

# CEED

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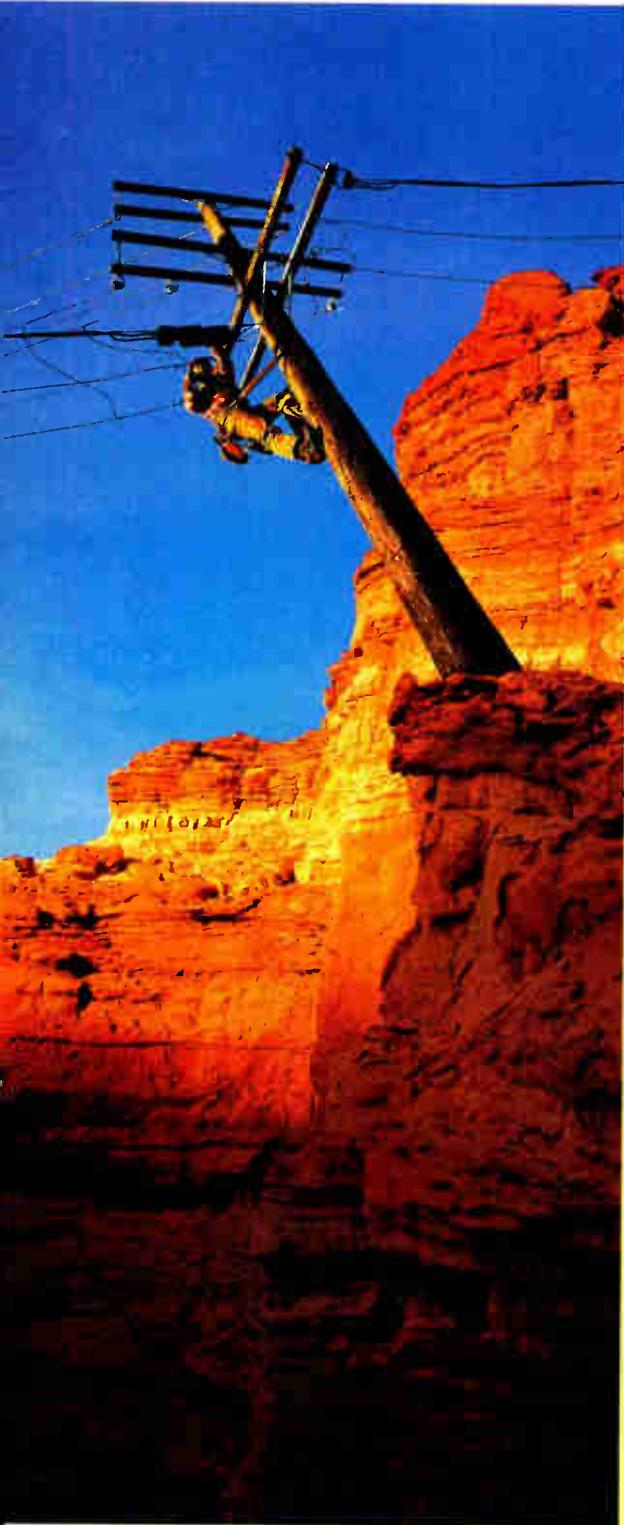


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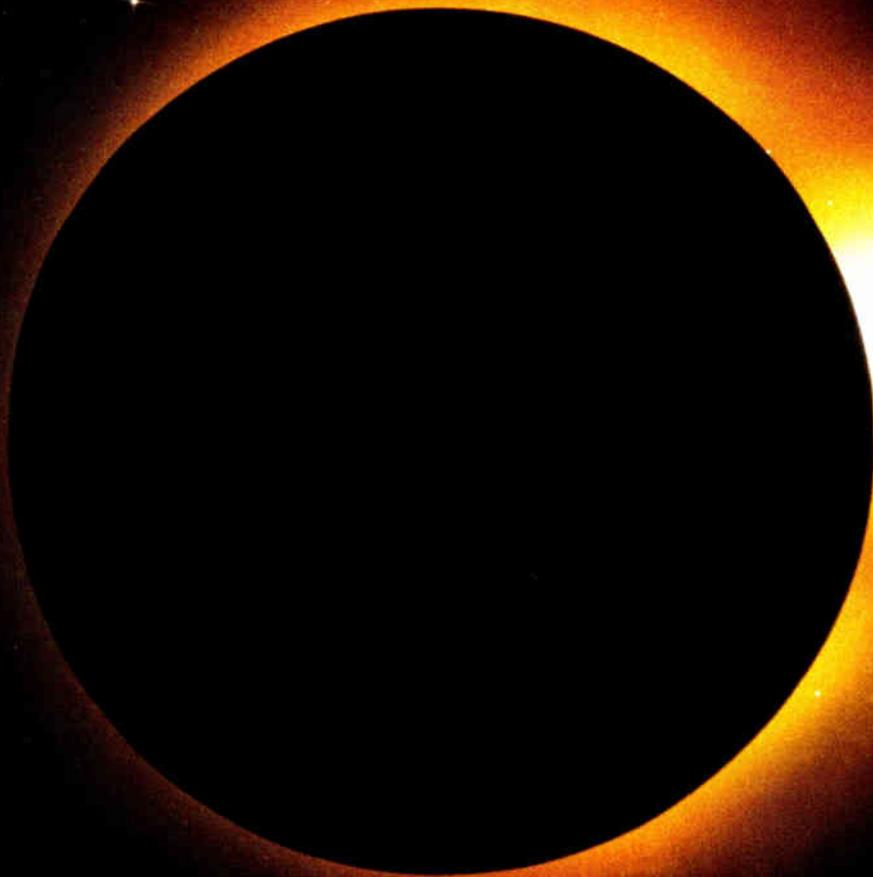
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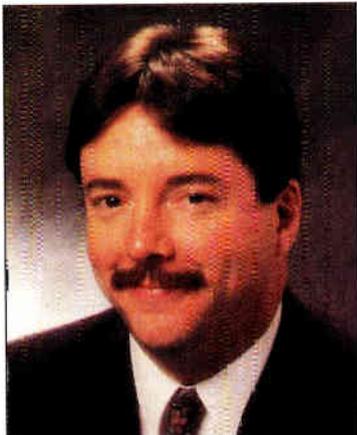
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The Western Cable Show gathering of MSOs and vendors that promised to develop a set of standards for high-speed data transfer over cable TV networks was indeed historic. Never in the history of the cable industry had such a press conference taken place: there, for all the world to see, were the country's largest MSOs and hardware vendors, sitting side-by-side in agreement.



## Is there a fly in the standards ointment?

While granting its historic proportions, one has to be skeptical of its chances for immediate success. This truly is one assignment that is easier said than done.

For those who haven't heard yet, an impressive list of MSOs and hardware manufacturers shared the dais with CableLabs during the Anaheim show. The panel announced its intention to develop a common set of interfaces and protocols that would permit hardware interoperability and interconnectivity, regardless of vendor. The intent is to hurry the development of high-speed modems so that MSOs can capitalize on the incredible growth and popularity of the Internet and on-line services.

But that doesn't mean everyone sees eye-to-eye.

Cable network operators smell money when it comes to the Internet. Their broadband networks make even the fastest telephone modems look like snails. Anyone who has ever witnessed a high-speed modem download a home page or some other massive file off the Internet at 10 Mbps is left with one inescapable conclusion: that this is simply the way those services were meant to be used.

But to preserve point-to-point interconnectivity, reduce manufacturing costs and ensure that consumers can purchase modems at retail, the MSOs simply must agree on standards, if they are to chase the on-line marketplace.

The problem is, they want those standards in a hurry, and that could create havoc. The cable industry has historically eschewed formalized standards, preferring instead to let vendors battle it out in the marketplace. Consequently, it has no track record with global standards bodies.

Yet during the press conference, there was talk of working with DAVIC, the IEEE, the ITU and perhaps others to develop global high-speed data standards. But the industry wants an initial set of standards by mid-April. Of this year. People who have experience working with standards groups say that cannot happen unless the group is kept small. Can this group be kept small enough?

Already, a consortium within the consortium has been formed. Hewlett-Packard, AT&T, Intel and Hybrid Networks have already decided to work as a group. The Interactive Television Association has also organized a consortium that consists primarily of computer and telephone companies. The group is bound to get bigger, and more diverse voices will enter the discussion.

The fact is that this CableLabs-led standards effort is being driven by four large MSOs. They will see to it that their individual needs are accommodated first. From a business perspective, that makes a lot of sense. But is that the best method to drive standards development, or should the process be approached with more patience?

If CableLabs pulls off this assignment on time, it will be worth every penny it spends over the next decade.

*Roger J. Brown*

Roger Brown  
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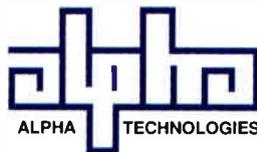
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## Antec/Nortel sign JV agreements; set up two new broadband companies

Cable industry supplier Antec and telecommunications equipment manufacturer Nortel have officially completed their joint venture agreements, setting up a new systems integration company in the process.

Integrated Technologies (IT), which will be based in Denver, will offer network providers a variety of services, including system design, network management, and transport and facilities design, according to Andy Paff, president and CEO of the new venture. Currently, the company is focusing its expertise on the HFC return path, powering issues, laser performance and related issues.

However, the new company will offer a variety of services, including analyzing existing networks, designing new ones, building a business plan surrounding new service provision and a host of others, said Ron Cotten, IT chief operating officer.

The new company intends to tap the resources of Engineering Technologies Group, an Antec system design company, to perform much of its design work. "We're really joined at the hip," said Paff during a press conference last month. By the end of this year, the company expects to employ nearly 200 people, he noted.

Services offered by IT will consist of network consulting, including the design, engineering and implementation of advanced HFC systems and digital Sonet or SDH regional infrastructures. These services include conceptual planning, detailed network modeling and full network engineering.

In addition, the company will test and certify existing HFC networks to determine a network's ability to deliver new interactive applications such as telephony and high-speed data. Technical integration plans for new services such as personal communications systems, on-demand programs, local and wide area networking, teleconferencing and telecommuting are also offered.

As part of its technical engineering services, the company will install, activate and certify equipment, network elements and subsystems that its client chooses. The company will also consult on the realistic capabilities and timetables for emerging products and will provide technical training services, as well.

Antec and Nortel officials expect 1996 to be a watershed year for cable telephony, one in which fewer trials are announced, yet there is still little deployment. Instead, Paff said,

MSOs will be working to upgrade their physical networks to prepare for two-way communication and developing business plans for new services.

"There are going to be surprises," noted Paff, "as this integration process goes forward. Unknown problems will crop up, while some of the things that are expected to be big problems may not end up being so big."

Previously, the two companies formally announced the formation of a product development company, yet to be named, which will be based in Atlanta. That company will focus on developing hardware for HFC networks to enable such services as telephony and data transfer. It will also house Antec's Digital Video group, which builds distributed video server networks.

### Cablephone trial begins in Belgium

Electrabel, Belgium's largest power company and cable TV technical partner of the IVEKA cable franchise, demonstrated in late November in Geel, Belgium, the first step in a multi-phase trial of a telephony over cable system which is being developed jointly by Scientific-Atlanta Inc. and Siemens Public Communication Networks Group.

The "CoAxiom" system was successfully demonstrated using six telephone sets (both wireless and regular phones) that were connected via the cable network to a central unit, located at the Geel city hall. A 10-mile branch of the existing Geel network was used with 32 trunk and distribution amplifiers in cascade and upgraded with 5-25 MHz reverse transmission capability. This reverse band was used to transmit ISDN-like digital 64 kbps telephony signals from telephone users to the central unit while a fraction of the 300-450 MHz band was used to transmit signals from the central unit to telephone users. No twisted pair wires were used, which demonstrated that the existing cable infrastructure in Belgium can support telephony services by upgrading the reverse path and powering network.

The demonstration of the system was the first phase of a collaborative trial. The next phase of the trial, nicknamed TOEKAN (Telecommunications over a CATV network), will involve 20 real subscribers of IVEKA's Geel network. Full network trials are planned for 1996, with deployment in 1997, and com-

mencement of service scheduled to begin in January 1998, according to current European Union local telephony deregulation rules.

Scientific-Atlanta and Siemens have entered into a global joint venture for development and worldwide marketing of telephony-over-cable products. In addition to transporting telephony and data over HFC networks, CoAxiom is being designed to also deliver energy control and monitoring services over current in-home wiring.

Using frequency division multiple access (FDMA) technology rather than time division multiple access (TDMA), the system provides network operators a more efficient method of managing a network's reverse path. This provides more useable bandwidth as well as increased reliability and redundancy.

The trial demonstrated the RF robustness of the system that makes it well-suited for existing European CATV networks which, unlike newly built networks, do not widely use fiber, said Ron Foster, vice president of S-A's telecom systems unit.

### Microsoft releases interactive platform

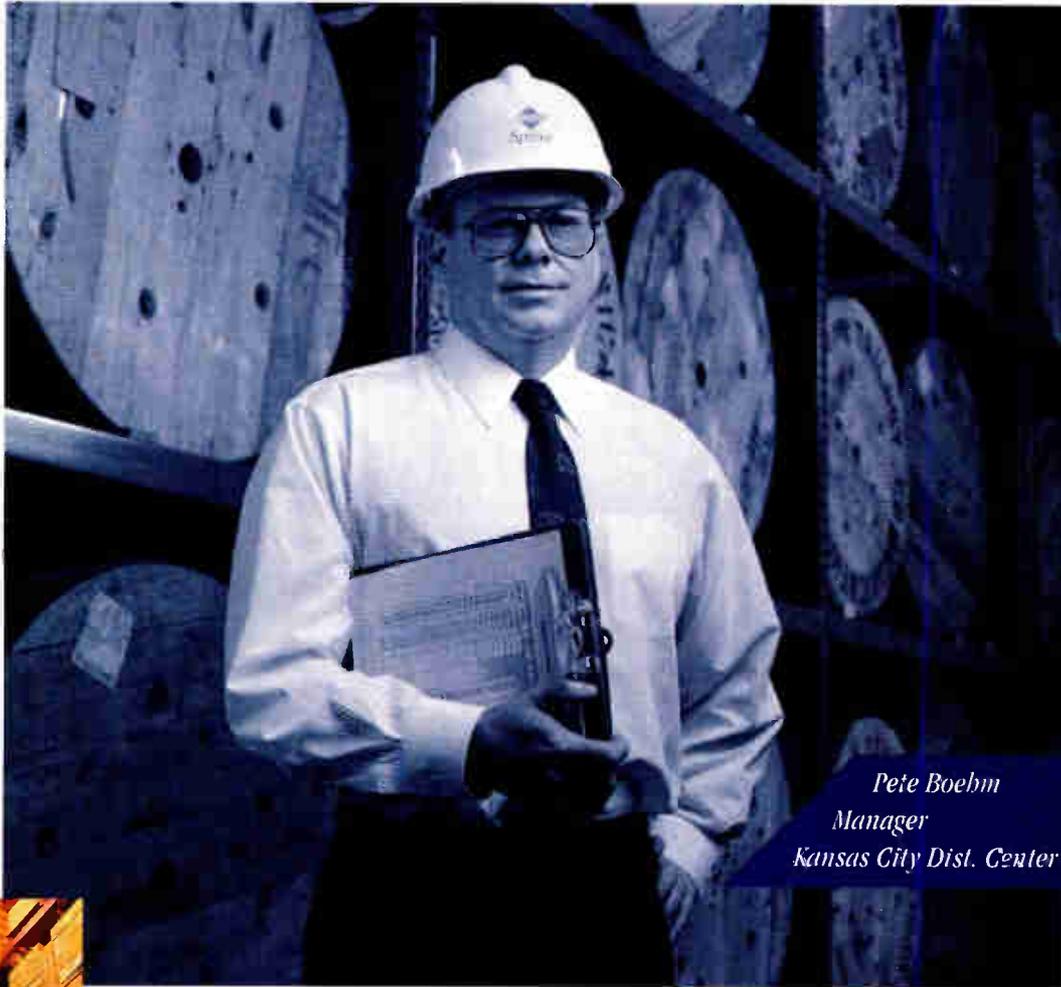
Microsoft Corp. announced that 20 of its Insight Program members—15 network operators and five systems integrators—will enter the laboratory-testing phase of its interactive platform by commencing testing of the Microsoft Lab Release, a broad interactive platform designed to prepare network operators for technical and marketing trials.

Comprising 28 companies, Microsoft's Insight Program is a collaborative program established in 1994 to prepare leading network operators for early testing and deployment of Microsoft's interactive technology. The network operators to begin testing are Belgacom, CGV, Deutsche Telekom, France Telecom, GTE Corp., Korea Telecom, Rogers Cablesystems Ltd., Royal PPT Nederland NV, Southwestern Bell Video Services, SNET Multimedia Services, Stream/Italia Telecom, Telefonica, Tele-TV Systems, Telecom Portugal and US West Communications. The systems integrators are Andersen Consulting, AT&T Network Systems, Lockheed Missiles & Space Co., SAIC and Samsung Electronics Co. Ltd.

The general-purpose platform is based on Windows NT and is intended to serve as the foundation for Internet, business-to-business and consumer services, according to Microsoft officials.

Each Microsoft Lab Release participant will

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receive a self-contained testing environment including software and documentation, interactive content, hardware and functionality-testing instructions.

This complete package allows Microsoft Lab Release participants to run, customize and develop applications such as community information programming; test system administration tools; and run the billing and subscriber management system.

In addition, members of the Microsoft Media Partners program—Discovery Communications Inc., CUC International Inc. and The Lightspan Partnership Inc.—are providing the initial interactive content for the first Microsoft Lab Release participants. Inacom Corp., a leading provider of information-management products and services, will provide the hardware for all of the Microsoft Lab Release participants worldwide.

Regular upgrades of hardware, software and content will enable Microsoft Lab Release participants to build up their testing environments to support large-scale technical and consumer trials.

As these companies begin their laboratory testing phase with Microsoft technology, Microsoft continues its ongoing interactive broadband trials with Tele-Communications Inc. in Redmond, Wash.; Southwestern Bell Video Services in Richardson, Texas; and Nippon Telegraph & Telephone in Yokosuka, Japan.

## DEC offers up four new video servers

Digital Equipment Corp. announced four new interactive video servers that have been designed to support analog ad insertion and near video-on-demand applications. The new offerings are comprised of the Mediaplex 24-channel and 40-channel ad insertion systems, and the Mediaplex 12-channel and 24-channel NVOD systems.

The system uses existing analog infrastructures to enable network providers to immediately capture higher revenues by inserting locally customized ads on cable channels or giving viewers more selections of pay-per-view programming and expanded schedule options.

The 24- and 40-channel Mediaplex ad insertion systems digitally encode advertisements using MPEG-2 compression technology, then store and distribute ads over cable communications networks to a pre-selected audience. Both systems provide the ability to encode and distribute a 30- and 60-second spot to a cable

operator's network in one hour or less.

Other Mediaplex video advertising system features include: local storage of 300 or more 30-second encoded ad spots; the StorageWorks highly available subsystem, providing ease of maintenance with hot swap disk drives supporting RAID Level 5; the ability to continue inserting spots in the event of a disk failure; separate hot-swap digital-to-analog decoders for each channel, for scheduling reliability and ease of maintenance; and automatic verification of completed spots from the ad insertion system for customer billing.

These systems, which will begin shipping in volume in February 1996, are priced as low as \$8,000 per channel.

Meanwhile, the Mediaplex NVOD systems give network providers the ability to broadcast multiple movies and other pay-per-view programs according to any schedule over existing analog infrastructures. They also provide the flexibility to program closely staggercasted distribution of one movie, a wider range of movies with more delay between streams, or any combination of the two.

An optional encoding station is available so that service providers can digitize their own content. Once digitized, movie content is a computer file that can be routed to local and remote video servers using traditional data networking.

The Mediaplex NVOD system is available in two configurations: An Alpha-based server, priced below \$180,000, that provides up to 12 video streams at 8 Mbps with the capacity to store up to 18 hours of encoded content, also at 8 Mbps; and a smaller system, providing up to six video streams, available for less than \$150,000. These systems are available immediately.

A second AlphaStation system, priced at \$200,000, provides up to 24 channels of output with the capacity to store up to 18 hours of content. This system will be available in the second quarter of 1996.

## HDTV standard finally sent to FCC

At long last, the FCC Advisory Committee on Advanced Television Service (ACATS) last month urged the Federal Communications Commission to adopt technology developed by the Digital HDTV Grand Alliance as the new digital television broadcast standard in the United States.

Marking one of the last steps in an eight-year process to establish a U.S. advanced television (ATV) broadcasting standard, the

25-member blue-ribbon ACATS panel recommended the new standard to the FCC, overwhelmingly approving the results of extensive laboratory and field testing of the technology.

The ACATS—which is comprised of senior executives from the broadcast, cable, telephone, consumer electronics, computer and entertainment industries—also reaffirmed technical specifications documented by the Advanced Television Systems Committee that will provide the basis for the new standard.

“This is a landmark day for many communications industries and, especially, for American television viewers,” said Richard E. Wiley, ACATS chairman, who has led the Advisory Committee’s efforts since 1987.

“At hand is a quantum leap in both quality and flexibility that will enhance greatly television’s ability to educate, inform and entertain us.”

The final technical report concluded, based on intensive laboratory and field testing, that the Digital HDTV Grand Alliance’s digital television system is superior to any known alternative system in the world, better than any of the four original digital HDTV systems and surpasses the performance objectives of the ACATS.

Wiley applauded the efforts of the Digital HDTV Grand Alliance in developing “truly world-class digital technology for America and the world.” He also thanked “the hundreds of participants in the Advisory Committee process for volunteering thousands of hours over the years.”

The Advisory Committee, which was formed in 1987 to recommend an HDTV broadcast standard to the FCC, has conducted an open, industry-driven process that promoted the development of all-digital technologies, addressing the needs of the broadcast, cable, computer and consumer electronics industries. In addition to the 25-member blue-ribbon panel, the ACATS was organized in numerous subcommittees, working parties and subgroups.

In May 1993, at the urging of the Advisory Committee, the developers of the four digital HDTV systems formed the Digital HDTV Grand Alliance, merging their technologies and pooling their resources to develop a “best-of-class” digital HDTV system.

Members of the Grand Alliance are: AT&T, General Instrument Corp., the Massachusetts Institute of Technology, Philips Consumer Electronics, the David Sarnoff Research Center, Thomson Consumer Electronics and Zenith Electronics Corp.

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## Sprint and Comcast expand materials pact

Sprint/North Supply announced that it is expanding its cable TV materials management solution for Comcast Corp. to include Comcast's Connecticut operations. Sprint/North Supply already provides a similar materials management program for Comcast in California.

Sprint/North Supply and Comcast's materials management program is based on establishing a standard vehicle inventory and then replenishing actual material used. Sprint provides inventory and drop materials directly to Comcast's individual installer vehicles. This standardization provides Comcast greater savings, because all of the technicians and installers use the same products.

"With this program, each vehicle functions as an independent storeroom," said Charles Alfonso, regional purchasing manager at Comcast. "Our inventory management system is now highly efficient, so our techs and installers can deliver the best possible customer service. And we save time and money, some of which can be used for capital projects. It's simply a great way to reduce operational costs, improve installer productivity and increase customer service and satisfaction."

Bill Winslow, Sprint/North Supply market manager, added that materials management solutions can deliver more than the traditional timely order fulfillment. "They can also redefine how technicians and installers are utilized. With a good materials management program in place, techs and installers are much more efficient, and cable company subscribers receive a higher level of customer service."

## Probita gets active in several areas

Business support software developer Probita announced several agreements recently.

First, the company became a member of CableLabs' Cable/Information Technology Convergence Forum, joining such companies as IBM, Intel, Digital Equipment Corp., Nortel and Hewlett-Packard.

Probita will bring its expertise in cable engineering, telecommunications switching and network technologies to the Forum, which is a group of information technologies vendors organized by CableLabs. Specifically, Probita plans to share its knowledge of real-time transaction processing and operations support systems with the group.

Probita, which is based in Boulder, Colo., has

built information systems for TCI, Ingenius and TV Guide On Screen and has a partnership with DEC to develop applications for Digital's TeMIP network management software.

In addition, Probita was named to the Datapro Advisory Board for the market research firm's Convergence Strategies & Technologies service. In this capacity, Probita will provide input and feedback to Datapro on its research reports and serve as a resource on technical issues. Robert Lund, Probita VP of network technologies, will be the liaison to Datapro.

Datapro's Convergence Strategies & Technologies information service provides detailed analysis and research of the convergence of computers, cable TV and communications markets.

Finally, the company announced it has completed implementation of its Proclaim software for Adlink's digital ad insertion system in southern California.

The software is a key component of Adlink's network, which will allow the company to distribute national and regional ads simultaneously to 57 different headends. Adlink will initially use switched megabyte data service (SMDS) to digitally distribute the commercials, but the software will allow the company to also use satellite, microwave and other transport options. Adlink built the system so that it could distribute commercials throughout the region faster and more reliably.

## Microware offers DAVIDLite software

As mentioned previously ("The tug-of-war over set-top operating systems," *CED*, Dec. 1995, p.58), Microware Systems Corp. formally announced the development of DAVIDLite, a reduced footprint operating system for digital cable TV, DBS and MMDS set-top boxes.

DAVIDLite is optimized and packaged for wireless and wireline digital broadcast receivers and minimally interactive decoders," said Steven Johnson, executive VP and general manager of Microware's New Media Systems division.

As a streamlined version of its OS-9 based DAVID v2.0 real-time operating system, DAVIDLite, is compatible with DAVID software, according to Microware executives. IT supports multiple processors (68XXX, PowerPC and X86) and fully supports MPEG-1 and MPEG-2 products from C-Cube, LSI Logic and SGS-Thomson.

The software requires just 256K of ROM and less than 128K of DRAM, making it optimized for low-cost decoders. Communications support has also been optimized for everything from no

return channel to fully two-way systems.

Also, the software includes MAUILite, a streamlined version of DAVID's multimedia application user interface that enables playback of resident and downloaded applications ranging from simple program guides to complex menus and games.

## Jottings

**The National Fiber Optics Engineers Conference (NFOEC)** has issued its first call for papers for the group's next meeting, slated for next September in Denver. Summaries for papers are due by March 1. This year's NFOEC is sponsored by Bellcore and US West. The conference covers operational issues surrounding fiber optics. Call Felix Kapron of Bellcore for more info at 201/829-5225 . . . **CableLabs** has entered into a reciprocal membership agreement with the Object Management Group, a group of open systems developers in the computer industry. As CableLabs becomes a member of OMG, the computer group becomes a member of CableLabs' Cable/Information Technology Convergence Forum. The goal is to make the cable industry more aware of what is occurring with object-oriented network management and give the industry greater input into open systems development . . . **StarSight Telecast** debuted its new digital navigation system last month. The new navigator was developed in conjunction with Orbit Interaction and will accommodate both digital and analog set-tops. It builds on StarSight's present program guides and offers data services, a selectable, scrolling message area, video browsing window and other features. The system is scheduled to be available after digital set-tops are rolled out . . . A controlling interest in **Channelmatic**, the manufacturer of ad insertion equipment, has been acquired by **IndeNet Inc.**, a Los Angeles-based distributor of television commercials. IndeNet is planning to use Channelmatic's digital Adcart/D to build a digital broadcast network to replace its analog tape-based distribution system . . . A collaboration between **Fore Systems, ADC Kentrox, PictureTel** and **Sprint** has shown how traditional video solutions can be integrated with ATM-based wide area networks. An ATM LAN at Fore's headquarters in Pittsburgh has been linked to a similar LAN in Bethesda, Md. over Sprint's T-1 ATM service, allowing low bandwidth group videoconferences, such as those offered by PictureTel, to be used to share data over the network . . . **Time Warner Cable's** Oceanic division has chosen to deploy digital ad insertion equipment from Texscan MSI . . . **CED**



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# The beauty of traffic-based plant design



By Wendell Bailey,  
VP of Science  
and Technology, NCTA

I have just departed lovely downtown Anaheim, Calif., where the largest cable crowd ever seen at the California Cable Television Association's annual

Western Show enjoyed several exhibit floors filled with people who were there (to hear many tell it) to look at anything digital. Virtually everyone who stopped me to ask a question wanted to know where they could see cable modems. Luckily for me, all I had to do was wave a hand vaguely in any direction, and lo-and-behold, I had a satisfied customer. The most common technical questions that kept coming up were related to modems. Most of the arguments I heard were about whether or not one should use an asymmetrical or symmetrical two-way system.

The arguments should be fairly familiar to everyone by now. If operators provide fully symmetrical systems at, say, 10 megabits downstream and a like number upstream, for what applications will all of the people who are connected use the upstream capacity? Since the average (as well as the fastest) typing speed is well below 10 Mbps in terms of transmission speed, why would anyone waste all of that bandwidth? This is the argument (grossly summarized) of the asymmetrical crowd. The symmetrical group

counters that the world is filled with people who want, and soon may need, the ability to send large amounts of data back upstream. The graphics and control needed for certain types of two-way interactive games are an example. How about all of those people who want to be publishers? New home pages are springing up by the tens of thousands all over the world, and if cable's customers get to use high-speed transmission downstream, can thoughts of publishing be far behind?

While the arguments related to asymmetrical vs. the symmetrical decision can seem like esoterica raised to high philosophy, there are critical, technical reasons why they must be understood.

The U.S. cable industry has somewhere between 30 and 40 megahertz worth of bandwidth to use in the reverse direction. People outside of the industry have written many comments about the apparent absurdity of expecting a system full of people to simultaneously use all of the upstream capacity without grossly overloading the system. But have the commenters ever stopped to consider how their local telephone system works today? Only certain parts of a telephone system are dedicated to the subscriber; the rest are what is called "common" equipment, which means it is shared between all subscribers on an as-needed basis. One of the most recognizable pieces of common equipment is dialtone. A user picks up the phone and hears dialtone;

he touches a number key, and the dialtone disappears. When he went off-hook (picked up his handset from the phone), he provided an electrical short circuit to the central office. That short allowed a current to flow, and that flow was detected by the central office equipment and read as a request for service. That request was acknowledged by sending a signal back to the subscriber to let him know that the central office was there and ready for action. That signal is a dialtone.

As soon as the subscriber touches a number key, the central office understands that it has been recognized, and it no longer needs to show its presence by providing dialtone. There is not enough dialtone for everyone to have their own, so we all share it. Usually, no more than 15 percent of the connected population in any central office can have dialtone simultaneously. If more than that make a request (go off-hook), no dialtone is connected until previous requests are served. This can manifest itself in extreme circumstances as no dialtone for hours and hours. This happened when President Kennedy was shot, and again when Martin Luther King was killed.

## Traffic theory

The ability to serve a large number of people with a finite resource is gained by the judicious design of a sharing system or protocol that takes into account the statistical probability that, out of a given group of users, demand for service will be uneven; that is to say, not all potential users will attempt to use the system at the same time. With such a system (traffic design), it is possible to allow anyone a relatively high probability that when he demands service, it will be provided, but not absolutely for certain at the moment it is requested. This is usually expressed as a certain grade of service, such as, "99 percent of the requests are serviced 99 percent of the time."

