JANUARY 1995 CED Western Show Wrap ◆ DSS issues ◆ '90s training ◆ CableNET review

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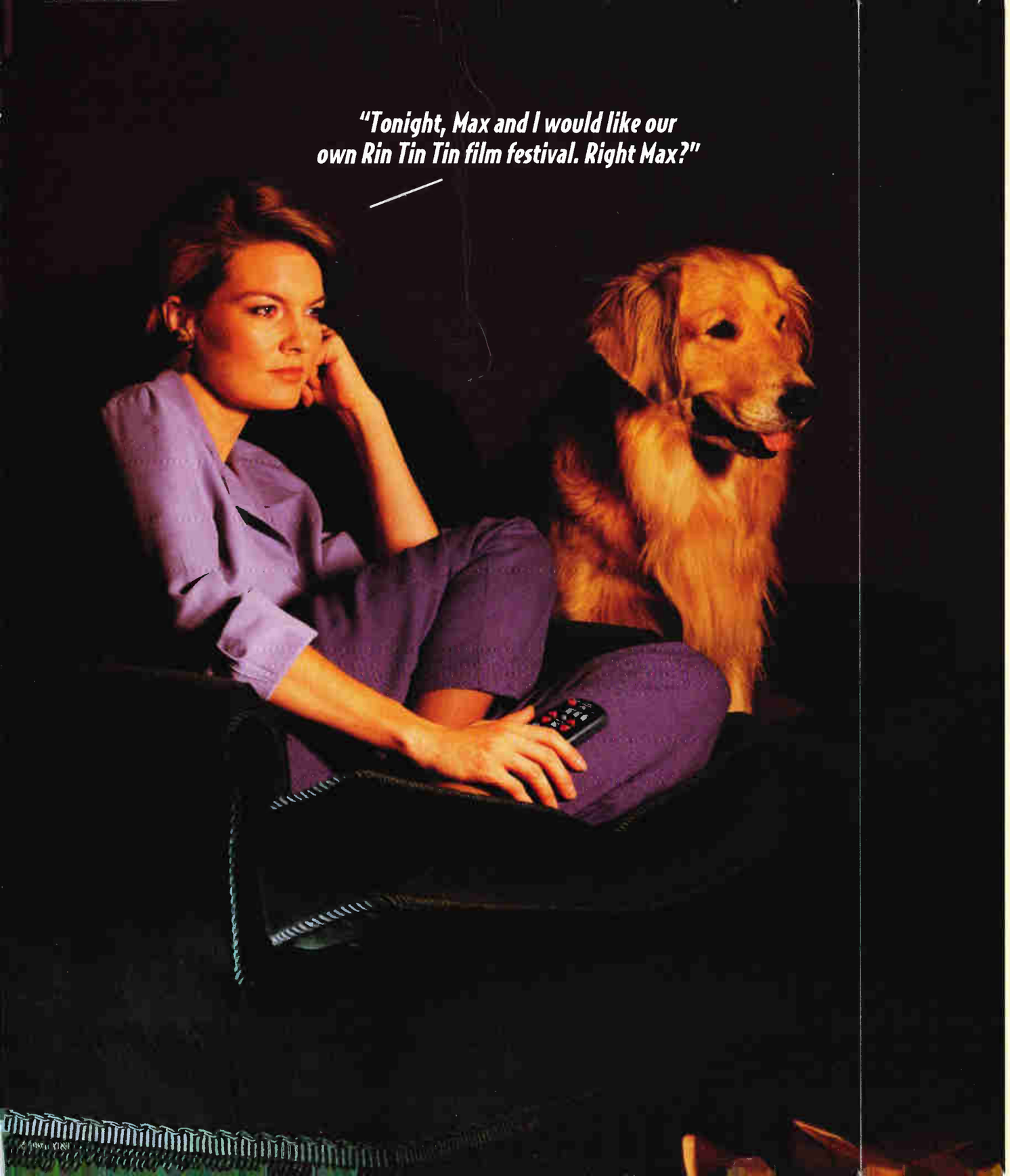
Nick Worth: 1994 Man of the Year

CableNET94
Special CableNET '94 Lift-out section inside

WHAT DO PEOPLE WHO WANT EVERYTHING YESTERDAY WANT FROM YOU RIGHT NOW?



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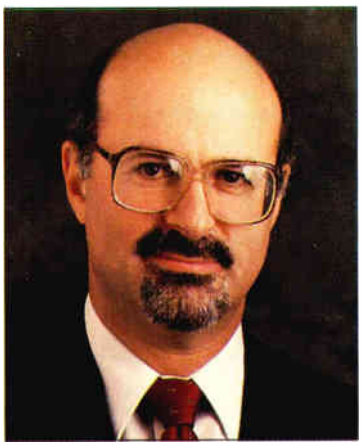
[1] FIND/SVP telephone survey

Circle Reader Service No. 1

Video dial tone sputters along



By Jeffrey Krauss, paddling upstream on the information waterway, and President of Telecommunications and Technology Policy

In 1987, the FCC began an inquiry into telephone company ownership of cable TV systems. The video dial tone (VDT) concept was created in 1988 as a way to let telcos operate cable systems without controlling the programming. The FCC's VDT proceeding took another step in November, with the release of a 150-page decision. VDT was, and still is, envisioned as a common carrier telecom service, where telephone companies lease broadband channel capacity to video programmers.

The major battle has been over cost allocations and cross subsidization. It will be expensive for telephone companies to install broadband capacity. Who will pay for that capacity? Will it be the video programmers who lease the channels, and their customers? Or will it be the telephone company's monopoly telephone customers? Consumer organizations, the cable TV industry and the state regulatory agencies believe that the FCC's latest VDT decision will allow telephone companies to extract these broadband network costs from monopoly telephone customers. The FCC, of course, disagrees.

Cost allocation tricks

There is a basic problem with the FCC's regulation of VDT. Telephone companies are virtually free to include a portion of the broadband network cost in with the price they charge for monopoly telephone service. This is because they must allocate shared network costs to telephone and video services if the services are carried in a common network.

