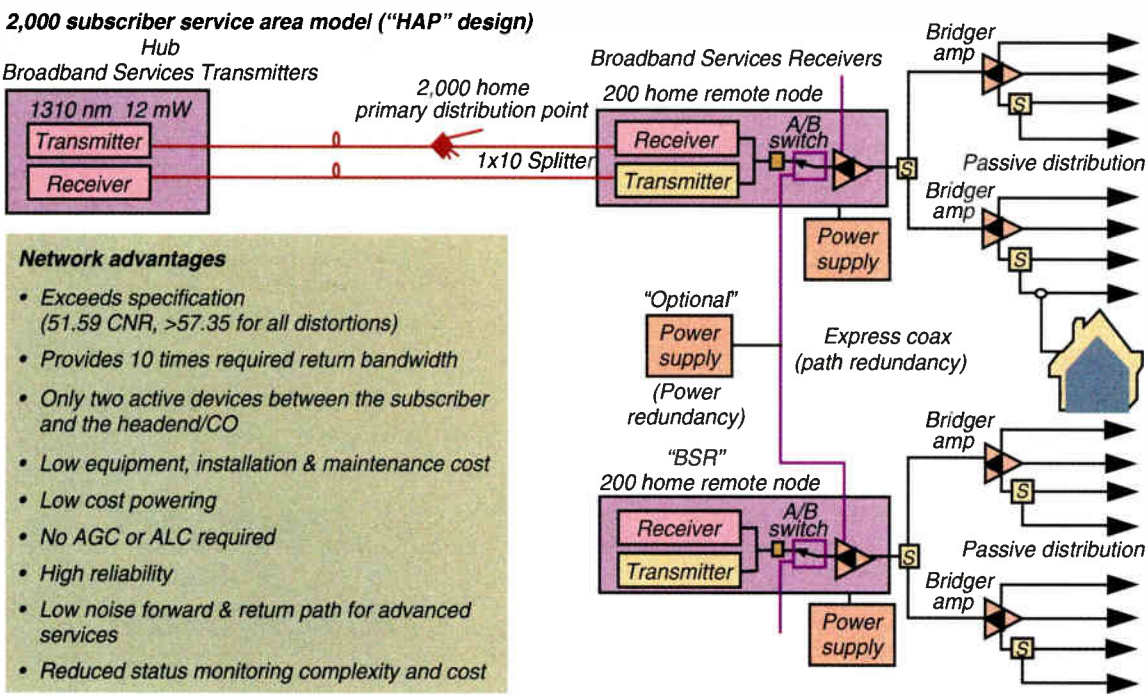
A hybrid active passive design

The author's company has designed a fiber-to-the-feeder network architecture that provides traditional active design, single-laser transmission to a segmented 2,000-node serving area combined with the exceptional reliability and performance of a passive network. This "hybrid active passive" (HAP) design yields a network that is less expensive to procure, engineer, install and maintain than either an active or passive network.

The HAP design takes fiber all the way out to the neighborhood, then relies on coax to feed services to the home. A wallbox on the subscriber's home serves as an interface for the coax and in-house twisted-pair telephone wiring necessary for terminating voice calls. Traditional HFC networks rely heavily on coax that cascades from the fiber node site over four or five coaxial amplifiers before terminating directly with subscriber cable equipment. While an effective arrangement for cable TV, this approach—with its numerous potential failure points—provides neither the reliability nor the quality required for other services.

In the HAP network, 50 MHz to 750 MHz downstream broadband services are introduced at the headend where the signal is transmitted over fiber optic cable to the primary distribution point. In a traditional active design, the primary distribution point would be the point of termination for the fiber optic network, and the beginning of the cascaded amplified coaxial plant.

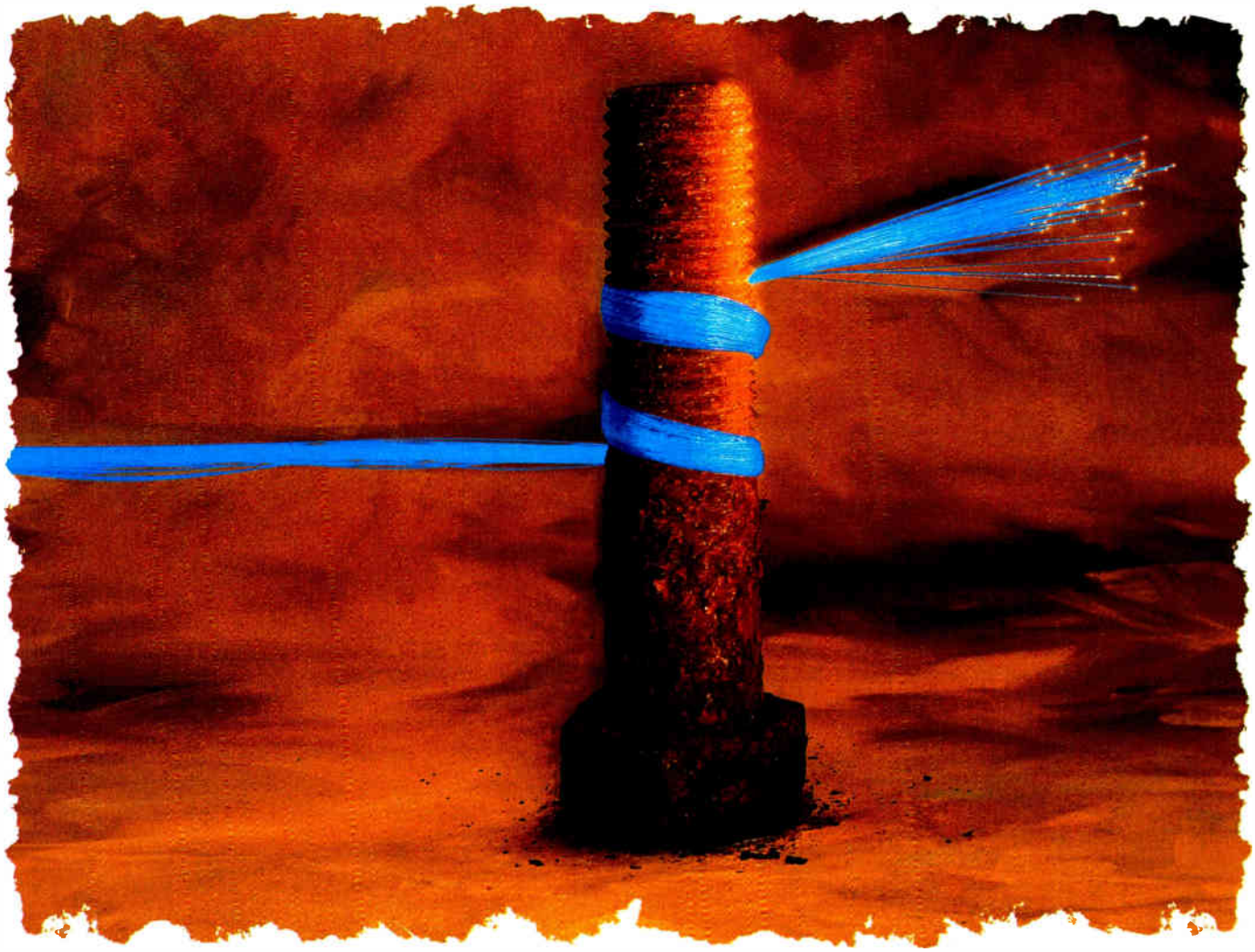
The HAP design uses the same single laser transmission approach of the active design, but instead of terminating the fiber at the primary distribution point, the signal is split and routed to multiple remote fiber nodes. The remote nodes are placed at the traditional active feeder point in the network, eliminating the need for active trunk cable distribution.



Fewer actives

With the virtual elimination of cascaded active devices, the remote fiber node—coupled with one stage of bridger amplification—can drive a passive distribution service area of between two and 500 homes.

The HAP design requires fewer power sup-



To bend glass without breaking it is impressive. To do it decades from now is amazing.

Alcatel fiber with the revolutionary AFC3 coating system actually gets stronger and stays flexible as it ages. Not convinced that's amazing? Consider for a moment. What else in the world defies the unwritten natural law that everything gets weaker, more brittle and less flexible with age? Yet few attributes could be more important for the fiber you install in your network. Because after you install it, you need to access it. Tomorrow. Months from now. And years from now. Get Alcatel AFC3 protected fiber, and you won't worry about flexing, stripping or splicing. For years and years. For a brochure on Alcatel world class fiber and cable products, please call **1-800-ALCATEL.**

ALCATEL

Circle Reader Service No. 14

plies, almost two-thirds fewer active devices than a traditional active design, and can be supported by a simplified status monitoring system, thus lowering overall installation and maintenance cost.

Superior signal quality

A typical active cable TV network using fiber to the feeder and coaxial distribution requires five to six active devices in cascade between the subscriber and the hub. In contrast, the HAP design requires only two: an optical receiver and a bridging amplifier between any subscriber and the hub. This reduction in active devices enables the network to deliver superior quality transmission that exceeds traditional design specifications for carrier-to-noise (CNR) and distortions (CSO and CTB).

In addition, extended-reach optical transmitters and low-noise receivers designed for the HAP network provide optical path transmission that rivals traditional 1550 nm performance without requiring special dispersion-shifted fiber optic cable, narrow linewidth lasers, or dispersion-compensating circuitry. The HAP design does not require the use of AGC (automatic gain control) or ALC (automatic level control) to establish or maintain high-signal quality integrity.

High reliability

To ensure network reliability, the HAP design uses a unique path protection and powering option. Unlike traditional path protection—which relies on additional optical fibers, expensive redundant transmitters, and/or receivers coupled by optical switches that can degrade performance due to reflection and insertion loss—the HAP design uses an "express coax" path between remote nodes linked by an RF A/B switch-provisioned optical receiver.

The HAP design divides the serving area into multiple cells supported by a dedicated return transmission path

An optical receiver equipped with an A/B switch can provide two levels of switching protection: it detects loss of light and failure of an optical receiver. If a failure occurs, alternate signal routing is provided from the adjacent optical receiver node via the express coax route. Using the auxiliary trunk level output feed of the remote node provides forward and reverse signal path protection with little or no degradation in performance.

To protect against mass outages caused by the traditional active design series deployment of power supplies, the HAP design uses a dedicated pole-mount power supply for each remote serving area. Because there are only three active devices at each serving area, with a combined power draw of 140 watts, battery capacity can be sized for eight hours of backup. Additional powering protection can be provided by deploying an optional power supply located on the express coax run.

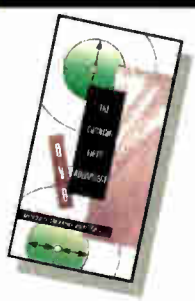
WHEN IT COMES TO OPTICAL FIBER WE'VE GOT YOUR NUMBER. NOW HERE'S OURS.

Cable TV technicians and engineers already know that Corning's consistent and field-friendly fiber provides the industry's lowest splice loss numbers. Now, when it comes to timely information for cable TV fiber applications, here's the only number you'll need.

Corning Optical Fiber

Count on Corning Fiber

Get a **FREE** copy of "The Corning Fiber Advantage"



Learn why Corning fiber is the best performing, most consistent and reliable optical fiber available; call the Corning Optical Fiber Information Center for your free copy.

800-525-2524
Ext. 538

CORNING

Count on *Corning*® Fiber™

Circle Reader Service No. 16

For More Information, Call 1-800-SENCORE!
(736-2673)

Sencore, 3200 Sencore Drive, Sioux Falls, South [illegible] 57107 - Phone [illegible] - Fax (605) 339-0317

COVER STORY

Telcos reshaping video battle plans

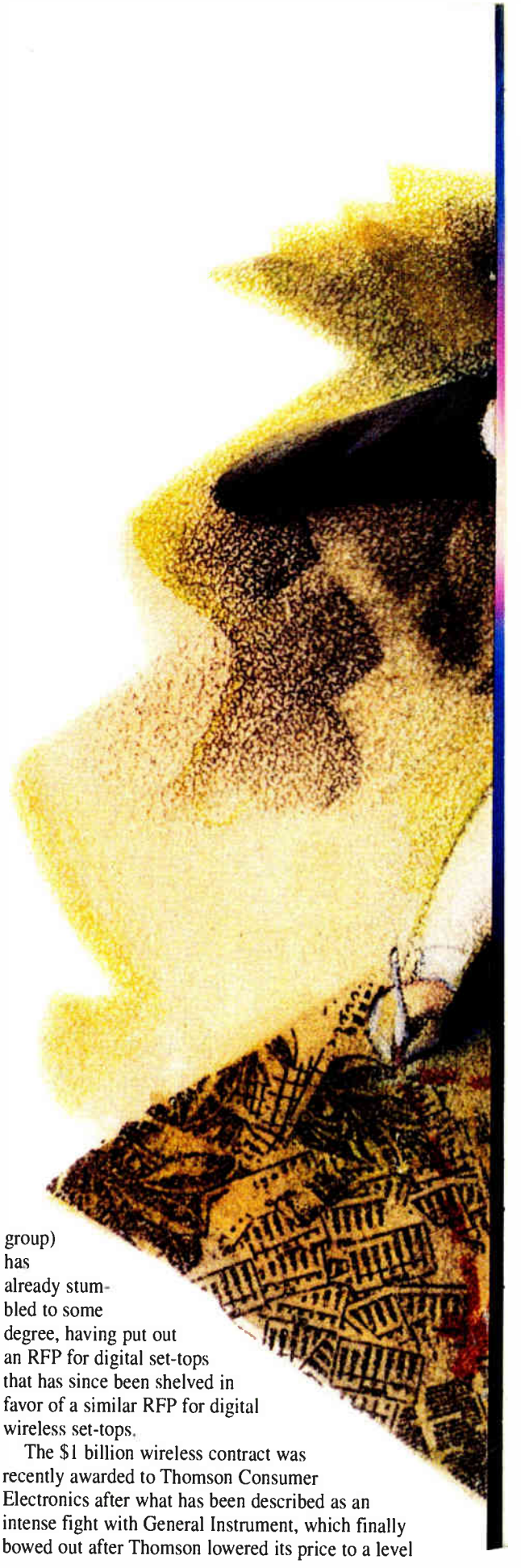
Delays and gridlock force some to retrench

By Roger Brown and Dana Cervenka

By now, cable operators were supposed to be feeling the heat of competition from telephone companies in a number of major markets as several of the largest regional Bell operating companies began rapid build-outs of broadband networks designed to offer broadcast and interactive video services. But as regulators took an inordinate amount of time to approve Section 214 waiver requests, and the RBOCs discovered these networks to be both more expensive and more complicated than originally anticipated, the competitive battle plans have been stalled, and in some cases, re-evaluated altogether.

Instead, some telcos, including Bell Atlantic and Nynex, asked the FCC not to approve their 214s as they went back to the network design drawing boards. In addition, others took advantage of the favorable regulations surrounding MMDS (multichannel, multipoint delivery service), a.k.a. wireless cable, and invested heavily in companies that owned licenses in desirable urban locations to make a rapid entry into the video arena.

At the same time, three of the seven RBOC sisters formed a consortium to leverage their combined buying power for hardware and pool the necessary funding to develop new sources of programming. Known as Tele-TV, the consortium of Bell Atlantic, Nynex and Pacific Bell (US West is rumored to be mulling joining the group) has already stumbled to some degree, having put out an RFP for digital set-tops that has since been shelved in favor of a similar RFP for digital wireless set-tops.



The $1 billion wireless contract was recently awarded to Thomson Consumer Electronics after what has been described as an intense fight with General Instrument, which finally bowed out after Thomson lowered its price to a level

ILLUSTRATION BY SALLY WERN COMPORT/SIS

Some RBOCs are rethinking the wisdom of entering the video market as a VDT provider

many consider too low to make money on. Thomson, however, is clearly large enough to absorb a loss–if there is one–on the boxes and is seen as keenly interested in garnering marketshare in digital set-tops (the company already supplies units for the DirecTv DBS service).

In addition, some RBOCs are rethinking their network architectures as well as the wisdom of entering the video market as a VDT provider. For example, Bell Atlantic and US West are both backing away from HFC platforms, publicly stating that they'd prefer to wait for promising fiber-to-the-curb hardware and systems that will drive fiber deeper into the network.

Ameritech, frustrated over the FCC's lengthy 214 approval process, has scrapped its VDT approach, choosing instead to enter the video market as a traditional cable operator, thinking it more fruitful to seek

franchises at the local level (which will also allow them to own the programming that's delivered over the network). Others are said to be considering that approach as well.

AMERITECH

Growing weary of waiting for the FCC to finalize the rules governing video dial tone service, Chicago-based Ameritech is charging ahead as a cable operator, securing franchise agreements in several cities in the Midwest. While the RBOC's video arm initially announced plans, in 1994, to offer services as a video dial tone provider, it put its time waiting on the Commission to good use, convincing a U.S. district court in Chicago that the company should be able to offer cable television service within its own area of operation, as well as outside.

"We have not ruled out video dial tone," qualifies Dave Onak, a spokesperson for Ameritech New Media Enterprises Inc., the company's cable TV/interactive video subsidiary. "We will wait and see what the final rules are, and then determine whether or not we can compete effectively with those rules, and if those rules make more sense from a customer perspective." That could mean operating as both a cable provider and a video dial tone provider, depending on the conditions that make sense for a particular market.

To pursue its latest strategy as a cable operator, the RBOC has negotiated four franchise agreements in suburban Detroit, Mich., where subsidiary Ameritech New Media Enterprises Inc. plans to serve about 110,000 residents. New Media's stated goal is to reach about 6 million homes by the year 2001, first launching service to some communities in the Midwest early in 1996. Late last summer, the company also announced the receipt of its first cable TV franchise in Illinois (Glendale Heights), where it will pour more than $5 million into a two-way video network. And Ameritech has already received approval to construct a two-way video network in Columbus, Ohio, where it is currently in the midst of franchise negotiations, and if successful, will go up against Time Warner Entertainment and Coaxial Communications.

Ameritech is forging alliances to make sure it has access to plenty of content to offer on its network

But while the company's guise has changed, the network has not: Ameritech is still committed to deploying a 750 MHz, hybrid fiber/coax broadband architecture that will serve nodes of no more than 500 homes in its target area in the Midwest. The company is in the process of constructing its platform in Illinois, Ohio and Michigan, with expectations that it will take about two years to build out the network in the four Michigan communities, and about a year in Glendale Heights, Ill.

Don't look for any video trials staged by the RBOC, though. Ameritech already has a body of experience in delivering video services, including work with video conferencing networks and experience in delivering interactive services. "We are confident that the technology works," says Onak. "So we are moving forward."

Last February, Ameritech gave the official nod to several manufacturers to supply its network, including Scientific-Atlanta, Digital Equipment Corp. and ADC Telecommunications Inc.

Ameritech is also forging alliances to make sure that it has access to plenty of content to offer on its network. One of those alliances is a joint venture with The Walt Disney Company, GTE, BellSouth and SBC Communications to "develop, acquire, package and market entertainment, educational and interactive programming on a nationwide basis," according to information released by the participants. The venture will also cook up its own consumer navigator, as well as offer VOD, home shopping and video games.

Bell Atlantic

In spite of its failed merger with Tele-Communications Inc. and the withdrawal of its section 214 waiver applications from the FCC, Bell Atlantic remains committed to offering video services in its territory and is moving forward with its video dial tone trial in New Jersey and the video-on-demand service in

From source to subscriber, only Tektronix helps you maximize signal quality. And customer satisfaction.

The all-new VM100 Video Measurement Set combines automated one-button testing, VITS signal ID, remote control capability, and Tektronix measurement accuracy in a highly affordable instrument.

The rugged RFM150 SignalScout™ signal level meter automatically performs a wide range of advanced measurements with unmatched simplicity.

In today's increasingly competitive cable TV industry, the key to keeping your customers happy — the key to keeping your customers period! — is better signal quality and more reliable service.

Fortunately you can turn to Tektronix for all of your testing needs. From installing and maintaining the cable plant, to monitoring and verifying the video/audio signal itself. Literally everything, from the headend to the home.

Today, Tektronix remains the industry standard to which all others are compared, from RF and digital transmission testing to the very latest in broadband and digital compression technologies. Tektronix is the name the television industry turns to. To win customers. And keep them.

For information on Tektronix communications test solutions, just call 800-426-2200. (When prompted, press "3" and ask for program 441.) Or, find us on the Web at http://www.tek.com/mbd/w441

TESTING THE CHANGING WORLD OF COMMUNICATIONS

Tektronix

This, however, is not the carrier's first experience with video trials. Back in 1986, the RBOC experimented with delivering cable service to two communities in the Orlando, Fla. area, though that trial concentrated on one-way video delivery.

BellSouth also constructed a sophisticated, all-fiber network utilizing Sonet technology and ATM switching to serve institutions and large businesses in North Carolina.

NYNEX®

After concluding a year-long, analog video dial tone technology trial in Manhattan, Northeastern RBOC Nynex is looking to start anew with a digital trial in the city when the equipment is ready, sometime next year. "We thought it made the most sense to wait until more advanced technology became available," says a spokesperson for Nynex, "beginning a new trial fresh in 1996, and taking a full year to evaluate the technology."

The Manhattan trial, which had involved about 2,500 customers in three East Side apartment buildings, utilized an HFC network to deliver cable TV programs for Liberty Cable Television and Time Warner in its first phase, delivering their programming to apartment dwellers. According to information released by Nynex, however, the trial's main focus was "to test the much-heralded video-on-demand services by combining Nynex's switching, storage and transmission facilities with the diverse offerings of cable TV and other program providers." And in fact, the RBOC provided interactive services such as movies-on-demand and news-on-demand to a few dozen customers involved in the trial.

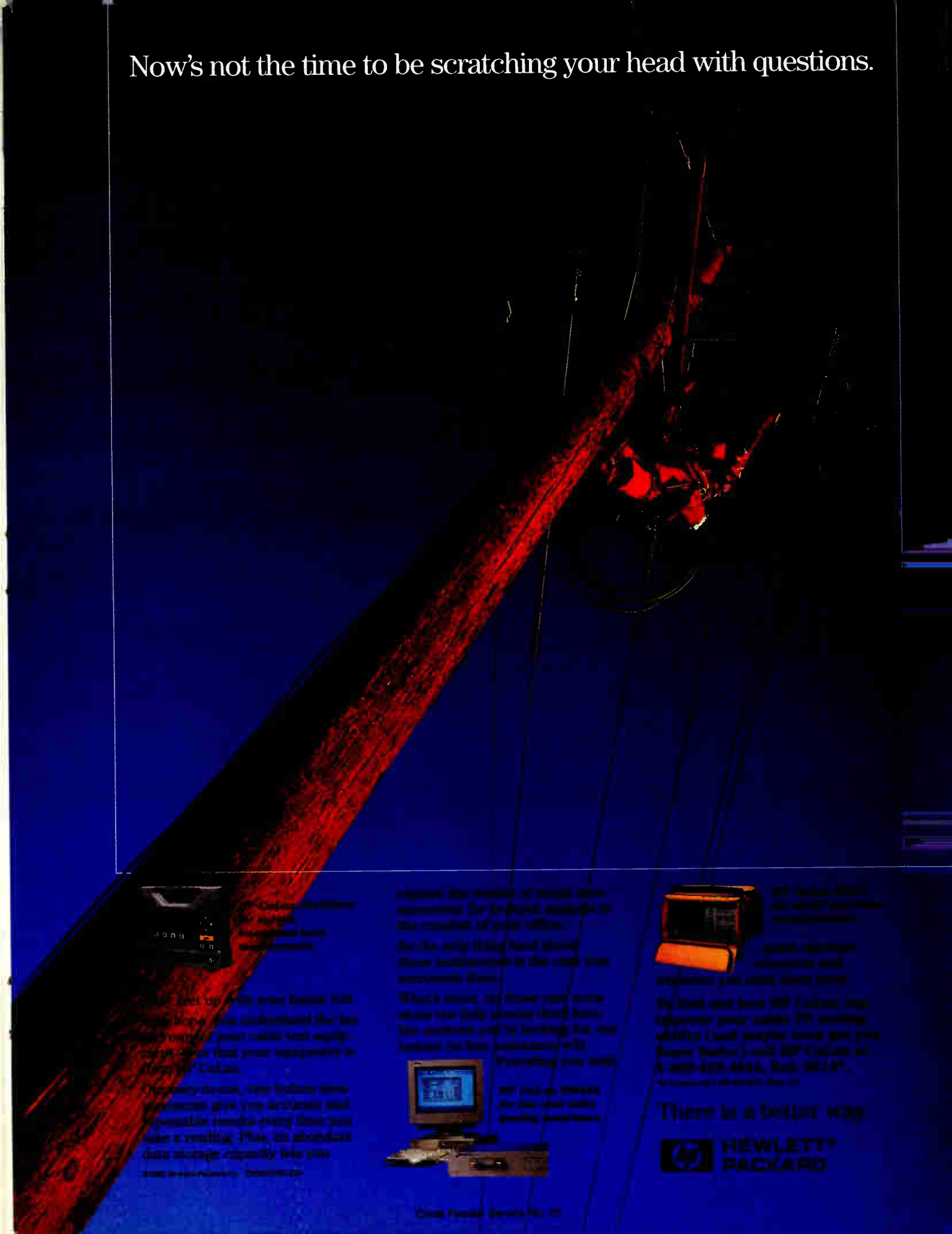
For its upcoming digital trial, Nynex will be looking at a variety of different technologies

While the Manhattan trial tested out the merits of the HFC architecture, for its upcoming digital trial, Nynex will be looking at "a variety of different technologies, depending on the market, including Switched Digital Video (SDV) and ADSL (Asymmetrical Digital Subscriber Line)," according to the spokesperson.

Separate from the trial, the RBOC is throwing its energies into wireless cable as its front-line strategy. Though wireless and wireline video are viewed by Nynex as being complementary, "near-term, we are going to get into the market more quickly and in front of more people with digital wireless cable," says the RBOC's spokesperson. To that end, Nynex is looking at digital wireless cable distribution through its investment in CAI Wireless, with plans to roll out the service beginning in late '96, and continuing on into 1998 across its region. The carrier predicts that the wireless strategy will enable it to pass 7 million people by the end of 1997.

Why the switch in tactics? After originally announcing plans to provide interactive television services to roughly 2 million homes in its region by the end of '96, Nynex took a look at

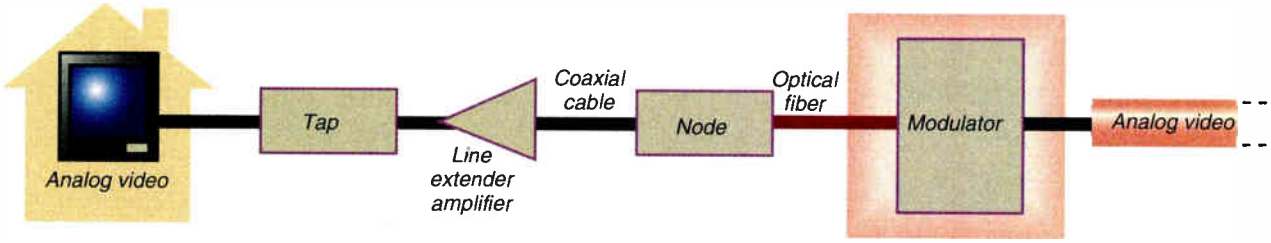
Now's not the time to be scratching your head with questions.