This same system of service grades and demand parameters will work in the case mentioned above. Cable operators only need to deliver enough reverse channel bandwidth to the number of users that will meet their service requirements; if operators have too little bandwidth, they either reduce the service commitment or reduce the number of possible users (reduce node size, for example), and the system works as required.

The beauty of traffic-based design is that operators can start out with keyboard speed considerations for most of their customers, and if the demand for bandwidth begins to increase, they can continue to reduce node size as they provide higher speed return channels to those who need them. This means that it doesn't have to be an either/or type of commitment; it could and probably should be a dynamic plan that assumes change over time.

The cable industry has already proven that it knows how to adapt its systems to meet new demands. High-speed cable modem decisions are just part of that tradition. **CED**

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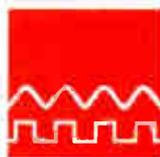
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# Why do they call it wireless?



By Jim Farmer,  
Chief Technical Officer,  
Antec Technology Center

Our new year, 1996, is the 100th anniversary of Guglielmo Marconi's first patent related to radio transmission. Marconi, along with Thomas Edison, is one of my heroes. I've often wondered what it was like back then, to develop hardware that actually worked, with nothing more than the unproven theoretical work of people such as George Ohm and James Clerk Maxwell. Where did experimenters get parts? Not only did those early geniuses not have oscilloscopes and spectrum analyzers, they didn't even have simple volt-ohm meters. Their work was largely based on theory and their own intuition. No wonder many still refer to electronics as an "art."

## Early heroes

While studying for my ham license, I'd read the FCC Rules and saw requirements such as, "the purity of emissions shall be as high as permitted by the state of the art." That phrase, "state of the art," offended my pre-teen self-righteousness. After all, electronics is SCIENCE, not ART. Well, I got my ham license anyway, and later completed some engineering degrees. And, I was afforded the opportunity to practice the electronic "science."

Along the way, as I learned more about electronics, guess what else I learned—electronics is a little bit SCIENCE and a lot ART.

The early heroes remind me of that. Marconi was Italian and did his early experiments in his native country. When he tried to sell the government on his work, he was rebuffed, so he moved to England. There, he patented radio in 1896 and formed the Marconi Telegraph Company. A farmer who saw Marconi's experimental wireless station in Cornwall, England remarked, "Sure don't see why they call it wireless; all I see is wires." (Which leads to a modern thought: our subscribers neither know nor care whether their programs are delivered by wireless, cable, satellite or water pipe. All they want is quality, selection, ease of use and low cost.)

Which leads to another point: what test equipment did Marconi have? When learning electronics as a pre-teen, I was blessed with a wealth of test equipment: my Dad's old volt-ohm meter with half a pointer. (I broke the other half the same day I learned why you don't measure voltage on the current scale.) That and my ear were my total collection of test equipment. Okay, I did have a soldering iron, a 150 watt job that used a railroad spike as a tip. I earned a little spending money repairing tube type radios (how many of you remember the "All American Five?"). It took forever to find and fix problems with so little test equipment, but in that

struggle, I sure learned a lot about radio. Those of you who haven't had such experiences are unfortunate, because they make for a better practice of electronics.

My crowning achievement back then was aligning an AM radio whose IF had been mis-aligned into the AM broadcast band. The radio would only tune to WSUN (620 kHz), but in about two days, I did manage to re-align the radio such that it received the entire broadcast band. My test equipment? Nothing more than my ear and knowledge of the frequencies of all stations in the Tampa Bay area. I had no idea what the new IF frequency was, but it wasn't the standard 455 kHz.

That reminds me of a more modern hero, Charlie Rhodes, now of the Advanced Television Test Center. He spoke once about putting together his first TV, built from scratch as a college project. He aligned it using only his ear and eye. Is that part of the reason he is one of the top television engineers today?

When we got our first TV, my mother was adamant about everyone sitting all the way across the room to watch it. The story at the time was that if you sat closer than a foot for every inch of screen size, you would be injured by radiation. Years later, Charlie explained that a few TVs produced in the late '40s did have radiation problems. However, the problem was quickly recognized and fixed. Manufacturers allowed the radiation rumor to persist, though. Picture quality wasn't very good, but if you sat far enough away, the manufacturers figured you wouldn't know how bad TVs really were.

## Living rooms get smaller, TVs get larger

Today, the closest distance recommended is three to five times picture height. This figure is based on "normal" visual acuity and the resolution possible in the NTSC television system. Displays are good enough that they no longer limit resolution. Rather, the limit is usually either the limits of the NTSC television system, or the limit is set lower by transmission impairments (such as those provided by a cable system). Sitting closer will not enhance resolution for people with normal eyesight, because they are already seeing all the information the system can deliver. The problem is: living rooms are getting smaller and TVs larger, so people are sitting closer. Does your cable system look good up close, or will subscribers see noise and distortions they might not have noticed before?

In 1901, Marconi successfully spanned the Atlantic, sending signals from Cornwall to St. John's, Newfoundland. He shared the Nobel Prize for physics in 1909. Though he continued his experiments in radio, later in life, he turned his attention mainly to affairs of state. When he died in Rome (1937), radio stations all over the world observed two minutes of silence in his honor. What did Marconi think of his work? Did he realize his place of importance in history?

Sometimes I feel unworthy to follow in the footsteps of the heroes of the electronics industry. Nevertheless, I shall endeavor to make whatever small contributions possible. Will you? **CED**

## Have a comment?

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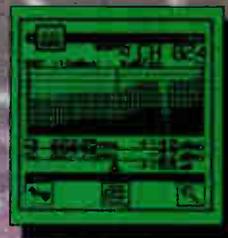
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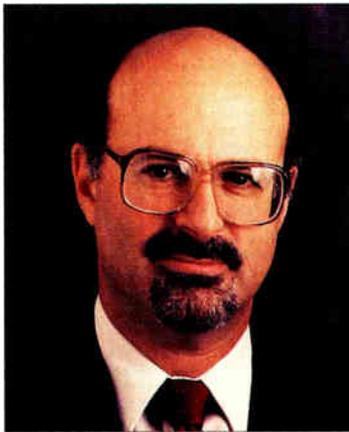
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# Lessons from the 1995 WRC



By Jeffrey Krauss, radio spectrum guru and President of Telecommunications and Technology Policy

I participated in the 1995 World Radiocommunication Conference (WRC) as part of the U.S. delegation. I saw great changes occurring in international radio spectrum management. These changes are partly because the economic value of the radio spectrum is now recognized, and partly because of the development of new international communications networks that use the radio spectrum.

International negotiations in the past were controlled by government experts; in the future, they will be controlled by industry representatives who have a lot to gain (or lose) from the decisions.

Every few years, the nations of the world send their radio spectrum experts to a conference to decide how the spectrum will be used, how different services can share frequency bands, and how to minimize interference between different services. The 1995 WRC was held in Geneva, in a conference center adjacent to the International Telecommunications Union (ITU).

This conference center has several huge halls that look like the United Nations General Assembly, with rows and rows of delegates all wearing headphones. About 140 countries participated in this conference. All oral statements are simultaneously translated into six languages. Documents are printed in

three languages. You think, "This is the way governments negotiate." But then you learn that the real negotiations take place in the hallways and small rooms.

## Important issues for the U.S.

The U.S. delegation went into this conference with three major goals. First, allocate additional VHF and UHF spectrum for low earth orbiting satellites, the so-called "little LEOS." Second, advance the effective date from 2005 to 2000 for so-called "big LEOS" to use spectrum around 2 GHz for satellite communications. Third, allocate spectrum around 5 GHz, 15 GHz and 29 GHz to be used as part of big LEOS networks.

Low earth orbit satellite systems are very different from the geostationary satellites we've used for years to deliver programming to cable headends. Geostationary satellites just sit there at a fixed spot, while LEO satellites continually orbit and might pass over all the countries of the globe. That's why it takes an international conference to deal with issues of LEOS spectrum use and interference.

At VHF and UHF, the frequencies are heavily used in other countries for land mobile communications, and are viewed as too valuable to be turned over to U.S.-owned little LEOS operators. The U.S. did not meet its goals of allocating additional spectrum for little LEOS.

At 2 GHz, the frequencies are heavily used in some

countries for fixed point-to-point microwave systems, and these countries did not want to pay for new microwave equipment operating at higher frequencies. The Arab countries in particular were opposed to the U.S. proposal. The result is that the big LEOS operators, if they want to get into operation earlier than 2005, will have to go to these countries and buy new microwave equipment for incumbent users, moving them to higher frequencies.

That is exactly what the FCC required for broadband PCS auction winners who want to displace incumbent microwave systems. But the ITU is not the FCC; it cannot order countries to give up spectrum if they do not want to. The Arab countries, however, have figured out how to work within the existing ITU procedures and still extract the economic value from "their" radio spectrum when more advanced countries want to use it.

## Higher frequencies

Finally, the U.S. achieved most of its goals at higher frequencies, after strong opposition from the Europeans. The key players here have names like Iridium, Odyssey, GlobalStar, Constellation and Teledesic. They each had their sights set on very specific frequency bands, which they want to use throughout the world. They each got the United States to incorporate their needs into the U.S. position, partly because they are all owned or dominated by U.S. companies. For example, Iridium is controlled by Motorola, Teledesic is owned by Bill Gates and Craig McCaw, and Odyssey is owned by TRW.

But at the WRC, differences were apparent. Iridium, GlobalStar and Constellation all have large European investors. The European delegations supported their specific needs. Teledesic and Odyssey do not have European partners. The Europeans opposed their requests.

Teledesic spent a year lobbying Third World countries, extolling the benefits of its satellite system for rural and sparsely populated areas. Countries like Morocco became strong supporters of Teledesic. In the end, Teledesic got nearly all the spectrum it wanted, far more than the Europeans initially wanted to permit. In the end, Odyssey also got most of the spectrum it wanted, but this success was due largely to the efforts of the U.S. Government negotiators at the conference, who felt it was their obligation to work for the U.S. position, rather than Odyssey's business efforts or political skills.

## Lessons

It was apparent to me that industry representatives will play a much more active role in future world radio conferences. Companies with international spectrum needs will have to create their own foreign relations departments, lobbying smaller countries and establishing partnerships with companies in larger countries. And foreign companies will have to take control of their own destinies, in the same way that U.S. companies have done. It is now evident in even the smallest countries that radio spectrum is big business. **CE**

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

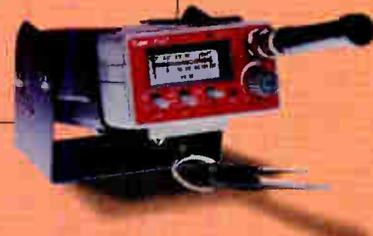
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As I write this during the holiday season, my thoughts sometimes drift back to holidays over the years spent in different towns. I wonder what the old neighborhoods are like today.

# Paying a visit to the hometown page



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

In the past, whenever nostalgia would grab hold of me, I would, in turn, grab the phone, seek out an old friend or relative and find out the latest and greatest concerning my old stomping grounds. But now I've found an additional way to revisit my hometown (actually two hometowns, as I split my formative years between Richmond, Va. and Baltimore, Md.) through the use of the Internet that is fun, fast, cost-effective and provides a wealth of information. I just set my World Wide Web browser to City.Net (<http://www.city.net>) and away I go.

City.Net currently enables connection to 1,150 cities and 575 other destinations from the City.Net web site. Some of the jurisdictions are represented by single home pages, while others, like my hometown of "Bawlmer" (a.k.a. Baltimore for the uninitiated), offer multiple web sites. These web sites offer information on travel, entertainment, local business, government and community services. They're put together by a wide range of organizations, including local governments, chambers of commerce, educational institutions, travel and tourism bureaus, and community groups.

Among my favorites to browse is the web site for the Town of Tonawanda, N.Y. (a suburb of Buffalo), population around 85,000. The development of Tonawanda's web site (<http://freenet.buffalo.edu/~tot>) was ably assisted by my good friend and colleague, Jim Finamore, Tonawanda's cable coordinator and a big proponent of local government's presence on and use of the Internet. Jim says the great thing about city web sites is that they can easily and effectively serve a number of different constituencies.

"For a municipality's residents," says Jim, "the web site can be like an 'electronic front of a refrigerator.' All those notes and notices concerning community events and the like that are typically held by magnets to the door of your refrigerator can be supplanted by immediate, 24-hour-a-day access to even more information on your personal computer."

Jim believes that it won't be long before the interactive component of many municipal web sites is increased, such that a large number of transactions, like applying for permits and licenses, could be completed through use of the Internet. However, there is a tradeoff in developing more sophisticated web site functions.

"Right now, the cost to the local government is low," Jim says. "As greater interactivity is added, the admin-

istrative and development cost will rise. However, such interactivity will provide much greater access to government services and greater usefulness of those services for our citizens."

What about residents who don't have Internet connections in their homes or businesses? The answer may be information kiosks with touch-screen capability in easily accessible public gathering places.

Besides effectuating a "we never close" government operation, another benefit of local government web sites is that they increase government personnel efficiency by reducing the telephone and in-person contact time needed to answer frequently-asked questions. Once the web site is operational, citizens can get these answers through the Internet.

From an external outreach perspective, the major focuses of city web sites are tourism and economic development. Cities large and small are currently promoting local attractions on-line, including descriptions, hours of operation, and pointers toward nearby hotel and restaurant accommodations. Additionally, cities and allied economic development authorities and chambers of commerce provide a wealth of web site information on the jurisdiction's business environment, market indicators and economic statistics—all designed to be attractive to businesses looking to expand or relocate.

## The great equalizer

Indeed, Jim sees the web site as the great equalizer that puts many smaller jurisdictions on par with their larger brethren. "We believe the Internet is helping Tonawanda compete more effectively with larger jurisdictions, especially in the area of business development," says Jim. In fact, since Tonawanda's web site became operational in April 1995, the Town has had inquiries from a number of Canadian firms seeking to implement operations in the U.S., after learning of the town through the Internet.

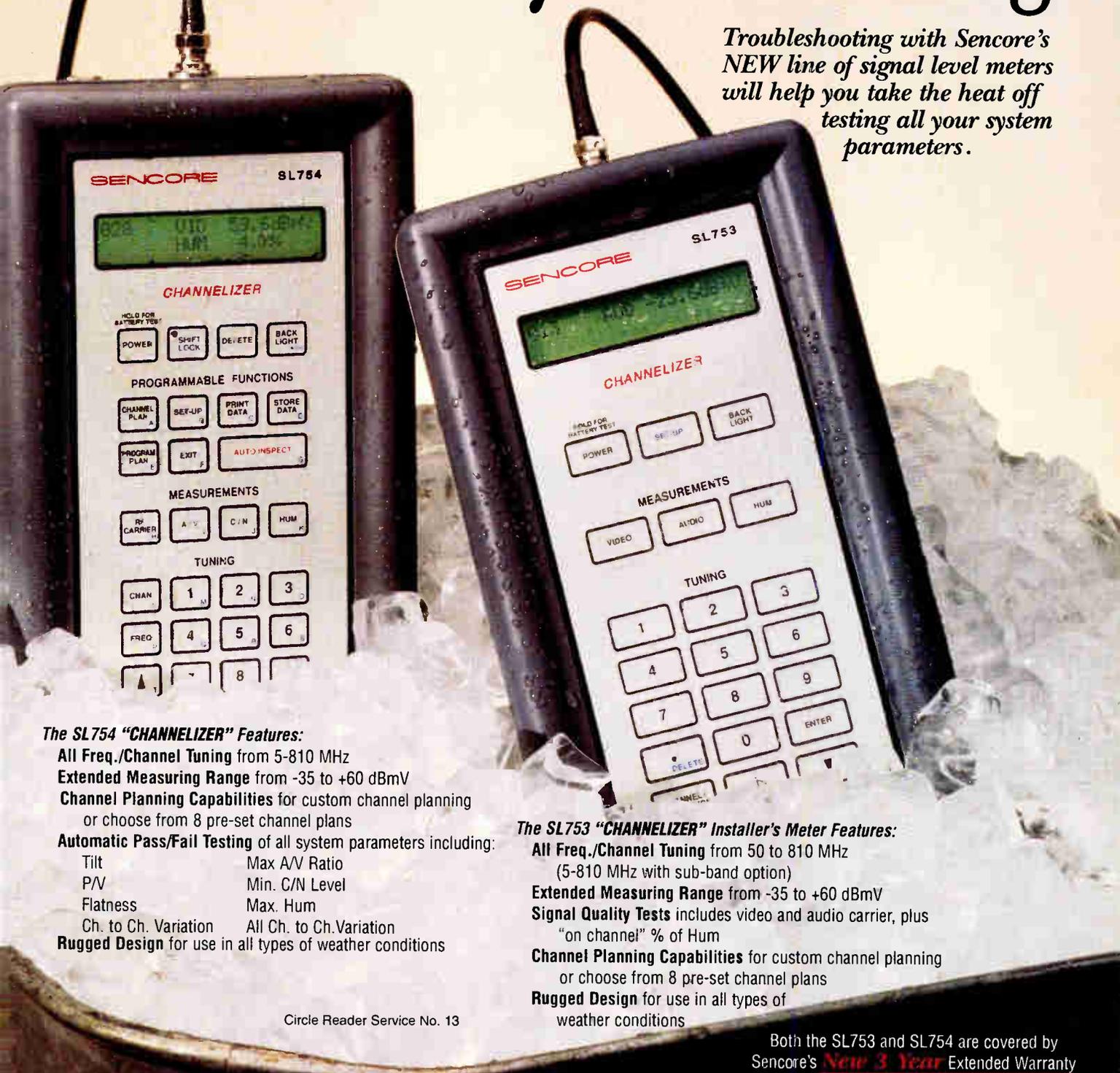
The editors at City.Net estimate that at least 5,000 cities will be on-line by the end of 1996, which means that every day, new cities are establishing web sites. As more sites are established, city representatives believe that they can be used to provide information on successful responses to common city problems and issues.

Jim also believes that local governments and cable operators can work together to increase the usefulness of city web sites. According to Jim, "The system speed, the connectivity, the established relationship between local franchising authorities and cable operators, are all elements which would suggest that cable can play a significant role in meeting the current and future community needs and interests regarding Internet access. Cities and cable operators should work to facilitate this role."

I agree. However, at this moment in time, my mind is drifting back to a summer full of blue crabs, beer and "Birds" baseball. Naturally, then, I point and click toward the "Charm Net" (<http://www.baltimore.com>). And there it is: "Welcome to Charm City, Hon." There really is no place like home. **CED**

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# A one-two punch for data security

Invention supports games

**C**ableLabs has devised a technique that combines hardware keys with hard encryption to secure the downloading of digital data over cable systems. If adopted, the new system "could help change the economics of the computer industry by luring people away from floppies and CD-ROMs and onto networked media," says Tom Williams, CableLabs' senior technical staff member and co-inventor of the approach, for which CableLabs sought a patent last July.

Systems like the Sega Channel are secure because a game is downloaded to random-access memory (RAM) in a game machine, where it can be played repeatedly until the game box is turned off—at which point the game vanishes from RAM.

But the move toward downloading to PCs complicates things because content piped to a PC can be stored on the hard drive and easily shared among friends or even "broadcast" over bulletin boards or the Internet.

Williams and Claude Baggett, CableLabs' director of customer premises equipment, attacked this problem by devising a variant on hardware keys. Such keys are commonly utilized to confine use of expensive software to

one PC. A typical key—"really nothing more than a connector with a microprocessor in it," says Williams—plugs into the back of a PC. It holds data that is referenced by the software periodically while it runs, verifying ownership of the software.

Williams' crucial idea was to have a host computer divide a downloaded program into a large block that is sent to the PC, and a small block sent to a hardware key. That key can be located inside a cable modem, in a plug-in PCMCIA card (such slots are now present on many PCs) or in its own box.

"Most programs that use hardware keys just have a little loop in the code that says 'go check the hard key to see if it's there, and it's the right serial number,' and it does that periodically," explains Williams.

"All a software person has to do is figure out where those little checks are and put a JUMP statement ahead of them that jumps to where the program continues."

With this invention, the data sent to the hardware key is not a static ID code, but a dynamic value returned by a particular program as it executes. This code "is the result of a subroutine that is situationally derived from the program," explains Williams.

Thus Williams' core idea, as he summarizes it, "is that a hardware key, which typically goes with one program, be made a generic device, and that it gains its authorization in a secure fashion from connection via a modem to a cable network. With a programmable, network-downloadable key, you don't need a different key for every application."

## Cryptography added

Williams conferred with Baggett, a cryptography expert, about ways to make the system secure. Baggett's suggestion was to hard-encrypt the data that goes to the hardware key and burn the decryption functionality into the hardware key. Baggett's preferred option for the key is an NRSS card, which is an ISO-7816 smart card which contains both the cryptographic engine, the key handling functionality and storage for the secured part of the software.

The combining of a variable key (Williams' part), plus high-grade cryptography (Baggett's part), means that "a pirate has to work like hell to beat one application, and having done so doesn't get him to square one with the next application."

The application developer, not the cable operator, decides what level of security to apply to a particular program: "A game dashed off quickly might be treated very differently from one that has 200 man-years devoted to it," Williams explains.

The system can work on one-way cable systems that are broadcasting a range of content, though two-way systems would be faster, says Williams.

An advantage of this invention over a Sega Channel-type, one-way broadcast channel is that, with popular games running 100 MB or more, 98-99 percent of a game would only have to be downloaded once, leaving only 1-2 percent to be sent out to the hardware key during each session, says Williams. Alternatively, says Baggett, samples of many applications could be distributed on CD-ROMs, with the unlocking mechanism available over cable.

As games grow more complex and subscriptions to game channels get pricier, Baggett sees "marvelous opportunities for cable operators to partner with game companies, and perhaps developers of other software."

Should this invention be patented and adopted, the main benefit to CableLabs will be to help its members to adopt a standardized security system, says Baggett.

In addition to games, the invention can support e-mail, "video magazines" and other content. **CED**

*This article was written especially for CED by Robert Wells on behalf of Cable Television Laboratories Inc.*

## Benefits of software downloading

- ✓ It supports distribution of more titles than can be physically accommodated on a retail store's shelves. This benefits developers battling for shelf space, as well as consumers.
- ✓ Updates and bug fixes can be distributed automatically.
- ✓ Subscribers can try a game or other program before they buy.
- ✓ By using a generic PC platform, it avoids the obsolescence associated with fixed platforms such as game boxes.
- ✓ It supports target marketing and market research because distribution can be confined to certain areas and sales measured against area demographics.

Source: CableLabs

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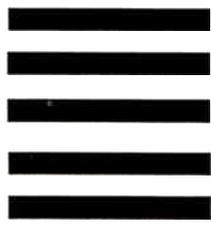
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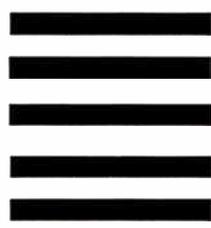
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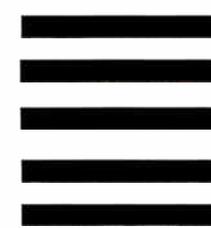
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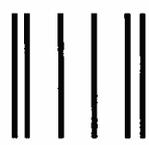
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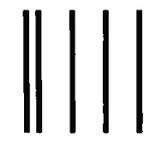
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# Contract installer is upset over lack of support in theft battles

I have a few thoughts in response to your survey on signal theft (*CED*, Oct. 1995, p.95).

I am a contract installer/service tech/auditor who has always taken an interest in signal theft in my system. It has about 135,000 subs and encompasses both wealthy and extremely poor areas.

I feel my system does not do enough to back me up. No one gets taken to court. Some examples:

- ✓ One address has cut into the feeder to hook up illegally six to eight times in the last year, causing a maintenance call every time, plus ingress problems.
- ✓ If I take an "unauthorized" (can't call them illegal) posi (positive trap) from a house and the customer calls up, we give it back.
- ✓ There are addresses I cut off three times in a week and cut their drop down.

I feel my company is devaluing their service by not prosecuting these people. There are only a few people actually hooking up the illegals. If they lean on a couple of the people who receive

the service, I think they could put them out of business. It is discouraging and demoralizing when I cut someone off for the 25th time (literally), and he sits on his porch laughing at me. I cut off approximately 30 illegals a week, and I know if I didn't, no one else would.

Thanks for the opportunity to give my thoughts on the subject. I think the last letter I wrote was to Santa Claus about 20 years ago.

Name withheld by request

## Debt of gratitude

I would like to convey my success story to you first-hand, due to the fact that if it had not been for *CED* magazine, my career would not be as successful as it is today.

It all started in Casper, Wyo. in 1976, when I managed to score a job with United Cable Television after a gentleman came to my parents' home to install cable. I began working for them, and found myself eating lunch one

day in the office break room. I picked up a magazine addressed to the company with the title *CED*. I had no idea that there were classified ads in the magazine until later that evening, when I was able to finish reading the articles. I found several ads for installers, service techs and so on.

I had taken the field of cable quite seriously. I had often thought about moving to Denver to work in the industry, but until I read your magazine, I was not sure how to go about this.

I answered a couple of ads...and received answers and offers from several companies. I took a job with United Cable TV in Westminster, Colo. (a Denver suburb).

Throughout the past 20 years, I have gotten most of my job offers out of the *CED* classified ads. I have advanced from underground construction and installations to working as a subcontractor, to owning a company with offices in Colorado, Montana and now Florida. My business is doing pretty well, and I am still working for a Montana company that I applied to a long time ago, from an ad in *CED*.

I have even bought and sold cable TV equipment from (the suppliers who advertise) throughout the magazine. All the companies and people I have contacted from your ads have been very professional and helpful.

I literally feel I owe it all to *CED* magazine. Thank you and your entire staff for such a professional magazine and for helping me and my family make it in this crazy, competitive world.

Mark Pickrell  
MNM Telecommunications  
Plantation, Fla.

## Old memories

The October *CED* issue was a gas! For old farts (like me?), your history of *CED* (and cable television) was a very pleasant stroll down memory lane (Leslie [Ellis] is probably way too young to remember, but her time is coming).

Thanks for jogging my memory on all the major events from 1975 on. It seems like we've come a long way since then. To quote the Grateful Dead, "What a long, strange trip it's been."

Where did you get all the old pictures—Walt C. with sideburns, Dave Large, Chiddix, Luff, Riker, Best, Callahan, Haag (no, that was a new picture before the Jeff Krauss beard)—great stuff! Even my good friend Louis (Williamson) spotlighted in the same issue. I'll have to keep this one a while.

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# Scalability: The newest HFC network weapon

## Balancing capacity, demand

By John Holobinko,  
Vice President of Marketing  
and Strategic Planning,  
ADC Video Systems

As competition between wired and wireless service providers increases, the pressure for networks to be profitable from day one is intensifying. Network profits are only made by delivering content cost-effectively. A network with a higher initial fixed capital cost for delivering a given set of services will most likely be less profitable initially, than a network with lower fixed capital cost.

In classic wired HFC and switched digital networks, the designer has been faced with a virtually impossible dilemma relating to network capacity: Designing a net-

is even more difficult when examined on a serving area by serving area basis. Networks are typically designed for an average capacity per serving area, measured either in average bandwidth per home passed or average kilobits per home passed. However, metropolitan areas are not homogeneous, but rather, diverse. This classic network design is guaranteed to result in some areas with capacity underutilization (wasted capital) and others with capacity overutilization (lost business and/or dissatisfied customers). What is very clear is that the inflexible natures of today's networks imposes the requirement that the network designer must choose a fixed capacity based on predicting future services and take rates. Historically, the ability to predict future services success by any forecasting technique has been dubious, at best. Yet, in essence, the network designer is called upon to predict the future.

Traditionally, HFC networks have been designed corresponding to the above criteria. Typically, the selection of broadband optical transmitters for a particular network configuration is made based on the optical output power of the transmitter and the average narrowcast bandwidth specified by the designer per home passed

or per serving area connected to the transmitter. There are currently three HFC network designs based on these transmitter types:

- ✓ High power 1550 nm transmitters and optical amplifiers in which 750 MHz is spread over tens of optical nodes covering thousands of homes passed.
- ✓ Medium power (10 MW+) 1310 nm DFB transmitters in which 750 MHz is spread over two to four optical nodes covering perhaps 1,000 to 2,000 homes.
- ✓ Low power (3-4 mW) 1310 nm DFB transmitters in which 750 MHz is dedicated to each optical node covering 100 to 1,000 homes.

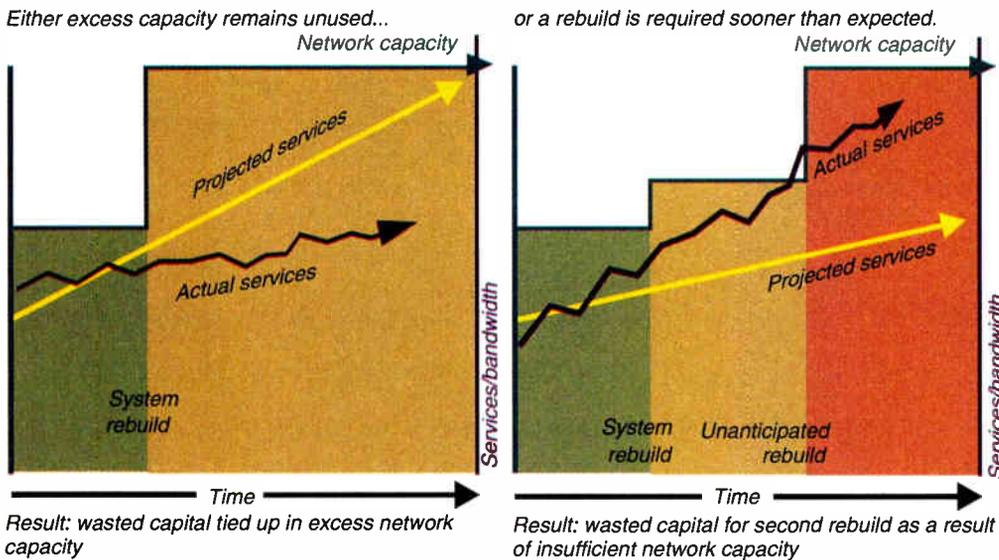
Designing a network with each of these transmitter types is limiting, because of their inflexibility relating to delivered bandwidth.

High power 1550 nm optical transmitters provide low cost broadcast services

delivery, but also limit the ability to offer narrowcast services. Adding narrowcast capability to the node has been postulated via a second wavelength on the same fiber, or a second fiber. However, anyone who remembers the days in which two fibers were used to carry 40 channels each to the node where these were then combined, knows the operational complexity and expense of such a solution. Doubling the number of transmitters (and possibly receivers) further complicates the network and decreases reliability. Installation and balancing a single node could take four to eight hours. Further, this approach is inflexible if the demarcation between analog and digital channels moves down gradually from 550 MHz to lower frequencies over time.

Medium power transmitters have been by far the

Figure 1: Classic network design. A hopeless case for matching services to capacity.



work with minimum capacity to support today's services will result in lower initial capital cost, and therefore, faster or higher profitability. However, a network designed this way may not provide sufficient capacity to take advantage of emerging future service opportunities. Service providers may find themselves at a competitive disadvantage, or forced into costly future network capacity expansion prematurely. Alternatively, designing a network with sufficient excess capacity to handle all possible future services will result in a very high upfront network capital investment, which will reduce or eliminate profits and reduce the capital available for investment in other business opportunities.