There are different ways to accomplish this allocation. For example, a video channel occupies 6 MHz, while a telephone channel occupies 4 kHz, so occupied bandwidth might be used as an allocator. But what about spare or unused capacity? The telephone company might argue that the fiber optic cable was installed to support telephone service, and thus all of the spare capacity should be paid for by telephone ratepayers. Moreover, the entire installation costs might be allocated to telephone service, and only a portion of the cost of the fiber itself allocated to video. Because the FCC refused to adopt rules to prohibit this trickery, telcos will have lots of opportunity to play these games.

Local telephone costs are regulated by state regulatory commissions. They don't want telcos to misallocate excessive costs to telephone service, because that results in higher local telephone rates. The National Association of Regulatory Utility Commissioners, which represents the state regulatory agencies, asked the FCC to adopt a standard allocation procedure, but the FCC refused. In contrast, the FCC's cable rate regulation rules do spell out detailed cost allocation procedures. Now, it will be up to the state regulatory commissions to try to detect telco cost allocation tricks.

Preferential pricing

It's crazy, from a business perspective, to expect Home Box Office, CNN, Discovery Channel, a public broadcaster and the local school district to all pay the same price for a video channel. But VDT is a common carrier service, and non-discriminatory pricing is the cornerstone of common carrier telecommunications service. A cable operator doesn't have to worry about this. Rather than leasing channel capacity to programmers, a cable operator pays them for their programming. And he pays different programmers different prices. The FCC doesn't regulate the prices that programmers charge, so marketplace forces determine the pricing. This is not so for VDT.

The telephone companies understand these realities. They asked the FCC to permit them to lease their entire video channel capacity to a single "anchor programmer" who would then operate like a cable system. The FCC rejected this request; it ruled that a VDT system cannot lease its entire capacity to a single customer.

Meanwhile, the question of preferential pricing is squarely on the table. Broadcasters believe they should get free or low-priced access to VDT systems. As justification, commercial broadcasters rely on "must carry" policies, and non-profit public broadcasters rely on their inability to pay commercial rates.

So the FCC has decided to re-examine this issue in a Third Further Notice of Proposed Rulemaking. The first part of this inquiry centers around the "need" for mandatory low-cost or free access to VDT channels for non-profit broadcasters and local government channels. The second part looks at whether to permit VDT operators voluntarily to provide preferential rates to commercial broadcasters and other programmers.

In this inquiry, programmers that support preferential rates will have the burden to show that such a policy is both legally permissible (in light of the legal requirement for non-discriminatory pricing by common carriers) and somehow promotes the public interest. Non-profit entities can point to "lifeline" telephone services as examples where preferential telephone rates were established for those with economic needs. Commercial broadcasters will argue that the continued viability of free, over-the-air broadcasting requires free access to VDT services. But cable programming services, even those like Discovery that compete directly with public broadcasting, don't have a chance.

VDT could be a strong competitor to cable TV. It will depend largely on how low the telcos can price the video channels, which will depend on how much cross-subsidization they can get away with. The resulting pricing levels, which could vary widely from one telco to another, will determine whether non-commercial broadcasters really need preferential rates. Meanwhile, the FCC VDT proceeding sputters along. CED

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Circle Reader Service No. 3

Contents

24 Man of the year

By Roger Brown

Nick Worth of TeleCable is chosen Man of the Year by his peers for his work on system reliability and work process improvement.

Features

40 Western Show wrap-up

By CED staff

The merely possible becomes probable, as a host of manufacturers showcased products targeted to assist operators in transforming their networks.

58 Taking the OSS plunge

By Gregory Hardy, Transmission Products, Scientific-Atlanta

Operational Support Systems (OSS) are becoming critical to the future of cable, as operators must now manage very sophisticated transactions over full service networks. This article provides a guide to getting started.

62 Telecom perspective

By Fred Dawson

This time, it's for real. Although the Western Show is always marked by plenty of glitz, last month, it featured major technical advances, as well as commitments by MSOs to applying the new technology.

68 Training for new technologies

By Dana Eggert, Scientific-Atlanta Institute

In the past four years, the rate of technological change has quadrupled, as measured against the past 40. Can anyone hope to keep up?

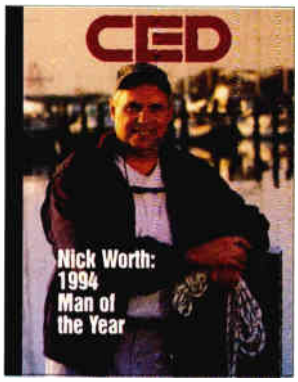
84 Cutting through chaos

By Dana Cervenka

The recent "Information Superhighway" conference revealed lots of confusion on the interstate. Nevertheless, the bold charge ahead and build.

CableNET '94 road map

What CableNET really meant to the industry, complete with descriptions from the participants, as well as a detailed diagram.



About the Cover

Nick Worth is charting a course for TeleCable's future. Photo by Keith Lanpher.

Departments

5 Capital Currents
10 In Perspective
12 Color Bursts
16 Labwatch
18 Frontline
20 Ciciora's Corner
22 From the Headend
56 Product Showcase
74 Back to Basics
76 Ad Index
87 Return Path
90 In the News
91 People
92 New Products
94 What's Ahead
95 Classifieds
100 My View

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Plug in a new channel.

Lead, follow, or get out of the way

Say goodbye to the days when cable operators could deploy hardware wherever they wanted without any thought of standards. As Walt Ciciora notes in his column on page 20, it used to be that cable systems were little "islands" of video signals that rarely came in contact with the outside world. But now MSOs want to provide telephony, national spot advertising, interactive services via regional hubs and distance learning; all these services require interoperability with neighboring systems and/or the public switched telephone network.

Efforts to steer cable systems toward recognized standards and protocols start with the Federal Communications Commission, continue with several trade associations, and rest with equipment manufacturers. The FCC has stated numerous times in the consumer electronics compatibility proceeding that development of a standard interface would be a great way to break the conundrum between set-tops and feature-laden TVs and VCRs. Manufacturers like Hewlett Packard, Mitsubishi, Sony and others want to build cable hardware, but endorse standards as a method to reduce cost. And currently, there are dozens of trade groups that want set-top box standards.

