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Last month, Microsoft founder Bill Gates opted to put his money where his mouth is by handing Comcast Corp. a check for \$1 billion as a way to spur the operator to upgrade its networks to two-way hybrid fiber/coax architecture. Frustrated by a general lack of available bandwidth, Gates chose to essentially buy spectrum and attempt to galvanize the entire industry toward rolling out high-speed data services.



The devil is hiding in the details

Some will argue that deploying new services isn't as easy as writing a check, however. A newspaper story out of Boston last month could give some ammunition to that point-of-view, and show why it's been a struggle for many to get high-speed data service up and running. For a lengthy list of potential problems, especially in the software domain, lie waiting to trip up even the most savvy operator.

Seeking real-life input for a cable modem story, a *Boston Globe* reporter witnessed first-hand how one computer-savvy user of MediaOne's Highway1 high-speed data service took advantage of a little-known software feature and used it to snoop into the hard drive of his neighbor—who was also subscribing to the service. By simply using the "file share" feature that comes with Windows95, network users can easily browse the contents of other computers attached to the same network.

The problem is that most consumers don't know this. They're not accustomed to being part of a network, and most probably don't realize the ramifications of being attached to one.

The result of the *Globe* reporter's tour was a lengthy Sunday newspaper feature story that warned users that their files may not be safe from prying eyes. It could have been much worse. If the user had mali-

cious intent, he could have deleted or copied files, planted a virus, rendered his neighbor's computer inoperative or performed a host of other, equally malevolent deeds.

Instead, the story should serve as a wake-up call to both network operators and subscribers, who have been alerted to simply turn off the file sharing feature whenever they log on to MediaOne's Highway1 service. In fact, MediaOne has done an admirable job of attempting to inform its subscribers. At least twice, the sysop has sent out e-mail to users reminding them of the file-sharing utility and how it can be turned off.

If nothing else, this near-miss should be taken as a learning experience. Thousands of man-hours go into launching high-speed data services—from choosing modems, to installing software and getting the back-office support up and running, there are millions of tiny details that have to work in harmony. It's amazing what might slip through the cracks. Keep your eyes open and don't assume anything.

Roger J. Brown

Roger Brown
Editor

CED MAGAZINE

VP Group Publisher

William McGorry

Publisher

Robert C. Stuehrk, Rstuehrk@aol.com

Editor

Roger Brown, Rbrowner@aol.com

Managing Editor

Dana Cervenka, Dcervenk@chilton.net

Associate Editor

Michael Lafferty, McLaffrt@aol.com

Contributing Editors

Leslie Ellis, Ellis299@aol.com
Fred Dawson

CONSULTING ENGINEERS

Chairman

Wendell H. Bailey, NCTA VP,
Science and Technology

MEMBERS

Jim Chiddix, Chief Technology Officer, Time Warner Cable

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Pete Smith, VP Engineering, Rifkin & Associates

Joe Van Loan, Senior VP & COO, Mediacom LLC

Director of Sales & Marketing

Scott C. Snyder, SSnyderCED@aol.com

National Accounts Managers

Linda S. Sommer, Lssommer@aol.com

Michael Tangney, TangneyCED@aol.com

Account Executive

Todd Marquez, Tmarquez@chilton.net

Classified Sales Manager

Tim Reeder; 800/866-0206

Assistant to the Publisher

Michelle Pazar

Production Manager

Johanna McGinnis, Jmcginni@chilton.net

Art Director

Don Ruth, Druth@chilton.net

Assistant Art Director

Anney Grossberg, Agrossbe@chilton.net

Address

600 S. Cherry St., Suite 400

Denver, CO 80222

303/393-7449; Fax 303/393-6654

Web site: <http://www.cedmagazine.com>

Circulation Director

Maria Gottlieb; 212/887-8565

Associate Circulation 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

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Illustration by Peter Bono, SIS

38 The art of cable network mastery

By Alan Gordon, Superior Electronics Group Inc.

The latest buzzwords in network management are "virtual presence"—in other words, an operator can view the status of the plant anywhere, at any point in time. Here are five steps to implementing an advanced network monitoring system.



CED magazine is an officially recognized publication of the Society of Cable Telecommunications Engineers. All members of the SCTE are qualified for a free CED subscription.

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By Bob Stanzone, Arris Interactive, an Antec/Nortel JV

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By John Holobinko and Bill Hartman, ADC Telecommunications Inc.

Dense WDM technology and the ability to create all-optical networks will allow further improvements in the cost, flexibility and reliability of cable TV networks. All-optical networks can offer economic benefits including lower plant costs from reduced fiber counts, and reduced future costs for network capacity expansion by further sharing common plant and equipment.

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By CED staff

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Illustration by Bob Stewart



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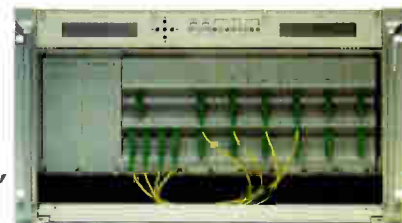


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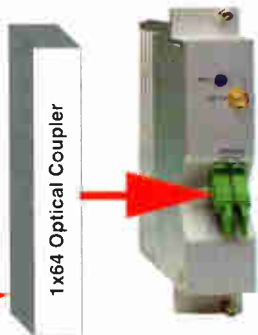
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Microsoft hands Comcast \$1 billion to get high-speed data kick-started

The big just keep getting bigger. Comcast last month shocked nearly everyone and helped rally cable industry stocks by agreeing to take a \$1 billion check from Microsoft founder Bill Gates in exchange for about 11 percent of the company.

The investment shows how frustrated Microsoft has become in its waiting game for network operators and telephone companies to add bandwidth and high-speed capability for data and Internet access. According to various press reports, the investment is aimed at boosting sales of Microsoft software and services, as well as giving it a conduit into Comcast's 4.3 million homes.

Industry analysts familiar with the transaction said the deal was done so that Microsoft could stay at the forefront of the merging computing/entertainment industries as well as garner a method to deliver new, on-line services.

Comcast will use the \$1 billion investment to accelerate construction of its HFC networks to support high-speed data services. The deal helps fourth-largest Comcast compete with the likes of Time Warner and MediaOne, which have attracted large investments from telephone companies.

A second, unrelated billion-dollar deal between Tele-Communications Inc. and Cablevision will give Cablevision an additional 820,000 subscribers in the New York/New Jersey area, helping cement Cablevision's dominance in the region.

With the additional customers, Cablevision will be able to tackle Bell Atlantic and Nynex "head-on," said Cablevision CEO James Dolan, in a statement. The company intends to offer high-speed data services and start new local sports and news channels.

S-A and GI chart new courses

As part of a conscious effort to expand their product lines into new business areas, both General Instrument and Scientific-Atlanta debuted new equipment designed to attract new customers.

GI's NextLevel Communications subsidiary is offering a suite of products that will bring the company into the digital loop carrier (DLC) and broadband customer premises equipment markets. The new line will complement NLC's NLevel3 Switched Digital Access

(SDA) System, which is currently being deployed by Nynex in communities around Boston and will soon be deployed in New York City, Long Island and Westchester County, New York. The Nynex contract calls for the deployment of one million lines, with provisions for up to five million lines.

NLC enters the \$1.5 billion annual DLC marketplace by introducing a Universal Service Access Multiplexer (USAM), a low-cost, flexible platform that delivers voice, data, Internet and video over twisted pair architectures.

The DLC USAM supports remote 32/96 line terminals that can be used to deliver a variety of services using the following access methods:

- ✓DSLAM for ADSL, SDSL and HDSL services from a CO or remote terminal
- ✓VDSL for services launched from a SAI or high-rise building basement
- ✓Broadband-ready DLC for low-cost telephone services
- ✓Business premises multiplexer for low-cost business voice and data services
- ✓CO terminal for unbundling and non-locally switched services.

For the Broadband CPE marketplace, NLC is unveiling four new products that bring ATM and TDM bandwidth to the home: an Ethernet-based interface, an ATM network interface card (NIC), a digital-set-top for video and a residential gateway device.

Ideal for the small office/home office data and Internet market, the N3 ETHERset provides connectivity between the NLevel3 SDA System and a standard Ethernet end node. This device provides delivery of high-speed data services to a subscriber's PC, workstation or laptop using a ubiquitous 10BaseT interface.

Targeting the home PC high-speed data and Internet market, the NIC connects to the NLevel3 SDA System using the DAVIC Profile A specification (51.84 Mbps downstream, 19.44 Mbps upstream).

For the delivery of new digital broadcast and interactive video services, the N3 VIDEOset is

a digital set-top box that interfaces to NLC's system via the DAVIC Profile A interface. The box provides high quality video using MPEG-2 and features an Ethernet interface for high-speed data and Internet access.

The N3 Residential Gateway consolidates multiple devices into one modular box to support the full service network at the home. Built on the N3 VIDEOset platform, this device is capable of driving the existing home cable TV wiring to allow multiple televisions to accept digital video services without the need for additional set-top boxes. The N3 Residential Gateway can also provide data and Internet applications, 10BaseT connectivity, and telephony services such as ISDN or POTS.

Next Level Communications also announces its new System Integration Service. This service will ensure the end-to-end interoperability of a broadband network, enabling network

providers to offer telephony, Internet and video services. Drawing expertise from GI's experience in digital satellite, broadcast analog and digital video, and cable TV; and NextLevel Communications' N3 View-1 and N3 View-2 Broadband Management Products, NLC can provide engineering, design, installation, integration, test, and



S-A's new Sonet gear

turn-up to assure a standard, sustainable, full service network. NLC is currently involved with a major U.S. network provider in this endeavor.

The NLevel3 SDA System provides the basic broadband architecture that acts as a unified access platform to integrate DLC, FTTC, and twisted pair xDSL (digital subscriber line) technologies. It supports all NLC's narrow-band and broadband CPE products.

Meanwhile, S-A introduced "Prisma Digital Transport," a Sonet (synchronous optical network) multiplexer that has been specifically optimized to deliver video services over regional headend-to-hub fiber interconnects and network backbones. The announcement marks Scientific-Atlanta's imminent entrance into the high-speed Sonet transmission market.

Field testing is planned for the fourth calendar quarter of 1997, with volume production planned for the first calendar quarter of 1998.

Planned as an OC-48 Sonet multiplexer, the

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Prisma Digital Transport will include a series of low-speed analog encoder and decoder interfaces for carrying video over long distances in an uncompressed, and high quality format. In addition, Prisma Digital Transport will provide a plug-in upgrade module to support two-way Sonet transmission, enabling a mixture of video and interactive services in a shared transport multiplexer.

The product's long-distance transmission capability is targeted at network operators that plan to consolidate several networks into large, regional fiber ring architectures containing one or two "superheadends" and several distribution hubs. Consequently, the OC-48 signal will be capable of achieving unrepeated distances of 90 to 100 kilometers (56 to 62.5 miles) and will be able to be used with a virtually unlimited number of hub cascades.

Its "self-healing" Sonet ring architecture and expanded equipment redundancy options offer greater reliability compared with traditional linear video transport systems. An open format make it interoperable with traditional Sonet interfaces.

Cable network operators will find the product attractive because it enables the rollout of two-way digital services, such as high-speed data and telephony, without requiring the addition of a stand-alone Sonet overlay. Instead, two-way capability will be possible by adding a plug-in upgrade module. This will enable network operators to cost-effectively deploy one-way interconnects on hubs where only broadcast video transport is needed, then incrementally upgrade individual hubs as two-way services are deployed.

"Scientific-Atlanta's Prisma Digital Transport will set the standard for delivering video and two-way services over the new network architectures of the future," said Paul Connolly, vice president of Scientific-Atlanta's opto-electronics business unit. "Our flexible, open-standards Sonet solution will provide the most cost-effective and migratable digital transport system available. Using this new platform, MSOs will be able to more easily and cost-effectively generate new revenue streams from high-speed data, telephony and other two-way services, while providing a higher level of system performance to subscribers."

Additional features expected to be part of Prisma Digital Transport include:

- ✓ Synchronous Sonet multiplexing of digitally encoded video, audio and STS3 payload to ensure long distance transmission over a virtually unlimited number of hub cascades.
- ✓ Baseband and composite IF encoders and decoders to enable centralization of stereo

encoding and scrambling equipment.

- ✓ Flexible network configurations supporting advanced point-to-multipoint, ring and drop add pass (DAP) architectures.
- ✓ 10-bit video sampling for superior subscriber picture quality.
- ✓ Full duplex low-speed DS-3 and Ethernet interfaces provisionable on a modular 155 Mbps basis.
- ✓ Common element manager platform for end-to-end management of all hybrid fiber/coax network elements.
- ✓ Improved system reliability with a complete equipment redundancy option for all common modules.

Fundy Cable prepares to go retail with modems

Canadian cable TV operator Fundy Communications Inc. will be offering high-speed data services to its subscribers, and plans to offer the Scientific-Atlanta dataXcellerator telephone-return cable modems for sale directly to consumers via local retail outlets.

The dataXcellerator modems were scheduled to appear on retail shelves in Moncton, New Brunswick at a suggested retail price of \$279 to \$299 (Canadian dollars) last month. This price includes in-store installation, set-up of the subscriber's PC, an Ethernet card and free service for one month.

Fundy's decision to deploy Scientific-Atlanta's cable modem system follows its earlier investment of more than \$80 million Canadian dollars to build an extensive fiber optic network. While Fundy owns 98 percent of the New Brunswick cable TV market, it is preparing to compete with the local telephone company to capture market share in advanced telecommunications services outside of video.

Scientific-Atlanta will provide headend equipment, installation and support, as well as one-way dataXcellerator cable modems for the launch in Moncton. Additional launch sites will follow in Fredericton and Saint John. Fundy's fiber optic ring will link their cable headends together in Moncton, Saint John and Fredericton. Fundy has committed to an initial purchase of 2,500 dataXcellerator modems with an option to order additional quantities as it supplies its retail distributors.

Fundy and Scientific-Atlanta plan to coordinate the development and enhancement of the dataXcellerator system and address customer questions and issues as part of the project, said Bob McIntyre, president of Scientific-Atlanta's subscriber systems.

The dataXcellerator cable modem system provides throughput of 1.2 megabits per second, status monitoring and remote network management through a Technical Assistance Center in Atlanta, takes up one-half of a 6 MHz video channel, and includes a built-in analog 33.6 Kbps telephone modem.

Comcast sets amnesty program

As part of an aggressive stance against growing cable theft, Comcast Cablevision last month conducted a cable amnesty program that gave residents of Chesterfield County a chance to turn themselves in to avoid legal prosecution.

Cable theft in that system is estimated to cost Comcast \$1.4 million annually in lost revenue. In addition, cable thieves cost the Chesterfield area nearly \$70,000 annually in lost revenue and taxes.

"Cable theft has become a growing problem in Chesterfield, and we hope the amnesty program will give people ample opportunity to become paying customers or have their illegal service disconnected and avoid potentially costly legal penalties," said Kirby Brooks, general manager for Comcast's Chesterfield County system.

Citizens who were illegally receiving cable television services had the opportunity to call Comcast and either become a paying customer over the phone or have the illegal service disconnected without facing any legal penalties. With that period completed, Comcast intends to aggressively pursue and prosecute any cable thieves who did not take the opportunity to turn themselves in during the amnesty program.

Comcast officials are in the process of conducting a house-by-house electronic audit of its cable system to identify cable thieves in its service areas. As these homes and businesses continue to be identified, the information will be turned over to the appropriate authorities for possible prosecution, which upon conviction, could include fines and jail time. The house-by-house audit is being conducted by Comcast technicians using the latest technology in electronic monitoring, including electronic "bullets."

Similar Comcast amnesty programs have resulted in roughly 10,000 people, who were illegally receiving Comcast Cable, turning themselves in to Comcast in December 1992, of which about 5,000 became paying customers, and 5,000 had their illegal service disconnected. Additionally, more than 1,000 cable thieves turned themselves in to Comcast in an

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- Full line of drop materials to 1GHz
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GTE expands ADSL trials for data services

GTE has launched two new high-speed Internet access trials using Asymmetric Digital Subscriber Line (ADSL) technology involving Duke University in Durham, N.C. and Purdue University in West Lafayette, Ind.

Collectively, the two new trials involve 70 participants, including 30 at Duke University and 40 at Purdue University. Both trials utilize ADSL/DMT modems.

GTE also announced that it will expand its high-speed Internet access and remote office connectivity trial involving Microsoft Corp. by 1,000 employees, making it the largest trial of its kind in the world. The new trial participants will be added over the next several months. A decision as to what equipment will be used to support the expanded Microsoft trial will be made at a later date.

In the previously announced Redmond, Wash. trial begun last summer, more than 100 area businesses plus 130 employees from Microsoft and GTE have been using the ADSL systems for various applications, including access to the Internet and private data networks using Microsoft's Windows NT-based servers.

Speaking of high-speed modems, US Robotics, Hayes Microcomputer Products and Ramp Networks are quietly preparing products that reach speeds of more than 100 Kbps, according to a report from *Computer Retail Week*, a weekly newspaper for technology retailers.

The report says that the US Robotics and Hayes devices, created by fusing two analog phone lines, require no special set-up by phone companies to run. In addition, Ramp Networks will release its WebRamp M3, a device that fuses three lines to reach a top speed of 168Kbps. Other vendors are reportedly planning similar releases, and such devices will be priced between \$500 and \$600.

New optical components introduced by S-A

Scientific-Atlanta Inc. unveiled a new series of modular 1550 nanometer externally modulated electro-optic transmitters and erbium-doped fiber amplifiers, and 1310 nm mid-power fiber optic transmitters.

The new series is part of Scientific-Atlanta's Prisma Optical Network product family, which combines all of the company's opto-electronics



Scientific-Atlanta's Prisma optical transmission equipment

products under one name. Future additions to the company's opto-electronics lineup will also bear the Prisma name.

Now available in production quantities, the newly introduced products will enable operators to achieve greater transmission distances, increase split ratios in their HFC architectures, perform more cost-effective narrowcasting, enjoy improved system margins and better noise distortion performance, according to company officials.

The new products leverage technology acquired in Scientific-Atlanta's purchase of ATx Telecom Systems last summer.

The high power output of the new transmitters and erbium-doped fiber amplifiers is ideal for interconnect applications, such as the linking of secondary headend hubs with a primary headend hub, where signals must be transmitted for longer distances. It also allows network operators to cost-effectively reach more subscribers per transmission source by enabling higher split ratios.

The new 1310 nm mid-power fiber optic transmitters, in tandem with existing low-power 1310 transmitters, can be used for narrowcasting applications, in which specialized programming is delivered to a targeted geographic region of subscribers. A single laser can be dedicated to one or several optical nodes, or it can be used as an overlay to 1550 nm transmissions. Both the 1310 nm and 1550 nm transmitters can be combined in a common chassis.

TCI, Antec form construction firm

In order to keep control of its upcoming huge construction schedule, Tele-Communications Inc. has formed a 50/50 joint venture with Antec Corporation to create limited liability corporation which would provide design, engineering and construction services.

The new venture, which will be staffed by

about 100 TCI and Antec employees, is intended to support TCI's recently-announced plans to spend more than \$1 billion to upgrade its domestic cable TV systems. Pre-engineering and design work in anticipation of the implementation of TCI's upgrade program is already in progress. Construction will begin during the second half of 1997.

"We have begun an aggressive program to upgrade our facilities nationwide and to bring a wide range of new digital services and capabilities to our customers," said Tony Werner, TCI senior vice president engineering and technical operations, in a statement.

Werner also said the deal would not affect the way the company purchases hardware, nor would it affect ongoing relationships with other design and construction companies.

As previously announced, TCI plans to invest significant capital over the next three years to upgrade both its transmission facilities and headend equipment. To implement these upgrade plans, considerable engineering, design and construction activities must be completed. The new joint venture company will ensure that uniform engineering and construction planning is in place and implemented so that an orderly and efficient construction and installation program is followed.

Jottings

Marking its first new set-top order in years, Pioneer New Media Technologies will supply at least 50,000 of its new Entertainer advanced analog set-tops to Time Warner Cable of Houston. The deal calls for Pioneer to initially supply between 4,000 and 5,000 units each month for 10 months, beginning this December. Pioneer recently announced its intention to once again actively compete in the cable-TV set-top arena . . . Charter Communications is testing high-speed data modems provided by Com21 in Alhambra, Calif. Charter was interested in testing an ATM-based solution as well as Quality of Service, according to company executives . . . CableLabs, along with test equipment manufacturer Netcom Systems, has commercialized software that assists modem suppliers and cable operators to test data modem performance levels. Other companies will be working with CableLabs to commercialize the intellectual property, as well . . . TCI has chosen to use "model:it" from Integration Technologies in Hartford, Conn., and Fremont, Calif. The software captures and manages physical network data in a geographic information system and documents it so that TCI can perform automated plant design . . . CED

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Bush sees nothing but clear skies



Norrie Bush

Recently re-elected to serve as Secretary and Region 3 Director on the board of the Society of Cable Telecommunications Engineers (SCTE), Norrie Bush puts

his involvement in perspective: "I am very strongly committed to the value of training dollars being used at SCTE functions, particularly at the local level. If my involvement is valuable or useful in raising people's awareness and encouraging participation, then that's what I want to do. We are dealing with a technology-driven future that I believe requires a greater degree of understanding, a greater degree of technical competence."

A member of the SCTE since the late 1980s, Bush was one of the early officers of the Society's Cascade Range Chapter, which, he notes, has had "astounding attendance over the years," no doubt egged on by the support of managers and plant managers in the region.

Current offerings from his chapter include four to five technical seminars per year, plus a "vendor's day," which brings together chapters in the region for two days of hands-on training with broadband communications equipment, under the tutelage of technical representatives from hardware manufacturers and distributors. Also on deck at an upcoming vendor's day in Longview/Kelso, Wash. will be technical workshops covering a

range of topics, possibly to include the transition to digital, as well as EAS (Emergency Alert Systems).

Bush, who has held various SCTE board positions during the course of the past four years, further demonstrates his commitment to training by serving on the Society's BCT/E Category III Exam Working Group.

Keeping an eye on EAS

Bush's commitment to the industry is pervasive, bridging his involvement with the SCTE to his position with Tele-Communications Inc. In fact, he's quick to give credit to his employer, which is quite supportive of his activities with the SCTE.

Currently technical operations manager for TCI of Southern Washington, Bush supervises about 65 people, including both office and field staff, and is responsible for the system's physical plant (about 1,600 miles) and infrastructure, as well as its technical operations. He lives just five minutes away from the system's headend, nestled in the lush, green forests of the Pacific Northwest.

At present, Bush and the Vancouver system are preparing for franchise renegotiations, and next on the menu may well be gearing up to provide digital video services. He's also keeping a close eye on developments in cable and EAS requirements by serving on the Washington State Emergency Communications Committee, which was responsible for drafting the EAS

implementation language within the state of Washington.

"The FCC said that states would implement plans that would be a mechanism for the distribution of emergency notification information, from a state viewpoint, out to all different areas within that state," he explains. "That specifically affects broadcasters—which is made up of radio and television—and cable. And my participation in that was from the perspective of cable. A lot of the rules have in fact been written. The FCC's Second Report and Order on EAS will provide some clarification on the rules (it will tell us about small systems, etc.), but in terms of state plans, it doesn't really affect them, because the mechanism for getting the information out to the systems is the same."

The old Oaks

Almost since the day Bush graduated from electronics trade school back in 1976, he has been involved in the cable industry, first working for Cox Cable in San Diego in an electronics repair position. He remembers rebuilding, repairing and revamping old Oak set-top boxes, and then moving on to bench repair work, eventually tackling headend microwave work for the system. "That was in the days before fiber," Bush recalls.

Working in the San Diego system through the end of 1981, Bush then transferred up to a new Cox franchise in Vancouver, Wash., where he was principally responsible for building the headend and microwave facility from scratch. About five years after the system was fired up, it had roughly 28,000 customers; that was also about the time Cox sold the system, which would eventually end up in the hands of TCI. During that transition to TCI's ownership, Bush held supervisory positions of progressively more responsibility, eventually reaching his current position as technical operations manager.

Two-fisted reader

A voracious, two-fisted reader, Bush is now simultaneously tackling a Colleen McCullough book about Rome, an autobiography of Billy Graham and a spy novel. But his nose isn't always in a book—Bush plays keyboards and usually hits the local chess club once or twice a week; in lieu of the latter, he plays correspondence chess via computer. And in the backyard of his Vancouver home, he keeps a greenhouse where he can coddle his plants before exposing them to the harsh outdoors, a pastime which is "a real joy, a relaxation." While he acknowledges the green beauty of his surroundings, Bush wryly notes, "There's a reason why it's always green."

He and his wife of 20 years, Judy, have three children: ages 14, 16 and 18. The youngest graduated from junior high school during last month's Cable-Tec Expo; the oldest graduated from high school right before it.

As for the future of the cable industry and its people, Bush remains optimistic: "There is great potential for people who are curious, who are interested in knowing how things work, who refuse to accept something that doesn't work."

—Dana Cervenka

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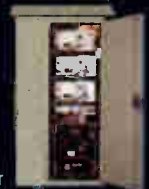
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Reader
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10

Outside of the service comfort zone



By Wendell Bailey, VP of Science and Technology, NCTA

This time last year, all anyone in the cable television industry could talk about was the certainty of the traditional telephone companies' entrance into the cable

industry's core business, i.e., video entertainment. This is not hard to understand because in the months prior to that time, every telephone executive who was capable of getting a pulpit announced loud and long that he would be there with the video goods within this or that timeline. One well-known CEO of a large and respected Regional Bell Operating Company (RBOC) went so far as to predict that "by the year 2000, (they) would have more than 50 percent of the cable television subscribers in the U.S."

This company, along with two other RBOCs, even established a new entity to crank out branded video product to be used by the traditional telephone companies to compete with the cable television industry. One regional Bell operator spent the last two years gathering franchise rights as the second operator in several dozen towns. Out on the West Coast, the incumbent operator decided that wireless, wireline and joint ventures of one kind or another would lead it to the land of video nirvana.

The RBOCs were not the only ones who were trying to get into someone

else's core business—the cable industry was also making more than a smattering of public statements about what it wanted to do, including telephony, PCS, long distance, and maybe a few other things. It is true that some of this is going on, but nothing, from either side, has been offered along the lines of what someone might have expected just over a year ago. So, what happened?

We in the cable television business could certainly say that the way the FCC and Congress treated us in the last two years (before the 1996 Telecommunications Act) made it difficult to act on some plans that we had. We could also claim that we have found something more immediate to work on.

I would suggest, if you will forgive my indulgence, that there are other possible explanations for two large and powerful industries to appear so out of synch with their public statements. Perhaps it is the propensity of large and powerful industries to get caught up in the promise of new possibilities, and to find out (too late) that no one will tell them that it just may not be possible to fulfill all of those promises.

This is not to say that none of the aforementioned hyperbole is taking place—just that if you believed only the tiniest sliver of the stuff that some companies were saying, then we would be up to our eyeballs in telco video-on-demand and equally spiffy cablephone services. In case you haven't noticed, we're not. My eyeballs are

still free and clear, and I think that I can see a reason or two as to why this state of affairs has come to be.

An employee of the most widely-mentioned effort at telephone company-sponsored video once told me that his bosses did not believe how hard it was to do video stuff, and how much it cost. They tried all of the most popular approaches to getting it moving—putting in more money, hiring more video people, making more public statements, and other typical actions. What is really going on here may be more simple, in retrospect, than we think.

Maybe, just maybe, we each know a whole lot more about how to do our own business than we can easily learn about someone else's business. The comment from the telephone boss about the difficulty of video has a perfect counterpart in comments that I have heard from my friends about the mysterious ways of the voice business. There are several good reasons why this might be so. Outsiders frequently think that just because both of our industries use wire, that we can do the same thing that the other guy can do. After all, it's just electrons running down a wire, right?

The telephone plant that's in place is optimized for the transmission of voice signals that are approximately 4,000 Hertz wide. Everything about that business is organized around a set of parameters that is unique to the transmission of that type of signal. This optimization is so pervasive that it even reaches into the tools and paperwork that are the day-to-day items which clutter desks and workbenches. The same is true about our business. We are highly optimized and specialized to deliver video. In order for either of us to offer the other service, some things will need to be modified, built or invented to make our plant do efficiently what their plant was optimized for, and vice versa.

Warts and all, we may be on to something

Now that the various pundits have spoken, and been somewhat rebuked, we can look around and see here and there examples of cable people figuring out some of the mysterious things about voice, and telephone people still intent on doing video. Whether or not either will make an acceptable business out of this exercise remains to be seen. I am heartened by the confidence that has been shown in our industry by the people who have chosen to cast their lots with us. Nothing about this level of confidence can guarantee that we are on the right track, but it does mean that someone looked at us, warts and all, and figured that we are on to something.

The telephone industry (in general) is more interested in long distance, the other piece of the voice business that they have been allowed into (sort of). The cable television industry is enamored with the possibilities of the high-speed modem business. Perhaps both of us have found something that we feel more comfortable doing, but we should also note that forward-thinking people on both sides are determined to make their plants do more than they were ever designed for. I, for one, would not bet against either in the long haul. **CED**

Have a comment?

Contact Wendell via e-mail at: wbailey@prodigy.com

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May 21, 1997

Mr. Joe Wu, President
TFT, Inc.
3090 Oakmead Village Drive
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Dear Mr. Wu:

In a recent survey of actual users of EAS encoder/decoders, the TFT EAS 911's sequentially lighted keyboard was preferred 7 to 1 for purchase over the competition. The survey was conducted by telephone between April 29 and May 16, 1997, to determine customer reaction and preferences from a sample of over 1,000 users in broadcast and emergency management.

During the two weeks of calling, CableFile was able to speak to 9.2% of the sample group who were identified as having used both the four-key and the 50 sequentially-lighted-key EAS units. Among the qualified respondents, the TFT 50-key products was overwhelmingly reported to be easier to use on a day-to-day basis by 54.2% who favored it.

Most respondents found both units easy for initial setup, but 95% said that the TFT was easy to setup, a full 20% more than the other type. 89% of the users told researchers that the TFT was easier to setup. For day-to-day operations, 83% of the qualified respondents preferred the TFT front panel design. When asked "If you had to add more EAS encoders/decoders to your system, which would you buy?" the TFT was once again the clear favorite. 68.5% said they would purchase the TFT. Only 8.5% said they would purchase the competition's product to the exclusion of TFT.

TFT provided CableFile with 1,000 names derived from its product registration cards to sample. Later in the surveying, TFT provided an additional 75 names of association presidents to broaden the sample. Out of the 75 names on the EAS association presidents list, 32% were unqualified, 40% were unavailable, and 28% were contacted; 14.2% of these contacts had used both systems.

Based on the above results you will find that of those we called who purchased emergency alert systems, TFT was the definitive choice.

(more)

**User Survey
Shows TFT EAS 911
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EAS 911 Encoder/Decoder



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Still stewing about using precise language



By Jim Farmer,
Chief Technical Officer,
Antec

Last month, Brunswick was stewing about the corruption of the beautiful and precise language of engineering. Let's continue that train of thought.

We were talking about the use of upper- and lowercase prefixes. These are very important and can lead to egregious errors, if used incorrectly.

In a prefix modifying a unit of measure, the lowercase is used if the multiplier is less than one. If the multiplier is greater than one, the uppercase is used if a multiplier less than one would use the same lowercase letter. If not, then the uppercase is frequently optional.

The *IEEE Dictionary* accepts either upper- or lowercase for the abbreviation of kilohertz (kHz or KHz), but prefers lowercase. For example, a frequency of 1,000 Hertz could be written as 1 kHz, with a lowercase "k," because k is not used for any multiplier less than one.

On the other hand, a frequency of 1,000,000 Hertz is written as 1 MHz, with a capital "M," because it is possible to talk of a frequency of 0.001 Hz, which would be written 1 mHz (millihertz).

Asking for clarification

Here's a war story, this time, from my undergraduate days. Way back then, shortly before the invention of fire, I took a physics course in which the professor decided to give a take-home quiz—he encouraged us to work together on it. Though it was a physics course, the particular unit involved electronic circuits.

One of the problems involved computing a resonant circuit at a frequency of four mHz (lowercase "m," as written by the professor). We debated whether he really meant for us to do the computation at a frequency of four millihertz (0.004 Hz), or whether he really meant four megahertz.

We decided that, because he was a full professor, and full professors don't make mistakes (by definition), he must want us to work the problem at four millihertz. That was a funny frequency, but sometimes, professors were given to doing things of that nature to keep us on our toes.

We decided to work the problem at four millihertz. The professor marked all of our answers wrong, as he had meant MHz, not mHz. We should have asked him for clarification, he said. A good scientist would have questioned an illogical input. I have never really forgiven him, though the years have dulled the pain somewhat.

There are some words that engineers misuse so frequently, that we forget what is right. Do you know

when to use "effect," and when to use "affect?" Those are two words engineers use a great deal, and misuse almost as often.

Tell you what: I'll give one of my famous, rare, and valuable "attaboys" to anyone who e-mails the correct answer to me.

Explaining the explanation

It comes as no surprise that Washington, D.C. lacks anyone with even a vague sense of the language. There was a particular FCC ruling a few years ago that was particularly noteworthy. It was written so badly that the Commish had to come out with an explanation of its ruling. The explanation was so bad, that they had to come out with an explanation of their explanation!

Why don't people think through what they are trying to describe? Put yourself in the shoes of the listener, and consider what he knows about your situation. I receive all too many calls in which the caller says, "The picture is bad. Help me." "In what way is the picture bad?" "Well, it just doesn't look right." Really, now, I could use a bit more detail. The SCTE has a whole bunch of examples of how different problems look. Ever study them?

50 points shy

Then there was the infamous first test in differential equations class. I walked out feeling so good! Then I got the test back, with a big red "46"! Four points were for the omission of a constant of integration, and I accepted that, but it still left me 50 points shy, and nothing on the paper to indicate where they went.

Dr. Fullprof's explanation: "I took those off because you didn't justify each step as you went along. Of course, no one in the class did, unless they had me before. I forgot to tell your class to justify each step. However, I'm going to give a couple more tests, and numerically, you can still pass, so don't worry."

The manual vs. reality

Then there's the one (no, the whole truckload) about the new product that arrived without a manual, so you couldn't set it up. You finally get the manual, and it's so full of errors and poor descriptions that you were better off without it.

The description in the catalog says that the new product will do one thing, but when you get it, well . . . that's a feature they meant to put in, but haven't done so yet.