The problem of balancing network capacity (capital expenditures) with services demand (network revenues)

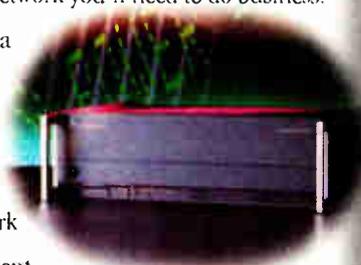
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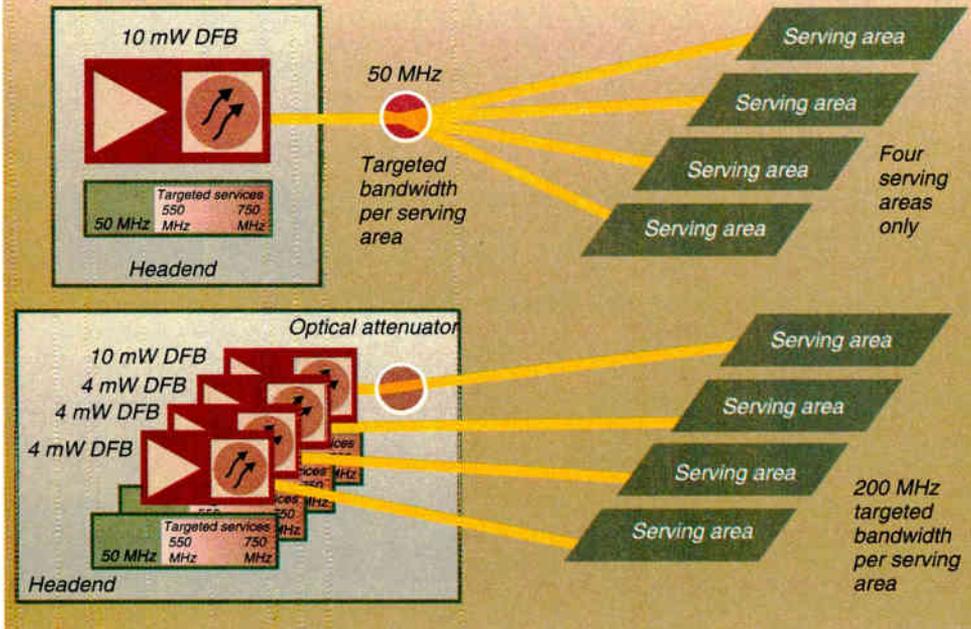
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Figure 2: Achieving higher granularity: DFB expansion concept.



widest implemented solution. The disadvantage of this approach is that there do not exist services today in place which utilize all of the narrowcast bandwidth available from this configuration. This makes this solution more costly than otherwise required. At the same time, there is no guarantee that these transmitters provide sufficient narrowcast bandwidth to handle all future narrowcast services requirements. With this approach, narrowcast bandwidth expansion per home passed requires network reconfiguration and the addition of new transmitters, while resulting in underutilization of the optical power of the existing transmitters. Low power transmitters solve the problem of dedicated bandwidth to the node, but at the greatest initial capi-

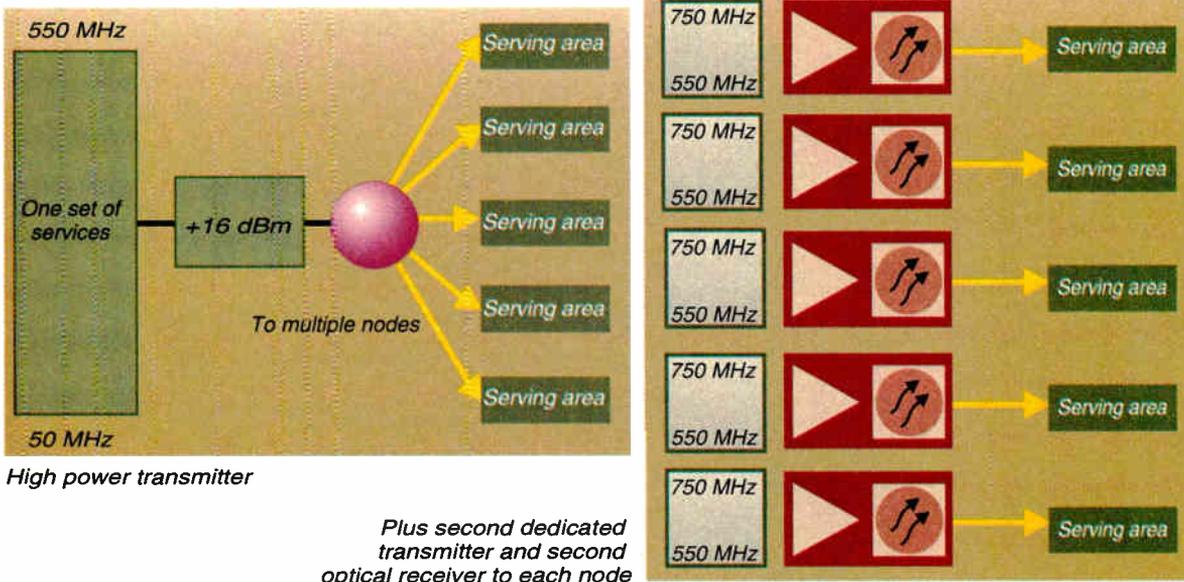
tal expense, because there is little offsetting revenue from currently available narrowcast services to offset their additional capital cost. Additionally, there is no assurance that all of the narrowcast bandwidth will ever be utilized for the foreseeable future. Therefore, they have the greatest potential negative impact on network profitability.

A common thread that runs through all of the above approaches is that each one of the above architectures requires that a portion of the network must be modified or rebuilt in order to increase network capacity. The ideal solution for the network designer is a transmitter which is scalable in terms of the narrowcast bandwidth that it delivers to each serving area, to allow creation of very cost-effective networks day-one, while providing the capability to expand narrowcast bandwidth on a serving area by serving area basis, in response to specific services demand. Today, the industry is seeing the introduction of the first scalable forward path 750 MHz transmitter for HFC systems. A scalable transmitter is one which allows the amount of dedicated bandwidth to an optical node to be expanded without replacement of any optical transmitters, fiber or cable plant modification, without modification or adjustment of the optical nodes, but rather by simple addition of modules to the transmitter itself. In other words, network capacity expansion can be done via a simple plug-in procedure at the video serving office (i.e. headend/hub) without as much as a truck roll to an optical node.

The ability to provide such scalability via the optical transmitter provides significant benefits over traditional network design approaches:

- ✓ Networks can be designed with lower initial capacity, at lower initial capital cost, without risking future narrowcast business opportunities;
- ✓ Network capacity expansion can be done modularly, with no new optics required and no modification of the cable plant;
- ✓ Network capital costs for capacity expansion can be tied closely to network revenue producing services roll-outs on an ongoing basis;
- ✓ Network expansion is graceful and controllable, able to be balanced to each specific serving area;
- ✓ Financial risk is significantly reduced.

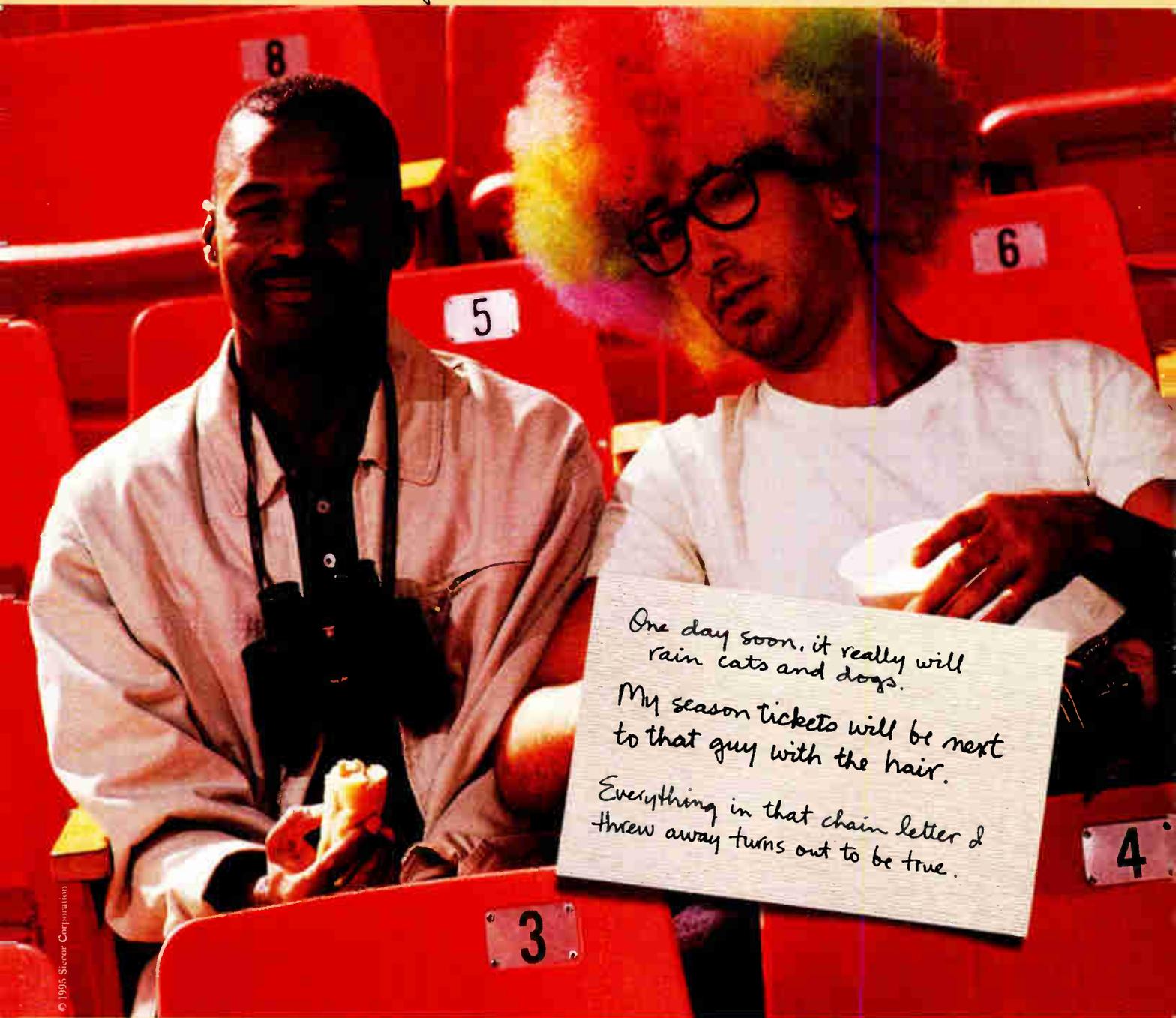
Figure 3: Achieving higher granularity. High power 1550 nm concept



High power transmitter

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## THE FEARS OF Roger Wallace , CATV NETWORK TECHNICIAN



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Figure 4: Forward path expansion

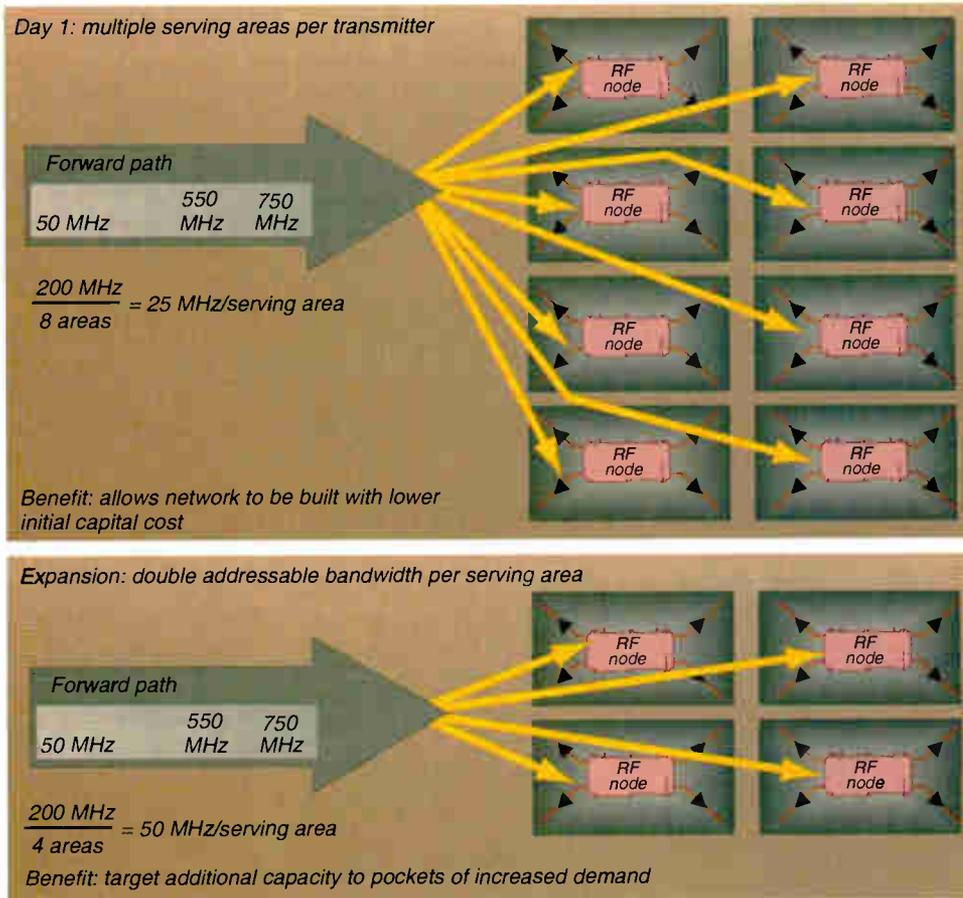
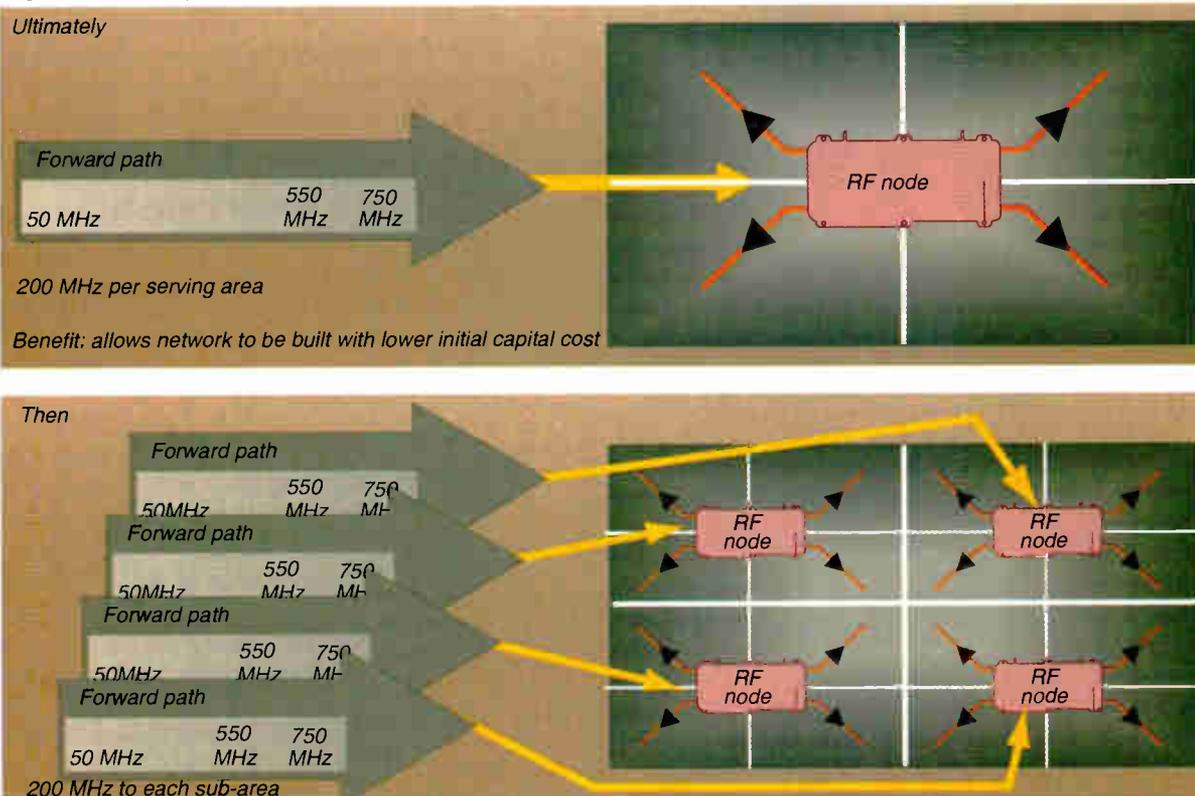


Figure 5: Forward path expansion



The first transmitters of this type will be available in the second quarter of 1996. The scalable transmitter consists of modules which slide into a universal equipment shelf. A transmitter consists of an optical source module plus one or more external modulator modules which are interconnected in various ways, depending on the narrowcast dedicated bandwidth required per serving area. What makes a scalable transmitter possible today is a number of technical and economic breakthroughs. These include: higher power 1550 nm DFB lasers for use as constant wave (non-modulated) light sources; new polarization maintaining optical components; and newly developed lower cost external modulators.

Here's how the forward path in the network is designed using scalable transmission. Initially, when the system is built, there are not yet available many targeted services. Therefore, the most cost-effective, profitable network design includes only small amounts of dedicated bandwidth per serving area. For this configuration, the designer can configure the scalable transmitter in a broadcast mode, covering the maximum number of serving areas possible based on the optical budget, with only a small amount of narrowcast bandwidth per area.

As more narrowcast services are deployed, eventually, some service areas will require additional narrowcast bandwidth. To provide such narrowcast capacity expansion requires only the addition of one or more external modulator modules after the optical light source. The existing optical splitter configuration is moved from its original place after the external modulator, to a position between the CW laser module and the external modulator modules. Because only the position of the optical components has changed, there is no change in the optical link loss to the nodes served by the transmitter. Therefore, there is

typically no need for truck rolls to the optical nodes in order to upgrade narrowcast bandwidth. System bandwidth upgrade has been reduced to a simple, modular plug-in procedure.

Because each individual external modulator module is capable of accepting a unique 750 MHz set of services, the total expansion in bandwidth of one transmitter is equal to the number of additional external modulator modules installed and connected with a given light source. No equipment at the transmitter or at the nodes is replaced, or underutilized after the expansion.

The reliability of this solution is equal or better to that of standard DFB laser-based systems. The optical source of the system is an unmodulated, constant wave (CW) high power DFB laser operating at 1550 nm.

No optical pumps are used. Operating a laser without modulation and at a constant power level eliminates transient input signal spikes that can prematurely age the laser. Control circuitry for laser bias and cooling is similar to traditional DFB systems. Signal drive circuitry for external modulators is based on standard RF circuits. External modulators today are so reliable that they are used in space missions and have even been shot from cannons as a component in projectile guidance systems. Therefore, the scalable transmitter does not introduce the need for back up or redundant paths any more than standard 10 mW-based DFB transmitter solutions.

The economic advantages of the scalable transmitter are multifaceted. The cost savings using this approach not only consist of the initial reduction in capital expense day one, but also the savings in truck rolls, additional, more complex maintenance and less network reliability due to increased numbers of transmitters and/or optical receivers of other approaches. To quantify the economic advantages of the scalable transmitter solution in their entirety requires a time value analysis of the capital investments in network transmitter equipment. For example, if a conventional solution requires an investment of \$10 million in transmitters day-one, and the scalable transmitter requires an investment of \$6 million day-one plus \$2 million in two years, plus \$2 million two years later to achieve the same narrowcast granularity, then both solutions would appear to cost \$10 million. However, using a typical cable TV opportunity cost of capital of 15 percent yields a cost of only \$7.5 million for the scalable transmitter solution, vs. \$10 million for the first solution. Importantly, the scalable solution also has less risk relative to the roll out of future services. The only time a future investment is made in the scalable solution is if revenue generating services are already successful enough to justify the future investments in narrowband capacity expansion.

There may, however, be some situations in which 750 MHz of dedicated bandwidth per serving area is needed from day one. In this case, a standard 4 mW DFB laser transmitter has been integrated into the same equipment shelf as the scalable transmitter. So, with one common transmitter platform, the best economical solution is available, whether it is low initial capital cost and grad-

Figure 6: Achieving higher granularity. Scalable transmitter expansion concept.

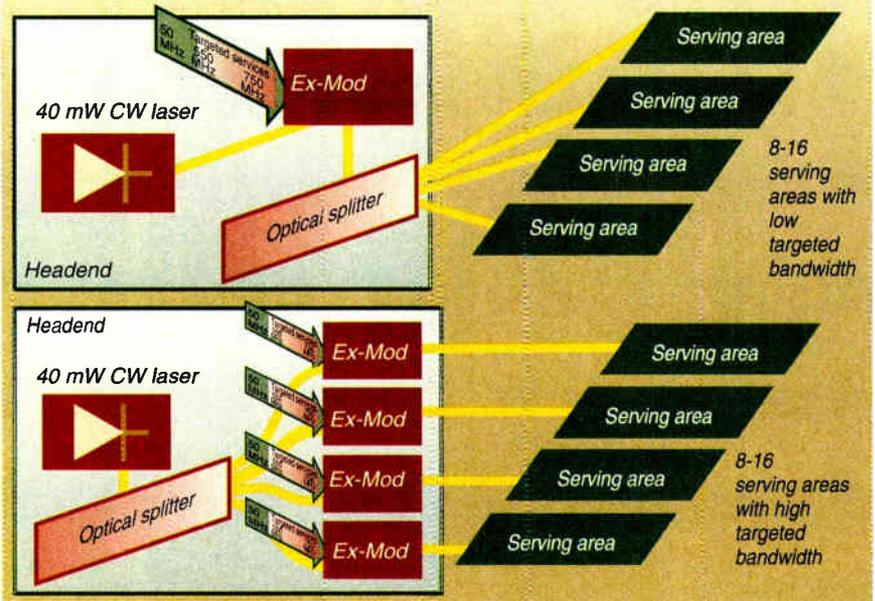


Table 1: Advantages of scalable transmitters

	Traditional 10 mW DFB scalable	4mW DFB laser	1550 nm high power transmitters/amps	Scalable 1550 nm
Bandwidth scalable?	No	No	No	Yes
Initial capital cost	Medium	High	Low	Low
Relative cost of bandwidth upgrade	High	Medium	High	Low
Telephony, data on same transmitter	Sometimes possible	Yes	No	Yes

ual growth, or immediate high dedicated bandwidth at higher initial capital cost. Table 1 summarizes the advantages of the scalable transmitter vs. the three other commonly used transmitter types for HFC networks.

The next step in HFC systems evolution will be scalable serving area sizes and scalable nodes. In combination with the scalable transmitter, this would provide the ability for HFC networks to migrate fiber closer to the subscriber gradually, and cost-effectively. Efforts are underway to address that issue.

One of the strongest historical criticisms of HFC networks compared to switched digital solutions has been their ability to deliver enough bandwidth to the serving area to handle very large amounts of narrowcast information. The scalable transmitter appears to alter that equation in that it keeps the initial advantage of the HFC network over the switched digital network at lower take rates, and allows bandwidth to be increased by four- to eight-fold without any modification of the cable plant at higher take rates, and with fewer fibers per optical node. For cable TV operators and telcos, this means that HFC systems can be built more cost-effectively than previously possible. CED

# Hildenbrand: Out in front on new network technologies

Cablevision  
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on new

network

technologies

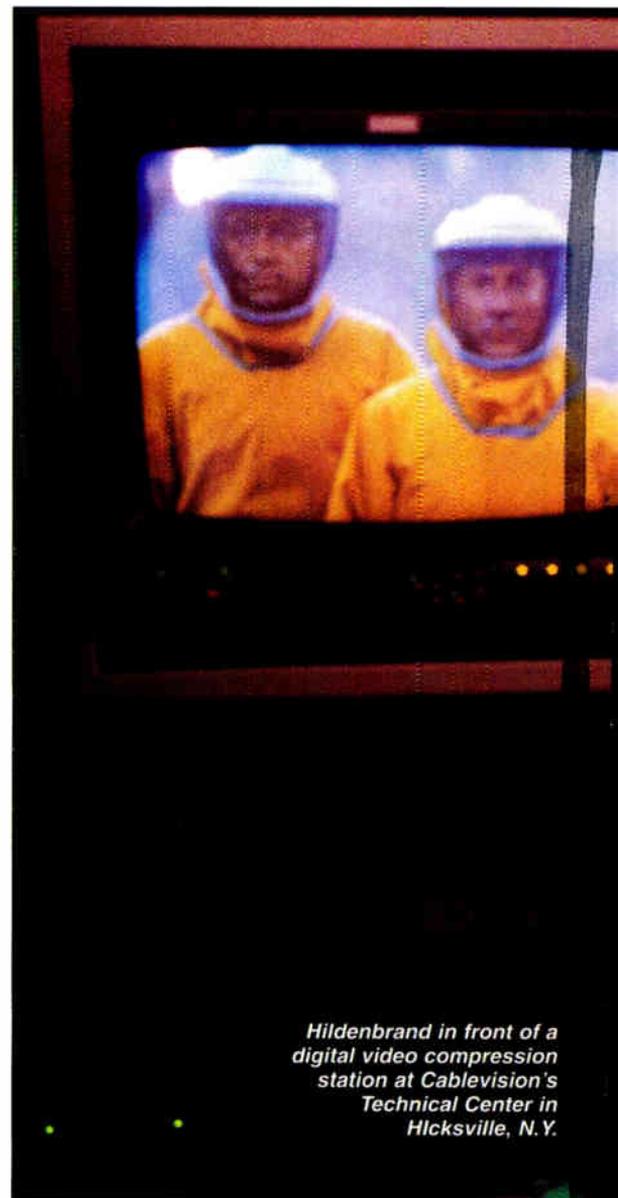
By Roger Brown

**W**ilt Hildenbrand's office doesn't look like those normally inhabited by vice presidents of technology at the big multiple system operators—it's small, almost Spartan in its appointments. It's also more cluttered than most, and it's filled with toys.

Not kid toys, mind you, but fun things like personal computers attached to high-speed modems, and a TV outfitted with interactive guides and services. But Wilt's cluttered office doesn't mean he has a cluttered mind; this is clearly one technologist who has a vision of where he wants his company to go.

This self-described oddball has quietly put himself and Cablevision Systems Corp. at the forefront of new technology by launching numerous important technology and market trials. Today, Wilt oversees tests of high-speed data transfer, cable telephony, telecommuting, interactive TV and digital video compression over perhaps the most unique system architecture the industry has seen.

It is in recognition of this desire to push the technol-



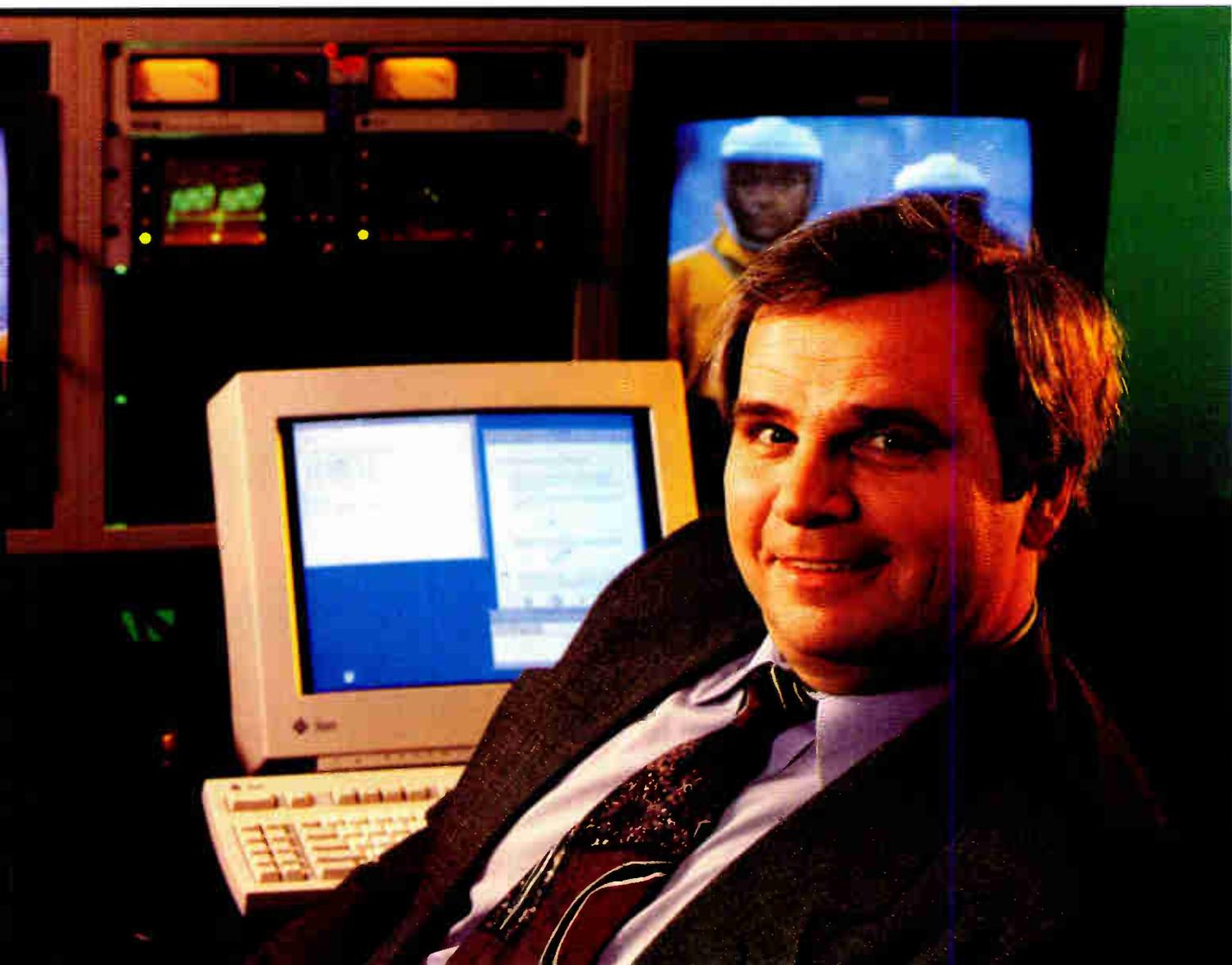
Hildenbrand in front of a digital video compression station at Cablevision's Technical Center in Hicksville, N.Y.

ogy envelope that Hildenbrand has been chosen as *CED* magazine's 1995 Man of the Year.

Hildenbrand's rise to the top at Cablevision is the classic rags-to-riches model that probably can't be duplicated today, now that degreed engineers and doctoral candidates have taken over cable television engineering departments as cable companies have grown up to be huge media conglomerates.

In fact, those who knew Wilt 30 years ago might be entirely surprised to discover what he's done with his life. After entering Oneonta Teacher's College in New York with the intention of becoming a chemistry teacher, Wilt admits he "didn't buckle down real hard" and found himself enlisting in the Air Force to avoid being drafted.

Once there, his fortunes changed dramatically. He ended up touring the southern U.S. doing airborne radio repair and discovered he actually enjoyed learning about electronics. "I learned some basic concepts," recalls Wilt, "but I also learned a discipline . . . ways to



follow rules and ways to duck rules—both of which turned out to be incredibly important.”