Now, don't just roll your eyes, turn the page and go on to the next story, because whether the cable industry chooses to participate or not, set-top standards are coming.

Although several groups are participating, the Video and Electronics Standards Association, or VESA, is arguably in the lead. This San Jose-based group was founded in 1989, has 225 members and supports interface standards in the computer industry. Already, the group has defined about 30 standard interfaces.

Its VESA Open Set-Top group, or VOST, has targeted the end of the first quarter of 1995 to offer architectural locations of security, user interface, peripheral hook-up, descrambler support, video and audio decompression, remote control and multiple TV and VCR support. It's an aggressive timetable, but VESA realizes its window is short before digital set-tops are deployed.

Numerous subcommittees have been organized under VOST, dealing with operating and technical issues. But so far, cable industry participation has been minor, at best. General Instrument, Scientific-Atlanta and Zenith are participants, but they're vastly outnumbered by computer and electronics component companies. Not a single MSO is listed, but US West, Bell Atlantic, Southwestern Bell and AT&T are involved.

The fact of the matter is, cable people hate long, boring meetings. In the past that has caused the industry to be under-represented or to arrive late at the dance. With scarce resources and even less time, it's doubtful cable operators will commit to attending VOST meetings on a monthly basis. This time, that may be disastrous. VOST is serious–it will develop and implement set-top standards, whether cable operators like it or not. The industry's engineers should immediately find a way to get involved and make an impact, because this is one area where change is coming quickly.

For information about VOST, call Janet Courtenay, 408/435-0333.

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Siemens, Sun and S-A combine to offer turnkey HFC system

A new consortium between Germany's Siemens AG, Sun Microsystems and Scientific-Atlanta has joined the list of huge companies that are touting turnkey end-to-end hybrid fiber/coax platforms for cable operators and telephone companies.

The consortium, which was about 18 months in the making, brings together Siemens' telecom and switching expertise, Sun's client/server products and S-A's set-tops, Broadband Integrated Gateway and HFC transmission gear. Siemens' domestic subsidiary, Siemens Stromberg-Carlson, will act as the system integrator for the group's product, dubbed "IMMXpress" (see Figure 1).

The approach each company has agreed upon is based on the familiar HFC platform, with a focus on node sizes of 80 to 125 homes, according to John Buckett, VP of sales and marketing at S-A. While there remains a debate between HFC and fiber to the curb, Siemens' Senior VP for Marketing and Business Development Van Cullens said HFC "is the best platform for the foreseeable future."

The IMMXpress solution offers switching, access, customer equipment, servers, cable telephony and operational support systems which can be customized to the user's specifications. Cullen said the modularity of the network would allow cable operators to take steps toward evolving present-day cable networks into full service communications networks.

Here's what each company will bring to bear:

Siemens offers ATM switching technology, network management expertise, intelligent network call control and advanced multimedia applications and content conversion for facilities and MPEG encoding. GPT Limited, a Siemens affiliate, offers a level 1 gateway and rapid service creation through its multimedia INventor product.

Sun offers its expertise in networking and server technology based on open standards and interfaces. And S-A, of course, offers its full line of products including set-tops, fiber/coax distribution systems, headend gear and soon, a cable/telephony system.

CableData unveils new transactional billing system

CableData, a company in the midst of redefining itself for the interactive age, intends to debut its Intelecable software, a transactional management system designed to support both telephony and cable applications, to domestic cable operators.

The system provides operators with the capability to fully integrate cable and telephony transaction management, through the use of a relational database architecture. In doing so, the need for separate databases for each application is eliminated, said Bob Crowley, senior vice president of U.S. Computer Services, CableData's parent.

Intelecable includes more than 100 integrated programs that support order processing, collections, charging and billing, field communications, marketing and financial reporting. It also enables new orders, service orders and billing inquiries to be addressed from a single screen, said Crowley.

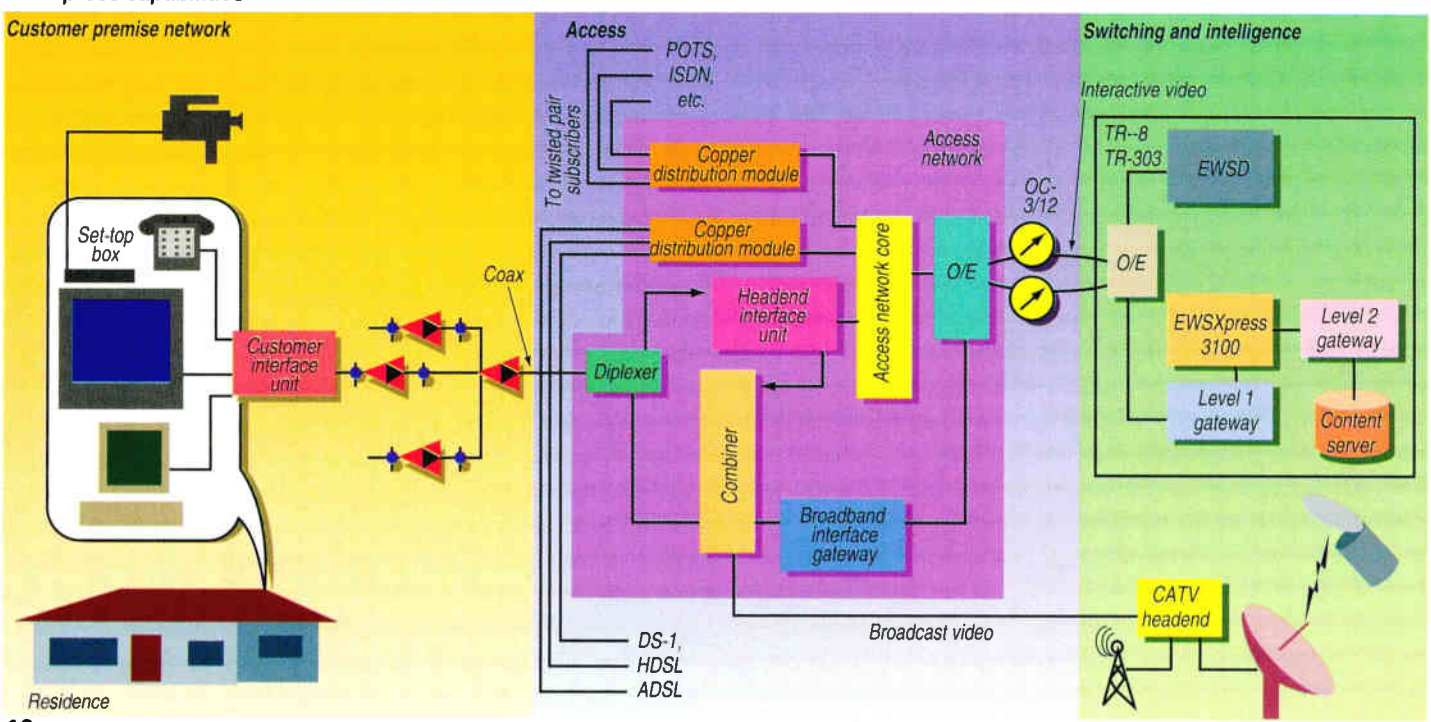
And, the software's "service group" concept means that key customer information can be maintained independently from the services each customer receives. Service groups, Crowley explained, enhance database integration because they link related information while allowing separate data input screens, specific report output, fault processing and separate billing and collections management for separate services.