Is there a cave dweller alive today who has never received a software manual (if supplied at all) that bears not even a coincidental resemblance to the way the software actually works?

When are communications engineers going to learn to communicate?

Gee, now I'm the one in a stew! **CED**

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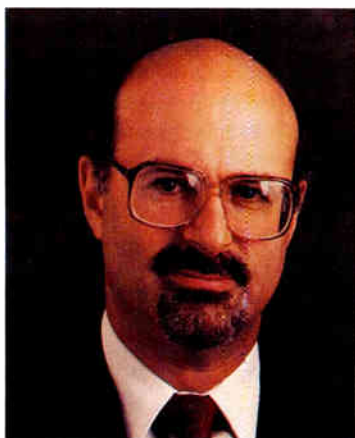
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Sorting out the satellite confusion



By Jeffrey Krauss, satellite skywatcher and President of Telecommunications and Technology Policy

You've probably read about some new satellite systems authorized by the FCC recently, and maybe you're confused by the new names, services and frequency bands. So here's a one-page summary of what it's all about.

Traditional GEO fixed satellites

We are all familiar with C-band and Ku-band satellites that deliver video programming to cable headends, TV stations and home dishes. These satellites are assigned to slots along a band that is located directly above the equator and at an altitude of 36,000 km, at which distance the earth's gravity and the sun's gravity are balanced. This is the geostationary orbit, and these satellites are called geostationary or GEO. C-band satellites operate at 6 GHz (uplink) and 4 GHz (downlink). Ku-band satellites operate at 14 GHz (uplink) and 12 GHz (downlink).

Now there's a new band for GEO satellites, called Ka-band. The frequencies are 28 GHz (uplink) and 18 GHz (downlink). The FCC has just granted construction approval for a whole slew of new Ka-band GEO satellites. Those pursuing Ka-band include names such as Hughes Spaceway, Loral Cyberstar, Motorola Millennium, and new guys such as VisionStar, NetSat 28, Morning

Star and KaStar. These systems are called "fixed" satellite systems because they communicate with earth stations that are fixed on the ground (as opposed to mobile).

The FCC has granted permits for U.S. companies to locate their satellites all the way around the world, not just over the U.S. There will be U.S.-owned Ka-band satellites over Europe and Asia. And guess what—Luxembourg has applied for orbital slots over the U.S.!

Very few of these new satellites will be used for distribution of video programming, because they are designed with spot beam antenna patterns that cover a few hundred miles, rather than global beams that cover the entire continent. So they'll probably be used for voice and data networks, rather than video distribution. The FCC authorizations require the start of construction within one year and launch in five years, by May 2002. We'll see whether this schedule can be met.

LEO fixed satellites

Teledesic has received FCC approval for a network of hundreds of non-geostationary satellites, orbiting the Earth at a lower altitude than the GEO satellites; these are low earth orbit, or LEO satellites. The earth stations will be fixed, and will track the satellites as they orbit. This system will operate at Ka-band, using slightly different frequencies than the Ka-band GEO satellites. This is an enormously expensive system, but

it will be owned by Bill Gates and Craig McCaw, and they can afford it. It's intended for data communications and for voice communications in rural areas and less developed countries. LEO systems cover the globe as the satellites orbit, and Teledesic plans to have earth stations throughout the world.

Both the Teledesic system and the Ka-band GEO fixed satellites will share the 18 GHz downlink band with a large embedded base of point-to-point microwave systems. These include microwave systems used by railroads, oil companies, local governments, cellular companies interconnecting cell sites, and pay-TV distribution networks such as Liberty Cable in New York. Satellite and microwave services have been able to share the C-band frequencies, using a procedure called frequency coordination, but frequency coordination at 18 GHz will be much more difficult. It may be quite a challenge for these satellite systems to find usable earth station sites.

LEO mobile satellites

A few years ago, the FCC approved the first generation of low earth orbit mobile satellites, systems like Iridium and GlobalStar and Odyssey. These will communicate with moving vehicles like trucks out on the highway, and with aircraft. Iridium just launched the first five of a network of 66 satellites. These systems use frequencies at 2.5 GHz and 1.6 GHz for their mobile communications, as well as "feeder link" frequencies at Ka-band to communicate with a few large gateway earth stations that interconnect with the telephone network and other private terrestrial networks.

The FCC has just reallocated spectrum for a future generation of LEO mobile satellites, around 2 GHz. Because the frequencies are very close to PCS frequencies, watch for proposals for hybrid satellite/terrestrial systems with handheld terminals that communicate with PCS cell sites if there are any nearby, and with satellites everywhere else. One of the major players expecting to use this band is called ICO Holdings, and is a spinoff of INMARSAT, the international maritime satellite organization.

This reallocation will require the relocation of some terrestrial users, both point-to-point microwave links and mobile microwave links used by broadcasters for electronic newsgathering (and by a few cable TV news operations). But the FCC has decided that the satellite systems will have to pay the relocation costs, just like PCS licensees have had to pay the relocation costs of incumbent microwave links. And the satellite folks don't like that one bit. They've come up with a plan that, rather than relocating the broadcasters, will simply kick them out. So we're in the start of a big fight, with satellite interests on one side and broadcasters on the other. But it will eventually be settled, and I'd guess that we might see the first satellites launched in this band around 2003.

With all of these new satellite systems in the works, at new frequency bands, there will be a variety of interesting new technologies coming along. Stay tuned, even if they are mostly non-video technologies. **CED**

Have a comment?

Contact Jeff via e-mail at: jkrauss@cpcug.org

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Lessons from the pioneers of cablephone



By Bob Stanzione,
President,
Arris Interactive,
An Antec/Nortel
joint venture

Is cable telephony going to take hold? Will cable get its share of the \$100 billion telephony market? At Arris Interactive, we believe the answer is yes. Together with our partners, Antec and Nortel, we have supported trials and early deployment of cable telephony systems with 10 or more cable operators in the U.S. and in the international market. These are the “pioneers” of cable telephony. Together, we’ve accumulated more than 10 million hours of real-world product experience. These early adopters blazed a trail for others to follow by overcoming regulatory obstacles and difficult plant conditions, proving in new technology and moving up the learning curves associated with starting any new business. Now, one of the keys to widespread industry success for cable telephony is for new entrants to take advantage of the lessons learned by these pioneers.

There are as many organizational structures for entering new businesses as there are cable operators. Our customers have found that an integrated HFC/telephony organization is best. This includes end-to-end ownership of the transport, switching and HFC aspects of the network. A single organization responsible for marketing, customer care, repair, maintenance and installation activities for both telephony and video services is essential. Streamlined communications and clear areas of responsibility will help ensure responsive and effective customer service. An integrated organization also helps manage staff size. A well-run organization can deliver service with significantly less headcount than a typical telephone company.

Rifle or shotgun marketing

It’s one of the oldest marketing decisions in the book: mass market or target market? Most of our customers have found that in the early days of their launch into telephony, the rifle approach (i.e., node-by-node deployment) works best. Nodal deployment enables operators to time capital investments to revenues. And it permits tailoring the design of each node to its demographics and penetration.

Node-by-node deployment has also shown benefits in attracting telephony subscribers. With the precision of today’s ZIP-code-based databases, marketing dollars can be focused on direct mail, and telephone and door-to-door selling. The results of this approach are impressive. One cable operator has seen penetration rates as high as 40 percent in a node in less than a year of commercial operation.

In order to grow quickly, automation of network management functions like provisioning, service orders and trouble management is a must. On the other hand, a “killer” OSS isn’t required to get into business. Find a

balance. A structured approach to problem investigation, root cause analysis, and problem elimination can compensate for a large, fully integrated OSS in the early stages of deployment. Again, establishing growth and penetration targets early allows the operator to size the system appropriately and automate essential functions while limiting initial capital outlay and operational complexity.

Most cable telephony systems put digital line card technology at the customer’s home, giving the cable operator a unique operational advantage over the telephone company. For example, most network operators use Customer Trouble Reports (CTR) per 100 subscribers per month as a measure of network reliability. Unfortunately, CTRs indicate that a network fault has already inconvenienced a customer. Better to have a system which automatically notes troubles and reports them to an operations center, so that they can be cleared before a customer is affected. The Arris Cornerstone system, for instance, continuously monitors the entire roundtrip path between the headend and subscribers and provides information regarding the health of these paths so that most faults can be cleared before any subscriber becomes aware of a problem, thereby improving the perceived quality of service and reducing CTRs.

This benefit even extends to non-telephony services. In one instance, an alarm was raised at the headend indicating loss of communications. The alarm was generated automatically; the customer was not at home. A crew was dispatched. After finding a downed cable, service was restored, not only to the telephony subscriber, but also to the five other cable TV subs served by that drop, none of whom were home.

Fine-tune your plant

Cable telephony systems equipped with “intelligent frequency agility” have conquered the challenge of upstream noise ingress. Intelligent frequency agility supports frequency hopping from spectrum with ingress to spectrum that is known to be clean. But, it is still incumbent on the cable operator to “sweep” the network, tightening connectors (especially where cold weather is a threat), terminating unused drops, cleaning fiber connections and weatherproofing to prevent corrosion.

Again, the technology of cable telephony simplifies this task. Cable telephony systems that support intelligent frequency hopping and monitor the status of the return path can provide a log of all frequency hops. With this, maintenance personnel can identify potential trouble spots and proactively maintain the RF plant.

The technology of HFC-based telephony has proven itself reliable. Telephone service *can* be delivered by traditional cable operators. The business opportunity is also real. Even though some cable operators have publicly scaled back their plans, they are continuing deployment in key franchises, and many others are now deploying. Likewise, international operators are showing their commitment to telephony with volume rollout plans. As more cable operators get into this business, they will do well to heed these lessons learned by the early pioneers. **CED**

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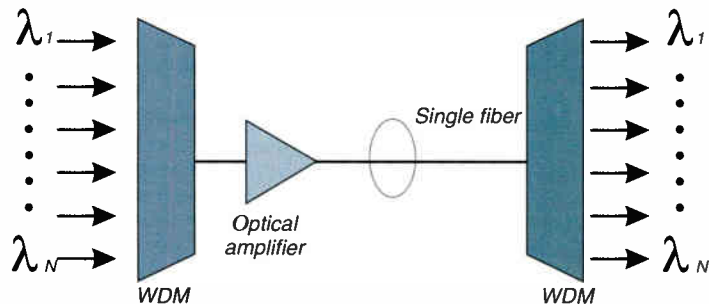
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Optical network technology

Future impact on cable TV networks

Figure 1: Dense WDM link. "N" can be 4-32 commercial applications today.



By John Holobinko, Director, Business Development, and Bill Hartman, Senior Market Development Manager, ADC Telecommunications Inc.

Wave Division Multiplexing (WDM) is the ability to transmit two or more optical signals independently through the same fiber, utilizing different optical wavelengths. Although transmission of 1310 nm and 1550 nm wavelengths has been used for many years, it has been the advent of commercially-available optical amplifiers which has made it now technically feasible to transmit tens of optical signals simultaneously on the same fiber within a relatively narrow

optical window of approximately 30 nm. This is referred to as Dense WDM transmission, or simply, dense WDM for short. Figure 1 illustrates a point-to-point dense WDM fiber link. Although the ability to transmit a dense WDM stream and amplify its multiple sig-

nals with a single optical amplifier is a key element of future all optical networks, commercial development of a number of new optical devices will be required in order to take full advantage of the potential benefits of all optical networks.

All optical networks may provide the following economic benefits to cable TV service providers:

- ✓ Lower fiber plant cost through significantly reduced fiber counts
- ✓ Shared signal transmission and switching through

common active optical components, reducing electronics costs

- ✓ Improved system reliability through reducing overall network active devices
- ✓ Faster fiber restoration after cuts, through significantly reduced fiber counts
- ✓ Reduced future costs for network capacity expansion by further sharing common plant and equipment.

In addition to these benefits, technology improvements may allow each hub to economically serve significantly larger areas in terms of homes passed per hub, thereby allowing further consolidation and reducing operations costs.

Elements of an all-optical network

Dense WDM technology enables the creation of multiple optical circuit paths within a single fiber path (Figure 2). In relative terms, it is easy to compare an all optical network to a fiber network in the following way: An optical cable consisting of multiple fibers within a sheath becomes a "superset." An individual fiber within the cable can be thought of as a virtual fiber cable. An individual optical wavelength within the fiber can be thought of as a virtual fiber.

Management, redundancy and routing can all be readily understood by translating requirements in conventional networks between cables, fibers and their virtual counterparts in an all optical network.

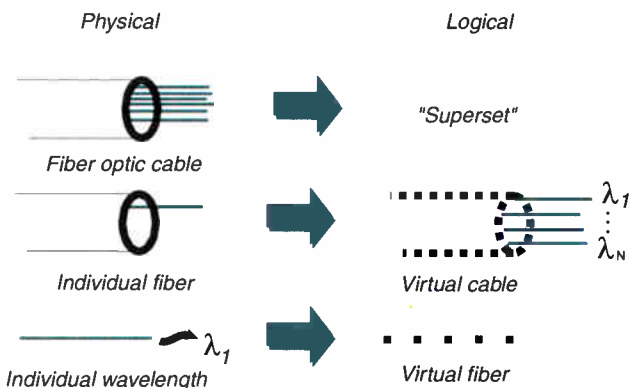
To attain the economic and operational benefits derived from implementing the future all optical network, a number of optical elements will be required which are currently not available in commercial quantities for widescale deployment. Figure 3 is a compilation of these devices. From left to right, it shows progression in time of the anticipated evolution of these devices.

Dense WDM transmission is not without technical challenges. Operating at the 1550 nm window, attention must be paid to issues such as the dispersion performance of the optical fiber, the flatness of amplifier gain in the optical bandpass, and the optical stability of fiber devices. Recognizing these challenges, this article is primarily focused on the potential application of all optical networks in cable TV systems.

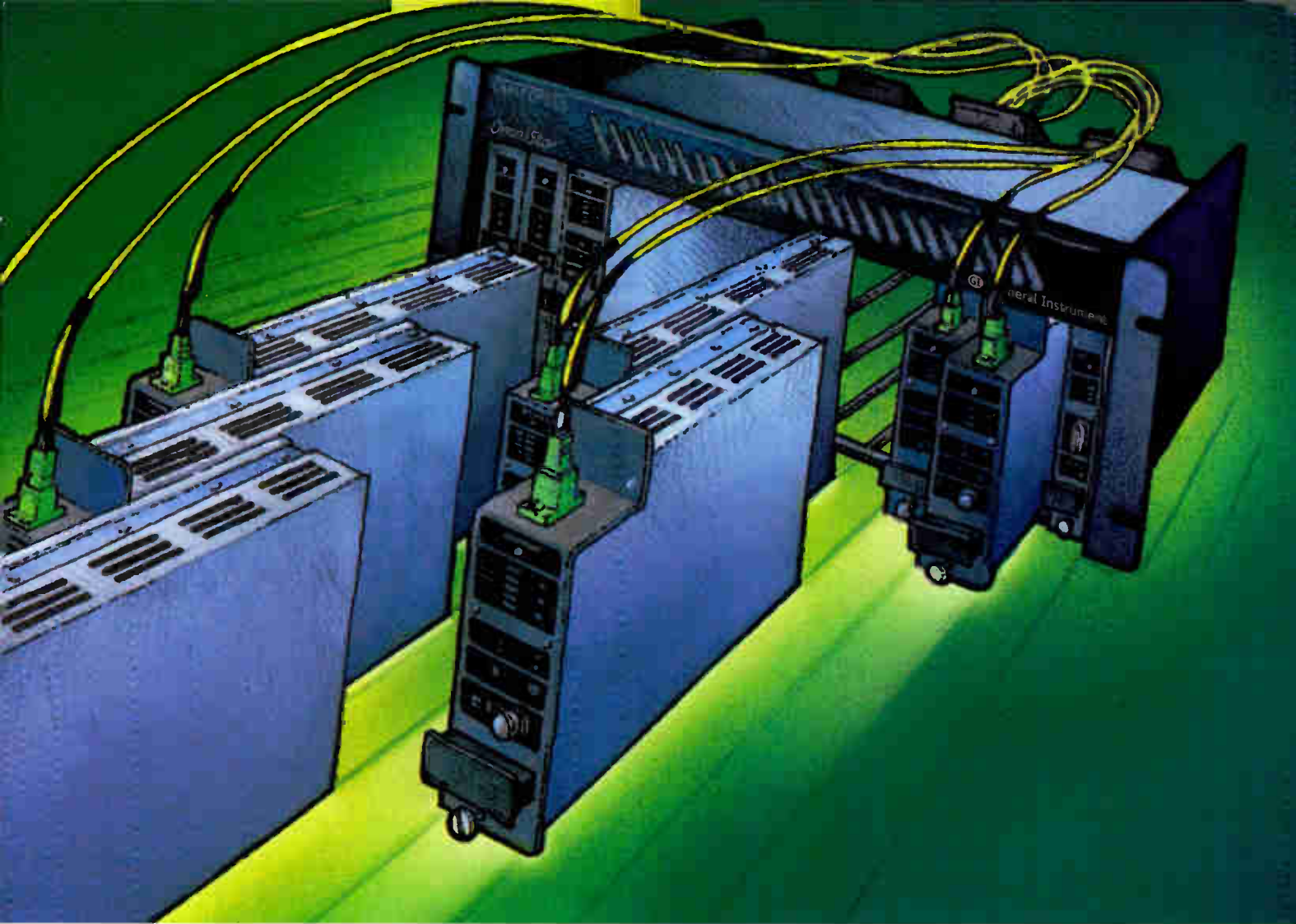
Large urban/suburban cable TV networks consist of a series of hubs/subheadends (or video end offices) connected to one or two master headends (or video serving offices) usually via a redundant fiber optic ring, commonly referred to as the fiber backbone system. While most large backbones are exclusively digital, medium-sized rings may be a combination of digital and high-powered linear systems. A hybrid fiber/coax distribution architecture is used to distribute signals bidirectionally between the hub and the serving areas via linear optical transmission between the hub and optical nodes, and linear RF transmission within each serving area between the node and subscribers. Figure 4 illustrates a typical backbone system architecture, while Figure 5 illustrates the distribution system architecture.

Dense WDM systems offer potential economic advantages in both digital and broadband linear (aka:

Figure 2: All optical network equivalents.



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Figure 3: Current and future elements for all optical network.

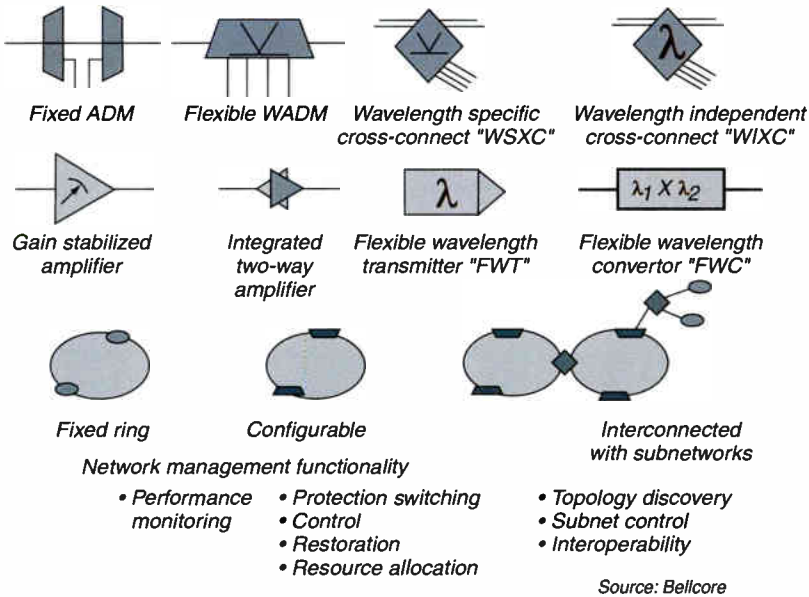


Figure 4: Backbone system. Fiber transmission is typically uncompressed digital for large networks, and a combination of digital and high-power 1550 nm AM for smaller systems.

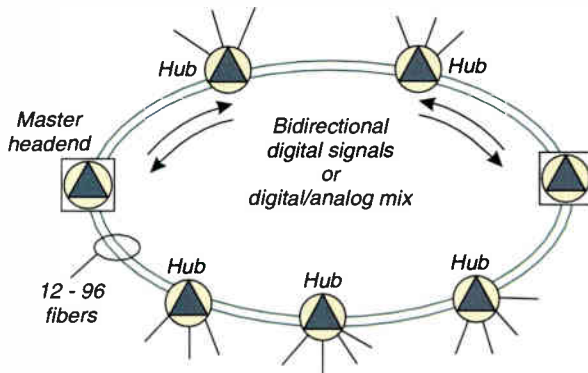
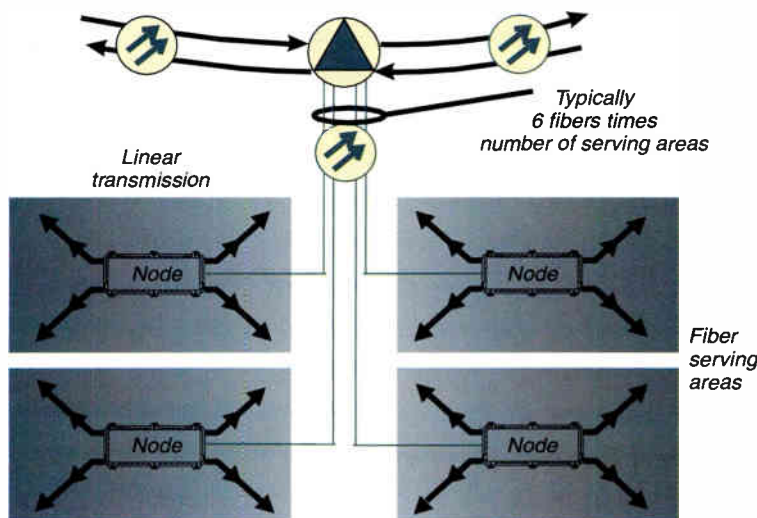


Figure 5: Distribution system. Fiber transmission is broadband linear between the hub and the optical nodes in the serving area.



analog) cable TV transmission. The first area of anticipated use of dense WDM technology in cable TV networks is in fiber backbones, followed by potential implementation in the HFC distribution system.

Dense WDM in backbone systems

Fiber backbone systems generally cover long distances. The longest systems in the United States now cover more than 500 kilometers. Given the expansion of cable TV networks into the delivery of high-speed data, telephony and other digital services, these systems usually employ uncompressed digital fiber systems to transport all video, data and voice services, or a combination of uncompressed digital and conventional telecommunications digital systems to transport and remultiplex various combinations of channels to create custom service delivery configurations at each sub-headend. Shorter systems sometimes employ a combination of digital transmission systems (for voice and data services), and 1550 nm high-power linear transmission systems (for broadcast video services) on separate fibers, which are then combined at the hubs.

Each fiber in backbone systems represents a significant capital cost because of the long distances traversed. The initial system may be even more expensive if requirements dictate leasing fiber(s) over a limited right-of-way such as a long bridge spanning a body of water. The ability of combining multiple digital signals using many optical wavelengths has already been demonstrated, and commercial products are already available. For example, the authors' company demonstrated eight wavelengths of its DV6000 uncompressed digital system at the 1996 SCTE Expo, as shown in Figure 6.

This provides a single fiber capacity of 20 Gbps, which translates to 128 analog cable TV channels, 256 DS-3 channels, 128 MPEG-2 QAM multiplex signal streams (with up to 20 MPEG multiplex channels per stream) or a combination of these signal types. Other vendors currently provide systems which can transmit eight or more simultaneous wavelengths containing digital information, over the same fiber. A counter-rotating ring can be implemented with no loss of capacity on two fibers, as shown in Figure 7.

Alternatively, it is technically possible to implement a bidirectional WDM system with redundancy on a single fiber at 10 Gbps.

Today, the application of WDM is primarily limited to point-to-point transmission between hubs on the ring. This is because of the fact that only "hard wired" fixed wavelength optical splitters are available. This provides the benefit of reduced fiber count, but not full optical add/drop capability. In order to dynamically drop or add a wavelength at any hub, a dynamically wavelength selective optical WDM device will be required. For high-speed digital telephony systems, there may be a significant cost advantage in being able to do a drop and add function in optics vs. electronically, because of the high cost of the digital add/drop multiplexor. Optical switching can perform virtually the same functions as TDM switching. The only optical

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limitation in multiplexor functionality is that there is not an easy way to make a drop *and pass* device.

The benefits of dense WDM are not as obvious in a smaller backbone system that employs 1550 nm high-power linear transmission of cable TV video channels. Although it has been demonstrated that digital and linear optical signals can be simultaneously passed through the same optical amplifier¹, the optical

link budgets of high-speed digital transmission systems are so dissimilar as to make this probably impractical in common implementation. For example, a 2.4 Gbps link operating at 1550 nm has a link budget of 29-31 dB, translating to over 100 km in length, which is within the range of distance between 90 percent of all hubs. A typical high-power linear system has a link budget of 12-14 dB. Therefore, the linear system will require amplifiers after a

distance of 12-14 dB, which is less than half of the link budget for the digital system. Operating the digital system through these amplifiers will provide no advantage to the digital system, and therefore, if digital and high-power linear signals are mixed on the same fiber, extra cost must be incurred to provide splitters to the digital signals in order to bypass these optical amplifiers.

Dense WDM in HFC distribution systems

While there are clear capital and operational savings to be had today from building a new digital fiber backbone system employing dense WDM technology through saving of fibers and electro/optic repeaters, there are potentially larger future savings in the forward and reverse path of the HFC distribution system.

Consider that the average hub serves between 20 and 80 optical nodes. It is typical to provide four to six home-run fibers between the hub and each node, because at least two fibers are normally required for bidirectional transmission, and extra fibers are installed to support future migration of nodes closer to the subscriber, or additional services close to the node. Multiplying the nodes times the fibers per node calculation means that as many as 480 fibers are required at the hub. Given that WDM would allow multiple linear signals to be transmitted on the same fiber, the number of fibers at the hub could be reduced by 67 percent, while maintaining the ability for future expansion of nodes closer to the subscriber.

Even greater savings are possible if fiber branching is allowed. For example, if 16 nodes could be served using 16 wavelengths originating on one fiber from the hub, then it is possible to serve 80 nodes two-way using only 10 fibers total. Figure 8 illustrates this concept. Note also, that in building a metropolitan system, that there may easily be 10 or more hubs, so that the savings realized is factored by the number of hubs (i.e. distribution networks) in the overall system. To accomplish this savings technically requires future development of both the lasers which can support 110 channel linear transmission at various wavelengths around 1550 nm, as well as WDM optical devices which demonstrate excellent long-term stability and performance while installed in an outdoor, unprotected environment.

Another alternative that has been postulated is to transmit in the forward path from the hub to nodes the common broadcast channels (typically from 50-550 MHz) at one common wavelength, and then to send the narrowcast signals to each node on a different wavelength where they are combined in the optical receiver.

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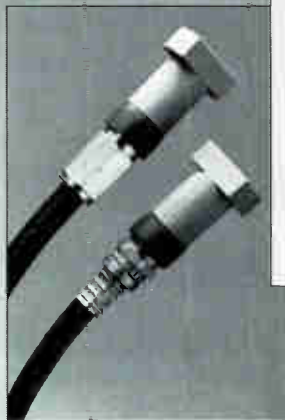
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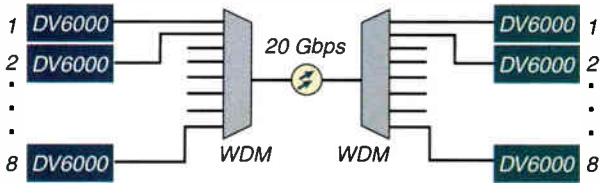
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Figure 6: ADC Telecommunications' DV6000 uncompressed digital transmission system employing DWDM for 20 Gbps transport.



er. Although this is possible from an optical perspective, the combining of signals at the node receiver may be a more difficult approach in actual implementation. This is because it is difficult to combine the signals at each node

with the correct RF level. Without going into a detailed technical explanation in the space of this paper, suffice to say that the RF output level of a signal out of an optical receiver is proportional to the input optical power of the received signal and the square of the depth of modulation. Trying to match two different optical transmitters' outputs coming into the node receiver with two power levels and two depths of modulation would probably be difficult.

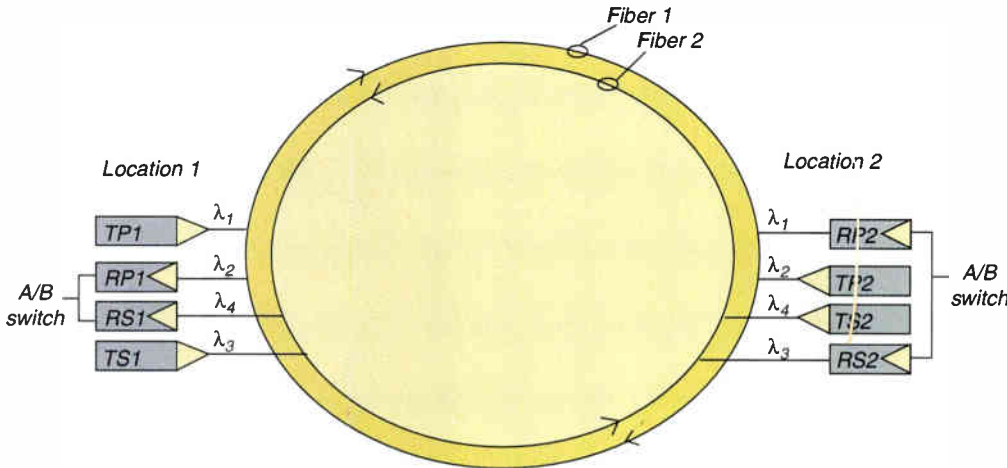
Dense WDM may also hold future promise for return path expansion. Today, block upconversion is the most often proposed means of taking up to four 5-40 MHz return paths and transporting them across a single fiber back to the hub. In the future, it may be possible to optically multiplex the return paths instead of frequency multiplexing these signals. Of course, this will

require both the multiple optical wavelength transmitters which are cost-effective, and the WDMs which meet the environmental rigors required to be installed in a strand-mounted, unprotected optical node.

All-optical network challenges

The current barriers to all-optical networks center around devices and availability. The ITU has suggested standardized channel spacing based on specified optical wavelengths in the 1550 nm bandpass region of optical amplifiers. In the digital realm, high-speed 1550 nm wavelength lasers are becoming available for 40 separate ITU wavelengths, at prices which are rapidly approaching standard 1550 nm pricing. Work is being done by some vendors on creating multi-wavelength laser arrays to further drive down pricing. However, using 40 different channels brings up the real-world problem of transmitter sparing. Currently, this limits the flexibility. The ideal solution is a tunable wavelength laser, if not for all transmitters, then at least as a universal spare. This is a comparable problem to that which the cable TV industry had in the 1980s, when VSB/AM modulators were fixed-channel. The advent of tunable lasers will significantly accelerate the implementation of WDM systems. Correspondingly, similar breakthroughs are required in broadband linear optical devices.

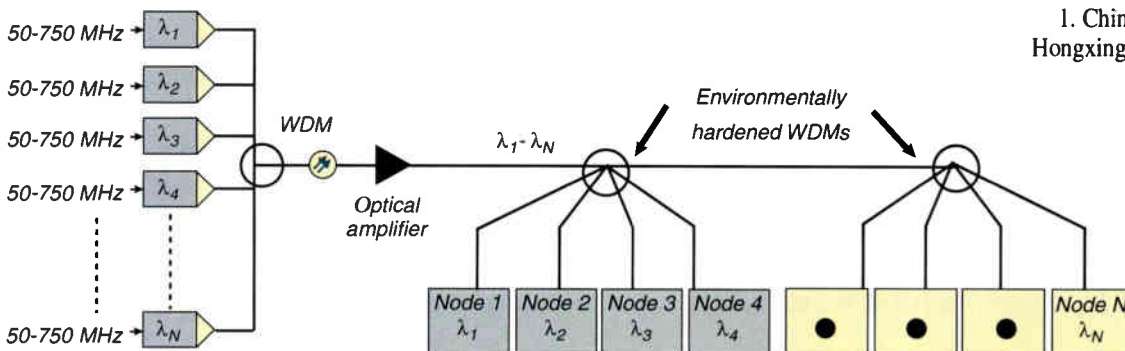
Figure 7: Counter-rotating ring with full fiber and electronics protection.



Another key requirement is the availability of low-cost/highly efficient WDM devices, both fixed wavelength and tunable, suitable for indoor and outdoor installation. In this area, technology is moving forward very quickly, and the emergence of these devices appears on the horizon.

Dense WDM technology and the ability to create all-optical networks will allow further improvements in the cost, flexibility and reliability of cable TV networks. Availability of the optical components necessary to create these networks will occur within two to three years, giving network providers additional means of providing better service and additional capacity to their customers. **CED**

Figure 8: Potential future dense WDM in HFC forward path.