After his military discharge, Wilt literally fell into a job at a Louisiana cable TV station, where he ran the studio console, inserted commercials and did some directing. In addition, he repaired the board and aligned the cameras when necessary. Suddenly, a new career path was laid out: “I knew that’s what I wanted to do,” Wilt says.

Eager to return to his native New York, Wilt parlayed a recommendation from a TelePrompTer office manager into a job as assistant warehouseman in Islip, on Long Island. “They didn’t have a studio, so they took a chance and offered me that job,” Wilt remembers. “They hadn’t hired a warehouseman yet, but they certainly knew assistant material when they saw it,” he laughs.

During that time, which was characterized by all-out construction and a mad scramble to acquire new franchises, Wilt spent a good bit of each day pre-setting amplifiers on the bench so that the turnkey contractors

could hang them and turn the system up quickly. From there, he gradually moved up the ladder: spending time as a service technician and performing installs. By 1975, Wilt had found a new home in the headend as chief tech.

The following year, Wilt took a job with neighboring MSO Cablevision, following the footsteps of Bill Quinn, his former supervisor at TelePrompTer. At that time, working in the headend was the place to be: Cablevision was starting new local programming services that kept technical personnel hopping. Those services, which today are known as American Movie Classics, Bravo and SportsChannel, and distributed by Rainbow Programming Holdings, required innovative approaches to distribution.

“It was wild and wooly,” Wilt recalls, “and there were no rules.” So he worked with Eastern Microwave to develop a microwave network and bought time from Western Union’s land, satellite and microwave network to feed services or provide backhauls of live sporting events.

**Wilt parlayed a recommendation into a job as assistant warehouseman in Islip**

Within a couple of years, Hildenbrand became a key member of the Cablevision central engineering group, where he supported the frenetic franchising effort through construction planning, site inspections and other roles. He also built an uplink site to support Rainbow's programming distribution efforts and used the facility's "down times" to send CNN news feeds and sports feeds from a variety of broadcasters.

"That was an interesting experience, not only from the technical aspect, but from the business aspect, too, because we brokered time over the satellite," says Wilt. "It turned out to be a valuable learning experience."

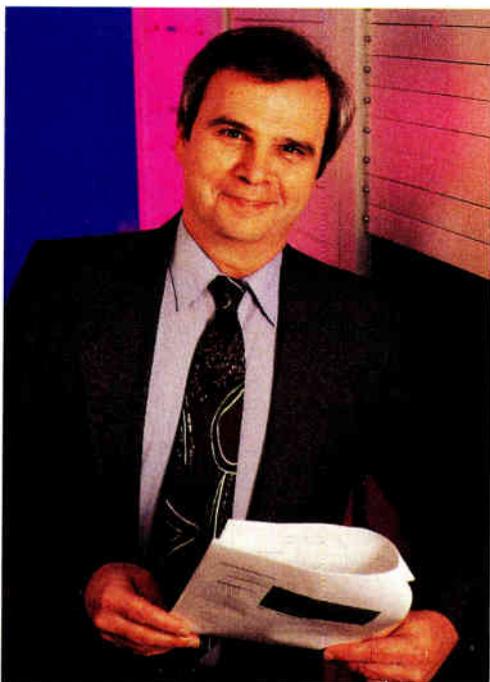


PHOTO BY BRIAN STANTON

**Wilt in front of video-on-demand transmission equipment**

As Rainbow grew, Hildenbrand became director of engineering. He stayed there for about four years until his perennial supervisor Bill Quinn was named general manager of Cablevision's Long Island system, which opened up a new opportunity. Suddenly, Wilt was vice president of engineering and customer service.

Unlike other industry engineering VPs, Wilt was responsible for making sure Cablevision customers were given the best possible service in addition to overseeing the engineering department. Although it was an odd job combination at the time, Wilt says it's one that made a lot of sense. "New developments and (the way the network is engineered) impacts customer service," he notes. And while the combination may have been unusual, it offered another advantage—the beginnings of an education on

telecommunications.

"Part of customer service is dealing with the telephone system," he says. "So, in a rudimentary way, you had to understand call volume, how to design a system, waiting times and the like." In short, it was a basic primer in traffic modeling.

The intense customer service focus caused Cablevision to develop its own set of internal performance standards long before the Federal Communications Commission formalized them. Wilt admits his "to-do" list was never completed, but "we did a lot of things," he notes.

Learning other disciplines also taught Wilt another lesson. "You can't ever just focus on the technology engine, you have to focus on the impacts that are made across the organization," says Wilt. For example, in a video-on-demand environment, it's important that customer service reps have access to billing information in real-time, not from a batch, so they can answer customer inquiries immediately. "All these different pieces of the puzzle interrelate and impact the ability to roll out new technologies."

And then, the industry exploded into a brand-new

technology age, where the introduction of fiber optics changed the way networks were designed and promised to revolutionize the types of programs that could be offered (read: interactivity). In order to remain focused on new technologies, engineering and technology was split from the customer service function about four years ago.

But the experience was invaluable. Wilt's knowledge of the other disciplines led him to one inescapable conclusion: when it came time to rebuild, Cablevision had to construct the most flexible, transparent network possible. A whole new slate of applications was coming, and no one could accurately predict which would win, and which would fall by the wayside.

While the rest of the industry began constructing fiber optic networks driven by lasers which operated at 1310 nanometers, Wilt and his crew took a long, hard look at 1550 nm transmission gear—not to be different, but because of fiber's inherent lower attenuation and ease of amplification at that wavelength.

"We wanted to take the network out of the equation," he says. "We wanted a network that was extensible—one that wouldn't be (adversely impacted) by new technologies." By using 1550 nm devices, Cablevision could use high-power devices and essentially split the outputs in the headend and still provide analog signal performance that was more than adequate. If there is a future need to improve signal performance or drive fiber deeper into the network, amplification is possible. (For a detailed discussion of how Cablevision built its network, see "Rethinking traditional CATV architectures," *CED*, September 1990, p.50.)

### Under fire

At the time, many people were flummoxed by Cablevision's design choice. Wilt's brethren had all chosen to use 1310 equipment, and Cablevision's support for 1550 was apparently, and inexplicably, seen by many as counterproductive to the industry's goals. Some—even a few who today are using 1550 nm technology—lashed out against him.

"It certainly caused a reaction," recalls Wilt. "There are very few things that have happened in this industry that have caused a reaction like that. To this day, I don't know why. To us, it wasn't a case of right or wrong—it worked for us. We weren't trying to tell anyone else what to do. Maybe it was an extra distraction no one needed during a time when fiber was brand new. Maybe rallying around a single standard was important, and we were being non-standard. I don't know.

"But that's an old wound that has finally healed," he continues. "It doesn't matter to me anymore. We use 1310 gear for certain applications. We need all the tools we can get, and this is just another tool." In fact, Cablevision for the past six months has been wave division multiplexing 1310 nm signals on top of the 1550 nm video streams.

But did that experience taint his view of his colleagues or make him reticent to become more active in the industry, something for which other industry engi-

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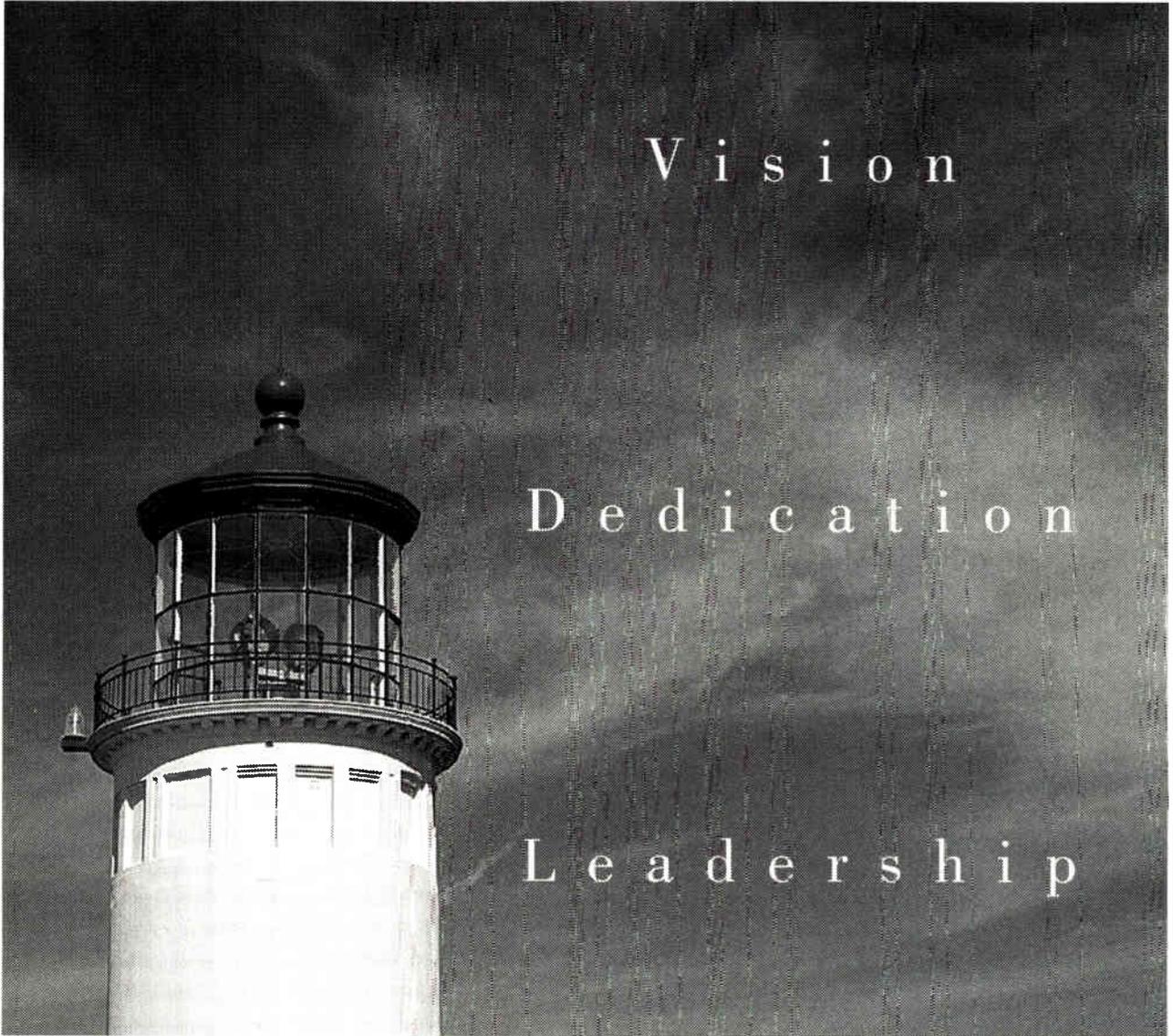
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**“It’s not important that the outside world understand me personally or what I’m doing”**

neers continue to criticize him? Wilt says no.

“Some of it’s company style,” he explains. “We don’t usually talk (about planned deployments) before we’ve done it. But we’re more open than we used to be, and that’s important. Anybody who wants to come in and see what we’re doing can do that. We’ll show you everything we’ve got.”

In fact, Wilt argues that because Cablevision doesn’t enjoy the same cache as a TCI or Time Warner, the company’s announcements don’t get the media play they might deserve. “Maybe we’re not as silent as everyone says—we just don’t draw the attraction. We’re small, we don’t have that much staff, and we’re busy. This is a high-task company, so we don’t spend a lot of time pontificating, we just go do.”

It is true, however, that Wilt doesn’t seek an audience or ratification from others that his plans and strategies are sound. What matters is that his strategy makes sense for Cablevision and its customers.

“I fit into that model because I’m the same way. It’s not important to me that the outside world understand me personally or what I’m doing. It’s important that what I’m doing makes sense for here.”

Although he bristles at the thought he’s a contrarian, Wilt does admit he’s, well, different. “I cherish that. I really do. I think differently about a lot of things. I’m

just weird. I accept that.”

Oddball tendencies aside, Wilt and his crew are today busy on several fronts. With nearly 1.6 million customers clustered in the New York/Long Island/southern Connecticut corridor, Cablevision has a unique ability to test new services on an educated, willing and financially attractive subscriber base. So Cablevision obliges—the MSO is soon planning to roll out high-speed modems for data transfer and Internet access; enhanced pay-per-view; telecommuting services to employees of a large Long Island company; low-level interactivity via GTE Main Street; residential telephony services; and digitally compressed movies.

Is that overkill? While Wilt likes to be on the cutting edge, he insists that all these trials and tests serve a purpose. “We’re looking to leverage the network and differentiate ourselves from our competitors. We’re not just doing this for the sake of the engineering department.”

A year ago, Cablevision contracted with AT&T Network Systems to deploy digital enhanced pay-per-view and video-on-demand. Although the roll-out has slipped somewhat, the MSO has begun taking delivery of a set-top manufactured by AT&T that enables those services to be delivered to subscribers’ homes.

For this service, Wilt chose to deploy a digital-only box to avoid having to be compatible with existing ana-

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**"There are very few things that have happened in this industry that have caused a reaction like that"**

log set-tops and services. He also decided he wanted a "dumb" set-top, reserving the intelligence for the server, making it easier to control security.

As of last month, there were about 25 set-tops deployed, and Cablevision was offering 10 movies at 10-minute start times. Meanwhile, new software for VOD was due last month, and service was due to roll out to about 50 "friendly" customers in the first quarter of 1996.

Unlike other MSOs that integrated several different parts from different vendors, Wilt chose to work solely with AT&T because it could deploy the server, the set-top and the network components. "I didn't want three vendors because they'd never agree, and everybody would spend more time pointing fingers than working on the problem."

But is EPPV and VOD a business? Does it make sense to offer digital services over a dedicated set-top? That's precisely what Cablevision hopes to find out.

In the meantime, Cablevision is also working with GTE Main Street to determine if there's any market pull for interactive services. By wrapping a custom-built sidecar that houses the Main Street technology around a standard analog set-top, Cablevision will be able to test some low-level interactive services.

"We'll roll out about 300 sidecars, put them in people's hands and see where it goes," he says. "We're not

quite sure what to do with it yet, but we're very enamored with interactive technology."

For nearly a year now, Cablevision has been testing as many high-speed modems as it could get its hands on. In Boston, it used LANcity equipment. Out on Long Island, it's testing both the Intel unit and Zenith's 500 kbps Homeworks unit over two-way HFC in 500-home cells, 2,000-home cells and across non-

fibered coaxial plant. That technical trial, which has about 300 users, is about to grow into a full-fledged service launch.

In spite of a hostile RF environment, Wilt says running data shouldn't be any more difficult than transporting video, providing the cable plant is clean. In fact, Wilt says it's noise, not ingress, that has been the limiting factor for him, probably because there is so much two-way plant. "There's stuff (noise in the RF spectrum) floating around there that surprised even us," he reports. But in terms of noise, "it's not the way it used to be. You get most of the work done just by meeting the signal leakage rules."

What about dynamic bandwidth agility, where return frequencies can literally "hop" away from dirty spectrum? Wilt says while the idea has merit as a solution,

it could potentially consume too much spectrum, which is already in short supply. "There's no magic bullet," he says. "I think you have to operate these systems as if you can't move away from the ingress."

Cablevision is also ready to launch a telecommuting trial with a company out on Long Island that wants to provide its employees with a method to access its internal network. Although details of this trial were unavailable, Cablevision already has telecommuters in Yorktown, N.Y.

There, 1,400 employees at IBM's Thomas Watson Research Center can log onto the digital data network to send and receive computer programs and files at speeds approaching 4 Mbps via Zenith modems. The interconnect is also used by two local high schools so that students can receive multimedia science programs.

Cablevision executives, including Wilt, are high on data transfer as a potential revenue source. "(Data) is probably my favorite project," notes Wilt. "It's the easiest to bring to market, the technology is not tremendously hard to do and it begins to act and feel like residential telephony, but it doesn't have all the reliability requirements. And it's something our competitors can not do."

Cablevision knows all about competition. With a firm foothold in southern Connecticut, the operator sits squarely within the sights of Southern New England Telephone (SNET), whose aggressive deployment of HFC networks for video have been well documented in this and other publications. "My job is to be afraid of everybody," says Wilt, who admits it's the telcos who are closest to offering real competition. "If you don't keep up, everybody's a competitor."

Just as SNET hopes to lure away a few Cablevision customers, Wilt and his clan hope to snare a few telephone customers. Cablevision is already running a handful of Nortel's Cornerstone Voice residential subscriber units and plans to deploy up to 50 more to understand usage patterns, traffic needs and other operational issues. By April, Cablevision should be deploying "hundreds" of the units. In addition, Cablevision has tested equipment from Tellabs, West End and ADC Telecommunications and hopes to soon test gear from Motorola.

## Haste makes waste

Even though Cablevision may be far ahead of other MSOs, Wilt says he favors a go-slow approach, mostly to make sure everything goes well. "I don't think we'll screw up, but we want to be very careful. We're assuming we only have one shot at this."

Of course, Cablevision already has some telephony experience through its competitive access provider subsidiary, Cablevision Lightpath, which has deployed a class 5 switch and today switches about 1 million minutes per month to about 150 commercial clients. "Lightpath has been a great learning tool," says Hildenbrand. "I wouldn't want to try to get into telephony without having had it."

Can cable MSOs really compete in the telephony world, where perception of reliability and customer ser-



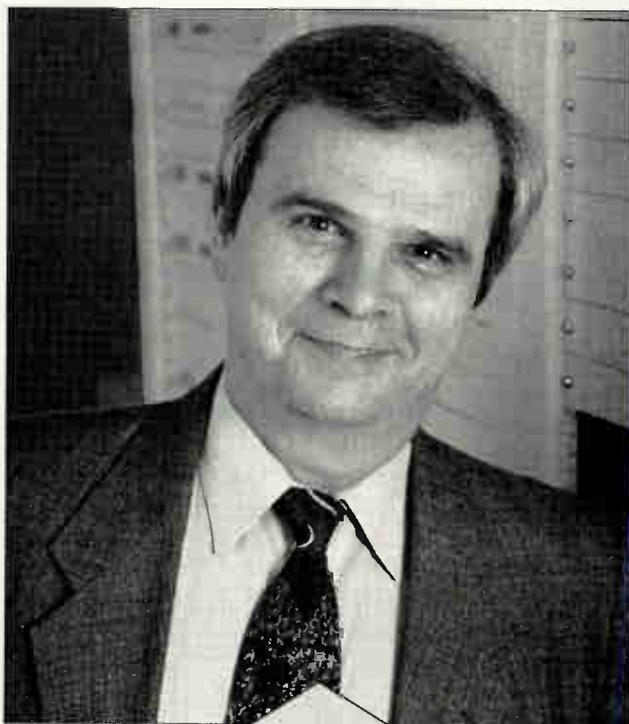
Hildenbrand and Cablevision CEO James Dolan (right) show off the MSO's Internet home page during last month's Western Cable Show.

PHOTO BY LONG PHOTOGRAPHY

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vice are everything, or is switched voice service biting off more than the cable industry can chew?

"It's clearly Mecca from an engineer's point of view," Wilt says. "It's held up as the service I have to be able to support." He says there are two key issues that must be overcome: powering and operations issues. "If we can get past some of the powering issues, I think we have exactly the same capabilities as the phone companies. It may even be possible to be more reliable by keeping voice quality higher than they do. I also don't have a legacy infrastructure to deal with. And my network doesn't have a limitation regarding second lines for fax or modems.

"So, no, it's not more than we can chew, assuming that we recognize we now have that responsibility. We have to get our operational mindset into the fact that this is on-line all the time. And we can practice with the PC modem, where I don't have the same benchmarks, but I can set the same standards for myself."

Wilt recognizes that reliability will be a key benchmark in the future, but argues that cable systems have already made tremendous strides. "You're not really allowed to be off the air

anymore," he notes. "It's not an emergency communications device yet, but there really is no outage time that's acceptable. Short of third-party power, these networks almost never go down anymore. This fiber to 500-home node stuff is just amazing—it's so bloody bulletproof."

### Hell week

It wasn't always that way—and no one knows that better than Wilt. In what could have been his worst week as an engineer, he recalls miscalculating a microwave link back in the '70s that caused a sports service to be off the air for about 100 hours. "The only reason I'm still employed is that it happened back when the stakes were different. But the impact on me was the same: it scared the hell out of me." He also says that's why he's always asking equipment suppliers for an escape valve when it comes to upgrade strategies. "It's a very hollow feeling to find out there's no net."

One man who knows what it's like to deal with Wilt is Dave Robinson, VP and general manager of General Instrument's digital network systems business unit. Between stints at GI, Robinson also worked with Wilt while he

was at AT&T. "Wilt is a truly brilliant engineer who constantly demands to know more, and to know why not," Robinson says. "He has a striking degree of intellectual curiosity and is one of the best out-of-the-box thinkers I've encountered."

Perhaps owing to his original intent of becoming a chemistry teacher, Wilt is also able to effectively communicate complex technical thoughts to others within Cablevision.

"Coming into the telecommunications industry with a completely non-technical background would have been a much more difficult task if I could not have run to Wilt every 20 minutes to discuss megahertz, Ethernet and other technical subjects," says Joseph Cece, president and COO of Cablevision Lightpath.

James Dolan, Cablevision's new CEO, agrees: "I've known Wilt for almost all of my career. His extraordinary knowledge has guided the company through countless technical initiatives."

Not that he hasn't had help. Like all success stories, Cablevision's ability to build new networks and test new services is the result of a team effort. And Wilt has one of the best unsung teams around.

First, there's R&D director Rudy Welter, who came to Cablevision from Bellcore, where he worked on advanced telecom networks. Scot O'Hare came from Grumman and has a doctorate in mathematics and a background in LAN networks and security. And Zizi Zhao, who holds a doctorate in applied math, is chief scientist and does a lot of Cablevision's Internet initiatives.

"I have no idea why three doctors are working for me," laughs Wilt, "it just worked out that way. But because I understand cable TV pretty well, I wanted to have people around who could smack me and say, 'you're an idiot; this isn't how the rest of the world works.' They look at and understand things now that I don't know about just yet."

And, of course, there's the support group at home, which consists of Lynn, Wilt's wife of 26 years; son Marc, who's attending Brown University and majoring in computer science; and daughter Mandy, who turns 14 this month. It's a close-knit clan that still takes vacations together, Wilt reports.

In short, while Wilt is out there testing new technologies, he's surrounded himself with a support infrastructure that virtually ensures he won't fail. But he's convinced his biggest hurdle isn't technical anyway—it's mental. "It's understanding that as we move into services that are more interactive and potentially life supporting, we have to change our mindset and keep our heads in the equation." **CEO**

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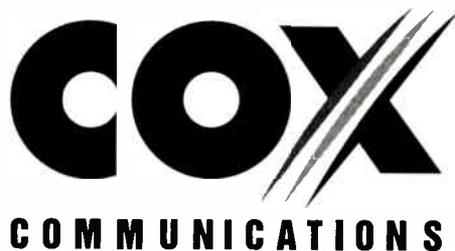
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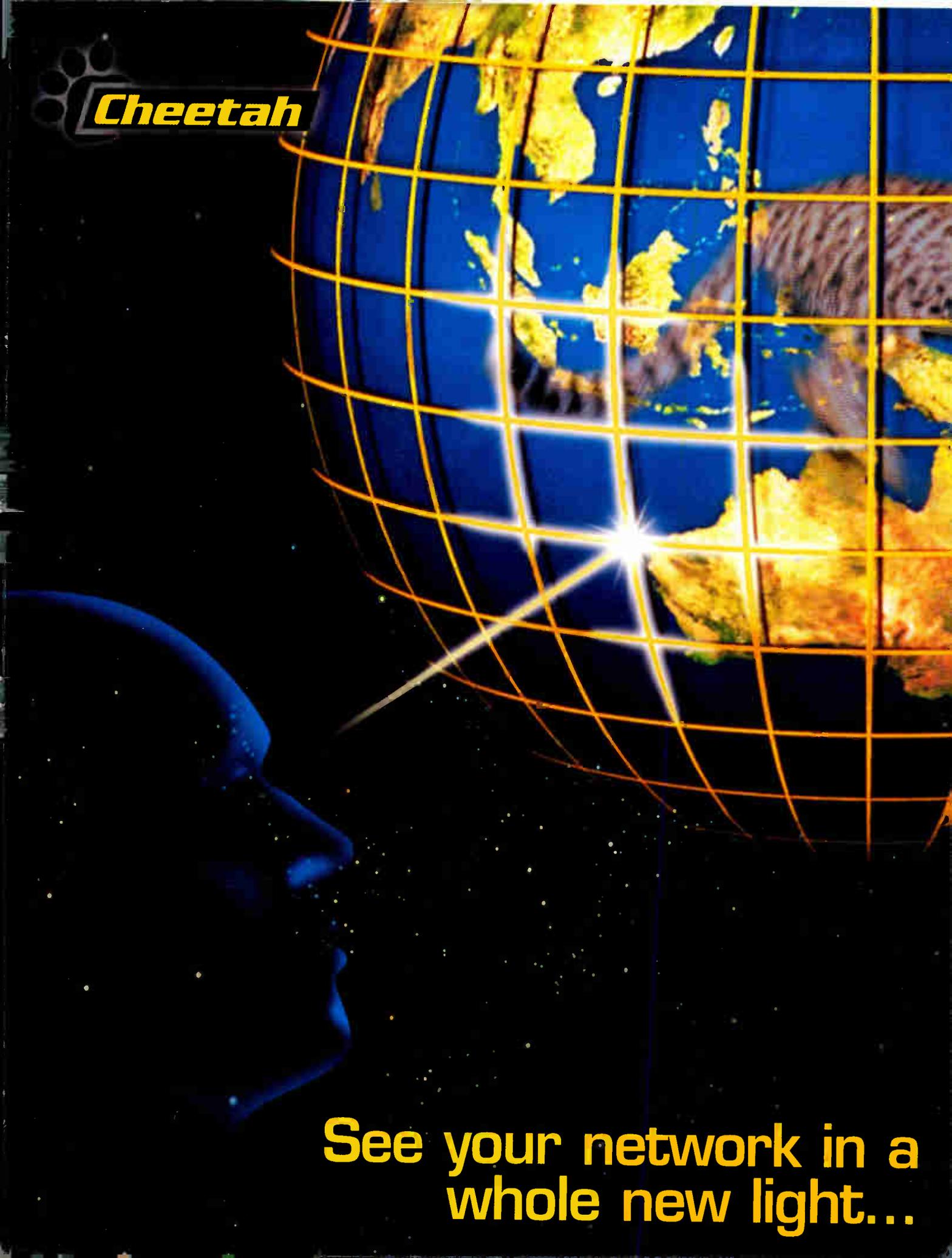
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The image is a composite advertisement. In the upper right, a globe is shown with a grid of glowing orange lines. A cheetah's face is superimposed on the globe, appearing to look through it. A bright starburst of light emanates from a point on the globe's grid. In the lower left, the blue silhouette of a human head is shown in profile, looking towards the globe. The background is a dark space filled with small white stars.

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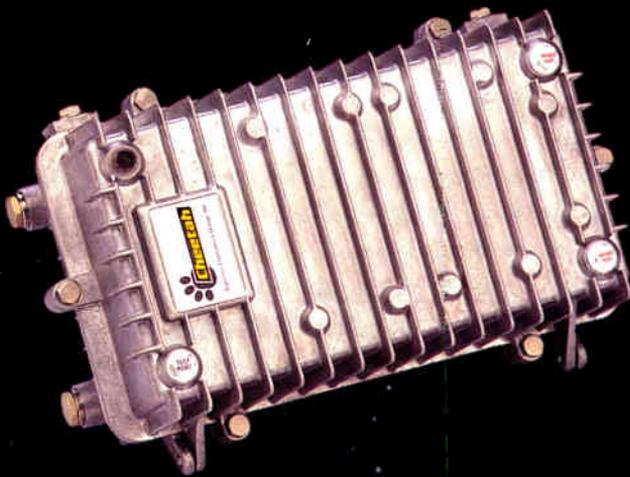
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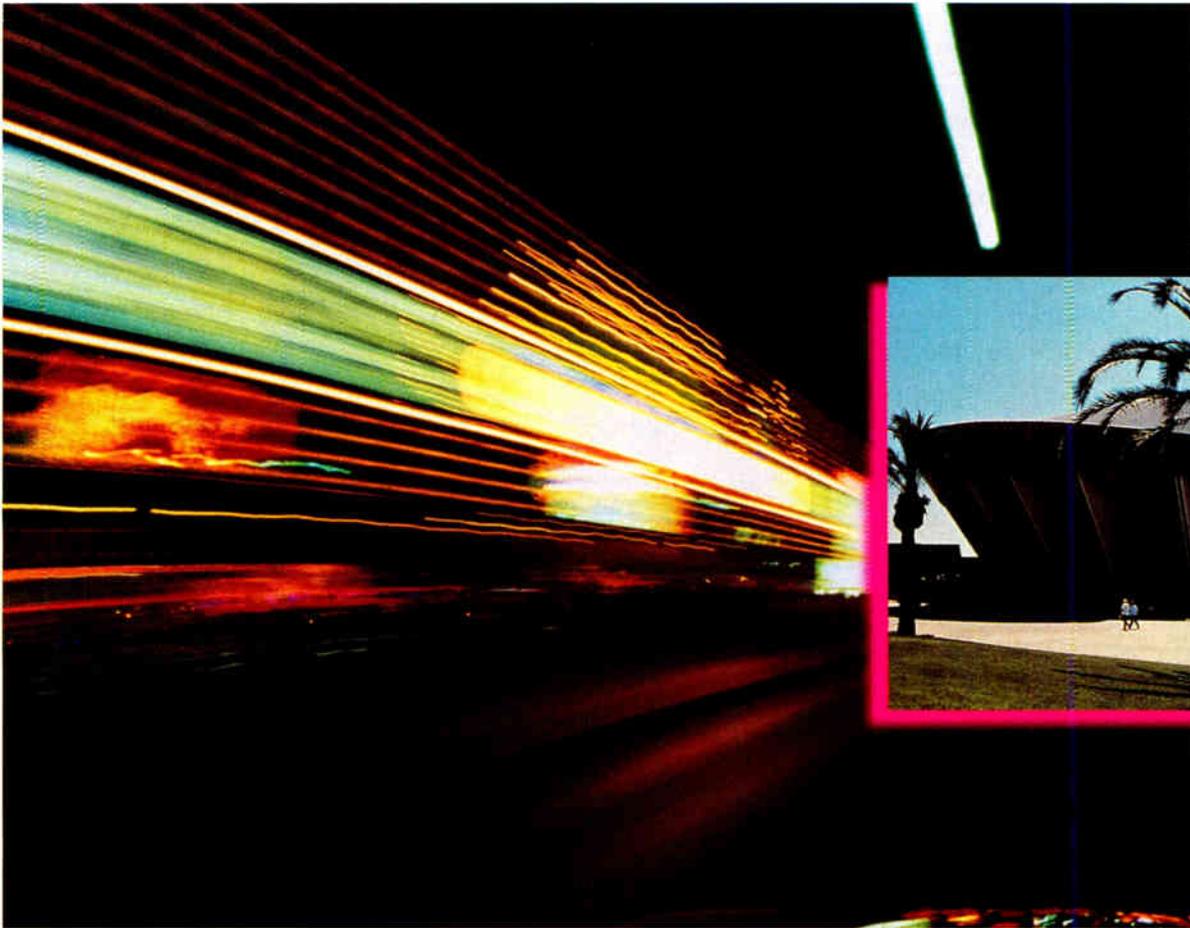
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# Western Show hits Modems, demos dominate show **warp speed into the future**

*By CED staff*

The advance notices regarding the 1995 Western Cable Show said that for the first time in a few years this was not going to be a technology show. Instead, it was to be driven by new programmers and discussions of how to survive a competitive, converging world.