The system was first installed last year in Birmingham, England, and the Western Show marked the first domestic product showing, according to CableData executives.

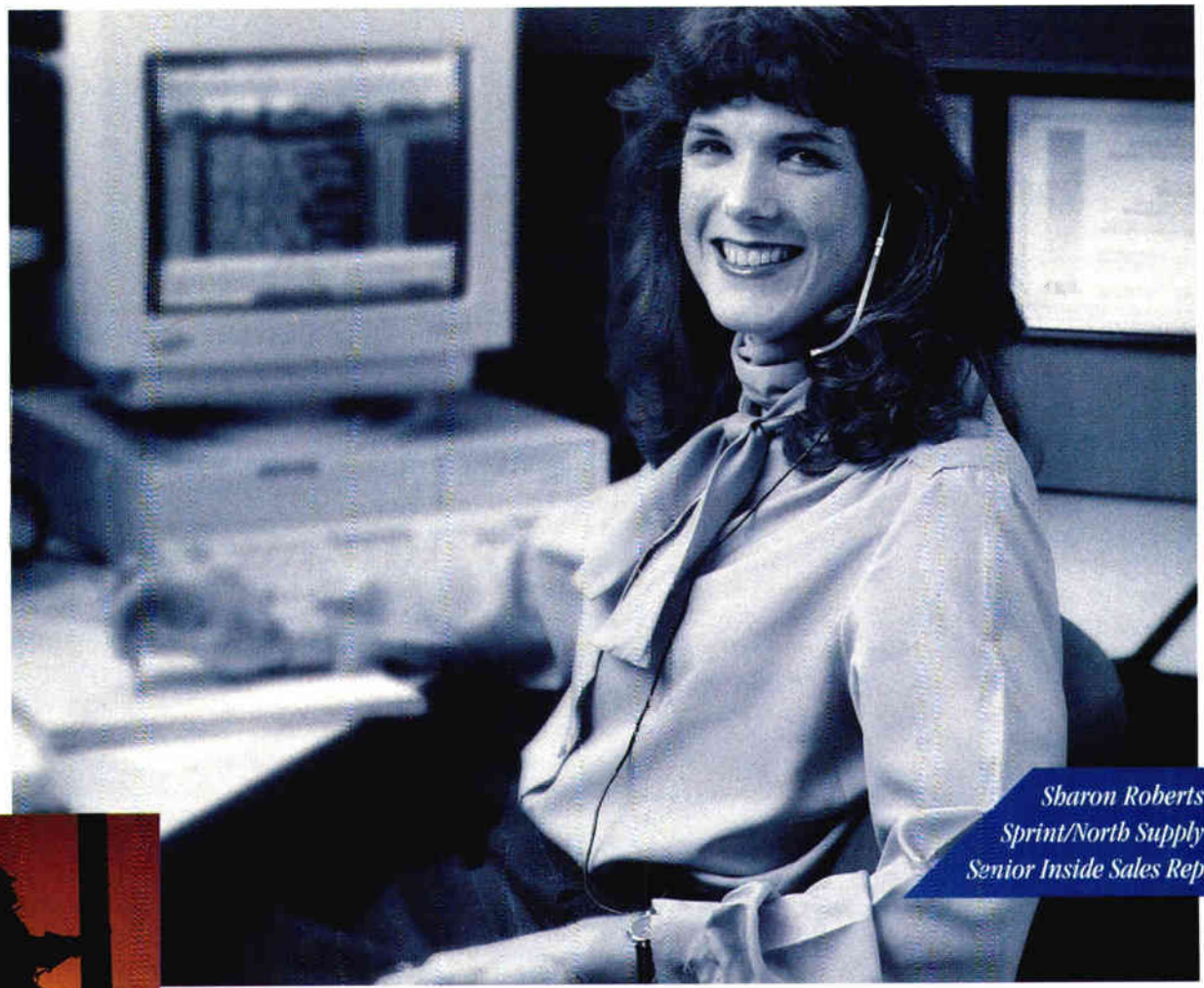
In addition, CableData formed a Convergence Technologies Group, a team of personnel focused on subscriber management and billing support solutions for cable TV, wireline/wireless voice and data services markets, and content providers.

The new Intelecable and traditional DDP/SQL products will form the backbone for

IMMXpress capabilities



Thanks To Sharon Roberts, The Chair Orders Kept Stacking Up.