There is a better way.

HEWLETT® PACKARD

Figure 2: Hybrid fiber/coax. For one-way broadcast services.



its plans and realized that "the technology just wasn't there," according to the spokesperson, who adds, "I think the whole industry is going through this."

On the wireline side, Nynex is forging ahead with constructing hybrid fiber/coax networks in New England, where it has received regulatory approval of its Section 214 waiver.

In February of this year, the RBOC also received FCC approval to begin constructing its HFC network in Warwick, Rhode Island, and to date, the network passes about 1,800 homes there. Eventually, the network will pass all 60,000 homes as per the terms of Nynex's 214.

However, it is not video, but telephony which must first pass muster on the HFC network. Once the company's engineering team is satisfied with its tests of telephony over the HFC infrastructure, then Nynex will have to file tariffs in order to offer commercial service.

And simultaneously with the FCC's approval of its Warwick application, the carrier received 214 approval to serve about 360,000 homes in the Somerville, Mass. area.

So even with its near-term strategy in wireless cable, the RBOC is still committed to building out its wireline network.

"We think that interactive services over a wired network are going to be a differentiator for us," adds the spokesperson. "It's just coming a little slower than we originally thought."

PACIFIC BELL®

No, Pacific Bell hasn't changed its network design. But it has altered its construction schedule to focus its planned buildout in the San Francisco Bay Area, where it will compete directly with TCI (which, after its acquisition of Viacom, will pass roughly 90 percent of the homes there).

Although Pac Bell sliced $1 billion out of its planned five-year, $16 billion capital expenditures to build the California superhighway, the company remains committed to the build, according to company spokesmen.

But the new plan will actually speed up the construction of the network in San Francisco, while slowing the process in southern California, where several cable operators own franchises. In fact, Pac Bell intends to roll out digital wireless cable services (MMDS) there sometime next year to speed entry into the video marketplace. That's where it expects to save the $1 billion it cut out of its budget and will instead use for other services, including long distance and wireless telephony.

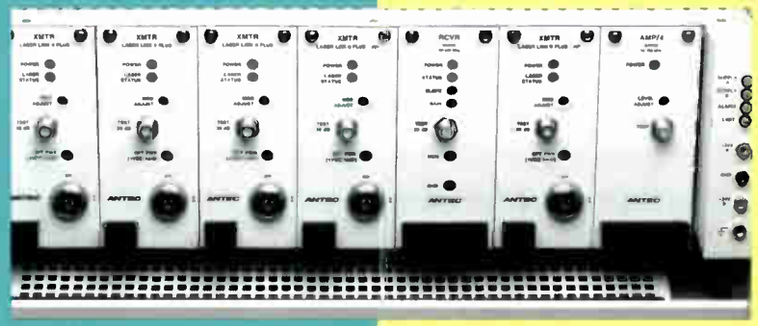
Under the new deployment schedule, Pac Bell now expects to pass roughly 1 million homes with its HFC network by the end of 1997, and about 3 million homes by 2000. Wireless service, in contrast, could be available to about 5 million homes in late 1996 or early 1997.

Although Pac Bell officials didn't provide specifics, the company did acknowledge that the Bay Area build will be expanded in scope to include communities to the north and east.

Although the company is dismayed over regulatory delays and legislative gridlock that have slowed the construction process, it remains convinced that the upgrade is critical "because of the improved telephone service and cost savings its offers," according to a release the company issued.

The network the company is building is an advanced HFC network that will initially be used to transport video and data services. It is expected that the same network will be used to offer telephony services sometime in 1996

Not Having to Change is Sometimes Better.



In 1988, ANTEC introduced fiber optic transmitters and receivers to U.S. cable television operators. We received the NCTA Vanguard Award for this achievement and we have steadfastly supported the application for 7 years running.

In 1990, we introduced the Laser Link II modular platform. So the Laser Link II shelf configuration you bought from us in 1990 supports the forward and reverse transmitters and receivers you need today. While making continuous improvements, the fundamental platform has remained the same, ensuring unprecedented reliability, lower operational costs, and zero technology obsolescence.

LASER LINK II™
TRANSMISSION SYSTEM

The Laser Link II Transmission System

The Laser Link II Transmission System moves up to 80 channels of analog video and compressed digital signals in a 50-750 MHz spectrum. It's both compact and modular. And its flexible internal footprint accommodates a broad array of laser diodes.

The Gateway Family of Optical Receivers

The Gateway Family of Optical Receivers integrates video, data and telephony signals in interactive broadband delivery systems, converts the signal back to RF, then transmits it to your customers' homes. The Gateway Family features analog and digital receiver platforms and multiple RF output options. Flexible enough to meet the intense demands of your growing network, you can upgrade Gateway output, redundancy, and network management at any time.

GATEWAY SERIES I

GATEWAY SERIES II

ANTEC

network know-how

ANTEC

network know-how

ANTEC Optical Transmitters and Receivers, including the entire family of Laser Link and Gateway Products, are the reliability standards by which every other manufacturer judges itself.

For complete information and to register to win a

PRIZE VALUED AT $500

in our Western Show Raffle call or fax.

(Operators only please!)

1-800-531-2611

EXT 8226

FAX 770-441-2460

Don't miss us at The Western Show, Anaheim, CA, Booth #200.

RAFFLE REGISTRATION

Please complete and fax us at 770-441-2460 or bring to Optronics Display at The Western Show, ANTEC Booth #200.

Name _____

Company _____

Title _____

Address _____

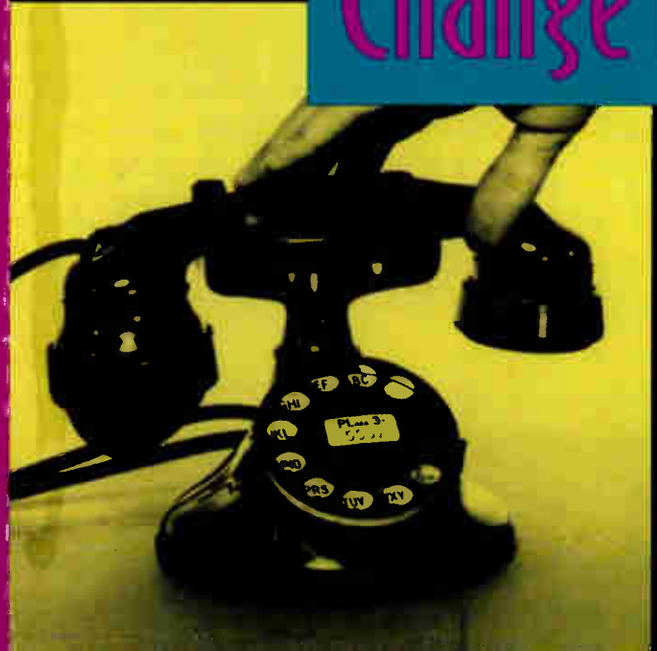
City _____

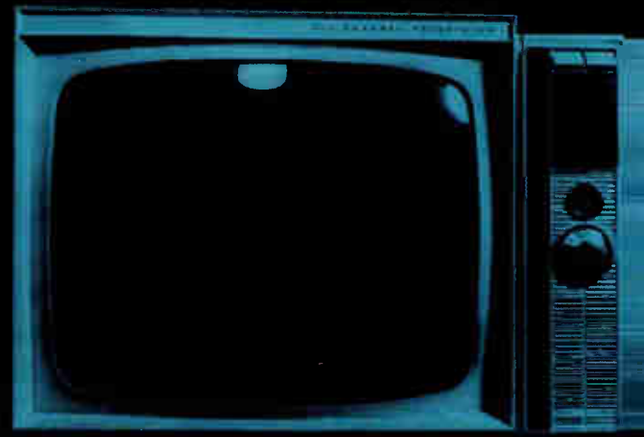
State _____ Zip _____

Phone _____

Raffle to be held at The Western Show, Nov. 30th, 4 pm. ANTEC Booth #200.

Change is Good.





THE FUTURE IS REAL

A Natural Migration

Leadership and vision. That's what sets us apart in today's environment of converging technologies. ADC Video Systems is leading the migration to advanced video and telephony network services with a clear vision and solution for your future – all while meeting your most demanding requirements today.

ADC Video Systems offers complete end-to-end solutions in hybrid fiber/coax videc/telephony transport and distribution, high speed digital fiber backbone transport, distance learning, Px64 multipoint video-conferencing, TV1 broadcast quality video and cellular telephone transport.

The flexibility to meet the needs of today's market will ultimately determine tomorrow's success. Whether you're migrating to digital video and telephony services, rebuilding your CATV network, installing state-of-the-art distance learning facilities or building videoconferencing networks, ADC Video Systems has the technology you need. Call us to find out why the future is real. We'll help keep you flying in the right direction.

ADC Video Systems

Formerly American Lightwave Systems, Inc.

999 Research Parkway Meriden, CT 06450

(800) 504-4443 • FAX (203) 630-5701

Circle Reader Service No. 27

when the necessary equipment becomes commercially available.

In addition to greater reliability and survivability, the network has been engineered to overcome some vexing problems like powering, the consumer interface and return path noise.

(For a complete network profile, see "Bandwidth management in an HFC network," *CED*, September 1995, p.78).

SNET

We go beyond the call

Southern New England Telephone (SNET) startled, if not stunned the world when it announced plans to rip out 100 percent of its copper to build an HFC, full service broadband network to deliver video, data and telephony service to 1.5 million Connecticut households. As Charlotte Denenberg, vice president network technology and chief technology officer for SNET, noted in an interview last March, "Our goal is to provide our customers unparalleled communications, information and entertainment services anywhere, anytime. And you cannot do that on a copper platform."

To test its new broadband video strategy, SNET has been running a VDT trial in West Hartford, Conn. since April 1994. The 350 customers in the Hartford trial have access to a 76-channel package which encompasses 45 channels of off-the-air, non-premium and premium channels, including the major network affiliates, ESPN, CNN, Nickelodeon, Court TV and MTV, 18 enhanced pay-per-view channels and video-on-demand with a library of more than 2,000 selections, according to Beverly Levy, manager–media relations, for SNET.

That programming is riding along a hybrid fiber/coax infrastructure down to node sizes of approximately 200 homes. Equipment suppliers for SNET's HFC network include AT&T Network Systems, Scientific-Atlanta and ADC Telecommunications.

Hewlett-Packard Co. will be supplying its MediaStream server to SNET's platform, which incorporates technology designed specifically for VOD services. S-A is providing both analog and digital set-tops, as well as analog and digital headend equipment. SNET chose Sybase Inc. to provide navigation and custom operational and business support applications to manage its interactive TV services. ATM switching from AT&T will handle the video streams, and ADC Video Systems is contributing digital transport technology.

The carrier has plans to expand its VDT trial to serve about 150,000 homes in Connecticut, and is merely awaiting FCC tariff approval for that trial. The towns to be added to the expanded trial include Farmington, Hartford, New Britain and West Hartford in the north; Darien, Fairfield, Norwalk, Stamford and Westport in the south. In addition, SNET has much bigger plans: to serve the entire state of Connecticut as a VDT provider, and is awaiting FCC approval of a 214 application to serve the area.

While TCI is the incumbent cable provider in West Hartford, SNET's existing channel lineup varies from that of the MSO, and also includes enhanced PPV and VOD.

The carrier's video plans are a competitive

CHALLENGE

In the mid 1980s, the CATV industry was looking for a way to transform existing tree and branch networks into systems with improved reliability, signal quality and channel capacity. Fiber optics was the obvious solution, but existing products were not practical for CATV signals.

SOLUTION

In 1987, Ortel pioneered the development of linear fiberoptic technology, enabling the development of the modern hybrid fiber coax (HFC) network. Many CATV industry fiberoptic "firsts" with respect to signal quality, transmission distance and channel capacity were stimulated by engineering and manufacturing breakthroughs at Ortel. Today, Ortel is the leading manufacturer of lasers and photodiodes for HFC networks.

RESULTS

HFC architectures are now targeted to provide entertainment video and advanced interactive services such as telephony and high speed data. This convergence between entertainment video and advanced telecommunications networks is fueling business partnerships and regulatory changes in the global communications marketplace.

If this is your business, you have plenty of decisions to make. At least your choice of linear fiber optics partners is easy: Ortel – ISO 9001 certified manufacturer of the laser of choice for HFC networks.

FIBEROPTICUPDATE

For more information about how Ortel's linear fiberoptic solutions for HFC systems can make your choices easier, please talk to your sales representative. Otherwise, call, write, fax or e-mail Ortel directly.

Making Light *Work* For You

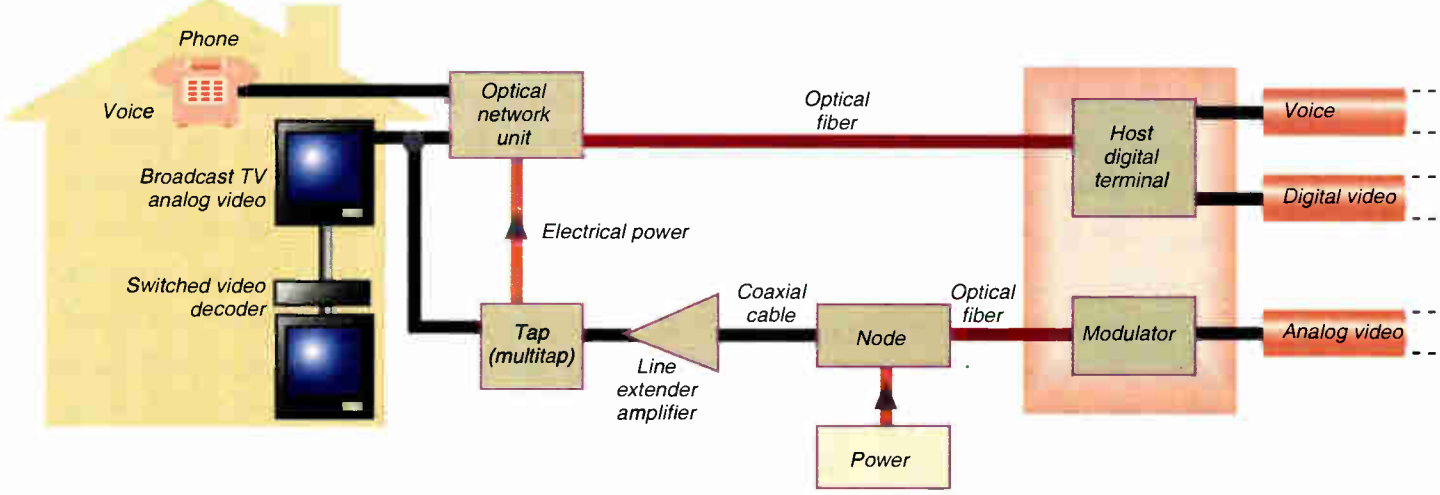
ORTEL®
CORPORATION

2015 W. Chestnut Street
Alhambra, CA 91803
Phone: (818) 281-3636
Fax: (818) 281-8231
Internet: mktbba@ortel.com

Circle Reader Service No. 29

OR ?

Figure 3: Fiber-to-the-curb. Overlaid with one-way HFC for analog video and power.



response to a redefinition of its business in the wake of three converging industries: information, communications and entertainment. "The information superhighway we are building for all of Connecticut, I-SNET, will be capable of carrying not only telephony," says Levy, "but the information and entertainment services of tomorrow."

Southwestern Bell Telephone

Southwestern Bell Video Services, a subsidiary of SBC Communications Inc., has made significant strides with its Richardson, Texas trial since CED's '94 telco/video profile was published. While in '94, company engineers were debating the merits of HFC vs. fiber-to-the-curb (FTTC), Southwestern Bell

Only One Sweep System Leads a Double Life!

Stealth Sweep... **Stealth Reverse Sweep...**

STEALTH REVERSE SWEEP

PUT REVERSE SWEEP CAPABILITY INTO YOUR HAND

The Stealth Reverse Sweep... The latest sweep technology has been enhanced to meet your reverse sweep testing needs. Forward and reverse path alignment can now be done simultaneously – and by one person – with one instrument – the handheld Stealth.

Engineered for the interactive revolution, the Stealth 3SR handheld unit with the reverse sweep option both receives and transmits sweep for fast, precise, and accurate measurement of both the forward and reverse paths.

Eliminating awkward, complicated equipment setup results in simplified testing, reduced fatigue, and less time maintaining your system. You'll wonder how we squeezed in so much capability.

Features include:

- Built-in sweep transmitter
- Simple, user interface
- Sweep any reverse band from 5 - 1,000 MHz
- Fast, continuous reference sweep
- Stealth Sweep ...a Wavetek exclusive, tests without interrupting viewer reception
- Signal analyzer for carrier levels, C/N, hum, tilt, and spectrum display
- Automated FCC 24-hour test capability

The Stealth Reverse Sweep provides all the accuracy, speed, and features you'd expect from the leader.

So, get the smallest, fastest, lowest priced, most capable sweep on the market. Get the Wavetek Stealth. **Call 1-800-622-5515.**

Wavetek... partners in productivity for over 25 years.

WAVETEK

Circle Reader Service No. 31

has since thrown its weight behind a topology for the trial–switched digital FTTC–and has also begun working with Microsoft, AT&T and Lockheed for the provision of hardware and software.

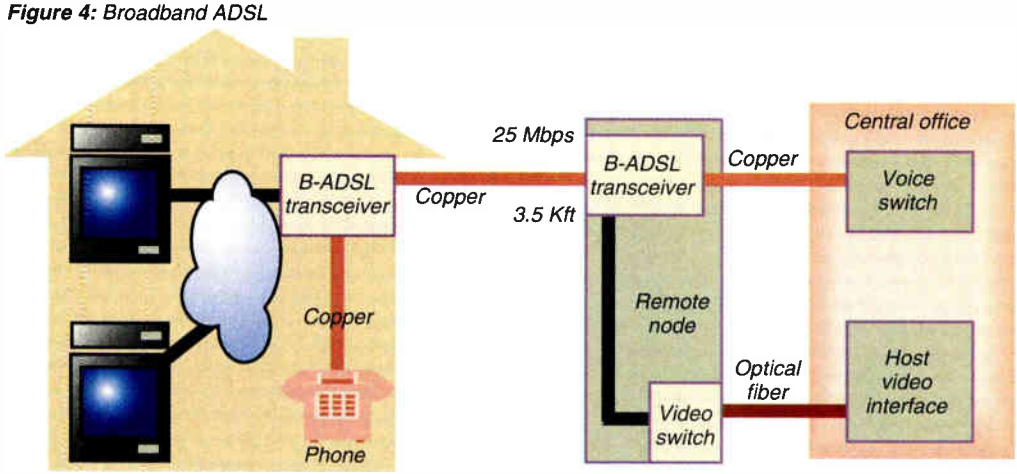
In announcements made this past summer, the video services subsidiary stated that digital FTTC would be "the backbone" of the Richardson network, and that "pending legal approval, copper wire will run from the curb to the home to provide telephone service, and coaxial cable will provide video." At present, the company is still waiting for the outcome of one of its lawsuits which challenged the prohibition against telephone company affiliates providing video programming in their telephone service territory. Though one case that was filed in the U.S. District Court for the Northern District of Texas was decided last March, granting SBC permission to offer cable in Richardson, SBC is also a party to a case filed in the U.S. District Court for the Eastern District of Virginia. That case challenges the FCC's right to demand 214 filings from telcos wishing to provide cable services.

Construction of the Richardson network, where the incumbent cable provider is TCI, was initiated in November 1994. In September of this year, Southwestern Bell Video Services predicted that it might still be providing cable television services before the year is out, with interactive services possibly coming into play in 1996. Those interactive offerings could include video-on-demand, educational material, interactive games and home shopping.

The Richardson network may eventually pass 47,000 homes when it's built out

As for the suppliers, AT&T and BroadBand Technologies Inc. were chosen to provide key network elements for the switched digital, FTTC architecture. Computer giant Microsoft is providing an end-to-end software package, which will encompass distributed operating system software to connect set-top boxes and consumer PCs with headend services and software platforms for delivering services such as video-on-demand and interactive applications. And Lockheed's Media Systems Integration group is acting as the systems integrator, charged with overall project management.

Figure 4: Broadband ADSL



Initially, the Richardson project will target 2,000 households, but the network may eventually pass 47,000 homes, the population of Richardson, when it's built out.

On the content side, SBC is one of the key partners in the aforementioned alliance between The Walt Disney Company, and communications companies GTE, BellSouth and Ameritech, to provide video programming and interactive services.

US West was supposed to be nearly a year into a market trial and roll-out of interactive services over its complicated HFC/FTTC overlay architecture in Omaha, Neb.

Instead, the much-anticipated trial finally got started Aug. 31 of this year and so far has 1,500 customers hooked up and receiving cable-TV services, including a package of basic, premium and pay-per-view programs. And now, apparently, the RBOC has a one-of-a-kind architecture that will not be repeated anywhere else because of significant technological advancements that have occurred since 1993, when the network was designed.

What about all the interactive services the RBOC promised, such as interactive TV, home shopping, video classifieds and home banking?

The interactive part of the test is still in its infancy, with about 20 "friendly users" receiving such offerings, according to a US West Communications spokesman. Those customers have custom set-tops, built by Scientific-Atlanta and containing the 3DO chip, in their homes. These interactive services are anticipated to be offered to the general public, though the spokesman declined to speculate when that would occur.

What happened? Like nearly every other grandiose declaration from late 1993, this test ran into complicated systems integration problems, which were compounded by slow approval from the FCC.

Where does US West go from here? The company, which is joined at the hip with Time Warner Cable but hopping mad over the MSO's planned acquisition of Ted Turner's empire, has already retrenched on additional network construction while it gains a little real experience in Omaha.

"If the trial goes well (in Omaha), we will ask that it be allowed to continue," said a spokesman, who noted that additional penetration had already exceeded expectations. But, he added, losing nearly a year to regulatory approval and market kick-off forced the company to rethink its planned builds in Denver, Salt Lake City, Portland, Ore., Boise, Idaho and Minneapolis/St. Paul, Minn.

In addition, the company continues to refine its network design in a quest to find the most flexible, least costly architecture. And the addition of wireless cable (MMDS) to the mix has thrown a wrench into the works as well.

"If we were to decide to use a wired broadband network, we would use switched digital video with ATM switching," said the spokesman. Why that approach instead of repeating the one used in Omaha? US West discovered its network cost a lot, took longer to build than it planned and caused a lot of disruption (i.e., dug up a lot of backyards). "We're looking at alternatives that won't be so disruptive, including DBS, MMDS and ADSL," the spokesman noted.

In addition, the company purchased from Wometco the cable system serving the Atlanta area, putting it in direct competition with BellSouth. There, the company plans to build an HFC network, but one with plenty of bells and whistles (see detailed story, page 52). CED

About the only thing it doesn't deliver is pizza.

Encrypted data communications
from addressable controller to subscriber.

Extensive on-screen display
with display and graphics capability.

Multiple program guides
Interactive Electronic Program Guide with grid-type presentation.

Near-video-on-demand
field-proven technology with display schedule and enhanced pause, resume and review instructions.

Dynamic picture shift encoding
for the ultimate in enhanced signal security.

Virtual data channels
for additional revenue generation.

As you can see, the BA-V1000 Command Station comes with the works. From its on-screen display capabilities to the security of dynamic picture shift encoding, the Command Station delivers great cable service. It's this kind of vision that keeps your customers happy. And hungry for more. When you're ready to order, just call your Pioneer regional sales manager.

PIONEER®
Pioneer New Media Technologies, Inc.

Northeast, 201-236-4186; Southeast, 614-777-7260; Mid-Atlantic, 614-777-7258; Central, 614-777-7257; West, 310-952-3063.

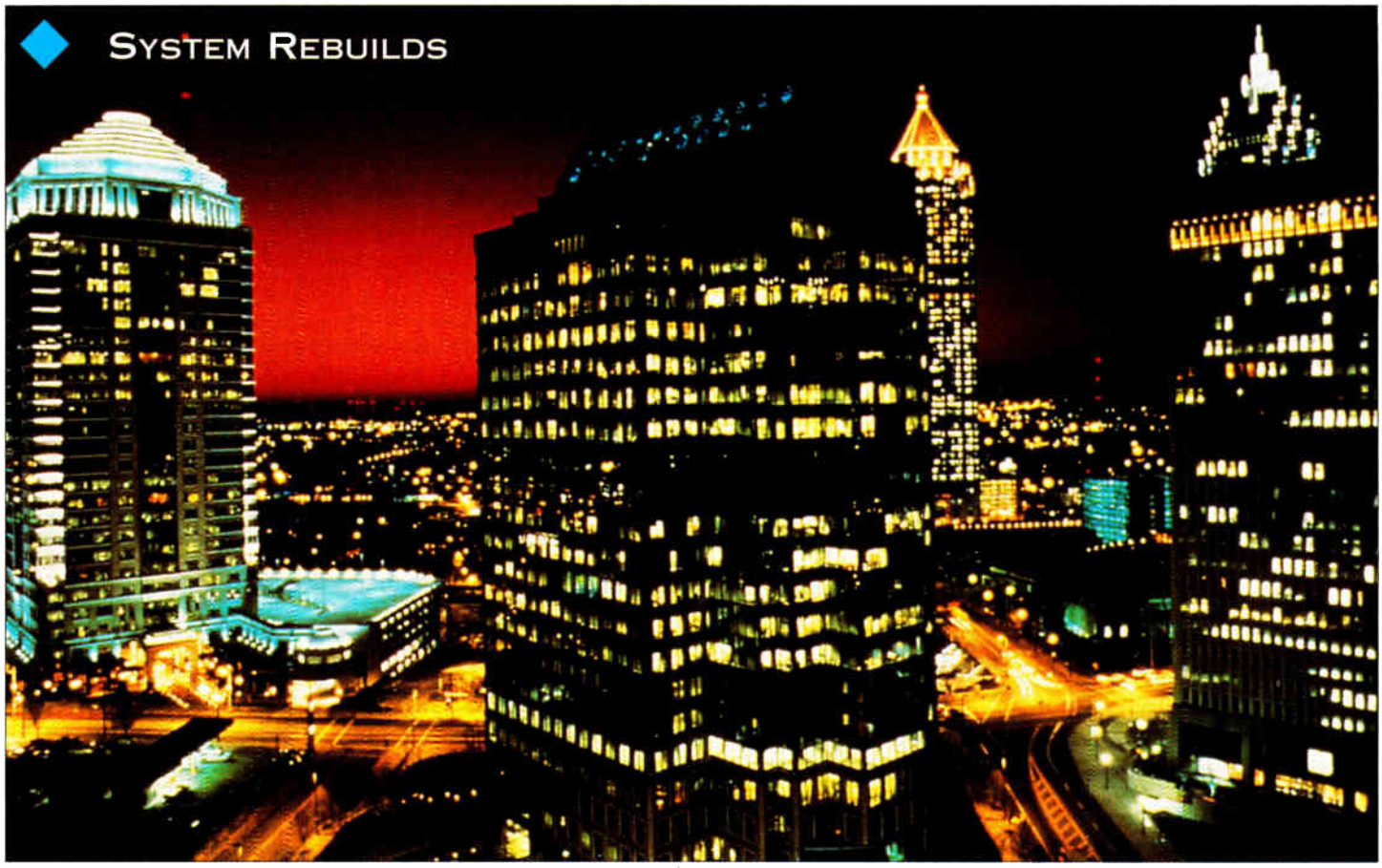


PHOTO COURTESY OF ATLANTA CHAMBER OF COMMERCE

US West rushes toward rebuild in Atlanta

Schedule is aggressive

By Leslie Ellis and Roger Brown

Imagine having this assignment: Rebuild the cable TV network in Atlanta using new, state-of-the-art equipment (some of which isn't even available yet) during the time when the eyes of the world are upon you because of the Olympics–and get it done by the end of 1997.