But the 23,000 people who went to Anaheim discovered that cable modem technology stole the show and dominated the show floor and press conferences (see related story, page 68).

But outside of high-speed data, there were

plenty of other things for technologists to explore. While many overlooked the historical event because of its tardiness, General Instrument Corp. demonstrated live reception and distribution of DigiCipher II/MPEG-2 programming at the show. GI received a live, digitally encoded signal from TCI's Denver-based Headend In The Sky (HITS) at its booth and transmitted that to the CableNET booth in another part of the convention center.

The demo showed, for the first time, the entire digital compression system from the uplink to the real DigiCable home terminal, in a live situation that emulates a working cable system. The MPEG-2 signal originated at

HITS and was delivered to the show via satellite to a dish on top of the convention center, and then to a GI integrated receiver transcoder (IRT). The signal was then sent from the IRT to the DigiCable terminals using 64 QAM for MPEG-2 decoding.

This is the same gear that TCI will begin taking delivery on as this magazine hits the streets. As widely reported, the technology has been delayed because of numerous design and implementation issues, both within GI and because of the MPEG standardization process.

While GI was obviously relieved to show its new digital system, set-top box manufacturers were also demonstrating how existing analog technology can be used to begin a migration path from simple interactivity to more advanced forms of two-way communication. Central to that theme was Wink Communications, which showed how its Wink Engine can be used to get subscribers used to interacting with their TVs. Wink was present in set-tops made by General Instrument, Scientific-Atlanta and AT&T.

The Wink Engine allows interactive applications such as news, weather and sports updates to be sent via analog set-tops. The software uses 128K of ROM, runs applications

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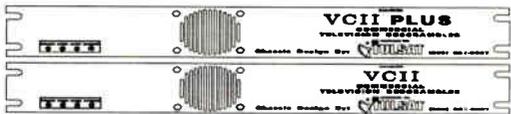
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## ◆ WESTERN SHOW HIGHLIGHTS

in less than 32K of RAM and typically adds no cost to the set-top box. Yet, the software offers full-screen graphics, 16 four-bit colors, individual pixel addressability, color cycling for simple animation, fades, wipes and transitions, and advanced data network capabilities.

Wink also announced a joint agreement with InterActive Digital Solutions to extend Wink's Interactive Communicating Applications Protocol (I-CAP) to IDS' InterActive Community broadband software. The agreement will create an open software platform that simplifies the transition from analog to digital content.

Also, CableSoft Corp. and Wink announced they will jointly develop interactive software applications for advanced analog set-top environments. In the deal, CableSoft's applications—including locally-based classified ads, interactive yellow pages and "LocalWorks," an interactive community directory—will run on Wink's operating system engine.

On analog cable systems, the CableSoft applications will operate as "virtual interactive channels," using the TV signal's vertical blanking interval to carry data to the Wink-equipped set-top. Wink already has an agreement to run its embedded operating system on GI's CFT-series advanced analog set-tops, as well as S-A's 8600x.

Executives with Wink and CableSoft said the development agreement creates a backbone system of hardware and software that supports interactive applications from data creating and input, through transport to the headend server, and on to the set-top.

### In other news

Both ADC Video Systems and FONS showcased ways for network operators to send specialized services to specific demographic clusters. Called "narrowcasting," the concept allows network operators to target services to specific demographic areas.

ADC's system, called "HWX," uses 40-milliwatt lasers and external modulators to send a minimum of 50 MHz of dedicated bandwidth to a serving area, said John Holobinko, VP of marketing and strategic planning for AVS.

In that scenario, 200 MHz of bandwidth—available between 550 MHz and 750 MHz—is divided by four serving areas to establish the 50 MHz narrowcast chunks, he said. Later, if service usage indicates a need for more narrowcast bandwidth, the laser's output can be optically split and sent to two external modulators—doubling the amount of narrowcast bandwidth available to 100 MHz, Holobinko explained.

"This was designed so that operators can economically scale their networks—they incur costs for new equipment only when extra services are required," Holobinko said.

Meanwhile, FONS' new "FONSmmitter" offered up a similar concept, also using high-power lasers with up to 32 outputs of lower level optical power for local distribution. Plus, said Mike Noonan, president of FONS, network redundancy is achieved because the same information is sent from more than one output source.

Both configurations contrast with another optical transmission platform that uses low-cost, low-power lasers closer to optical nodes for the same purpose—like Scientific-Atlanta's System 70 optics, which was also on display for the first time.

Engineers with Tele-Communications Inc., Time Warner Cable and others said they're evaluating both approaches—changing out headend electronics with high-power, multiple output vs. using lower power lasers in the field—but that the ultimate decision will come down to economics.

"These things are easy to decide: You look at the money involved, and pick the cheaper one," said Jim Chiddix, senior VP of engineering and technology for Time Warner Cable.

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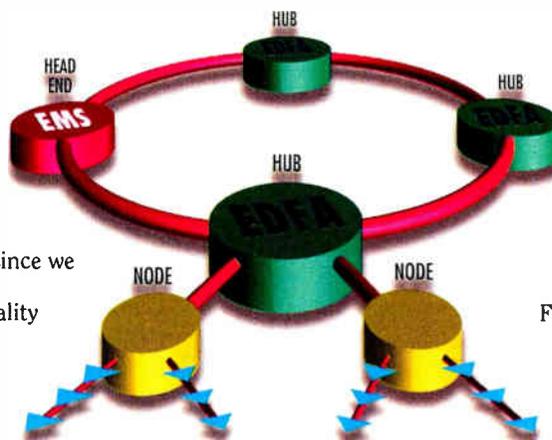
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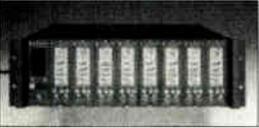
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## ◆ WESTERN SHOW HIGHLIGHTS

### Headend equipment

Standard Communications Corp. unveiled a new, channel-specific modulator and announced the completion of its Stratum 80-channel broadcast quality distribution system during a press conference at its facility.



**Standard's Stratum Modulator System**

The new "Apex Mod" allows network operators to add channels or improve performance of existing modulators by as much as 5 dB carrier-to-noise (providing an 80-channel system C/N of 63 dB), according to Standard officials. The unit produces out-of-band C/N greater than 100 dB, and second- and third-order distortion greater than -70 dBc. The unit is the first product for the new Apex line of products.

Also, Standard officials announced that the Stratum Series distribution system will be integrated into TCI's San Francisco Bay Area system and Comcast's Baltimore cable system. The Stratum system, which was announced last year, but just recently completed the development cycle, is a six-foot bank of modulators driven by an intelligent backplane that can automatically configure and switch to a back-up modulator in the event of failure.

These features make the system ideal for network operators interested in providing reliable signal transmission. "We're trying to help operators achieve 99.99 percent reliability," said Clayton Dore, Standard's director of sales and marketing.

Standard has also announced a new cable TV channel package, a combination of its broadcast certified Agile IRDII MT650 satellite receiver with the new TVM550/550S series television modulator. The package is designed to offer operators a satellite TV receiver/descrambler and modulator/BTSC stereo generator in two rack spaces.

The new "Apex Mod" allows network operators to add channels or improve performance of existing modulators by as

Edging closer to the rollout of its digital video file server network, the Prevue Channel said it had completed the deployment of a digital network control system using MPEG-2 video. The new system lets Prevue build an MPEG-2 video library while it works toward the completion of its server network over the next 12 to 18 months, executives said.

It also means Prevue will be able to access about 400 percent more on-line video inventory than its current systems allow, giving it more variety in PPV, premium and basic video clips, executives said.

"This is a significant step toward going completely digital from end-to-end, and to do it without resorting to an interim solution like others have done with MPEG-1," said Bert McCoy, VP of research and development for Prevue. McCoy said Prevue worked closely with Conner Storage Systems Inc., Vela Research Inc. and SeaChange Technologies Inc. to develop the components of the network control system.

Vela Research introduced its third-generation "Centaur" MPEG encoder, designed to compress analog source video into MPEG-1 or MPEG-2 bit streams.

New features in the Centaur include support of serial D-1 and AES/EBU inputs, closed captioning, and a pause/resume feature for working with longer movie material, executives said. Also, the encoder has been repackaged into a smaller chassis, making it more suitable for installation in confined environments.

The encoder is available in both MPEG-2 adaptive field frame [AFF] and a lower cost frame only [FOE] version, and will be available early this year.

Vela also released the latest versions of its EISA and PCI bus integrated decoder boards that feature NTSC/PAL studio-quality, MPEG-2 decoding capabilities with genlock video input. The boards can decode image resolutions from SIF to UTU-R-601 (CCIR-601)

with on-board reconstruction of I, P and B frames. Both decoders now offer closed-captioning support for extraction from user data fields in video elementary streams using the new LSI 640002 chip. Other enhanced features include a video output driver, output video buffer and increased video output levels.

ASC Audio Video Corp. displayed its newest addition to the Virtual Recorder (VR) line of products, VR SpotBase, along with VR NLE and VR Net Delay. VR SpotBase is a full-featured spot insertion program with built-in inventory database, machine control capabilities and integrated logging systems.

SpotBase allows users to locate spots from current tape inventory and digitize them onto the hard drive. Once loaded, spots are immediately available for playback to all VRs in the system. The responsiveness of the program allows a spot to be played to air even while being digitized.

SpotBase interfaces directly with contemporary traffic systems and features a variety of automatic functions. Media management activities are handled without operator intervention, and full-featured control of source VTRs, via industry protocols, is provided.

VR NLE is the on-line/off-line integrated non-linear editing system, while VR Delay is a two-VR switcherless system that allows simultaneous, variably delayed record/playback access to the same media.

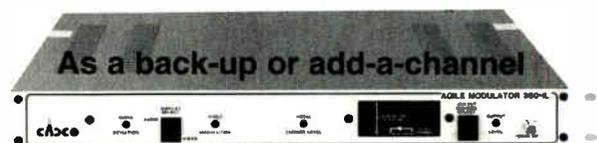
Antec's Digital Video business unit demonstrated its digital advertising insertion system. The demo showed how MPEG-2 video storage and Digital Video's video file server architecture allow operators to incrementally build an advertising business, while paving the way for node-targeted ad insertion services.

Imedia Corp. demonstrated a new server and software that increase the capacity of digital cable systems, enabling them to deliver up to 24 channels per 6 MHz. Imedia's server was demonstrated in the home entertainment sec-

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tion of CableNET '95 and used GI's DigiCable set-top boxes. It employs statistical multiplexing technology developed by the company that more efficiently allocates bits across channels, delivering a 24:1 channel multiplex. With Imedia's products, cable operators can deliver more programming, while offering new features, including VCR-like control of movies over a broadcast environment.

Monroe Electronics Inc. introduced the new Series 3000R-162 Program Timer 4, which features events for 365 days ahead, with 4, 2x1 audio follow video switches. The unit will store up to 322 events, with any combination of events between different switches. Users may use priority overrides to enter holiday or special events switches in place of every day use. The unit offers a variety of timed programmable functions.

ATCi announced the availability of worldwide satellite-based MPEG-2 solutions. ACTi's MPEG-2 program encoders are designed around an open architecture that permits economical digital broadcasts with a newly developed chip that features integrated components for denser circuitry. The modular encoding system uses sophisticated pre-processing, noise reduction, encoding algorithms and statistical multiplexing to produce compressed pictures at the lowest possible data rate. ACTi's system also provides flexible inputs for audio and video originating from satellite, tape, fiber or file servers.

The company also introduced a high-speed broadcast data satellite modem/receiver that links powerful host computer (LAN/WAN) networks with remote offices.

Mega Hertz displayed a flexible audio and video Emergency Alert System (EAS) for cable television operators. The Sub-Alert EAS system is capable of overriding and distributing baseband audio and video sources, composite or separate A/V IF, individually or jointly and simultaneously. The system allows cable operators to individually select which channels will be overridden with both audio and video EAS messages using any combination of switching and distribution methods. The Sub-Alert can be configured to override hundreds of channels.

In addition, the system has addressed the current EAS FCC requirement imposed on cable operators, while also providing for the needs of both the sight and hearing impaired subscribers. Because in-home units are not required with the Sub-Alert, the system costs less than audio only compliance. The Sub-Alert can be immediately installed for local EAS franchise requirements, and when necessary, upgraded for FCC compliance by adding

the required encoder/decoder, once type accepted and certified by the FCC.

Smithills MultiMedia Systems Inc. announced that the first product in a planned family of digital video servers will be available for ad insertion and pay-per-view applications in the second quarter of 1996. Target markets for the new server include cable operators, broadcast TV stations (for ad insertion applications) and pay-per-view sites at

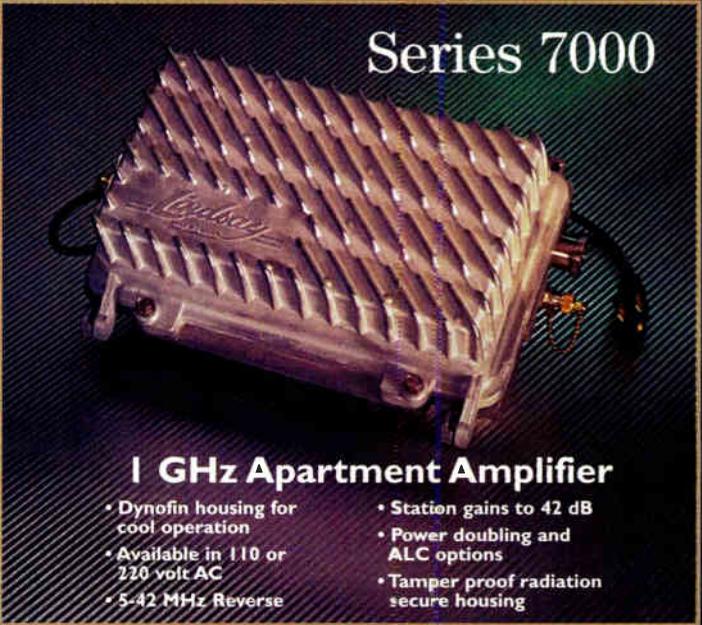
hotels and hospitals, as well as via airline and cruise line users.

The new server will provide redundant, disk-based storage for increased reliability; use existing telephone lines for electronic distribution; and offer instant responsiveness to sudden changes. Smithills Multimedia Systems is a Dallas-area startup company specializing in digital video systems.

GI displayed its latest generation of

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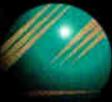


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## ◆ WESTERN SHOW HIGHLIGHTS

Commander 6 headend products, which feature bandwidth capabilities to 1 GHz. The products include the C6M-II modulator and the C6U dual channel upconverter.

Leaming Industries released the AVM-1, which provides cable TV, SMATV, private and wireless cable systems with an affordable NTSC mono audio video modulator in 1/3 of a rackspace. The AVM-1 generates a TV channel output from video and audio baseband signals. Built-in features include: frequency agility from 50-450 MHz (to 550 MHz optional), 60 dBmV output, SAW filter, BTSC stereo and SAP compatibility. Three units can be mounted per standard 19-inch rack.

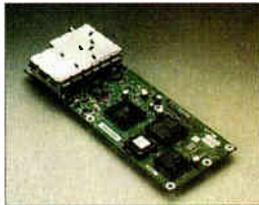
Pico Macom Inc. has introduced the PFAD-900, a frequency agile demodulator for cable TV, MMDS and SMATV applications. The PFAD uses microprocessor controlled tuning to demodulate all VHF/UHF and cable channels from 54 MHz to 801.25 MHz and converts to baseband audio and video. It incorporates a phase locked loop synthesized local oscillator with a non-volatile microprocessor for precise channel selection.

And new to the company's family of head-end equipment is the PFAM-550, a double heterodyne conversion audio/video agile modulator with sideband filtering that provides adjacent channel compatibility and frequency accuracy. It provides 57 ±3 dB output from VHF channel 2 through cable channel 78, including HRC and IRC offset frequencies, and is available in all PAL formats.

CLI (Compression Labs Inc.) has been granted a patent for its statistical multiplexing technology, StatMux, that is part of its MPEG-2 Magnitude encoder product. The technology enables broadcasters to enhance the video quality and add more services in the same bandwidth, thus improving network economics. Broadcasters can dynamically allocate bandwidth among the multiplexed video channels, depending on picture complexity.

For example, during fast-moving sporting events which demand the most bandwidth to achieve high picture quality, the Magnitude encoder can borrow encoding bits from a channel which is currently in a low motion sequence. The net result in a broadcast system is the ability to add 20 percent more content (channels) in the same bandwidth.

TV/COM International Inc. demonstrated its QAM modulator and QAM receiver at the show. The modulator provides high performance digital throughput of user data in a cable headend; the receiver is a cost-effective, front-end solution for volume cable set-top box applications. Both are part of the company's Compression NetWORKS, a complete



**TV/COM's QAM Receiver**

test system, designed so that network engineers can both generate and analyze digital bit streams formatted with the MPEG-2 transport layer. The MTS100 is the first product out of Tek's alliance with Matra Communication, a France-based telecommunications equipment supplier, and was designed for encoder/decoder compliance, multiplexer operation/repair, transmission system testing and MPEG system training.

"MPEG-2 promises to be a foundation technology for digital convergence, which we believe will be the key driver of test and measurement technologies over the next several years," said Dan Terpac, president of Tektronix Measurement Business Division. The system is currently available and costs about \$45,000, Tek executives said.

ComSonics Inc. released the Sniffer Sleuth, the newest addition to its Sniffer product line of leakage detection equipment. The unit is a complete leakage control package: it's agile between 45 and 145 MHz, can be set in 1 kHz increments and is self-contained, with both near-field and far-field probes and a dipole antenna.

The company also introduced an enhancement to its WindowLite Plus family of products—the WindowLite Plus Delta, a user-friendly virtual sweep analyzer. Users can read, compare, store and recall sweep data from their systems on-site, as well as read real-time data from the amplifier itself.

The Delta option of the WindowLite Plus software features Intellifill, which produces a continuous spectral amplitude measurement using TAG channel measurements as a baseline, creating a virtual sweep analyzer display on a WindowLite Plus.

Also new from ComSonics are the TDRLite, a time domain reflectometer; the Video Window, a digital video

DVB-compliant MPEG-2 system digital video compression system.

### Test equipment

Tektronix Inc. showed off its new MTS100 MPEG



**ComSonics Inc.'s TDRLite**

multimeter; the GeoSniffer; Sniffer I.D.; and the Path Finder II.

### OSS, monitoring

Southwestern Bell Video Services and its software integration partner, Lockheed-Martin Corp., said they will use an opera-

tional support system developed by Objective Systems Integrators for SBVS' video network in Richardson, Texas.

In the deal, OSI will provide its "NetExpert" fault management software to direct digital video information to SBVS' network operations center, company executives said. OSI will also provide professional service and support for the network management portion of the project, said Tim Sebring, VP of sales and marketing for OSI.

Wavetek Corp. showed its CMS1000 monitoring package, a remote monitoring and control system comprised of PC-based central monitoring software and Stealth measurement technology. Working together, the 3SM remote headend performance monitoring unit and the Windows-based CMS1000 central monitoring software offers a flexible package that provides RF signal measurement and analysis capability, as well as the ability to monitor and control up to 200 remote headends or hub sites. Users will benefit from automatic systemwide data gathering, quick notification of



**Wavetek Corp.'s monitoring package**

alarm conditions, and remote control of functions at the headend.

Superior Electronics introduced two new products, the GPM General Purpose Monitor and a next generation monitoring module, the CMA transponder. The rack mounted GPM, which accommodates four option cards, can be configured to monitor various manufacturers' headend or hub devices.

Superior's CMA transponder has 10 monitoring ports and has been engineered with a different front end and processor architecture to fit into smaller devices such as amplifiers and fiber optic nodes. The company has also developed a two-tiered software strategy, Cheetah Vision, designed as an entry-level system for monitoring and testing traditional analog services. It automatically generates FCC Proof-of-Performance documents and other pre-defined and user-defined reports.

AM Communications announced that Rogers Cablesystems has selected the company as a source for status monitoring systems. AM received an initial purchase order valued in excess of \$400,000 for status monitoring equipment to be installed in one of several Rogers systems.

And AM conducted a live demonstration of its new OmniVU Network Monitoring Software in its booth. OmniVU is the Windows NT/Windows 95 successor to the company's LANguard System. A multi-user, networkable system, OmniVU is based on Microsoft's OLE 2.0 standard for data interchange between software applications. Users and their developers can design custom extensions to the OmniVU system by purchasing AM's OmniVU Toolkit. The toolkit describes the entire OmniVU software API (Application Programmer's Interface) and is supplied with utility programs and numerous examples.

DPS Inc. released version 2.0 of the KDA 864 remote telemetry unit, utilizing upgraded firmware and four new expansion cards to provide added interfaces, alternate-path routing and daisy-chain expansion for network monitoring applications. The KDA supports discrete point monitoring, control point operation, analog value monitoring, ASCII data gathering and TBOS protocol conversion at remote locations. It reports via fixed or dial up networks to a central monitoring facility, such as DPS' Intelligent Alarm Monitor or T/MonXM WorkStation.

The company has also released T/GrafX for Windows, an alarm system display providing graphic representation of network status in a Windows environment. T/GrafX is an adjunct to DPS' T/MonXM WorkStation and Intelligent Alarm Mediator. Also new is the



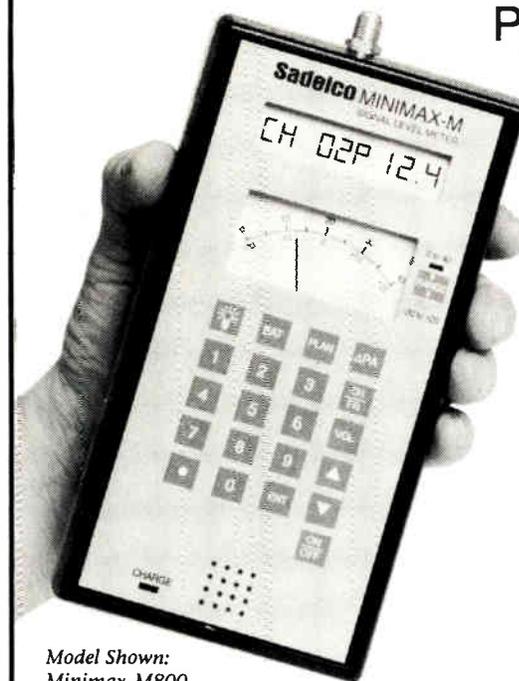
DPS' T/GrafX

AlphaMax 82A alarm monitoring remote, providing pager-notification of alarms and dial-up control for small alarm networks.

SAT Corporation put its new SAT 330 Series of CATV Monitoring Systems on display during the Western Show. The systems measure noise ingress levels and execute data signal analysis per CCITT Recommendation G.821 for errored and severely errored seconds and G.826 for block-based measurements.

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## ◆ WESTERN SHOW HIGHLIGHTS

The fully automated systems use SAT's Windows-based software installed at the head-end to control the hardware, store data and generate reports of the collected data. Operators can access data and generate reports using SAT's Central Site System.

### Taps

For the first time, Electroline Equipment Inc. demonstrated ClearPath, a fully-automated system used for pinpointing the source of unwanted noise and distortion in the return path of an HFC network within three seconds. ClearPath can isolate the source of ingress down to a single drop. When combined with the "intelligent tap" features provided by the company's SuperTap, cable TV and telephone networks can automatically identify and disable the source of an interfering signal in the reverse path, protecting network two-way communications.

Electroline also announced a new eight-port DropAmp, which the company says will cut MDU install time by 50 percent. The DropAmp is a customer premises amplifier that compensates for high drop plant signal attenuation encountered when drop lengths are



**Electroline's ClearPath**

long, when multiple TVs and VCRs are connected, or when high frequencies are used to deliver programming. The amp supports eight TVs, VCRs or stereos inside a single unit and is compatible with two-way communications and compressed digital video.

Finally, the company developed a family of taps in a variety of configurations, featuring models that block or pass power on all or some of the ports. A four-port version can pass power on all four outputs, block power on all four outputs, or pass power on only two of four outputs. The 100-percent passing version is suitable for telephone companies, which will have telephony penetration of 100 percent. Other new versions feature remote shut-off of interference-causing drops, as well as different functionality on each tap port within a single housing.

Similarly, Signal Vision Inc. introduced the SV-PA-01 power adaptor and the SV-PC-02 power combiner for telephony tap interface.

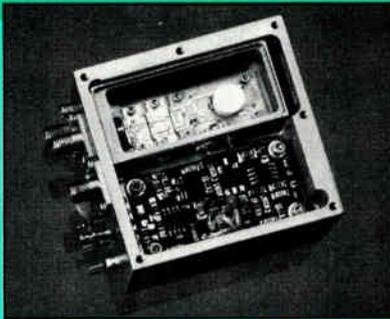
When installed in combination with an existing expanded bandwidth directional tap, these devices combine AC with RF to facilitate telecommunications options requiring AC power on subscriber drops.

TVC Inc. and Antronix Inc. announced a joint marketing agreement to distribute Antronix's newly upgraded Milenium wide body and OMT series multi-taps. Both product lines are now available in 750 MHz and 1 GHz bandwidths. The Milenium line allows operators to upgrade their plants to telephony with new F port or twisted pair powered face plates that possess an uninterrupted signal power feature which eliminates downtime when the baseplate is removed.

The OMT product line can also be converted to subscriber F port powering by a simple base plate change out.

RMS Electronics unveiled a new 1 GHz multitap that offers color coding of port groups for easy identification, longer F-ports to allow for security/locking nuts and wider spacing for easier cable management within a street cabinet. The taps are available with a range of tap values in both 32- and 48-port versions, and all units are guaranteed to operate to 1.2 GHz.

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### Distribution and fiber optics

GC Technologies Inc. showcased three new product lines at the show. First, the company introduced singlemode couplers featuring high optical performance and long-term reliability at a competitive price. Available in single wavelength, wavelength flattened and dual wavelength, GCT's couplers allow users a range of operation lengths and multiple pigtail and packaging options.

The company also introduced a preterminated, wall-mount cabinet designed for fast, easy cable installation. And finally, GCT introduced an economical, real-time fiber monitoring and test system that provides fiber optic users with immediate feedback on the slightest degradation in optical power signals and allows front panel test access to quickly determine fault location without disrupting traffic on the fiber under test.

Pico Macom Inc. announced the production of its new PDA 30, a 1 GHz amplifier with +30 dB gain across the entire 50-1000 MHz bandwidth. The amp is designed for SMATV, cable TV, TVRO and MMDS systems. It's available in three versions: forward path only, forward with amplified return path, or forward with passive return path. An external power supply allows for use with all international power systems.

ABC Cable Products announced the CBLinX-2 baseband optical transmitter and



## ◆ WESTERN SHOW HIGHLIGHTS

shows the condition of equipment in the head-end, hub sites and strand-mounted devices graphically and alerts system personnel of outages.

Texscan announced the release of three new products: a laser transmitter, a low-cost fiber optic distribution node and a fiber optic broadband transmission platform. The new rack-mounted laser transmitter, model TLT-7507, is based on custom, high linearity DFB laser technology specifically designed for multi-channel AM video applications. The TLT-7507 will be able to support optical loss budgets previously covered by models TLT-7506 and TLT-7508, which will be discontinued.

The company has also released its GLAS-FTDA fiber optic distribution node and a new fiber optic broadband transmission platform, the VersaLite Communicator. The 750 MHz GLAS-FTDA is available with one trunk and two or three high-level distribution outputs. An 870 MHz version is expected to be released by the end of January 1996.

The VersaLite Communicator includes a variety of forward path transmitters for use in 550 MHz and 750 MHz applications, narrowcast transmitters for 600-750 MHz applications, return receivers and transceivers.

ADC Video Systems Inc. announced the development of a new product, the DV6300 Single Channel Digital Transport system. This product will be a key component of ADC's DV6000 Universal Digital Video Transport product line. All existing DV6000 encoder and decoder cards are interchangeable with DV6300 installations. This was designed to provide transport versatility of any given signal, including baseband video, scrambled IF video, MPEG-2 compressed video, DS-3/DS-1, E-3/E-1, video carrier and more. The DV6300 system consists of six products that includes three "standalone" units which encode or decode the signal at a remote location, and three interface cards that plug in to a DV6000 or DV6010 system.

ADC Video Systems also announced a new generation of optical transmitters and demonstrated the industry's first Targeted Services Distribution (TSD) Shelf.

ADC's HWX transmitter platform configures networks using laser source modules and external modulator modules. HWX components include a common shelf and network management, redundant power supplies/controllers, DFB direct modulated laser modules, CS laser source modules, external modulator and optical amplifier modules.

The TSD Shelf is an optical transceiver and block conversion platform that allows providers to add new interactive services to an

existing network selectively without a major rebuild. The Shelf's modular architecture allows for the addition or expansion of new services for telephone, ISDN, LAN services and interactive video in HFC networks. The TSD supports inbound and outbound communications with a forward frequency band of 550 to 750 MHz passing up to 16 6-MHz channels, and a reverse path of 5 to 275 MHz.

GI launched two new transmission network products at the show: a broadband telecommunications apartment house amplifier (BHA) and broadband telecommunications tap. The BHA is a high-gain, indoor distribution amplifier designed for use in multiple dwelling units. The amp is available in 750 MHz and 550 MHz models and with power-doubled or push-pull output stages. The tap is an AC power-passing tap capable of delivering video, voice and data over the HFC system.

In addition, GI's OmniStar family of Cableoptics products drove a number of demos at the GI booth. The OmniStar family is a broadband optical platform that supports advanced HFC telecom systems. In addition to the complete line of laser transmitters with varying output power levels, a new module, the Omni-RPR return path receiver offers bandwidth capabilities up to 200 MHz.

Cadix International announced the debut of its CX-2001-FD CATV Fiber Design System software which automates the layout and management of the fiber plant. The new software executes the design, creates the splice connections (which may be viewed as graphical or textual data), as well as calculates distances and fiber count. Land-based maps may be scanned directly into the system. In addition, maps that are industry standard DXF or IGES format can be accessed by the Cadix software.

The Synchronous Group introduced a new family of products designed to provide higher power and increased systems capability. The new product family includes the 100 mW EMS-1550 External Modulation System Transmitter and an expanded line of EDFA (Erbium Doped Fiber Amplifiers). The amplifiers are now available with a range of power outputs up to 250 mW. The EDFA-150 Optical Amplifier is housed in a new enclosure, designed for pedestal mounting.

In conjunction with these new transmission components, the Synchronous Group also introduced two new optical receivers, Model MDU (Multiple Dwelling Unit) and Model SHR (Single Home Receiver). Designed to compliment the EMS and EDFA, the receivers provide the necessary input and output characteristics required for advanced system design, including fiber-to-the-curb or fiber directly to

the home. Both units will also provide optional fiber returns for collecting all types of subscriber data.