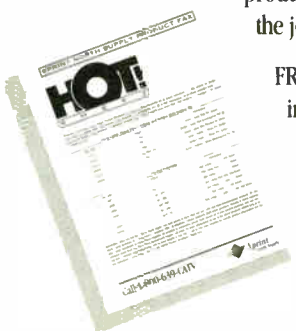


Sharon Roberts
Sprint/North Supply
Senior Inside Sales Rep

American Cablevision had a seating problem. They had to make an emergency replacement of their data lines to a national stacking chair manufacturer. But it was Saturday – and with business booming, computer downtime was out of the question. So Sharon Roberts, senior inside sales rep at Sprint/North Supply, sat down and worked out a solution.

Sharon coordinated a major weekend maneuver to deliver fiber optic cable to American Cablevision. First she contacted the Sprint/North Supply product manager, who advised her what to order. Then Sharon checked availabilities at our 10 distribution centers across the country and chose the closest one. The distribution center staff found a carrier, who delivered the cable on time for the big weekend replacement.

With the new data lines in place, the chair orders kept on coming – thanks to Sharon's stand-up performance. It's typical of the can-do approach that's an everyday thing for us. So when you need broadband product, call Sprint/North Supply, your full-line national distributor – we never sit down till the job's done right.



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the new group's efforts in the U.S. The group will consist of experts from both the cable and telecommunications industries. Bob Crowley, senior vice president, was chosen to head the new group.

FCC issues rules on alerting system

The Federal Communications Commission introduced a new digital Emergency Alert System last month to replace the antiquated analog Emergency Broadcast System. The difference between the two systems are too lengthy to adequately cover here, but major differences include the ability to turn on TVs and radios that are not currently turned on, replacement of weekly tests with monthly coordinated tests between broadcasters and cable operators, and the ability or provide warnings in languages other than English.

Cable systems will be required to purchase equipment to decode the EAS warnings. However, because cable is new to the program, operators have been given until July 1, 1997 to comply with the provisions of the new EAS rules. Broadcasters must comply by July 1, 1995.

However, the level of required cable participation was, at press time, still being debated. The industry has lobbied the FCC against providing audio and video override on every channel because of the high cost. It appears that request was granted and that small cable systems (those serving fewer than 10,000 subscribers) were given a break as well.

However, the press release that came out at press time did not address the subject. In fact, the FCC has requested additional comment on whether its waiver standards should be extended to small cable systems or not and what constitutes a "small" system.

CableWatch: one way to view outage time

Here's an ironic twist: One day a guy gets mad at his local cable system because of an outage, so he invents a product that can record how long signals are lost over a given time. He intends to sell it to other consumers as a way to keep cable systems honest. Instead, the cable system buys a few units, tests them, likes them and installs them as a way to self-monitor the system. So now, the inventor is marketing them to cable systems.

That's exactly what happened to Jim Quesnell of Los Angeles, who developed the gizmo that's now called "Cable Watch." In fact, 64 cable companies around the country have purchased to device to help them prove compliance with the FCC customer service regulations, appease angry customers and keep track of outages on a regular basis.

The device is quite simple. It consists of an electronic circuit that detects the FM signals sent out with every cable signals. When the signal is absent, the device starts counting, keeping track of how long the signal is lost. The device, which costs about $40 is available through New Era Technology of Los Angeles.

Zenith, Teledyne ally on digital encryption

Zenith Electronics will incorporate military-grade encryption technology developed by Teledyne Corp. in the digital set-top decoders it is making with Philips Consumer Electronics and Compression Labs Inc. in order to provide a higher level of security in its video stream, Zenith executives said the agreement will make its new digital boxes, dubbed "Media Access," the most secure on the market, because the encryption system uses a "totally nonlinear" process that is extremely difficult to defeat.

The biggest difference between the Teledyne/Zenith system and others is that both the decryption and conditional access portions are physically integrated into a single, non-removable chip, explained Terry Garcken, a digital design manager for Teledyne and the person largely involved with the Zenith project.

"That means there aren't any control messages that have to go to the conditional access module in the clear," Garcken said. Other systems, particularly those which use smart cards for conditional access to programming, separate the conditional access and decryption functions.

Because the MPEG-2 standard requires that the 4 byte header packet be sent in the clear, it's plausible that a clever pirate could capture an MPEG-2 stream of a "free" program and swap it with that of an encrypted program, Garcken explained. The Teledyne system addresses that concern by using bits in the header to affect the encryption that follows. Because the individual MPEG-2 packets following the header are encrypted separately and differently, there is "essentially no way of attacking it," Garcken said.

This is the first time Teledyne will put its encryption technology to use in a commercial application. Previously, its encryption technology was used in its "Identification Friend or Foe" system, which mounted on F-15 and F-16 U.S. Air Force jets to determine the status of other nearby aircraft.

The new Zenith/Teledyne ASIC (application specific integrated circuit) chip will allow network operators systemwide control over service authorization to individual set-tops, a Zenith spokesman explained. The Teledyne security cryptology is compatible with the MPEG-2 video compression standard decoder technology being developed by Philips and CLI, as well as Zenith's 16-VSB modulation format.

Jottings

In times of great change come numerous personnel changes. Over the past month, **General Instrument Corp.** appointed Larry Osterwise president of the communications division and a vice president of the entire corporation. Osterwise, a 25-year veteran of IBM Corp., was previously general manager of Production Industries Consulting and Services for Big Blue. Osterwise was tapped for his manufacturing and logistics prowess . . . Meanwhile, **Zenith Electronics Corp.** lured William Luehrs away from his executive post at Scientific-Atlanta, naming him a corporate vice president and senior VP of network systems operations. At Zenith, Luehrs will be responsible for financial performance and operations activities, including engineering, product management and manufacturing . . . **Antec** has hired Jim Faust to head Antec International. He comes to Antec from GI . . . **Southern New England Telephone** has been authorized to expand its Connecticut video dialtone trial to 150,000 homes in Hartford and Farfield counties. The trial will now include 78 analog channels, "time shifted" services and movies on demand. Digital services will be brought on line by the end of 1995. SNET has announced a $4.5 billion satewide network, due to be completed in 2009 . . . **American Lightwave Systems** (ALS) has successfully completed interoperability testing between its digital fiber optic transmission system and Zenith's 16-VSB modulation scheme. ALS officials claim that the capability of transparently transporting a digitally modulated and compressed video carrier translates to a lower start-up cost for service providers because digital modulators won't be needed at every remote hub or central office . . . **GTE mainStreet** has opened a 7,000-square-foot interactive TV center in Santa Monica, Calif. The new facility boasts the first interactive cable TV production studio . . . **Time Warner** continues its push into the telephony arena by announcing it plans to offer telephony in Manhattan, cellular service in Rochester and has petitioned the Public Utilities Commission in Ohio to offer service there. CED