An impossible task? Perhaps not, but it won't be easy. MediaOne, the newly-named cable television arm of US West in Atlanta that plans to compete with incumbent BellSouth for local telephony traffic, is forging ahead with a planned $300 million upgrade project that will keep its technical staff scrambling over the next 28 months to upgrade about 12,000 miles of hybrid fiber/coax plant–or about 14 miles per day, including weekends.

In spite of the massive size of the project and the unusual circumstances that will shut down the project during a planned moratorium on construction when the Olympics come to town next summer, the company is pumped up to meet the challenge, said Steven Andrews, president of MediaOne (formerly known as Southern Multimedia Communications).

"Most of the industry doesn't believe we can do this," Andrews noted during a technical session during the recent Eastern Cable Show in Atlanta. Add to that the difficulties in deploying unproven technologies such as power-passing taps, network interface units that will be located on the side of the home and 90-volt power nodes, "and you can see that we're in a position of considerable risk," Andrews said.

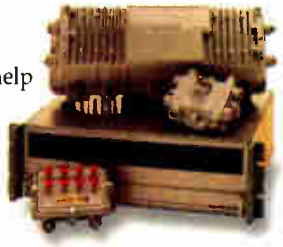
But Andrews also said that US West is convinced the risky nature of the bold upgrade is well worth the potential payoff that will be provided from provision of voice, video and data services as early as next year in parts of Atlanta.

As the newcomer to town, MediaOne recognizes that it has to peacefully coexist with other communications providers in the area in order to offer consumers the kind of connectivity they're used to. So Andrews has no qualms about extending an olive branch: "The important thing as I see it is that we cooperate with the other operators [in the Georgia area], so that we have a strong presence here," Andrews said. He noted this type of cooperation between cable MSOs and telcos was a missing element in the United Kingdom, where US West first cut its teeth on video provision in concert with Tele-Communications Inc., under the TeleWest name. Without that cooperation, Andrews said, the chances for success are diminished.

Specifically, the MediaOne Atlanta upgrade involves collapsing 12 existing headends into two master headends, and the addition of a Sonet-based fiber ring, video file servers, a network monitoring and control facility and a class 5 telephony switch. ADC Video Systems Inc. will supply its Homeworx transmitters and ISX receivers to the upgrade. AVS gear will be installed in both headends and in 42 nodes.

The two 25,000-square-foot master headends, which will be located in Vinings and Stone Mountain, Ga., each serve about 42 "distribution hubs," which are connected to each other and the headends by counter-rotating Sonet rings driven by 1550-nm DFB (distributed feedback) lasers for reliability, said

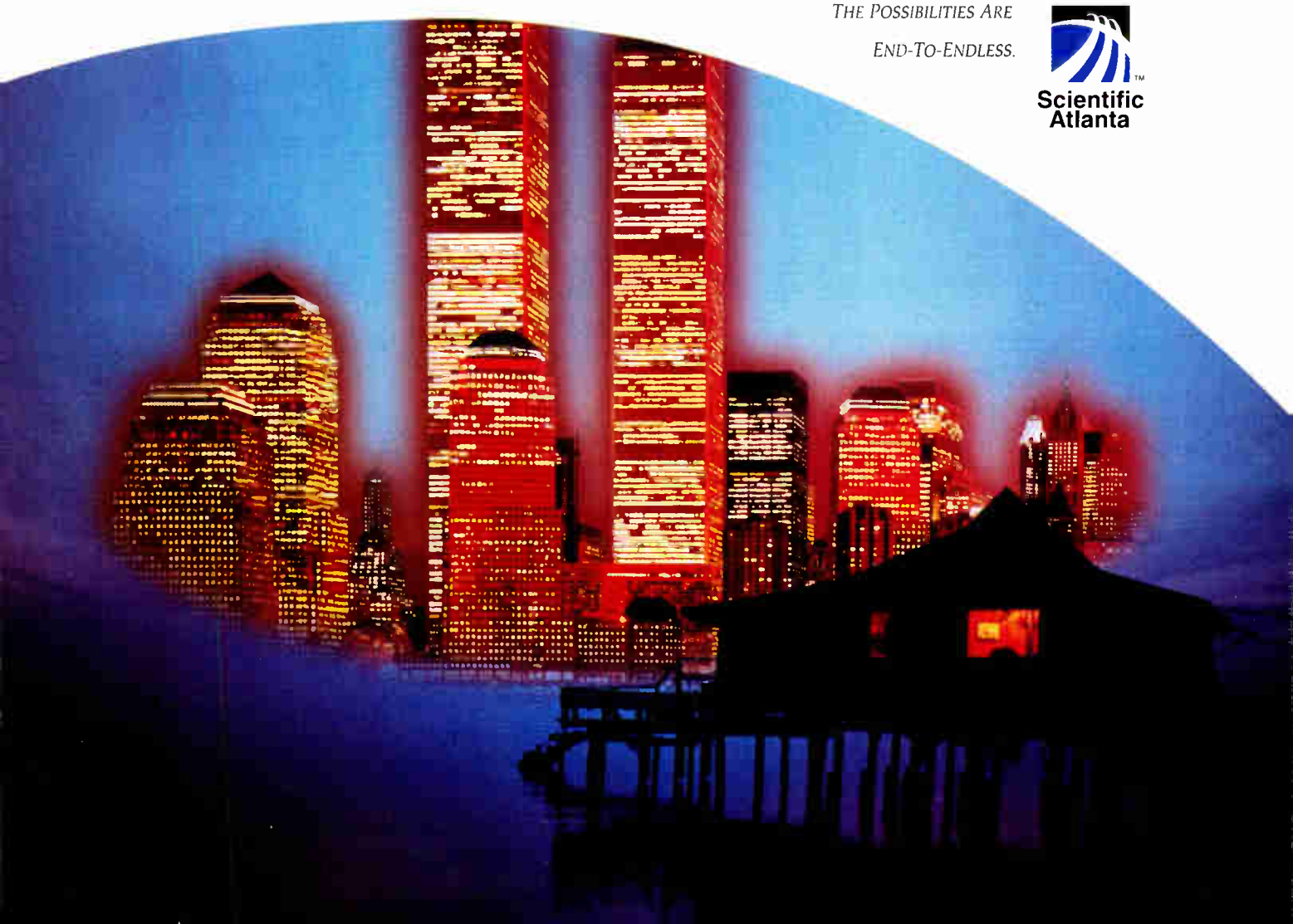
TRANSMISSION ARCHITECTURES THAT GO DOWNTOWN TO DOWN HOME.



Whatever demographic areas you serve, we can help you get the most from the assets and resources you deploy. More than just a "product vendor", Scientific-Atlanta is a strategic partner who can understand your business plans, your service revenue models, and the competitive pressures you face. Both in the near term and down the road. We'll recommend an evolvable broadband architecture, along with integrated transmission products that give you the lowest cost per mile designs. So as you plan your next rebuild or upgrade, plan to call on the expertise of Scientific-Atlanta at 800-433-6222.

THE POSSIBILITIES ARE END-TO-ENDLESS.

Scientific Atlanta



Atlanta 1996

Official Sponsor of the 1996 Atlanta Olympic Games

Circle Reader Service No. 33

Greg Worthman, director of network upgrades for MediaOne. The Sonet backbone will also be used to support competitive access, switched telephony and multimedia services.

In turn, each distribution hub, each of which is between 300- and 600-square-feet in size and passes between 20,000 and 30,000 homes, feeds between 40 and 50 optical nodes, using 1310 nm DFB lasers to drive signals onto six fibers, feeding clusters of 500 homes, Worthman said.

Ultimately, US West will subdivide the network from those nodes to serve 500 homes or businesses with up to 750 MHz of bandwidth, with the 5 MHz to 40 MHz reverse path fully activated, said Worthman.

To power the network, US West plans to purchase 90-volt, 60-cycle power nodes from an as yet unnamed vendor, Worthman said, adding that "this [powering] strategy is brand new to us–some of the power nodes are the size of Coke machines." Each power node will provide up to 8,000 watts of power and will be outfitted with battery backup and a gas-powered generator that kicks in when the power is down.

Other new items on the US West upgrade agenda: Power-passing taps, where voltage is passed through the network to the home over either coaxial cable or twisted pair (the telco hasn't yet decided which it will use); and network interface units (NIUs) installed on subscriber homes to collect and distribute voice, video and data signals throughout the home.

Network redundancy and survivability are key factors in the MediaOne rebuild in Atlanta.

The foundation for survivability includes:
- *Network monitoring and control*
  - *Central office and headend*
  - *Optics*
  - *Sonet transport*
  - *Hub-interconnect and node optics*
  - *Power "nodes"*
  - *Network Interface Units (NIUs)*
- *Common communications protocols for diverse elements*
- *Return path diagnostics*
  - *"Bridger" switching*
  - *Smart taps*
  - *Remote NIU control*

The cost of those new items is also an issue, Andrews noted, saying that while the NIUs alone could cost in the $300 range, he's more interested in an NIU that hits a $150 price target. "We've had to change our whole outlook. This is a broadband network, not a cable network," Worthman said, noting that in its quest for reliability, MediaOne will likely yank out all crimp-style F-connectors in favor of compression connectors, and will replace any in-home or network gear that doesn't pass 750 MHz worth of bandwidth.

To ensure network survivability, MediaOne plans to deploy a network monitoring and control system that polls central office and headend, optics and Sonet transportation gear; hub interconnects and node optics; and every other component in line to the home, said Worthman. Such a system will use common protocols, he added.

Before the end of the year, the company wants to connect at least 21 of the 42 distribution hubs, and start physical splicing in portions of Cobb and Clayton counties, Worthman said. "Our intent is to roll out as many as 160 nodes worth of upgraded plant by the end of the year," said Worthman, noting that "we're finding we may need as many as 25 to 30 people to knock out a node per day." CED

Six ways to maximize your system performance.

Tricorder III
Hand-held instrument functions as signal level meter, leak detector and data logger. Measures signal levels, hum, carrier to noise, and performs 24-hour test. Calibrated leakage optional.

Searcher Plus
The industry standard. Performs calibrated leakage measurements down to 2 microvolts per meter. Comes with mobile mount for quarterly drive-outs, and can be hand carried to pin-point leak source.

Super Plus
The ideal instrument for detecting signal ingress, Super Plus offers over 4 times the sensitivity of any other leakage detector. Immune to power line interference and ignition noise. Special sub carrier tag ensures that only your leaks are detected. Perfect for overbuilt areas. Uses Searcher Plus mobile mount and antennas.

VF Series Filters/ AM-1000 Preamplifier
VF preselectors extend the range of composite triple beat, cross-modulation and carrier-to-noise measurements by up to 20 dB. AM-1000-20 dB preamplifier boosts set-top converter output to level needed for FCC part 76 testing.

TFC-600 Tunable Frequency Counter
Automatically strips modulation from the video carrier for accurate measurement of video carrier frequency and aural-visual carrier separation.

9580 Return Alignment System
Balances the return path and includes spectral display for measuring ingress and noise. Updates sweep measurements twice per second. Optional switcher allows 8 test connections per headend unit. Each 9580 headend unit will support up to 6 field units simultaneously.

Make Trilithic your source for CATV test equipment.

Trilithic offers a full line of outstanding CATV test equipment to help you keep your system in top operating condition.

From signal measurement to leakage detection and headend testing, Trilithic products are designed to give technicians reliable, efficient performance under the most demanding field conditions.

For more information on Trilithic's complete line of CATV test equipment, call today or contact your local Trilithic representative.

TRILITHIC
The Best Thing On Cable

9202 E. 33rd Street
Indianapolis, IN 46236
317-895-3600
1-800-344-2412
Fax: 317-895-3613

Circle Reader Service No. 35

Switched video and the virtual services model

Lessons learned from history

By Rob Mason, Senior Product Manager, Network Marketing, GI Communications Division, General Instrument Corp.

The quest to find the endgame delivery system for broadband has often overlooked the lessons of history. As a wide variety of services continue to converge, historical models from the arenas of telephony and data communications offer valuable insight into the potential future course for multimedia. These models show telephony and data communications moving in the direction of more logical or "virtual" networking approaches.

These approaches have allowed voice and data providers to offer more dynamic services at an ever-increasing rate. The appeal of these virtual voice and data services has strategic import for evolving video distribution networks and adds perspective to the ongoing debate between HFC (hybrid fiber/coax) and FTTC (fiber-to-the-curb) as the architecture of choice for new services.

One of the first areas where virtual services enjoyed mass appeal was the commercial telephone market. At first blush, the idea of a virtual telephone network seems to be an oxymoron. After all, the phone network represents the largest, most tangible incarnation of a physical network. Even so, the combination of advanced signaling systems and high-speed transactional databases allowed a number of long distance carriers to "go virtual" in the mid-1980s. Since then, these carriers have enhanced their virtual voice platforms and now generate billions of dollars in annual revenue.

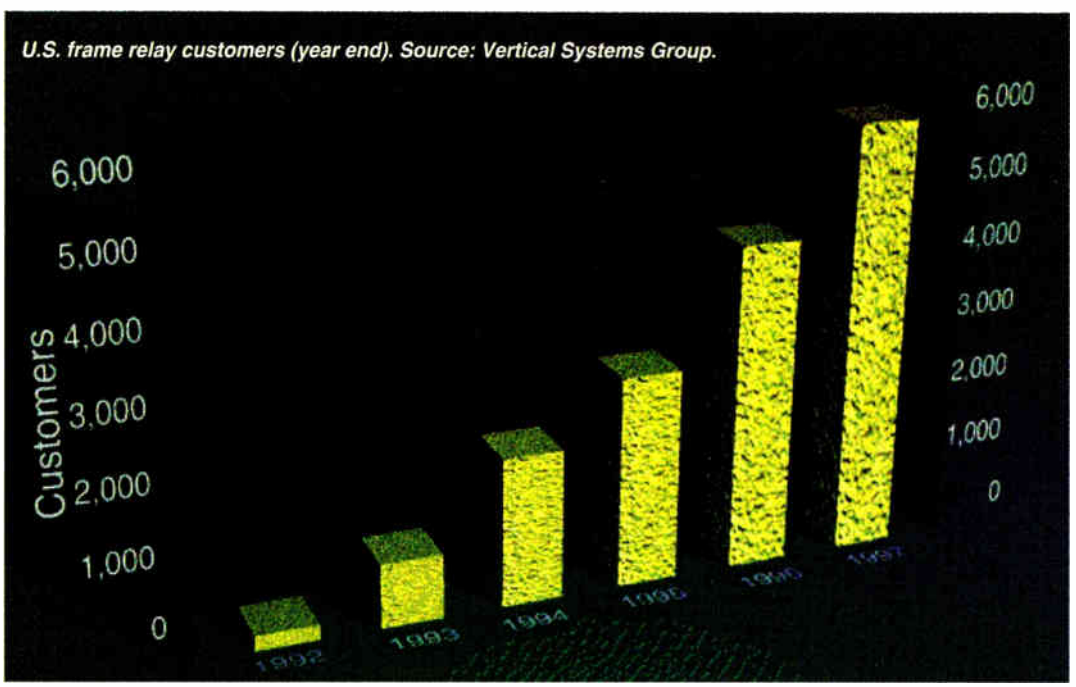
Essentially, the process goes as follows. As a business telephone customer, you need to contend with blocks of telephone numbers, often direct dial, that you obtain from the network. Unfortunately, you cannot exercise global control of these numbers, and ultimately take what you are given. The result is a collection of phone numbers for dozens of facilities that span every conceivable combination of digits. As inter-facility communications escalate, travel increases and corporate directories need to be printed, this mixed morass of 10-digit phone numbers becomes unwieldy.

Enter the virtual voice network. Virtual voice networks allow a totally different approach. Typically, the business customer makes up a three-digit prefix for each domestic office and then assigns each user a seven-digit number based on that prefix. By dialing a seven-digit number that includes the prefix, the caller can reach any other person in any other office. This actually resembles older private networks where individual company switches were connected to each other through umbilical cords known as "tie lines." The difference here is that new virtual voice networks use high-speed database transactions to mimic the "feel" of a private voice network. Instead of accessing a dedicated tie line, the network interprets the user's seven digits on the user's profile and sends them across the network like a conventional call. As a result, phone numbers are easy to remember, and corporate directories are masterpieces of organization.

Data follows suit

The mass appeal of virtual voice services provides a number of lessons. One is the value of porting intelligence into the network. The more control that resides in the network, the greater the range and speed of the feature set available on that network. Switching equipment at the edge of the network was relegated to call processing, while the network emerged as the customer lynch-pin. A second lesson from the virtual voice experience is that there is a broad window of opportunity before technology commoditization arrives on the scene.

Not to be outdone by the resounding success of the modern virtual voice platform, the data communications industry took the concept of a virtual service in an even more exciting direction. The pressing needs of LAN (local area network) users to interconnect large numbers of computers across a wide area drove this process to fruition. Despite huge advances in the capability of premise equipment like bridges and routers, network managers still faced the daunting task of connecting (and paying for) data communications lines between each facility. As the number of LANs exploded, this became an onerous and cost-prohibitive approach. A simple calculation can suggest that 20 separate facilities



Philips DVS...
reaching beyond the box.

Let's make things better.

Helping smooth your transition into the world of digital video. That's our commitment.

Philips DVS–Intelligent Solutions for Intelligent Networks. Call 1-800-SET-TOPS.

PHILIPS

PHILIPS

Circle Reader Service No. 36

could require an astronomical 190 leased lines to provide mesh connectivity. Clearly, a fresh approach was needed.

Public networks had been around for a long time, but no public network was available to meet the speed and flexibility that LAN users required. The solution was called frame relay, a new and decidedly virtual approach to high speed data networking. Frame relay permitted the LAN manager to pay for traffic sent, rather than for "pipes" between offices. The metric of cost-per-megabyte rapidly displaced the metric cost-per-month. More importantly, the virtual nature of the frame relay service permitted a single access line in the network to handle a huge number of simultaneous connections. This allowed connections to be defined logically in software, rather than physically with wires. Frame relay continues to capture share in large pieces and has reduced the cost and management hurdles associated with running a network.

The lessons from frame relay are similar to those learned from virtual voice networks; namely, the network is an invaluable asset that can be leveraged to provide high levels of functionality. Moreover, the functionality can represent something impossible to replicate in a private, non-virtual solution. In addition, the process of going virtual can rearrange the billing paradigm entirely, introducing new ways of defining and paying for services. Frame relay also proved that customers are willing to accept and fund modifications to the premise–in this case, frame relay software upgrades–to gain the service improvements and flexibility associated with a virtual network.

Enabling the video network

In many ways, the emerging switched video model is similar to its virtual antecedents in the worlds of voice and data. As technologies such as ATM and Sonet evolve, the possibility of virtualizing the entire video service platform becomes very real. The process could conceivably evolve to permit the network to reach the same prominence that it holds in modern voice and data technologies, leading to a host of network-enabled features and services.

The first area of focus will be interactive services. The highly personal nature of offering video-on-demand, electronic mail, home shopping and other interactive services requires a significant amount of granularity in the distribution network. In a hybrid fiber/coax (HFC) network, intelligent network elements ensure that the interactive carrier appears at the right distribution node. The use of encryption allows the necessary degree of security and privacy. In a fiber-to-the-curb approach, the connection-oriented nature of the interactive service is enabled solely on the basis of the connection-oriented network. Individual interactive connections are enabled across an ATM fabric, with some form of ATM edge vehicle guiding the connection to the appropriate destination.

In both cases, a form of virtual connection is provided, one more MPEG-oriented (HFC), and one more ATM-oriented (FTTC).

The next area of interest is digital broadcast. In this area, one can begin to see a possible divergence between the HFC approach and that of FTTC. Advances in digital compression are enabling high density digital broadcasting with an absolute minimum of digital artifacts. Typical movies can be realized with bit rates in the 3 Mbps range, while sporting events such as basketball can be satisfied by bit rates in the 6 Mbps range. The addition of a form of statistical multiplexing can produce even greater digital efficiencies, permitting rapidly changing programs to "steal" bandwidth from more mundane programs on a line-by-line basis. This allows digital broadcasting of entire multiplexes that capture maximum bandwidth efficiencies.

The HFC approach to digital broadcast has been to allocate a reasonable range of spectrum to the digital broadcast service and fill this range with the maximum content. The blended bit rate of this content is typically on the order of 3-4 Mbps, permitting 200-plus digitally compressed broadcast channels to be serviced by the transport network. The FTTC approach resembles a virtual or "emulated broadcast."

In the connection-oriented FTTC implementation, the digital "broadcast " channels are provided on an as-needed basis. This enables a similar viewing paradigm to digital broadcast, while removing any realistic capacity constraints. Because there is really no broadcasting taking place over the subscriber media, it can provide an indefinite amount of broadcast content.

The classic trade-off introduced by emulated broadcast is scalability versus latency. The proponents of an HFC approach would argue that the immediate availability of channels at the set-top creates less latency when surfing among the digital channels. At the same time, FTTC makes a statement on scalability. Despite the reality of ever-improving compression technology and modulation, new builds may be in the ground for quite a while. Deployment managers need assurance that their efforts will not be bandwidth constrained. FTTC provides some assurances in this area.

In addition to interactive services and digital broadcast, the last bastion for non-virtual services will be traditional analog broadcast. Setting aside the host of regulatory issues associated with analog broadcast, there are still hurdles to going virtual. The tallest of these is the need to hand off a traditional analog signal to a cable-ready television that is not connected to a digital set-top. HFC is a natural here, since it is a technology fundamentally built on analog broadcast. The signal the cable-ready set needs is already available; it simply needs to be tuned. FTTC systems realize this embedded advantage of HFC for traditional services and have typically met this challenge by providing their own analog overlay. While this seems to represent a departure from the connection-oriented nature of FTTC, the HFC overlay for analog broadcast serves a dual purpose. It also provides a convenient mechanism for powering the FTTC network components.

Will history repeat itself?

Revisiting the historical service models from telephony and data communications suggests both similarities and discontinuities. The major difference is that the virtual networking trend experienced in voice and data was more oriented toward the commercial user, rather than the individual consumer. Also, there were no convenient broadcast analogs in terrestrial voice or data markets. In addition, the cost-bandwidth product of the access lines needed for commercial voice and data tended to be more prohibitive than the related quantities in broadband networks.

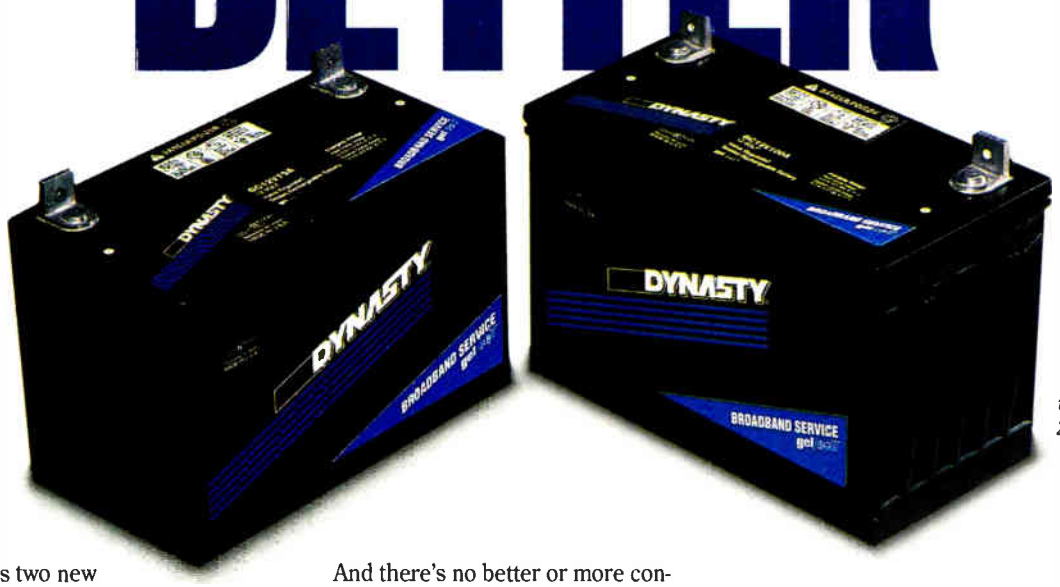
Despite these differences, the similarity between virtual voice and data and the potential for virtual mixed-media remains quite viable. The major advantage gleaned by network providers of virtual voice and data was the pull of functionality back into the network.

This accomplishes a number of goals. First, the provisioning of new services can take place more rapidly, without the inertia of outdated premise equipment. Second, the characterization of new services can become more dynamic, with the opportunity to change billing metrics and feature sets on the fly. Finally, the complex connectivity demands of internetworking can be more readily satisfied.

The virtualization, initially of digital broadcast, and ultimately, of the entire transport service, can add logical constructs to a host of other areas. One of these areas is the virtual CD-ROM, where a consumer sources content at high speed from a network, rather than using a local drive that is prone to obsolescence.

Just as the voice and data experiences of the past have shown virtual approaches to be desirable, multimedia transport networks will eventually realize similar advantages. Virtual approaches to the distribution of broadcast and interactive video traffic can enhance the service provisioning effort, allow for mass customization of the delivery system and can obviate concerns over network obsolescence. CED

THE BEST JUST GOT BETTER



Better
The GC12V75's improved run time and competitive price make it an exceptional value.

Best
The GC12V100 offers the industry's longest run time and an unprecedented 2-year warranty.

Alpha offers two new choices for improved system reliability: the Dynasty GC12V75 and GC12V100 float-service broadband batteries. These new Dynasty gel/cell® batteries offer the *longest* run time of any battery sold in the industry.

Dynasty broadband gel/cells® are also the only batteries that share the features and reliability found in telecommunication battery designs. There is simply no better battery for reliable cable system performance.

And there's no better or more convenient battery service than the Alpha Advantage℠ program.