Scientific-Atlanta introduced a new fiber optic receiver that integrates a 750 MHz fiber receiver and a high-output RF amplifier. The new device is designed to serve a relatively small number of homes in passive or near-passive cable networks, where few, if any, RF active devices are needed. S-A officials said the new receiver, the model 6910, is ideal for network operators who are planning to launch new interactive or narrowcast services and are deploying networks with ever-greater amounts of fiber in them.

Quality RF Services showed a 600 MHz replacement board for the S-A distribution amplifier. The new circuit board upgrade provides 450/550 MHz users the means to increase their bandwidth and provide two-way circuitry in one step. The board also features improved shielding for better response.

QRF also unveiled the new QLEP355 (550 MHz) line extender for SLR/SLE housings. The two-way line extender has integral duplex filters and accepts a return amplifier. It's the companion LE to the QSJ550 line of trunk stations. For JLE users, the new 550 MHz QJLE upgrade kit is now available.

Harmonic Lightwaves Inc. announced the initial production of the MAXLink transmission system for 1550 nm-based applications. The system provides flexible and cost-effective solutions for a variety of applications and architectures, especially long-haul applications that are beyond the reach of 1310 nm transmitters. The combination of dual complementary outputs and high SBS suppression allows users to span long fiber distances and achieve excellent performance using a single transmitter. On a 100 km link, users can achieve CNR of 53 dB with 80 channel loading.

### Subscriber equipment

NCA Microelectronics introduced a new 860 MHz, volume control convertor/decoder designed as a complement to the company's Chameleon scrambling system. The new CD-E861V set-top is available in both NTSC and PAL versions.

The Cable and Broadcast Systems Group of Pioneer New Media Technologies Inc. displayed its Dual Tune/Dual Decode DoubleVision Command Station home terminal. The home terminal fulfills FCC regulations for simultaneous viewing and recording capabilities and provides intuitive on-screen menus.

The DoubleVision Command Station has two separate tuner/descrambler combina-

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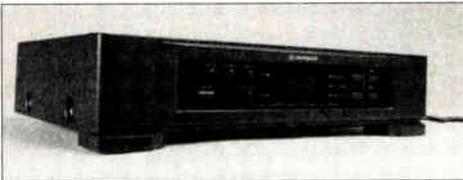
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tions—one for the television and one for the VCR. The terminal also features a built-in output switch, which allows users to watch a television program without disturbing the VCR tuner. Display and programming features include: an on-screen control display which shows what channels are selected and what programs are scheduled to be recorded; program timers which allow viewers to program VCR and order pay-per-view (PPV) at the same time; and an on-screen prompt which notifies subscribers if there is a charge for a



**Pioneer's DoubleVision**

program they have selected for viewing or recording.

Pioneer's BA-V1000 Command Station features extensive near video-on-demand functions, on-screen display capabilities, dynamic picture shift scrambling, virtual channels and audio masking. PPV is supported with on-screen confirmation.

### **Cable telephony**

First Pacific Networks Inc. used the show as a forum to introduce its new Digital Transmission Unit (DTU), which extends the benefits of the FPN1000 architecture to conventional access multiplexers used by telephone providers throughout the world.

The DTU provides a transparent interface between a digital central office switch and remote access multiplexers over a hybrid fiber/coax network. The DTU may be deployed in 30-, 60- and 120-subscriber access multiplexer configurations, allowing service providers to add capacity gradually as demand dictates.

The DTU offers international cable operators an alternative to individual voice interface units (VIUs) for high density urban areas, multiple dwelling units and small businesses by enabling them to match the deployment of telephony-on-cable equipment against subscriber penetration rates.

Nortel's Cornerstone Voice demonstration allowed visitors to the Antec, Nortel and CableNet '95 booths to place telephone calls through Multivision Cable TV's local cable network. Nortel and Antec are forming a product development joint venture company headquartered in Atlanta, and a systems integration joint venture company headquartered in Denver.

AT&T Network Systems has enhanced its HFC-2000 Broadband Access System to meet the needs of cable MSOs who intend to offer local telephone service over their networks. Specifically, the enhancements include scalability and the ability to be integrated into existing video networks. Key building blocks in the system include the host digital terminal, network interface unit and an element management system.

### **Subscriber management**

In order to empower their customer service representatives to handle and resolve customer inquiries and transactions more quickly, Continental Cablevision has contracted with a diverse group of vendors to develop and deploy a subscriber management system. Continental held a press conference to announce the new system.

Dubbed "Concert" (Continental Customer Expert System), it is expected to be fully implemented by early 1997 and will allow CSRs to handle billing, sales and service calls via Apple workstations.

Continental chose a number of technology companies to bring the system to fruition. A combination of off-the-shelf and custom applications in a client/server configuration are being used, instead of proprietary billing and customer management systems.

Specifically, Continental has signed the following companies to the program: Arrowsmith Technologies for fleet management; CSG Systems for billing software; Cabletron Systems; Database Technologies, which will work on a data warehouse; Entex for CSR training; IBM; MicroAge, which will install computer hardware and software; Oracle; Pyramid Technology; RWD Technologies; SCT and Sun.

### **Equipment enclosures, construction**

Channell Commercial Corp. has made a new addition to its Signature Series of above ground enclosures—the SPH1010. The new enclosure is designed to house active gear such as line extenders or distribution amplifiers and/or dual passive combinations.

The new line will feature two optional bracketry systems. The first option includes a hot-dipped galvanized vertical stake and a mounting bracket. The B2 optional bracket will include an inverted "U" shaped bracket.

A new, improved Strand-Guard Figure 8 duct is now available from Arneo Corp. The new design features a UV stabilized, HDPE jacket co-extruded with a flexible corrugated duct. The integrated aerial duct system resists expansion/contraction stresses and doesn't

require costly expansion joints. Because it forms a closed system, new air-assisted cable installation equipment may be used for faster installations. A side benefit to the new duct is a reduced coefficient of friction between duct and cable due to reduced surface contact. This permits faster, smoother installations, regardless of the chosen installation method. The duct is offered with 1-inch or 1 1/4-inch ID duct and a choice of 6.6M or 10M bonded messenger.

The Broyhill Manufacturing Company introduced the Cable Winch System, which allows a single worker to safely set up and monitor winch operation. The winch system offers improved manpower utilization and productivity, protection from cable over-tensioning, an auto-lube system (available in the near future) which applies cable lubricant at the recommended rate automatically; and a force sensing system which measures the total pulling force applied to the cable. In addition, pulling speed coordination for multiple assist winches occurs on demand, automatically following the end puller.

Accessories for aerial or underground installations include the I-4310 aerial or I-4320 underground kits and manual pressure relief adjustment (for maximum pull force calibrated and set by the operator). The assist winch is used when initial pull force goes beyond 600 pounds for fiber optic cable.

### **CableNET exhibit tops off show**

Internet access and programming content were two key themes of CableNET '95, the hands-on demo that showcased the cable industry's ability to deliver data, telephone and video services to customers. CableNET is a joint production of the California Cable TV Association and CableLabs.

The Internet focus was chosen because MSOs are moving to offer high-speed data services and creating their own home pages to promote themselves over the World Wide Web. In addition, CableLabs executives hoped the demo would act as a catalyst to increase the industry's long-term presence on the Web.

CableLabs provided six Internet "surfing stations" scattered around the exhibit so that attendees could experience multi-megabit Internet access. Companies that had Internet applications in the booth included: @Home, Discovery Channel Online, The Lightspan Partnership, America Online, LANcity, Motorola, Tandem, Infonautics and World's Inc. In addition, a CableNET Web site debuted (address: <http://www.cablenet.org>) offering Internet surfers an opportunity to learn about the demo via computer. **CED**

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# Cable modems

Standards push, retail models gain wide support

# put on industry fast track



By Michael Lafferty

The cable television industry's intent to deploy high-speed data modems was shouted out loudly and ratified by nearly every large MSO during last month's Western Cable Show, where an unprecedented show of support for universal communication standards took place.

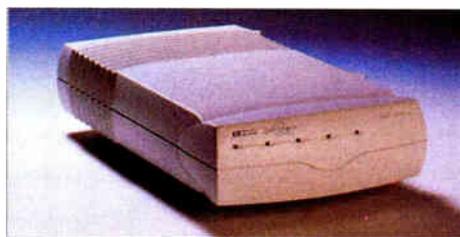
Operators and vendors alike appeared to be in lockstep during a press conference at which they called for a set of common network interfaces and protocols (see Figure 1). Dr. John Malone, CEO of TCI, said such protocols are absolutely critical if computer users are to continue to be interconnected over broadband networks just as they are today via narrow-band phone lines.

While the show of force should rightly be considered a watershed event, so should the fact that this is the first time cable operators have embraced the retail model where consumers own the hardware. In the past, mostly

for security reasons, the cable TV industry has been reluctant to give up any control of the devices that are connected to its networks.

Furthermore, such commonality will drive costs down, allowing consumers to one day purchase the modem at retail outlets at prices below \$200, according to Jim Chiddix, senior VP of engineering and technology at Time Warner Cable. "I see no reason why these modems, when mass produced, should cost any more than (today's analog) set-top box," he said.

On the stage during the press conference were representatives of CableLabs' executive



H-P's QuickBurst cable modem

committee, which includes TCI, Time Warner Cable, Comcast, Cox and Rogers Cablesystems. The vendor community was represented by General Instrument, Hewlett-Packard, Intel, LANcity, Motorola, Nortel, Scientific-Atlanta, Toshiba and Zenith.

## CableLabs to coordinate protocol effort

The standards-setting effort will take place under the guidance of Cable Television Laboratories, which has been charged with the task of hammering out an initial set of protocols by mid-April 1996. After that, additional specifications will be agreed upon and released over time, said Dr. Richard Green, president and CEO of CableLabs.

Cable industry leaders are envisioning the standard as a global one, and as such, plan to work with established standards bodies, including the ITU, IEEE and perhaps DAVIC, among others. However, the MSOs very much want to drive the effort so they can capitalize on the popularity of the Internet that has caused its explosive growth. One thing the MSOs don't want is a long, drawn-out standards process that causes them to lose a business opportunity. "Clearly, we want to avoid government regulation," said Malone.

The interoperability effort got another boost during the Western Show when AT&T Network Systems, Hewlett-Packard Company, Hybrid Networks Inc. and Intel Corporation announced their intention to jointly develop open cable modem specifications by the end of 1995. Christened the Broadband Link Team (BLT), the four-member coalition said that once a set of specifications was arrived at, they would submit them to the appropriate standards committees, cable operating companies and CableLabs for their review and recommendations.

The capability (and potential profitability) of broadband networks to deliver multimedia data to PCs at speeds up to 1,000 times faster than today's "high-speed" telephone modems (generally 14.4 or 28.8 Kbps) was certainly not lost on the BLT. "The intersection of powerful home computing and high bandwidth communications," said Avram C. Miller, Intel vice president of corporate business development, "is creating the most powerful new medium since the invention of television. But to bring this medium within the reach of most consumers will require the economies and flexibility of interoperable technologies."

The BLT's jump into the race for modem protocols, at least for its members, is not seen as competition, but as a complement to the CableLabs protocol effort. In fact, the BLT intends to publish its initial, "version 1" spec

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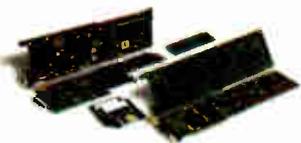
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## ◆ DATA-OVER-CABLE

(it was scheduled for release sometime last month), then seek comment from the industry. Following that, the group will follow the specs that come out of the CableLabs work and release a "version 2" of its software and interfaces when they are known.

The rush for modem protocols has another organization joining the crowded race—the Interactive Television Association (ITA). During the Western Show, the ITA's Broadband PC Council met to begin planning its work in addressing technology standards, consumer marketing and content development issues related to the launch of cable modem services throughout the country.

The 25-member Council is a broad mix of manufacturers, cable operators, content providers and RBOCs (including Bell Atlantic, BellSouth, Pacific Telesis and US West). This diversity in membership, according to Andrew Sernovitz, ITA's president, will hopefully bring about a faster, smoother deployment of data communications over cable TV for all concerned.

"We're unique in that we're the only group



Motorola's CyberSURFR

are being deployed in a variety of ways. Motorola's CyberSURFR cable modem and Cable Router

infrastructure products got the lion's share of attention at the recent Western Show, when it was announced they had been chosen by three major operators for planned trials and rollouts in 1996.

The three "agreements in principle" dealt with orders from TCI (200,000 units), Comcast Corporation (100,000 units) and Time Warner Cable (50,000 units). The combined agreements put the Motorola products at the leading edge of the cable modem wave and revenues with a potential value of \$105 to \$175 million (using a ballpark unit cost of \$300 to \$500 each).

Hewlett-Packard's QuickBurst cable modem received a boost from Comcast Corporation as well, with an order of up to 150,000 units from

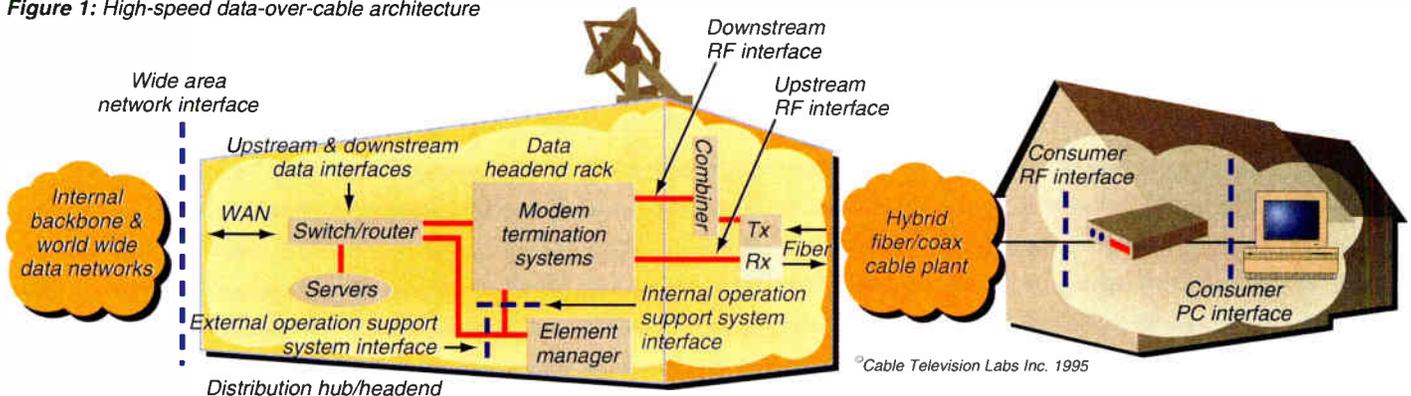
Time Warner Cable's San Diego Division announced it will start technical trials of a cable TV high-speed data transfer system with Toshiba America. The TWC/Toshiba trial will run until the end of May 1996.

### Pricing issues

While the likes of Time Warner, TCI, Continental and Comcast are gearing up for their various cable modem trials and rollouts, Viacom and Intel have taken their 13-month Castro Valley, Calif. trial to the next important level—pricing. As one of the largest, longest-running broadband data marketing trials, this latest trial phase will produce a wealth of information on just how much consumers are willing to cough up for cable data services.

The initial pricing plan offers trial participants two levels of access on a flat-fee basis. Premium services will be offered and priced separately. Of those initially approached to switch from free service to a paid access arrangement, officials report an encouraging high conversion rate, said to be near 90 percent.

Figure 1: High-speed data-over-cable architecture



that's equal parts hardware, wires and content," says Sernovitz. "And, while standards are relevant to what we're doing, we won't be authoring standards per se.

"The council is likely to be a translator, working on things that ease the transition. We want to be able to say, 'Here's what these other bodies are working on, here's what it means to you, the cable operator...here's what it means to you, the content provider.' We want to be able to provide planning tools for people so they...can get the cable modem business past the start-up stage as fast as possible, whether it's developing appropriate content, hardware or infrastructure during the transition."

### Modems make headway in marketplace

All this jockeying for position in the race to establish protocols shouldn't take away from the fact that cable modems are a reality and

the nation's third largest cable operator. Comcast's rollout of the QuickBurst modems could take place in such markets as Baltimore and Philadelphia later this year.

A unique campus-wide cable TV-based computer network at Boston College, dubbed "Project Agora" (Gathering Place), is the platform for the purchase of 5,000 LANcity Personal Cable Modems by Continental Cablevision, the nation's fourth largest MSO.

The campus network features 18 independent fiber nodes, each of which feeds drop locations via coaxial cable. As a result, an electronic community of 2,500 classrooms, 400 administrative offices and 6,000 dormitory rooms has been established. Continental will deploy the 5,000 LANcity modems at home offices and city government locations throughout New England beginning this year.

In other related cable modem developments,

With all this activity going on it's difficult for operators to keep up with who's offering what and when it will be available. Yet many are interested in satisfying their modem curiosity as soon as possible. (See table, next page.)

New product offerings include: General Instrument's asymmetrical "SURFBoard" modem with telephone return for near-term deployment; Hewlett-Packard's QuickBurst modem which is expected to be in full production by mid-1996; LANcity's Personal Cable TV modem (LCP) with its 10 Mbps symmetrical (and asymmetrical capability) configuration; Motorola's CyberSURFR modem; and a new family of cable modems that will deliver up to 40 Mbps of digital data from Zenith. Closing fast are other modem efforts by ADC Telecommunications, Com21, Pioneer New Media Technologies and Scientific-Atlanta.

Given the talk of pending protocols and a

**Table 1:** Manufacturers and cable modem products underway

Company	Modem name	Available	Price	Speed (down/up)	Tel. return	Bandwidth needs	Trials
ADC Telecomm.	Homework Data	May '96	\$665 (stand-alone/Ethernet); \$465 (add-on module/HISU)	Symmetrical 512 Kbps.	Yes	6 MHz/240 users	Jan.-Apr. 1996
Com21	ComPORT STU	4thQ '96	\$500-\$600	30 Mbps/2 Mbps	Yes	300-800 MHz (Dwn); 0-40 MHz (Up)	1stQ '96 Palo Alto, CA
General Instrument	SURFboard; PCLinx	SB - Mar '96 PL - 4thQ '96	\$300 \$300	SB - 27 Mbps/POTS PL - 27 Mbps/1.5 Mbps	SB - Yes PL - No	6 MHz carrier	Castro Valley, CA; Paris, France; & with Comcast
Hewlett-Packard	HP QuickBurst	Mid '96	Not available	30 Mbps/15 Mbps	Not initially	88-750 MHz (Dwn) 10-32 MHz (Up)	Rec'd order: Comcast/ 150,000
Intel Corp.	Intel CablePort Adapter	4thQ '96	Will be negotiated	30 Mbps/128 Kbps	Yes	50-750 MHz (Dwn) 5-42 MHz (Up)	Castro Valley, CA Long Island, NY Philadelphia, PA
LANcity Corp.	LANcity Personal (LCP) Cable TV Modem	Now. Shipping since 8/95	\$595	10 Mbps/10 Mbps	No	54-750 MHz (Dwn) 5-42 MHz (Up)	Fully deployed; in various trials in N. America Rec'd order: Continental/ 5,000
Motorola	CyberSURFR	1stQ '96	\$500	10 Mbps/768 Kbps	Yes	50-750 MHz (Dwn) 5-40 MHz (Up)	Rec'd orders: TCI/200,000; Comcast/ 100,000; Time Warner/ 50,000
Nortel	Cornerstone Voice	Volume quantities: Apr. '96	Not available	30 Mbps/2.5 Mbps	No	2 MHz per 24 voice channels	Long Island, NY
Philips Broadband Networks	Broadband Communications Gateway (BCG)	Sept. '96	Competitive	Evolutionary from 64 Kbps to 3 Mbps	Still researching	300-750 MHz (Dwn) 15-65 MHz (Up)	Being planned
Pioneer New Media Technologies	Not determined yet	End of '96	\$425	27 Mbps/1.5 Mbps	Still researching	6 MHz carrier	To be determined
Scientific-Atlanta	To be announced	Fall '96	Depends on features & volume	27 Mbps/1.5 Mbps	To be determined	150-750 MHz (Dwn) 14-26.5 MHz (Up)	To be announced
West End Systems Inc.	WestBound 9600	March '96	From \$500 per DS-0	64 Kbps - 2.048 Mbps both ways (4:1 data compression avail.)	No	11-750 MHz	Europe, N. & S. America
Zenith Electronics Corp.	HomeWorks	Now	\$495	500 Kbps/500 Kbps & 4 Mbps/4 Mbps avail. now; 40 Mbps/10 Mbps avail. 3rdQ '96	Yes	50-750 MHz (Dwn) 12-108 MHz (Up)	Fully deployed; in various trials around U.S.

full roster of modem products rushing to the marketplace, many MSOs are interested in creating a new revenue stream without shutting the door on future developments. Digital Equipment Corp. is trying to help MSOs cut through the clutter with its new Cable Industry Network Competency Center (CINCC).

Located in Littleton, Mass., the CINCC has been established to provide network consulting, integration and management services on a vendor-neutral basis. The Center staff brings its multi-disciplinary expertise together to provide flexible, modular and economical network solutions that address each client's individual strategic business needs.

While the dawning of the cable TV data communications revolution poses all kinds of

questions for MSOs individually and as a group, it also puts service providers on the spot as well. For the first time, compared to today's rather pokey modem speeds (generally 14.4 or 28.8 Kbps), true "high-speed" data communications will finally become a reality with cable modems.

Yet tens of thousands of consumers sucking down all sorts of multimedia data on their own digital superhighways that are 10 Mbps wide or larger could put a real strain on the system and its contents as it's constructed today. To help avoid any future megabit traffic jam, Motorola's Multimedia Group has announced the formation of a Broadband Applications Forum.

The forum has been designed to bring leading broadband equipment manufacturers,

content developers and packagers together to plan the next-generation of interactive data and video applications. Led by Motorola, the forum will include major on-line service representatives, as well as participants from the interactive game, electronic commerce, videoconferencing and entertainment industries.

According to James M. Phillips, corporate vice president and general manager of Motorola's worldwide multimedia distribution and marketing division, the goals the forum will be trying to achieve are in everyone's best interests. "Operators are interested in turnkey networks," says Phillips. "This forum will allow companies to work together to make technology come alive with exciting new content and applications." **CED**

# People on the move

GC Technologies has appointed **Dr. Michael Corke** as president and COO. Dr. Corke was previously executive vice president of technology for GCT, and is also a founder of the company. In addition, Corke held prior positions at Amphenol and Aster and received his doctorate in physics from the University of Reading in England.



**Michael Corke**

Micracor Inc. has named **Howard Laffler** as president and chief executive officer. Laffler has also joined the company's board of directors. He is leaving his most recent post as vice president and general manager of Unisys Inc.'s Server System Division. Laffler replaces Mr. Jess Belser, past president and CEO of Micracor, and past president and CEO of Micracor's largest venture capital investor, Rothschild Ventures of New York.

Micracor has also named **Dr. Edward Labuda** to its scientific advisory board. Dr. Labuda most recently served as vice president and chief operating officer of AT&T's Lightwave Strategic Business Unit (SBU). He now serves as executive director of the IEEE LEOS (Lasers and Electro Optics) Society.

**Bill Musser** has been promoted to chief operating officer of Atrex Inc. Musser will be responsible for overseeing all aspects of operations for the national cable installation company. He most recently served as director of operations for the company. And **Rick Gilreath** has been promoted to project manager for the electronic upgrade of Scripps Howard Cable in Sacramento, Calif. Atrex is rebuilding the entire 4,000-mile system. He most recently served as Atrex project manager for the Scripps Howard system in Knoxville, Tenn.

Oak Industries Inc. has announced the appointment of **Francis Lunger** as senior vice president, chief financial officer. Lunger joins Oak with more than 27 years of experience, including assignments in public accounting, corporate finance and general management. Most recently, he was acting president and CEO at Nashua Corp.

The Society of Cable Telecommunications Engineers has promoted **Marvin Nelson** to the newly-created position of vice president, technical programs. Nelson joined the society in 1991 as director of chapter development and was responsible for fostering the growth of the Society's local chapters and meeting groups, now numbering 74. In 1993, he was appointed director of Certification Programs and became responsible for the administration of BCT/E and Installer examinations, as well as interfacing with volunteer groups updating the program's curriculum and exam questions. In his new position, Nelson will oversee all technical aspects of the Society's operations, including supporting the SCTE Engineering Committee's development of technical standards.

**Dr. Jerry Bennington** will join Cable Television Laboratories Inc. (CableLabs) as a visiting executive on loan from TCI Technology Ventures for two years. Prior to joining CableLabs, Bennington founded Ingenius, an educational multimedia publishing venture of TCI and Reuters NewMedia. As CEO of Ingenius, he led the startup of the venture and spearheaded the development and launch of What On Earth, an award-winning, daily multimedia learning product.

**Peter Volanakis** has been named as executive vice president of operations for Siecor Corp. He joins Siecor after 13 years with Corning Inc. He most recently served as managing director and general manager of Corning's European automotive emission control business, located in Wiesbaden, Germany. Prior to that position, Volanakis was the director of corporate marketing.



**Peter Volanakis**

Primestar Partners has appointed **Joel Ginsparg** to its senior management team. Ginsparg joins Primestar as senior vice president of technology and operations. In this capacity, he will assume responsibility for the company's engineering and systems operations functions. Ginsparg brings more than 16 years of experience in business unit management and operation to his new position, and he has specialized in the high-tech arena.

**Steve Necessary** has rejoined Scientific-Atlanta Inc. as vice president and general manager of analog subscriber systems. He returns to the company after more than four years with Antec, where he was president of the products group. Prior to Antec, he had been with Scientific-Atlanta for more than nine years, most recently as vice president of marketing in subscriber systems. Necessary is responsible for worldwide product planning, marketing, and profit-and-loss for analog set-top terminals and related system management equipment.

**David Robinson** has returned to General Instrument as vice president and general manager of the digital network systems business unit of the GI Communications Division. In this position, Robinson manages the continuing development and deployment of GI's line of terrestrial digital technologies. He previously worked for GI from 1983-93, when he left to join AT&T Network Systems in North Andover, Mass. While with AT&T, Robinson served as services delivery networks director, managing consumer broadband network product lines for video and multimedia delivery system "offers," including digital video compression/transmission and high-speed data access/transport network electronics; home terminals interfacing to TV sets and PCs; associated control/security systems; servers and client-server software.

Alcatel has announced a product-line based reorganization of its North American Network Systems operations, directed by president and CEO **David Orr**. The company is establishing four major product segments, each led by a vice president and general manager, to optimize alignment of product development with market requirements. The executives and their product segments are: **Jean-Luc Abaziou**, VP and GM, broadband products-ATM, network management, full service network and carrier; **Joe Bass**, VP and GM, lightwave products; **Dave Kimzey**, VP and GM, radio products; and **Ken Lewis**, VP and GM, cross connect products. **Bob Reed**, previously vice president, product line management, joins Orr in the office of president and CEO and will support him in the operation of the business.

Pioneer New Media Technologies Inc. has appointed **David Nicholas** as senior vice president of sales. Nicholas will manage the previously separate sales teams for Pioneer's cable, broadcast, multimedia and optical storage product lines. He will report to the company's president, Tom Haga. With 15 years of related experience, he had previously served with Pioneer as senior vice president of its cable and display groups. During that period, the division doubled its sales over a five-year period. Nicholas left Pioneer for a two-year term as vice president and general manager of Texscan/MSI, a company

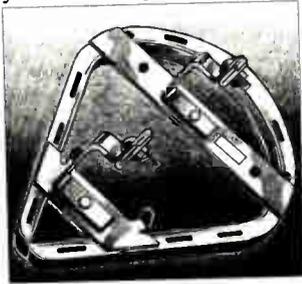
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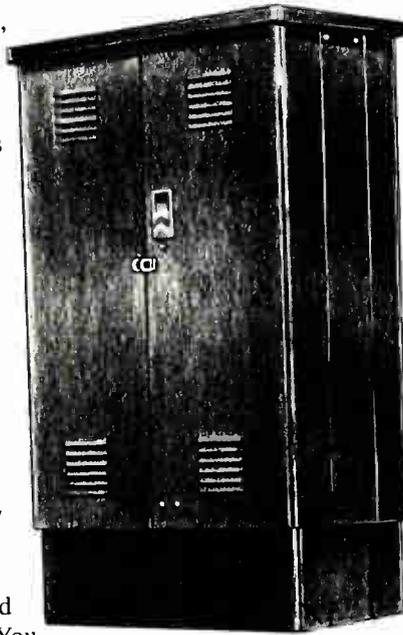
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## ◆ PEOPLE

involved in analog and digital video playback systems. He had also been previously employed by Panasonic and Magnavox on the companies' cable television sales and product management teams.

White Radio Limited has appointed **Steve Quinn** to the newly-created position of vice president and general manager communications division. Quinn, who has been with



**Steve Quinn**

White Radio since 1981, joined the fledgling communications group as a sales trainee, and for the past nine years, has been the national sales manager of that group. He is also in his third year as chairman of the Trade and Services Members of the Canadian Cable

Television Association (CCTA). Prior to joining White Radio, he was co-founder of the Toronto-based RBI Productions. Quinn assumes responsibility for overall direction of the division, the strategy for growth, market development and expansion, principal rela-

tions, product assessment and acquisition, and customer development and growth.

Microware Systems Corp. has promoted **Richard Russell** to vice president of research and development for the core technologies division, from director of development environments for core technologies. Russell will focus on expanding the company's real-time operating system, OS-9, as well as networking and development environment products. He will continue to bring new technologies to market and foster new and existing third-party relationships. In his previous position, his responsibilities included the development of Microware tools such as FasTrak and the Ultra C/C++ compilers.



**Phillip Camel**

Times Fiber Communications Inc. has announced the appointment of **Phillip Camel** as vice president for international sales and marketing. Camel will be responsible for the management and expansion of TFC's

international sales and marketing organization in Asia/Pacific, Latin America and Europe. Camel comes to TFC from Scientific-Atlanta, where he held a similar position, and prior to that, had been in international sales at Zenith Electronics Corp.

Southern New England Telecommunications Corp. (SNET) has named **Jonathan Rubin** as vice president-integrated marketing. Rubin, formerly senior vice president of the residential service division for Boston-based interexchange carrier Trans National Communications Inc., will develop an integrated marketing strategy for SNET. The strategy will be designed to raise customer loyalty to the SNET brand, increase revenue and build market share for the company's products and services.

**Michael Hill** has been appointed vice president of operations for Atrex Inc. Hill will be responsible for developing new business in the cable and satellite communications industries. He began his career in the industry more than 25 years ago. Most recently, Hill was general manager for the Lakeway area of East Tennessee for

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## ◆ PEOPLE

Sammons Communications Inc. He will be based in Knoxville, Tenn.

ADC Telecommunications Inc. has named two individuals to management positions in its broadband connectivity division. **Bill Hartman** has joined ADC as senior market development manager for its broadband connectivity strategic marketing group, and **Brian Bauer** has been named senior product manager for ADC's broadband connectivity integrated drop management system. Hartman will be responsible for identifying and developing new products and market opportunities for North American broadband residential applications. He will also be involved with the broadband connectivity division's strategic planning, partnering and acquisition activities. He most recently served as area marketing manager for Raychem Corp. He began his career with Raychem in the RF military connector area.