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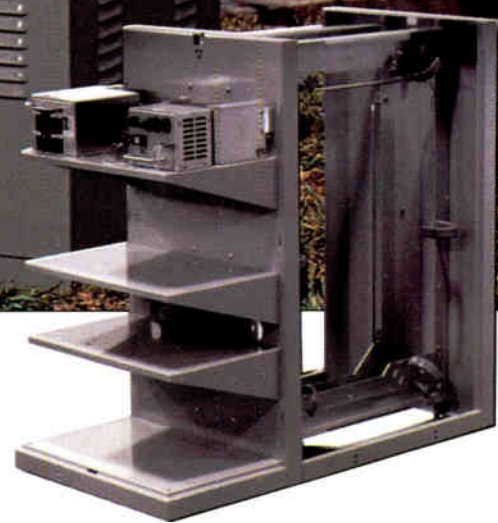
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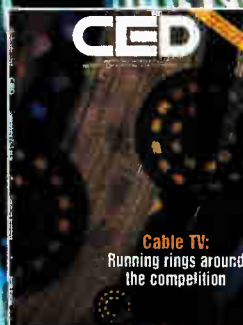
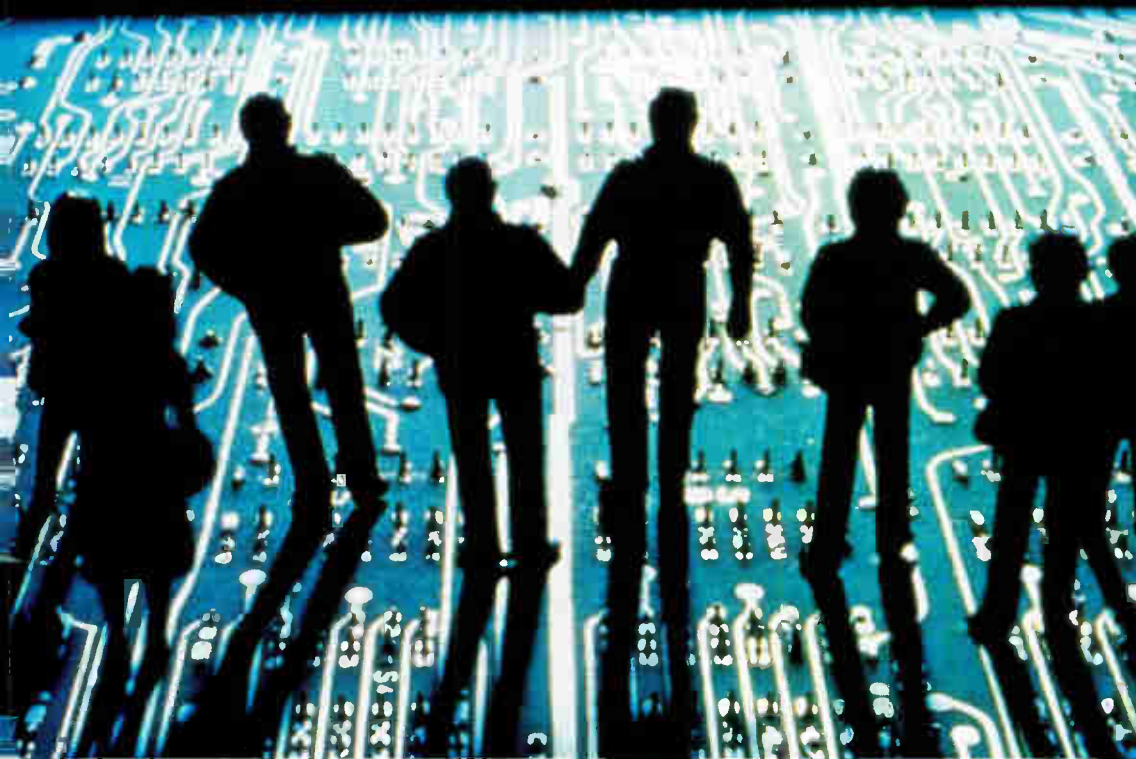
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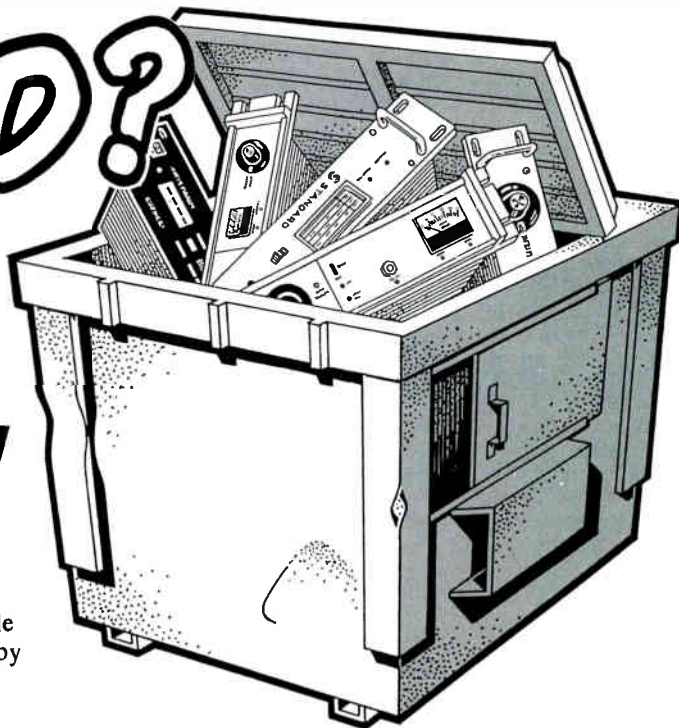
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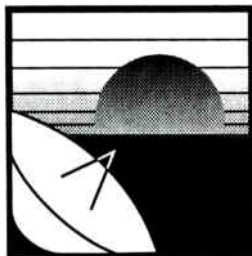
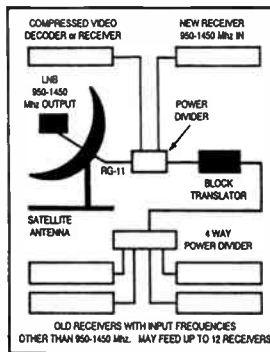
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A customer complaint is a poor substitute for sound network management practices. With competition and the deployment of new services, reliability of the network has become critical.

Information from a network monitoring system is playing a key role in improving construction practices, installation procedures, plant maintenance procedures and customer service. All of these elements together have become part of a larger plan to continue to improve network reliability.

The goal of an advanced network monitoring strategy is to create a *virtual presence*, where the operator can view the status anywhere in the plant at any time. In addition to the traditional status monitoring role of identifying faults in active distribution devices, a virtual presence implies capturing fault information from the entire hybrid fiber/coaxial (HFC) domain, evaluating quality of signal and plant performance, correlating all this data, evaluating it, and disseminating information to the appropriate functions. And all of this is completed in real time. Virtual presence is paying off with increased network reliability, availability and customer service.

The following steps illustrate the process of building an advanced network monitoring system toward the goal of creating a virtual presence.

Five steps to implementing network monitoring

1. Status monitoring.

Gathering data on the status and health of each individual network element such as power supplies, fiber nodes, amplifiers and headend equipment provides immediate notification of an equipment failure.

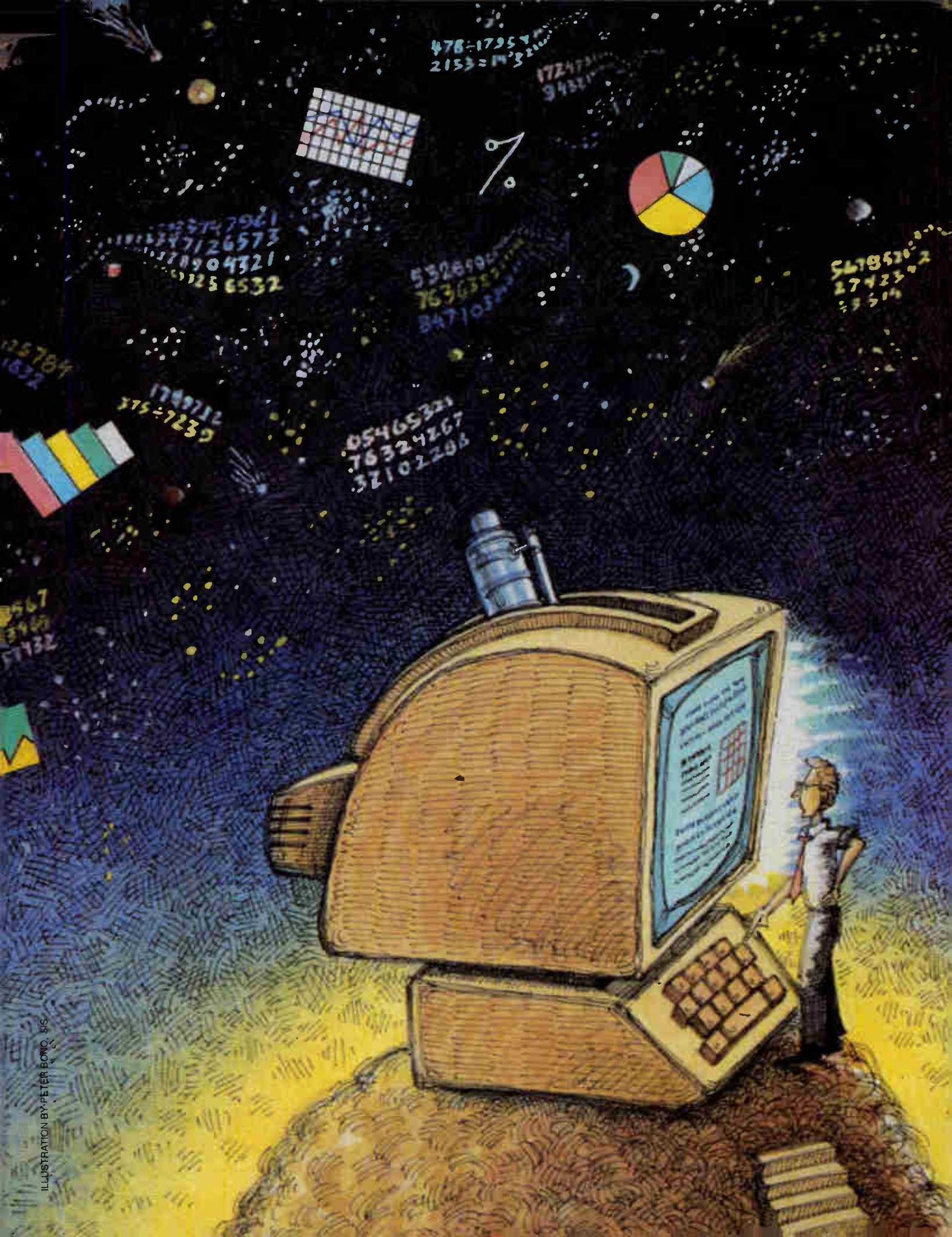
Without status monitoring, the nature and location of equipment failures must be correlated using customer complaints as primary sources of data. Further technician time must be spent in correlating and eventually isolating the location and nature of the equipment failure. This absorbs valuable technician time in constant fire-fighting mode.

In addition, status monitoring can often provide warning of impending service interruptions before subscriber service is interrupted. For example, when loss of commercial power causes a power supply to switch to battery standby, an alarm is issued and a generator can be dispatched to the site before backup battery power is lost. Another common example is when an optical node loses optical power on the primary fiber and switches to the redundant fiber path, an alarm is generated and appropriate repairs can be made before subscriber service is affected.

Another benefit of status monitoring is the ability to verify redundant systems. For example, a system operator can purposely place power supplies into standby mode to verify backup battery voltage, and faulty batteries can be replaced before an emergency occurs. Redundant fiber systems can be checked in the same manner.

2. Performance monitoring.

Performance monitoring allows operators to continually monitor and verify the integrity of the services at various points throughout the network. A spectrum analyzer at the headend automatically monitors level and distortion parameters on all channels before the signal leaves the headend. Strand-mount spectrum analyzers at FCC proof points and strand-mount signal level meters throughout the network



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An expert system creates rules to follow when certain symptoms are encountered

automatically and continuously monitor distortions and levels throughout the plant.

Performance alarms generated at the headend or at various points in the field allow the operator to pinpoint the source of the signal degradation and take steps to solve the problem—many times before subscribers notice distortions and degradations in picture quality.

Return path monitoring can offer the operator nearly instantaneous data on return path ingress and can immediately narrow the location of the ingress source.

3. Implementing an HFC domain manager.

The HFC domain manager is the key value-added element between the physical plant and the technicians and service personnel responsible for the maintenance of the system. The domain manager performs the following basic functions:

✓Configuration: Through the domain manager, an operator can view and configure each network element. The operator can select parameters to monitor and configure alarm limits for each parameter. For instance, a strand-mount spectrum analyzer can be configured to take video and aural carrier level, carrier-to-noise (C/N), and hum measurements on all video channels. For each measurement, the operator can set minor and major alarm limits, so if at any point in the network C/N dips below a certain value, an alarm will be generated.

During routine maintenance, system operators may want to disable certain alarms. Conversely, when a problem is suspected on a specific video channel, operators may want to monitor that channel more closely with non-interfering composite second order (CSO), cross modulation and depth of modulation measurements.

✓Data acquisition, filtering and presentation: In a true HFC domain management system, massive amounts of data will be generated, perhaps from multiple element management systems. The domain manager is responsible for filtering the data into usable information and presenting that critical information to the user.

Trend analysis is an important function. Rather than simply report the C/N on channel 22 or the string voltage of a three battery supply once every 30 seconds, the data should be archived in a file. In this way, the system user can observe long-term trends and take necessary actions. An alarm condition must be reported immediately, but data gathered over time should be managed and presented in the appropriate format.

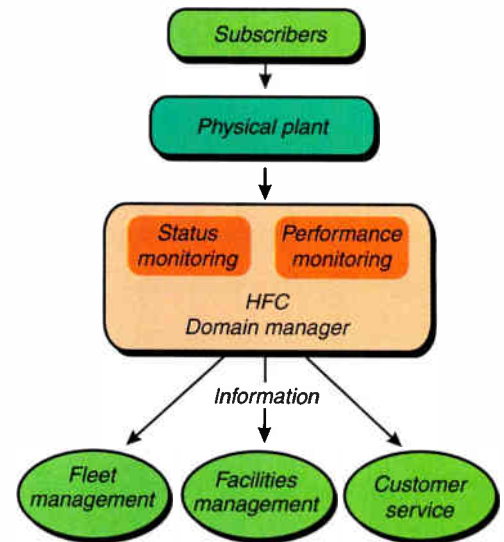
In many scenarios, a single point of failure creates large numbers of sympathetic alarms. This is referred to as the “barking dog” scenario: Late one night, a dog is awakened by a prowler and begins barking. In a rapid chain reaction, all the dogs in the neighborhood wake up and start barking. When the police arrive, it is impossible to tell which dog is barking at the actual prowler and which dogs are barking just because the other dogs are barking.

In a similar fashion, a domain manager has the ability to filter sympathetic alarms and report the most likely cause of the alarm storm.

✓Cross correlation and root cause analysis: Far more complex than simple alarm filtering is the cross correlation of service problems back to symptoms in the physical plant.

Examples of these service problems might be a high rate of dropped data packets for cable modems, an increasing rate of dropped or interrupted telephone calls, or a high rate of communications alarms in the

Figure 1: Achieving a virtual presence.



status monitoring system. These subtle problems often tie up the senior engineers and technicians for days, and even months, until the root cause is discovered and run to ground. Every engineer has a favorite “you-won’t-believe-this-one” story.

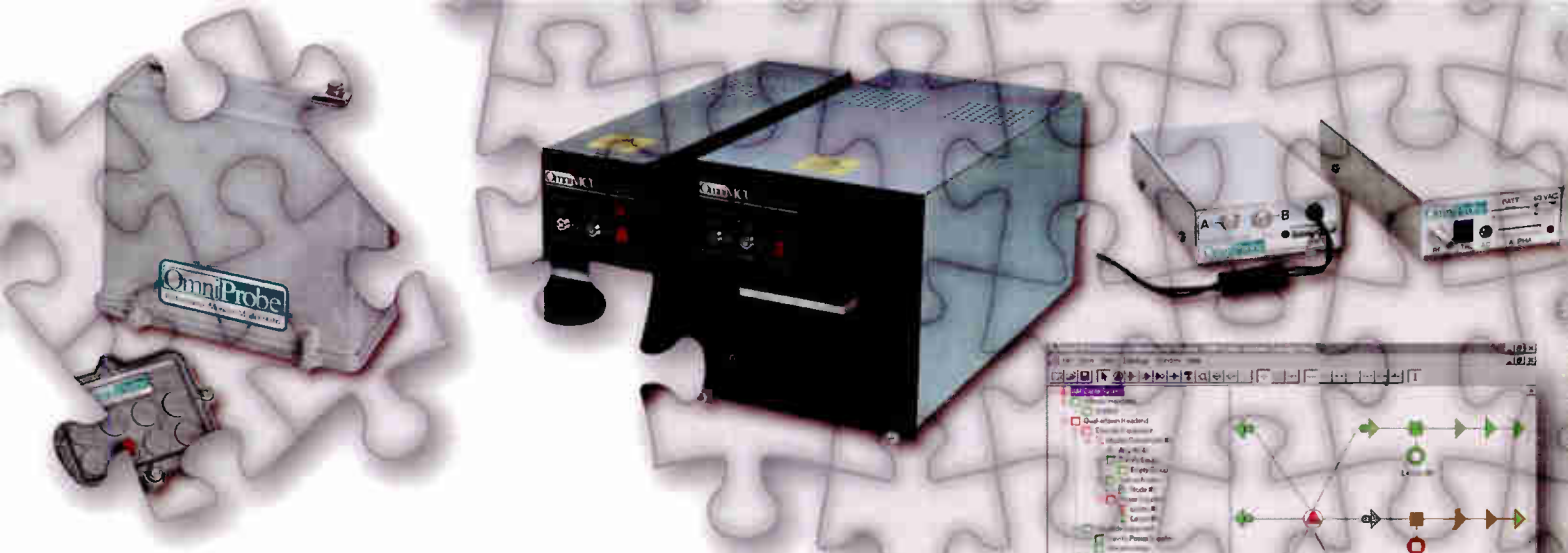
An expert system operates by taking senior engineers’ knowledge about the plant, past problems in the plant, troubleshooting procedures, etc. and creating rules for the system to follow when certain symptoms are encountered.

With a rules-based expert system in place, alarms can be generated when a certain combination of symptoms appear—long before an actual network failure or service interruption. When alarms are reported, they can include a short list of most probable causes and suggested maintenance procedures.

✓Distribution of information: The final responsibility of a domain manager is the distribution of information.

This can include the geographic distribution of information—for example, getting an alarm from an unmanned hub back to the headend or network operations center. *A beeping computer in an unmanned hub is of very little value.*

Distribution of information also refers to distributing data to other operational support systems (OSS).



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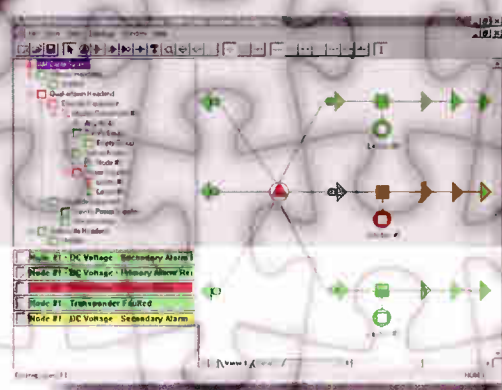
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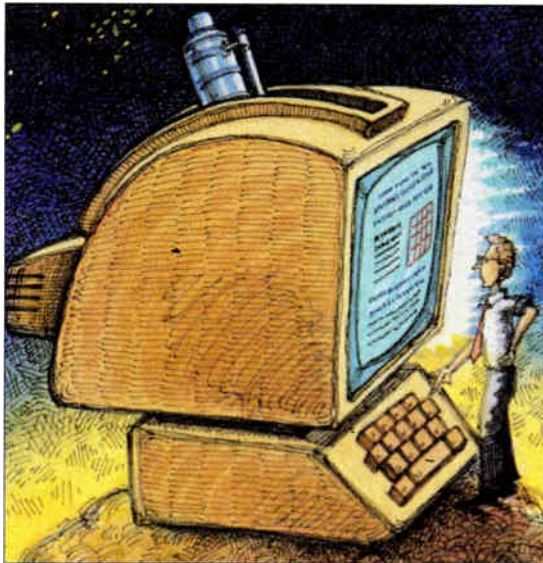
Common open standards such as SNMP and CMIP are required.

4. *Adapting business practices.*

Network surveillance becomes most valuable when viewed as an integral part of building a more reliable network for the addition of new services, not when viewed as a necessary evil or simply gathering data.

One of the unexpected results when a network management system is deployed for the first time is the new availability of data. Cable operators are rethinking their business and training practices to fully leverage this new information source. This new information is driving changes in the way networks are run.

**Develop
procedures for
prioritizing
incoming alerts**



To fully leverage the new information:

A) Rely on the information coming from the new system to direct field engineering resources. Have personnel with adequate technical background analyzing incoming alerts to determine the next steps. Develop procedures for prioritizing incoming alerts and distributing alert and alarm information. Decide the criteria necessary to open a trouble ticket. Determine who can close a trouble ticket. And have a contingency plan for problems that are not resolved within a specified period of time.

B) Use the data to measure the reliability of the network. Analyze alerts on a weekly and monthly basis, set metrics for improvement and institute new maintenance procedures to increase the reliability of the network. This analysis should also lead to modifying construction practices, installation procedures and routine test and maintenance procedures. Change control procedures may be implemented to ensure commonality throughout the network.

C) Review and improve training procedures. As new business practices and process flows are put in place, gaps in training will become obvious. Engineers, technicians, network systems personnel, customer service personnel—all must be trained to use the system and

must be trained in new practices and procedures.

5. *Creating a virtual presence.*

Status and performance monitoring provide detailed information about the status of the physical plant and the performance of the forward and return spectrums.

Virtual presence implies getting information from remote locations in the plant to the right place in the right format at the right time. By quickly routing critical plant information to the appropriate operations personnel to implement repairs or to respond to customer service issues, the cable operator has achieved a virtual presence throughout the plant.

A simple example shows the difference between data and the power of information when it is presented correctly:

Power is lost to a large segment of the network, and many subscribers have completely lost service. A red light flashes on a computer screen in the headend—that is data (certainly better data than correlating phone calls from angry customers!).

The dispatch center needs to know the type of power supply, location and nature of the fault. With this information, a technician can be dispatched to fix the problem.

Customer service personnel do not care about the details of the power supply—they need to know which subscribers are affected and the expected time of repair. With this information, the customer service department can be prepared with pre-recorded messages and further information for affected subscribers.

The system manager may not be involved in the day-to-day emergencies and repairs, but he or she can use the fault summary information. With this data, the system manager can begin to make decisions about modifying maintenance procedures to minimize the occurrence of certain faults. The manager can also prioritize budget dollars and focus the purchase of new equipment toward improving overall network reliability.

Three different job functions, geographically separated, each requiring different types of information—that's an example of a domain management system providing virtual presence.

Summary

As cable providers deploy the infrastructure of status and performance monitoring systems, new and powerful network data is becoming available. The HFC domain manager is playing a crucial role in gathering, filtering, correlating and distributing this data, and cable operators are re-evaluating their business and network maintenance practices to fully leverage the new information. Properly deployed network monitoring systems are creating a virtual presence where the new-found information is immediately routed to the people who need it in the format best suited to their tasks.

With this virtual presence in place, HFC networks are reaching enhanced levels of reliability—just in time to support new and exciting revenue-generating services. **CED**

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Digging deeper into network management

What's a MIB—and who cares?

By Leslie Ellis

MIBs. That's the new catch-phrase floating around engineering circles, and it doesn't have anything to do with "Conehead" parlance of years past. ("Mebz," for non-"Saturday Night Live" viewers, was a common phrase used by the alien family to express disappointment.)

As recently as three years ago, engineers were starting to use the "SNMP" (simple network management protocol) acronym as part of their lexicon to describe technologies they needed. SNMP, simply put, is a binary language spoken by network components, like headend gear and distribution electronics, and used to report status.

These days, and at the recent Cable-Tec Expo in Orlando, engineers freely add "MIBs," or management information bases, to those conversations. Loosely put, MIBs represent the "words" in the SNMP language.

A key to network management

What's it all about? According to panelists and attendees of the Expo, it's all about solid network management. Long the first item whacked from capital budgets, network management is quickly becoming a more valued necessity because it intercepts problems before customers see them, and it drives defects out of the broadband plant, which saves money over the long haul.

But, increasing the value of broadband plant from hauling video to supporting two-way digital communications will require a significantly more rigorous focus, engineers say.

"These days, people are worried about getting this (digital equipment) in place—but after that, we'll have to worry about how to manage it," said Yvette Gordon, director of interactive technologies for Time Warner Cable's Full Service Network, speaking at the Expo last month. "MIBs and SNMP are important, because if (a network component)

isn't monitored and it fails, we're not going to catch it," explains Gordon.

Many of today's components do support SNMP, but some engineers complain that the MIB information is too plentiful and not wholly useful.

"There's a tonnage of information in the MIBs, particularly as it relates to cable modems, but it takes a lot of sifting to find the most valuable performance parameters," notes Tom

we seem to be at a point where the amount of MIB data related to the HFC network is very much lacking, and it varies from modem vendor to modem vendor," agrees Jamie Howard, director of cable networks for @Home Network.

Staniec described one case where a cable modem (he wouldn't say which manufacturer) spat out about 21 different MIB variables related to HFC plant conditions. Staniec asked the vendor which were the most important for locating HFC plant problems, and was told to study the total number of packets transmitted, the total packets in error and the total number of retransmitted packets.

"Clearly, it's going to take time for us to learn, through experience, which of those values we need," says Cox's Rolls. "There are a lot, I can assure you, that are of little use."

"The point here is to be able to develop a cause-and-effect relationship for troubleshooting," Staniec says. "A lot of work still needs to be done."

CableLabs is one organization that is spearheading an effort to make sure the MIBs of varying vendors' gear talk together. Last month, CableLabs hosted an event at its Louisville, Colo. headquarters to hammer out the physical parameters of standardized "transponders" that will be slipped into future distribution actives to monitor for problems.

Broadband network operators familiar with digital deployments say that kind of momentum can't happen soon enough.

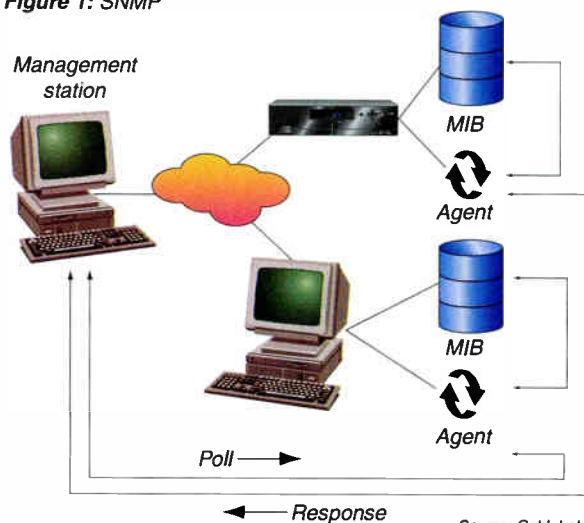
"Digital services are not a case of perpetual motion—you can't just plug them in and walk away," says Van Macatee, director of advanced network management for TCI and another Expo panelist. "These things must be managed, and in new ways."

Macatee describes historical network management systems as situations where operators followed the "largest fire," instead of taking a pro-active, preventive approach. And, he says, as operators add digital technologies into their networks, they'll simultaneously be front-loaded with more statistical data than ever before.

"Count on the fact that you'll suddenly be faced with a wealth of data, and then plan on using it daily and weekly," Macatee says of the different network management reports based on hardware and software status information. "Use it all. Find a way to use it all," he adds.

Macatee says that overall, network managers need to recognize that there will be failures, and work to minimize them. "The goal should be to be able to restore services as quickly as possible," he notes. **CED**

Figure 1: SNMP



Staniec, vice president of network technologies for Time Warner's Road Runner service.

Ditto for Jay Rolls, director of multimedia at Cox Communications. "The (cable) modems are pretty powerful in that they're fully network manageable, and there's a plethora of MIB variables and parameters—but there are no systems provided by the vendors for really understanding the values that you may call, or to group them or make any sense out of them," says Rolls.

Simply put, it's a case of too much information that's not readily organized, engineers say. "Yes, we do have a lot of MIB data that is available—however, in our assessment of the MIBs,

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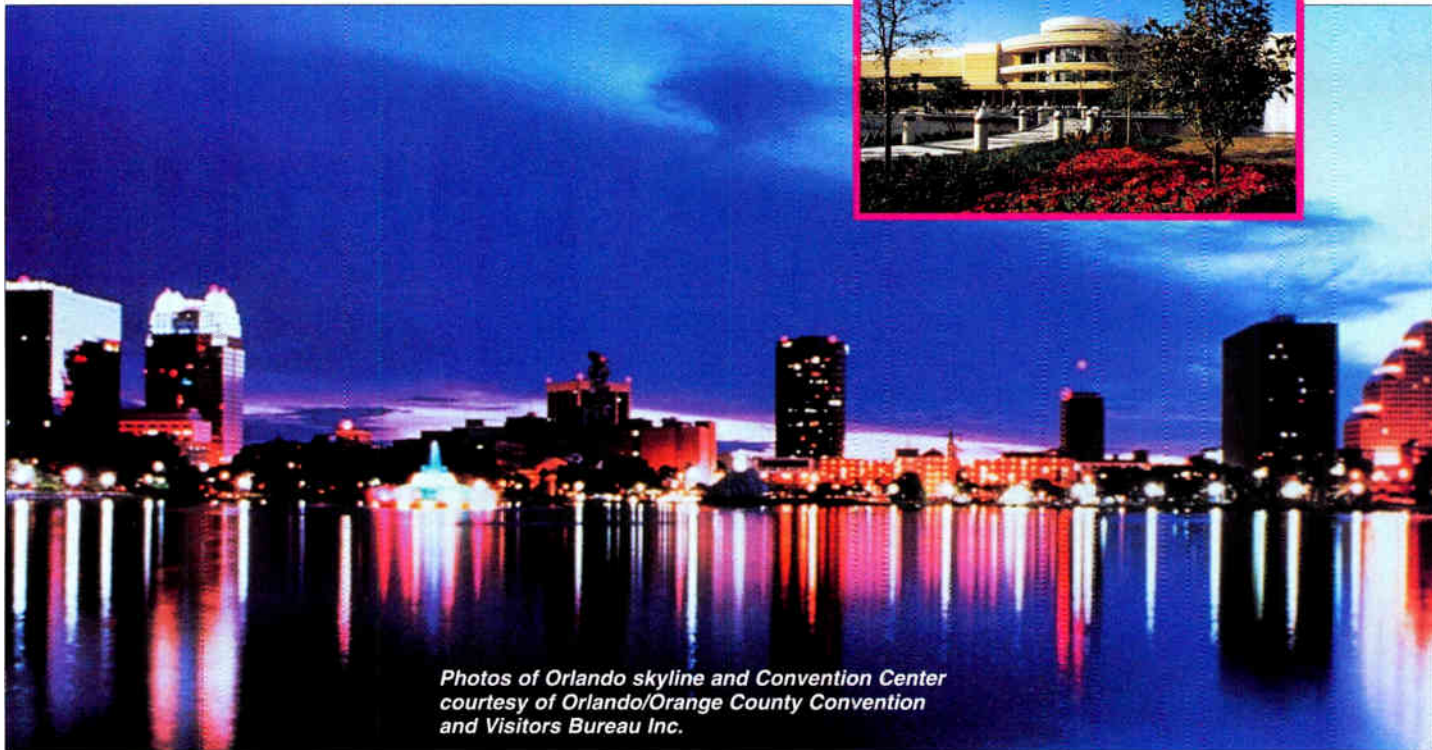
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Modems, test gear, return path hot at Expo

SCTE gathering attracts thousands

By CED staff

What this year's SCTE Cable-Tec Expo may have lacked in new whiz-bang announcements was more than made up by a buoyant, optimistic sense that the cable industry is preparing itself for entry into a long, competitive battle to provide consumers with a dazzling array of new services.

Cable modem news again dominated this show, attended by 8,200 cable operators and exhibitors who flocked to Orlando, Fla. Vendors including U.S. Robotics, 3Com Inc. and Terayon Corp. targeted trial and product news to the attendees in Orlando. Meanwhile, roughly 800 miles and a time zone away, other vendors spouted their data news at the SuperComm Show in New Orleans. Hayes Microcomputer Products started that push, with word that it has sold 10,000 of its cable

modems since they became available in May. The vendor would not say who had purchased the products.

Cable-Tec's annual Engineering Conference also weighed-in heavily on the data side. "High-speed data services appear to be the major potential for the future of our business, so the focus on preparing for digital deployments like cable modems is a major theme this year," said Bill Riker, president of the SCTE.

Other hot topics this year included advanced test equipment for troubleshooting the new services that run on RF plant, and return path solutions.

Modem news

Terayon Corp., which has just completed field tests of its cable modems over an all-coaxial cable system in Urawa, Japan, says that results of that trial demonstrate its modem's

ability to deliver reliable data over systems with severe upstream noise interference.

Zaki Rakib, CEO of Terayon, said during a briefing at the Expo that the tests should come as good news to operators wondering how to deal with the troublesome 5-40 MHz upstream path.

The company's modems were tested over three large coaxial systems serving up to 25,000 homes, and then, over a large, aggregated cable network serving more than 62,000 homes. The tests were made at the particularly crummy 15 MHz center frequency—an upstream region with significant interference from impulse noise, narrowband and wideband interference from a variety of sources.

Terayon's cable modem access system is based on S-CDMA (Synchronous-Code Division Multiple Access) technology.

Meanwhile, ISC Datacom Inc. has delivered the first 75 of 245 PTM-19a, low-speed, frequency agile data modems that were ordered by the city of Fort Worth, Texas for traffic control. The modems, which run at 19.2 kilobits per second and use CPFSK modulation, will be placed at various intersections around the city to provide communication links between the transportation engineer's office and the computers that control the traffic signals.

This allows the city to poll intersections for traffic light status and change requests. It also allows light timing patterns to be downloaded

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Blonder Tongue's VideoMask™ Interdiction System is the complete program security solution for today's cable market. The Multiple Dwelling Interdiction Unit (MDIU) is a new member of the VideoMask™ family and is ideal for MDU installations. The MDIU is available in 8, 12, and 16 port configurations and is housed in a rugged, outdoor, steel enclosure. Each MDIU consists of one or more 4-port subscriber groups mounted in an RFI-tight steel inner enclosure. An outer steel enclosure provides excellent protection for outdoor installations, while an integrated lock prevents tampering with the interdiction components.

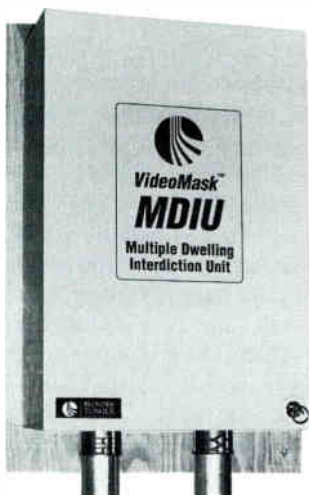
The MDIU is suitable for wall mounting and includes a backing plate with locating studs for quick installation. A removable bottom panel provides easy access to the entry/exit connections and subscriber drops. Ample room

Available in 8, 12, and 16 port configurations

is provided for installing a directional coupler for those system designs requiring cascaded . MDIU's. This work space can also accommodate the installation of L-band components for those systems providing both analog (50-750 MHz) and digital (950-2150 MHz) programming. Blonder Tongue also manufactures these L-band components - please contact our Sales/Marketing Departments for more information.