- **The Longest Run Time Available**
  These new broadband gel/cells® provide the industry's longest run time.
- **The First 2-Year Warranty**
  The new GC12V100 offers the industry's first full 2-year warranty.
- **The Most Complete Battery Service**
  Fast delivery and complete recycling with the Alpha Advantage℠ program.

The Alpha XM Series CableUPS® and the Johnson Controls Dynasty gel/cell® battery.

▸ *For more information, on the* ***Alpha Advantage℠*** *battery program call:* ***1-800-421-8089***

United States
Alpha Technologies
3767 Alpha Way
Bellingham, WA 98226
Tel: (360) 647-2360
Fax: (360) 671-4936

Canada
Alpha Technologies
5700 Sidley Street
Burnaby, B.C. V5J 5E5
Tel: (604) 430-1476
Fax: (604) 430-8908

INTERSTATE BATTERIES
Fresh Power. Guaranteed!

DYNASTY® JOHNSON CONTROLS

alpha ALPHA TECHNOLOGIES

ATTEND THE ONLY SAFETY & TRAINING CONFERENCES

FOR THE COMMUNICATIONS INDUSTRY.

DENVER, COLORADO
DECEMBER 11–13, 1995

FIFTH ANNUAL

SAFETY & TRAINING

CONFERENCES & EXHIBITION

AT THE UNIQUE
INVERNESS HOTEL AND
GOLF CLUB (Formerly the Scanticon)

SAFETY PAYS!

TRAINING MAKES DOLLARS AND SENSE!

Safety '95 and Training '95 return to Denver this year. These annual conferences have become the premiere events for communications industry safety and training professionals. They offer the *only* opportunity for you to meet with your peers and learn from the experts. You will hear what others in your position throughout the industry are doing, learn the latest techniques, gather dozens of ideas, and meet experienced professionals who will share their programs and experiences. Scheduled back-to-back, these conferences are necessary for anyone with training or safety responsibilities. Attendees may choose to attend Safety '95 or Training '95, or they may attend both conferences at a significant discount. ***REGISTER TODAY!***

Session topics include:

- Preparing for an OSHA inspection
- Customer service training: What works?
- Building a contractors' safety program
- What does safety cost?
- Getting management buy-in
- Your role in distance training
- OSHA fall-protection standards
- And more

Who should attend?

- Safety managers
- Customer service trainers
- Safety committee members
- Management trainers
- Risk and insurance managers
- Technical trainers
- Operations managers
- Human resource personnel
- Facility engineers and managers
- Training managers and directors

Call 1-800-488-1396 to immediately receive full conference and registration information by fax!

To receive information by mail, please complete all information below and mail or fax to **CommPerspectives,** Attn: Gary, 600 S. Cherry St. #400, Denver, CO 80222. 800-883-4824 • 303-393-7449 (ext. 225) • Fax 303-329-3453

Name _____

Title _____

Company _____

Address _____

City _____

State/Province _____

ZIP/Postal Code _____

Country _____

Office Phone _____

Fax _____

C5-95 2

SPONSORED BY:

ANTEC

nct

Scientific Atlanta

OFFICIAL PUBLICATIONS:

CABLE

CED

CONVERGENCE

Multichannel News

CONFERENCE PRODUCED BY:

CommPerspectives

CABLE '96

APRIL 28 - MAY 1, 1996

LOS ANGELES CALIFORNIA

CALL FOR PAPERS

Send Technical Paper Proposals to NCTA by December 22, 1995

One-page summaries of prospective papers will be selected in early January by an NCTA Engineering Committee subcommittee. Judges look for reference value and originality. Previously published papers and product pitches are not eligible. Any topic of interest to cable TV engineering managers is acceptable. Mail or FAX summaries with author(s) name, company, address, FAX and telephone numbers to:

Katherine Rutkowski
Director, Technical Services
National Cable Television Association
1724 Massachusetts Ave., NW
Washington, DC 20036
FAX # 202/775-3698
e-mail: AVUG43a@prodigy.com

ncta

National Cable Television Association
1724 Massachusetts Avenue, N.W.
Washington, D.C. 20036
(202) 775-3550

Getting a handle on cable signal theft

Are operators ready to ante up?

By Roger Brown

Making cable signal piracy a newsworthy event is difficult. Signal piracy has long been one of those issues that has dogged the cable industry–a thorn under the saddle providing a constant source of irritation, yet nothing operators ever felt was out of control.

But now that the estimated revenues lost to pirates has topped $5 billion, or roughly 20 percent of the entire annual revenue of the industry, can MSOs continue to be less than vigilant when it comes to pirates? As competitive pressures from direct broadcast satellite, the telcos and others mount, would it be prudent to improve network and set-top security to help recoup some of those losses?

A digital layer

At least one company thinks that's exactly what cable operators will be forced to do–and thinks it has a viable answer for cable systems plagued by heavy theft.

NCA Microelectronics says it has developed a new circuit board for existing analog set-top boxes that dramatically improves system security and costs about $45 per set-top, according to Harvey Nickerson, vice president of research and development for the Canadian firm.

Essentially, the new circuit board adds a digital layer to the gated sync suppression scrambling method that set-top boxes already perform. Timing information is transmitted in bursts of encrypted data–and more than 100 different encryption methods can be used and switched at any time, according to Nickerson.

NCA is trying to market the new encryption method after developing it for a cable system in Canada. Fundy Cable's system in New Brunswick, which had been riddled with pay service theft (an estimated 50 percent of customers were receiving premium services without charge), asked General Instrument to improve the security of the set-tops that were already in the field. Nickerson says GI told Fundy that the best way to enhance security was to buy new set-tops.

PHOTO COURTESY OF MURRAY ALCOSSER, THE IMAGE BANK

Not willing to simply throw out its initial hardware investment, Fundy instead approached NCA engineers for ideas. At that time, NCA was primarily an engineering consulting firm specializing in high reliability electronic design for military, industrial and agricultural applications in which Fundy was the parent company.

Nickerson says that he was initially skeptical that he could find a solution that would be less expensive than what manufacturing powerhouse GI could do. But after some initial examination, he found there was a way to solve the problem more cheaply than throwing out the existing hardware.

After developing and testing the new circuit boards, Fundy switched out approximately 10,000 set-tops in six weeks under the guise of performing some preventive maintenance on the devices. Then, after the swap-out was completed, a software command altered the scrambling scheme.

It only took about 30 minutes before the telephone began to ring with dozens of requests for service, says Nickerson. The company was wildly successful at recovering illegal decoders and upgrading those customers to full paying subscribers, he says. Penetration of premium service households easily doubled throughout the system.

The economics of prevention

Would a similar approach work in major U.S. cable systems? Nickerson says it would–but others aren't so sure.

Engineers who have long battled piracy doubt that the economics of an electronics changeout would work. In other words, they argue that there wouldn't be enough lift in penetration to pay for the upgrade–and they'd still be saddled with an existing analog set-top. Yet they don't deny piracy can be a problem.

"Piracy has always been an issue and, to an extent, has been viewed as a cost of doing business," notes Jim Chiddix, senior vice president of engineering and technology at Time Warner Cable. "It's not been an issue that we've ever been able to relax about. I think there's great danger in being complacent about it. We've got to continually stay on the offensive to signal piracy, whether it's people climbing poles and hooking themselves up illegally or electronic kinds of piracy.

"It's also a battle where economics are important," Chiddix says. "We can't afford to spend an infinite amount of money against the problem, so it's a matter of balancing cost and benefit. I think we've done a pretty good job of that as an industry. Yes, there's been piracy, and it's been an ongoing battle, and there have been periodic coups in one direction or another, but pirates keep getting put in jail, and our customers know that piracy is illegal."

How many headend channels are enough?

Perhaps 80 or 100 channels still sound impressive. Until you realize GI's next-generation COMMANDER® 6 Modulators and Upconverters use 1 GHz bandwidth to push the headend performance envelope to 161 channels (much greater with digitally compressed services). It's the new standard for giving subscribers more programming, entertainment, and information services.

What's more, GI's COMMANDER 6 Modulators and Upconverters offer you all the benefits of frequency agility without sacrificing high performance.

What about digital?

If it seems far off, think again. GI's frequency-agile upconverters handle both analog and digital signals right now. So, you won't have to replace them when you implement our industry-leading DigiCipher® and DigiCable™ technology. Now that's smart.

What about space?

GI engineers solve physical space problems at your headend or central office, too. As an example, our new COMMANDER upconverters handle two standard channels instead of one.

That means you can effectively double the number of channels you offer in the same physical space.

What about services?

GI provides the full range of signal origination, reception and processing products for the emerging technologies—analog and digital video broadcast, digital audio, games, data, and other interactive services. Consider our headend prepackaging service—GI's total system solution, custom-designed, assembled, tested, and delivered using GI expertise.

So, if you're looking for headend solutions with a future, look to General Instrument—the worldwide leader in end-to-end analog and digital communications systems. Call to learn more about GI's next-generation headend systems—advanced enough to be their own replacement.

New GI COMMANDER 6 Upconverter

GI General Instrument

(215) 674-4800 (worldwide) • (800) 523-6678 (toll-free in U.S.) • (215) 956-6497 (fax worldwide)

Others agree that economics remain a huge issue. Without really knowing what the piracy rate is, it's a gamble that any countermeasures would be worth $45 per home.

"I remember Jerrold showing off a new analog scrambling system it was working on," recalls Joe Van Loan, VP of engineering at Cablevision Industries. "But it cost more than what we're buying today, and nobody would pay it. Even a $10 premium on a box for improved security was more than people were willing to pay."

And that's how the industry has gotten to where it is today, notes Van Loan, who says the typical net lift from anti-piracy programs is somewhere around 10 percent. "That isn't a lot of money after you figure what you spent for better security."

The law and technology

Although they don't condone theft of service, GI officials say that cable systems often tolerate theft–even when they're aware of it–simply because thieves are good customers. "Think about it: customers who steal never call to complain about picture quality or outages. They just pay the cost of basic service month in and month out," says one executive who asked not to be identified. "In a competitive environment, why would you want to alienate and aggravate your customers?"

The arguments for better security by NCA and others bring up an interesting question: who's responsible for keeping thieves at bay–the set-top manufacturer, or the cable operator?

"It's a joint responsibility," says Chiddix. "I don't think either the manufacturer or the operator can divorce themselves from responsibility for security. Manufacturers have an ongoing responsibility, in the context of supporting their product, to pay a lot of attention to security and piracy, but the operator plays a key role in implementing technological solutions, educating its customers and making the issue visible to the public."

Van Loan agrees: "When the day is done, it's a combination of the law and technology going hand-in-hand. You can't depend on convertors to protect your pay services. The cable operator has to make a reasonable effort to protect his signals, and he needs the protection of the law so it doesn't get out of hand."

The other issue working against solutions like those developed by NCA is the impending move toward digital systems, the engineers say. Roll-out of digital set-tops has been delayed, and most operators are still purchasing large quantities of analog boxes, yet few would risk more capital on what they see as an interim solution before digital boxes become pervasive.

"It's probably not wise (to retrofit existing boxes)," says Van Loan. "If you take an old Jerrold 450, unless you replace the tuner, it's still a 60-channel box."

Furthermore, reliability becomes an issue, he says. "We see failure rates on older boxes of 15 percent to 20 percent annually. In new ones, it's 1-2 percent, so there's a cost for maintenance and disruption tied to old boxes. When you add all those things up, it probably makes more sense to put $100 in a new box than $40 in an old box. We have a rule that, depending on the age of the box, we'll spend up to a certain amount in repair and refurbishment. On a new box, we'll spend up to $50; in an older box, I think that limit is about $20, then we scrap it and use it for parts."

For an MSO with millions of addressable subscribers, such a swapout would be prohibitively expensive, notes Chiddix. "I'm sure that translates to a wonderful business opportunity (for vendors), but I would have to ask some hard questions about the cost-effectiveness of that kind of investment in old equipment. It's more tempting to buy new generation equipment, rather than make that kind of investment."

Perfect masters

In the digital world, encryption and access control are arguably more important than in the analog world, because if the digital code is broken, copies can be made–and digital copies are perfect masters, notes Dave Auer, product line manager for VLSI Technology's secure information technologies group.

That's why VLSI is aggressively marketing a new generation of security chips that promise to make everything from cellular phones to set-tops more secure. VLSI and AT&T Network Systems jointly developed the Information Vending Encryption System, which was built into the set-tops AT&T has deployed in Cablevision Systems' digital network. Auer says VLSI is actively shopping the chip to several set-top manufacturers, especially new entrants like IBM, Thomson and others. "They're very interested," he notes.

In spite of that, others like Nickerson argue that analog signals will be a way of life for years to come. He simply can't understand how cable operators let so much potential revenue slip from their hands. "I think the whole world has a throw-away mentality," he says. CED

Our Inserters have a head start, before they get to your headend.

Testing our systems is something we take very seriously at SDI. That's why every StarNet Digital Inserter runs and verifies thousands of spots– before they're shipped. Our quality control department loads each system with commercials and connects it to the live tone feed. And the testing is not done until the system verifies insertions at over 99% accuracy.

We think our testing and quality control is the best in the industry. If you don't believe us, just ask our customers. With over 35 systems installed, SDI is a leader in the digital insertion market.

SDI
STARNET DEVELOPMENT INC.

404 W. Ironwood Drive, Salt Lake City, UT 84115
(801) 464-1600 · Fax (801) 464-1699

Circle Reader Service No. 40

Small systems and dealing with new technology

Not a time to do nothing

By Dave Heyrend, Director of Engineering, United Video Cablevision Inc.

For cable telecommunications engineers who love to "fiddle with new stuff," these are exciting times. The regulatory climate of the past few years created an urgent need for new revenues and helped drive development of alternative ways to use a cable television system. The threat of competition requires that we enhance services on all levels. Greater customer awareness opens our delivery systems to increased scrutiny, demanding new innovations in operations.

What's ahead?

There are formidable challenges facing the cable television technical community. Improving network reliability is a prerequisite for any company that wants to offer new services. Training technical staff to maintain the new services is also a paramount consideration to future operations.

As we consider factors that will apply to cable systems delivering new and enhanced services, system reliability emerges as one of the first needs. In order to be on the same playing field with established telephone providers, we must target a 99.99 percent network availability figure. This means trunk and distribution plant outages will be measured in minutes per year, rather than hours. Fiber rings routed in diverse paths, backup lasers with automatic switches and power supplies with multiple levels of redundancy are some of the devices that will need to be employed to increase system reliability.

The competitive environment in providing entertainment, interactivity, data and voice communications will dictate that the delivery of these services be transparent to a user. Downtime for maintenance, testing or even "honest mistakes" will be unacceptable. Field service management systems will need to be employed to insulate customers from disruptions. Operators need to consider employing status monitors which tell them when power to each supply is off, and how long it has been off. Technical personnel will need to know immediately if certain parameters such as response, carrier-to-noise, or system level are within tolerance. Automated mapping systems will be interfaced with the monitoring system to enable timely identification of a trouble area. Technicians will be automatically paged to respond not only to outages, but also to "out of spec" conditions measured by status monitors. Comprehensive feedback and a much higher level of system control will be required.

In addition to a reliable system, another primary component for the delivery of new services is a fully activated return path. Full return path maintenance is very labor intensive because every home connected to the distribution plant and every active device in the system has the potential to introduce destructive noise or distortion into the network. A team dedicated to daily monitoring of the return path operation, and to detect and correct ingress incursion, will be vital.

The subscriber drop system is a component of the plant that gives cable television its greatest advantage over competitors. This direct broadband pipeline into the home will become, perhaps, our greatest asset.

Unfortunately, it is now the largest contributor to service calls, responsible for 70 percent to 85 percent of all calls. It is the part of the system over which operators have the smallest degree of control, and its installation is typically accomplished by employees with the least amount of training. To accommodate future services, the drop system must be engineered, and possibly even re-engineered, to provide adequate signal level to a proliferation of devices–multiple TV sets, computers, security sensors, electric and water usage readers and telephony equipment.

Figure 1: *Maximum drop length worksheet*

Maximum outside drop cable length = [redacted] *feet*

Outside drop cable type = *RG* [redacted]

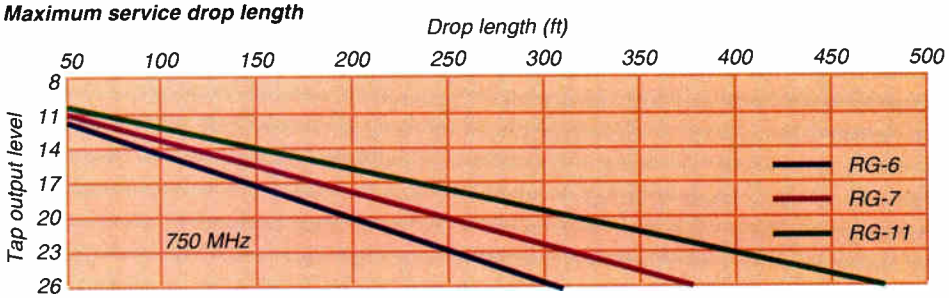
Inside drop cable length = [redacted] *feet*
Inside drop cable type = *RG* [redacted]

1 dB to terminal (TV, VCR, convertor)
4 dB = splitter
? dB = VCR bypass mode
? dB = Other loss
5.0 dB total other losses

System upper design frequency = [redacted] *MHz*
Tap output level = [redacted] *dBmV*

System design (MHz)	55	350	400	450	550	750	1000
Inside drop attenuation/100 ft. =	1.4	3.7	3.9	4.2	4.7	5.5	6.4
Inside drop loss @ =	1.0	2.6	2.7	2.9	3.3	3.9	4.5
Other losses =	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Tap output =	16.0	16.0	16.0	16.0	16.0	16.0	16.0
Signal remaining =	10.0	8.445	8.3	8.1	7.7	7.2	6.5
Outside drop attenuation/100 ft. =	1.4	3.7	3.9	4.2	4.7	5.5	6.4
Maximum drop length =	**694**	**231**	**211**	**194**	**167**	**130**	**101**

Maximum service drop length



IT'S A PROMISE KEPT.

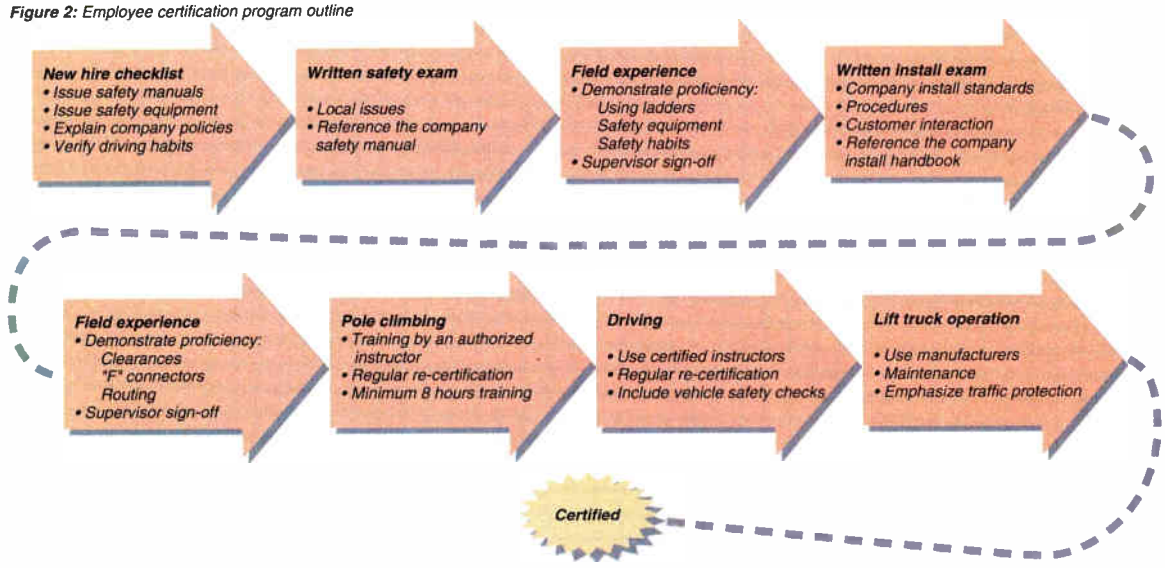
MORE THAN A TRAP,

AN EAGLE IS A TRAP THAT ARRIVES ON TIME, AS PROMISED.
LAST YEAR, EAGLE DELIVERED ON SCHEDULE 98.5% OF THE TIME. AND WE'RE WORKING TO IMPROVE, WITH MORE THAN 750,000 TRAPS IN STOCK AND THE LARGEST TRAP PRODUCTION CAPACITY IN THE WORLD.
FOR TRAPS ON TIME, CALL
1-800-448-7474.
EXTENSION 13

EAGLE
COMTRONICS INC.
P. O. BOX 2457 • SYRACUSE, NY 13220 USA
800-448-7474 • (315) 622-3402 • FAX (315) 622-3800

Circle Reader Service No. 41

Figure 2: Employee certification program outline



Shielding on cable and hardware must be increased; inferior components must be removed and replaced.

The above represents a glimpse into the future of cable operations. It may be your immediate future, or a more distant one. System location, size and demographics will determine how soon it happens.

Will it happen to me?

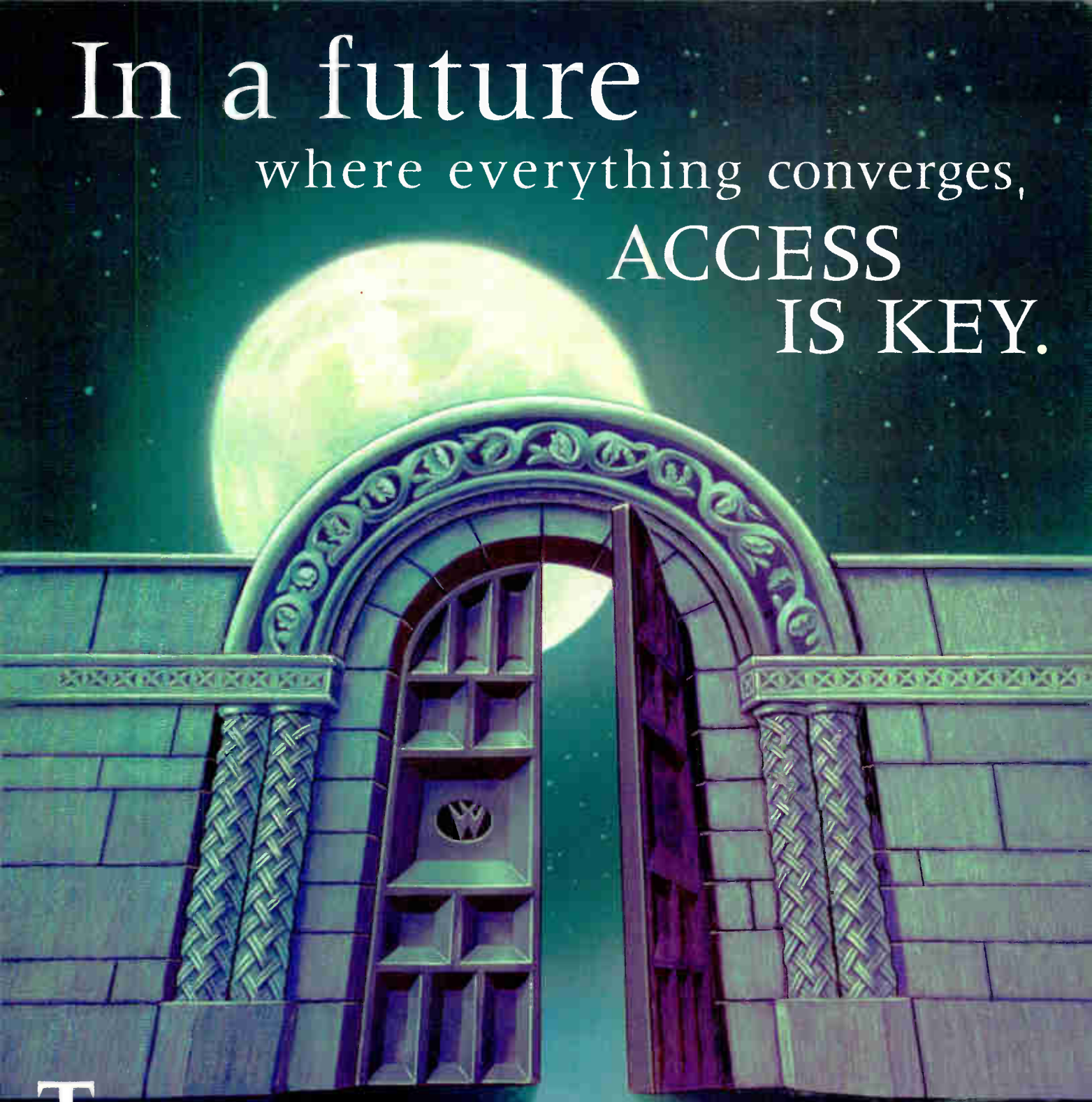
There is a great deal of speculation regarding which new technologies consumers see as valuable, and how much they will actually be willing to pay for them. Do subscribers want to watch movies-on-demand, or will nearly on demand suffice? Is there enough interest in Internet access, telemedicine or video shopping to warrant a line on the household budget? The particular services are sometimes unclear, but the threat of competition is driving the industry to take action. If there is a particular service which consumers will pay for, cable companies want to be the provider of choice.

Many operators have a solid plan going-forward, and some are currently working on the implementation of jazzy new technology. But what about the smaller guys, who by virtue of economics, must adopt a "wait-and-see" strategy?

While now may be the right time to "sit tight" and wait for new services to be proven, this certainly is *not* the time to do nothing. From a technical perspective, there is plenty to do in preparing cable systems to accommodate future services, as well as an urgency to earn the loyalty of subscribers.

The following suggestions, while easily implemented with minimal expense, can result in huge dividends if and when the time comes to enter the fray.

✔ Introduce drop standards which will provide for digital readiness and a 15- to 20-year life span.



The future of communications is one word — convergence. Integrated frame relay or ATM networks replacing separate voice and data networks. Hybrid fibre/coax systems carrying not just cable television, but voice and data as well. In this new world of boundless opportunity, secure, reliable access is key.

West End's ***Janua*** access products are the gates opening into this new world of communications.

The Janua family includes: the WestBound 9600 HFC Communications System; Arcadian & Burgundy Frame Relay Access Devices; Shureino ISDN Terminal Adapters.

WEST END
A Newbridge Company

Tel: (613) 623-9600
+44-1 633 479600
(703) 707-9600
E-mail: westend@newbridge.com

See us at
THE WESTERN SHOW
Booth 2414

Circle Reader Service No. 52

A 10-minute outage is perceived by the customer to be as disturbing as an outage that lasts all day

✔ Adopt installation procedures designed to minimize reflections, i.e., specify cable bend radii, eliminate staples, reduce splices and connections.
✔ Specify maximum drop lengths based on system-specific parameters, i.e., bandwidth, tap level, splits and inside wiring (See Figure 1). Train each installer so that he/she understands how to select the correct cable and can calculate its maximum length.
✔ Upgrade to high quality materials. Buy well-shielded passives and select cable shielding by taking into account the long term derating for bending and flexing.
✔ Insist on secure attachment techniques and materials. Use hardened metal clips and exterior and interior wall screws. Severely limit the use of any plastic fasteners.
✔ Replace any inferior parts, including customer-owned pieces, whenever they are found.
✔ Use only connectors with appropriate weather and corrosion protection.
✔ Use "do not remove" tags and heavy-duty materials for good bonding solutions.