As senior product manager for integrated drop management systems, Bauer will lead the initiative to provide end-to-end connectivity products focused on hybrid fiber/coax and fiber-to-the-curb applications for the global market. He has chaired a variety of committee working groups for the Society of Cable Telecommunications Engineers, and has worked with CableLabs and Bellcore on research and specification development. At Raychem, he held a variety of marketing, product management and engineering positions; he most recently served as Raychem's circuit protection worldwide telecommunications marketing manager.

Trilogy Communications Inc. has made a series of personnel announcements. **Bob Williams** has joined the company as manager of research and development. Williams has more than 20 years of domestic and international experience in the telecommunications industry, and most recently served in engineering and product management positions at Northern Telecom Canada.

And **Tony Liccardo** has joined Trilogy as its new western regional sales manager. Liccardo brings working knowledge from companies including TVC, Colony and Continental Cablevision of California.

The three Corning Inc. scientists who invented optical fiber are recipients of a new, national award. **Robert Maurer, Donald Keck** and **Peter Schultz** were honored by Commerce Secretary Ronald Brown in Washington late last year. Brown presented the first annual American Innovator Award, which was established this year by the Commerce Department's Patent and Trademark Office, to "recognize the enormous social and economic contributions made by individual inventors." Maurer, Keck and Schultz have been widely credited with developing the first low-loss optical fiber. In 1970, working at Corning's research and development laboratories in Corning, N.Y., they achieved a key breakthrough in optical fiber development. Their fiber was the first in the world to yield an attenuation measurement (light loss) lower than 20 dB/km. The manufacturing process developed by Maurer, Keck and Schultz, known as vapor deposition, is the basis for optical fiber made today.

**Cheryl Calvo** and **Jesse Johnson** have joined Information + Graphics Systems Inc. Calvo will serve as IGS' software test manager, while Johnson has been named to the new position of business partnerships manager. IGS provides data management software and data integration services to manage network assets for telecommunications and utility companies. Calvo's primary responsibilities include managing a team of software testers and developing and administering software test assurance programs. Prior to joining IGS, Calvo was manager of engineering at Applied Graphics Technologies. Johnson is responsible for expanding IGS' relationship with strategic partners to initiate new business opportunities. He comes to IGS from Oracle Corp., where he was managing principal in the database company's professional services organization. Johnson managed client projects and contributed to application design and database tuning. **CEO**

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# MSOs ready to Who wins— MPEG or GI? draw on compression

By Fred Dawson

The cable industry is finding itself forced to reopen the book on compression just as the primary supplier of digital technology to MSOs is preparing to deliver on its long-standing commitments.

Leading companies are rethinking earlier decisions to launch General Instrument Corp.'s proprietary DigiCipher extension of MPEG-2, with issues ranging from the costs of memory versus costs of bandwidth to the question of what impact worldwide penetration of MPEG-2 will have on cable's agenda in light of the

long delay in rollout of DigiCipher. Making matters more difficult, MSOs also must adjust bandwidth assumptions to factor in new advances that squeeze far more digital channels into a 6 MHz frequency slot than earlier strategies assumed was possible.

The issue of whether or not to proceed with the DigiCipher compression technique is most pressing at Tele-Communications Inc.'s HITS (Headend in the Sky), where officials are preparing for launch of over 80 channels of digitized programming by June. HITS is hoping to make a decision on whether to use the DigiCipher syntax, or to go with full-profile MPEG-2, or a standardized extension known as "dual prime" this month, says David Beddow, senior vice president of TCI Technology Ventures Inc.

"There's no resolution of the question at this point," says Beddow, stressing that, however it is resolved, HITS' commitment to GI will stay on track. "The big issue is whether we populate the boxes with the extra megabyte of RAM (random access memory), because, one way or the other, we're going with the GI access and control (security) system."

The HITS compression evaluation is part of a larger industry discussion on the issue, now underway under the auspices of Cable Television Laboratories. Time Warner Cable, which supports the world standard approach, and TCI have agreed to try to reach consensus on compression after years of debating the issue.

## Bandwidth vs. memory

The question comes down to whether cable can use a relatively abundant resource—bandwidth—to compensate for a 50 percent reduction in the amount of DRAM (dynamic random access memory) which the full MPEG profile requires in the set-top box, says James Chiddix, senior vice president of engineering and technology at Time Warner Cable.

"The argument (for DigiCipher) is that you can achieve very high quality by going to higher bit rates without using 'B' frames," Chiddix says, in reference to the bi-directional frames that are part of the main MPEG profile, but which are eliminated from DigiCipher and the dual prime extension of MPEG.

The main profile of MPEG-2 requires relatively fewer bits than DigiCipher and dual prime for any given level of picture quality because it uses motion prediction based on the makeup of frames in front of, as well as behind, the B frame to fill in the picture for each B frame. The memory in the set-top is what allows the decoder to "look at" future frames for information that feeds back into a given B frame. The other versions only use motion prediction in a backward direction, which is to say, an algorithmic determination of how many bits are required to fill in each frame depends on information from the frames that have gone before it in the video stream.

From Time Warner's perspective, if the best approach is to avoid B frames, then it must be done in the context of using an accepted standard, either through de facto world acceptance of DigiCipher or use

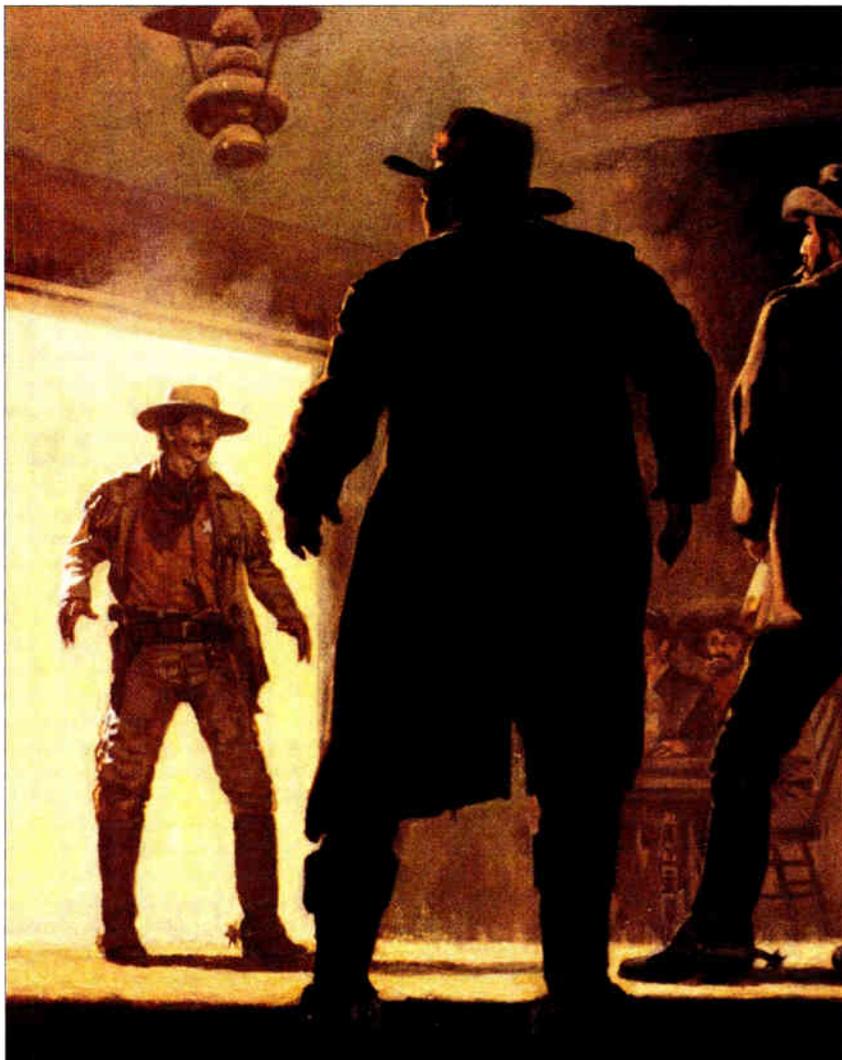
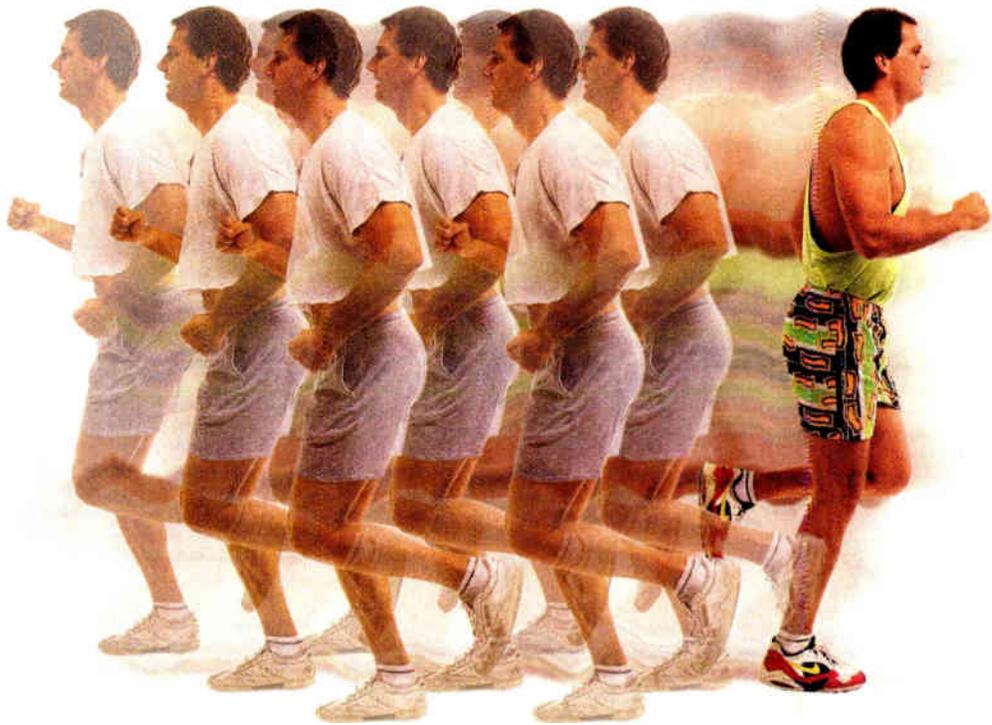


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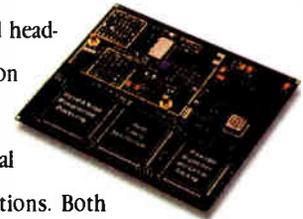
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**“Avoiding the use of B frames could result in significant cost savings”**

of the already standardized dual prime extension. “We don’t want to be parties to bringing a proprietary system into the marketplace,” says Chiddix.

As Beddow noted, set-top boxes to be delivered by GI for commercial deployment this year are designed to accept a full MPEG-2 or a dual prime feed as well as the DigiCipher feed. “We’re not looking at any delays as a result of any new directions we might take,” he adds.

Beddow puts the cost of the extra megabyte of DRAM at about \$60, although just what the costs will be is part of the difficult assessment that lies ahead. Others, usually MPEG proponents, say the cost is more likely to be about \$40.

Alex Balkansky, president and CEO of C-Cube Microsystems, a leading supplier of MPEG-2 chips, argues that, with the launch of digital video disks (DVD) this year, together with the recent implementation of full MPEG-2 by DirecTV, volume production of full MPEG-2 systems will quickly drive prices down, even if the memory component remains relatively high. Manufacturing costs for DVD players will start at \$450 per unit and go down quickly from there, he says.

If true, this puts MPEG-2 boxes well within shooting range of GI’s prices. Costs for set-tops using the

DigiCipher system are much higher than originally projected, with moderately featured terminals pegged at about \$400, and fully featured boxes at \$450 or higher. Two years ago, the projected price for a low-end box was at or under \$300 per unit.

“Forecasting the cost of memory is really the most difficult part of the digital cost equation,” says CableLabs President Richard Green, adding that “the costs of memory have actually gone up a little over the past year.”

Says Chiddix: “With the memory requirements associated with Windows 95 added to the other demand factors we’re seeing, there’s a credible argument to be made that the cost curve for memory could remain flat for the next few years. Avoiding the use of B frames could result in significant cost savings.”

But, he adds, cost is also a consideration for DigiCipher, which must reach mass production scales if there is to be a cost advantage. “Unless DigiCipher can show that it can match MPEG-2 quality, which it must do if it is to become a mainstream business, I don’t think we’re going to see the production volume that will make it competitive with the full MPEG-2 approach taken by the consumer electronics industry,” says Chiddix.



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Green makes a similar point. One of cable's problems on the cost curve is that the DBS industry beat cable to the punch in launching digital service, thereby pushing the worldwide chip manufacturing community toward implementation of full MPEG-2 for encoders and decoders, he says. Thus, the burden is on cable to swing manufacturers to the simple profile approach at volume levels that will achieve the economies of scale enjoyed by full profile MPEG-2 suppliers.

A recent report in the *Wall Street Journal* noted DRAM prices had jumped several percentage points on product slated for delivery last fall. But it also pointed to predictions by research firms that over the next two years, supply will begin to outstrip demand, resulting in a surplus of memory chips by late '96.

### The moving target

At presstime, CableLabs was slated to soon begin side-by-side showings of digitally compressed material that would allow its members' engineers to subjectively weigh whether the simple profile of MPEG-2 with dual prime or DigiCipher extensions can achieve the picture and sound quality delivered by the main level profile of MPEG-2. CableLabs is compiling tapes

made with full MPEG-2 encoders to compare with tapes using material generated from simple profile encoders developed by General Instrument Corp. and AT&T, whose dual prime system is now in deployment by Cablevision Systems Corp.

"Dual prime is the equivalent to DigiCipher in terms of employing compression without B frames, but it happens to be part of the standard, whereas DigiCipher isn't," Green notes. "So we have to be careful that we get the maximum bang for our buck as we search for cost-effective solutions.

"We're getting much closer to a consensus within the cable industry on all aspects of digital compression," Green adds. "So now we're trying to attract the attention of the manufacturing community to get them to focus on the approach we want to take."

The viewing tests are crucial to this process, not only with regard to achieving consensus within cable, but also in persuading the manufacturing community to go cable's way, Chiddix notes. "If it convinces us, it should convince others," he says.

But the testing process is tricky, given the fact that encoders, which determine how good the quality is, vary in performance from manufacturer to manufacturer even within a given MPEG category, Green notes. In

**The viewing tests are crucial to achieving consensus within the industry**



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fact, the latest developments in techniques surrounding the implementation of the basic MPEG algorithms in the encoder have made the whole issue a moving target which CableLabs will be hard pressed to keep up with in any evaluation process.

For example, Imedia Corp., a new company, demonstrated encoding and multiplexing technology at the Western Show last month that can deliver as many as 24 movie channels in a single 6 MHz TV channel using full MPEG-2 compression. And Compression Laboratories Inc., supplier of encoders to DirecTV using chips made by C-Cube, showed off statistical multiplexing and other techniques in real-time compression that can support up to 18 movie channels in an MPEG-2 stream.

The levels of compression achieved by CLI and Imedia assume use of B frames, although CLI has conducted tests to determine what the bandwidth tradeoffs are if B frames aren’t used, says James Lakin, vice president for marketing and business development for the Broadcast Products Group.

“Based on two types of tests we’ve developed, we think that for any given picture quality, the bit rate goes up 15-20 percent without B frames,” he says.

These new levels of video throughput are attained without any alterations in the basic MPEG algorithms and without sacrificing video quality, proponents say. Instead, they employ a variety of techniques in the encoding and post-encoding processes which eliminate any bits not necessary for a given quality threshold and assign bandwidth on the fly so that no one video stream is using any more space than it needs at any split second in time.

“In constant bit rate encoding, MPEG allocates too many bits to simple frame changes and too few to complex changes,” says Edward Krause, vice president of research and development at Imedia. “So we start with a variable bit rate encoder, where we use an algorithm that determines exactly how many bits are necessary to sustain a constant picture quality.”

This algorithm can be applied to any VBR encoder, Krause notes, adding that Imedia does not make the encoders but is strictly a software company. At the output of the encoder, in the multiplexing process, the Imedia system uses a statistical multiplexing process which varies bandwidth allocations to fit the exact needs of each channel’s bit stream.

The Imedia 24-channel video count assumes a data rate of one megabit per second per digital channel, with modulation running at the 64 QAM (quadrature amplitude modulation) rate of 27 Mbps per 6 MHz channel. Krause says the system would require 1.5 Mbps to run live sports action.

These rates represent dramatic reductions from the bit rates commonly assigned to video, with movies typically running at between 2 and 3 Mbps, and sports consuming 5 Mbps or more. Imedia’s demo at the Western Show operated at baseband using multiple clips of the same video running at 1 Mbps rather than putting 24 separate channels together over a 64 QAM

stream, but officials say the full suite of software components will be ready for commercial deployment by the second quarter of ’96.

CLI’s capabilities are reflected in actual commercial operation, although the DirecTV system is not pushing the limits of the technology. CLI’s Western Show demonstration showed how VBR encoding and statistical multiplexing result in constantly varying bit rates per channel in a live feed from DirecTV transponders. Alphanumeric windows displayed the bit rates on each TV screen, with rates increasing or falling as the scenes shifted on each channel.

“DirecTV is operating at an average of 3-5 Mbps per channel, but, if you were using MPEG without adding these techniques, the hockey game you see here would be assigned 6 or 8 Mbps,” noted Gary Trimm, president of CLI’s Broadcast Products Group, during the demonstration.

Along with its own patented version of statistical multiplexing, CLI uses a proprietary technique known as “detelecine,” which involves more efficient use of the redundant frames in film sequences. Because film operates at 24 frames per second, and NTSC video operates at 30, a film channel, to be compatible with television receivers, carries six frames per second of “padding,” which can be used for other information in the transport stream, says Trimm.

Statistical multiplexing and detelecine each expand bandwidth efficiency by about 20 percent, Trimm adds.

### **A momentous decision**

The stakes are high as cable prepares to launch digital services, playing catchup rather than leading the charge as had been originally intended. C-Cube’s Balkanski offers a sobering analysis of what the cost impact of widescale adoption of MPEG-2 could mean to the cost curve by citing what his firm has experienced with MPEG-1 CD players in the Far East, which were introduced over a year ago as a playback system for karaoke, multimedia games and other full-motion video formats.

The CDs hold only 74 minutes of video, but have proven extremely popular, with player sales in the millions of units, says Balkanski. “The manufacturer’s cost for video CD players a year ago was \$300 per unit,” he notes. “Today, it is \$130.”

With over one million subscribers now taking services employing full MPEG-2 rather than high-speed MPEG-1 via the three satellites operated by Hughes Communications, advocates of the worldwide standard can be expected to ratchet up efforts to persuade terrestrial network operators to swing behind this approach to digital transmission, rather than waiting for other options.

“We believe this will open the eyes of people in the U.S. who are weighing which way to go,” says Trimm. “The cable industry can’t afford to make the wrong choice.” 



# Avoiding bad weather accidents

Planning and training are key

By Earl Bennett,  
Corporate Manager of  
Safety and Training,  
RTK Corporation

Imagine this: it's a cold January day, the snow is coming down quickly and the installation schedule is maxed out. Back at dispatch, the telephone looks more like a Christmas tree than a simple tool for communication, as subscribers flood the lines with complaints of snowy pictures, downed drops and scattered system outages. When you're sure things can't get worse, the unspeakable happens—your best installer has been involved in a significant accident. Now all the other problems seem minute, and you are left wondering what to do first.

Though this scenario seems dramatic, it is all too common, particularly in the northern section of the country during the formidable months of winter. Unfortunately, these challenges are unavoidable, because quite simply, it's all part of the job. Work crews must go out on snowy, slushy, rainy days—it's just the nature of the business. Subscribers don't stop calling just because of poor weather; they want their MTV. So how is the need for a delicate balance of safety and customer service communicated to the work crews?

Safety training is required by OSHA. The most common type of safety training is the safety meeting. Documented safety meetings are a consistent reminder to employees of their responsibility for safety, and they can fulfill some of OSHA's training requirements. At RTK, we conduct weekly safety meetings about topics that are relevant to the concerns of our crews and our customers (i.e., the cable companies we work for). As the winter months approach, we especially want safety to be the buzzword on the lips of every one of our installers. This article discusses practical methods for developing a bad-weather strategy and ways to communicate this strategy to field employees during a safety meeting.

## Developing a bad weather strategy

Acknowledging the challenge of working in poor weather is the first step in developing a bad-weather work strategy. Defining practical solutions to these challenges will take teamwork and cooperation from all levels of management. Remember, crews have to work in poor weather to meet the immediate needs of the customers. But how can work be performed safely in inclement weather? Where does the installer draw the line, and legitimately choose to forgo a job until the

conditions improve? Where is this invisible line and can it in fact be crossed?

Unfortunately, arbitrary answers don't always work. A decision made one day may literally save the life of an installer. On another day amidst similar conditions, the same decision may not be warranted. Here's the rub: When human life and safety are at stake, efforts must be made to protect and safeguard against careless, avoidable accidents. A company's commitment to employee safety is seen when it is willing to err on the side of caution. Now, how do you communicate in such a way as to ensure that the customer's needs are met, while simultaneously looking out for your employee's safety? One way is to establish a bad-weather strategy that customers and employees can live with well before the storm clouds roll in.

## Teamwork defined

When bad weather hits, it is particularly important that everyone pitches in to help. Even before the bad weather arrives, preplanning must take place. Management must agree on ways to collectively work safer in bad weather. Establishing a general plan for



An RTK installer takes extra precautions in snowy weather. Photo by John Brouters, RTK.

most situations will ease the stress of trying to figure out how the work will get done on the day of the problem.

First, assign the task of monitoring local weather information to one of the staff. Make sure this information is passed on to management prior to the storm. This will allow time to prepare work vehicles for poor weather. A full tank of gas, snow tires, an ice scraper and jumper cables are a must. Half the battle of completing a service or installation call is the ability to conquer the conditions. Equip the crew with the tools to go out and conquer the weather! No one would want to be stranded or stuck in the snow because of bald tires, for example.

Second, agree on criteria for must-do work. Reports of no pictures and downed drops are traditionally considered must-do work. Other calls, such as those for non-pay disconnects and change-work, may not be as critical on the bad-weather day. Defining the criteria before the poor weather arrives will alleviate the stress of making these decisions when the problem hits. This

**About the author**  
Earl Bennett is RTK's corporate manager of safety and training. Since Bennett's arrival in 1992, he has been the catalyst for the development of an in-house training and safety program. He is also the primary author of RTK's Qualified and Competent Installer Program (QCIP) Training Manual and is currently the chairman of the SCTE Installer Certification Program's (Third Edition) Revision Committee.

## ◆ BACK TO BASICS

is a great opportunity for the cable operator and contractor to work in unity. The cable operator's sales force, customer service department and dispatch must be aware of the effort that is going on out in the field, but it is equally important for field personnel to understand the stress of continually taking irate phone calls and complaints from subscribers.

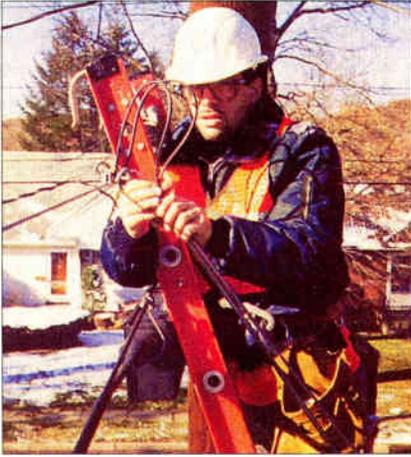


Photo by John Brouters, RTK.

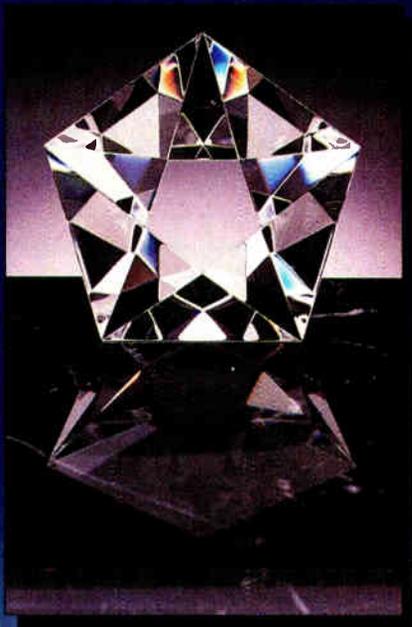
It is best if communication between departments is concise and gracious—patience and grace must abound. Communication is the operative word. Subscribers are much more likely to deal well with delays when they are not left dangling, waiting for the installer.

When the weather is extremely poor, such as snow as deep as the bumpers, black ice conditions or hail bouncing off the windshield, pairing up installers may be one way of completing the assigned work. By working in pairs, extra help is built into every job. Working from the ladder on an ice-covered sidewalk isn't as dangerous when proper precautions are taken, and someone is there to foot the ladder. This method of creating "weather work teams" is an effective way of promoting safety.

Sometimes, however, this is not possible, and other considerations have to be taken that may include adjusting the day's workload. By adjusting the workload, the stress of having to get to the next job is relieved. Statistically, accidents occur when employees are pressured to rush from job to job. This is accelerated on bad-weather days. These accidents are the ones that can be avoided. Installers must be taught to use common sense to avoid accidents. Sometimes the pressure of getting the job done forces employees to work in a manner that produces accidents. The goal on poor weather days must continue to be providing the best service for the subscriber, but getting the work done cannot be at the expense of forsaking safe work practices.

Because the nature of the cable television business mandates single-man work crews, trusting the intuition of our field employees becomes a factor. They are the ones in a position to identify what is a hazardous condition at a given jobsite. Teaching technicians and installers how to identify these treacherous situations must be a priority. Supporting your staff's decisions may mean that some work gets rescheduled and requires an additional visit.

Everyone knows accidents happen on the job every day, yet their full impact isn't always seen until the effects spill over into other departments. Even then,



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## Providing a safe workplace makes good sense from an accounting standpoint

many only see the accident's out-of-pocket costs, not the actual cost. But the direct (or out-of-pocket) cost of an accident is only a small portion of the actual cost. Direct costs are medical bills from an accident, compensation payments made to the employee who is unable to work and increased insurance premiums.

But every accident has a rippling effect into the company; these are the indirect costs. Indirect costs are four to 10 times higher than the direct costs. Often, they are not accounted for, but always take a toll on the company's bottom line. An example of an indirect cost is when a supervisor spends five hours of productive time performing an accident investigation, then drives to the hospital to find out how the injured employee is, calls the office several times to make sure all of the injured employee's route is rescheduled, and then returns to the office to fill out all of the accident reports and paperwork. Supervisor time is an indirect cost because his/her scheduled work did not get done.

There are many other indirect costs, such as hiring and training someone new to fill the injured employee's position, or the cost of overtime paid out because other staff members have to pick up the slack of one less employee doing the work. Overall, providing a safe workplace makes good sense from an accounting standpoint.

Once the plan is established, conducting the safety

meeting seems quite easy. An effective safety meeting is one where interaction and questions are freely expressed. Try to build this interaction into the meeting. Describe situations that are real-world and find out how the crew would work safely if it were faced with the problem. Sometimes a real accident from the previous year can be discussed, and accident investigation findings can be explained.

Each of the following bullet points can be used as a safety meeting by itself.

- ✓ How to work safely in poor weather. Discuss ways to determine if a job is safe to do, how to survey the work site before beginning the job, and when to ask for help.
- ✓ How to drive in poor weather conditions. During the meeting, emphasize defensive driving techniques.
- ✓ Dressing for poor weather. Discuss the concept of dressing in layers. Remind crews to use rain gear when appropriate and to be prepared. Explain what work boots are appropriate according to your company's policy on snow days.
- ✓ Customer relations and safety. Discuss what to do if your crews have wet feet before they enter a subscriber's home. Go over methods of dealing with the subscriber when rescheduling is the only option.

Safety must be the watchword that drives a company, particularly during the bad-weather months. **CED**

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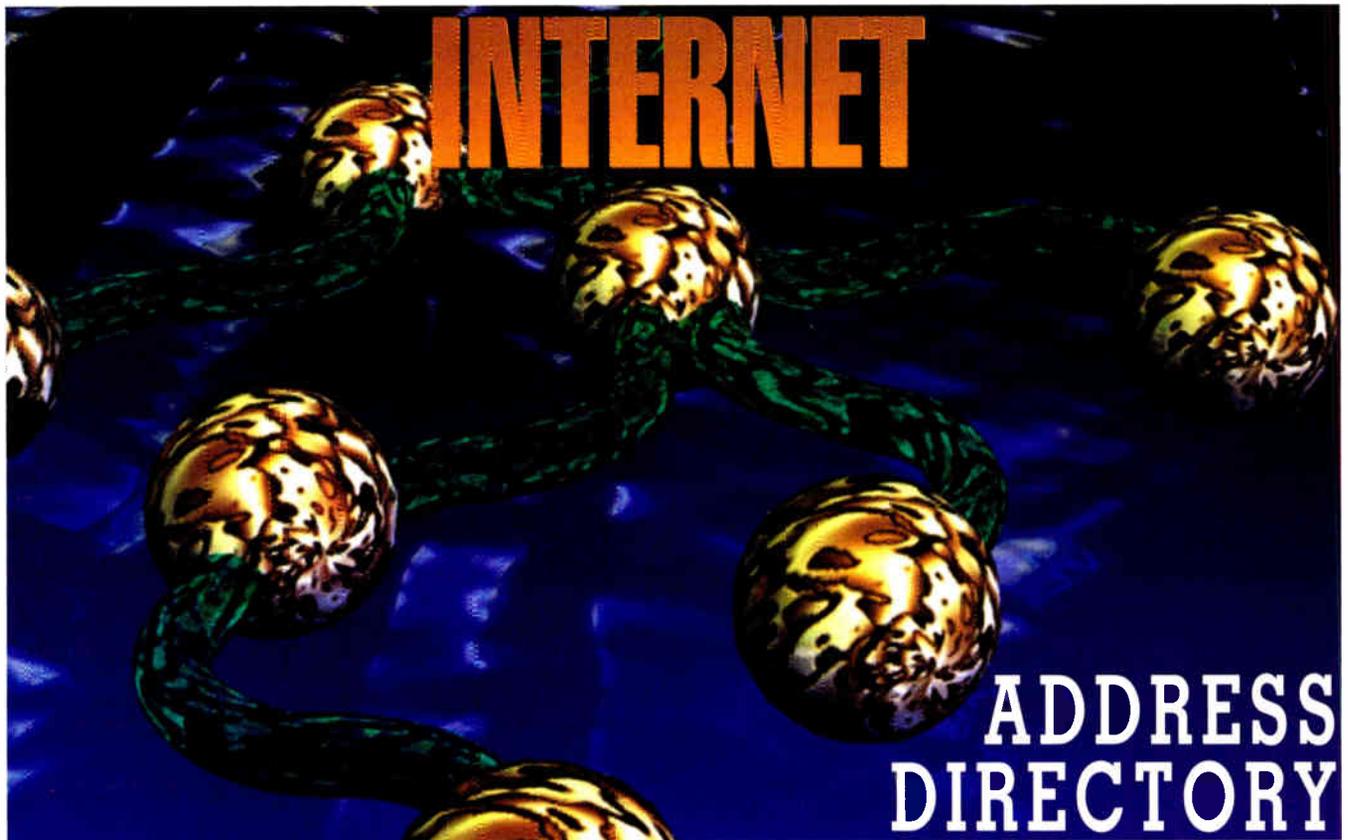
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# CED

THE PREMIER MAGAZINE OF BROADBAND COMMUNICATIONS



## The issue: 1996 construction plans

The telcos may have stalled their broadband plans, but DBS is out there, and telecom reform is pending, increasing the likelihood of more competition. This coming year promises to be exciting as MSOs begin to

compete in the telephone local loop and add interactive capabilities to their networks. We'd like to know what steps cable operators are taking to compete in this new environment.