Blonder Tongue's VideoMask™ Interdiction Unit (VMIU), which serves 4 subscribers from a die cast housing, is also suitable for pedestal based MDU installations. Blonder Tongue has recently begun offering several pedestal mounting kits, including Channell (SPH1320, SPH1212, SPH1010) and Reltec (TV1024) models. These bracket kits allow up to 4 VMIU's (a total of 16 ports) to be mounted in one pedestal, with plenty of room for entry/exit connections and subscriber drop cables. Both the MDIU and VMIU

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over the cable system, instead of programming the hardware at the intersection.

In other news, ISC Datacom officials said they are currently developing a new modem for use in the automatic meter-reading industry. These modems, which would allow utilities to access power meters remotely, offer time-of-day billing options, load management and more, are projected to cost less than \$100 each.

On the international front, TV Cable Ecuador, the largest cable operator in that country, will use telco-return cable modems and associated network equipment made by General Instrument Corp. for its high-speed data launch in Guayaquil and Quito. TV Cable Ecuador's network passes 100,000 homes in those two cities. Already, 100 modems are installed and operating there, according to officials.

Jorge Schwartz, executive vice president of TV Cable Ecuador, said in a statement that he likes the way the modems have performed so far. "The initial installation went very smoothly, especially considering that we were inaugurating a brand new technology," he said. TV Cable Ecuador plans to first offer the service to residences, then expand to schools and universities.

Charter Communications and Insight Communications will test cable modems made by U.S. Robotics Inc., the vendor said. Charter will test an undisclosed number of the telco-return modems in its St. Louis system, where it serves 200,000 customers. Insight will test the modems in its suburban Indianapolis system, where it serves about 30,000 cable customers.

InterMedia Partners Inc. will kick off high-speed data services in its metro Nashville system, using gear made by Motorola Inc. Ken Wright, chief technical officer for InterMedia, said that headend installations were scheduled to start last month, followed by the installation of the @Home Networks Inc. regional data gear.

InterMedia's modems were scheduled to be installed into "alpha" homes the week of June 26, according to Wright. He also said that commercial deployments will begin in September, with follow-on launches in adjacent counties occurring throughout the year. "By the end of '98, we plan to have the service in front of about 400,000 homes passed," Wright said.

On the software side, CableLabs and Netcom Systems Inc., a Chatsworth, Calif. maker of equipment for testing high-speed data gear, said they've worked together to commercialize a test software package that assists modem suppliers, other laboratories and system operators to test and evaluate the performance levels of cable modems.

CableLabs researchers worked with Netcom to emulate the data traffic generated by real-world cable modem systems using Netcom's "SmartBits" test system. Last year, Labs researchers used the SmartBits test system to generate and analyze traffic for up to 80 users in a single piece of test equipment.

What was missing was software to make the system simulate the data traffic generated by real-world cable modem systems, said Bob Cruickshank, director of data applications for CableLabs. His group then collaborated on software, which CableLabs calls its "cable modem traffic tester." CableLabs then encouraged Netcom, which had created software simulating other types of high-speed data traffic, to develop a commercial version

Powering for reliability

When it comes to real-life powering, Mark Alrutz, director of technical services, CommScope, has some key points to make.

- ✓Realize that multiple return paths exist in the powering of coaxial plant.

- ✓Return resistance is NOT equal to the coaxial shield resistance; it is LOWER.

- ✓As resistance drops, voltage drops are lower, and current draw is reduced.

- ✓Keep craftsmanship and quality as the main focus in your powering efforts.

The hands-on experience of Steve DuChene from Time Warner Communications' Tampa Bay Division in deploying 90-volt powering was extremely valuable as well.

- ✓We need to start thinking in terms of power, not voltage. Why?

- ✓You will likely need more power to operate a given mile of two-way, 750 MHz plant than one-way, 450 or 550 MHz plant.

- ✓Due to the lower voltage losses in a 90-volt plant, you tend to run out of power (current) before you run out of voltage. In fact, it turns out you end up getting about 40 to 50 percent more reach using 90 volts.

- ✓Some of the major issues Time Warner faced with the 90-volt deployment included: amplifier RF pins—early modules had high failure rates; they now remove the fuse shunts from the module when it is changed and then return them in the replacement amplifier when it is in the housing.

- ✓He recommends that if you plan on feeding more than 2,500 watts from one power location, you will likely want to consider a change to 240 volts for the input to the unit. Also, you

will need a high-quality 240 volt power generator with good frequency regulation for long power outages.

- ✓Surge protection, while improving, is still a problem. DuChene notes that there haven't been many improvements when clamps are used in amplifiers. DuChene has used shunts in place of fuses in passives and amplifiers to prevent nuisance outages. However, when they short, they can take down an entire node. Recommends a minimum 230 peak voltage trigger point for silicon-based clamps operating at 90 volts.

David Johnson, director of engineering design, Cox Communications Inc., took seminar attendees through powering design considerations.

- ✓Central 90-volt powering with generator backup is considered the most reliable and costly scheme available today. That means it's imperative to maximize efficiencies and resources as much as possible.

- ✓How? Crossing of node boundaries with express power cable to power portions of an adjacent node from one supply.

- ✓Optimal load balancing among modules and/or express power feeds may dictate placement of the central power supply somewhere other than right at the node.

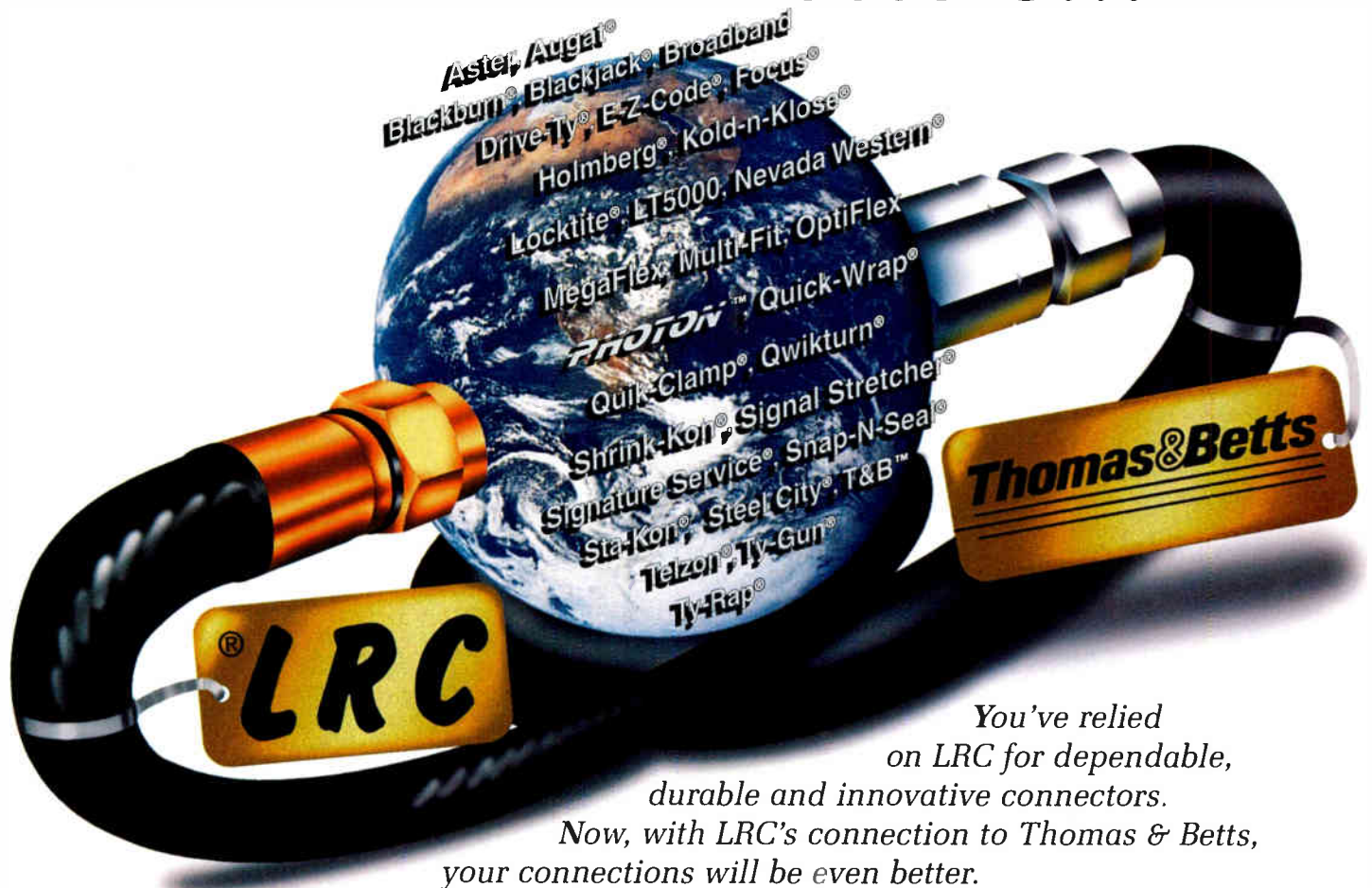
- ✓Use of higher wattage modules when they will eliminate other modules in the supply.

- ✓Where central powering is impossible in the short-term, placing distributed 90-volt modules in existing 60-volt locations is an option.

- ✓Use of a robust network powering software program is imperative in providing thorough load and analysis testing for telephony-ready networks.

—Michael Lafferty

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of that software.

Speaking of software, 3Com Corporation has developed a new software application designed for cable service providers. The 3Com Cable Ethernet Installation Software allows operators to quickly set up the subscriber equipment for their customers. It is included at no charge with a new 3Com Cable Modem Bundle, which consists of one EtherLink III network interface card (NIC), one 3Com Cable Modem and the new installation software. The software, which runs on Windows 95, was specifically developed to ease cable modem and NIC installation by integrating many of the installation steps under one application. It also addresses the most common installation problems before they occur.

MediaOne has expanded availability of its MediaOne Express high-speed Internet service in southeast Florida—the service is now available to 400,000 homes in the MediaOne Express Broward and Dade County service areas. The service uses Surfboard cable modems from General Instrument's NextLevel Satellite Data Networks Group.

And Broadband Networks Inc. introduced a new family of RF and optical T-1 products at Expo. The new line was specifically designed for cable operators who want to generate additional revenue from new services like Internet access and voice.

The RF product is frequency agile over 10 channels. It can be used to eliminate long-distance telephone charges when providing Internet access by allowing cable operators to use their broadband plant to collect inbound service from local modem banks.

The T-1 family also includes 1310 and 1550 nm optical products that provide bidirectional T-1 service over a single fiber strand, instead of two fibers.

Headend equipment

Myriad announcements about new headend gear came out of Expo, with an emphasis on more efficient and space-saving products.

New from Scientific-Atlanta Inc. are modules that promise to shave headend space restrictions. As part of its "Continuum" headend system, the new modules are designed for plug-and-play capabilities, frequency agility, compact design packaging and high-quality audio, company executives said. The new modulator and upconverter modules are scheduled to start shipping this summer, with the stereo encoder planned for the fall.

The new components address a continuing problem in the broadband industry: Headend space restrictions. By reducing rack space



Scientific-Atlanta's Continuum

requirements by up to 50 percent, operators can install equipment needed to support new services such as digital video and high-speed data without having to worry about running out of headend space, S-A executives said.

"To compete effectively in the market today, operators are implementing a variety of new headend interconnect system architectures, such as source and hub and ring interconnects, to provide redundancy and reduce staffing requirements at each plant site," said Peter van der Gracht, vice president and general manager of S-A's headend systems division. Quality RF Services is now offering cable TV RF return path signal isolation for the headend. The new QISO/R75-32 is a 5.25-inch by 19-inch, rack-mount chassis containing eight independent, four-output, 50 dB isolation amplifiers with 5 MHz to 75 MHz passband. The loop-through inputs of the unity gain amplifiers allow additional isolated outputs from a single source. Each output has better than -20 dB return loss needed for digital signal distribution in the headend return path processing environment.

Meanwhile, WaveCom Electronics Inc. showcased its DQM3010 Dual QAM Modulator. The product includes two independent QAM modulators with frequency agile upconverters in a 1-unit high chassis. VHF and UHF versions cover an output frequency range from 55-850 MHz. The unit comes with a front-panel LCD display, remote control with RS-232 or RS-485 serial interface and has fully synthesized tuning for drift-free operation with frequency accuracy of 1 kHz. Each modulator may be independently set for output frequency and output level. In addition, bit rate, modulation order, excess bandwidth and error correction coding can be factory-set to customer requirements. The unit is compatible with DVB, DAVIC and Digicipher II standards and includes all-digital modulators.

WaveCom has also announced a new frequency agile upconverter for cable, MMDS and LMDS applications. The UC3010 is comprised of 10 independent, frequency agile upconverters and a common power supply. A single card covers a frequency band from 50 to 850 MHz and maintains a phase noise specification which exceeds the requirement of 64 QAM, according to the company. High-level

mixing, a microwave frequency IF and multiple levels of filtering achieve low out-of-band performance and low spurious emissions over the 45 to 900 MHz band. In addition, the card chassis can contain from one to 10 independent agile upconverters in a 3U rack mount.

Mega Hertz/Spectrum introduced "Casablanca," its new non-linear editing system. The system has been designed to economically deliver the power, functionality and capability of a high-end professional non-linear system.

Mega Hertz/Spectrum displayed a new product from Magic Box, the Alphagen Plus Character Generator with Image Capture. The character generator offers the features of the Alphagen Plus, and adds a built-in hard drive for storage of user-supplied backgrounds.

And Mega Hertz/Spectrum announced a new product from Magic Box—the Photogen Photo Advertising system. Photogen gives the user the tools to create local ads without "computer-based limitations," according to information released by Mega Hertz/Spectrum. The system utilizes user-friendly menu driven software, automatic ad/layout templates, and a library of thousands of backgrounds and pieces of clip art. The user also has the flexibility of colorization, rotating, scaling and animation. Photogen also offers optional digital audio, paint programs, billing, scheduling, reports, video switching, weather display and remote communication.

Iris Technologies Inc. used Expo to show operators how they can solve the headend wiring conundrum, with its "Video Commander" routing system.

Meanwhile, Barco announced the availability of its new multistandard TV and sound demodulator (Marco Polo) and its Vivaldi II Multi Image Display System.

The Marco Polo hyperband tuner covers the entire frequency range from 45 MHz up to 860 MHz, which allows demodulation of TV signals, including BG, DK, L, I and MN. It also accepts mono sound, IRT stereo, BTSC and NICAM stereo. A user-friendly menu guides users through a selection of 128 present programs. Specific channels and frequencies may also be selected using front panel switches.

Barco's Vivaldi II Multi Image Display System can transform any multi-sync VGA monitor into a four-channel video display system for broadcast applications. The Vivaldi system accepts both analog and digital inputs and allows for full-screen enlargement of any four displayed pictures, freeze frame and on-screen white reference for accurate color evaluation. The 19-inch, rack-mountable Vivaldi unit also provides typical broadcast features

Congratulations

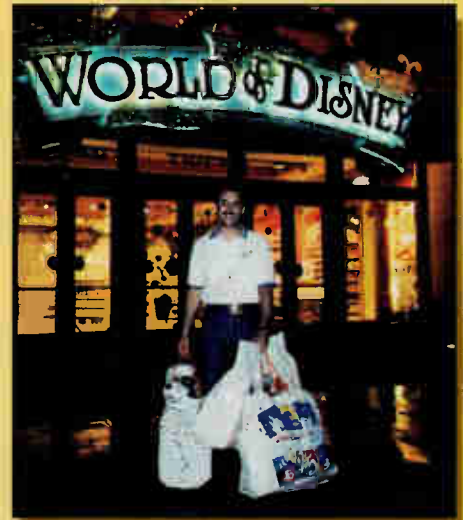
David Johnson, Cox Communications

Grand Prize Winner

of CED Magazine's 1997 SCTE Cable-Tec Expo Reader Appreciation Giveaway



The CED staff scrambles to keep up with the demand for shirts by SCTE readers. Over 800 CED/SCTE Cable-Tec Expo commemorative golf shirts are awarded to Expo attendees in just 20 minutes.



David Johnson, Director of Engineering Design for Cox Communications, Inc. in Atlanta proudly shows the fruits of his Grand Prize \$1,000 shopping spree at the "World of Disney" store.

Congratulations to all of the CED Reader Appreciation Giveaway prize winners.

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Lin Sherer, S.L.M. Telecom Engineering
Rick Weiss, Media One
Gary Phillips, Time Warner Communications
Mark Alrutz, Commscope
Johnny Olinde, Star Cable
Jay Smith, TCI/TKR Cable of Southern Kentucky
Jeffrey Davis, Jones Communications
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Nevin Seeley, Fundy Cable Ltd.
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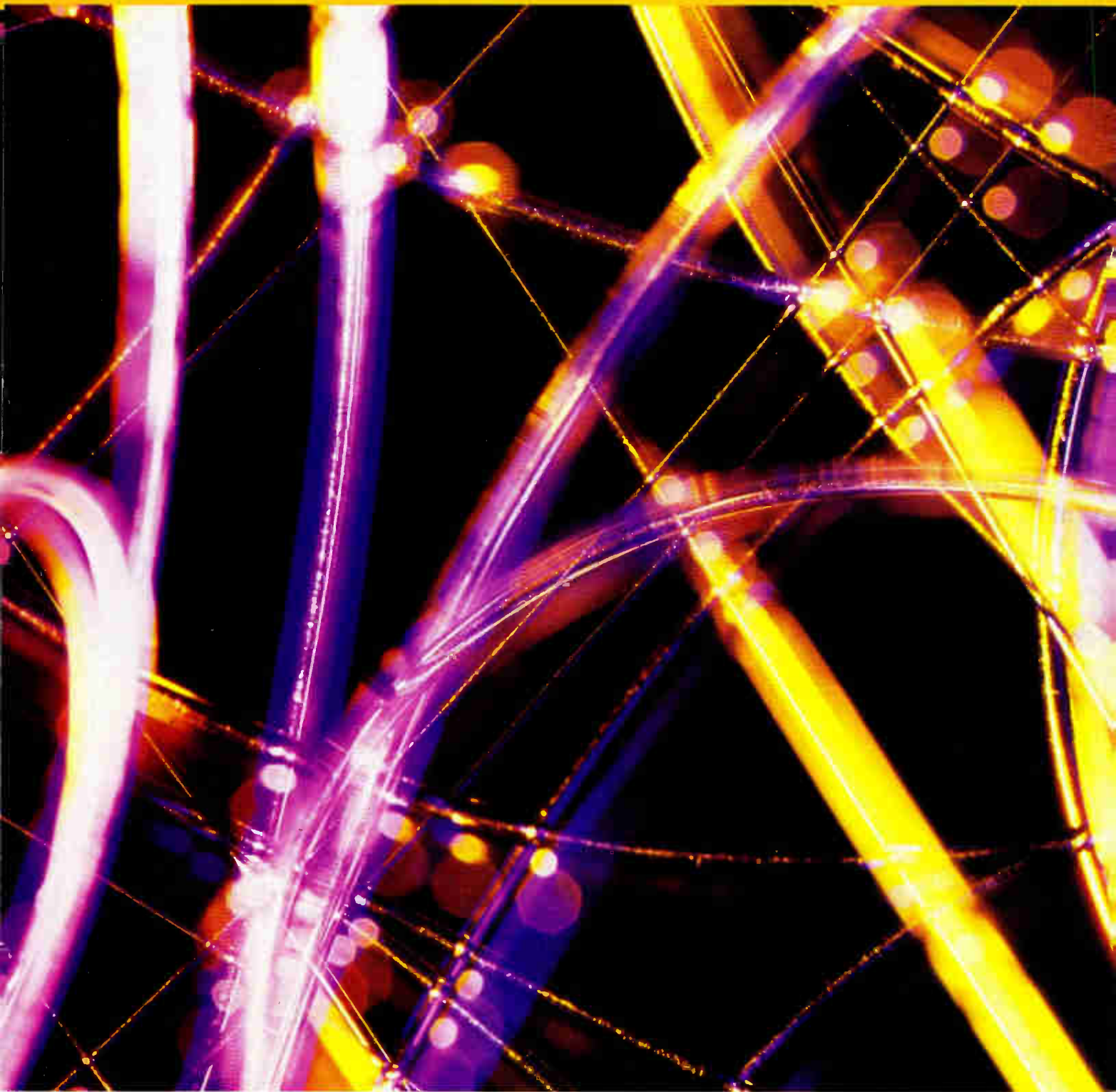
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NII Norsat International Inc. has introduced its new line of agile channel processor modules and a new series of television modulators. The CP 61/62 line of agile channel processor modules, when installed in the housing, accepts any television channel input from 5 MHz to 880 MHz and provides a modulated channel output.

The CP 61 has an agile frequency output range of 30 to 600 MHz, while the CP 62's range falls between 300 to 800 MHz. A key feature of the product line is its ability to demodulate T channels which are used in reverse path transmissions. The modules support NTSC, PAL and SECAM formats for various installations, including cable TV and private broadcast networks.

Norsat's VM 61/62/63 series of TV modulators and channel processors has a tumble range of 5 to 800 MHz and supports adjacent channel operation. The series also features an intuitive Windows-based graphical user interface option which allows for local or remote control over all of the system's operating parameters. The modulators are agile, compatible with NTSC, PAL and SECAM formats.

NII Norsat International has also announced the availability of two remote control options (RS-232) for the company's multi-standard private cable headend system.

Both options, the RC60 and the RC62, offer Windows-based graphical user interfaces (GUIs) that provide automated control over all cable headend functions, including: operating frequencies (ranging from 5 MHz to 800 MHz), A/B input source switching, audio and video modulation levels, and carrier and sub-carrier power levels.

The company has also announced that its 9000 series Ka-band, low-noise block down-converters are now available in prototype quantities.

Standard Communications Corp. went online at Expo, with its Web site up and running for show attendees' perusal. The company featured its new DSVR digital receiver series and its Stratum modulation system, with software able to be viewed on a 31-inch monitor.

General Instrument's NextLevel Broadband Networks Group announced that it is now offering a suite of pre-packaged headend equipment options for digital headend systems. The pre-packaged equipment is designed to reduce system upgrade complexity by performing a number of pre-deployment tests prior to shipment. The tests provide system-

level performance verification, and the factory staging area duplicates the signal environment, including signal levels, format and cable-runs. Currently, four configurations are available: three 6-MHz digital multiplex channels; six 6-MHz channels; six 6-MHz channels plus a suite of test equipment; and 12 6-MHz channels.

The R.L. Drake Company announced its VM1550 modulator is now available in T-channel configuration. The fixed-channel modulator, which safeguards against unwanted tampering and accidental setting changes, now provides a modulated visual and aural RF carrier output on any T-channel 7 through 11.

Drake's VM1550 modulator has been designed to accept video and audio baseband

signals from a satellite receiver, TV camera, video tape recorder, TV demodulator or similar equipment. In addition, the IF loop-thru capability of the modulator provides a padded IF output prior to channel conversion, allowing replacement of the standard internally-generated IF output with an alternate source of composite IF or insertion of IF scrambling equipment.

The unit also features several other audio/video features, including a 4.5 MHz audio carrier input for BTSC input. A heterodyne conversion system, in conjunction with the use of a SAW filter, provides vestigial side-band selectivity for adjacent channel headends.

WaveCom Electronics Inc. has introduced its RA2020 frequency agile cable TV modula-

Surge suppression, fusing and "slugging"

With an increasing demand for 99.99 percent reliability, John Downey, senior field engineer, C-COR Electronics Inc., reports the use of surge suppression and special fusing schemes for system reliability is growing.

✓It's essential to assure a well-bonded (i.e., attaching to another company's neutral line) and grounded (i.e., using your own separate ground rod) system.

✓According to the National Electric Safety Code, the cable system should be bonded at a minimum of four connections per mile, and at pole crossings. However, never bond at a pole where a power utility arc suppressor is installed.

✓Another industry practice, and an NESC rule, states that a separate vertical ground should be used on every active, main line power supply, first, tenth and last pole.

✓Most amplifiers will use a 3AG, 313, main fuse to eliminate certain current spikes which occur as a result of surge protection module (SPM) firing. 3AG is the physical dimensions and automative glass case. 313 is a dual spiral-wound filament which signifies a slow-blow fuse.

✓Temperature variations will sometimes "blow" fuses at a certain percentage of their rated capability. Spiral-wound fuses are more stable

with temperature than other types of slow-blow fuses.

✓Optimum transient protection would involve inserting surge suppression devices in every active. But, it's very costly.

✓An optional plan might include maintaining a fusible link between the main line power supply and the actives in a system.

✓Downey suggests placing a fuse in the power insertor (one for each direction power will travel) or in the first amplifier to see AC voltage.

✓If you have additional surge suppression devices allocated to each branch, proceed by placing one device in the last trunk/bridger amplifier in cascade.

✓Do not place a surge suppression device in the main fuse location.

✓Place buss bars (slugs) in the trunk-in/trunk-out ports of all trunk amplifiers in cascade.

✓The best place to insert a surge suppression device in a trunk/bridger amplifier is in any of the "slugged" ports.

✓It is recommended to use fuses or circuit breakers in the active distribution ports. If those ports are "slugged," a serious fault on that feeder leg could take down the entire cascade by "blowing" the fusible link.

—ML

tor and its Stacker/Destacker. The RA2020 accepts audio/video baseband inputs and provides a modulated visual and aural carrier on any NTSC or PAL channel in the 45 to 550 MHz and 550 to 850 MHz ranges. The modulator is comprised of up to 12 independent agile modulator cards with a common power source in a 3U chassis.

The WaveCom Stacker/Destacker is designed to stack up to 10 reverse blocks (5 to 45 MHz) on top of each other, starting at 80 MHz. The 10 stacked blocks would then be combined with a narrowband SCADA channel to form a frequency spectrum from 5 to 750 MHz. Each Stacker would be agile to any stacking block, thus eliminating the need for fixed custom frequency Stackers. The Destacker receives the 5 to 750 MHz frequency spectrum and converts the desired block down to the original 5 to 45 MHz reverse block spectrum.

Aska Communication Corp. announced a number of new products at Expo, including a digital audio/video modulator; 1 GHz, one-sided horizontal ports splitters, designed to have input and output ports on one side of the housing; weatherproof quality connectors, which use a silicone gel that forms around the crimped area for complete protection; and a 1 GHz grounding block, 1 GHz splice and 1 GHz terminator.

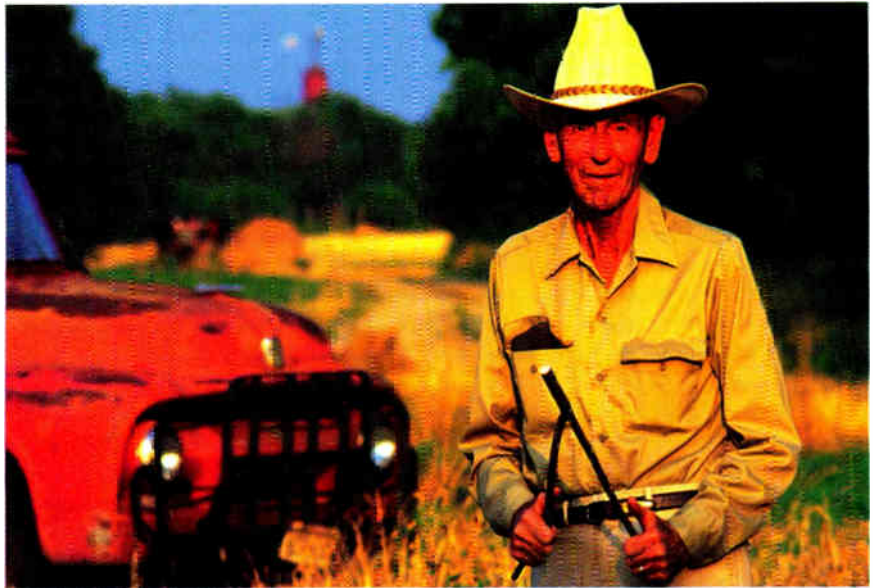
And Viewsonics Inc. introduced its new return path, 48-way, multi-port isolator. The rack-mount device provides needed gain and port-to-port isolation for the deployment of new return services.

Philips Broadband Networks showcased its Crystal Exchange headend system, a modular platform that allows broadband operators to install the appropriate plug-in boards into the digital switch interface (DSI) and RF interface headend modem shelves (HEM), adding boards as subscriber demand for telephony and data services increases.

Belden is now offering composite cable designed to solve many of the difficulties associated with headend installations. The construction includes a coaxial Series 59 Duobond Plus tri-shield to which two separate audio cables are bonded. The cables each contain two 22 AWG shielded copper conductors. With this design, one cable can serve needs typically requiring three separate cables.

Meanwhile, the Broadband Communications Division of ADC Telecommunications Inc. announced the extension of its 1550 nm Homeworx transmission system to include models for single fiber distribution and dual fiber supertrunking.

The company also introduced new encoders



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Cable Leakage Technologies has been in the RF leakage detection business for over 6 years and Wavetrackers have patrolled millions of miles of cable all over the world. Wavetracker boasts positive identification, 2-5 meter accuracy and one step prioritization. And all of that because CLT invented the original Wavetracker...it's that simple.

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and decoders for transporting a modulated intermediate frequency carrier with an approximate bandwidth of 7 MHz. The encoders and decoders provide an interface with the company's DV6000 and DV6010 digital transport systems for the transmission of IF signals in PAL B/G format.

And, ADC's new HX6213 Dual Path Receiver adds to the upstream capability of the Homeworx AM Transport System. With the HX6213RX, system operators can add two-way transmission capability for video and data applications including telephony, data services, Internet access and video-on-demand.

Fiber optics

ADC Telecommunications introduced a new forward path receiver that extends performance to 860 MHz for cable TV and telephony applications. Featuring a +35 dBmV RF output, the receiver is capable of receiving 1310 or 1550 nm forward path optical signals within a hub or office environment, and outputs up to 112 NTSC video carriers at 35 dBmV.

The company's Broadband

Communications Division also introduced a family of return path transmitters for use with the company's ISX optical distribution nodes. The transmitters provide bi-directional broadband services to cable TV systems for delivery to communities and businesses.

The ISX2 return transmitter is designed for networks with small subscriber counts that require a low volume of two-way or only one-way services, and the ISX3 family of return path transmitters offers 5-300 bandwidth capabilities and a 1 mW optical output for the delivery of enhanced telephony, integrated digital services, full bandwidth data or multiple video channels.

The division also announced an increase in CNR optical performance to 55 dB for its 750 MHz 1310 nm transmission platform. Operators upgrading systems can use the 1310 nm platform's increased performance to add to their distribution network, or to the transmission length of existing cable, says the company.

Quality RF Services introduced the QRCIA multiple isolation amplifier for laser transmitters. The amplifier offers 60 dB combining

isolation for narrowcasting of video, telephone or RF modem signals coupled directly to individual laser inputs. The 3.5-inch by 19-inch rack-mount chassis contains five independent hybrid amplifiers. Bandwidths offered are 550, 50 and 860 MHz.

And Siecor Corp. featured its ALTOS cables—a new line of loose tube optical fiber cables for outside plant telecommunications applications—at Expo. The cables include water-blocking technology and new materials that make them easy to install and access.

The cables incorporate a combination of water-swellable tapes and yarns, rather than flooding compounds, to prevent water penetration.

The company also featured its OptiFit assembly, designed to connect the Optical Network Unit (ONU) to the optical drop cable. The patented design allows the user to configure the system with pre-connectorized cables dropped at the node location.

Finally, Siecor featured its new X77 fusion splicer, which combines the splicing features of the M90 fusion splicer in a unit the size of the company's X75 micro fusion splicer.

DiCon Fiberoptics has introduced an Add/Drop WDM cassette. The standard package combines two, three-port filter WDMs in a pigtailed version for board mounting or a front panel connectorized version for shelf installation.

General Instrument Corp.'s NextLevel Broadband Networks Group announced two new upstream optical transmitter modules for the NL StarGate 2000 Telecommunications Optical Node Platform at the Expo.



DiCon Fiberoptics' Add/Drop WDM cassette

The NL StarGate 2000 platform offers two different upstream optical transmitters, models SG2-IFPT/* and SG2-DFBT/*, to provide thermal stability, advanced management capabilities and plug-and-play operation. The transmitters enable operators to offer advanced applications like telephony, high-speed data applications and video-on-demand.

"The NL StarGate 2000 transmitter family offers broadband operators split-band or redundant functionality to address the effective use of the available return bandwidth," said Pat Harkins, senior product manager of Cableoptics Nodes for NextLevel's Transmission Network Systems business, in a statement.

The SG2-IFPT/* transmitter is equipped

Broadband RF Modem

Model ACM-200 Asynchronous Cable Modem is designed to operate at any data rate up to 19.2 Kbps, protocol transparent. This modem meets NEMA traffic control temperature requirements and is well-suited to many data applications. FSK modulation provides reliable data transfer under severe noise conditions. Call today for information!

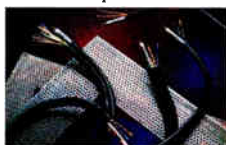
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with an isolated Fabry-Perot laser with an optical output power of 400 μ W. The SG2-DFBT/* transmitter uses an uncooled distributed feedback laser operating at 1 mW for improved link performance. Both transmitters offer automatic power control, an integrated RF amplifier, thermal slope efficiency compensation, a module fault indicator, integrated optical and RF connectors and status monitoring capability. In addition, the transmitters accommodate a full 35 MHz of digital data, or up to two video channels.

C.I.S. Inc. has developed a fiber engineering calculations software module which calculates fiber loss budgets and generates a sheath bill of materials indicating aerial, underground, sag, slack and total route. The product operates on the Windows NT platform with FOCUS fiber modules.

Belden Wire & Cable Co. displayed its new central tube fiber trunk cables at Expo. Available in both armored and all-dielectric configurations, the new cables range from 4 to 216 fibers. As such, they can serve both the last optical link, as well as the loop distribution markets.



Belden cables

In a related announcement, the company also said it will increase the utilization of composite plastic reels for its coaxial products. The reels, made of recycled materials, are reusable, regrindable and more economical than traditional wooden reels. In addition, the recyclable reels offer substantial stacking stability for safer and more reliable storage and transport.

Fitel/Lucent Technologies introduced two new loose tube fiber optic cables, as well as a loose tube cable breakout kit and a splicer's tool kit. Fitel/Lucent's cable TV market product—single-jacket all-dielectric loose tube cable—is the first of the company's cable designs to be made available with "DryBlock" water-blocking technology. The technology achieves water-blocking performance through the use of super-absorbent polymers.