Develop a quality control plan that specifies inspection on a regular basis. Inspect a certain percentage of the work that is performed by each individual in the field. This will indicate deficiencies in workmanship or procedure, and will also provide the opportunity to praise jobs which have been completed correctly. Inspection records should be retained for reference during regular employee performance reviews. Track corrective actions and inform customers of same. Have technicians verify that a problem is corrected to the customer's satisfaction before leaving the location.

It has been reported that a 10-minute outage is perceived by the customer to be as disturbing as an outage that lasts all day. This perception alone can have a significant impact on whether or not "cable" is accepted as a full service provider. That's why operators should perfect an outage management program. It should consist of training, recording and creative ways to avoid or limit outages. Foster the attitude that every technician should be "sweating bullets" while shutting down active plant, even if it affects only one customer. Consider rigging temporary bypass circuitry when planning repairs on active equipment. Communication with the office and/or customer is essential here, too.

Organize a formal training program. Cable companies cannot afford to put an untrained individual into the field. The consequences of a poor public image, substandard workmanship and operational liability can be devastating to the operator who wishes to grow his business. A full program will consist of an initial assessment period where employees are tested, interviewed and observed so that training needs can be determined and a baseline of current knowledge can be established. Next comes the actual training, which should be tailored to best fit with

A Bright New Light in the Headend Universe

PULSAR

BARCO introduces PULSAR, a revolutionary modulator for CATV headend applications requiring high quality RF signal and automatic provisioning. PULSAR offers remote monitoring and control of all modulator functions. An intelligent "white limiter" and video AGC prevent overmodulation and automatically optimize video input signal levels.

Remote or Local Control

Easy-to-use front panel keys allow direct control of video and audio RF levels, modulation depth, frequency deviation, and input switching. An RS-485 interface allows remote control of the unit.

Maximum Flexibility

PULSAR operates with 110 Vac or -48 Vdc, making it compatible with both conventional CATV or Telco powering schemes. The modulators feature IF substitution and are compatible with all major scrambling techniques.

Find Out More!

PULSAR gives CATV operators and Telcos an entirely new dimension in signal and service delivery. To find out why PULSAR will transform the future of headend modulators, call 770/590-7900.

- High RF Output Over the Entire Frequency Range
- White Limiter and Video AGC
- Auto Set-Up, Auto Alignment
- Complete Software Control for Monitoring and Backup
- Fixed Frequency and Tunable Versions
- 110 VAC and -48 VDC Powering
- Unique In-Channel Tilt Control

See Pulsar at the Western Cable Show, Booth 1013.

PULSAR BARCO THE ULTIMATE MODULATOR

BARCO

1000 Cobb Place Boulevard
Kennesaw, GA 30144
Tel: 770/590-7900
Fax: 770/590-8836

Circle Reader Service No. 43

normal system operations. Finally, a regular assessment of progress should be made. Using technical operations data can be helpful here. Measure, record and compare statistics such as those that evaluate service call returns, time to repair outages and FCC test results. Gauge employee progress by utilizing information obtained during the assessment period.

Institute an employee certification program to ensure that all employees receive specific training to perform their jobs correctly. It should include, at a minimum: safety, installation, driving skills and lift truck operation (see Figure 2).

A sweep and preventive maintenance program is essential to maintaining a "tight" system. A comprehensive program in this area will identify some system problems before they cause disruptions. It also allows for planned repairs that can be handled more efficiently, rather than emergency repairs resulting in longer disruptions and possibly more significant damage. Inspecting physical plant and hardware for deterioration or other problems can keep the system in good condition and possibly extend its life. It's very easy to come across a system problem that is not critical and say, "there isn't time for correction now" or "someone else will take care of it." But if each technical employee is trained to keep a watchful eye on the system and record each and every item that needs attention, then parts can be ordered and repairs can be scheduled. Have each employee keep a log of items which need attention and generate work orders on a regular basis from the logs.

Batteries and standby powering circuits are other system components which require regular, planned maintenance. Recording run times, events and history may indicate a failing unit before it actually causes disruption.

Another major technical asset of cable plant is its secure, high bandwidth, two-way pipe into the home. No one else has it–it can be our claim to the future. However, only five percent of the homes in the country have the return portion of this valuable asset fully operational. Most systems have return capability engineered into the original plant design, and their amplifiers have available space for diplex filters and return amps, but the path lies dead. Do not underestimate the complexity of activating this path. Activate the return path now to work out the problems and prepare technicians to maintain it.

Install fiber at every opportunity. Hundreds of projects and several years of experience have proven fiber to be a cost-effective transportation system for broadband services. At each rebuild or consolidation opportunity, evaluate how much fiber can be incorporated into the design.

A program that is gaining attention in the improvement of organizational control of field work is fleet management. The benefits are surfacing at several MSO locations. The cornerstone of the program is in communicating with mobile employees. Whether accomplished by satellite-delivered messages, radio and positioning devices or simply by establishing a call-up job start/finish procedure, the ability to direct field resources in a real-time manner can help provide the customer service improvements that will retain subscribers. It promises to be an effective way of responding to problems more quickly and efficiently, while providing the customer a higher degree of information regarding appointments, repair expectations, outage duration and several other aspects of service. These are important points in delivering the message that cable is serious about the future.

The items outlined here only scratch the surface of preparatory operations for "wait and see" strategists. The recommendations represented cannot be perfected overnight. Staffing levels may need to be increased; automated equipment will need to be deployed. It will take much training, diligence and effort. But, if operators wait until it's time to launch a new service to institute these changes, it will be too late. Embracing the operating practices now will help ensure cable systems' value and status for the times to come. CED

channel Surfing

New

MicroStealth Multi-Channel Testing -- for under $900

The Faster, Easier, Comprehensive signal level meter for cable TV installers.

Multi-Featured... For the first time, installers can check all channels quickly and accurately- ensuring FCC compliance and reducing subscriber callbacks. MicroStealth's scan mode displays multiple channels simultaneously on a single screen. Plus, measure up to 890 MHz for today's high bandwidth cable systems.

Easy Viewing... View the signal levels on a detailed, high resolution LCD display -- a feature, up until now, only available on higher priced signal level meters.

Easy to Use... With the press of a single button, cable installers can easily get a snapshot of the system's performance. There is even a one button *Go/No-Go* function so you can be sure you are within FCC compliance on every installation. MicroStealths are lightweight, rugged and water resistant, to withstand the abuse of every-day field use.

MicroPriced... The new MicroStealths are yours at unbelievably low prices. Even the enhanced MicroStealth MS1200 with 890 MHz frequency extensions, full scan mode, FCC *Go/No-Go*, and printer driver capability, is about half the price you would expect.

All the accuracy, speed and ease of use at a price you expect from a leader.

Call 1-800-622-5515

Wavetek...partners in productivity for over 25 years.

WAVETEK

Upheaval on PCS front inspires new thinking

Wireline ops may have time to weigh options

By Fred Dawson

Broadband network operators eagerly anticipating the transport revenues they see flowing from the deployment of advanced wireless telecommunications services should be careful not to count their windfalls too soon.

With the experiment in chaos known as personal communications services now moving into the no-man's-land between vision and reality, the magnitude of the immediate logistical challenges facing license holders appears to be growing exponentially. Moreover, the strategic uncertainties surrounding the market opportunities for PCS are deepening as cellular companies leap to exploit advances in digital technology.

Now that the "A" and "B" block broadband (voice) auctions are out of the way, the next steps toward rolling out PCS are proving tougher than anticipated, starting with what some industry players are charging is extortion on the part of current spectrum users in the 1.8-2 GHz slot who must be relocated at the expense of new PCS providers. "Obviously, microwave relocation is a very significant issue," says Al Kurtze, chief technology officer for the Sprint Telecommunications Venture. "It could have a significant impact in terms of our financial obligations."

"Microwave relocation is one of the most costly and complex issues facing the broadband PCS industry today," says Jay Kitchen, president of the Personal Communications Industry Association (PCIA). Noting that PCIA has asked Congress to reduce the voluntary negotiating period between PCS licensees and existing users of the spectrum at 1.9 GHz from two years to one, Kitchen says, "(The current FCC plan is) turning out not to be an acceptable solution, because a two-year wait is going to dramatically delay implementation of PCS systems."

Moreover, Kitchen says, the pattern of higher than expected charges being leveled by incumbent users, consisting primarily of utilities, railroads and other private entities, is undermining people's willingness to bid on the "C," "D" and "E" blocks of spectrum still to be auctioned for PCS, resulting in a $2-billion reduction in projected aggregate bidding.

FCC Chairman Reed Hundt tells PCS entrants their best hope for redress is Congress, rather than the Commission. "As you know, we all anticipated it would be costly," Hundt says of the relocation process. "But it's extremely important that the FCC not change the rules in the middle of the game as far as the incumbents are concerned. I don't want to lend the impression to anyone that we can't be trusted here."

The issue is "very important," acknowledges Rep. Jack Fields (R-Texas), chairman of the House telecommunications subcommittee. Noting he will be promoting a House measure in the budget reconciliation bill that would reduce the negotiating period by one year, Fields says he is hopeful "we will be able to roll up the schedule for vacating in these bands of spectrum."

Another looming impediment for PCS lies in the tedious process of finding sites for antennas. While it's less a problem for providers who rely on the strand-mounted remote antenna driver (RAD) used in conjunction with HFC networks, the issue is not trivial even for them, Kurtze says.

"Site acquisition is another opportunity to experience some delay," Kurtze notes. "We're working very hard on that. We think this is one of the major gating items."

The situation doesn't look good from the trenches,

Combined PCS/cellular CDMA coverage by MTA

Want to get your cable company into the telephone business?

■ Just call Nortel, the one partner with all the experience and know-how you'll ever need. ■ We offer Total Network Solutions for cable telephony, including switching, operations support system (OSS) and regional interconnection. Our Cornerstone Voice system delivers telephony over hybrid fiber coax.

Start dialing.

And best of all, you can install our products today. ■ Get everything you need to deliver success. Reach Northern Telecom at 1-800-4 NORTEL (dept 2H17) or on the Internet at http://www.nortel.com. ■

NORTEL

A World of Networks

Broadband Networks · Enterprise Networks · Wireless Networks
Switching Networks · Network Applications

Circle Reader Service No. 46

PCS must be redefined to include a combination of wireline and wireless service

says Greg Sweet, the owner of Acquired Telecom Services in San Francisco, a site acquisition consulting firm. "I'm afraid what we're heading for is complete war if we don't do something as operators and manufacturers to let the American public know what we're trying to do," he says. Sweet takes industry leaders to task for not preparing the public for the coming of PCS. "How are we going to sell the American people on the idea of 100,000 new facilities over the next 48 months if our industry and the leadership don't take an interest in being proactive?" he asks.

PCIA and other industry officials say the priorities associated with addressing basic licensing and other issues have left little time for thinking about the local site problem. "I agree we need to do a better job of explaining PCS to the public," says David Twyver, president of wireless systems at Nortel. "The major players who have the capacity to talk about these things have been consumed by the effort in Washington to find out what the rules are going to be."

There is a role for the federal government in this area, Fields says, noting that "if there is to be a seamless (PCS) network that benefits the consumer, there must be a quick rollout of tower sitings." The House version of the telecom reform bill would have the FCC undertake a rulemaking to streamline the process, making it possible to install facilities under certain conditions without obtaining zoning permits.

"I think we can protect local interests and not have a process that stops an exciting industry," Fields asserts. But while Fields may believe such a step is in the national interest, Kitchen acknowledges city and state government organizations are lined up to lobby hard to prevent the House version from becoming law. "We're in a real fight," he says.

To the still-unresolved issues on the regulatory front must be added the questions of number portability and network interconnection, answers to which will determine the future of wireline as well as wireless competition in telecommunications. "We think these issues need to get standardized at the federal level," notes Kurtze.

So far, as has been evident in state-level battles over proposed terms of interconnection and number portability between local exchange carriers and their wireline competitors, the prospects for quick resolution on a state-by-state basis appear bleak. But a more expeditious handling of the issues through federal intervention depends on completion of the telecom legislation that now faces the threat of a Presidential veto. And even if everyone in Washington signs off on the measure, the PCS industry will have to wait through new proceedings at the federal and state levels for the rules ensuring number portability and reasonably priced interconnection to take shape.

The cellular impact

Meanwhile, the cellular industry's implementation of digital technology is forcing PCS providers to be more creative in coming up with strategies that will allow them to distinguish their services from the giants of wireless.

"The new wireless entrants can't afford to strike a me-too posture when it comes to the scope of their services," says Ben Scott, president and CEO of PCS PrimeCo, the joint venture involving Bell Atlantic, Nynex, US West and AirTouch, the recently spun-off cellular unit of Pacific Telesis. "PCS has to be innovative in building a network beyond basic voice and in marketing its products. PCS has to–and will–deliver something better."

In fact, notes Nortel's Twyver, PCS providers can succeed without replacing cellular as the leaders in mobile service. "Cellular is growing and will dominate mobile for as long as we can see, but I expect there will be more PCS subscribers within six or seven years than there are cellular subscribers," Twyver says.

PCS must be redefined to include a combination of wireline and wireless service, Twyver adds, echoing the strategy articulated by the Sprint venture and others.

"Anytime-anywhere communications means access to service when and where it's needed from wired and wireless terminals," Twyver says. "PCS needs to be positioned as more than just a new flavor of mobile cellular."

This is AT&T's goal, says Richard Bodman, senior vice president for corporate strategy and development at AT&T, which, with its acquisition of McCaw Cellular and successful bidding on key PCS markets, is positioned to marry the two classes of service into a single advanced digital platform.

"We'll have a single phone which, when we're using it in our house or in our office, operates just as though it is an extension of the networks in those buildings," Bodman says, "but when we walk out of our house and go around the globe, they operate attached to global and nationwide cellular or other wireless networks."

Countering incompatibilities

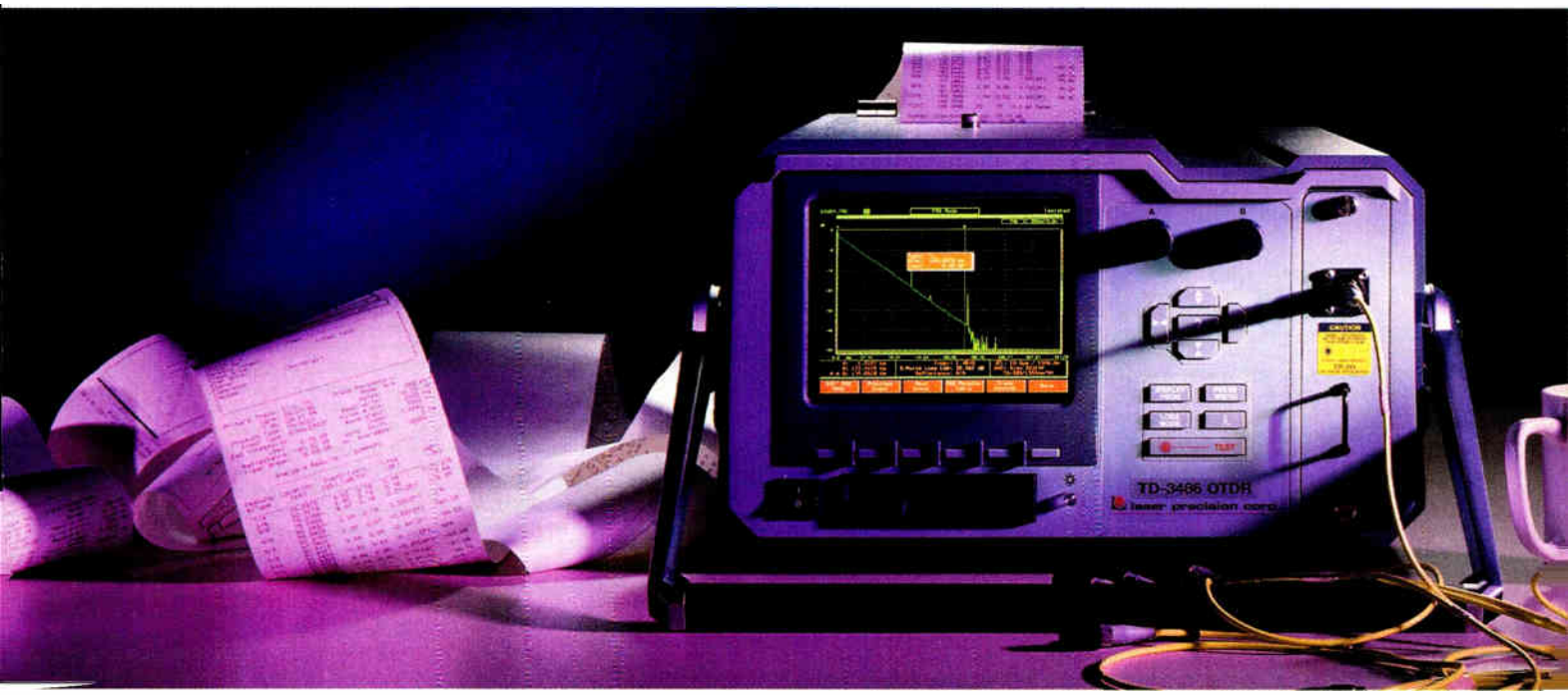
Twyver, Bodman and others say the distinguishing factors for PCS, and eventually, digital cellular will include high quality voice matching or exceeding today's wireline quality, means of authentication to overcome fraud, and the ability to deliver fax, data and e-mail services. "The true usefulness of being able to make a call from a moving vehicle has allowed the customer to overlook the sheer rottenness of the service," Bodman says. "We have to change so that wireless is not only as good as wired networks but better."

Roaming from one PCS territory to another will not be as important as these other things, Twyver asserts, noting that the target base for PCS extends into the consumer market where travel is less frequent than it is with business users. "Very few of the cellular customers who have been added lately actually roam," Twyver says. "This represents a tremendous opportunity for people who provide regional or local service."

It would be a happy coincidence for PCS providers if this proves to be the case, given the lack of any standardization on air interface protocols that would make roaming in the PCS domain an easier goal to achieve. But, with or without roaming, the incompatibility of competing standards is still a major problem, says Kari-

The world's newest, fastest OTDR can test 500 fibers in less than a day.

It's probably taking you all week.



Our new TD-3486 modular OTDR is loaded with a 486 processor, governed by our exclusive software, and reduces fiber optic cable test time significantly. What now takes three minutes to test on an ordinary OTDR takes only 22 seconds on the 3486. Which means your technicians can do a lot more testing in a lot less time, and you'll save a lot of money. And the 3486 does it with better resolution and clearer, more accurate traces which are easily seen in your choice of colors on its VGA display. Restoration time is dramatically accelerated, too.

The world's fastest OTDR brings new meaning to "one-button testing." Plus, it's so incredibly easy to operate, you're really going to reduce training time.

The dynamic range is nothing short of extraordinary.

The TD-3486 can go from 32 dB all the way up to 40 dB. Special modules let us give you precisely what you need whether you're testing 2 km of cable or 200 km. But the next thing you need is more information about the newest OTDR from the company that makes nothing but fiber optic test equipment: Laser Precision. Call us toll-free, or write, and we'll tell you more in no time at all.

GN Nettest
laser precision division

We're easy to work with.
109 N. Genesee St., Utica, NY 13502 315/797-4449 or **1-800/443-6154** Fax: 315/797-5847

Circle Reader Service No. 47

Network operators could find themselves in the driver's seat as PCS begins to sort itself out

Pekka Wilska, president of Nokia Inc., a leading supplier of cell phones.

Noting that by his count there are some 50 variations on digital standards for PCS affecting handset design, Wilska says, "It's going to take awhile before PCS has the same economies of scale as cellular. That's our headache."

The primary split on air interface standards in the U.S. is between those who are following the TDMA (time division multiple access) route, most of whom are already in the cellular business and hope to add PCS service areas to broaden their market footprints, and those who are going toward CDMA (code division multiple access), which is seen as a more bandwidth efficient technology by many leading players in PCS.

The argument for TDMA, which is now in the early phase of deployment, rests in large measure on its lead time in the marketplace over CDMA. But, as TDMA stumbled in the runup to production last year, that lead narrowed to about a year, assuming CDMA moves into early tech trials in mid-1996 as expected.

Bodman professes to be unconcerned about the downsides of a market divided by competing air interfaces, which also include PCS- and DCS-1900, the U.S. adaptations of Europe's TDMA-based GSM (global systems for mobile); Omnipoint's IS-661, a spread spectrum technique combining elements of CDMA and TDMA; and a variety of variations on these and other approaches.

"I'm not suggesting we're all going to be one friendly club doing everything one way eventually," Bodman says. "But we're going to be driven by the needs of our customers, and they'll pick what they want in the marketplace. Great ideas seem to be coming from very diverse places, and we will have an environment that allows us to bring ideas out and test and accept the things that are really happening."

While AT&T inherited McCaw's commitment to the cellular TDMA standard known as IS-54, it sees no reason to switch horses based on claims for CDMA superiority. "AT&T is delighted with the technology we inherited," Bodman says. "We don't feel we have any technological disadvantage."

With TDMA in its cellular networks, AT&T will have a quick start on building a broad footprint in TDMA-based PCS, officials say. "Our handsets will be interoperable, whether the local wireless link operates at 800 MHz or 1.9 GHz," notes Scott Erickson, vice president of marketing for AT&T's wireless division.

The company's mobile wireless systems could also eventually meld with fixed wireless access technology to eliminate the need to build broadband pipes in the last mile of the local network, officials noted. "Fixed wireless loop access represents a great opportunity for us, on the equipment as well as services side, as local access opens to competition," Bodman says.

Interestingly, AT&T's Network Systems unit, to be spun off in the company's reorganization next year, recently announced it would apply CDMA technology in production of a digital wireless local loop system supporting plain old telephone service and ISDN starting next April. In addition, the recently proposed AT&T global satellite telecommunications system, offering high-speed, two-way Ka-band service to individual users, will operate in CDMA mode.

Officials say such conflicts now are not critical barriers to eventual compatibility, so long as the industry adopts AMPS (advanced mobile phone service) as the analog standard that can serve as a common second port connection for phones in either TDMA or CDMA systems. In fact, Nortel's Twyver says that, assuming AMPS prevails, dual-mode phones at cost points within the reach of PCS users who really need to roam will be available by the time PCS networks are widely deployed.

"I believe we'll have dual-mode digital GSM or TDMA and CDMA phones within 12 or 18 months," Twyver says, "and the 5, 10 or 15 percent of subs who need to roam will be able to."

The resale option

Whether the transition to wireless proves as seamless as these executives suggest or as unseemly as Nokia's Wilska predicts, the logistical roadblocks arising from microwave user relocation and antenna site location appear certain to extend industry timelines, affording wireline operators more time to weigh their options as PCS providers come calling in search of low-cost network infrastructure options.

In fact, if Time Warner Telecommunications is right, network operators could find themselves in the driver's seat as PCS begins to sort itself out. This is because, in the Time Warner view, notwithstanding billions spent at the auctions, PCS and cellular spectrum is on the road toward commoditization.

"There's going to be enough wireless capacity to meet all the needs of the marketplace many times over," says David Tyler, legal counsel for Time Warner Telecommunications. "We believe $45 as a flat monthly rate with unlimited usage is not out of reach within the next two to three years."

TWT pondered whether to bid on PCS spectrum for the better part of a year, finally concluding that there would be plenty of spectrum available to secure as a reseller without paying the high cost of winning at auction, Tyler says. By upgrading its cable networks with fiber, he adds, Time Warner will be in a position to secure spectrum in the anticipated glut to come and to launch service while others are still building out their wireless networks.

"The consumer wants one-stop shopping, a single service package of options to choose from, one bill and one number to call," Tyler says. "The first company to bring that to the customer will win in the marketplace."

If TWT is right, the combination of abundant spectrum and low HFC infrastructure costs could make the resale business an option for cable operators everywhere. With all the heavy lifting still to be accomplished in the wake of the spending spree at the FCC, at least a few PCS licensees may be ready to talk deals with someone who can put the spectrum to use once the logistical barriers are cleared. CED

IF IT'S

MORE LIVE CHANNELS

DIGITAL

MORE MARKET INSTALLATIONS

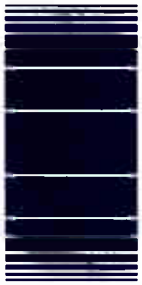
ADVERTISING,

MORE DIGITAL COMMERCIALS

CHANCES ARE

THAN ANYBODY ELSE.

IT'S US.



SEACHANGE TECHNOLOGY

CONCORD, MA • 508-287-4499, EXT. 232 • FAX 508-287-4099

AT WORK IN THE REAL WORLD.

Visit us at the Western Show

AERIAL LIFTS

VERSALIFT

GAIN MORE SIDE REACH AND BETTER LINE ACCESS WITH THE NEW TEL-29 NE

Boom-tip mounted bucket puts your operator two feet closer to that hard-to-reach splice.

It's TIME to check out VERSALIFT!

TIME

P.O. Box 20368 Waco, TX 76702-0368
(817) 776-0900 TELEX (910) 894-5218
FAX (817) 776-7531

VERSALIFT

Circle Reader Service No. 100

CABLE WINCHES

CABLE PLACEMENT WINCHES INTRODUCTORY

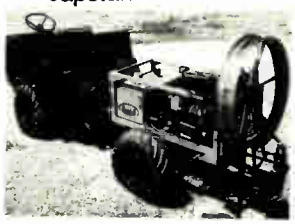
ECONOMY ASSIST WINCH MODELS

$9995.00* INTERNET SPECIAL

Cable winch system in pick-up truck

Winch system mounted on 4x4 utility vehicle

- Auto-speed control
- Economical
- Pull force recordable
- Aerial or underground
- Fiber, coax or copper
- Less manpower required
- Compact design
- Dual directional capstan



**Internet special price applies to special winch Model 4000USP and 4000ASP*

Broyhill

P.O. Box 475, Dakota City NE 68731-0475
Phone: 800-228-1003 FAX: 402-987-3601
URL: http://www.broyhill.com E-MAIL: Broyhilsal@aol.com

Circle Reader Service No. 101

DRAFTING & DESIGN

Program Manager

File Options Window Help

Lode Data Drafting and Design

Lode for Windows®

The most popular broadband engineering software is now available for:

Windows® 3.1x
Windows® NT
Windows® '95

New Drafting Assistant Import Features:

- EOL signals
- Power supplies
- Device-to-device footages
- Housing and self terminators

Call now for details!
All versions are available to current customers for immediate download on the Lode Data BBS

LODE

Lode Data Corporation
7120 E. Hampden Avenue
Denver, CO 80224
Tel: (303)759-0100 Fax: (303)759-0214

Circle Reader Service No. 102

FIBER OPTIC ASSEMBLIES

QUALITY FIBER OPTIC ASSEMBLIES

SINGLEMODE/MULTIMODE

- PC/APC >65 dB
- FDDI
- ESCON
- SMA
- BICONIC
- FC
- SC
- ST

MULTI-FIBER DESIGN/TERMINATION

SAME DAY DELIVERY

Custom designed fiber optic cables for CATV, Telecomm and Datacomm applications.