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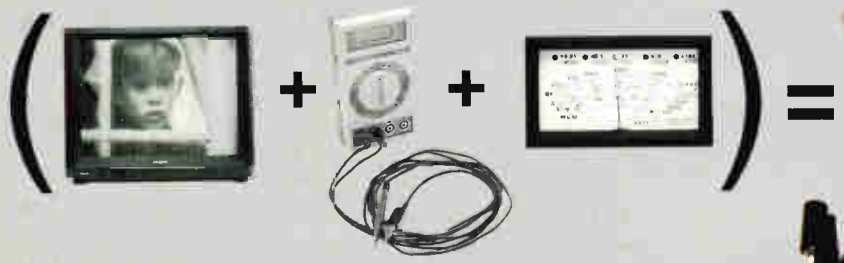

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'Evangelizing' for server solutions

Wattawa's quest

This month, CableLabs will issue an executive summary of its analysis of digital media servers–those high-capacity, fast-throughput computers that will be the linchpins in future broadband interactive networks. The findings stem from a request for information (RFI) issued last May which drew responses from 26 vendors, and were fleshed out at a media server conference held by CableLabs last September.

Scott Wattawa, a Time Warner Cable alumnus who's now CableLabs' project manager for operations software architecture, heads the project assessing server-related engineering issues. He began a recent interview by noting that dramatic cost-performance gains in both computational power and disk storage will continue at their sizzling pace "not endlessly, but well into the next decade." The significance? Projecting just "a couple of years ahead," says Wattawa, "server-based video and other interactive on-demand services are a dead ringer for a business in just about anyone's book."

How big of a server?

But offering on-demand services will mean solving many hardware and software design puzzles, Wattawa hastens to add. For example, one conclusion he drew from poring over RFI submissions was that there is no ideal server size.

✔ Uniprocessors, whose one microprocessor produces six to 10 video streams, may be appropriate in some cases, especially ramp-ups. But many boxes mean many high-speed connections to the network, and "all those network cards inside PCs can become a significant cost factor," Wattawa cautions.

✔ Symmetric multiprocessing, with eight to 10 processors producing 100 to 200 video streams, is a second viable option.

✔ Massively parallel processing, with 10 to 10,000 processors, yields disproportionately more video streams per processor–about 10,000 to 100,000 in all–but involves the risk of sinking millions of dollars into technology that may become outdated within three years, says Wattawa.

Another design issue is that the electromagnetic media being adapted from other uses are optimized for error-free delivery of bits rather than for delivering bits at a constant rate, which is what audio and video demand.

In a typical data server, "bad tracks get remapped to another place on the disk, and the heads have to hop there, which takes time. Or, if an error occurs, the controller tries to reseek, and by that time you're losing frames–you get essentially a freeze-frame...at the house."

There are two solutions, according to Wattawa. One is a RAID disk farm (redundant arrays of inexpensive disks configured so that a backup data source is always standing by). A second way out is to make sure the data is laid onto the disk in a linear fashion.

Beyond the boxes

"Better and faster boxes with more and more streams are a given," observes Wattawa. "The toughest issue is not the video streams. It's how the box plays in the network and how one makes a business of all this."

"A network has hardware and software rules," continues Wattawa. "It's harder to change the software rules." For example, the difficulties telcos have had in modifying their billing and network management software are well known. Cable companies, as they enter transaction-rich environments, may have an easier time than telcos by using the latest generation of object-oriented systems and design programming.

Wattawa expects that the near-term solutions coming from hardware and software vendors will be adaptations of existing products. But he expects them to have products optimized for on-demand video delivery within about three years.

Part of the "very savvy" strategy Wattawa sees some large MSOs pursuing as competitive access providers (CAPs) is to evolve the operational support systems (OSSs) they develop as CAPs into future consumer services. "The CAPs have very intensive OSSs," he says. "I think that it would be a mistake to build one OSS for CAP and another for residences. The idea is to swallow the pill early on." He adds: "But this idea may not work for all of our members."

"Deployment of capital and how this relates to turnover of assets and inventory is one of the big issues of convergence," he continues. "The computer industry is used to three-year capital cycles. That [means] that three years from purchase, the systems hitting the showcases can have twice the price/performance ratio. The communications industry is used to...capital cycles closer to 10 years."

The pace of change is causing MSOs to strategize like never before. An example is MPEG compression. The question becomes: what compression rate provides quality that is acceptable to the movie studios and to consumers, while minimizing an MSO's cost in disk farms? "People I've talked to think 4 Mbps is about as low as people want to go–and for fast-action sports, 9 Mbps is more acceptable, if you don't want basketballs to start turning into MPEG blocks," says Wattawa. Wattawa sees his paramount role as that of "trolling" for technology solutions and "evangelizing" to broaden the vendor base. The goal, he adds, is to maximize MSOs' vendor options and "to commoditize and consumerize the technology as quickly as possible."