## The questions:

1. Does your system have a significant plant upgrade planned for 1996?

Yes

No

Don't know

2. If so, approximately how much money will be expended to perform the upgrade, not including labor?

Less than \$5 million

\$5 million to \$10 million

More than \$10 million

3. What will the upgrade consist of? Check all that apply:

Bandwidth expansion

Addition of fiber optics

Activation of two-way plant

Status monitoring

Digital electronics

New headend equipment

Phone over coax

4. If your system plans to expand bandwidth, what type of electronics are you planning to purchase?

550 MHz

750 MHz

1 GHz

Other

5. When was the last time your system was significantly upgraded with new hardware and electronics (excluding maintenance expenditures and plant extensions)?

Within 12 months

Within 3 years

3-5 years ago

More than 5 years ago

6. Why is your system being upgraded?

Franchise requirement

Need more channels

Competition

New services

Other

7. Does your system intend to roll out digital compression to customers in:

1996?

1997?

1998?

Later?

No current plans

8. How interested is your system in providing high-speed data and Internet services?

Very

Somewhat

Not interested

9. How interested is your system in providing telephony services over the coax plant?

Very

Somewhat

Not interested

Your comments:

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**RESULTS**

# The issue: Signal theft

One of the biggest operational headaches cable operators have to deal with today is signal theft. The National Cable Television Association has estimated that the cable industry loses about \$5 billion every year

to unauthorized viewers of cable signals—a whopping 20 percent piracy rate. This survey asked what you think about signal security.

## The results:

Cable systems appear to be truly concerned about local cable theft, but that concern doesn't necessarily translate into action, according to this survey. For example, most cable systems still rely on audits and amnesty programs to reduce theft, vs. installing new hardware or demanding a better scrambling system.

Predictably, MSOs suffer greater rates of premium service theft than basic service theft, yet nearly half say they're losing less than \$20,000 a year to pirates. Given that a premium channel is typically priced at about \$10 a month, it would take just 166 pirates to cause a loss of \$20,000 per annum.

Interestingly, more than half of those who responded said their systems had indeed filed charges against service thieves in the past year.

Finally, while nearly everyone agreed that set-top manufacturers could do more to improve security, few are willing to pay for that security. Most were willing to shell out no more than \$10 per box.

*Congratulations to Ken Ross of Star Cable, who won \$50 last month just for filling out this survey. To enter your name, answer the questionnaire on the previous page. Good luck!*

**1. What is your system's current penetration rate for basic subscription services?**

Below 35%	35%-55%	56%-75%	Over 75%
<b>0%</b>	<b>12%</b>	<b>53%</b>	<b>35%</b>

**2. What would you guess is the current level of basic service theft in your system?**

Less than 5%	5%-15%	16%-25%	Over 25%
<b>59%</b>	<b>29%</b>	<b>12%</b>	<b>0%</b>

**3. What is your system's current penetration rate for premium services (of all basic subs)?**

Less than 50%	50%-75%	75%-100%
<b>41%</b>	<b>47%</b>	<b>6%</b>

**4. What would you guess is the current level of premium service theft among basic subscribers in your system?**

Less than 5%	5%-15%	16%-25%	Over 25%
<b>29%</b>	<b>41%</b>	<b>24%</b>	<b>6%</b>

**5. How much revenue does your system expect to lose to signal theft during 1994?**

Less than \$20,000	\$20K-\$35K
<b>47%</b>	<b>29%</b>
\$36K-\$50K	Over \$50,000
<b>6%</b>	<b>12%</b>

**6. What recent steps has your system taken to reduce signal theft? (multiple answers allowed)**

None	Regular audits	Offer amnesty
<b>12%</b>	<b>65%</b>	<b>35%</b>
Started security program	Other	
<b>18%</b>	<b>0%</b>	

**7. How concerned is your system's management about local signal theft?**

Very concerned	Somewhat concerned	Not concerned
<b>41%</b>	<b>53%</b>	<b>6%</b>

**8. Has your system filed charges against anyone for service theft over the past year or so?**

Yes	No	Don't know
<b>53%</b>	<b>47%</b>	<b>0%</b>

**9. What hardware do you have in place to battle piracy? (multiple answers allowed)**

Scrambling	Traps	Locking pedestals
<b>76%</b>	<b>82%</b>	<b>65%</b>
Set-top descramblers		None
<b>82%</b>		<b>0%</b>

**10. Do you think set-top manufacturers could do more to make their scrambling systems more secure?**

Yes	No	Don't know
<b>76%</b>	<b>0%</b>	<b>18%</b>

**11. How much would you be willing to pay, per set-top, for a vastly improved security system?**

Less than \$10	\$10-\$25	\$26-\$40	\$40-\$50
<b>29%</b>	<b>18%</b>	<b>12%</b>	<b>18%</b>

**Your comments:**

"My belief is that when all personnel follow through with their duties, signal theft will not be as easily accomplished as it is now."

— Gregg Brazee, Auburn Cablevision in central New York

JANUARY

**9 Pocono Mountain SCTE Chapter, Technical Seminar.** Topic and speakers TBA. Location: Holiday Inn, Hazleton, Pa. Call Anthony Brophy (717) 462-1911.

**9-11 Wheat State SCTE Chapter, Testing Session.** BCT/E certification exams to be administered. Location: Wichita, Kan. Call Joe Cvetnich (316) 262-4270.

**11 SCTE Satellite Tele-Seminar Program.** Topic: Emergency alert systems, from Expo '95 in Las Vegas. To be transmitted on Transponder 14, 2:30-3:30 p.m. Eastern time. Call SCTE National Headquarters (610) 363-6888.

**15-16 SCTE Regional Training Seminar.** Topic: Introduction to telephony, with SCTE director of training Ralph Haimowitz. Location: Sheraton Hotel, Newport Beach, Calif. Call SCTE National Headquarters (610) 363-6888.

**17 Big Sky SCTE Chapter, Technical Seminar.** Topic: Annual meeting and technical program. Location: Little Big Man Pizza, Laurel, Mont. Call Marla DeShaw (406) 632-4300.

**17-19 SCTE Regional Training Seminar.** Topic: Introduction to fiber optics, with SCTE director of training Ralph Haimowitz. Location: Sheraton Hotel, Newport Beach, Calif. Call SCTE National Headquarters (610) 363-6888.

**18 Central Indiana SCTE Chapter, Technical Seminar.** Location: Holiday Inn, Indianapolis, Ind. Topic: Installations. Call Al Opurt (317) 825-8551.

**18 Michiana SCTE Chapter, Testing Session.** BCT/E certifica-

Trade shows

**January**  
**8-10 SCTE Conference on Emerging Technologies.** Location: San Francisco, Calif. Call SCTE Headquarters at (610) 363-6888.

**February**  
**14-15 Sixth Annual Northern California Vendors Day.** Location: Fairfield, Calif. Call Steve Allen (916) 786-1610.

tion exams to be administered. Location: LaPorte, Ind. Call Russ Stickney (219) 259-8015.

**18 Penn-Ohio SCTE Chapter, Technical Seminar.** Topic: Technical basics for the installer tech, and Installer Certification tutorial on practical exams. Call Marianne McClain (412) 531-5710.

**20 Cascade Range SCTE Chapter, Testing Session.** BCT/E certification exams to be administered. Location: TCI office. Call Cindy Welsh (503) 667-9390.

**22-24 Technology Forecasting for the Telecom Industry.** This three-day course includes coverage of video-on-demand and interactive TV. Location: Stouffer Hotel, Austin,

Texas. Call (800) TEK-FUTR or (512) 258-8898.

**25 Central Florida SCTE Chapter, Technical Seminar.** Topic: Hands-on fiber training—cable preparation, splicing, enclosures and test equipment. Location: Sheraton Inn East, Tampa, Fla. Call Pam Kernodle (813) 371-3444.

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

**29-2/1 ComNet '96.** Location: Washington, D.C. Convention Center and Renaissance Washington, D.C. Hotel. Call (800) 545-EXPO, or (617) 551-9800.

**31 North Country SCTE Chapter, Technical Seminar.** Topic: BCT/E Category I Tutorial—Signal processing centers; and BCT/E Category V Tutorial—Data networks and architectures. Location: Anoka Technical College, Wadena, Minn. Call Bill Davis (612) 646-8755 for additional details.

**Meeting.** Location: Doubletree Suites Hotel, Phoenix, Ariz. Call the ACTA office at (602) 955-4122.

**8 SCTE Satellite Tele-Seminar Program.** To be transmitted on Galaxy 1R, transponder 14, 2:30-3:30 p.m. Eastern time. Topic: Inside FCC form processing, from Expo '95 in Las Vegas. Call SCTE National Headquarters (610) 363-6888.

**12-13 Video Networks.** Telcos Meeting Customer Needs in Video Services. Location: The Renaissance Atlanta Hotel, Atlanta, Ga. Call Pam Watson (312) 540-3856 for more information.

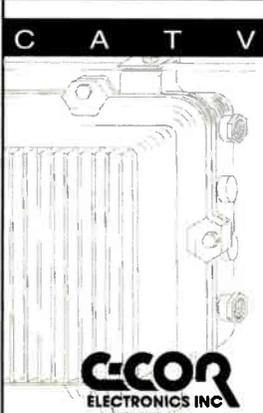
**14-15 Utilities-based Telecommunications:** Implementing Strategies to Increase Market Share. Location: The Renaissance, Atlanta, Ga. Call (312) 540-3083.

**20-23 Fiber Optic Training,** produced by The Light Brigade. Featuring a new, four-day format. Location: Honolulu, Hawaii. Call Pam Wooten at (800) 451-7128 for more information.

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## Fiber optic product line

STATE COLLEGE, Pa.—Broadband Networks Inc. has introduced a new fiber optic product line called the Transport 3000 Series. The Transport 3000 is a line of high performance transmitters, receivers and modulation electronics that provides FM quality at AM costs.

The series has been designed so that a network can be incrementally expanded in a cost-effective manner. By simply adding video personality modules, the network can be configured to deliver from two to 16 channels per fiber. All Transport 3000 products support the delivery of video and 10 MB data and will operate over a range of 25 dB optical loss.

Circle Reader Service number 41

## Set-top demux chip

BERKELEY HEIGHTS, N.J.—AT&T Microelectronics has announced a line of single-chip MPEG-2 demultiplexers that can be used in set-top boxes for cable TV, direct broadcast satellite (DBS), video-on-demand and interactive TV applications.



AT&T demux chip, AV6220A

The MPEG-2 System Layer Demultiplexer (MSLD) chip is main-level, main-profile MPEG-2 compliant and is designed to interoperate with a

variety of other functional devices in set-top boxes. The chip interfaces with a variety of demodulator devices, microprocessors, and multiple MPEG video and audio decoders, including new combined video/audio decoders. The AT&T MSLD chip demultiplexes the incoming MPEG-2 transport layer data stream into separate video, audio and system data streams, which are then channeled to various processing components in the set-top box.

Both the first-generation AV6210A MSLD chip released in March, and the new second-generation AV6220A chip were designed with a system-level perspective to perform control, timing and processing functions, as well as demultiplexing. In addition, the new MSLD chip is compatible with the European Digital Video Broadcasters technical standard. It can identify and extract up to 32 user-definable program IDs and provides eight programmable data filters for extracting program specific information (PSI) and service information (SI) tables.

Circle Reader Service number 42



## Fiber optic circulator

SAN JOSE, Calif.—E-TEK Dynamics Inc. has announced a Single Polarization Maintaining Fiber Optic Circulator (SPFC). This new, high performance model has 60 dB isolation at either 1310 or 1550 nm and transmits an incoming signal from port 1 to port 2, and another from

port 2 to port 3. They are ideal for WDM networks, optical amplifiers, cable TV systems, testing and OTDR measurements, according to the company.

Key features include high isolation (greater than 60 dB); low insertion loss (1.0 dB typ.); low crosstalk (-50 dB); wide

## Markers

MILWAUKEE, Wis.—Tyton has released its newly-designed Rite-On marker system. Now refillable, the Tyton Rite-On marker dispenser can be reloaded, making it a more cost-effective and efficient method of labeling.

Different sizes of self-laminating markers, with a clear tail which seals the legend under the vinyl, are available. Also, pre-printed quality control labels, with different text choices, can be used with the Rite-On dispenser.



Rite-On marker dispenser

The Rite-On dispenser comes in a highly visible, safety yellow, high-impact plastic, making it easy to find, resistant to oils and greases, and durable. The dispenser features a special window which holds the label firm for easy marking. Made to fit in the palm of the hand, the Rite-On dispensers are ergonomically designed for ease of use. The dispensers also fit easily into a shirt or pants pocket.

Circle Reader Service number 43

## F Connectors

LEDGEWOOD, N.J.—Now available from Bomar Interconnect Products Inc. are Right Angle, PC Board Jacks (Part Number 864B509) featuring a low VSWR of 1.5 max. and one-piece contact construction for increased reliability over two-piece crimp styles.

Widely used in cable TV, MATV, CCTV and numerous video-related consumer products, Bomar's PC board jacks may be ordered in either long (0.90-inch body, 1.28-inch length) or short (0.70-inch body, 1.08-inch length) versions.

These connectors' specifications include a working voltage (at sea level) of 500V rms, frequency range of 0-500 MHz and an insulation resistance of 5,000 Megohms minimum. Constructed of machined brass and nickel-plated, the jacks additionally feature a temperature range of -40 degrees C to +65 degrees C and a 500 mating durability.

Circle Reader Service number 44

## Fiber cabinets

PAWCATUCK, Conn.—Ortronics has announced the ORMMAC (Ortronics Multimedia Access Cabinet) High Density Fiber Cabinets. The fac-

### Single Polarization Fiber Optic Circulator

temperature range; and a high polarization extinction ratio (25 dB typ.).

Also new from E-TEK is the Single Mode Single Window Broadband Monolithic Single Fusion Coupler (SWMC). The 1x3 or 1x4 SWMC coupler is carefully constructed to achieve high port to port uniformity and low excess loss, according to the company. The compact package is well-suited for applications in cable TV, test equipment and telecommunications. The SWMC has excellent performance, including low insertion loss and low PDL. Applications also include fiber-to-the home, local area networks, subscriber loop and multi-channel splitting and combining.

And finally, E-TEK has announced the Automated Laser Characterization System (ALCS), a computer-controlled system designed to test and characterize laser diodes automatically.

The system measures near field, far field and wavelength spectrum using an optional spectrum analyzer that is linked through the IEEE-488 bus.

Circle Reader Service number 40

tory-assembled cabinets have pre-loaded, pre-punched high density fiber faceplates allowing more fiber in less space. They accommodate multimode and singlemode patching and/or splicing from 12 to 144 terminations. The units include adapters, slide-out drawers for ease of installation and designation, and cable storage, plus top, bottom and side cable entries.

The company has also introduced its Bottom Hinged Wall Mount Brackets, designed for easy rear access applications where real estate is at a premium. The panel opens down for termination. After termination is complete and horizontal cables are dressed out, the user can simply lift the hinged panel back into position and secure it.

The brackets have the standard EIA hole pattern and mount 19-inch wide patch panels (sold separately). The wall mount brackets measure 21 inches wide by 8 inches deep to support the TIA/EIA-568A Category 5 cable bend radius requirements.

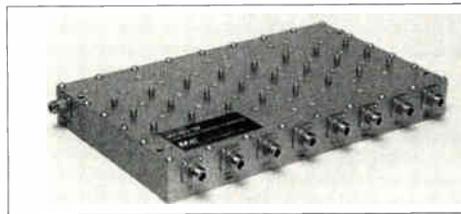
Also new from Ortronics is the Category 5 110 Patch Panels with hinged wire management. The units were designed to address rear access applications where space is at a premium. The panels open down for easy termination, and upon completion, the user lifts the hinged panels

back into position to secure them. For maximum space efficiency, the hinged panels can be used with Ortronics Mighty Mo II Wall Mounted Wire Management Rack, though they also mount to a standard EIA relay jack or wall mount bracket. The hinged panels are offered in standard or high density 24, 48 or 96 port configurations.

Circle Reader Service number 45

### Wireless channel combiner

EAST SYRACUSE, N.Y.—Microwave Filter Company has introduced a low-cost, compact, nonadjacent channel combiner for wireless cable. The new Model 13000 Micro "Q" semi-adjacent channel combiner, nicknamed the



Channel combiner for wireless

"Notebook," is digital-compatible, easy to install, field retunable to any four nonadjacent channels (2500-2686 MHz) and can be cascaded to combine all 16 ITFS and MMDS nonadjacent channels. This is combined in a package that weighs only 12.25 pounds.

The Micro "Q" Notebook has an advanced Micro-cavity design that supports superior electrical performance. Between one and four channels can be provided for 5, 10 or 20 watt applications. It is available for all U.S. and international channels.

An optional rack mount version of the Micro "Q" is also available, which makes it easy to place right in the transmitter rack.

Circle Reader Service number 46

### Video/text encoder

SUNNYVALE, Calif.—With the introduction of the SAA7182 and SAA7183 Digital Video Encoders, Philips Semiconductors is offering a single-chip solution which encodes digital video into PAL, SECAM or NTSC composite video, S-Video (Y/C) and RGB analog signals. The SAA7183 also features Macrovision Pay-per-View copy protection.

The new encoders, which are designed as "one-chip multi-standard back ends" for digital video systems, are ideal for MPEG-1 playback in equipment such as video CD players and multimedia computers. They also allow manufacturers to produce multi-standard set-top boxes for digital satellite TV and cable TV networks. By incorporating two, independent 27 MHz triple DACs, both ICs can generate

CVBS, S-Video and RGB outputs simultaneously—meeting all the signal requirements of SCART connector standards.

Circle Reader Service number 47

### Fiber optics

LOCUST VALLEY, N.Y.—Multidyne has introduced the FTX-95/FRX-95 Fiber Optic Video and Digital Stereo Audio Transmission System. The system's signal-to-noise ratio exceeds 75 dBs, and the differential phase and gain are less than 0.5 percent and 0.5 degrees, respectively.

The system includes front panel controls for video gain and 1,000 feet of cable equalization. The video bandwidth of 10 MHz supports HDTV, NTSC, PAL, SECAM and video with duplexed audio carriers at 4.5 MHz, 5.8 MHz and 6.4 MHz. Applications include links from the studio to the cable TV headend, distance learning, studio to transmitter and backhaul feeds from special events.

The 20-bit stereo digital audio delivers a signal-to-noise ratio exceeding 85 dBs. The receive unit has front panel controls for left and right channel audio gain.

The system is available in portable and rack-mount configurations with all optical wavelengths, LED multimode and laser singlemode.

Circle Reader Service number 48

### Multiple fiber coupling

PALO ALTO, Calif.—Wave Optics Inc. is now offering precision silicon arrays for multiple fiber coupling applications. Applications include coupling to integrated optic devices, arrays of lasers, arrays of detectors and multiple fiber connectors.

V-grooves are available with standard 250  $\mu\text{m}$  ( $\pm 0.5 \mu\text{m}$ ) or custom center-to-center spacing. Standard arrays are available with 2, 4, 8, 16 and 32 grooves. Arrays of up to 2,000 fibers are possible. Arrays are available separately, or assembled and connectorized.

Circle Reader Service number 49

### Tunable bandpass filter

EAST SYRACUSE, N.Y.—Communications & Energy Corporation Inc. has introduced the Model 4634-(Fo) bandpass filter, which band-passes any carrier frequency in the FM radio band. The filter is factory set to any frequency between 88 and 108 MHz. It may also be returned to any other FM radio frequency.

The filter has a 3 dB bandwidth of 400 kHz with an insertion loss of 4 dB (typical). Suppression at  $\pm 700$  kHz is 30 dB. Connectors are Type F (female). The filter measures 3 x 3 x 12 inches and weighs one pound.

Circle Reader Service number 50

### **CableLabs to use Nortel switch**

LOUISVILLE, Colo.—Nortel has provided Cable Television Laboratories Inc. (CableLabs) with a DMS-500 telephone switch to be used as part of a system for testing the performance capabilities of telephony equipment over cable television plant.

"This switch, when coupled with our existing cable television network equipment, gives us an end-to-end test capability," said Scott Bachman, vice president of operations technologies projects, CableLabs, in a prepared statement.

A DMS-500 switch provides local and long distance switching capabilities on an integrated platform and is targeted at new telecommunications service entrants to the competitive telephony business. Nortel debuted the DMS-500 as part of the CableNET exhibition at the 1994 Western Cable Show. The switch will occupy one laboratory test room in the CableLabs' building. It is scheduled to be operational some time this month.

### **Cox customers get bonus**

OMAHA, Neb.—Cox Communications has introduced WireLinK, a free telephone wire maintenance service, as part of its cable television package in Omaha. With WireLinK, Cox will repair free-of-charge any telephone wiring or cable problem that occurs within the customer's home.

"Cox customers will realize significant savings since they no longer need to purchase the local telephone company's wire protection plan, currently \$2.25 per month, or face costly service calls if they do not subscribe to the protection plan," according to Richard Hook, vice president and general manager of Cox Communications in Omaha, in a prepared statement.

WireLinK is one of Cox's initial moves toward providing telephone and other telephony-related services in Nebraska. All Cox subscribers, including customers receiving Cox's new free level of cable service called Localink, can receive WireLinK as part of their cable service package. The service provides free-of-charge maintenance on all telephone wiring from the phone company's "network interface" to the wall outlet(s) within the home.

### **Drake sells 20,000th receiver**

MIAMISBURG, Ohio—To commemorate the sale of the 20,000th ESR1240A, the R.L. Drake Company has awarded commercial distributor Paul Nickless of Nickless Schirmer and Co. with a complementary ESR1240A. The unit is a rack-mountable, economical SMATV receiver, according to the company.

The commemorative unit was presented to Paul Nickless, president of NSC, at the Drake

corporate office in Dayton, Ohio. In turn, NSC presented the ESR1240A to Cablevision of Texas, one of NSC's biggest customers.

### **S-A creates scholarship fund**

ATLANTA—Scientific-Atlanta has announced the creation of the Glen P. Robinson Jr. Scholarship for Education in honor of the company's first president. The annual scholarship for the son or daughter of a Scientific-Atlanta employee will be in the amount of \$1,500 per year for four years, or \$6,000.

The announcement was part of the company's Founders' Day celebration in recognition of the contribution made by S-A's original founders to the company and the local community.

### **VSI, AT&T team on distance learning**

NORCROSS, Ga.—VSI Enterprises Inc. and AT&T Network Systems announced an agreement to work together on an offer that enables telecommunications providers to provide distance learning applications to local communities, schools and businesses. Distance learning is an interactive way of delivering education and training through multimedia technology (voice, video and data) so that people can learn new concepts regardless of time, location or on-site teaching resources.

Under the terms of the teaming agreement, VSI and AT&T Network Systems will jointly market their distance learning solution to service providers in the United States and Canada. The two companies may also explore opportunities for the future co-development of videoconferencing products and services related to distance learning.

The agreement combines AT&T Network Systems' narrow and broadband ISDN- and ATM-based multimedia products with VSI's interactive videoconferencing systems in an end-to-end learning solution for service providers.

The AT&T/VSI offer includes the AT&T GlobeView-2000 Broadband System, a high-speed switching system based on asynchronous transfer mode (ATM) technology, which makes the fast delivery of voice, video and data possible; the AT&T EMMI Multimedia Interface, an ATM desktop multimedia interface that provides advanced data communications capabilities; and VSI's interactive videoconferencing system centered on its Omega Architecture software, which controls all aspects of a conference through on-screen icons and computer mouse commands.

### **Fujitsu, Bay Networks announce alliance**

RALEIGH, N.C.—Fujitsu Network Switching of America Inc. and Bay Networks Inc. have announced a development and marketing alliance by which Fujitsu will market, sell,

install and service Bay Networks' Broadband Network Access Switch (BNX) in combination with its own FETEX-150 ESP Series ATM switch. Under terms of the relationship, the companies will also jointly develop products, focusing on interoperability between the two product lines, integrated end-to-end switching systems and a common network management system.

Through the alliance with Bay Networks, Fujitsu can now offer carriers a frame relay switching product which is scalable from DS-0 to DS-3 and is already employed in the central offices of one major carrier; the broadband capabilities of its FETEX-150 ESP ATM product; and a network management system that integrates both ATM and frame relay services.

### **Augat to supply Optus Vision**

MANSFIELD, Mass.—The Communications Products Division of Augat Inc. has been awarded an agreement, valued at more than \$15 million, to supply Optus Vision with connector products to be used in the building of Australia's first commercial cable television system.

The buildup of the HFC network will encompass several major Australian cities, including Sydney, Melbourne and Brisbane. The cable system went on-line last September. The construction of the system is the first phase of Optus Vision's network that will eventually span thousands of kilometers of cable and be capable of serving approximately three million homes.

### **Zenith inaugurates NOM-certified lab**

CHIHUAHUA, Mexico—After becoming Mexico's first cable set-top decoder maker to obtain "Norma Oficial Mexicana" (NOM) certification earlier this year, Zenith Electronics Corp. has inaugurated Mexico's first NOM-certified laboratory specifically dedicated to serving the cable industry. (The NOM is the government-directed Mexican equivalent of Underwriters Laboratories [(UL)] approval in the United States.)

The lab was officially dedicated in a ribbon-cutting ceremony, led by Mexican government officials including Decio de Maria y Campos, under-secretary of commerce and industrial promotion; and Zenith executives Bill Luehrs, president, Zenith Network Systems; and Eduardo Solis, director of manufacturing, Zenith Network Systems. The lab is located in Zenith's cable manufacturing plant in the city of Chihuahua.

"This new lab offers Zenith the unique ability both to sell NOM-approved cable products and certify the set-top decoders that serve the Mexican cable market," said Luehrs. **CED**



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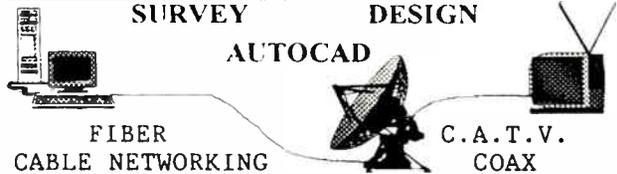
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# Central office switched architecture



By Archer S. Taylor,  
Director and Senior  
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Video Dial Tone (VDT) authorizations by the FCC have been exceedingly slow. As a consequence, some RBOCs (Ameritech and PacTel, for example) have adopted conventional multi-channel, hybrid fiber/coaxial (HFC), cable TV type architectures, at least for their initial projects. Also, the Nynex consortium with Bell Atlantic and PacTel is serious enough about developing digital wireless (MMDS) facilities to place an order for 3 million digital set-top boxes at a cost in the neighborhood of a billion dollars.

In the long run, it appears that the telephone companies still believe in central office switching as the preferred architecture for video distribution to the general public. For many years, telephone industry forecasters have proclaimed demand access video, now known as video-on-demand (VOD), to be the gateway to a golden age. For VOD, central office switching architecture has the great advantage of permitting unlimited simultaneous access, depending only on the capacity of the headend facilities. With HFC architecture, on the other hand, access is limited to some form of near-video-on-demand (NVOD) by the finite channel capacity of the distribution network.

Bidirectional interactivity is seen as a companion to VOD. While technology is available to accommodate interactivity and plain old telephone service (POTS) on HFC networks, both are more readily adapted to central office switching. Moreover, anyone attempting to steal centrally switched programs on fiber or coaxial cables would only be able to view whatever programs happened to be selected at the time by others. This kind of random peep show could hardly stimulate a financially rewarding piracy venture (See My View, *CED*, December 1993).

The enormous cost of replacing embedded copper pairs with coax or fiber also argues stoutly for an architecture that would fit the limited bandwidth capability of the existing narrowband infrastructure. Digital compression and high efficiency modulation techniques (e.g. ADSL) in a central office switched architecture seem to be the only way video programming could successfully be transmitted on copper pairs.

Cable TV has experimented over the years with a variety of switched distribution architectures. Most were actually "off-premises convertors" rather than examples of central office switching. Because of primitive technology, limited capacity, faulty manufacture, conceptual problems and a widespread perception of inherently higher costs, none has enjoyed enduring success. Justification for the extra cost rests primarily with still unproved revenue from interactive services and VOD. For whatever reason, however, various RBOCs

appear to be retreating to the conventional wisdom of the cable TV industry by adopting HFC architectures, perhaps temporarily.

Nevertheless, telco interest in switched architecture persists. BroadBand Technologies Inc. (BBT) recently described a revised version of its SDV (switched digital video) architecture (See *CED*, Sept. 1995, p. 36), developed jointly with AT&T Microelectronics. The BBT/AT&T architecture would utilize a stream of ATM (asynchronous transfer mode) packets on optical fiber to ONUs (optical network unit) connected to four subscriber premises with unshielded twisted pair (UTP) drop wire. The ATM packets addressed to each ONU would be assembled and multiplexed at the Sonet OC-1 data rate (51.84 Mbps).

The video data stream, POTS, and the separate voice/data channel would be transmitted on the UTP in separate spectrum bands below 50 MHz. Between 10 and 25 video programs could be addressed to each ONU, at about 2 to 5 Mbps each, depending on the rapidity of motion in the particular program and the desired picture quality. The downstream OC-1 would be squeezed into the frequency band at approximately 6-26 MHz, using the AT&T developed 16 CAP (carrierless amplitude and phase) modulation, comparable to 16-QAM.

## Intractable consumer issues

In order to provide basic analog services in the clear, as required by the 1992 Cable Act, BBT proposes to parallel its SDV architecture with a conventional HFC analog coaxial network. Basic cable TV programs would be distributed to subscriber premises in the conventional manner on fiber and flexible coaxial drop cable, while VOD, POTS and interactive data would be delivered on UTP drop wire.

The separate analog coaxial network may also be a recognition that the 1992 Cable Act arose out of severe public exasperation with the frustrations arising, in part, because of the limitations of the cable set-top box, and multiple remote controllers. Without the parallel, non-scrambled analog HFC distribution network, a central office switched architecture could be subjected to the same angry public complaints. Yet it cannot help but add to the inherently high cost of the central office switching architecture.

Convenience features, such as channel recall, skip and add, picture-in-picture, program guide and navigation could easily be provided remotely at the central switch. Only a video monitor would be needed for display. This suggests that central office switching architecture could become embroiled in the same kind of intractable issues which continue to plague discussions between cable TV and the consumer electronics industry. As compatibility expert Walt Ciciora reported in Dallas last year: "[The consumer electronic side's] ultimate fear is that if too much control is lost, the TV becomes a mere monitor." The consumer electronics industry is quite unlikely to hand over to central office switching its control over features that are its very lifeblood. **CED**

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