ARIA TECHNOLOGIES, INC.

5309 Randall Place
Fremont, CA 94538
Ph: 510-226-6222 Fax: 510-226-6242

Circle Reader Service No. 103

INSTALLS

FIBER OPTIC SYSTEMS

Design • Installation • Testing • Full Turn-Key Services

APPLICATIONS:

Telephone • Cable TV • 802 Networks • Process Control • Security • IVHS • Educational Networks

SERVICES INCLUDE:

SYSTEM ENGINEERING & DESIGN
OUTSIDE PLANT CONSTRUCTION
PROJECT MANAGEMENT
AERIAL & UNDERGROUND
CABLE INSTALLATION
SYSTEMS INTEGRATION • PREMISES WIRING
SsplicING • TERMINATION • TESTING
ACTIVATION • TRAINING
EMERGENCY SERVICE

AXSYS **Communications**

P.O. Box 571
Danielson, CT 06239-0571
Tel: 860-774-4102
Fax: 860-774-4783

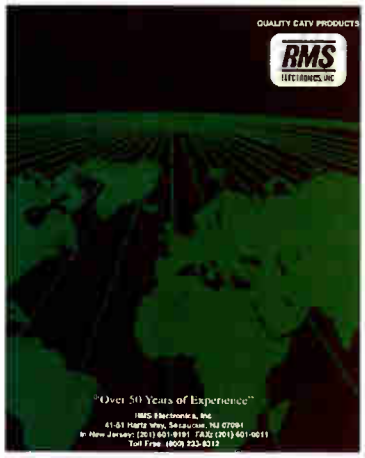
Planes 1057
(1405) Buenos Aires
República Argentina
Tel: 582-2915
Fax: 582-1372

Circle Reader Service No. 104

PASSIVE DEVICES

RMS Over 50 Years of Experience

FREE CATALOG



RMS Electronics is a leading manufacturer/supplier of cable equipment. We are becoming the fastest growing supplier of cable components in the world. The new RMS American catalog contains an extensive line of over 400 products which are used in the construction or rebuilding of cable television systems. Call for your FREE catalog today!

RMS Electronics Inc. (800) 223-8312

Circle Reader Service No. 103

POWERING

Power Supply Performance That Others Simply Can't Touch

Performance Model SB3000 Power Supply System, $990.00

Not only do we supply more power than the others, but we do it more reliably than anyone else. Besides that, we have revolutionized the way batteries are charged. Before, batteries were expected to last a mere 12 to 18 months as they were being boiled, equalized and trickled charged to death. But we have changed all that. Now you can expect four or more years of life from your batteries thanks to our remarkable charger. And to top it off, our life time warranty assures you of never having to pay for another power supply repair. And like we say...*power supply* ***PERFORMANCE*** *that others simply can't touch.*

CALL JUD WILLIAMS AT 800-279-6330

(INTERNET) jud.williams@industry.net

Performance CABLE TV PRODUCTS
P.O. BOX 947, ROSWELL, GA 30077

AN EDWIN-ROSS COMMUNICATIONS COMPANY

Circle Reader Service No. 106

TOOLS

Our Name Tells The Story . . . Use It

Cable Prep Stripping/Coring Tools
- Produces beveled-edge on outer conductor
- Light-weight
- Non-corrosive
- [illegible] on "hot cable"
- User-friendly in all temperatures
- Color-coded tool available for all cable sizes

Cable Prep Jacket Strippers
- Available for every size cable
- Color-coded for easy identification
- Knurled body for positive grip
- Fast, efficient jacket removal

We make your job easier!

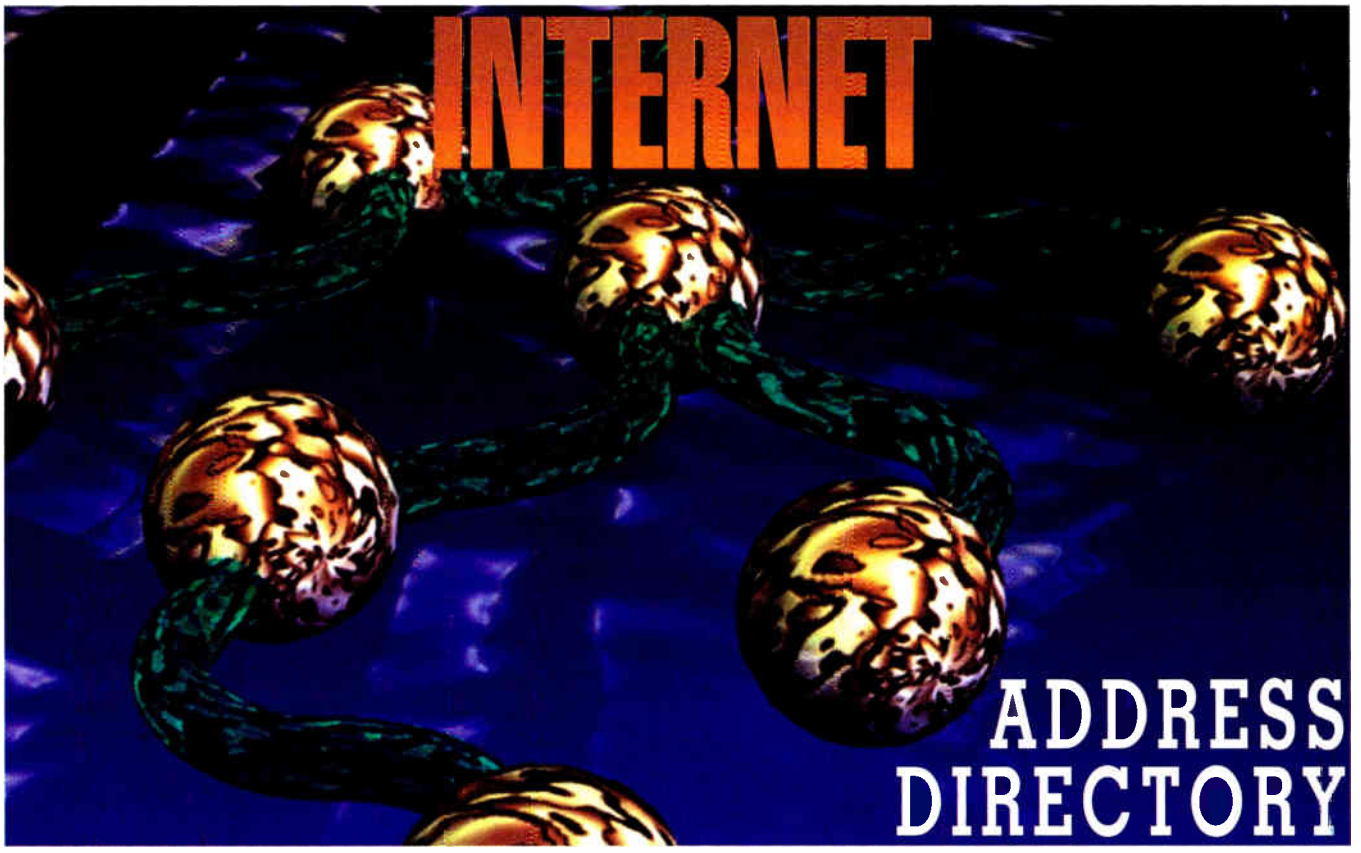
[illegible] of our products are made in the USA with USA materials

cable prep®

BEN HUGHES COMMUNICATION PRODUCTS CO.
207 MIDDLESEX AVENUE, P.O. BOX 373
CHESTER, CONNECTICUT 06412-0373
(203) 526-4337 FAX: (203) 526-2291 (800) 394-4046

Circle Reader Service No. 107

CED



The following list contains the Internet addresses for advertisers appearing in CED, and is provided as a service for our readers.

AXSYS Communications, Inc.
Laura.Lehsten@internetMCI.COM

The Broyhill Mfg. Co.
URL:http://www.broyhill.com

CommScope
http://www.commscope.com

Corning, Inc.
http://usa.net/corning-fiber

General Instrument Corp.
http://www.gi.com

Microwave Filter Co. Inc.
http://www.ras.com/mwfilter/mwfilter.htm

Nortel
http://www.nortel.com

Tektronix
http://www.tek.com/Measurement

Trilithic
http://www.trilithic.com

WestEnd Systems
E-mail:Westend@newbridge.com

CED magazine is not responsible for any omissions or any inaccuracies.

CED

CED is pleased to bring you this paid advertising section, which categorizes the leading manufacturers and suppliers of cable and telecommunications equipment.

CED Leading the way into the new world of telecommunications

Aerial Lifts

CALL 712/864-3737
FAX 712/864-3848

ARMLIFT, DIVISION OF TG INDUSTRIES, INC.
Manufacturer of ArmLift aerial lifts serving the needs of both telephone and the cable industries. Telescoping and articulating models up to 38' of working height for van and truck mounts. 300-lb. bucket capacity. Variety of power sources and a full line of truck equipment options. Complete factory installation available.

CED

Aerial Lifts

CALL 817/776-0900
FAX 817/776-7531

TIME MANUFACTURING CO.
Manufacturers of Versalift aerial lifts, telescopic and elbow types, trunk or van-mounted, with working heights up to 65 feet. Sold internationally through distributors.
P.O. Box 20368, Waco, TX 76702-0368

CED

Billing & Mgmt. Information Systems

Gain from the experience
Profit from the vision

CALL 800/835-8389
FAX 916/636-5645

Integrated cable and telephony transaction management systems and billing services that provide savings from operational efficiencies and avenues for improved customer satisfaction. CableData's statement and production mailing facility provides high-speed statement turnaround and is the largest centralized First-Class mailer in the U.S.
11020 Sun Center Drive, Rancho Cordova, CA 95670

CED

Cable

CALL 704/324-2200
WATS 800/982-1708
FAX 704/328-3400

CommScope-General Instrument is an ISO 9001 registered quality manufacturer of cables for telecommunications and other digital applications, the only US manufacturer of a complete line of coaxial and fiber cables for use in the cable television plant and a world leader in cable innovation. CATV products include: Optical Reach®, Quantum Reach®, Parameter III®, and a full line of drop cables including many that are available in E-Z Pak® packaging.
1375 Lenoir-Rhyne Blvd., Box 1729, Hickory, NC 28602

CED

Cable

CALL 203/265-8500
WATS 800/677-2288
FAX 203/265-8422

Times Fiber Communications, the only coaxial cable supplier standardized on GHz bandwidth for trunk feeder and drop cables, is committed to: Quality, service and technology.
With over 40 years experience we continue to lead the industry in product advancement and innovation.
Times Fiber Communications...where technology meets the bottom line.
358 Hall Avenue, Wallingford, CT 06492

CED

Cable/Data Communications

CALL 708/391-8000
FAX 708/391-8569

Zenith Electronics Corporation has been a leader in electronics for more than 75 years. Zenith's core business–Consumer Electronics and Network Systems–is at the center of the company's digital strategy, which includes interactive television, analog and digital set-top boxes, digital video discs (DVD), digital wireless cable, video dial-tone, broadband data communication networking and HDTV systems. Zenith has more than 10 years experience in the network systems area.
1000 Milwaukee Avenue, Glenview, IL 60025

CED

VENDORS FOR CATV AND TELEPHONE INDUSTRIES

Contractors

Kennedy Cable

CALL 912/557-4751
WATS 800/673-7322
FAX 912/557-6545

KENNEDY CABLE CONSTRUCTION, INC.
Aerial and underground line construction of CATV, LANs, telecommunications and fiber optic systems. Splicing, upgrades, rebuild, new extensions of system, balance, sweep and proof system.
Hwy. 280 W., P.O. Box 760, Reidsville, GA 30453

CED

Contractors

Schenck construction

CALL 360/668-1300
FAX 360/668-1400

SCHENCK CONSTRUCTION
Turnkey aerial and underground cable TV construction
FIBER OPTIC CONSTRUCTION
POWER AND TELEPHONE CONSTRUCTION
8602 Maltby Road, PO Box 1530, Woodinville, WA 98072

CED

Distributors/Suppliers/Reps

FIBERTRON
Your Link with Fiberoptics

CALL FOR PRICING AND DELIVERY INFORMATION
Cable • Cable Assemblies • Connectors • Couplers • Distribution Equipment • FDDI • Innerduct • LAN • Modems • Multiplexers Multimedia Outlets • Splices • Splice Kits •Splice Trays Splice Closures • Supplies • Test Equipment • Tools • Tool Kits

Southwest
714/871-3344
Southeast
770/409-1700

CED

Northwest
510/635-1970
Northeast
717/852-6565

Distributors/Suppliers/Reps

MHz
MEGA HERTZ

Denver: 800-525-8386, 303-779-1749 Fax
Atlanta: 800-962-5966, 404-368-8928 Fax
St. Louis: 800/821-6800, 314-429-2401
Ocala: 800/922-9200, 904/351-4403 Fax

Manufacturers Rep for: ABC, AM Comm., Aurora Inst., Cable Innovations, CLT, Lectro, QRF, Radiant, Tektronix and Cabelcon
Distribution of: Antennas, coaxial cable, character generators, commercial insertion, distribution electronics, fiber products, headend equipment, power supplies, satellite electronics, test equipment and A/V products. Call for a complete MHz catalog.

CED

Distributors/Suppliers/Reps

TeleWire SUPPLY
An ANTEC Company

CALL 303/799-4343
WATS 800/232-9378
FAX 303/643-4797

Telewire Supply is your source for a full line of quality products for all of your broadband network needs: aerial and underground construction, headend and distribution electronics, taps and passives, cable and connectors, drop and installation material, tools and safety equipment, and fiber cable and apparatus.
94 Inverness Terr. E., Ste. 310, Englewood, CO 80112

CED

Enclosures

Cable Security

CALL 334/742-0050
WATS 800/288-1506
FAX 334/705-3620

CABLE SECURITY SYSTEMS
Manufacturers of the Beast™ lines of high security, low maintenance apartment boxes featuring our superlock locking system; distributors of padlocks, plastic and metal riser guard and molding products. The Beast™ is the number one high security apartment box in Cable TV. Don't sell your system short–invest in the best–the Beast™.
506 Walker Street, PO Box 2796, Opelika, AL 36803

CED

Fiber Optic Enclosures

Amphenol
Fiber Optic Products
Illuminating the world of fiber optics™

CALL 708/960-1010
FAX 708/810-5640

Amphenol Fiber Optic Products manufactures interconnect products for telecommunications, datacommunications, CATV and test and measurement systems. These systems include SMA, ST, FC/PC and SC connectors; complete termination tooling kits; simplex and duplex patchcords and pigtails as well as single mode and multimode passive fiber optic couplers, WDMs, attenuators and rack and wall mount fiber distribution enclosures.
1925A Ohio Street, Lisle, IL 60532

CED

Fiber Optic Training

FIBER OPTICS
The Light Brigade
KENT, WASHINGTON

CALL 800/451-7128
FAX 206/251-1245

Fiber optic training at a location near you! If you are designing, installing or maintaining fiber optic systems for voice, video or data applications, we have a class for you. We also have ten videotapes on various fiber optic topics that will enhance your in-house training. Call for our free training video preview.

CED

Networks

ANTEC

1.800.TO.ANTEC
OR 708/439-4444
FAX 708/439-8527

ANTEC is an international technology integration company specializing in the design, engineering, manufacturing, materials management and distribution of products for both fiber and coaxial broadband networks.
2850 W. Golf road, Rolling Meadows, IL 60008

CED

Opto-Electronics

C-COR® ELECTRONICS INC

CALL 814/238-2461
WATS 800/233-2267
FAX 814/238-4065

C-COR offers digital and AM fiber optics, RF amplifiers, network management systems, modems, passives and 90 Volt powering options. Services include network design, field engineering, technical training, equipment repair, 48-hour emergency repair service and a 24-hour emergency hotline. C-COR is ISO 9001 registered.
60 Decibel Rd., State College, PA 16801

ISO 9001 REGISTERED

CED

Opto-Electronics

Scientific Atlanta™

CALL 800/722-2009

The leader in AM fiber systems with a full line of equipment for all applications. Our Fiber-to-the-Serving-Area (FWA) architecture provides the most economical method to extend fiber to small pockets of homes. FSA also allows delivery of a range of advanced services such as PCS, video on demand, multi-media and other voice, video and data services. Network management and control system insures optimal system reliability.

CED

Powering

ARGUS TECHNOLOGIES

United States: 360/647-2360
FAX 360/671-7096

ARGUS TECHNOLOGIES LTD.
Argus Technologies is a member with the Alpha group of companies and offers a complete range of DC power system products and accessories that provide innovative solutions for all telecommunication power requirements.
3767 Alpha Way, Bellingham, WA 98225

CED

Powering

POWER GUARD

CALL 334/742-0055
WATS 800/288-1507
FAX 334/742-0058

World leader in supplying Global Network Powering Solutions. Manufactures a complete line of foreign and domestic power supplies including UPS's, standbys and non-standbys in totally modular AC and DC versions. Our "Power by Design™" concept reduces operating costs. Battery Vaults™ will extend battery lives. Manufacturing the strand mountable Power Cast™, the Power Clamp™ surge protectors and distributing Johnson Controls batteries.
506 Walker Street, PO Box 2796, Opelika, AL 36803

CED

Technical Journal

CED

CALL 303/393-7449
FAX 303/393-6654

THE PREMIER MAGAZINE OF BROADBAND COMMUNICATIONS
Since 1975, Communications Engineering & Design magazine has been providing professionals in the broadband communications industry with information that solves their engineering problems and is "THE" publication properly positioned to help advertisers profit from the convergence of data, voice and video technology.
600 S. Cherry St., Suite 400, Denver, CO 80222

CED

Test Equipment

MATRIX TEST EQUIPMENT INCORPORATED

CALL 908/469-9510
FAX 908/469-0418

MULTIPLE FREQUENCY SIGNAL GENERATORS
DISTORTION ANALYZERS
CUSTOM DESIGNED TEST EQUIPMENT

CED

Test Equipment

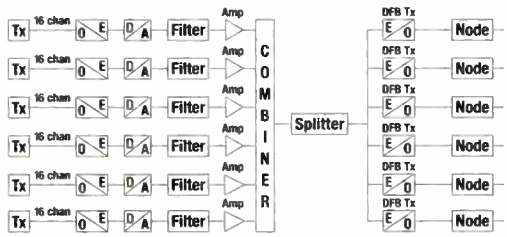
WAVETEK

Domestic 317/788-9351
National Toll Free 800/622-5515
FAX 317/782-4607

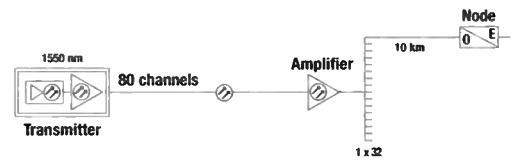
Wavetek manufactures a complete line of CATV test equipment for fiber optic and coaxial cable use. Products include signal level and analysis meters, optical signal level meters, system analyzers, video analyzers, OTDR's, system sweep equipment, frequency agile leakage detection and bench sweep gear. Wavetek's broad line of products also includes test equipment for the wireless communications, telecommunications, ATE, metrology and LAN markets.

CED

EVEN A CFO CAN TELL THE DIFFERENCE.



Before



After

ATx™ TELECOM SYSTEMS, INC.

JAVELIN SERIES

With 20.5 dBm of fiber optic power, the revolutionary Javelin™ 1550 optical link provides all the power you need to simplify your transmission networks. Let our applications engineers show you how launching Javelin into your current system can dramatically reduce the cost. Call ATx today at (708) 778-2900, or fax us at (708) 369-4299.

The issue: Interconnects

Cable companies that are serious about entering the telephony or high-speed datacom markets will have to be able to send and retrieve signals across traditional cable system franchise boundaries to cover wider geographic areas. This is a major break with tradition, where each cable system was its own island. Some say it can't be done easily. What do you think?

The questions:

1. Has your system consolidated headends by adding fiber to your system?

❑ Yes ❑ No ❑ Don't know

2. Has your system considered constructing one regional "superheadend" to serve the community?

❑ Yes ❑ No ❑ Don't know

3. Has your system either considered interconnecting or already completed an interconnect project with an adjacent cable system owned by other MSOs to fully "cover" the metro area you serve?

❑ Yes ❑ No ❑ Don't know

4. Do you think such an interconnect could save your system money over the long term?

❑ Yes ❑ No ❑ Don't know

5. Do you think your neighboring MSO would welcome the opportunity to interconnect with your system?

❑ Yes ❑ No ❑ Don't know

6. Do you believe an interconnect could bring your system more revenue through data delivery to businesses, advertising or other services?

❑ Yes ❑ No ❑ Don't know

7. How important will interconnects be in the future?

❑ Very ❑ Somewhat ❑ Not at all

8. Today, would you be inclined to deploy Sonet equipment or go with a less costly analog or proprietary uncompressed digital fiber system?

❑ Sonet ❑ Proprietary ❑ Don't know

9. Do you think cable operators can overcome individual preferences (i.e. signal security) to be able to interconnect their systems effectively?

❑ Yes ❑ No ❑ Don't know

10. Do you think a new set of standards should be created to allow for neighboring cable systems to interconnect seamlessly?

❑ Yes ❑ No ❑ Don't know

11. Do you think the cable TV industry should do more, less or about the same amount of work to determine the feasibility of interconnecting?

❑ More ❑ Less ❑ About same

Your comments:

Fax us at:

303-393-6654

Make a copy of this page and fax it back to us at the number above, or mail it to *CED*, 600 South Cherry Street, Suite 400, Denver, Colo. 80222.

*Every month, we'll pick one response from those we receive and award $50. See official rules below.

Names won't be published if you request your name to be withheld, but fill out the name and job information to ensure that only one response per person is tabulated.

Your name and title

System name:

Location:

Your MSO:

Your job function:

Daytime phone #:

Official rules: No survey response necessary. Enter by returning the completed survey via fax or mail to the locations indicated above, or print the words "CED Return Path" on a 3"x5" card and mail it along with your name, address, daytime phone number and signature. To be eligible for the drawing, entry forms must be received by 5 p.m. on December 30, 1995. CED is not responsible for lost or misdirected mail. One entry per person. Forms mutilated, illegible or not in compliance with these rules shall be considered ineligible in the sole discretion of the judges. Odds of winning depend on the number of entries received. A random drawing from eligible entries will be held on or about January 1, 1996. Winner will be required to provide his/her social security number and proof of identification and is solely responsible for all federal, state and local taxes incurred. Prize is not transferable to any other person. Sweepstakes participants agree to waive any and all claims of liability against CED magazine, Capital Cities Media Inc., Capital Cities/ABC Inc. and its affiliated and independent contractors for any injury or loss which may occur from participation in this sweepstakes or receipt of the prize. Winner consents to publication of his/her name for publicity purposes without further compensation. Participants must be 18 years of age or older. Employees of CED magazine, Capital Cities Media Inc., Capital Cities/ABC Inc. and its affiliated and subsidiary companies, and their respective employees, agents and independent contractors, and their immediate families are not eligible to participate. Void wherever prohibited, license required, restricted or taxed by law. Sweepstakes sponsors reserve the right to change or modify the sweepstakes rules while the sweepstakes is in progress. Participation in the sweepstakes constitutes acceptance of all sweepstakes rules.

RESULTS

The issue: Interactive TV

Although many will agree it has hit some obstacles, interactive TV is one of the hottest buzzwords in the industry today. Everyone seems to be preparing themselves and their networks to offer programming on demand, shopping services and games that can be played by multiple players in different locations. This survey polled our readers on the subject.

The results:

1. How important is it to the management of your system that interactive TV services be offered over your system?

Very important	Somewhat important
36%	**36%**
Not important	Don't know
18%	**9%**

2. How soon do you think services like interactive shopping, games and other services will be offered over your cable system?

1-2 years	3-4 years
18%	**36%**
5+ years	Don't know
36%	**9%**

3. Is your system presently real-time, two-way active?

Yes	No	Don't know
27%	**73%**	**0%**

4. If not, are there any plans to activate the return path?

Yes	No	Don't know
25%	**25%**	**50%**

5. Do you think it will be difficult to fire up a return plant and keep it "clean" enough to offer services like telephony and data reliably?

Yes	No	Don't know
55%	**36%**	**9%**

6. Do you think your system will have to use an advanced modulation scheme like spread spectrum to make the return path more usable?

Yes	No	Don't know
36%	**18%**	**45%**

7. Seven years from now, do you think people will be spending more time interacting with the TV–or with a personal computer?

TV	PC	Don't know
36%	**45%**	**9%**

8. If you offered true video-on-demand services today where movies cost $5 each, what percentage of your subscribers would buy them each month, in your opinion?

Less than 10%	10-20%	20-50%	50+%
36%	**18%**	**45%**	**0%**

9. Has your system added fiber optic technology to help break the system up into smaller "cells"?

Yes	No	Don't know
73%	**27%**	**0%**

10. Overall, of the following choices, which has the highest priority with your system's management right now?

Data delivery	Telephony
18%	**9%**
Interactive TV	Plain old TV
18%	**55%**

The promise of a future full of two-way networks offering interactive services remains alive, according to those readers who responded to the fax-in survey on the subject. Interestingly, more than one-third said the concept of interactivity is very important to their management, while another third said it was "somewhat important."

Yet doubts exist. Most said it will be at least three years, and perhaps more than five, before interactive services are offered over their cable plants. That could be a result of the fact that so few cable systems are presently two-way active. But when subscribers and the networks are ready, respondents expect the flood gates to open: nearly half said they expect between 20 percent and 50 percent of their customers to buy interactive services.

In fact, the return path remains a huge hurdle for system operators. A majority of those responding said it would be difficult to maintain a "clean" return channel to offer reliable telephony and data transmission.

Regardless, the clear focus at cable systems is on the here and now–and how to make it better. More than half said plain old entertainment TV remains the highest priority of their managers.

Congratulations to Edward Wachowicz of Nynex in Queens, N.Y. who won $50 just for sending in a completed questionnaire. To enter this month's drawing, simply fill in your responses on the previous page!

Your comments:

"Cable companies should focus more on telephony (to) give the phone companies competition."
– Jon Baker, Continental Cable, Brockton, Mass.

"Internet access will be the next challenge for cable companies. Telephone lines are just too slow on the World Wide Web."
– Larry Langevin, Greater Media Cable, Ludlow, Mass.