Its dual-purpose outdoor/indoor loose tube fiber optic cable, called Option1, enables direct transfer from outside plant to indoor riser applications. The cable qualifies as a riser-rated, low-smoke/zero halogen cable and features lightweight, jelly-free, DryBlock technology.

Fitel/Lucent's Breakout Kit features 24-inch, color-coded 900 μ m tubing to facilitate quick and reliable field connectorization. Six- and 12-fiber kits are available. The company's Splicer's Tool Kit provides all the necessary

tools needed to prepare loose tube cable for mid-span entry, splicing and testing.

Amphenol Fiber Optic Products has introduced its new 948 Series Fiber Management System. The system offering includes a variety of enclosures for patching, splicing, distributing and coupling fiber optic signals for both singlemode and multimode cables. The panels are preloaded with applicable components, including adaptors, splice trays, couplers and cable assemblies, to reduce labor costs during field installations. A full line of accessories is also available, including racks and inner bay units.

Norscan said that it's now offering CableView, an object-oriented, GUI (graphical user interface) outside plant database and preventive maintenance system. The system provides a complete database of all fiber optic cable outside plant records and displays those records as either a schematic or an overlay onto a map.

Advanced Custom Applications Inc. chose Expo as a forum to introduce the MASSsleeve, a mechanical fusion splice protection cover which requires no heating, curing, gluing, taping or crimping. It snaps onto the fused fibers after the fusion process, eliminating the requirement to pre-thread the sleeve or to heat shrink it. One of the covers accepts any ribbon or mass fiber counts, including 2, 4, 6, 8, 10 or 12 fibers.

Alcoa-Fujikura has exclusive distribution rights into all new markets for the MASSsleeve, extending from cable TV to telephony.

Methode Electronics Inc. has introduced the Universal Polishing Disk, which accommodates the polishing of any fiber optic connector built around a standard 2.5 mm cylindrical alignment ferrule. The universal disk can handle up to four ST, SC or FC connectors simultaneously, or one duplex SC or FDDI at a time.

Integrated Photonic Technology (IPITEK) has introduced a number of fiber-related products, including a fiber management system, consisting of the Fiber Management Chassis, multiport modules and bulkhead connector plates. The system provides modular, secure mounting and protection for fiber optic components, plus high density termination and routing of fiber optic lines.

The company has also announced its DTX 1310 DFB laser transmitter module, a direct modulation transmitter for a variety of architectures, including narrowcast and broadcast applications.

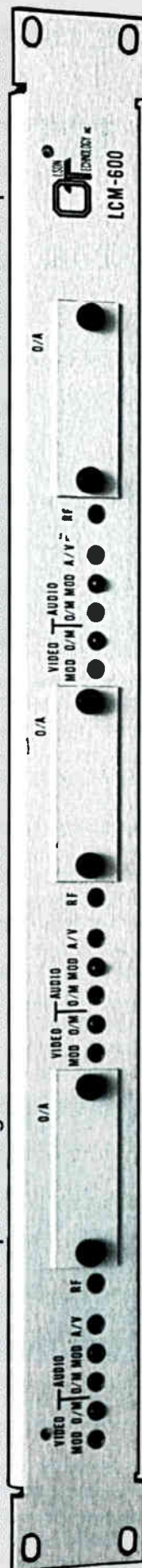
Also new from IPITEK is a new member of the IMTRAN family product line, the



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with strong engineering specs that sweep to 1.2 GHz," said Gary Napolitano, president of RMS, in a statement.

Another special feature of the tap is the user's choice of tap values. "Customers can choose what dB value they want in their system design," said Napolitano. "For example, the customer can select to have a 14, 25 and 29 dB tap value in the same Modular Multi-Tap unit, and we will build it like that for them."

The dB value is color-coded, so that the operator can tell at a glance the value of that portion of the multi-tap. The port design is also unique, in that RMS Electronics does not use the common male/female connection (F connection) to link units, but instead, makes a direct connection between each unit. One of the multi-taps can serve an entire 48-unit apartment building, according to information released by the company.

Raychem Corp. introduced a new family of 1-GHz taps, splitters and couplers for cable TV applications. The Legend Series features both indoor and outdoor products with some unique features. For example, the new outdoor taps come equipped with an RF/AC non-interrupt switch, allowing operators to maintain their systems without interrupting signal flow. The taps are tuned with the switch already installed to avoid potential signal degradation. They are available in two-, four- and eight-port versions.

The entire line is available in attenuation values of 4 dB to 35 dB. Each product is tested to meet minimum specifications on temperature, humidity, water immersion, vibration and physical drops.

Harmonic Lightwaves Inc. has introduced its new Narrowcast Isolation Amplifier (model NIA 1800) which enables the addition of narrowcast services (e.g., Internet traffic, digital and analog VOD or NVOD, telephony and customized local programming) to supplement broadcast video delivery. By eliminating cross-talk between narrowcast signals, isolation amplification maintains the integrity of the separate signals as they travel through a signal-combining network.

Harmonic's NIA achieves space efficiency by packaging five RF signal combiners and isolation amplifiers into a single, two-rack-unit high product. It is compatible with both +15 dBmV and +25 dBmV input transmitters and

backward compatible with the installed base of DFB transmitters. As a result, it is a natural bridge between Harmonic's PWR Link DFB transmitters and TRANsend QAM modulator. Available for shipment in July, the amplifier can also be used in a 10 dB gain pre-amplifier configuration.

Protective Wire & Cable Inc. unveiled its newly-patented lightning retardant cable (LRC) in the Protex booth during Expo. Currently available in prepackaged kits for DSS satellite systems (in 10-, 15-, 25-, 50-, 75- and 100-ft. lengths), the innovative drop cable will soon be available on reels for cable industry applications. Inventor Samuel Gasque says the cable came about "by accident" in work he had been doing for NASA. The LRC works by turning the magnetic field of a lightning strike against itself, thereby impeding the flow of current as the strike travels down the cable. As such, it forces the main energy surge down the ground, wire to ground, instead of down the cable.

Gasque claims independent laboratory testing has shown the cable offers up to 700 percent improvement over standard RG-6. And in a recent development, he says the Warranty Corporation of America will offer insurance policies on any consumer home electronics (TVs, VCRs, stereos, etc.) that are connected to the company's cable.

Times Fiber Communications Inc. showcased a new headend drop cable and 50 Ohm power cable with RF capability at the Expo.

The 1 GHz headend drop cable is Underwriters Laboratory-listed and utilizes a silver-coated, copper-clad steel center conductor, bonded high-velocity, precision matrix foamed, polyethylene dielectric, quadshield construction with two 96 percent braids and a flame-retardant PVC jacket. The 50-ohm power cable offers reduced loop resistance because of a larger center conductor, while preserving some RF capability.

Qintar Inc. has introduced a 750 MHz indoor, two-way distribution amplifier for multi-dwelling unit (MDU) applications. When fully loaded with 110 channels, the dual-hybrid push-pull amplifier has a gain of +38 dB forward. The -30 dB test points are external for easy testing. For added protection, the RF input has a gas diode surge arrestor and the AC (120 V/60 Hz) input is fused.

The CDA-75038-2W comes with a standard return path 5-42 MHz, 22 dB amplifier for present or future requirements. Gain control, slope control and access to the equalizer pad are located beneath the metal cover for maintaining RFI integrity. A 550 MHz version, which also offers 38 dB gain forward and 22

dB reverse, is also available.

Lindsay Electronics announced its new LSA Series Subscriber Amplifiers, including the Model LSA-15, a low-noise, high-performance, amp for in-home design flexibility. The amp has 15 dB of gain from 53-1000 MHz and has 5-42 MHz passive reverse filters.

Whether techs and installers are installing single cable or dual cable, new Feed-Through Bushings from Telecrafter Products also accommodate telephony, a messenger or both. Each of the extra cable passageways remains sealed until it is needed for use. Constructed of weather-resistant, UV-stabilized polyethylene, the bushings are available for single or dual cable installations.

Arco Corporation introduced its new ShurLock Coupler System for coupling HDPE and PVC conduit. No special tools are needed to install the couplers, which can withstand 125 psi air pressure and water head pressure of greater than 20 feet.

Antec Network Technologies introduced three new products, including a new family of 870 MHz RF amplifiers, its LightMap Fiber Software Administration System and its TrackLink element management system.

The 870 MHz Mini-Bridger and Mini-Trunk Amplifiers are multi-port platforms designed to support a family of plug-in amplifier modules and accessories. Both amplifiers feature plug-in diplex filters, automatic slope and level control, and return path options of 5-40, 55, 62 or 186 MHz. The LightMap system provides a complete software system to track the fiber, circuit and hardware in fiber networks. Using a simple point-and-click graphics system, users can build, display and print true-to-life replicas of fiber cable paths.

Antec's TrackLink element management system allows operators to perform configuration and fault management functions for a network of Laser Link II optical products in the headend. A variety of screens provide



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Arco Corporation's new ShurLock Coupler System.

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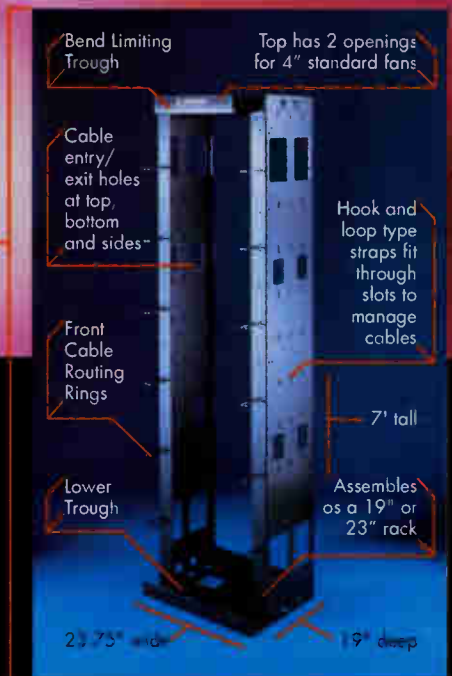
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Trilogy Communications announced it will expand production capacity for its coaxial cable, and introduce a new family of plenum-rated cables in the third quarter.

Bomar Interconnect Products Inc. is now making a push-on male F-connector, which it calls "Push-EZ."

Preformed Line Products has introduced its Coax Drop Wire Closure, which provides a secure watertight environment for direct buried splicing of coax cable. Universal closure halves make for easy installation of the unit, says PLP. The halves snap together, requiring no special tools. Once installed, cable alignment tabs keep the cable straight, and the unit securely in place.

ABC Cable Products announced that in addition to offering its own line of CBLinx Optical Network products, it is also an official

distributor for U.S. Fiber Optics. For several years, the company has offered optical links for video, audio and data transmission, return paths, L.O. feeds, Ethernet and distance learning. Its CBLinx line of optical transmitters and receivers have been used for institutional networks, teleconferencing and broadcast and studio video transporting.

Belden Wire & Cable Company has introduced a new series of composite and drop distribution cables specifically designed for the simultaneous transmission of voice, video, data and/or power in cable TV and telecommunications applications. The new cables combine 75-ohm coaxial cable with unshielded twisted pair cabling within a single jacket.

Times Fiber Communications Inc. has introduced Armored Drop Cable and 75 Ohm Mini Coax. The armored cable is designed for underground use where cable damage is likely to occur from dig-ins or foreign objects in the

back-fill; the 75-ohm cable is designed specifically for headend use where space is at a premium.

Electroline Equipment Inc. has announced that its new CAT-T addressable splitter units, providing on/off or two-tier addressable control of up to 64 tap ports, will be commercially available this summer. The new units are part of the Electroline Compact Addressable Tap family of products.

The new CAT-T units will allow cable operators to increase the subscriber capacity of a CAT unit to control up to 64 drops, without replicating the control and power supply circuitry. The new units are essentially slaves which connect to an addressable CAT splitter via its nine-pin "D" connector. Up to three CAT-T splitters may be connected to a CAT.

Meanwhile, Cable Innovations Inc. has introduced the new UHB-2001 Universal House Box, a modular drop line solution. The

Inside wiring options

For those with little "hands-on" knowledge of twisted pair media, J.R. Anderson, vice president, and Ernest Gallegos, MTS supervisor for Integration Technologies, spent some time on twisted-pair basics.

✓Unshielded Twisted Pair (UTP): Twisted pair conductors that don't have any external electrical shielding. It's the standard media used today to interconnect voice and data services within a premise.

✓Tip and ring: Commonly called a "pair," tip and ring come from the old days when live operators used to complete telephone calls by physically connecting 310 patch cord and plugs between the appropriate party lines. Today, current (-48 VDC) or voice outbound is sent on the tip wire. The return path, or receive, is on the ring wire.

✓Telephone cable color coding: To help distinguish the different "pairs" (see above), a color code was developed that is used on 25 pairs of wires and repeats on multiples of 25 pairs. The current code has 10 colors: white, red, black, yellow and violet—known as tips; and blue, orange, green, brown and slate—known as rings.

✓Loop vs. home-run wiring: The most prominent wiring scheme today

is loop (or series) wired systems. Limitations? Signal degradation, outlet wiring problems and administration of set-top box controlled access. Home-run wiring features dedicated conductors from individual wall plates that are installed back to a hub or star-point. Advantages? Allows service provisioning for each individual user location; ensures high-capacity connections up to 100 Mbps.

Albert Feaster, from Ortronics Inc., covered some of the basics of proper telecommunications terminations in the home.

✓Screw terminal type hardware will not meet requirements for data delivery. High-speed circuits need insulation displacement contacts (IDCs).

✓IDC terminations come in two forms—Split V and Barrel—with Split V being the most popular. IDC advantages: ease of termination; higher data speed capabilities; gas-tight connections, easy to add, move or change; and a large product selection.

✓Jacket stripback recommendation: Remove only the length of cable jacket required for termination to connecting hardware; should be limited to no more than one inch from the point of termination.

✓Untwisting of pairs recommendation: Limit to no more than 1/2-inch from the point of termination for category 5 cables.

✓Bend radius recommendation: Not less than four times cable outside diameter.

✓Cable tie recommendation: Ties should be finger-tight, but not so tight as to distort the outer jacket of the cable.

✓Cable support recommendation: When suspended above an open ceiling, cable must be supported by hangers with 48- to 60-inch spacing; cable bundles should be limited to 50 cables maximum to avoid crushing the cables on the bottom.

✓Avoid nicking or scoring the insulation on the inner conductors when stripping back the outer jacket, because it will change the performance characteristics of category 5 cable.

✓Maintain maximum horizontal distances and terminate horizontal cables with connecting hardware of the same category or higher.

✓No bridge taps or splices in the horizontal.

✓Maximum pulling tension for 100 W4 pair UTP should not exceed 25 pounds.

—ML

1 GHz UHB-2001 improves drop line congestion and efficiency. The installation of drop line passives is plug-and-play, says the company. And, a two-way splitter can be changed to a three-way splitter via a plug-in.

Lucent Technologies Microelectronics Group demonstrated a high-power optical amplifier at Expo. The new offering is a 22 dBm, low-power dissipation and low-noise optical amplifier. The low power dissipation of the optical amplifier enables the system provider to provide a maximum number of optical amplifiers per shelf, which decreases the required real estate compared to other optical solutions. Also, the high power of the optical amplifier provides a cost reduction over single output 16 or 13 dBm optical amplifiers.

Powering

A number of vendors showcased powering systems aimed at increasing the reliability of broadband communications applications.

Alpha Technologies has added 12 new broadband power systems to its product line. Each of the new power nodes is based on the Genasys power module and support power requirements ranging from 1350 to 8000 watts.

Each of the new systems incorporates uninterrupted power, user-selectable output voltages, complete modularity and several power rating growth plans. In addition, each system can be configured with primary and secondary utility grid inputs, standby batteries and a fully integrated or remote engine generator, providing up to four independent sources of input power. The system's integrated design allows seamless, automatic transfer between these input power sources, ensuring uninterrupted output power.

Cable Innovations Inc. has announced its new version of its patented power



Alpha Technologies has added 12 new power systems

insertor/surge suppressor, the CLPS-3009PI. The unit is a full 16-amp, self-contained, surge suppressor. Enhancements include the replacement of dual SCRs with a single solid-state Sidactor for increased reliability,

durability and faster firing time. Isolation of the power port has also been improved by a solid aluminum, case cavity power port. The CLPS-3009PI may be used with 60- and 90-volt systems.

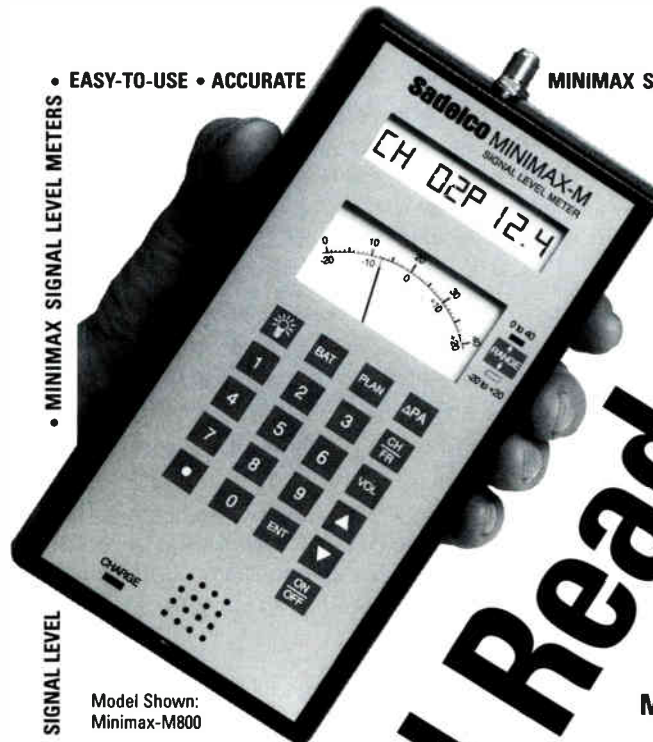
Exide Electronics Group Inc. announced the Lectro ZTT/Plus (Zero Transfer Time)

uninterruptible power system. Containing a microprocessor and ruggedized transformer, the ZTT/Plus provides increased reliability, an enhanced user interface and improved overload capabilities for cable and broadband networks.

The improvements also provide for a lower price, according to Exide, which should help MSOs reduce initial and long-term costs. The system is available in 120 VAC, 60 Hz and

60/90 VAC output versions.

The heart of the unit is a digital microprocessor that increases network reliability by enabling smarter functions, such as improved brownout detection. The replacement of analog meters with a new LCD (liquid crystal display) panel and the use of digital controls reduces parts count and increases unit reliability. Technician service and maintenance time are reduced because the ZTT/Plus is true digital



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root mean square measurement (RMS)-ready. Techs no longer have to use handheld meters and perform calculations to obtain critical information, because the integrated LCD screen can scroll through pre-calculated data at the touch of a button, providing information such as input/output voltage, time on battery, output current and battery voltage.

SatCon Technology Corp., developer of a flywheel energy storage system for cable TV and utility applications, announced it has formed a strategic partnership with Duquesne Enterprises to establish a company to manufacture and distribute the flywheel storage system.

Duquesne will invest \$5 million toward the establishment of Beacon Power Corp., which will become a subsidiary of SatCon, as well as distribute the product in seven mid-Atlantic states. In return, Duquesne will receive approximately 800,000 shares of SatCon stock. SatCon's flywheel energy storage system will soon be field tested by a handful of cable operators, according to



**Exfo's FOT-920
MaxTester**

alleviates, says Electroline, is the cumbersome process of testing a multiplicity of two-way active fiber optic nodes. The TPS speeds testing procedures by connecting the RF test points from many nodes into a single multiplexing device, allowing connection of one

networks—especially fiber nodes. Operators can use the Test Point Selector (TPS), which was featured at Expo, in four different manual or automated testing configurations. No matter which of the four methods is used, the TPS speeds testing of 16, up to several thousand, separate return path signals from a remotely-controlled multiplexer.

What the TPS alleviates, says Electroline, is the cumbersome process of testing a multiplicity of two-way active fiber optic nodes. The TPS speeds testing procedures by connecting the RF test points from many nodes into a single multiplexing device, allowing connection of one

tests needed for those using a digital 64 QAM system, including: digital channel power level measurements, estimated bit error rate and exclusive drop compensation measurement.

In addition, a new PC-based SV953 MPEG-2 stream station licensed by Sencore provides a test solution for testing and analyzing MPEG-2 digital video broadcast signals. The SV953 gives the user the capability to record, playback, monitor (in real time) and perform a complete analysis of the recorded transport stream that contains multiple video, audio and data stream information.

Essentially, the unit is a tool for MPEG-2 product development, production and transmission analyzing and testing.

In the development environment, the SV953 provides a signal source and diagnostic tool. Its ability to play out the same test stream repeatedly at data rates of up to 60 Mbps provides a source for developers of integrated receiver decoders (IRDs) and modulators. In the production environment, the station provides a source of repeatable test patterns for use in aligning and testing IRDs and modulators.

And, the SV953 provides program and service providers with real-time monitoring of the transport stream to ensure program materials meet MPEG-2 and DVB standards.

HP CaLan has enhanced its 3010R/H Sweep/Ingress Analyzer with several new features. One headend box for both forward and reverse sweep lets the operator make the most efficient use of bandwidth. The dual path sweep also adds up to more headend space and less test equipment to buy, according to the company. The user can also measure the average power of digital carriers—including return path TDMA (burst) carriers.

In addition, sweep speed is faster. A tech adjusting an amplifier in a typical 750 MHz system would see results in 650 milliseconds, says HP.

Sadelco Inc. announced that all of its Minimax Signal Level Meters can now read digital channels. The new feature provides accurate readings of the average power of all digital channels, says the company, and a single keystroke tells the Minimax that the tuned

Is your system ready to handle data?

Getting ready to launch high-speed data services? Not sure if your system can handle digital signals? Wondering about the noisy environment on the return channel?

Not to worry, says Gene O'Neil, principal field engineer/trainer for Bay Networks' Data Over Cable Division.

"If you have reasonable quality cable plant, properly installed headend equipment and a properly configured server, the modems will operate," said O'Neil during a workshop held during the Expo.

Modem manufacturers that use digital signal processing can typically overcome return path issues of group delay, tilt and reflections and allow two-way communication to take place. But there are some rules-of-thumb to keep in mind:

- ✓ Design for unity gain in the return

path. This helps the modem perform its "auto adjust" functions.

- ✓ Avoid operating near the edge of band, where group delay and tilt are more problematic.

- ✓ Keep the return amp cascades and diplex filters to a minimum because they introduce group delay.

- ✓ Alter your policies and procedures to eliminate unterminated taps and corroded connectors. They foster micro-reflections.

O'Neil said there are trade-offs when it comes to using higher-order modulation schemes, and that the QPSK method is quite reliable and robust. While other methods, such as QAM, provide more bits/Hertz, they're not as robust and need forward error correction.

—Roger Brown

William Stanton, who will become president of Beacon Power Corp. The device replaces batteries as a method to provide clean backup power in case of outages.

Test equipment

Engineers seeking the latest in broadband communications test equipment at Expo were not disappointed. Electroline Equipment Inc. offered cable operators a new method for remotely testing ingress into their

jumper, one time, to test many different nodes. Using the TPS, a cable operator can leave a piece of test equipment permanently connected, and initiate the testing procedures from a remote location using a PC and modem.

The TPS can be connected in four ways, depending on whether lowest cost or highest automated capability is desired.

Sencore Inc. introduced its new signal level meters for 64 QAM signal analysis at the show. The new meters are designed to provide special



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channel is digital. The meter then automatically makes the correction and displays the average power of the digital signal.

Wavetek Corp. introduced the MTS 5100, a multi-purpose, mini OTDR designed to maximize fiber test productivity. The MTS provides fiber installers with the ability and modularity to tackle any field situation in a single test platform, according to the company.

The MTS handles single and multimode installations, in-service testing and out-of-band monitoring. The unit is suitable for switched public networks, long-haul transport systems, analog or digital broadband systems or local area networks.

The MTS features optical testing from 635 to 1625 nm, dead zones as low as one meter, and dynamic ranges normally expected only from a mainframe OTDR. The unit has two available bays featuring field interchangeable modules with varying dynamic ranges and wavelengths, as well as a light source, power meter and visual fault locator.



Wavetek's MTS 5100 mini OTDR

Durable construction and 16-hour-lasting batteries make the MTS available and capable for extended field use. With a streamlined user interface, help functions and drop-down menus, the MTS allows "single button" automated testing. A generous internal memory size (200 traces) and fast Power PC processing, coupled with simple memory and file management menus, provide complete measurements in Bellcore GR196 format. Wintrace, Wavetek's Windows-based trace analysis software, is available for detailed analysis.

Hukk Engineering used the Expo to debut a QAM-based bit error rate tester. Dubbed the CR1200, the device tests pre- and post-FEC bit error rates, signal-to-noise, errored seconds, severely-errored seconds and signal level, Hukk executives said.

The test gear also handles traditional analog test measurements, like signal level, carrier-to-noise, hum and 24-hour tests.

ComSonic Inc. showcased its new WindowLite Digital, newly-upgraded WindowLite PLUS (with a larger display and upgraded CNR and hum measurements), four new 1-GHz coax relays, and the Delta upgrade for the WindowLite line of signal level meters.

Trilithic Inc. has announced firmware enhancements to its 9580 SST Return Path Analyzer that expand its ingress capturing

capabilities. A new fast mode allows reliable measurement of ingress bursts as short as 12 milliseconds. In addition, frequency coverage has been extended to detect AM broadcast ingress, a cause of laser clipping.

Trilithic announced a tool for subscriber ingress control, the Guardian RSVP, which automatically measures the carrier/(ingress and noise) ratio of the entire return path and verifies that communication from the home to the headend is within the range of set-top terminal capability. Working with the Guardian IsoMeter Reverse Leak Detector, the RSVP also tests the subscriber's in-house cable for ingress potential.

Cable Resources Inc. introduced the RDU, a new piece of test equipment for maintaining return systems in HFC networks. The RDU displays noise, ingress and RF carriers, in the same manner as a spectrum analyzer. In addition, the RDU monitors and displays the headend return levels at any two carrier frequencies with a 0.5 dB resolution. System technicians can use the unit to monitor the return system from any point in the cable system without a headend spectrum analyzer/camera setup.

Tektronix Inc. has announced option 22 for the VM700T/A series video measurement set, making it the only available system, says the company, that verifies video sync timing drift and drift rate at the output of a video distribution network. The system is a solution for network operators who need to ensure quality for video signals transported over Sonet and SDH video distribution networks.

The new series measures H-Sync frequency drift below 10 Hz and drift rate of a baseband video signal to determine whether they are within the limits acceptable to professional studio and post-production equipment.

Wilcom Inc. introduced a new, high-power, optical power meter for cable TV and long-span telephony optical signal transmission. Designed for use with signals generated by Erbium-doped fiber amplifiers where power levels up to +25 dBm are often encountered, the Model FM8515C optical power meter features reference store, 0.01 dB resolution, measurements in dBm, dBr and milliwatts, and a dynamic range greater than 60 dB. Although calibrated for 1310 and 1550 nm wavelengths, the FM8515C offers the ability to make 850 nm measurements for general utility purposes.

The meter is calibrated from -40 dBm to +20 dBm but is capable of accepting out-of-range optical signal levels from dark to +25 dBm.

And Exfo E.O. Engineering Inc. has introduced its new FOT-920 MaxTester, the latest addition to its power meter product line.

Available in a number of configurations, the new unit can combine an automated bidirectional tester with an ORL tester, a full-duplex talk set, a message exchanger and a visual fault locator.

A recently-developed, intelligent, referencing technique maximizes accuracy by performing diagnostic functions at the same time the reference is taken. The unit also features extensive memory for storing 500 fiber tests, and intuitive download software for report generation and archiving, as well as a simple user interface for operators.

Videotek introduced several new products at Expo, including a 192-channel DM-192, with synchronous or envelope detection; and the VTM-200 multi-format on-screen monitor, which turns an ordinary SVGA computer screen into a picture monitor, a waveform monitor, a vectorscope and an audio monitor. The 1-3/4-inch high unit can accept NTSC, PAL and 601 serial digital inputs.

The company has also announced new pricing packages, including a composite video analyzer with auto-measure, a precision agile demodulator, a vertical interval test signal generator, and an auto-measure system integration kit, for a discounted package price of \$14,580.

Siecor, for its part, introduced its new OTS-300 Express Series, which includes a power meter, light sources and testers that test and store dual wavelength power and attenuation measurements simultaneously.

Network management/monitoring

Vendors also showcased products at Cable-Tec designed to provide operators with more control over their networks.

Philips Broadband Networks introduced a hybrid fiber/coaxial domain management system that allows broadband network operators to simultaneously monitor and control all network components and services. The domain manager is a fully integrated system that controls separate element management systems (EMSS), such as those used to manage headends and HFC transport infrastructures, and advanced services like broadband telephony and interactive data transfer.

With mapping capabilities and standardized external interfaces, the manager directs four specific functional areas: network configuration, which controls the network's elements and resources; network performance, which optimizes response time and resource allocation; network fault management, which diagnoses faulty equipment and devises corrective action; and network security, which controls end user access to services.

Through surveillance of each EMS, the sys-

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tem locates faulty equipment quickly, and by analyzing network trends and statistical data of network components, it can also determine areas of instability and forecast faults before they occur.

The domain manager also offers a database which provides update, inquiry and reporting capabilities, as well as user-friendly topology mapping.

Harmonic Lightwaves Inc. announced two new products designed to meet service operators' needs for enhanced element management on each end of the hybrid fiber/coax network. The NETWatch Multiple Element Manager

(model MEM 5000) is the first element management system designed to manage other SNMP element managers, according to Harmonic.

The NETWatch Management Transponder (model NMT 5000) extends element management farther downstream to include power supplies, amplifiers and line extenders, thus providing a more comprehensive network monitoring system.

Superior Electronics Group Inc. used Expo to show off an automated system for return path monitoring. A part of its "Cheetah" product line, the Automated Ingress Monitoring

(AIM) system targets ingress sources by continuously and quickly sweeping individual return carriers, characterizing persistent and periodic forms of ingress, and acting as an interactive analysis tool, executives said.

It works to analyze ingress, which happens when noise sources leak into the upstream path and sometimes block signal flow, on a 24-hour basis. When ingress is detected, an alarm is triggered that notifies the system operator via computer, pager or phone.

New from Tollgrade Communications is the Lighthouse status monitoring transponder, which offers frequency agility, and enables operators to make fast, remote changes of cable TV status-monitoring transmitting and receiving frequencies. The new transponder,

Cox engineer receives 1,000 thanks from CED magazine

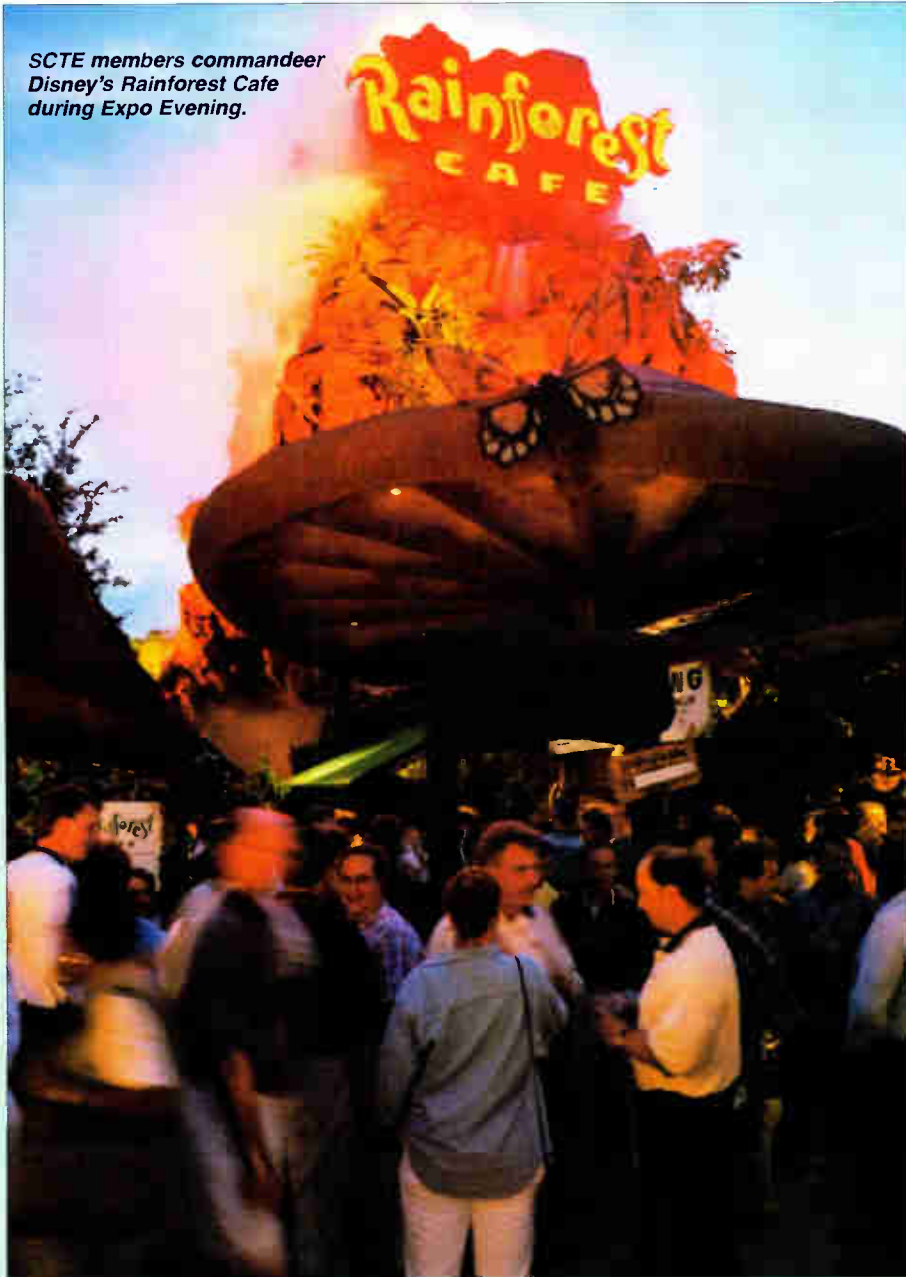
Most people who attend a Cable-Tec Expo find themselves hitting the ground running on the first day, and there is little let-up until they find themselves running for their plane on the last day. David Johnson, director of engineering design for Cox Communications in Atlanta, found himself covering a little more ground than most at Cable-Tec after completing a \$1,000 shopping spree at the exclusive World of Disney store, courtesy of CED.