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

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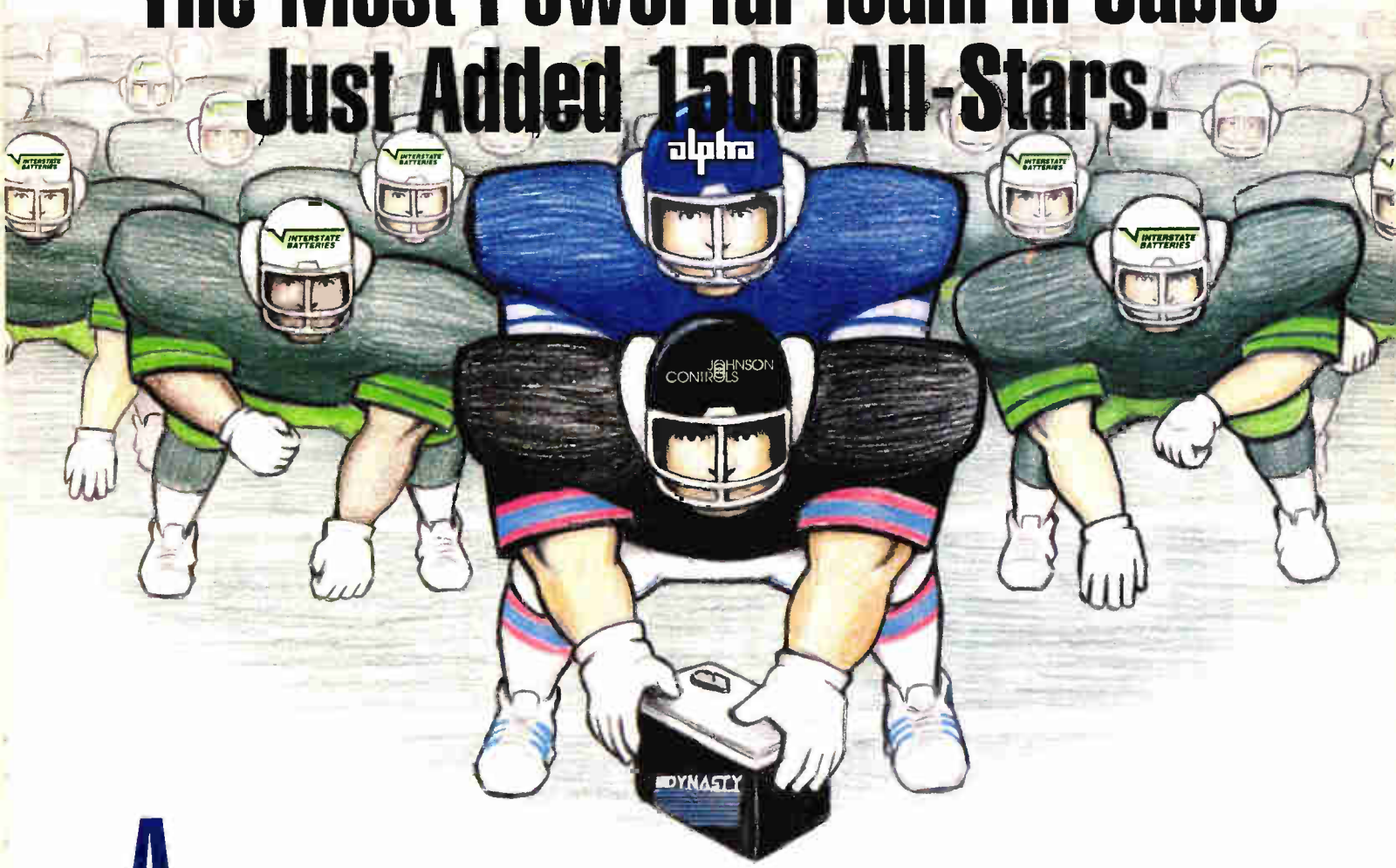

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Circle Reader Service No. 8

SCTE standards effort needs you

By Walter S. Ciciora, Ph.D.

The cable industry of just a few years ago had little need for standards. Each cable system was a world of its own, independent from the universe around it.

Signals stayed closely contained within these domains and only had to function with the equipment used locally. If the signals and procedures were incompatible with those used in the adjacent cable system, it did not matter. No one even noticed.

In addition, the cable engineer had little time and less patience for the standards-setting process. Committee meetings are boring, ponderously slow and frequently contentious for seemingly trivial reasons. When standards committees involve competitors, the proceeding slows considerably. When standards committees cross industry lines, the process becomes unbelievably slow. Committees also seem to attract a few people with personality problems. Some find this a wonderful time to be combative and obstinate, to bring some excitement into their otherwise boring little lives. For the rest of us, committees are not fun.

Even under these difficult circumstances, a few technologists from the cable industry have seen standards and standards committees as critical and have participated in an attempt to benefit the industry.

The way it is

What has changed is that standards and standards committees have taken on new importance. What has not changed is that it is still extremely difficult to get participation in the committees and support from non-technical management for those who participate.

There are several reasons why standards have become newly important. First, the costs of compression are huge and must be shared. Second, as cable systems merge and form larger clusters, standards take on a new economic value as these systems are interconnected and jointly operated. Third, as the various telecommunications industries experience "convergence," standards will become critical. Fourth, as manufacturers make equipment to be directly sold to consumers and connected to cable, that equipment must not cause interference to other cable subscribers, but be easy to use. Fifth, government regulatory agencies are pressing for standards.

The advent of digital video compression and the tremendous cost of processing video signals digitally for compression has made multiple approaches too expensive and beyond justification. Digital video compressors are $100,000-plus machines. In-home hardware needs the benefit of cost reductions coming from standardization of components. These devices employ literally millions of transistors. Only large volumes can divide the non-recurring engineering costs into small enough pieces to be affordable.

As some cable systems cooperate to do joint advertising, and others merge, standard equipment and procedures make things much easier, reduce costs and prevent technical difficulties. The convergence of industries has made standards critical for interoperability.

Government regulation has responded to pressures from those who wish to participate in cable's business. In particular, the FCC has been active in the pursuit of standards. If industry groups do not create certain standards, the FCC's staff will do so on its own.

Who sets standards for cable?

There are three cable entities with technical responsibility: CableLabs, the National Cable Television Association (NCTA) Engineering Committee, and the Society of Cable Television Engineers (SCTE). CableLabs is precluded from setting standards–the lawyers tell us–by the anti-trust laws and the special R&D consortium legislation which allows CableLabs to exist without violation of anti-trust regulation.