"It will be a very interesting next few years watching the development and implementation of interactivity unfold!"
– Gregg Brazee, Auburn Cablevision, New York state

NOVEMBER

1 Big Country SCTE Chapter, Testing Session. Installer certification exams to be administered. Location: San Angelo, Texas. Call Bill Neely (915) 646-3516.

1 Rocky Mountain SCTE Chapter, Technical Seminar. Topic: In-home wiring and its effect on digital signals. Location: NCTI, Littleton, Colo. Call Mike Phebus (303) 795-1699.

6-9 Fiber Optic Installation & Splicing, Maintenance & Restoration for CATV Applications. Produced by Siecor Corp. Location: Hickory, N.C. Call (800) 743-2671, ext. 5539 or 5560.

7-9 Philips Mobile Training '95. Location: Calais, Maine. Call (800) 448-5171 (800-522-7464 in New York state).

8 Badger State SCTE Chapter, Technical Seminar. Topic: Fiber amplifier technology. Location: Holiday Inn, Fond du Lac, Wis. Call Brian Revak (608) 372-2999.

8-9 Convergence Technology: Dealing with the Challenges. Produced by Multichannel CommPerspectives. Location: Marriott's Orlando World Center, Orlando, Fla. Call Gary at (303) 393-7449, ext. 225.

8-9 Migration to Digital Networks, produced by Scientific-Atlanta Institute. Location: San Francisco. Call Bridget Lanham (800) 722-2009, press 3.

9 SCTE Satellite Tele-Seminar Program. Topic: Fault location in fiber optic and coaxial cables (Part 1) from Expo '94 in St. Louis, Mo. To be transmitted on Galaxy 1R, Transponder 14, 2:30-3:30 p.m. Eastern time. Call SCTE national headquarters at (610) 363-6888.

Trade shows

November

5-8 U.S. Telephone Association's 98th Annual Convention. Location: Orlando, Fla. Call the USTA at (202) 326-7300.

29-12/1 The Western Show. Location: Anaheim, Calif. Call the California Cable Television Association (510) 428-2225.

9-10 Antec Fiberworks Compressed Video: Concepts and Transmission (CVCT). Location: Orlando, Fla. Call Karen Olheiser (800) FIBER-ME.

11 Chaparral SCTE Chapter, Technical Seminar & Testing Session. Topic: BCT/E Category I headends/signal processing tutorial. BCT/E certification exams to be administered. Location: Albuquerque, N.M. Call Bob Baker (505) 763-4411.

13-14 Fundamentals of the Digital Network. Produced by Nortel. Location: Orlando, Fla. Call (800) NT-TRAIN and select option 1.

13-16 Antec Fiberworks Fiber Optic System Training (FOST). Location: Denver, CO. Call Karen Olheiser (800) FIBER-ME for more information.

14-15 Understanding Hybrid Fiber/Coax Design, produced by Scientific-Atlanta Institute. Location: San Antonio. Call Bridget Lanham (800) 722-2009, press 3.

14-16 Philips Mobile Training '95. Location: Syracuse, N.Y. Call (800) 448-5171 (800-522-7464 in New York state) to register or for information.

14-16 Advanced Broadband Applications Engineering Training. Produced by General Instrument. Location: Indianapolis, Ind. Call (215) 830-5678.

14-17 Fiber Optic Installation & Splicing, Maintenance & Restoration for CATV Applications. Produced by Siecor Corp. Location: Keller, Texas. Call (800) 743-2671, ext. 5539 or 5560.

15 Dixie SCTE Chapter, Technical Seminar. Topic: Back to the basics and the big picture, plus Terry Bush of Trilithic. Location: Arizona Rib Company. Call Powell Bedgood (205) 733-1679.

15 Oklahoma SCTE Chapter, Technical Seminar. Topic: Vendor fair, with speakers TBA. Call Oak Bandy (405) 364-5763, ext. 249.

15-16 Fundamentals of the Digital Network. Produced by Nortel. Location: Orlando, Fla. Call (800) NT-TRAIN and select option 1.

16 Penn-Ohio SCTE Chapter, Technical Seminar. Topic: Fourth annual broadcast forum. Location: Sheraton Inn North, Pittsburgh, Pa. Call Marianne McClain (412) 531-5710.

16-17 Telco Video Platforms 101 Summit. Co-sponsored by the Interactive Television Association and Video Information Provider Consulting. Location: Washington, D.C. Call ITA at (202) 408-0008.

17 SCTE (U.K.) 50th Year Formal Dinner. Location: Woburn Abbey, Bedfordshire, England. Call Megg Abel, SCTE publicity officer, 0181-760-0222 ext. 245.

24 Wheat State SCTE Chapter, Testing Session. BCT/E certification exams to be administered. Location: Great Bend, Kan. Call Joe Cvetnich (316) 262-4270.

28 Desert SCTE Chapter, Testing Session. BCT/E and Installer Certification exams to be administered. Location: Colony Cablevision office, Palm Desert, Calif. Call Bruce Wedeking (909) 677-2147.

People on the move

Siemens Stromberg-Carlson has named **Fred Fromm** as president and chief executive officer. Fromm succeeds **Anton Hasholzner**, who has been appointed to the executive staff of the new organization of Siemens Public Communication Networks in Munich, Germany. Fromm most recently headed Siemens Stromberg-Carlson's sales organization.

Fred Fromm

ATx Telecom Systems Inc. has appointed **John H. Clark** as chief operating officer. Formerly ATx's vice president for research, development and engineering, Clark was a founder and managing director of Amoco Laser Company. In his new position, Clark is also responsible for ATx subsidiaries Optical Spectrum Technology and Fibercore Ltd.

TELE-TV Systems has appointed **Craig Tanner** as senior vice president, advanced technologies. Tanner will be responsible for TELE-TV Systems' efforts to pursue new technologies, develop interactive services and participate in the setting of industry-wide technology standards. He joins the company from Cable Television Laboratories Inc., where he held the position of vice president, advanced television projects.

AM Communications Inc. has announced that **Hal Krisbergh** has been elected to the board of directors. Krisbergh was formerly president of General Instrument's Communications Division and had been with GI from 1981 to 1994.

Antec Corp. has elected **James Faust** to its board of directors. Faust has been executive vice president and president of Antec International since joining the company last January. A 28-year veteran of the broadband communications and consumer electronics industries, Faust was senior vice president and general manager, satellite systems, and vice president international for General Instrument Corp. prior to joining Antec.

James Faust

Electronic System Products (ESP), a division of Antec, has appointed **Tom Quigley** and **Randy Butler** as vice presidents. Butler brings 18 years of telephony and electric utility experience to his position as vice president of marketing responsible for business development. Prior to joining ESP, Butler was a consultant for the Atlanta office of Stone & Webster Management Consultants Inc. As vice president of digital systems, Quigley is responsible for overseeing ESP's Application Specific Integrated Circuit (ASIC) development. Quigley most recently served as manager, subsystem development for National Semiconductor Corp.

Antec Corp. has also announced the appointments of **Mark Adams** and **Thomas "Tee" Harton IV** to its engineering group. Adams brings 15 years of experience to his position as director of engineering, passive products. Prior to joining the company, he served in various engineering positions for Scientific-Atlanta. Tee Harton was appointed project manager, responsible for final development activities associated with the Regal PowerTap product. He joins Antec from S-A, where he served as project manager of fiber optic receiver development.

Mark Adams

General Instrument Corp. has appointed **Carol Armitage** as senior vice president of engineering for the company's Communications Division. Armitage was previously Next Generation Access director for AT&T Network Systems. Armitage will oversee development of engineering processes and strategies for the division.

David Dodge has been named as vice president–software systems for **Time Warner Cable's Full Service Network.** Dodge will coordinate the development of the Full Service Network's interactive network applications and software systems. Previously, he was vice president of engineering for Media Cybernetics in Silver Spring, Md., where he was responsible for the development of numerous software products and projects.

CableData Inc. has announced the formation of its Integration Strategies Group, to be led by **Jerry Johnson**, vice president of integration strategies. Johnson was previously vice president of system development for U.S. Computer Services (USCS), parent company to CableData. Before joining the USCS management team, Johnson served as a consultant to CableData.

Tellabs Operations Inc. has promoted **J. Thomas Gruenwald** to vice president, strategic resources. In this new role, Gruenwald is responsible for consolidating several internal corporate activities into an integrated, high-performance management organization. Gruenwald most recently served as director of engineering of the Network Access Systems Division, and has worked in a number of capacities since joining the company in 1991.

ADC Telecommunications Inc. has named **Ross Shariati** as vice president of marketing for its Network Services Division. Before joining ADC, he was a director of DSC's Advanced Products Division, where he was responsible for the product marketing of DSC's Sonet, SDH and ATM family of cross-connect systems.

Superior Electronics Group Inc. has named **Michael Smith** as director of technical services. He is now responsible for customer service, field installation and technical support for the Cheetah product line. Previously, Smith worked for Adelphia Communications as director of engineering for the Virginia region.

Scientific-Atlanta Inc. has promoted eight engineers to the position of principal engineer, the company's highest technical position. Those named principal engineer this year are: J. Martin Armfield, Alpharetta, Satellite Networks Division; George Cawthon, Stone Mountain, Communications and Tracking Systems; Wayne Sheldrick, Whitby, Ontario, Canada, Satellite Television Networks Division; Jose Fernandez and Wayne Vaughn, Broadband Communications, Lilburn; and Greg Dubberly, Leo Montreuil and Luis Rovira, Broadband Communications, Atlanta.

At ceremonies during the Eastern Show, **Dr. H. Allen Ecker** was presented with the prestigious Innovator of the Year Award by the **Southern Cable Television Association's** board and membership. Ecker currently serves as senior vice president–technical operations and chief technical officer for Scientific-Atlanta.

Donny Hollifield has been promoted to project manager with **Atrex Inc.** Hollifield has been with Atrex since 1991 as an assistant supervisor, and now oversees Atrex operations with Scripps Howard Cable in Knoxville, Tenn. Prior to joining Atrex, Hollifield was a contract installer for the Scripps Howard system. CED

GI announces contracts with Turner, ICG

SAN DIEGO–General Instrument Corp. has announced that Turner Broadcasting System Inc. will use GI's DigiCipher II equipment to provide compressed video/audio and data services to Latin America.

Turner will use GI's DigiCipher II MPEG-2 compatible digital compression system to eventually reach more than 1,500 different sites throughout Latin America. The service will be transmitted over PanAmSat 3, scheduled to launch in late '95, and will become operational in February of 1996.

GI also announced that ICG Wireless Services, a unit of IntelCom, will provide gateway services to Europe using GI's DigiCipher II equipment.

ICG will utilize GI's MPEG-2 digital compression system to uplink programming to European markets through Orion Atlantic, L.P., an international satellite partnership. ICG will provide service to current Orion customers in Germany and the United Kingdom through an uplink site in New York. RTL television, a German channel, will use the service to send daily news feeds from the site to its bureau in Germany. Asianet Limited, an Asian market entertainment programming provider, will transmit its programs to cable markets in the U.K.

And finally, General Instrument and Tadiran Mer Communications, an Israeli communications company, have joined forces to provide a full range of RF addressable equipment for a new cable franchise in Israel.

GI will provide RF addressable headend systems and Intercon 7000 series international addressable set-top terminals for operator Golden Channel's newest franchise in Eliat, southern Israel. Once finished, the franchise will provide subs with a number of standard terminal features such as pay-per-view, impulse pay-per-view, last channel recall and parental control.

GI brokered the deal with its cable distributor, Tadiran Mer Communications (TMCS).

Cox R.I. inks contract with Arrowsmith

AUSTIN, Texas–Arrowsmith Technologies Inc. has been awarded a $1 million contract to provide its Fleetcon system to Cox Communications New England's Providence, R.I. operation. The Rhode Island award is the second contract awarded to Arrowsmith for Cox's New England operation.

Cox's New England properties, which include Connecticut, Rhode Island and Massachusetts, serve 282,000 subscribers throughout New England. Arrowsmith will install its Fleetcon system in approximately 100 vehicles using local and wide area networks operated from three dispatch locations.

Atrex signs contract with Scripps Howard

JACKSONVILLE, Fla.–Atrex Inc. has signed a multi-year contract for an electronic upgrade of Scripps Howard Cable in Sacramento, Calif. Atrex, a cable installation company servicing systems throughout the United States, will rebuild the entire 4,000 mile system.

The upgrade began in June of 1995 and is slated to be completed in about three years.

German group places major set-top order

BERLIN, Germany–TV/COM International Inc.'s international partner, Nokia, has announced an agreement to deliver one million interactive digital decoders to BetaTechnik, a subsidiary of the Kirch Group in Germany. Delivery will begin in the Spring of '96. TV/COM will supply its digital demodulation components to Nokia for the fulfillment of the order.

The decoders use TV/COM's technology to turn a television set into a multimedia station, allowing pay-TV programs and on-line services such as interactive games, home banking or home shopping to be received. They comply fully with the European DVB standards and use MPEG-2 for signal decoding. The operator can download new software via satellite as more services become available. More than one million households today in Germany have access to pay-TV services, and by the year 2000, digital services will reach more than 6 million subscribers.

C-Cube wins Emmy for encoder

MILPITAS, Calif.–The Board of Governors of the Academy of Television Arts and Sciences has awarded C-Cube Microsystems Inc. with an Emmy for the company's MPEG digital video encoder. The company is being recognized for outstanding achievement in engineering development for the television industry.

C-Cube's encoder provides the core digital compression technology necessary for the delivery of digital broadcast applications worldwide such as direct broadcast satellite services, interactive television trials, video storage, video-on-demand, satellite news gathering and distance learning.

Antec announces reorganization

ROLLING MEADOWS, Ill.–Antec Corp. is reorganizing in order to reduce the cost of operations and refocus its product and market development activities.

"Our reorganization plan will have four major components," said John Egan, president and CEO, in a prepared statement, including: merging the two distribution divisions into one, thereby streamlining operations and eliminating several facilities, with a commensurate reduction of inventories; focusing product development activities on only those projects that directly support development of network elements for the early deployment of HFC architectures; curtailing international expansion and concentrating efforts on existing successful programs in Latin America and Asia Pacific; and accelerating the integration and consolidation of its manufacturing and engineering business in order to capture the available synergies of 1994 acquisitions.

Philips supplies Century rebuild in Kansas

MANLIUS, N.Y.–Philips Broadband Networks Inc. provided fiber-to-the-feeder technology at 750 MHz in the forward direction and 5 to 42 MHz in the reverse for Century Communications' recently activated system rebuild in Liberal, Kan.

The $2 million two-way system should improve both video and audio quality for Century's 5,500 customers and will link Liberal to the information superhighway, according to Philips.

A Philips/Magnavox Diamond Hub, with light redundancy in a self-healing loop, is integral to the system, which Philips' engineers designed. The rebuild also incorporates Philips network amplifiers, line extenders and 9000 Series taps and passives.

Diamond acquires Sachs

DENVER, Colo.–Diamond Communication Products has acquired Sachs Communications Inc., a Canadian manufacturer of outside plant hardware. The acquisition is part of both companies' strategy for growth and to widen their presence in the international market.

Sachs President Jack Sachs indicated that he will lead a new company under the name of Sachs Worldwide to market Sachs/Diamond products on the international scene and to develop new products for the telecommunications industry.

Each company will be operating under its own brand name, with Bob Muir as chief executive officer.

Standard signs agreement with NCTC

LOS ANGELES–Standard Communications Corp. has announced a new cooperative distribution agreement with the National Cable Television Cooperative (NCTC). The new distribution agreement allows NCTC members to purchase Standard's new line of broadband products at co-op prices, while enabling Standard to expand its market to small cable systems. CED

Tracking resistant fiber optic cable

CARROLLTON, Ga.–AT&T Fitel has announced its PowerGuide Tracking Resistant Fiber Optic Cable. PowerGuide TR cable is designed for aerial distribution and transmission networks and for long span point-to-point applications. PowerGuide TR has a specially formulated jacket that allows it to be placed in electric fields up to 25 kV without damaging the outer sheath material. It is an all-dielectric self-supporting (ADSS) fiber optic cable designed for spans up to 3,000 feet, depending on loading conditions, fiber counts and sag restrictions.

The cable is custom-designed per customer application to optimize both performance and value. PowerGuide TR offers one-step installation and utilizes simple attachment hardware, minimizing installation costs. The cable is nonconductive and the optical transmission is immune to electromagnetic interference, eliminating the need for expensive shielding and grounding precautions.

Circle Reader Service number 55

Underground utility box

LENOIR CITY, Tenn.–Quazite has introduced the Composolite 4'x4' vault, a square, underground utility service box. The new 4'x4' size is the largest in the Composolite product line. The vault adds increased capacity for electrical and telephone service needs. It's available with a two-piece cover for standard and heavy applications, or a manhole cover for easy access.

Lightweight precast polymer concrete makes installation easier and reduces costs. The vaults can stack for extra depth and are available with or without a base.

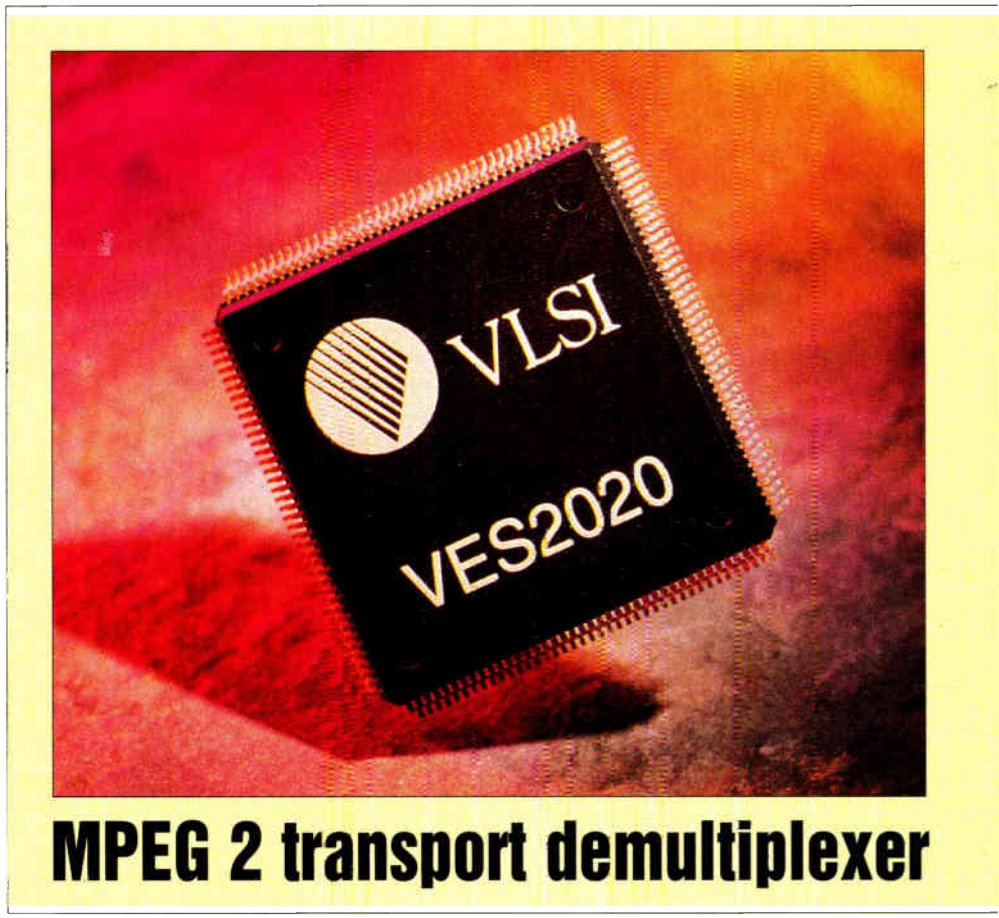
Circle Reader Service number 56

Cable TV laser

ACTON, Mass.–Micracor has announced a high-power, stimulated Brillouin scattering-free, 1319 nm laser for cable TV applications. The new 200 mW laser will radically simplify system topology, according to the company, by facilitating a mix of multiple short and long distance links using the same transmitter. The high power will enable a reduction in the number of critical active components and hardware, thus reducing system costs and improving system reliability.

The laser has noise reduction circuitry which allows a CNR performance of 59 dB, and owing to the multi-frequency spectrum, SBS effects are eliminated without using "dithering" or phase modulation techniques which can introduce unwanted beat notes and additional circuit costs. At the core of the technology is the patented MicraChip laser, which provides the power and flexibility of a solid-state Nd:YAG laser in the same low-cost, reliable package as a semiconductor laser.

Circle Reader Service number 57



MPEG 2 transport demultiplexer

MPEG test system

MTS 100 MPEG test system, from Tektronix

BEAVERTON, Ore.–Tektronix Inc. has introduced the MTS 100 MPEG Test System, which is the first product to integrate both signal generation and analyses of MPEG-1 and MPEG-2 test signals, according to the company. It is suited for applications in encoder/decoder compliance and stressing; multiplexer operation, repair and stressing; transmission system testing; manufacturing quality assurance and MPEG system training.

Output and acquisition of transport stream data is at rates from 50 Kbps to 45 Mbps. Based on the available 8 GB of hard disk capacity (20 min at 45 Mbps), output and acquisition may be either of limited length, determined by a single file or continuous using end-to-start looping.

Circle Reader Service number 58

SAW-filtered modulator

SASKATOON, SK, Canada–Earthvision Systems' Cygnet AM80F is a fully agile, SAW-filtered modulator operating on any frequency from 7 to 550.25 MHz in 250 kHz increments. It features front panel channel selection and level controls.

Advanced engineering combines high frequency mixing and multiple levels of filters to achieve low out-of-band noise performance in the unit. The AM80F modulator is

VLSI's DVB-compliant, MPEG 2 transport demultiplexer IC for set-tops

SAN JOSE, Calif.–VLSI Technology Inc. has unveiled a new Digital Video Broadcast (DVB)-compliant MPEG 2 transport demultiplexer IC for set-top box applications.

The VES2020 is a software-configurable, full-featured device that is central to set-top designs. Its transport and demultiplexing functions are crucial for processing MPEG 2 digital video data for either satellite or digital cable set-top boxes. Production quantities will be available in early 1996.

Architected around a programmable state machine, the VES2020 provides a flexible system solution that addresses the needs of a growing number of digital video service providers throughout the world, including services such as Canal+ of France and JSAT in Japan. The VES2020 comes with VLSI-authored, customizable microcode and application program interface (API) software, along with an optional complete MPEG 2 reference platform that includes the VES2020, MPEG 2 audio and video decoders, a microcontroller, an NTSC/PAL encoder and DRAM.

Circle Reader Service number 54

available in NTSC and PAL B/G, I and D versions.

Circle Reader Service number 59

Pedestal

FRANKLIN PARK, Ill.–Reliance Comm/Tec Corp. has announced the availability of its new CCP1016 Combined Connection Pedestal, designed to house both coaxial and twisted pair copper distribution equipment.

The CCP1016 is an above-ground metallic enclosure featuring two separate compartments, allowing efficient use of hybrid coax/copper distribution facilities, yet offering craft separation between the two. Each chamber contains a universal mounting plate with mounting provisions for any fixed-count terminal block, as well as coaxial equipment such as taps and splitters.

By offering coaxial and copper facilities in a single pedestal housing, the CCP1016 combines the capabilities of two enclosures. It is produced for providers of both voice and video services, as well as for joint coax/copper trenching applications. Installation time and associated costs are reduced with the secure pedestal, and inventory management is simplified with only a single part number.

Circle Reader Service number 60

New generation IRD

LOS ANGELES–Standard Communications Corp. has developed a new compact, integrated receiver/descrambler to meet the demands of private cable system engineers' future headend requirements.

The Agile IRD SC model MT630 is a frequency agile, C/Ku-Band satellite receiver

Standard Agile IRD SC model MT630

with integrated VideoCipher RS capabilities, designed specifically for small to medium capacity cable systems. The receiver provides smaller, less efficient dish systems with enhanced threshold performance, guaranteeing optimum performance. The unit's design offers engineers convenient set-up and easy integration into both new and existing systems. Front panel adjustments of all vital functions permit precision alignment of critical video, audio and fine tuning specifications, reducing set-up time and assuring optimum receiver operation.

The receiver features a fully synthesized PLL tuning circuit, with continuous tuning AFC and microprocessor control. The IRD SC allows the engineer the option of selecting a microprocessor controlled 24 channel C-band frequency plan, or alternate Anik and Ku-band frequency plans.

Circle Reader Service number 61

Fiber connector

CAMARILLO, Calif.–RIFOCS Corp. has introduced its new Diamond Fiber Optic Connector which has several unique features to address the needs of the emerging multiple services environment. Those include: optical performance equivalent to or better than NTT-FC, NTT-SC, ST and DIN47256 Connector types (Il 0.15 dB, RL > 60 dB); integrated protective automatically engaging caps shield ferrule from dust and scratches and address the growing importance of eye safety; positive latching mechanism with interchangeable color-coded and mechanically keyed thumb-latch; and a rectangular footprint and push-pull design for high packing densities.

Circle Reader Service number 62

Coaxial detectors

MORGAN HILL, Calif.–Anritsu Wiltron has announced the availability of precision 0.01 to 50 GHz detectors, which feature small size and low SWR over a dynamic range.

Model 75VA50 uses specially designed Shottky diodes and Wiltron-developed thin film techniques for matching the diode to the input transmission line, resulting in 3 dB flatness to 50 GHz and less than 2:1 SWR at 50 GHz. Broadband coaxial performance is achieved via the Wiltron V Connector, a DC to 65 GHz coaxial connector system that enables Wiltron to manufacture its family of 50 and 60 GHz precision components.

These new detectors complement Wiltron's line of precision microwave and millimeter wave components and instrumentation.

Circle Reader Service number 63

Fiber stripper

FREMONT, Ohio–The Clauss Fiberoptic/Telecom Division is introducing a new dual-action fiber optic stripper, Model No. CFS-1.

Features include a 0.078-inch diameter stripping hole at the top of the tool to strip the fiber jacket; and a 0.0055-inch diameter hole and V-opening in the blade to allow the removal of 250 micron buffer coating from 125 micron fiber.

Other features include precisely formed cutting surfaces to assure clean, smooth strips; comfort-grip ergonomic handles; and a lock to hold the tool closed when it is not in use. The CFS-1 is pre-set at the factory and needs no adjustment.

Circle Reader Service number 64

Planar waveguide

MILLERSVILLE, Md.–Gould Fiber Optics is now supplying Planar Waveguide components to the North American market. Available in split counts from 2 to 32, the devices feature a small package size (6 x 22.5 x 70 mm) and can be readily installed into most common splice trays.

Manufactured by IOT, these splitters offer high directivity and low return loss (≥ 60 dB). In addition, these components are specified over a broad wavelength range (1260-1360 nm and 1480-1580 nm) with less than 14.3 dB insertion loss for a 1 x 16. Together with the option for dual inputs, the IOT planar waveguide splitters provide system designers with greater flexibility in allocating both loss budgets and physical space for installation. Components have been extensively tested for many mechanical (vibration, pull and drop) and environmental (cold, dry heat, damp heat and temperature cycle) conditions.