Johnson was the grand prize winner in CED's special Cable-Tec "thank you" to the publication's readers, who recently said in a Readex Readership Research Inc. editorial audit that the magazine is their favorite technical magazine. The first 800 Cable-Tec attendees who came by CED's booth were



Cable-Tec attendees step right up and get their red-hot CED golf shirts.

SCTE members commandeer Disney's Rainforest Cafe during Expo Evening.



PHOTOGRAPHY BY PHELAN EBENHACK

which is scheduled for commercial release in October of 1997, is adaptable for status monitoring applications with a range of industry-standard power supplies, line amplifiers and fiber nodes.

"With the frequency-agile Lighthouse transponder, the operator can access a larger part of the available spectrum to select a clean transmission channel and remotely change that channel as needed to maintain communications," according to Don Pavlek, assistant vice president, Tollgrade Communications.

Wavetek Corp. and Arris Interactive have established an agreement in principal for Wavetek to offer a return path monitoring system designed and manufactured by Arris.

The new system is currently available and

will be marketed exclusively by Wavetek as the RP100 Return Path Monitoring system.

It's designed to isolate noise and ingress from multiple, individual return paths for the purpose of monitoring, recording and analyzing spectrum data. The automated system uses hardware designs from the Arris Cornerstone HFC telephony system to collect the return path spectrum data.

A Windows software package provides data storage, a graphical user interface to display two-dimensional and three-dimensional spectrum graphs for user analysis and allows the user to set alarm thresholds for automated notification of potential problems on individual return paths.

IPITEK announced its new NodeWizard

Network Management System and its associated digital interface, the Node Control Processor (NCP). The new system provides centralized network control and monitoring functions for the company's digital fiber optic transmission systems.

Siecor Corp. featured its OptiCon Network Manager (ONM) Release II software at Expo, which provides the means to maintain and track all fiber optic components in cable head-ends, central offices or in premises applications, regardless of the manufacturer. The ONM is a Windows-based application that provides system operators with a graphical way to represent the fiber optic elements in their system, and which eliminates the need for a specialized database administrator.



CED's Snyder (l.) and Stuehrk (r.) flank shopping spree winner Johnson (center).

given a commemorative *CED* golf shirt and were urged to wear the shirt during Thursday's "Expo Evening" event at the Rainforest Cafe. Nearly 50 lucky readers spotted wearing the shirts that night were randomly selected to receive prizes provided by the Walt Disney Co. and the ESPN Total Sports Network.

When Johnson turned up with his numbered ticket to see what he won, he jokingly said, "I'm here to collect the Grand Prize!" Scott Snyder, *CED* director of sales and marketing, who was matching numbers and prizes, said laughingly, "Hey, you did win the Grand Prize!" Johnson returned the

laugh and replied, "Yeah, sure. So what did I really win?" It took a few minutes to convince Johnson that it wasn't a joke.

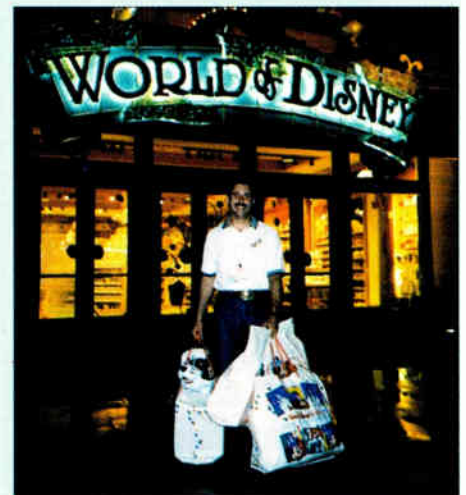
Of course, all great plans of Mickey and men have their glitches. Johnson's \$1,000 shopping spree, with a roundtrip limo ride, was scheduled for early next morning before the World of Disney store opened at 9 a.m. The problem? He was the featured first speaker in an 8 a.m. Cable-Tec seminar that morning.

What to do? Snyder huddled with *CED* Publisher Rob Stuehrk. Stuehrk bolted for the nearby store and quickly arranged a midnight dash for Johnson. With his cellular phone at the ready for quick consultations with his wife on what she and their three-year-old daughter, Sarah, might like, Johnson got down to some serious shopping.

He says his wife really liked the watch he got her, but that her favorite gifts were the keepsakes he bought for their daughter, including a hand-painted, glitter-filled, Cinderella Castle Musical Snowglobe. "My daughter, on the other hand," says Johnson, "thinks the giant stuffed puppy dog is the best of all. At least she does today. Who knows what it will be a week from now." Johnson reports he's torn on what he likes better, the limited edition Disney watch

or the bronzed statue of Donald Duck he bought for himself.

Johnson also took some shopping time to give his departmental co-workers back in Atlanta a "high five," or more accurately a "high four," when he stocked up on nearly 20 sculpted business card holders shaped like Mickey's gloved, four-fingered hand. Both Johnson's wife and daughter



Johnson ponders his good fortune and the logistics of getting his bounty back home.

were able to enjoy their gifts almost immediately, since they were already slated to join him the next day. Lucky for him, too, since he needed considerable help carrying all his Disney bounty back to Atlanta.

—ML

Cable-Tec Games test the best

Contestants test their wits, (cable) wire and winning ways for bronze, silver and gold

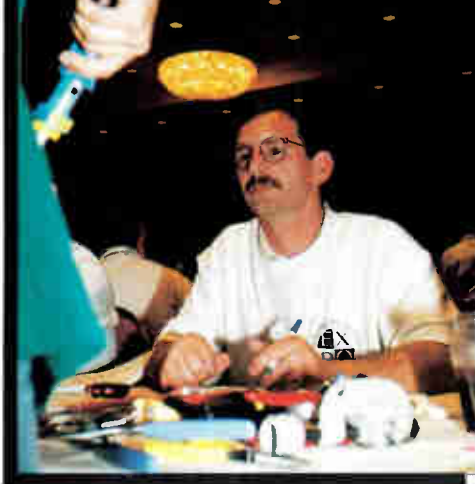
One of the most anticipated events at any Cable-Tec Expo is a real hands-on event. The Cable-Tec Games put cable professionals on the spot physically and mentally. This year's event was no exception.

Nearly 20 professionals competed individually as they rotated in teams through four competitive events during the Games. Mental skills were truly tested during the meter reading, MTDR and the infamous Cable

Jeopardy events. Physical skills were put to the test during the sometimes hazardous trunk/feeder cable splicing event.

Always one of the spectators' favorites, the splicing competition draws a good deal of the attention (and sometimes a little blood) as connectors, cutters and utility knives fly in the timed five-minute competition. Contestants are judged on the preparation of the cable, with points taken off for burrs, nicks or unevenness, as well as proper coring for both ends of the cable (i.e., core depth 7/8" +/- 1/16").

PHOTOGRAPHY BY PHELAN EBENHACK



(On this page, clockwise from left) Ken Wood, Gilbert Engineering, keeps his critical judge's eye on the splicing action, while Doug Hamilton, return contestant and this year's splicing gold medalist, puts a little elbow grease on his own splicing effort.

Philip Sherman, University of Richmond in Virginia, takes a few pointers on meter reading before he gives it his best.

Louis Savage, manager of information systems for the House of Commons in Ottawa, Canada, splices cable the Canadian way.

Carol Barnes, MediaOne, Pompano Beach, Fla., calculates his answers in the MTDR contest.

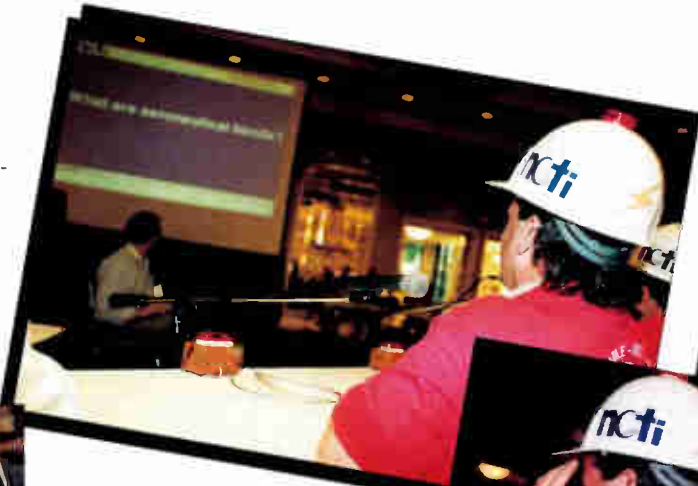


there is

When it comes to installing the connector itself, judges pay particular attention to any blood (deduct five points) or, heaven forbid, if any stitches are needed (deduct 10 points) by contestants. Fortunately, this year's event, while drawing the usual attention, drew little, if any, blood.



Contestants tried their best for individual bronze, silver and gold medals in all four events. Winners were also selected by overall or cumulative scores in bronze, silver and gold award categories.



Cable Jeopardy takes contestants into a wide variety of subjects, including basic electronics, RF spectrum, signal leakage, test equipment, system security and cable math, to name a few. Steve Timcoe, Ameritech/New Media, Warren, Mich., goes through the familiar question-generating angst and finally comes up with the right answer...or the right question.



Steve Christopher of Thomas & Betts (and Games coordinator) takes turns congratulating gold medal individual and overall winners (clockwise from left). Doug Hamilton, Hardline Communications, Prescott, Ariz., collects his gold medal for the splicing event, as well as bronze medals in meter reading and Cable Jeopardy.

Woody Cash, TCI, San Jose, Calif., not only takes the gold overall, but a gold medal in the MTDR, a silver in Cable Jeopardy and a bronze in splicing. While Tom Saylor, Technology Services, Troy, Idaho, takes home a gold medal in meter reading and Cable Jeopardy (with a record 1,060 points).

Telephony

Cox Communications will deploy residential telephony gear made by Antec Corp. later this summer, through a contract that spans three years and at least three of the MSO's nine metropolitan clusters in the U.S.

In the deal, Cox started deploying the "Cornerstone" gear, made by the joint venture effort of Antec and Nortel known as Arris Interactive, in the Orange County, Calif. area early this year. Cox had been testing the Arris equipment, as well as hardware made by Tellabs Operations Inc. and ADC Telecommunications Inc. in that system, Antec executives said.

Jack Bryant, president of Antec's Digital Systems Division, said during an interview at Expo that the manufacturer is still "very bull-

Conference at the end of May, it was announced. Arris Interactive is a joint venture between Antec and Nortel.

The User Conference was designed to foster continuing information sharing between operators regarding telephony engineering, operations and marketing issues. In addition, the user group forum will allow the operators to share ideas for accelerating acceptance and deployment of cable telephony. Cablevision Systems, Cox Communications, TCI Telephony and Time Warner Communications were all represented at the conference.

Meanwhile, Arris Interactive has expanded its portfolio of customer access devices for its Cornerstone cable telephony system with new Multi-Line Voice Ports, designed to serve con-

and shuts off if shorted to ground or opened. The device resets the power when the cable is reconnected or properly repaired.

Preparing for EAS

The R.L. Drake Co. is helping cable operators prepare for new regulations with the IFM80 Emergency Alert System (EAS) Modulator. The audio/video modulator is a vestigial sideband NTSC modulator that provides a high-level composite IF output signal. The IFM80 is designed to accept the EAS message audio and video from an EAS decoder and drive the EAS IF inputs of all modulators in a cable TV or SMATV system. In addition, the unit can also be used with a variety of modulators, both old and new. By using an IFS80 IF accessory switch, the IFM80 can be compatible with modulators that have a composite IF loop connection, but not a specific EAS IF input.

Also new from Drake is the VM2550A frequency agile modulator, equipped with an extensive channel capacity and "superior" video quality to meet the demands of larger cable TV systems. The unit is also equipped for EAS compatibility, according to Drake. And, the company is offering the VM2552A BTSC stereo modulator; the VM2450A frequency agile modulator; and the FMC1000 FM stereo modulator.

Mega Hertz has announced the development of full-color EAS multi-channel crawl and cross-channel promotion products that are compatible with the "Sub-Alert" emergency alert system. The MCC products and Sub-Alert can be configured to selectively crawl EAS messages on premium channels, while simultaneously overriding basic channels in any combination of switching requirements, says the company.

Trilithic's EAS Products Division displayed a full line of specially-designed EAS products, including video and IF switches, crawl generators, decoders, controllers and associated equipment—a solution called the "EASy System." All of the components are modular, so the system can be configured to fit any headend configuration. EASy systems require little rack space because the signal-insertion components mount directly onto the back panels of the processors and modulators they serve, says Trilithic.

Meanwhile, Trilithic's Instrument Division has added a new member to its family of return maintenance products—the 9580 TPX. When used with the 9580 SST Reverse Path Analyzer, the TPX can automatically scan up to 64 individual return paths and tests for ingress and noise.

Tips for managing an HFC upgrade

Wondering how to make an upgrade of your hybrid fiber/coax plant easier? Jim Ludington, president of INT2, has some suggestions.

- ✓"Correct as-builts—that's the key."
- ✓Assemble your project team well in advance of construction (up to one year for large projects).
- ✓Physics can play a role in any upgrade. "You can't harden concrete faster than concrete hardens." There are limits to how much you can do, in a given period of time.
- ✓An upgrade is an enterprise-wide process which crosses an entire organization, and each group involved must be in the loop. From CSRs to the marketing department, everyone should

know the path of the upgrade.

✓Have a maintenance crew on hand that's up to speed on the upgrade process, and which can troubleshoot areas where the upgrade crew worked recently.

✓Because there is an inadequate supply of skilled labor to build the amount of miles planned by MSOs and other telecommunications companies, more intense project management is required.

Ludington gave his advice to Expo attendees during a workshop entitled "Managing your HFC upgrade: Making a difficult job easier," co-authored by Walter Colquitt, director—video network development, OpTel Inc.

—Dana Cervenka

ish" about residential RF telephony, citing deployments with seven MSOs worldwide.

"Cable telephony is alive and well," Bryant said. He said the seven operators are already serving up residential phone service to 7,500 customers, and that Antec's gear passes more than 1 million homes.

Chuck McElroy, vice president of residential broadband services for Cox, said in a statement that Cox considers telephony a way to distinguish itself from other communications providers. "With telephone service, reliability is critical, and we're very impressed with the quality of the (Antec) equipment," McElroy said.

Seventeen representatives from four cable MSOs who are deploying Arris Interactive's Cornerstone Voice cable telephone system attended the company's Cornerstone User

concentrations of up to six or up to 12 telephone lines from a single unit.

HFC network operators can use these devices, together with the Cornerstone one- or two-line voice ports, to serve single family residences, as well as small businesses and apartment buildings using the same headend telephone platform. The Cornerstone ports were demonstrated at Expo.

Norscan Inc. has introduced the "DropCheck," which meets proposed NEC requirements for an automatic shut-off device for powered telephony coaxial drop cable, according to the company.

Norscan officials say that the new NEC proposal requires coaxial drop carrying 90-volt AC power to be buried 18 inches deep, or, have an auto cut-off device installed. Norscan's inline device passes 5-750 MHz

FrontLine Communications has acquired the EAS product line of Information Age Systems (IAS). The two companies will combine sales and marketing of the complete product line directly and through the established IAS representative organization.

IAS has been a supplier of two common EAS solutions—IF and baseband switching. The IAS 700 series product line includes EAS receivers, decoders and all necessary peripheral equipment. Combined with FrontLine's All Channel Message (ACM) text messaging system, the alliance is able to deliver a flexible EAS solution.

The ACM product already has a large installed user base, with more than 280 installations worldwide. Recently, FrontLine adapted the ACM to offer a digital EAS system.

"(IAS was) closely involved with the FCC through the entire process of determining the EAS requirements for multichannel systems," said Tom Harmon, president of FrontLine, in a statement. "Obviously, this acquisition is a very logical and positive step for FrontLine."

In a recent telephone survey conducted by CableFile Research, users of Emergency Alerting System encoder/decoders said that they would choose the TFT Inc. EAS, by a margin of seven-to-one.

The Federal Communications Commission is expected to release a Report and Order on emergency alerting procedures in the near future.

The purpose of the survey, says TFT, was to determine which type of front panel design is preferred for day-to-day operation and setup—a four-key front panel, or the 51-key design TFT created.

Respondents were qualified in the survey as being actual users of both types of systems, and respondents' names were derived from more than 1,000 broadcasters and emergency management officials.

Subscriber equipment

ABC Cable Products LLC debuted its new line of universal remotes with enhanced memory at Cable-Tec Expo. The newly-designed 4-in-1 universal remotes were specifically designed to operate cable TV, TV, VCR and auxiliary functions like digital radio. In addition, ABC also offers the choice of enhanced memory retention, which would allow units to retain their codes up to 16 hours, or for more than 40 years.

Tools

Cable Prep has announced the release of its lightweight line of drop cable tools. Designed to increase user-friendliness, the Hex Crimp

Light and TerminX light are crafted from high-quality aircraft aluminum. The two tools are fully field adjustable, and the Hex Crimp also features a toggle mechanism for terminating standard F connectors.

The CPT Drop Cable Strip Tool is constructed from rugged plastic and comes with a life-time warranty against breakage. The patented "sweep" in the CPT model allows debris to be removed automatically after preparation.

Cable Prep has added a new compression tool to its product line. The PT-5000 Pocket TerminX tool has an ergonomic design for a positive grip that reportedly reduces hand fatigue and ensures a proper termination.

Two models are available, one for RG-6/59 and one for RG-7/11. It's factory-adjusted to a specific connector application and comes with one tip and a field alignment gauge. When the application changes, users can simply order a different tip, rather than re-tool.

Cable Prep has also announced its Pro Series Strip/Core Tool, which weighs about half a pound. The Pro Series PSCT retains all of the features of the original SCT in an aluminum body model. The strip core blade produces a beveled edge on the outer conductor which allows for easier application of the connector without damaging the inner O-ring and assists in virtually eliminating water migration after termination.

Lemco Tool Corporation unveiled a new one-step, multi-function coring tool. The new tool will combine jacket removal, coring, stripping, and center conductor pointing in one tool.

Meanwhile, dB-tronics showed its Pocket Toner, suited for checking continuity and helping techs find their way in a "rat's nest" of cables.

Equipment enclosures

RELTEC announced the CCP1016 Combined Connection Pedestal, an above-ground housing which can accommodate a joint installation of coaxial, copper and/or fiber distribution facilities and equipment such as taps, splitters, line extenders, splice modules, terminal blocks and splice cases.

The company also displayed its TV1831AFH and TV1228AFH above-ground, low-profile, 360-degree access enclosures, designed to provide maximum capacity and work area for multiple applications of trunk amplifiers, line extenders and distribution equipment.

Channell Commercial Corp. has introduced its new SPH1432 broadband electronics enclosure with the 600 Series HDC cover providing

"excellent" heat dissipation performance and featuring a new base designed for improved strength, cable storage and access.

"The heat dissipation capabilities enhance the service life of the new generation of network electronics and overall network reliability—our new enclosures are superior when compared to other plastic and metal enclosure designs," said Drew Zogby, VP of marketing for Channell.

Security is improved with the SPH1432 because of Channell's Self-Lock system, which provides a self-latching mechanism, making it easier for technicians to properly secure the cover. The Self-Lock system offers multiple lock head options consistent with industry standards and unique customer requirements. Constructed of high performance polyethylene thermoplastic, the SPH1432 comfortably houses line extenders and tap/splitter



Channell Commercial's SPH1432 enclosure

combinations. Easy access to cables and interior electronics is also featured.

Siecor Corp. introduced its new HouseBox (trademark name search pending) cable demarcation enclosure CDP series of network interface devices for broadband applications. Designed for mounting on the side of the home, the HouseBox enclosure is available in three different sizes and provides protection to the subscriber drop components. With the enclosure, MSOs can significantly reduce the number of service calls related to problems at the customer drop.

The unit's thermoplastic construction is highly resistant to degradation by ultraviolet light and will not deform when it comes into contact with common household insecticides. The enclosure is also equipped with rubber grommets to secure the cable entry points and help seal the network components, providing better security from the environment.

Satellite

Satellite Export & Engineering was joined by Nickless Schirmer & Co. (NSC), Superior Satellite Engineers (SSE) and Research Concepts Inc. (RCI) at their Expo show booth.



ILLUSTRATION BY A. RUGGIERI/THE IMAGE BANK

Keeping pace with the big guys

Turnkey ISP products, local content keep smaller ops in data race

By Michael Lafferty

Long ago (two, maybe three years ago) when the idea of high-speed cable modems really caught on in the cable industry, the idea that they could be the linchpin for an economically-viable datacom service in a 100-subscriber system (at least in this lifetime) was considered all but absurd.

My, my, what a difference just a couple of years makes.

As the top 10 MSOs stumble over each other rushing to the press rooms with the latest announcement on the newest system launches of their particular on-line data service (@Home, Roadrunner, etc.), innovative

software developers and hungry operators, small and medium alike, aren't waiting for the trickle-down theory of high-speed data to start flowing their way one drip at a time.

They're joining forces to catapult themselves and small-town cable subscribers onto the information superhighway today. The turnkey ISP providers bring their computer expertise and Internet savvy to the mix. The small- and medium-sized operators not only bring their considerable appetites for new revenue (and risk taking), but their close ties to the communities they serve. By capitalizing on those relationships, the operators and the service providers are looking to build a solid local content base on which to anchor their

new service.

It's a dynamic collaboration that's beginning to put smaller operators in the datacom big leagues. And while their subscriber numbers may not be all that big, the datacom services these smaller ops are putting together, with their strong emphasis on local content, are becoming as compelling as anything the big boys have on the street.

Worldly view of local content

One of the most innovative datacom services to come along is WorldGate's TV On-Line (TVOL) service. Led by a renowned former GI executive, Hal Krisbergh, the service shuns cable modems and their high-speed hype. Instead, TVOL's computing intelligence is based in the headend and uses eight VBI lines to send content to analog set-tops.

Subscribers can surf the 'Net with their remote controls or communicate via e-mail and visit chat rooms and newsgroups using a wireless keyboard. The service's "hyperlinking" capability gives subscribers one-button access to various Internet locations/options (web sites, e-mail, chat rooms, etc.) highlighted during TV shows and advertisements.

WorldGate's efforts to target the curious,

but unsophisticated, Internet user (...Connecting the Unconnected™) beg the question of what they're going to do to snag subscribers whose ignorance of the Internet could fill a couple of high-density disks. Ken Nimmer, WorldGate's vice president of consumer marketing, believes this indifference works to his company's advantage.

"This is Internet for the masses," says Nimmer. "Consequently, we don't believe a large number of our subscriber base will be that focused on surfing the 'Net, with its 10 billion pages. Instead, they will be going after things that are more meaningful, that are less threatening, that are less awesome. And that certainly includes local content."

Nimmer believes WorldGate's success lies, in part, with the parent who has school-age children. That parent knows there's a PTA meeting coming up, but can't remember where or when it's scheduled. That parent wants to check on his child's soccer team schedule, as well as its win-loss record. It's this type of



WorldGate's PC-less Internet service keeps local content front and center.

local content that Nimmer thinks will hook the unconnected to WorldGate's PC-less Internet service.

"That's what is going to get people to use this service," insists Nimmer. "Because it's a useful way to get information that they currently can't get very easily. We've broken our local content category down into such things as schools, shopping, restaurants, entertainment, and even a phone directory (see above) so that they can get the latest information. You

may want to find which restaurants are having special discounts, movie start times, or whatever. All of that will be a part of the local content category. And because we think it will be so important, local content will be on our main menu, which is the first screen people see."

This emphasis on local content, says Nimmer, has revenue implications for the operator as well. "We think that the local content category is something that will be extremely important to the cable operator for Internet TV. Because we think the local sales person can go out to advertisers and say, 'Gee, wouldn't you like to sponsor the school board Web page? Or wouldn't you like to do a page for City Hall or some other civic organization?' Tying in local advertising to local content and then getting people to use it, making sure they know that it's available, is a whole new revenue stream and something we're certainly going to focus on."

True grit = real success

While Bill Bauer may not be on a mission from God, he's certainly got the drive, determination and dedication to make it look that way. Bauer's tiny WinDBreak Cable system (110 subscribers scattered over the Nebraska landscape) and his newly-formed Internet service company, interTECH, are garnering a lot of attention from operators, both large and small.

Bauer has never let his system's small size hold him back. As a result, he's come up with a unique system that can put almost any sized operator on the Internet service map. His system shuns hard-wire connections to Internet service providers (T-1 prices in his neck of the woods: \$4,300 a month!). Instead, he's put his faith and his IP packets in the sky, using much more affordable VSAT technology.

The WinDBreak/interTECH system uses a 1.2-meter satellite dish for both uplink and downlink traffic to connect the headend with a national operations center (NOC) that, in turn, provides connection to the Internet backbone. Traffic is carried at up to 12 Mbps down to the cable headend, and 64 Kbps up from the headend. Data is sent through a PC-based router connected to an HTTP/proxy server, which is connected to the cable network by 10BaseT Ethernet and cable data modem launch equipment. Cable customers connect through 4 Mbps cable modems.

While the technological achievements his system features are considerable, he hasn't forgotten that content is what is going to make his system a winner among subscribers. Bauer readily admits he doesn't have the budgets the big boys have to develop and deliver content.

Yet, that hasn't stopped him from coming up with his own approach to the problem.

"How do we keep it new, fresh and alive all the time," asks Bauer, "without breaking the bank? I'm going in a bit of a different direction when it comes to content. How do we connect local stores, organizations and other events with all the information that's on the Internet? Me creating more content for the Internet is ridiculous. There's so much out there now.

"It's more important to direct people to what's out there. Which is quite a bit different from what @Home and Roadrunner and all



WinDBreak's Navigator site can be changed 'on the fly' from the headend.



Easy-to-read and navigate around, subs find help quickly.



WinDBreak subs get the news they want fast with a simple click.

these others are doing. They're going and presenting the content to the customer. I just want to point them in the right direction."

To help his datacom subscribers find the Internet path they want, Bauer and his small staff have been working on the system's Navigator or homepage (www.windbreak.com)

to make it even more user friendly, and even entertaining, he says. "We have to move past the technology stage and move to the idea that we're in the entertainment business. And this is an entertainment service to some extent."

Using the VSAT satellite system, Bauer explains, allows him to do IP multicasting. What that does, he says, is allow him to send out one packet of information to, say 500 sites. "And what that can do," says Bauer, "is change the background, change an icon, move things around to keep it (the homepage) fresh and new all the time, whether it's my particular system or another interTECH system three states away. Because the Internet changes so rapidly, sites get really old in just weeks. And

need in the datacom arena. For example, Bauer says there is a virtual void in the industry when it come to effective datacom test equipment.

"There are no pieces of test equipment out there. And we've been working with an engineer to develop some new software/hardware combination that will work and is affordable. And we did the first plant testing on it recently. It was great."

He reports that with this new testing device, he was able to learn "more about my cable system in two days of work than I've known since I started the plant. We were able to track down an end-of-line seizure screw that had not been tightened. It had no effect on the video

signal, but we were seeing a reflection on some of the testing we were doing. And, we are looking at a platform that is \$2,500, not \$20,000. And it's giving us more information than we can get from a spectrum analyzer."

The interTECH system has been designed with its creator and his bill-fold in mind. "It's a simple system that doesn't cost a lot, and it works," says

Bauer, who has spent about \$17,000 to get data service up and running in his Harrison system. In his discussions with other operators, Bauer quotes a price of about \$19,000, to give himself some "wobble room." The price quote includes equipment from Zenith, which Bauer considers to be the most cost-effective today.

"We can purchase cable modems for \$318 right now (the Zenith 4 Mbps product). What interTECH is moving toward is having a high enough order volume to be able to move to the \$299 price. If you buy 1,000 modems you can get them for \$299 each. What InterTECH will do is buy that volume of modems and sell them at that price. It's to our advantage to give the operator any help they can get. Because we'll get our income from on-going revenues with support and other services."

The plight of the smaller operator in an industry that's dominated by cable behemoths is not all that bleak, as Bauer's system has shown. But, he's convinced there's a real danger to the entire industry and small communities themselves if the small operators succumb

to outside competition or don't take the opportunity to support their communities in new ways.

"I've been looking at an interesting opportunity," says Bauer. "There is a cable operator that has 34 headends and a total of 3,600 subscribers. So, that's roughly a little over 100 subscribers per headend. They have no big systems. I think their biggest system is something like 270 customers.

"Now, how do they stay viable? How do they make money in markets with 19-channel systems? When you're looking at a system designed this way, how do they survive? How do they compete against DirecTV and other DBS competitors? What is it they can offer that gives them some strong revenue and is something they can do better than anyone else? The Internet fits the bill perfectly.

"The thing we keep forgetting is that as people in smaller communities keep buying dishes and doing things outside the community that don't bring revenue back into the community, it fosters a long, steady decline. These communities are going to die. So, what the cable operators can do is help their communities stay alive and vibrant. They can help residents keep a strong interest in these communities that are the heart of our nation. And cable is out there and it can make it happen."

Ramping up in Virginia

One of the most ambitious and accomplished smaller system Internet rollouts is occurring in a burgeoning suburb 35 miles west of Washington, D.C. Cablevision of Loudoun (county) and Community Networks Inc. have joined forces to forge a dynamic service that is ramping up to serve a population with almost ideal demographics.

According to Max Kipfer, vice president and general manager of Cablevision, his system's demographics almost beg for an Internet service. For example: the median income is \$84,000; average monthly cable revenues are \$50; 70 percent of all homes have a PC—and 18 percent have two; 35 percent subscribe to an on-line service; and the area is growing rapidly—10 percent new home growth per annum.

Cablevision's 32,000 computer-savvy subscribers are about to experience the roll-out of a service that's generated a waiting list of nearly 400 people simply by word-of-mouth. CNI's turnkey approach (data network design, systems integration, local and national content development, network management, customer support, etc.) has obviously struck a chord in this Virginia community.

Not one to spend money when he doesn't



Bauer's WinDBreak Cable Online service and its unique satellite delivery system continues to draw interest from around the country.

it's hard to justify having a graphics person on staff full-time for a 100-subscriber cable system. This way, it stays fresh. It makes it look like that system has that kind of staff that does all these kind of things."

Bauer's sites are also trained on developing his service for local businesses as well. As far as he sees it, there's no reason why the local shoe store can't cash in on a national promotion or sale.

"What I have envisioned, for the future," explains Bauer, "is a way to sell products over the Internet. It's basically akin to QVC on line. But I want to take it to the next generation, to where, say, Nike wants to sell a certain brand of shoe. And they put an ad in our cyber mall. The customer goes in and buys the shoe and the shoe gets delivered to the local shoe store, not to the customer. So, the customer goes down to the store, where he makes sure everything is all right, the shoe fits, etc."

Bauer's focus on content for his system and interTECH client/operators hasn't swayed him from developing technology he and others will

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have to, Kipfer notes the system has been designed to grow at its own pace, beginning with telco-return cable modems. The effort began, says Kipfer, about a year ago, when the system was upgraded to 550 MHz. Bob Dattner, Cablevision's chief technical officer, approached Kipfer about reserving some of the new bandwidth for Internet access.

"We went round and round about it," reports Kipfer, "and I kept saying, 'Give me a business plan, Bob. You know I sell cable. I

you're doing to your image and what you're letting your customers get used to in the meantime... Why let your customers buy an ISDN line, when a year from now you can blow it away when MCNS modems kick in. Let them buy from you right now and establish the relationship."

In the meantime, says Kipfer, Cablevision not only establishes a strong relationship with its new Internet customers, it also gets a jump on what neighborhoods are primed and ready for two-way cable modem service.

"What we decided," says Kipfer, "was that we'd let market demand decide where to go two-way. So, if a specific community or a specific set of streets seems to have a heavy concentration of one-way users, we'll just upgrade that area. That way we're upgrading because we know there is demand, as opposed to upgrading in anticipation of demand.

"We think the penetration numbers are probably around 10 to 15 percent. When we start getting those numbers, it almost justifies that area to be turned to two-way. We've allocated enough channel space to be able to support both a one-way modem and a two-way modem service."

Kipfer and Dattner readily admit that their



Kipfer

current customer base of about 120 people contains a goodly portion of "wunks" who have gone ga-ga over the speed of their cable modems. But that doesn't preclude them going after others who look beyond the speed for some Internet substance. "I think we get the early adopters just by saying we're fast," says Dattner. "So take a guess, maybe that gets you 5 percent. I think the next 5 to 10 percent are the people who want to buy it, but they need an excuse to buy it. So you say, 'Look, read your homeowner's association newsletter. You've got kids in school. We'll give you an e-mail account. We'll teach the teachers how to give your kids homework over the 'Net.' So, I think you get some people out of that.

"The people that I'm really interested in can barely handle the point-and-click of Windows. Maybe they can handle their Macintosh. With the Pulse product that CNI is developing, when you sign on, it suggests places for you to go on the Internet. So you don't have to go surfing. You just point and click and it takes you to interesting places. And it's intelligent

software. We're probably six months to a year away from having something I would say is a good product."

When fully developed, the Pulse local con-



After logging on Cablevision's 'Net service...

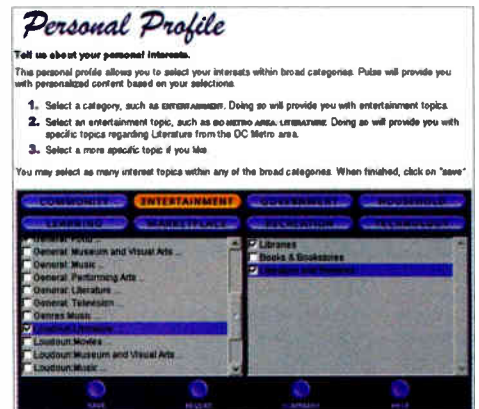


the world is just a point 'n click away.

sell video. That's what I've done. I'm not opposed to it, but you've got to show me that I can make as much money selling the Internet as I can selling another Playboy service or something." Kipfer says, after considerable research, lots of inquiries and more than a few meetings, Dattner came up with "a business plan that made some sense, but it involved not doing it on our own, but in partnership with CNI."

Both felt there was an urgency in their efforts to get an Internet service rolling. Their bright, affluent customers, they were afraid, might commit to some other service that would leave Cablevision out in the cold down the road.