Circle Reader Service number 65

PRODUCTS, SERVICES & EQUIPMENT DIRECTORY

White Sands

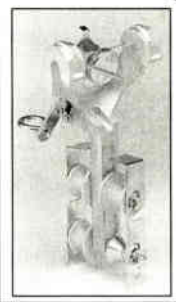
1-800-Jumpers

CUSTOM MADE CABLE ASSEMBLIES INCLUDING
F to F, N to N, BNC, RCA, F-81

Gilbert AHS	RG-56	Belden
LRC	RG-59	Times
Off Shore	RG-11	Comm/Scope
Amphenol	RG-213	Intercomp
	RG-214	

We will make any cable assembly. Quick delivery on all colors and lengths.
Fax: (602) 582-2915. Ph (602) 581-0331
335 W. Melinda Drive, Phoenix, Az 85027

LEMCO



TOOLS:
CONSTRUCTION
SPLICING
DROP INSTALLATION
717-494-0620
CATALOG: 800-233-8713

COMMUNICATIONS & ENERGY CORPORATION
COMMUNICATIONS & ENERGY CORP

FILTERS & ANTENNAS FOR CATV / SMATV / MMDS / LPTV

Manufacturer specializing in fast delivery of Filters for CATV and other video systems, MMDS & LPTV Transmitter Channel Combiners and other broadcast filters and Terrestrial Interference filters for TVRO systems.

7395 Taft Park Drive
East Syracuse, NY 13057

Tel 315-452-0709
Fax 315-452-0732
US/CAN 800-882-1587

Contact: Steve Shafer or Vince Cupples

TKR REPAIR CENTER — *Quality Repair at Competitive Pricing*

REPAIRS & SALES

- *In Warranty Repair*
- *Jerrold Addressable Repair Specialist*
- *DP5, DP7 & DPV7 / Panasonic 1402, 1403*
- *Remote Repair (URC 450, 550)*

Free delivery & pickup in certain areas

For more information contact:
TKR Repair Center
Tel: (908) 583-2026 • Fax: (908) 290-1677
25 Industrial Drive • Cliffwood Beach, NJ 07735

TCI AFFIL.

COMMERCIAL ELECTRONICS, INC.
CATV ENGINEERING SERVICES
CATV EQUIPMENT REPAIRS

Hybrid Sales	Meter Calibrations
Equipment Upgrading	Headend Alignment
Performance Measurements	FCC Offsets

Free Pick-up Service In Certain Geographic Areas

800-247-5883

209 E. JACKSON ST., • PO BOX 484 • GATE CITY, VA 24251

GTS ENTERPRISES, INC.

- *Fiber Fusion Splicing Specialists*
- *Optoelectronic Equipment Installation*
- *CW Proofs to 750MHz*
- *Upgrade/Rebuild Construction*
- *Computer Drafting and Design*

508 Industrial Drive • Woodstock, GA 30189
PH (770) 591-1670 • FX (770) 591-1484

CALAN WAVETEK TRILITHIC CALAN WAVETEK TRILITHIC

Need repair? Don't despair!

CTV INC.
RF & Cable Test Equipment Repair

Specializing in Repair, Calibration & Upgrade

717/828-6235
Fax 717/828-6335

RR 1, Box 86-V7 Dingman's Court,
Dingman's Ferry, PA 18328

CALAN WAVETEK TRILITHIC CALAN WAVETEK TRILITHIC

DESIGN EXTENDER
THE MAPPING INNOVATORS

A Division of GLA International
Est. 1982

Strand Mapping	FTF-FTSA Design
As Built Mapping	Fiber Optic Design
Rebuild Mapping	Lode Data - AutoCad
Fiber Optic Routing	Lynx, Focus, CableView
MDU Surveys	Microstation (DGN) Experts
Map Digitizing	File Conversions DWG - DGN - DXF
System Design	CAD System Sales & Training

625 Woods Mill Rd. South Ste. 300 Town & Country, Mo. 63017
Phone: 314-579-4627 or 800-875-8786 Fax: 314-579-4628

CAREER OPPORTUNITIES

A TRADITION SINCE 1935

HARRIS-McBURNEY COMPANY JACKSON, MICHIGAN

IMMEDIATE OPENINGS IN FLORIDA & MIDWEST AREAS

FOR

CATV SPLICERS & INSTALLERS WITH TRUCK & TOOLS

IF YOU HAVE A POSITIVE WORK ATTITUDE AND WISH TO JOIN A GROWING TEAM

CONTACT

HARRIS-McBURNEY COMPANY
JACKSON, MI
MI – 800-248-3802
FAX – 517-787-6809
FL – 800-282-5611

EOE — M/F

DRUG FREE WORK PLACE

ACI
ADVANCED COMMUNICATIONS INCORPORATED

SPLICERS
Southern California

ACI. A growth-oriented telecommunications contracting firm, has immediate openings for 10 **experienced** CATV splicers in the San Diego, California area. Offers for employee and contractor positions are available. ACI offers employees insurance benefits and use of company bucket trucks.

Call at 1-800-825-4224

CED CLASSIFIED MEANS BUSINESS!

Since 1975 we have served professionals in the CABLE-TV industry by matching talent with opportunity. Below is a sampling of the talents we are seeking to match with the many opportunities that are currently available.

- HEADEND TECHS
- DESIGNERS
- LINE TECHNICIANS
- SWEEP TECHNICIANS
- CHIEF ENGINEERS
- CHIEF TECHNICIANS
- SERVICE TECHNICIANS
- LEAD TECHNICIANS
- BROADCAST/L.O. TECHS
- PLANT MANAGERS

JIM YOUNG & ASSOCIATES
One Young Plaza - 1235 Ranger Highway - Weatherford, Texas 76086
Call Toll Free (800) 433-2160 or Fax (817) 599-4483

RESIDENTIAL TECHNICAL SALES MANAGER/DIRECTOR

Digital Music Express is seeking a qualified candidate to fill a Technical Sales Manager/Director position based in New York. This residential division position requires a thorough technical knowledge of digital audio. A college degree in electronics or related field and experience in a cable system is preferred.

The Technical Sales Manager/Director will manage a multi-state territory and assist the residential field staff with respect to the technical delivery of *DMX*. A working knowledge of headend equipment and cable band-width is essential.

Please mail a resume and salary requirements to:

Digital Music Express
342 Madison Avenue, Suite 902
New York, NY 10173-0002
Attn.: Vice President, Eastern Region

***DMX* offers a competitive salary and benefits package and is an EEOC employer.**

UNITED STATES POSTAL SERVICE™

Statement of Ownership, Management, and Circulation
(Required by 39 U.S.C. 3685)

1. Publication Title	2. Publication No.	3. Filing Date
CED	3 3 0 - 5 1 0	October 1, 1995
4. Issue Frequency	5. No. of Issues Published Annually	6. Annual Subscription Price
Monthly except twice in May	13	$48

7. Complete Mailing Address of Known Office of Publication *(Street, City, County, State, and ZIP+4) (Not Printer)*
825 7th Avenue, New York, NY 10019

8. Complete Mailing Address of Headquarters or General Business Office of Publisher *(Not Printer)*
825 7th Avenue, New York, NY 10019

9. Full Names and Complete Mailing Addresses of Publisher, Editor, and Managing Editor *(Do Not Leave Blank)*
Publisher *(Name and Complete Mailing Address)*
Rob Stuehrk, 600 South Cherry St., Suite 400, Denver CO 80222

Editor *(Name and Complete Mailing Address)*
Roger Brown, 600 South Cherry St., Suite 400, Denver CO 80222

Managing Editor *(Name and Complete Mailing Address)*
Dana Cervenka, 600 South Cherry St., Suite 400, Denver CO 80222

10. Owner *(If owned by a corporation, its name and address must be stated and also immediately thereafter the names and addresses of stockholders owning or holding 1 percent or more of the total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a partnership or other unincorporated firm, its name and address as well as that of each individual must be given. If the publication is published by a nonprofit organization, its name and address must be stated.) (Do Not Leave Blank.)*

Full Name	Complete Mailing Address
Chilton Publications	825 7th Avenue, New York NY 10019
Stockholders owning or holding one percent or more of total amount of stock:	
Capital Cities, Inc.	77 West 66th Street, New York, NY 10019

11. Known Bondholders, Mortgagees, and Other Security Holders Owning or Holding 1 Percent or More of Total Amount of Bonds, Mortgages, or Other Securities. If none, check here. ☐ None

Full Name	Complete Mailing Address
None	

12. For completion by nonprofit organizations authorized to mail at special rates. The purpose, function, and nonprofit status of this organization and the exempt status for federal income tax purposes: *(Check one)*
☐ Has Not Changed During Preceding 12 Months
☐ Has Changed During Preceding 12 Months *(If changed, publisher must submit explanation of change with this statement)*

PS Form 3526, October 1994

13. Publication Name: CED	14. Issue Date for Circulation Data Below: September 1995	
15. Extent and Nature of Circulation	Average No. Copies Each Issue During Preceding 12 Months	Actual No. Copies of Single Issue Published Nearest to Filing Date
a. Total No. Copies *(Net Press Run)*	24,139	26,561
b. Paid and/or Requested Circulation (1) Sales Through Dealers and Carriers, Street Vendors, and Counter Sales *(Not Mailed)*	0	0
(2) Paid or Requested Mail Subscriptions *(Include Advertisers' Proof Copies/Exchange Copies)*	19,583	22,226
c. Total Paid and/or Requested Circulation *(Sum of 15b(1) and 15b(2))*	19,583	22,226
d. Free Distribution by Mail *(Samples, Complimentary, and Other Free)*	913	1,012
e. Free Distribution Outside the Mail *(Carriers or Other Means)*	2,070	1,950
f. Total Free Distribution *(Sum of 15d and 15e)*	2,983	2,962
g. Total Distribution *(Sum of 15c and 15f)*	22,566	25,188
h. Copies Not Distributed (1) Office Use, Leftovers, Spoiled	1,573	1,373
(2) Return from News Agents	0	0
i. Total *(Sum of 15g, 15h(1), and 15h(2))*	24,139	26,561
Percent Paid and/or Requested Circulation *(15c / 15g x 100)*	86.78	88.24

16. This Statement of Ownership will be printed in the _____ issue of this publication. ☐ Check box if not required to publish

17. Signature and Title of Editor, Publisher, Business Manager, or Owner — Date
Rob Stuehrk, Publisher — October 1, 1995

I certify that all information furnished on this form is true and complete. I understand that anyone who furnishes false or misleading information on this form or who omits material or information requested on the form may be subject to criminal sanctions *(including fines and imprisonment)* and/or civil sanctions *(including multiple damages and civil penalties)*

Instructions to Publishers

1. Complete and file one copy of this form with your postmaster on or before October 1, annually. Keep a copy of the completed form for your records.
2. Include in items 10 and 11, in cases where the stockholder or security holder is a trustee, the name of the person or corporation for whom the trustee is acting. Also include the names and addresses of individuals who are stockholders who own or hold 1 percent or more of the total amount of bonds, mortgages, or other securities of the publishing corporation. In item 11, if none, check box. Use blank sheets if more space is required.
3. Be sure to furnish all information called for in item 15, regarding circulation. Free circulation must be shown in items 15d, e, and f.
4. If the publication had second-class authorization as a general or requester publication, this Statement of Ownership, Management, and Circulation must be published; it must be printed in any issue in October or the first printed issue after October, if the publication is not published during October.
5. In item 16, indicate date of the issue in which this Statement of Ownership will be printed.
6. Item 17 must be signed.

Failure to file or publish a statement of ownership may lead to suspension of second-class authorization.

PS Form 3526, October 1994 *(Reverse)*

Jones Intercable's Alexandria headend

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

Sometimes the wave of the future seems to unfold right before your eyes. That's the way it felt to me at that September morning press conference in Alexandria, Va. Chris Bowick and Carl Elieff of Jones Intercable displayed their modern and altogether professional new headend in Alexandria, and led us through the technical details of their intriguingly advanced HFC network architecture.

It is all there, for a degree of reliability and maintainability that should serve as a role model for the industry: totally redundant fiber routing, both forward and return; self-healing fiber transmission paths; passive coaxial network; extensive continuous status monitoring; battery standby power for every optical node.

Professional design

The Jones Intercable network passes 73,100 units in the city of Alexandria, 38 percent of which are residential, 41 percent MDUs (multiple dwelling units) and 21 percent commercial: businesses, hotels, office and industrial complexes. There are 257 miles of RF coaxial route, 52 percent of which are underground. In addition, there are 216 sheath miles of optical fiber. The network contains an astounding 14,072 fiber miles, averaging better than 65 fiber count per sheath. There are 461 optical nodes in the network, averaging 158 passings per node, 1.79 nodes per coaxial route mile.

Each node is connected with six fibers, two downstream (forward), two upstream (return) and two spares, all the way back to the headend. The two downstream fibers follow geographically separate routes, as do the two upstream fibers. Failure anywhere on the primary downstream fiber automatically switches the optical receiver in the node to the secondary downstream fiber. Similarly, failure in the primary upstream fiber automatically switches the optical receiver at the headend to the secondary fiber. Primary and secondary fibers are driven continuously by the appropriate downstream or upstream laser through optical couplers.

Fiber optic routes are confined mainly to 10 geographic rings covering the city. Primary fibers from each node go one way around the rings back to the headend; while the secondary fibers go the other way for route diversity. The four fibers from each of the 40 to 50 nodes associated with each ring route are spliced into a cable with 120 to 180 fiber count, laid along the designated fiber ring routes. To avoid confusion, it should be understood that signals to or from an optical node travel in the same direction on opposite sides of the ring. In the classical definition of the ring network topology, on the other hand, the signals would make a complete round trip terminating at the headend, and coupled to the nodes at drops (i.e. taps) along the way.

The Jones headend is one of the most professional I have had the pleasure to inspect. A complete video and audio patch panel provides access to all signal points for test or temporary replacement. All video services are protected with active back-up. The entire headend is protected by a UPS (uninterruptible power supply) with dual backup generators to take over the full load in case of a power outage. All wiring is concealed in enclosed cabinets and conventional computer type flooring for easy access. A bank of video monitors provides visual monitoring not only of headend video on all channels, but also, pro-active monitoring of the optical node and battery power source sensors, allowing staff to anticipate problems before they result in an outage or subscriber complaint.

With six fibers from each of 461 optical nodes, the management of at least 2,766 fibers at the headend presents a daunting challenge. Fiber management shelves are enclosed in locked cabinets for security against inadvertent damage. Splices in the ring cable are contained in sealed but re-enterable splice enclosures.

A most unusual feature of the Jones facility in Alexandria is the Nortel DMS 500 Class 5 telephone switch. Uncommon as they are now, I believe we will find telephone switches in many more cable TV headends in the future. Jones is about to launch a competitive access provider (CAP) service, offering switched telephone service to a number of large commercial and industrial users by means of dedicated fiber loops terminating in the Class 5 switch. Competitive local and long distance service will be offered to residential users, integrated into the HFC network nearing completion.

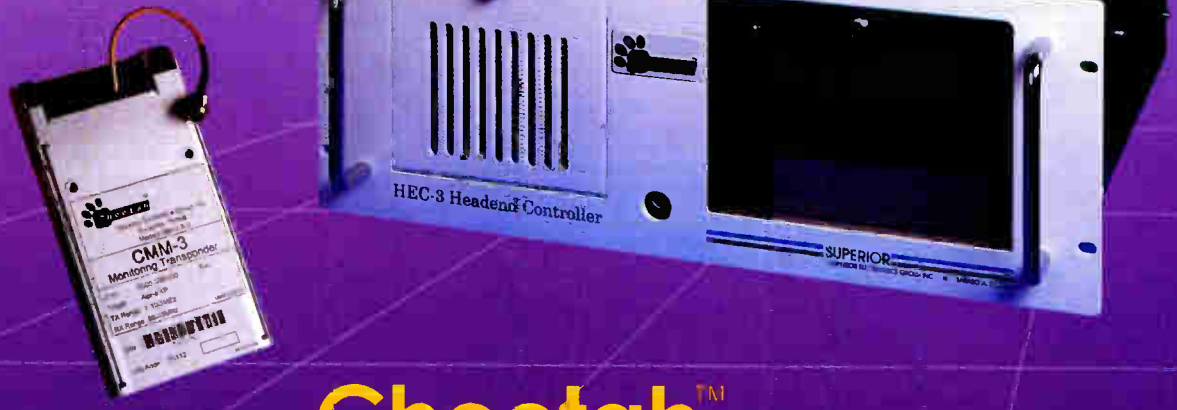
Favorable conditions

Chris Bowick and the other Jones personnel at the press conference clearly recognized that Alexandria was a particularly favorable location for the development of the passive RF network using the ring routing arrangement. The 284 passings per route mile of RF coaxial plant, 62 percent of which are MDU and commercial, certainly represent more favorable conditions than are likely to be encountered in many urban and suburban franchises. They already had ductwork in the most congested areas and were not faced with expensive trenching to accommodate the upgrade. Because of the high linear density, the plant cost per passing seems to be quite comfortable.

Nevertheless, Jones has performed a great service for the industry by demonstrating innovative ways to provide redundant fiber routing and passive coaxial network architecture. In particular, I believe it is especially useful to turn away from the traditional ring network topology to the concept of diverse fiber routing in a series of high fiber count cable rings. This concept can be adapted for applications in other, perhaps less favorable situations.

Certainly, this is a step in the right direction that had to happen. CED

Cheetah™



Cheetah™ Status Monitoring Solutions:

The only system to give you Frequency Agile RF Modems

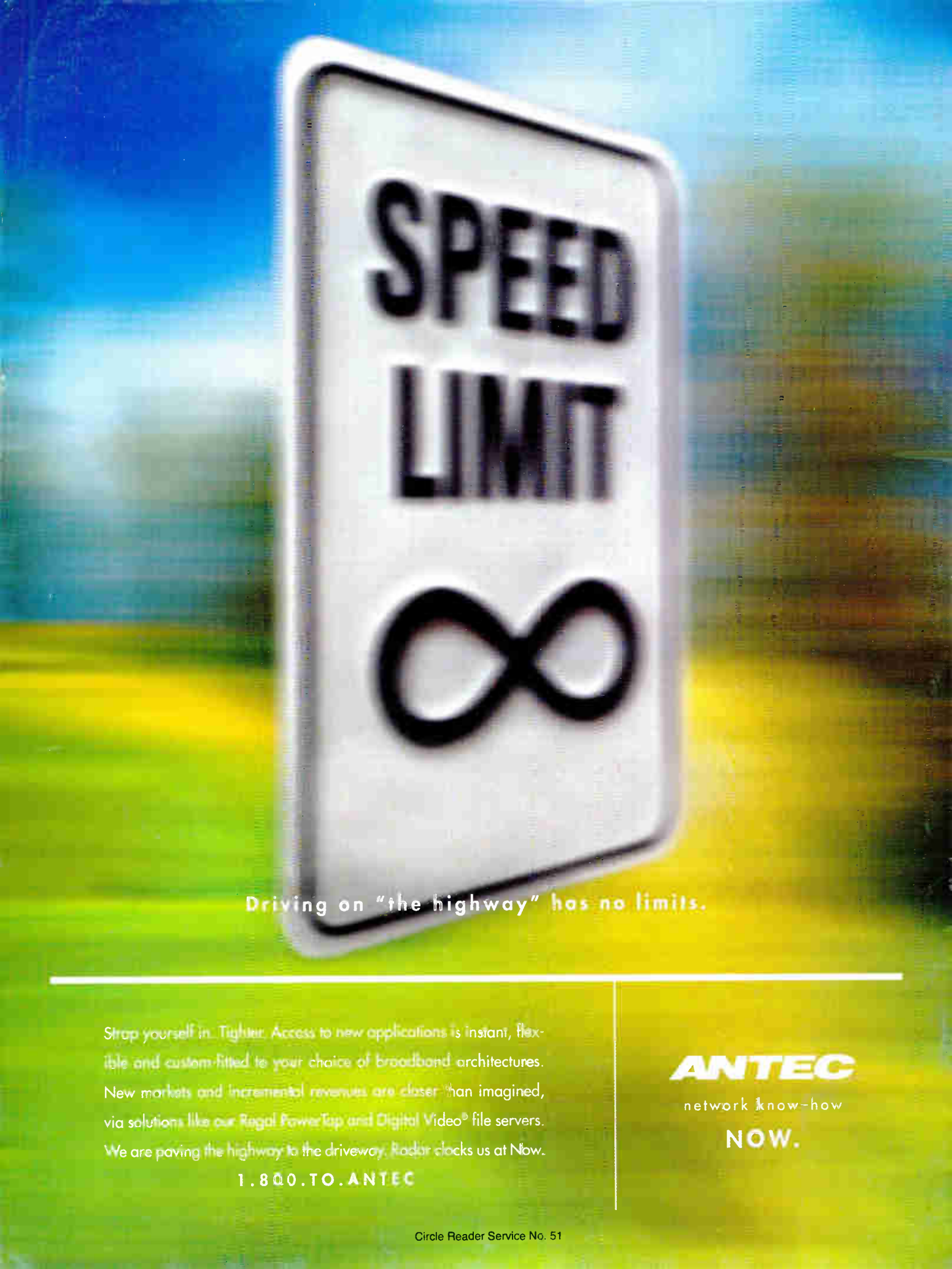
A status monitoring system is only as reliable as the return path. Accumulated noise and ingress on the return path may cause problems with your status monitoring system. Avoid these problems with the Cheetah System™. By using frequency agile RF modems in all field devices, the Cheetah System allows you to adjust frequencies from your headend or main office. You never have to roll a truck or physically adjust field devices.

The Cheetah System also ensures that ***polling never stops***! When one channel is in use for polling and an alarm occurs, the alarming device may be queried for more detailed data on the next data channel. The Cheetah System continuously monitors your entire network even when you are performing tests and taking measurements at a problem location. For a reliable status monitoring system, be sure to require The Cheetah solution.

Call (813) 756-6000

SUPERIOR ELECTRONICS GROUP, INC.

6432 Parkland Drive • Sarasota, Florida 34243 • (813) 756-6000 • Fax (813) 758-3800



Strap yourself in. Tighter. Access to new applications is instant, flexible and custom-fitted to your choice of broadband architectures. New markets and incremental revenues are closer than imagined, via solutions like our Regal PowerTap and Digital Video® file servers. We are paving the highway to the driveway. Radar clocks us at Now.

1.800.TO.ANTEC

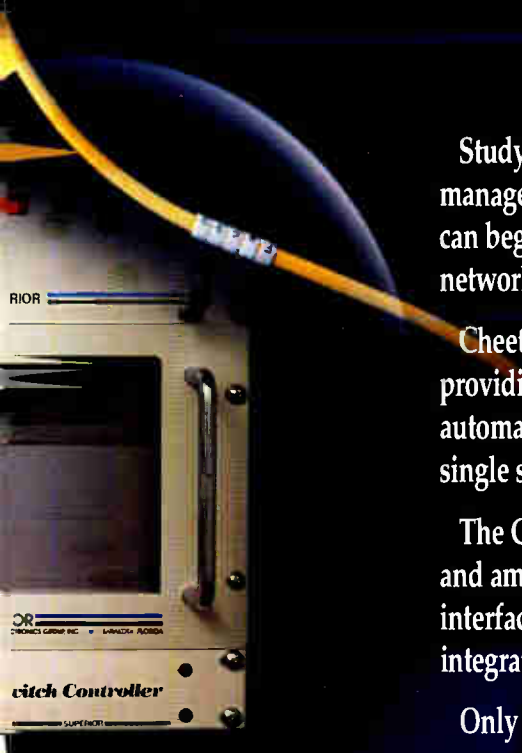
ANTEC

network know-how

NOW.

Circle Reader Service No. 51

Management.



Studying the big picture, Cheetah shaped a visionary idea – a flexible network management system that grows with your evolving network. The Cheetah System can begin with the simplest of configurations and elegantly expand to a total network management system.

Cheetah's vision for network management takes form as an integrated solution providing comprehensive status and performance monitoring, headend management, automated testing, plus control of multiple services like data and video. All on a single software platform.

The Cheetah System is fully compatible with major power supply, fiber optic node and amplifier manufacturers. Cheetah's foresight in standards compliance and open interfaces means your network management system can function globally, easily integrating multiple services and third-party operational support systems.

Only Cheetah has the vision to give you network management this complete.

One Integrated Solution

Cheetah offers a complete network management solution, from your headend through the end-of-line. Begin with a status or performance monitoring system... and grow it seamlessly into a complete network management solution for the HFC domain.

Leading the industry in functionality, speed and flexibility, Cheetah's complete solution is the preferred choice in the Pacific Rim, Europe and North America.

Call today and find out why Cheetah is an international standard.

Network Management

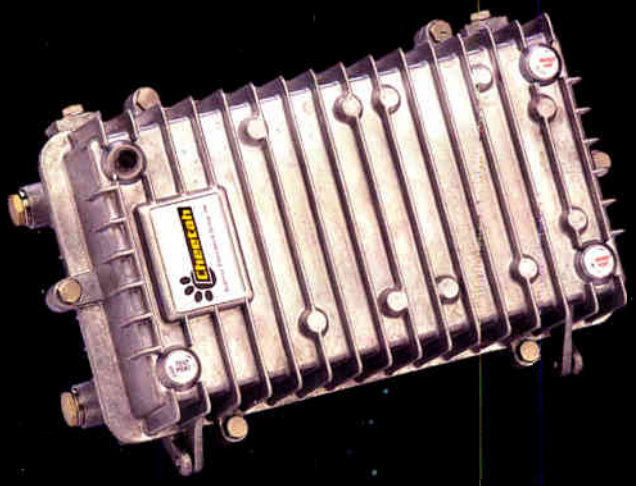
Cheetah's visionary approach to network management goes several steps further than traditional systems. Cheetah manages the entire HFC domain, as well as the integration of multiple services.

- Scalable solutions from UNIX to Windows NT
- Customize alarm management through an expert system
- Open architecture and standards adherence ensure compatibility
- Configure and activate network services and equipment
- Evaluate network performance through customized displays and reports

Performance Monitoring

Cheetah's fully automated performance monitoring system increases reliability and reduces truck rolls and overtime. It is also invaluable for troubleshooting and scheduled measurements.

- Continuous, non-interfering distortion monitoring at headend and end-of-line
- Fully automated FCC Proof-of-Performance testing



Status Monitoring

The Cheetah universal status monitoring system keeps you updated on the status of any manufacturer's power supplies, fiber optic nodes and amplifiers.

- Reliable, flexible and fast
- Frequency agile modems and remotely reprogrammable firmware help overcome ingress and make upgrades easy
- Cheetah's alarm filtering capabilities and high-speed polling identify failure sources quickly

SUPERIOR ELECTRONICS GROUP, INC.

6432 Parkland Drive • Sarasota, Florida 34243 • Phone: (941) 756-6000 • Fax: (941) 758-3800