"What we're doing right now in my mind is a no-brainer," says Dattner. "Any cable system that isn't using at least 6 MHz to do a telephone return, I wouldn't say they're quite making a mistake, because maybe if they wait six months they're better off. But boy, what



Personal profile individualizes web access

product will take a lot of the worry out of Internet surfing. Subscribers, when they initiate service, will be asked to fill out a personal profile that details subscriber interests, whether it be antiques, wine, travel, or bottle cap collecting. Once completed, the profile serves as a guide for the Pulse program to search out the Internet for sites that fit that profile. Whenever subscribers sign on, they can check to see what the service has found, and with a simple point and click, they'll be at a site that fits their particular interest.

Kipfer and Dattner report the beta tests and the initial rollout have taught them a variety of important lessons. Their contract installer force, in large part (approximately 60 percent) took the installation training (which includes



CNI's equipment rack in Cablevision's office

installing computer modem cards) and are doing well. They've established two-man installation teams, even though one could do the task. It seems they've found that customers aren't quite ready to accept the idea that the guy crawling around in their attic pulling cable wire has the finesse to crack open their computers.

Kipfer has also made the executive decision to keep



Loudoun community info easy to access

cable invoices separate from Internet service payments. He thinks the \$39.95 unlimited access charge for the Internet service could have a detrimental effect on the average \$50 cable bill. "I'm currently in favor of separate billing," explains Kipfer. "I'm just not sure customers are ready to see a Cablevision bill that says \$90 owed on it, even though I think that's just perception."

"But, I don't want to jeopardize my \$50 a month average revenue by throwing a \$40 CNI bill on that. I'm afraid people will look at their cable bill and there will be a cannibalization effect on our cable services."

Turnkey tango

Another entrant in the turnkey Internet tango contest is Online System Services (OSS) based in Denver, Colo. What originally started out as a web development and consulting firm, has branched out to fill what they think is a pressing need—Internet access for small-to medium-sized communities.

"One of the areas we identified," says Steve Adams, OSS president and CEO, "was that smaller communities weren't being provided Internet access, at least at good rates. A lot of the smaller communities were having to dial up through 800 numbers or whatnot and were spending \$8, \$9 or \$10 an hour to get that access. So, we put together a package that integrated hardware and software, and developed some of our own proprietary software, and ended up with our own turnkey package—the Community Access America (CAA) product."

Adams says the OSS package is more than so much hardware. "This isn't just a bundle of hardware and software," he explains. "We've got a complete system that supports the cable operator in getting into this business. We've developed very comprehensive business models so that we can go in and do an analysis of the market. We figure out how many subs are there, what the demographics are, the PC penetration of the market and

what the potential return on this is. We help calculate break-even point. So we go through and really help the operator develop their whole business model."

The company has begun two trials of its system. In Kingsport, Tenn. a hybrid telco return system is being installed, while full two-way LANcity installation is taking place in Kansas. In their dealings with these and other operators, Adams has found a few things that seem to send chills down cable spines.

"We found two things that really scare the hell out of cable operators about this whole thing," says Adams. "One, is help. Where do you get technical support? Where does a cable client go if their modem isn't working? And that really scares them. So we're providing that service and getting rid of that fear. The second one is the installation part. I mean, I've sat in the room with the top execs at TCI and watched them go pale when you



Homepage for Kingsport, Tenn. trial

talk about opening up the computer case and installing a modem inside. Their next thoughts are liability, lawsuits, what happens when they format the hard drive accidentally, or whatever?"

"So, the other thing we help the cable operator with is that we will work with the cable modem manufacturer, whomever they select, and we'll go into that community and identify the dominant PC retailers. Then, we'll go to those retailers and say, 'Look, we're going to be using GI modems or whatever in this system, and we'll train your people on how to install them.' So, when the subscriber wants to get his cable modem installed, he takes his PC over to the retailer and pays for the modem and the installation.

"That does two things for the operator. All the cable installer has to do is run a splitter and plug in the coax. Secondly, it gets that cable modem off the balance sheet. That capital investment is not an issue."

Adams says the technology doesn't obscure other operator needs. They're currently in the process of finalizing their Community Access

Partnership product, a local content creation software program. "It's probably one of the most important features that we have," says Adams. "And what we've done there is that we've spent better than a year now, and I'd hate to admit how many dollars, developing a very feature-laden and robust Web content development system for a local community.

"We've gone to the extremes, because in a smaller community the cable operator may not have someone who's got the technical expertise. We've done it so you can provide local

content for businesses, schools, the media outlets—radio, newspapers, television—without having to be technically proficient. If you can type, you can develop content for community groups.

"So, what we've done in this Community Access Partnership program is put together a method for content to be provided on a local basis, where the cable operator acts as the aggregator of all that. And, probably most importantly, we've devised a way to lower the barrier of entry for merchants to sell their products and services on-line. So, instead of spending thousands of dollars, we can really reduce the cost of that, and it becomes financially viable for a small store to sell on-line."



Typical equipment rack with Cable Access America hardware



Online community section for Kingsport, Tenn. OSS/CAA trial

These service providers are just the tip of a growing iceberg. Internet access is no longer confined to the big-budget MSOs. Technology, ingenuity and a fair amount of chutzpah has given smaller operators the leg up they need to stave off competition where it hurts most—in their own backyard. **CED**

Signs point to Weapons come in a range of frequencies broadband wireless onslaught

By Fred Dawson

Wireline network operators should be prepared for an onslaught of new competition from users of advanced broadband wireless technology, notwithstanding the myriad factors conspiring to delay the LMDS segment of the new sector from getting started.

While failure of the government to open 1.3 GHz of spectrum to local multipoint distribution services within targeted and repeatedly delayed timeframes has clearly dented the potential competitive impact from the wireless side, technology has pushed ahead to where the

Inc., supplier of advanced wireless systems now being deployed commercially in South Korea, and soon to be deployed in field trials in the U.S. and elsewhere.

BNI is putting gear into play at MMDS (2.5 GHz), 24 GHz, LMDS (28 and 31 GHz) and 38 GHz tiers, demonstrating that, where abundant reaches of radio spectrum can be found, so, too, can a viable, low-cost means to broadband access.

"We're frequency independent from 2.5 GHz to 42 GHz," Graves said, explaining that the choice of which frequency range to operate in can be made via software without requiring alterations in hardware.

Evidence as to how far the technology has come abounded at last month's Supercomm convention in New Orleans. Companies demonstrating production-ready and, in two cases, already-in-production integrated service broadband LMDS systems included BNI, in conjunction with Siemens Stromberg-Carlson and Newbridge Networks Inc.; Texas Instruments Inc., in conjunction with Bosch Telecom Inc., and Hewlett-Packard Co. ADC Telecommunications Inc., which has LMDS gear in development, showed its MMDS wireless broadband system, a version of which is being used in a trial by wireless cable operator CAI Wireless Systems Inc. in Pittsburgh.

The Supercomm demonstrations represented the first time anywhere that such capabilities had been demonstrated in one place by multiple vendors. BNI's system, linking a primary transmitter/receiver at the BNI booth with compact transmitter/receiver antennas located at the Siemens and Newbridge booths, used solid-state technology and a proprietary implementation of ATM (asynchronous transfer mode) to deliver circuit switched voice integrated with two-way Internet and other data hookups over a 6 MHz channel, with another 6 MHz devoted to broadcast MPEG video.

This and other demonstrations of sterling quality voice and data links in the hostile multipath environment of the New Orleans convention center contradicted the message coming out of Washington, where FCC officials leaked word they would miss the latest unofficial LMDS auction target date—mid-summer—by several months.

While Commission officials, speaking on background for publication, attributed the new delay to the work backlog at the agency, they were offering other justifications privately, including the contention that further delays in LMDS were not harmful because there wouldn't be equipment available to support service launches even if auctions had been held this summer. Moreover, some Commission officials were said to have insisted, lack of gear is a function of lack of interest in the technology, which could translate into limited Wall Street support and a poor showing for the auctions.

Making matters worse for LMDS, the United States Telephone Association and Ameritech have filed petitions asking U.S. appeals courts to overthrow the FCC's Second Report and Order on grounds that the agency's partial ban on telco (and cable) bidding on LMDS spectrum is unconstitutional. Under the ban plan worked out by the Commission, cable and telephone companies would have access to only 150 MHz

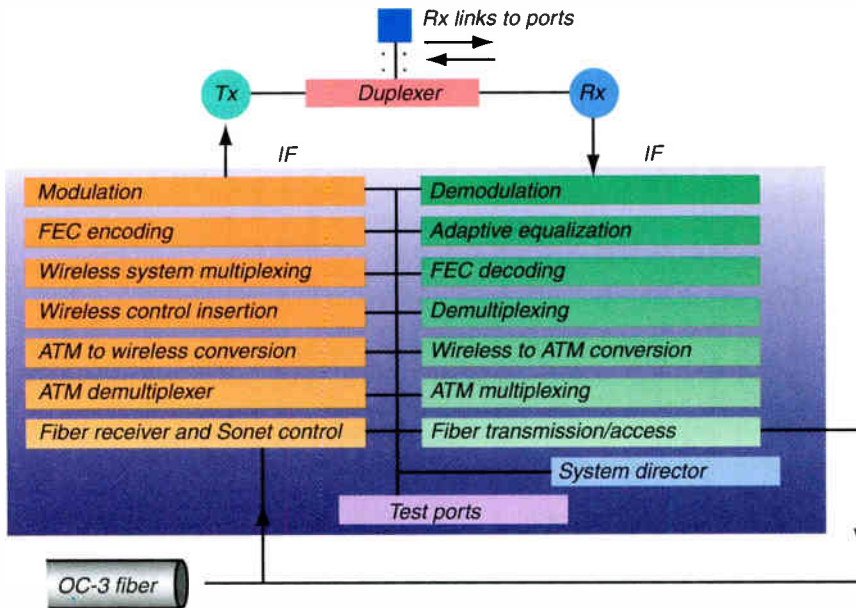


Figure 1: Network node equipment. The network node equipment, available in a variety of configurations, is the heart of the wireless ATM network and provides system-level command and control. The illustration shows the discrete functions of the network node.

Source: BNI

means of attack are available across many frequency zones outside the 28 and 31 GHz LMDS segments. Cases in point include preparations by leading companies at the already-licensed MMDS (multichannel multipoint distribution systems) and 38 GHz tiers to begin field trials of interactive point-to-multipoint systems before the year is out, and a possibly even faster push into the wireless broadband market by Associated Communications, the wireless broadband firm headed by former AT&T senior executive Alex Mandl.

"There's growing recognition that wireless spectrum affords an opportunity to move quickly into broadband communications ahead of the wireline carriers, and people are acting on that opportunity," said David Graves, chairman and CEO of Winnipeg-based Broadband Networks

of spectrum within their operating territories, leaving 1.15 GHz at the 28 and 31 GHz tiers to be used by a single licensee in each of 493 basic trading areas.

"If they would just set the date, we'd all have something to go on, including a sense that what they're telling us in private about (getting auctions underway in) November has any more meaning that what they've told us before," said an angry executive at one LMDS firm, asking not to be named. "Even with the telcos' court action, the failure to set an auction date is significant, because, if the telcos are going to ask for a stay, as everyone assumes they will, the courts will be forced to act on the question sooner than later."

Sources said LMDS interests, worried that the latest delays could drag out beyond November, are discussing ways to gain assistance once again from key figures in Congress, including Senate Commerce Committee Chairman John McCain (R-Ariz.), who earlier this year demanded in a letter to FCC chairman Reed Hundt that the commission move forward expeditiously with LMDS. But, with Hundt leaving the Commission and three other Commission seats in the process of being filled, it may take awhile before any new political pressure finds a target.

Meanwhile, the 28 GHz players are nervously watching on the sidelines as competitors at other frequency tiers prepare to begin field tests of the newest generation of wireless broadband gear. FCC officials "sit there making these statements (about lack of equipment availability) at the very moment when, in a major public forum half way across the country, a bunch of vendors are proving them wrong," said one LMDS company official, in reference to the Supercomm demos.

"As for their worries about who wants LMDS spectrum at a moment when demand for local access bandwidth is going crazy, you've got to wonder whether they understand the differences in spectrum economics between PCS and LMDS," the LMDS executive said. "In PCS you have a glut of operators competing with 30 MHz or less spectrum, and in LMDS, you have a single operator making use of 1.15 GHz to deliver fixed broadband services for which competition is virtually non-existent."

Not only are vendors known to be in the wireless broadband sector now bringing advanced gear to market; other, major players in telecom are about to introduce systems for LMDS, sources said. "There are some big shoes to drop—Motorola, Lucent (Technologies) among them," said one executive, asking not to be named.

"The Commission's handling of this matter is horrible," said David Mallof, president of Webcel Communications Inc., a startup in the broadband wireless sector. "We have the technical means to finally bring competition to the entrenched carriers, and we can't use it."

Intended or not, one of the consequences of the delay that has LMDS interests most concerned is the advantage already-licensed Associated Communications is likely to have in being first to market with point-to-multipoint systems capable of serving a large market base. "There are some people, and I don't know what to believe, who see the FCC's handling of LMDS as part

of the action on Associated," said another LMDS executive. "But, whether or not it's true, it's clear the LMDS delay is going to help Alex Mandl."

Associated, licensed to operate nationwide over 400 MHz of frequency at 24 GHz, vs. the 28 and 31 GHz regions reserved for LMDS, formerly was authorized to operate at 18 GHz, which turned out to be a problem for fixed satellite service startup Teledesic Corp. The shift set Associated back, or so it was claimed, though Associated, just like everyone else in the fixed wireless broadband zones, is just seeing the gear it needs coming into the market. Indeed, if the FCC had acted expeditiously last year to hold LMDS auctions in the fall, as its Wireless Bureau chief had indicated it would, everyone would be at the starting gate as the new equipment, much of it easily adaptable across several frequency tiers, comes off the assembly lines.

Depending on operating frequencies and power levels of the system used, signals over this new gear can reach and can be sent from all points of connection over a service area measuring anywhere from two to four or five kilometers in radius from the central transmitter. Line-of-sight is important but becomes less so as the wavelengths shorten and become more coherent at high frequencies, supporting good reception and return path transmission via reflective surfaces. The downside is that, as frequency increases, viable propagation distances go down, requiring installation of more transmitters per region.

"What we're demonstrating is the viability of technology that can be applied at many (frequency) levels," said Ed Cantwell, president and CEO of Bosch Telecom Inc., the newly expanded U.S. unit of Germany's Bosch Telecom GmbH. "With the delays at the FCC and other factors affecting the regulatory environment for LMDS, we felt we had to have this kind of diversity to survive."

Bosch, in conjunction with an expansion of its U.S. presence, is acquiring the multipoint systems unit from Texas Instruments Inc., where Cantwell was a senior executive. The company has moved its U.S. headquarters from Gaithersburg, Md. to Cantwell's base in Dallas in preparation for what it sees as a major market swing to broadband wireless.

Bosch, with two-way point-to-multipoint gear operating at the 10.5 GHz tier in the U.K., is moving quickly to providing such capabilities at 24 GHz and 38 GHz as it taps into the technology developed by the former TI group, said Arno Kosko, vice president of business development for public networks at the parent company. "We'll have hardware for the 24 GHz segment very shortly," he added.

Demand at 38 GHz for point-to-multipoint high bandwidth systems is a primary reason that wireless supplier Allen Telecom Inc. has just committed to investing \$4 million for a 19.9 percent equity interest in millimeter-wave equipment startup WINDATA Inc. of Littleton, Mass., said Allen Telecom CEO Robert Paul. "Long term, our plan is to supply the LMDS market, but we see an immediate opportunity in the 38 GHz sector," he noted.

With 38 GHz product in the prototype phase at WINDATA, the Allen investment will be sufficient to bring the product to market very quickly, Paul said,

**As frequency
increases,
viable
propagation
distances go
down**

First-to-market opportunities may be strongest for MMDS licensees

declining to be more specific about timing. "The first couple of suppliers to market are going to end up with a pretty good market slice," he added.

Improbable as it might seem for companies struggling to survive in wireless cable, first-to-market opportunities in broadband wireless may be strongest for MMDS licensees, some of whom are looking at use of their airwaves at the 2.5 GHz tier as a means to offering two-way communications in the consumer and small-office sectors.

"What we're seeing is everyone is racing to develop equipment for these applications, so there's going to be a change in how MMDS operators approach their business," said Patrick McConnell, director of advanced technology and government affairs at American Telecasting Inc., the nation's largest MMDS operator.

ATI is working with another MMDS company, CFW Communications Co., in a test delivering voice services over CFW's facilities in Waynesboro, Va. using frequency-adjusted CDMA equipment built to the PCS IS-95 standard by Motorola Corp. The test will seek to determine the CDMA propagation characteristics at 2.5 GHz over the full reach of a single MMDS transmitter tower, which extends out to about 40 miles.

Along with determining the viability of two-way voice links over so large a transmission area, the test will look at "how much capacity can be squeezed out of CDMA in a fixed versus mobile environment" and at the extent to which transmission beams can be sectorized to accommodate reuse of frequencies, said Bud Zirkle, COO of CFW. "We're also interested in seeing whether CDMA delivers better performance with regard to line-of-sight requirements than we typically get with MMDS signals, which we think it will," he said.

CFW, which also holds PCS licenses extending across much of western Virginia and parts of Maryland, Ohio, Pennsylvania and Tennessee, is looking at adding a fixed service via MMDS to its mobile service package. ATI is considering moving to fixed voice service offerings in its major markets, including Denver, Portland, Ore. and Seattle, McConnell noted.

Moving along a similar, but technologically different track, is CAI Wireless, another leading MMDS operator, in its tests involving ADC's gear in Pittsburgh. Voice and data services "could become important new revenue streams in our industry," said John Prisco, president of CAI. "MMDS has a speed-to-market advantage that could have a big impact on the marketplace."

CAI, with a special FCC permit to use its Pittsburgh facilities as a "two-way wireless laboratory," will move into two-way data in the near future, Prisco said. "We're also working with other vendors so that we can determine which platforms are best suited to our needs," he added.

One of the challenges MMDS operators face is finding ways to maximize efficiency of the limited amount of spectrum they have available, given their desire to provide TV as well as two-way services. "The old view that we're spectrum limited doesn't apply when you look at what digital compression means to efficiency in video services," McConnell asserted. "With new statistical multiplexing techniques combined with MPEG compression,

vendors are talking about delivering 12 or 13 video channels per 6 MHz channel, which means we get to something like 240 TV channels using 120 MHz of spectrum."

That leaves about 16 MHz to play with within the contiguous spectrum region most operators have at their disposal, which might be enough to serve reasonably high levels of penetration using highly sectorized antennas that permit reuse of frequency across the serving area. "They're talking about 27 sectors with 27 different base stations co-located at the transmitter," noted John Powers, director of PCS market development for Motorola's Cellular Infrastructure Group.

While this degree of sectorization would support significant levels of penetration, there would still be a question of whether costs, including customer premises equipment, as well as the base stations, are low enough to make this approach competitive with wireline alternatives, Powers said. "It may be hard to cost justify in highly populated areas, but it might be viable in rural sectors," he noted.

However, based on "the very compelling" penetration expectations surrounding the use of sectorization in the Waynesboro test, ATI should be able to implement fixed telephone services in its markets at costs that would be competitive with other new entry technologies, McConnell said. "We're not looking on this as something for limited pockets of the service area," he noted.

"There are two schools of thought on this, where you can either sectorize the antenna to get frequency reuse across multiple segments from the transmitter or build more transmitters, in effect cellularizing the network," McConnell added. One reason sectorizing is more appealing to ATI is the growing resistance in communities around the country to installation of ever more radio transmitters. The harder cities make it for operators to build networks, the more operators have to pay for available sites, McConnell said, adding that "infrastructure costs for wireless networks are going through the roof."

CAI, having decided not to use CDMA, is taking the cellularized approach to exploring advanced services options. "CDMA is not spectrally efficient compared to the technologies we're looking at," Prisco said.

ADC's system employs 32 QAM (quadrature amplitude modulation) in the downstream and OFDM (orthogonal frequency division multiplexing) in the upstream. While these modulation techniques achieve much higher bit counts per available bandwidth than CDMA, they are less robust in coverage, meaning that, where a CDMA, highly sectorized system might work from a single transmitter, use of QAM and OFDM might require multiple transmitters to achieve required coverage.

"If we can demonstrate the viability of these services over our airwaves, the market opportunity is such that it might make sense to move to a cellularized deployment of transmitters," Prisco said. "If we can provide a full range of broadband services supporting high levels of market penetration over a transmitter radius of five to seven miles, we'll have an enormous advantage over LMDS or 38 GHz systems, where we think the cell radius will have to be in the one- to two-mile range to achieve comparable levels of coverage."

Whichever way MMDS operators go, Prisco asserted they have a time-to-market advantage over wireline access systems, notwithstanding the technical testing MMDS operators must perform before moving ahead with system upgrades. "Our opportunity to be first to market with high-speed data services is not going to go away overnight, given the upgrade and other issues that the telcos and cable operators face," Prisco said.

But MMDS operators will have their work cut out for them trying to maintain any early lead ahead of the stampede into broadband wireless that can be expected from other, less bandwidth-restricted spectrum sectors. "You'll start to see rollouts and trials soon, which will go a long way toward stimulating interest in broadband wireless local loop," said Doug Smith, vice president and general manager of BNI. "The real question is when those operating companies who are doing this will go public with their activities, because that's the key to getting the market focused on this opportunity."

Of course, drawing widescale attention from potential competitors is exactly what those in the know within the wireless operating community want to avoid. Publicly, companies like AT&T, MCI and GTE will attest only to a casual interest in LMDS, though AT&T officials acknowledge that, with their fixed wireless loop strategy they're looking at all tiers for broadband extensions. But these three and other firms such as 38 GHz operators Winstar, BizTel, now owned by Teleport Communications Group, and Advanced Radio Telecommunications, are much more committed to LMDS than they let on.

"AT&T, MCI and GTE are strongly focused on LMDS at this point," said a wireless industry consultant, asking not to be named. "But the longer the FCC takes in getting auctions underway, the less good it will do them to stay under cover, because the technology is just too compelling to ignore."

The challenges wireless operators now face are not unlike those of any other entrants in broadband competition, including incumbent carriers. While incumbents have a big headstart, all players face the daunting twin tasks of implementing a means of integrating and managing traffic at the physical layer while putting together an overall OSS (operations support system) to handle administration, maintenance and billing across all service categories.

Wireless broadband appears to be headed for some iteration of ATM (asynchronous transfer mode) as the means of integrating traffic, but most vendors are shying away from ATM in their initial products, given a

lack of standards for ATM in the wireless domain and a general feeling that ATM to the premises is not a prerequisite to getting broadband services underway in wireless anymore than it is on the wireline side. In fact, where the "nailed-up" version of ATM transport, as in private virtual channels, is concerned, digital systems like Bosch's are indifferent to the format. "Things are

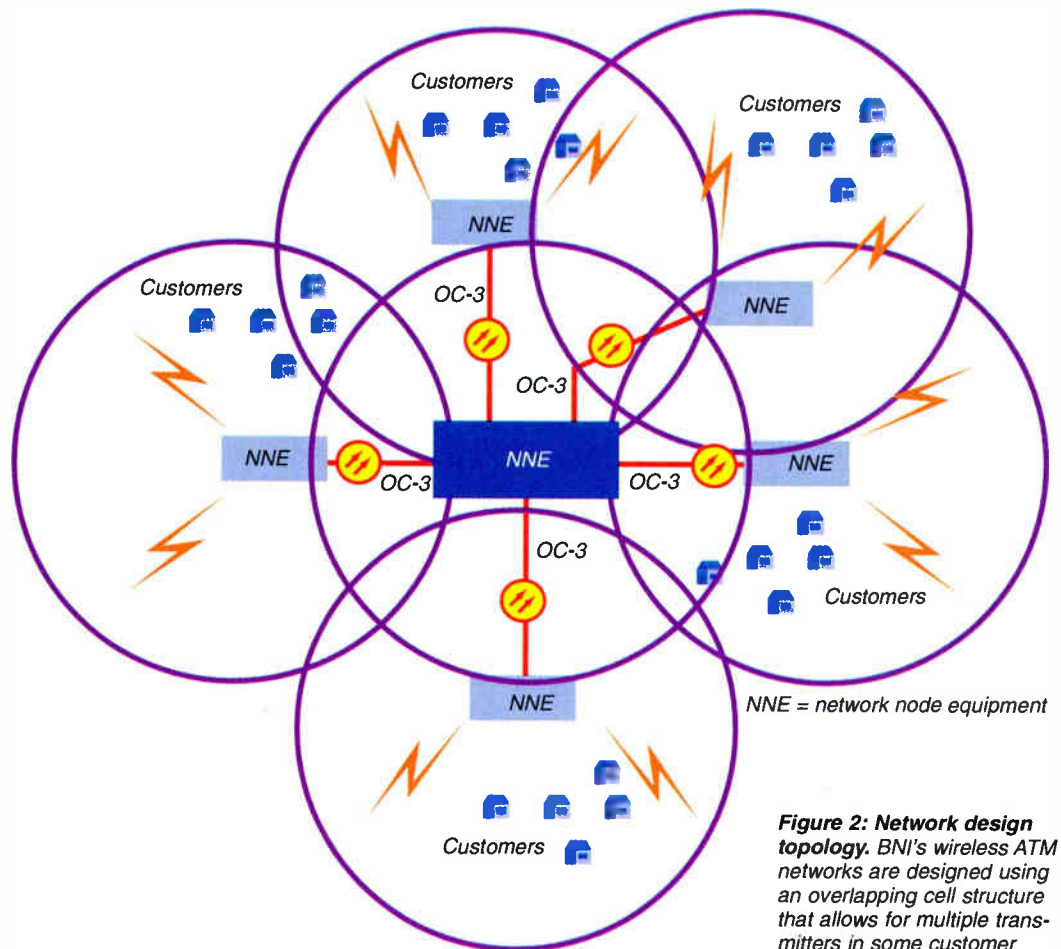


Figure 2: Network design topology. BNI's wireless ATM networks are designed using an overlapping cell structure that allows for multiple transmitters in some customer areas to meet demand.

Source: BNI

too unsettled in ATM to be worrying about anything past provisioning PVCs at this point," Cantwell said.

BNI, seeing things differently, is partnered with Newbridge, and, by extension of the Newbridge-Siemens alliance on ATM, with Siemens in development of an ATM solution for broadband wireless. While BNI's system offers operators flexibility to use ATM-based or TDMA (time division multiple access) formats, the goal of the partnership is to provide a fully integrated service solution in an approach to ATM that will be offered as a proposed standard in international forums.

"Anybody who says this technology is not ready to deploy isn't paying attention," Smith said. Like any other manufacturing sector, what's needed to crank up the assembly lines in broadband wireless isn't more system design, he said, it's the final tweaking of systems into production that can only be accomplished through beta tests, which, so far, are out of reach for the LMDS sector, but certainly not for the others. **CED**

Cable management system

SPOKANE, Wash.—Telect Inc. has improved its modular cable routing and protection system to address a variety of application environments. Recently renamed CableLinks, the company's cable management system is fully modular. Its design focuses around a series of flexible "links" that snap together and configure to the customer's specific



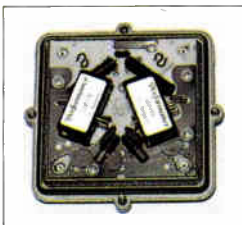
Telect's CableLinks

needs. The links tilt and pivot both horizontally and vertically to maintain critical bend radius and protect fragile fiber from bending, kinking and crushing. Heavy-duty plastic routing channels rotate to conform to any degree turn while maintaining a minimum bend radius for the cable. New components include several transition pieces to help users customize cable routing patterns to their specific needs.

Circle Reader Service number 51

Circuit breaker

ROSWELL, Ga.—New from Performance Power Technologies is the Performance Model SG15A Surge-Gard circuit breaker, which replaces standard fuses in Jerrold SSP power insertors and automatically resets in 60 seconds after being tripped. The device is designed for use in locations where fuses frequently blow for no apparent reason, and it installs directly into ordinary fuse holders with no alterations.



Performance Power Technologies' circuit breaker

The circuit breaker contains a snap action auto reset thermal mechanism approved according to UL standard 1077. The voltage rating is 250VAC maximum and has a typical life of 100,000 operations at 2X rated current. Maximum interrupt capacity is six times the rated current.

Circle Reader Service number 52



Single chip for modems

SUNNYVALE, Calif.—A new ASIC chip from Stanford Telecom incorporates all of the modulator/demodulator functions required for subscriber modems in hybrid fiber/coax cable systems, says the company.

The new chip, the STEL-2176, is designed specifically for the reception and transmission of data over broadband coaxial cable networks. The ASIC includes convenient interfaces and integrates upstream and

Communications cabinet

CHAMBERSBURG, Pa.—Hennessy Products Inc. has introduced a new cabinet design—the Modular Universal Communications Node (M-UCN), engineered to be both modular and expandable. The cabinet is completely climate-controlled, constructed of aluminum, and designed to meet Bellcore specifications. Its flexibility makes it suitable for various applications where protection of sensitive electronics from outdoor conditions such as extreme temperatures, wind-driven rain, earthquakes and vandalism is absolutely essential.

Engineered in modules, the M-UCN is capable of allowing the installer to finish the final assembly process at the job site. Rooftop applications are simplified as each module fits into an elevator. The system can be expanded by adding the required module to the already-installed cabinets. In addition, the M-UCN can be provided with various climate control options such as air conditioners, heat exchangers, heaters, insulation and the Hennessy Environmental Control Unit (ECU), which controls the various climate-control components installed and allows for remote monitoring.

Circle Reader Service number 53

Module for mini-OTDR

MORGAN HILL, Calif.—Anritsu Wiltron Company has introduced a new module for its MW9070B mini-OTDR that allows it to achieve 40 dB dynamic range. The mini-OTDR's resolution has also been enhanced to



Anritsu's mini-OTDR

1 m at distances as far as 100 km and is Bellcore GR-196-CORE compatible.

The unit, says Anritsu, is the only mini-OTDR that combines fine resolution over long distances

with a high dynamic range. The pairing of the two allows users to find splices or breaks in fibers with 1 m resolution over both short and long-haul lines.

Anritsu has also improved its emulation software so that it complies with Bellcore's GR-196-CORE standard. Users can now take OTDR trace data from any source, combine it with data collected by the MW9070B and manipulate it on a PC. A hard copy can now

Stanford Telecom's STEL-2176

downstream clock plans. This will result, says Stanford, in a reduction of the size and cost of the modem equipment used at the subscriber location. Expected applications include Internet access, interactive cable TV, and digital telephony over cable.

On the downstream path, the demodulator section of the STEL-2176 is programmable to receive 16, 64, or 256 QAM signals, with high acquisition speed. On the upstream path, the modulator section is programmable to either QPSK or 16 QAM PSK modulated signals, with optimal spectral shaping and fine tuning resolution across an output frequency range of 5 to 65 MHz. It includes an integrated digital-to-analog converter.

Circle Reader Service number 50

also be printed on a desktop printer.

The mini-OTDR is suited for field use because it is weatherproof and meets or exceeds military specifications for shock, vibration, dust and water.

Circle Reader Service number 54

Fiber optic transmission link

CHRISTIANSBURG, Va.—Force Inc. has announced the availability of its new Model 2762 ExcelLinX Plus+ FM fiber optic transmission link. The link has been designed for RS-250C short haul quality transmission of baseband video and balanced stereo audio signals



Force's fiber optic link

over singlemode optical fiber.

The unit offers studio-quality audio and video performance in low to moderate optical loss situations.

Circle Reader Service number 55

Rack-mount patch panels

MONTREAL, Canada—NORDX/CDT Inc. has introduced FiberExpress, a new series of fiber optic rack-mount patch panels that feature interchangeable connector adaptor strips for more installation flexibility.



FiberExpress rack-mount patch panels

Four basic patch panel models are available in the FiberExpress series. Each model includes interchangeable adaptor strips for SC, duplex SC, ST and FC connector types. They are available in either single density (6) or double density (12) port counts.

All strips are either available loaded with a connector type of choice or empty. Compact interconnections are possible from 6 to 96 fiber-count cables. All units are designed to occupy either one, two, three or four units of rack space (i.e., 1.75" per space).

Circle Reader Service number 56

Multi-cell innerduct

HARRISBURG, Pa.—AMP Inc. has introduced OptiDuct, a new multi-cell innerduct that provides installation of up to six fiber optic cables in a single, four-inch PVC duct.



AMP's multi-cell innerduct, OptiDuct

Available in single-cell, two-cell or three-cell configurations, the innerduct is made of rugged polyethylene. To minimize spiraling, the multi-cell configurations feature a unique "shared wall."

With a 40-year lifecycle, OptiDuct possesses an inherently low coefficient of friction which requires less lubrication. The innerduct is available in a variety of colors, and individual cells can be color-stripped to aid identification.

Runs of up to 7,000 feet are possible without a splice. Optional pre-installed pull tapes ease cable installation.

Circle Reader Service number 57

Cable assemblies

AUSTIN, Texas—3M's newly-introduced line of angled physical contact (APC) cable assemblies has been designed to meet low reflection and low insertion loss performance parameters.



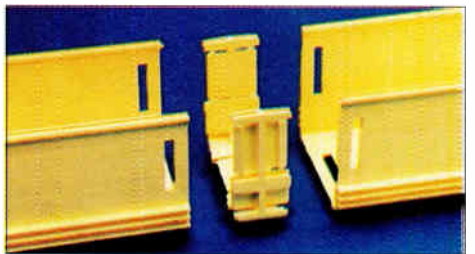
3M's cable assemblies

The singlemode, factory-terminated jumpers are intended for high-speed digital or analog systems requiring stable, low-reflection connectors. The assemblies are available with SC/APC or FC/APC connectors, and the FC/APC cable assemblies are available with either a 2.0 mm or a 2.15 mm connector key.

Circle Reader Service number 58

Ducting system

NORTHBORO, Mass.—Fiber Optic Network Solutions (FONS) Corp. has introduced its new Lightpaths ducting system. With its simple, snap-together design, the ducting system allows for fast, hardware-free installation.



FONS' Lightpaths ducting system

A unique cut-out tool may be placed over the ducting to cut out space that allows users to place vertical drops virtually anywhere in their networks.

Circle Reader Service number 59

Video multiplexer

MELVILLE, N.Y.—Vicon Industries Inc. has introduced AurorA, its new digital video multiplexer.

The unit offers a choice of 16-channel monochrome or color units with simplex or duplex operation.

Circle Reader Service number 60

FILTERS

Reader Service 36

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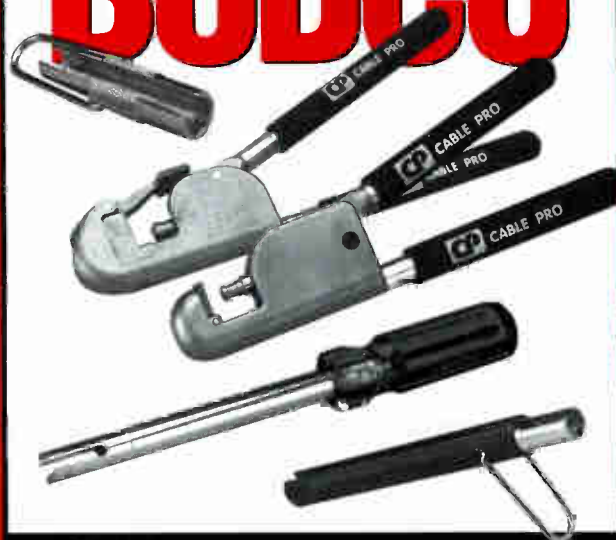
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HEADEND EQUIPMENT

Reader Service 39



The issue: Going two-way

Operators are spending millions of dollars to upgrade their networks and implement new services like high-speed data. Along with that has come a new push for networks to become more transactional than

ever. But to do that, a cable network has to be two-way active. Getting that return plant working well can be a tricky proposition, especially in large networks. What are your thoughts about upgrading to two-way?



The questions:

1. How important is it to the management of your system that high-speed data or some sort of interactive service be offered over your system?

Very important Somewhat important

Not important Don't know

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 5+ years Don't know

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

Yes No Don't know

4. If not, are there any plans to activate the return path within the next 12 months?

Yes No Don't know

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

Difficult Slight problem No problem

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

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

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 5% 5-10% 10-30% 30+%

9. If you offered high-speed data and Internet access at \$40 per month today, what percentage of your subscribers would sign up, in your opinion?

Less than 5% 5-10% 10-30% 30+%

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

Yes No Don't know

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

Data delivery Telephony
 Interactive TV Plain old TV

Your comments:

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RESULTS

Modem costs and noise in the cable system return path will be the biggest obstacles to deploying high-speed data services over a cable network, according to those who responded to our survey on data services.

Nevertheless, operators appear undaunted in their plans to implement the service. More than half have already dabbled with it, and a majority of those who haven't said they have plans to test or roll out such services within the next year or so. Yet a large number must be planning on using telephone-return modems, because only a small fraction have a lot of operational two-way plant. Regardless, nearly everyone expressed confidence that they could roll out data services faster than the local telco can implement ISDN or ADSL services.

As for content, most said they intend to offer local content and will work with a third party to develop it.

And finally, the MCNS group should make a greater attempt to publicize its effort to standardize cable modems, because most knew little or nothing about it.

Congratulations to Charles Smith of GCI Cablevision in Homer, Alaska, who won \$50 for his input. Make yourself eligible for a future drawing by filling out the questionnaire on the previous page and faxing it in!

The issue: Data over cable

It's the hottest issue on everyone's agenda: Deploy high-speed data services to compete with telcos and differentiate from the satellite broadcasters. But to date,

roll-out has been relatively slow. When will that change? This survey sought your opinion.

The results:

1. Are you either testing or implementing high-speed data services over your cable system?

Yes	No	Don't know
54%	46%	0%

2. If not, do you expect to test or roll out such services within the next 12 months?

Yes	No	Don't know
57%	0%	43%

3. Do you intend to offer a service with local content, such as @Home, RoadRunner, or something similar?

Yes	No	Don't know
46%	23%	31%

4. If so, do you intend to develop that content yourself or work with a service provider to gain access to that content?

Develop it	Work with someone	Don't know
8%	46%	23%

5. How familiar are you with the MCNS group and its efforts to standardize cable modems?

Very	Somewhat	Little	None
8%	31%	46%	15%

6. How much of your cable plant is presently two-way active?

100%	75-99%	50-74%
15%	15%	0%
25-49%	Under 25%	
8%	62%	

7. Do you have plans to significantly increase the amount of plant that is two-way active this year?

Yes	No	Don't know
38%	46%	15%

8. Do you think you can roll out high-speed data services faster than the telcos can offer ISDN or xDSL services?

Yes	No	Don't know
54%	23%	23%

9. What do you think will be the major obstacle for cable operators who want to offer high-speed data services?

Two-way activation	Cost of modems	
23%	46%	
Standards	Return path noise	Other
31%	46%	8%

Your comments:

"We do not use fiber in our reverse system. It all comes back through the forward trunk system. I'd say it's reliable, and it's fast—just watch the noise floor."
 — Name withheld by request

"Everyone wants modems sold at the store, but what happens to your network traffic when thousands of people buy a modem that you can't control?"
 — Scott Shelley, SBC Media Ventures, Arlington, Va.

"I think operators must re-think their drop installations to include quality cable, equipment and personnel!"
 — Tim Ingham, Falcon Cable TV, southern Nevada

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Advanced Networking

C-COR Electronics, Inc. Circle #22

C-COR's RF amplifiers, AM headend equipment, digital fiber optics, and customized service and maintenance provide global solutions for your network. p. 43

General Instrument Corporation Circle #15

GI/NextLevel Broadband Networks Group is a worldwide market leader in digital and analog set top systems for wired and wireless cable television networks. p. 29



Construction Equipment

Telecrafter Products Circle #4, 18

Supplies drop installation products for CATV, DBS, and wireless operators, single and dual cable fastening products, identification tags, residential enclosures. p. 8, 33



Datacom Equipment

ISC Datacom Circle #29

Manufactures frequency-agile RF modems and translators. Modem speeds to 64 kbps. Builds electronics to specifications. p. 56

Ortronics Inc. Circle #31

A leading manufacturer of flexible structured cabling networking systems, providing fiber optic cross-connect products, adapters, patch cords, patch and splice accessories, fiber management, multimedia workstation outlets. p. 61



Distribution Equipment

Alpha Technologies Inc. Circle #10

World leading manufacturer of power conversion products, widely used in cable television, telecommunications, and data networks around the world. Offer a complete line of AC and DC UPS systems. p. 19

Lindsay Electronics Circle #17, 37

Focused on the last mile, our revolutionary new technology creates 1 GHz communication amplifiers, passives, taps, and subscriber materials to solve system problems before they become subscriber problems. p. 32, 88

Moore Diversified Products, Inc. Circle #19

Moore manufactures network construction products to stock. Organize and protect fiber optic and coaxial cable. p. 35

Thomas & Betts Corp. Circle #25

Thomas & Betts, LRC, offers a complete line of high quality CATV RF coax connectors backed with superior customer service and a worldwide distribution network. p. 49



Distributors

Budco Inc. Circle #38

Marketing and distribution company for installation tools, construction supplies, marking identification, and security products for cable plant. Exclusive distributor of taplocks, the industry leader for marking drops. p. 88

ITOCHU Cable Services Circle #8

iCS, Inc. is a leading full service stocking distributor, operating ten sales offices and nine warehouses conveniently located in North and South America. p. 15

Spectrum Circle #30

Full line CATV supplier. Including headend/distribution electronics, drop material, test equipment, audio/video, commercial insertion, automated playback equipment and photo advertising. p. 57, 36-37



Fiber Optic Equipment

Alcatel Telecommunications Cable Circle #27

Alcatel Telecommunications Cable offers premium fiber optic cable products for outside plant and indoor environments, including optical fiber, loose tube, central tube, and specialty cables. p. 52-53

Corning Incorporated Circle #16

The Corning Optical Fiber Information Center gives you FREE access to the most extensive fiber-optic library in the industry. p. 31

Synchronous Group Inc. Circle #6

The Actair and Antares 1550nm external modulation transmitters offer outstanding performance and the best specifications in the industry. Perfect for super trunks and direct distribution. p. 10-11



Headend Equipment

ADC Telecommunications, Inc. Circle #1

Leading global supplier of transmission and networking systems. The company holds a preeminent market position in physical connectivity products for fiber optic, twisted pair, coaxial and wireless networks worldwide. p. 2-3

Barco, Inc. Circle #14

BARCO's Gemini Upconverter is an ideal alternative to conventional modulators for hub site headends, accepts digital or analog IF inputs and saves cost and space. p. 27

Blonder Tongue Laboratories Circle #24, 44

Quality manufacturer of headend equipment (including pre-fabricated headends), reception, distribution, MDU interdiction products and test equipment. p. 47

Dawn Satellite Circle #20

Dawn Satellite offers technical information and competitive prices on products such as: satellite "dish" antennas, satellite receivers, digital ready LNBs, modulators, processors and a wide variety of related products. p. 37

Harmonic Lightwaves, Inc. Circle #7

Harmonic Lightwaves is a worldwide supplier of highly integrated fiber optic transmission, digital headend and element management systems for the delivery of interactive services over broadband networks. p. 13

Microwave Filter Co., Inc. Circle #36

Passive electronic filters, traps and filter networks for interference elimination and signal processing at the TVRO, headend and distribution equipment. p. 88

Monroe Electronics, Inc. Circle #39

We supply rack mounted or cased cue tone encoders/decoders. Also, timers, A/V and RF/IF switches and other control products. p. 88

Scientific-Atlanta Circle #41

Scientific-Atlanta's new Continuum™ Headend System for analog and digital applications. This features a vertical packaging design which allows for up to forty front-loaded modules to fit into a standard 70" rack. p. 104

SkyConnect Circle #23

SkyConnect meets the demands of the growing cable advertising industry by offering the most complete digital advertising solutions available. p. 45

Standard Communications Circle #3

The industry's leading manufacturer of rebroadcast quality satellite reception and RF broadband products. Delivering programs to thousands of CATV and SMATV systems. p. 7

TFT, Inc. Circle #11

Manufactures and markets through CATV OEM's & system integrators (EAS) Emergency Alert System. Products including: EAS 911 Encoder / Decoder, EAS 930A Multi-Module Receiver and (IHAD) In Home Alert Device. p. 21

West End Systems Corp. Circle #33

Products incorporate advanced RF transmission technology (OFDM) to deliver robust, reliable VOICE, DATA, ETHERNET, INTERNET communications via HFC (Hybrid Fiber/Coax) networks. p. 65



Services

NFOEC Circle #105 p. 79



Test Equipment

AM Communications Circle #21 p. 41

Cable Leakage Technologies Circle #28

With the FCC imposing stiff fines for leakage, CLT presents operators with the only sure, comprehensive method of locating and documenting the nearest street address of system faults/signal leakage. And it's totally automatic. "WAVE-TRACKER". p. 55

Hewlett-Packard Company Circle #5

Hewlett-Packard offers a comprehensive range of test equipment to keep your entire broadband system at peak performance - from headend to subscriber drop. p. 9

Sadelco, Inc. Circle #32

Sadelco, Inc. manufactures SLMs for CATV. Minimax meters can now provide accurate reading of the average power of all digital channels. p. 63

Sencore Circle #12, 34

Sencore designs and manufactures a full line of CATV, Wireless CATV, QAM and MPEG-2 test instruments. Each instrument is designed to meet your system analyzing and troubleshooting needs with exclusive tests and measurements. p. 23, 67

Superior Electronics Group, Inc. Circle #40

Leading system solution for monitoring your HFC plant. Providing full compatibility with multi-vendor distribution devices and third-party OSS systems, Cheetah will integrate with your network now and in the future. p. 103

Trilithic, Inc. Circle #13

Trilithic manufactures test equipment for the CATV and LAN industries and components for aerospace and satellite communications. Key products are SLMs, leakage detectors, and a comprehensive line of return test equipment. p. 25

Wavetek Corporation Circle #2, 9

Manufactures equipment for CATV, telecommunications, wireless, and general purpose test. CATV equipment includes signal level, analysis, and leakage meters, sweep and monitoring equipment. p. 5, 17

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14-18 Hands-on Fiber Optic Installation for Local Area Networks, produced by Siecor Corp. Location: Hickory, N.C. Call (800) 743-2671, ext. 5539 or 5560.

21-22 Fiber Optic Network Design, produced by Pearson Technologies Inc. Location: Minneapolis, Minn. Call Eric Pearson (800) 589-2549 for more information.

23 Rocky Mountain SCTE Chapter technical seminar. Topic: Distribution/optical link performance. Call Hugh Long (303) 603-5236.

28-31 Fiber Optic Training, produced by The Light Brigade. Location: Denver, Colo. Call (800) 451-7128.

29-8/1 Fiber Optic Training, produced by The Light Brigade. Location: Vancouver, B.C. Call (800) 451-7128.

30-8/1 Fiber Optic Network Installation, produced by Pearson Technologies Inc. Location: San Francisco, Calif. Call Eric Pearson (800) 589-2549.

AUGUST

5-7 Broadband-LAN Laboratory, produced by C-Cor Electronics Inc. Location: State College, Pa. Call (800) 233-2267 for more information.

6 Great Plains SCTE Chapter, Testing Session. Location: Bellevue, Neb. BCT/E and Installer certification exams to be administered. Call Herb Dougall (402) 597-5666.

12-14 Broadband Communications Technology, produced by C-Cor Electronics

July
24-26 SBCA's Satellite Show, produced by the Satellite Broadcasting & Communications Association. Location: Nashville, Tenn. Call (703) 549-6990.

28-31 Jornadas de Television por Cable '97. Location: Buenos Aires, Argentina. Call the Argentina Cable Television Association (011) 54-1-342-3362.

August
18-20 Great Lakes Cable Expo. Location: Indianapolis, Ind. Call (317) 845-8100.

September
10-12 PCS '97 (Personal Communications Showcase). Location: Dallas, Texas. Call PCIA at (703) 739-0300 for more information.

21-25 NFOEC '97. Location: San Diego, Calif. Call (619) 467-9670.

28-30 Atlantic Cable Show. Location: Baltimore, Md. Call (609) 848-1000.

October
20-22 Eastern Cable Show. Location: Atlanta, Ga. Call the Southern Cable TV Association (404) 255-1608 for more information.

21-23 1997 National Communications Forum/InfoVision97. Location: Chicago. Call (312) 559-4600.

December
10-12 The Western Cable Show. Location: Anaheim, Calif. Call the CCTA at (510) 428-2225.

Inc. Location: State College, Pa. Call (800) 233-2267.

14 Music City SCTE Chapter, Testing Session. Location: Nashville, Tenn. BCT/E and Installer certification exams to be administered. Call Ken Long (615) 244-7462, ext. 319.

14 Shasta/Rogue SCTE Chapter, Testing Session. Location: Medford, Ore. BCT/E and Installer certification exams to be administered. Call Mike Smith (541) 779-1814.

15 Oklahoma SCTE Chapter, Testing Session. Location: Edmond, Okla. BCT/E certification exams to be administered. Call Doug Huston (405) 348-4225.

19-22 Fiber Optic Training, produced by The Light Brigade. Location: Helena, Mont. Call (800) 451-7128.

20 New England SCTE Chapter, Testing Session. Installer certification exams to be administered. Location: Worcester, Mass. Call Tom Garcia (508) 562-1675.

20-21 Profiting from Wireless Cable and LMDS, produced by ICM Conferences Inc. Location: Chicago, Ill. Call Kimberlee Mulherin at (312) 540-5698.

20-21 Mastering Telecommunications Fundamentals, presented by Two Rivers Technologies. Location: Raleigh, N.C. Call (201) 798-3311.

25 Broadband Communications Network Overview, produced by General Instrument. Location: Rochester, N.Y. Call (215) 674-4800 for more information.

25-28 Fiber Optic Training, produced by The Light Brigade.

Location: Idaho Falls, Idaho. Call (800) 451-7128 for additional information.

27-29 Fiber Optic Network Installation, produced by Pearson Technologies Inc. Location: Columbus, Ohio. Call Eric Pearson (800) 589-2549 for additional information.

SEPTEMBER

6-10 NATOA Conference (National Association of Telecommunications Officers and Advisors). Location: Tucson, Ariz. Call (202) 429-5101 for further details.

8-9 CDMA System Engineering & Optimizations Workshop, produced by WIT. Location: Dallas. Call (510) 490-6459.

11-12 Bellcore's Competitive Local Access Seminar. Location: Richardson, Texas. Call (800) 832-2463.

15-19 Broadband Communications Network Design, produced by General Instrument. Location: San Francisco, Calif. Call (215) 674-4800.

16-18 Digital Network Engineering Training, produced by General Instrument. Location: San Francisco, Calif. Call (215) 674-4800.

23-25 i+e intranet + extranet Conference & Exposition, sponsored by Gartner Group. Location: Moscone Convention Center, San Francisco. Call (203) 256-4700 for more information.

24-26 Fiber Optic Network Installation, produced by Pearson Technologies Inc. Location: Morristown, N.J. Call Eric Pearson (800) 589-2549 for more information.



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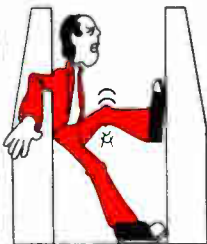
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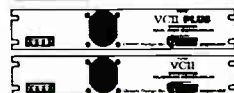
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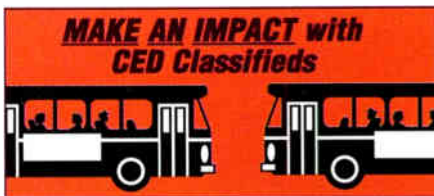
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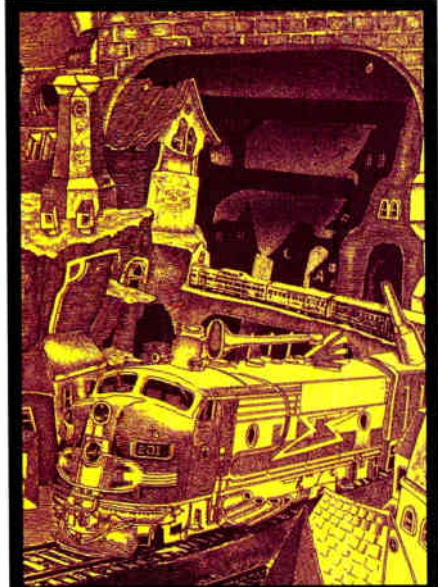
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Cox converts to CBIS in San Diego

CINCINNATI, Ohio—Cox Communications San Diego recently converted its more than 474,000 customers in the San Diego area to CBIS' CableMaster 2000 solution, under provisions of a contract signed last year.

CableMaster 2000's on-line, real-time relational database will enable Cox employees in San Diego to provide more responsive, efficient, and comprehensive customer assistance, according to information released by CBIS.

"After four months of intensive training by our 700 employees, our conversion to the CBIS solution was extremely successful," said Bill Fitzsimmons, VP of financial operations for Cox, San Diego.

NUKO, ADC announce alliance

SAN JOSE, Calif.—NUKO Information Systems and ADC Telecommunications have jointly announced the introduction of a strategic alliance and the introduction of the ADC CDV3000 MPEG-2 multi-channel digital video transport system. As part of the alliance, NUKO is providing an MPEG-2 codec platform that will be used by ADC for delivering advanced video services to customers for a variety of applications. The CDV3000 system consists of a multi-channel, fully compliant MPEG-2 encoder, decoder, ATM multiplexer and network management system.

The system incorporates features including the ability to transport video over the ADC DV6000 digital video transport system, as well as transmission over other standards-based networks such as Sonet, SDH and ATM.

In other news, NUKO has signed an agreement with Korean Network Corp. for the two companies to jointly develop and market solutions based on NUKO's Intelligent Broadband Services Network.

NUKO and KNC will develop a digital set-top utilizing C-Cube MPEG-2 decoder chips as the first product in the new alliance. The agreement, says NUKO, will provide a framework for the two companies to collaborate on a number of projects to address the growing global demand for video services for a wide range of applications, including residential switched digital video, video distance learning, satellite uplink, telemedicine and business conferencing.

TCI arm buys SkyConnect ad system

BOULDER, Colo.—TCI Media Services has purchased the Mediaplex Video Advertising System from SkyConnect for 10 cable headends, serving nearly 160,000 household subscribers in its Reno, Nev. service area.

Eight of the headends will have SkyConnect's new HE-240 insertion system

installed. The HE-240 includes most of the technological advantages inherent in SkyConnect's other system, the HE-140, but is priced lower, based on inclusion of the new SC 4-Plus, according to the company. The SC 4-Plus is the company's four-channel, combined switch and decoder component. The HE-240 system is fully compatible with the HE-140, which is to be installed in the first two headends, and like that system, is scalable to 40 channels per rack. Both of SkyConnect's systems utilize Digital Equipment Corp.'s Alpha Server 64-bit chip technology.



TCI Media Services already has SkyConnect systems in two headends in Santa Cruz, Calif.

The two HE-140 system headends were scheduled for installation in early summer; the HE 240 systems, sometime this month.

Sun Country to launch PerKInet

LOS ANGELES—Internet Ventures Inc., which launched its PerKInet turnkey Internet access service earlier this year, has reached an agreement with Sun Country Cable to make the high-speed service available in several of the operator's 45 systems.

IVI will begin deploying the technology in Sun Country's Los Altos Hills, Calif. and Deer Park (Spokane), Wash. systems as early as the first of this month. PerKInet made its commercial debut on Ventura's Avenue Cable TV system last March.

PerKInet uses Phone Return Cable Internet prism technology, which combines regular phone lines and existing cable plant to deliver Internet access at twice the speed of ISDN.

Sun Country Cable services about 23,000 subscribers in Alabama, Arkansas, California, Mississippi, Oregon, South Carolina, Texas and Washington.

FONS Corp. expands

NORTHBORO, Mass.—FONS (Fiber Optic Network Solutions) Corp. has opened a new sales office in Atlanta, Ga. The Atlanta office

will be managed by the company's newly-appointed national accounts manager, Brian Abson.

The pertinent information is as follows: address—121 Southfork Dr., Woodstock, GA. 30189; phone (770) 516-7697.

Having recently expanded its 30,000 square foot manufacturing headquarters in Northboro, Mass. by 2,000 square feet, FONS also recently hired a new production supervisor and 30 new manufacturing employees. The expansion, say company executives, is a response to increased demand generated by recent product introductions.

Vyvx upgrades four teleports

TULSA, Okla.—Vyvx Inc. has announced major upgrades at its four teleports, including a 16-meter standard A antenna in the Los Angeles area. The improvements will allow for a greater range of uplinking solutions, additional fiber paths and redundancy for better service, says the company.

Vyvx UpSouth Teleport in Atlanta has installed one 8.1-meter Ku-band dish to serve international customers in the Atlantic region. International C-band antennas are under construction and are expected to be operational this month. Another 9.2 meter C-band dish has been added for domestic service. Upsouth is planning a new transmission facility that will double its present capacity. Switching into and out of the facility has already improved with a new 128-by-128 routing switcher, says Vyvx.

Connectivity with the Vyvx fiber network will increase substantially this summer, with the construction of an OC-48 digital link.

Vyvx's Denver Teleport has expanded its occasional use C-band capabilities with another occasional use C-band transmit system. Vyvx Steele Valley Teleport in Los Angeles has installed new, 9-meter C-band and 8-meter Ku-band movable antennas for occasional use. And Vyvx National Gateway Teleport in New York has installed one 8.1-meter antenna fixed on the Orion 1 satellite, offering full digital and analog Ku-band service.

RELTEC to buy N.Ireland mfg operation

CLEVELAND, Ohio—RELTEC has entered into an agreement with GPT Ltd. to acquire its Ballynahinch manufacturing operation. Located in Ballynahinch, County Down, Northern Ireland, the operation specializes in electrical manufacturing capabilities and complements RELTEC's other operations in the U.K.

GPT Ltd. is owned by General Electric Company (GEC) of the U.K. and Siemens AG of Germany. **CEC**

Taking a dip in a cool technology pool



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

I had some hot fun in the summertime down in Orlando at the recent SCTE confab, especially surveying some of the latest data-over-cable products. Whether you're talking about planned Multimedia Cable Network System ("MCNS")-compliant devices, equipment targeting ongoing IEEE 802.14 standards development, or a variety of proprietary technologies, there was many a cool jewel in the SCTE Expo modem pool.

For example, S-CDMA (Synchronous-Code Division Multiple Access)-based modems certainly piqued my interest. From the information provided, S-CDMA systems appear significantly robust, provide overall high-speed transmission and can provide different classes of services. I was also impressed with the OFDM (Orthogonal Frequency Division Multiplexing)-based products that I saw which enable single user transfer rates of up to 256 kilobits per second with high upstream spectral efficiency.

I was also intrigued by the internet-working devices on display at the Expo, with interfaces available for Sonet, ATM, ethernet, fast ethernet, frame relay, T-1 and a variety of other transport technologies. These types of devices really begin to accelerate the capability of the cable industry to serve both the residential and business marketplace, as well as effi-

ciently interconnect with other telecom systems.

The system advancement and revenue-generation opportunities related to the data-over-cable efforts of operators, vendors and standards development groups are obvious. What may be less apparent at first is the ability of these rapidly-developing technologies and initiatives to create cost-effective and highly capable institutional networks ("I-Nets").

Modems and I-Nets

For example, cable modems that are robust and facilitate high speeds and spectrum segmentation for continuous users could enable residential, business and institutional users to be combined within the same overall frequency set. Similarly, dedicated circuit devices that have high spectral efficiency and high noise tolerance can enable circuits that provide continuous data pathways for institution-to-institution traffic to be stacked between areas not assigned for shared broadband data services. Further, sophisticated internetworking devices can be utilized to maximize the interconnection between existing institutional services provided by other carriers and targeted institutional network infrastructure to create a seamless architecture for public use.

When taken together, incorporation of these types of advanced devices into institutional network designs can enable institutional applications to be successfully

implemented using portions of an upgraded subscriber network, in tandem with separate, dedicated institutional connections. If such dedicated I-Net infrastructure is developed as part of the fiber-to-the-node design within an HFC subscriber system upgrade, then the dedicated connections become even more cost-effective.

These types of interwoven I-Nets that take advantage of today's (and through phase-ins, tomorrow's) network technologies are beginning to surface as part of franchise renewals. For example, the renewed Paragon franchise in Portland, Ore., takes a "best of several worlds" I-Net development approach. For instance, 12 MHz of capacity in the downstream direction and 8 MHz upstream is set aside on the subscriber network to accommodate certain low bandwidth public uses separate from residential data communications systems. The City of Portland ("city") is reviewing the potential for a variety of applications, including the development of traffic signal control operations over such circuits. Other institutional users that already have or will have subscriber network connections, such as schools and libraries, will be able to utilize shared data systems, such as those designed for Internet access, within this spectrum set-aside.

The Paragon renewal also addresses a separate institutional infrastructure for high bandwidth video, voice and data transmission requirements, with spectrum of at least 120 MHz allocated in each direction, and connectivity provided either through an HFC architecture or through dedicated fiber links. The city is currently in design discussions with Paragon related to the educational and governmental locations and applications that will utilize the dedicated infrastructure. Part of what will help shape these discussions and the ultimate network implementation is the advanced transmission technology that is or will be available to effectuate network use.

The city and Paragon were concerned about the cost of the network and the flexibility that it will have in meeting institutional networking needs between now and the time the franchise expires in 2010. Accordingly, the franchise renewal enables Paragon to charge reasonable fees for use of the I-Net and to reclaim portions of the subscriber network spectrum set-aside by transitioning affected users to the separate, higher-capacity I-Net when appropriate. The franchise renewal enables the city to enforce minimum performance and service standards related to the I-Net and to renegotiate technology requirements beginning in 2002, if a technology assessment at that time determines that state-of-the-art services are not being provided.

The incorporation of advanced transmission and internetworking technologies; synergy between residential, business and institutional applications; cost-effective network development; and flexible architectures designed for enduring operation are all part of the recipe for successful institutional network development.

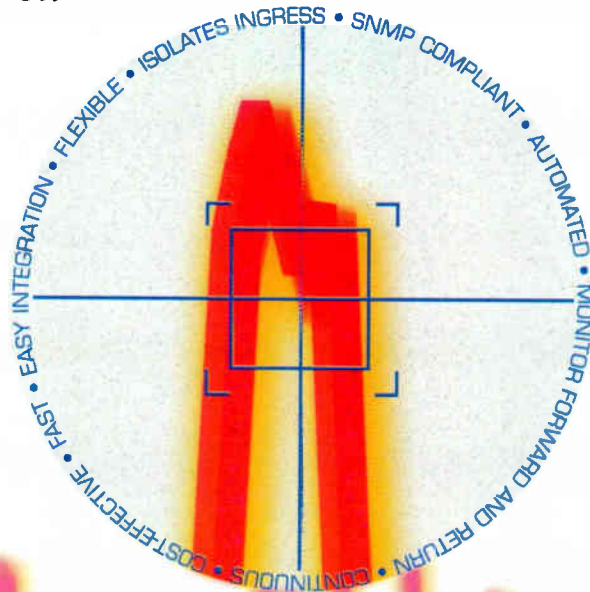
It could be a long, hot summer for a number of operators and franchising authorities on a variety of franchise renewal issues. Concerning I-Nets, one way to beat the heat will be for both parties to take a big dip in the cool modem pool and bring the best fit to the top. **CED**

Have a comment?

Contact Tom via e-mail at:
tomgrob@rivoaksc.com

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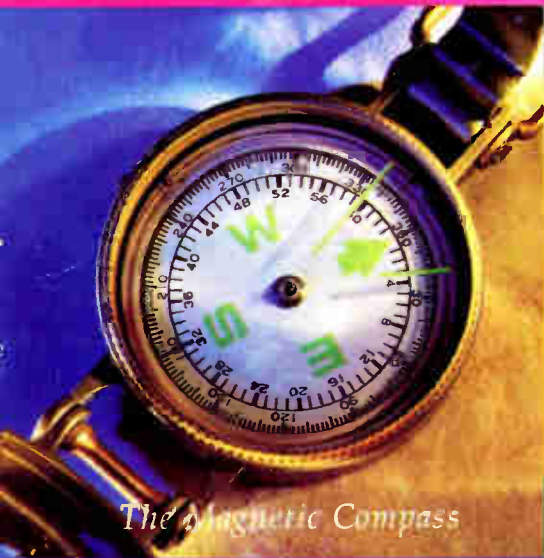
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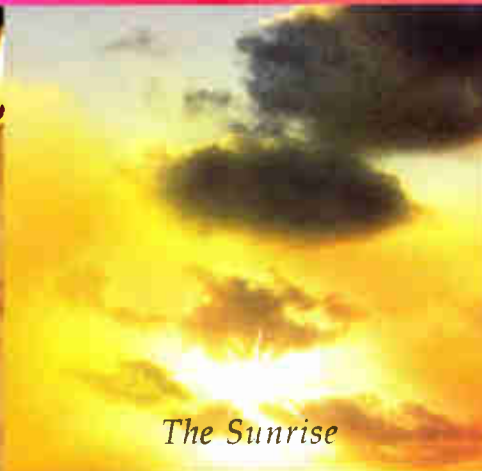
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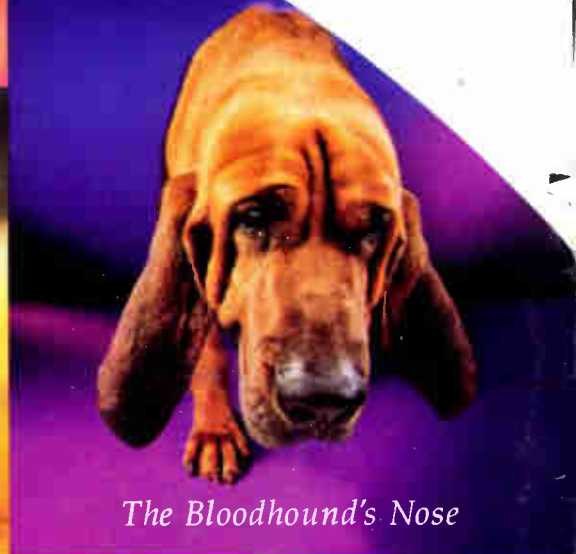
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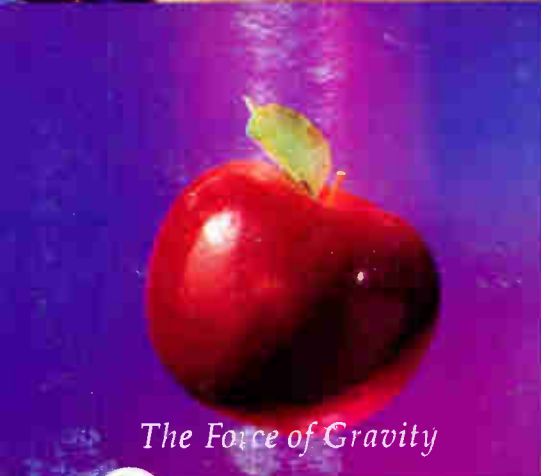
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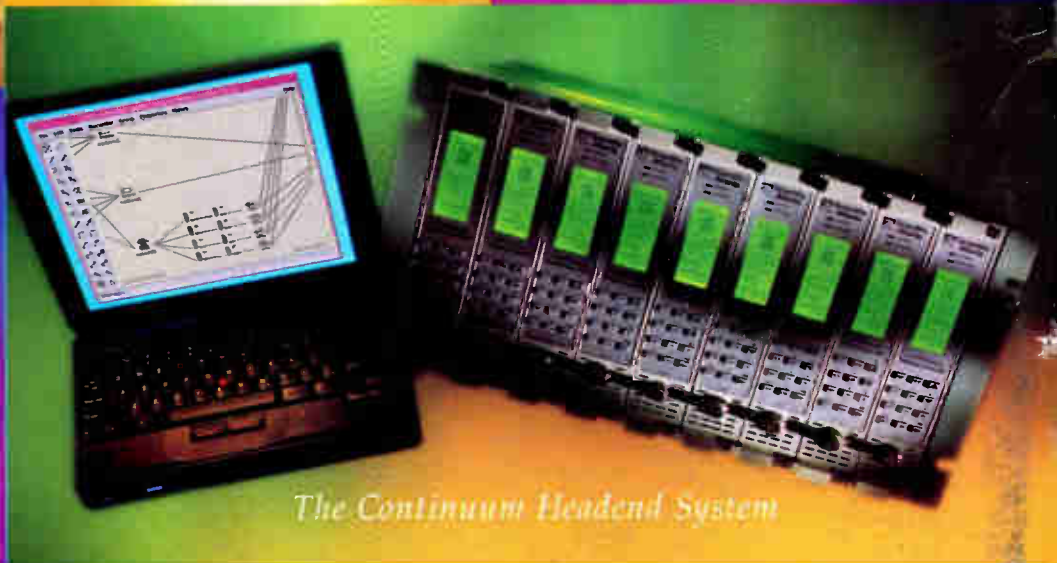
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