The NCTA Engineering Committee is primarily involved with the Washington regulatory and legislative scene. NCTA works in Joint Engineering Committee (JEC) environments to facilitate inter-industry standards, but does not create standards itself. The task of inter-industry cooperation is not very efficient.

The SCTE is the most likely organization to carry on this effort, partly because it's an individual membership organization made up of technical experts.

The SCTE has a remarkable record of accomplishment in the area of standards. SCTE efforts in standards development began in 1990. The first push was in the Interface Practices Subcommittee (IPS). During its brief history, the IPS has worked on 43 standards and recommended practices. Other committees cover the Emergency Broadcast System (EBS), maintenance practices and procedures, design and construction, and material management/inventory control.

The SCTE has applied to the American National Standards Institute (ANSI) for accreditation as an approved standards developer. Initially, this application was opposed by the Electronic Industries Association (EIA), which claimed that it should set the standards for cable! That clearly demonstrates the danger of not taking the initiative and allowing the field to be open for others. The EIA is not alone in its desire to create standards for cable. A wide variety of groups with differing agendas are striving for standards for set-tops.

The two best steps to preserving cable's right to determine its own technical standards are: 1) to ensure a strong, healthy, accredited SCTE standards process by being active in it; and 2) to participate in the other committees which are trying to set standards for cable, in order to keep them aware that there is a proper forum for these efforts at the SCTE. CED

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Circle Reader Service No 10

A trip down memory lane

By Chris Bowick, Group Vice President/Technology, Jones Intercable

Those of us who have been in the CATV industry for quite a number of years are beginning to experience déjà vu. In an effort to better understand why many of us seem to share that feeling, I thought we would take a trip down memory lane by examining some of the major technical papers that were presented at the NCTA National Conventions in 1980, 1981 and 1982.

The year 1980 was an especially big one for the proposed deployment of digital services via the CATV network. Out of 10 technical sessions presented at the show in Dallas, three were devoted entirely to data communications. Twelve technical papers were published and presented covering standards and techniques, government and commercial applications, and residential and consumer applications.[1] A paper entitled, "Cable Service: A Data Distribution Link," by Thomas Albright of Printer Terminal Communications Corp., described a concept called LADD, for Local Area Data Distribution, that would be a "viable alternative to dial up or leased phone lines for customers with multiple terminals and time fragile information." Harold Katz of Interactive Systems/3M, in his paper, "Status Report on EIA Broadband Modem Standards," described the work of EIA subcommittee TR 40.1 that was working "to develop industrial standards for data modems that would be used on broadband cable networks." At the beginning of his paper, Katz says that "interest in the distribution of data via two-way CATV cable networks has been a topic at NCTA conventions for over 10 years." Since this is now 1995, that would mean that we've been having quite a lot of discussions on the subject for well over 25 years!

And finally, as I was browsing through the technical papers from 1980, visions of the Sega Channel began to unfold. In his paper titled, "Consumer Software Services Via Cable Television Systems," Charles Dages of Jerrold described the "PlayCable" system which would "efficiently provide a large variety of entertainment, education and information services, and will provide the subscriber with a useful software service." He describes it as a video game system for which the subscriber no longer has to buy game cartridges. Instead, the video game software is downloaded to memory via the CATV system for play in the home.

In 1981, out of 10 technical sessions, only two were devoted to the subject of data communications on CATV facilities.[2] In his paper titled, "The Link Between the Computer and Television," Ralph Grabowski of VISIONtec noted that, "Much discussion has been focused recently on 'the home of the future.' Making the home interactive is a goal of cable television operators to create new markets and increase cable revenue." Claude Baggett, now with CableLabs, but then with Cox, presented a paper entitled, "Upstream Noise and Bit-Error Rate Analysis of an Operational One-Way System Converted to Two-Way Operation." He describes the Cox INDAX system that ran at 28 kbps, using the CSMA-CD protocol. It's hard to believe that in 1995, this is still an issue that we are struggling with.

In his paper titled, "High Speed PCM Data Transmission on CATV Systems," Gilles Vrignaud of Catel described the technology required to transport T-1 level (1.544 Mbps) digital signals on our systems. In his conclusion, he stated, "Interfacing T-carriers to CATV systems is a straightforward procedure, and the performance results are excellent. The inherent bandwidth capabilities of a coax network give the CATV operator a unique opportunity to transport T-carrier signals, and participate in the current communications explosion."

Another article by Thomas O'Brien Jr. of Jerrold, entitled, "A Unified Approach to Data Transmission Over CATV Networks," describes a vision that many of us are still hoping for. He states that, "Many feel that data services will compel both rural and urban cable systems to form a national communications network."

Everything old is new again

In 1982, the National Show expanded its technical sessions to 14. Of those, two were devoted to the combined transport of "video, voice and data" on our networks, with a total of eight papers presented (not including Videotex).[3] Paul Baran of Packetcable Inc., in his paper, "Packetcable: A New Interactive Cable System Technology," described "a new digital control and communications system intended to support high speed, interactive broadband computer communications on both present and future cable systems."

And if you believe that the regional hub interconnect concept is new, take a look at Ernest Tunmann's paper entitled, "Two-Way Cable TV Technologies." Mr. Tunmann, of Tele-Engineering Corp., tackled the subject of two-way architectures and their "application as the transmission media for video, voice and data in a Regional/Local Carrier Network environment."

R. P. McNamara of Jerrold wrote an excellent article entitled, "MetroNet: An Overview of a CATV Regional Data Network," in which he described "a means of providing a cost-effective data communications link to the small business and residential consumer market over currently deployed cable systems." The system he described would support "a subscriber base of at least 50,000 subscribers." Sound familiar?

As we, as an industry, continue to try and find our way in the bold "new" world of telecommunications, interactivity, and multimedia, I think it sometimes helps to review the past. It's a very humbling experience, and can help us to focus our efforts so as not to repeat history. CED

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2. Technical Papers, NCTA 30th Annual Convention, NCTA, Washington, D.C., 1981.
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Charting a course for success

TeleCable exec chosen 1994 Man of the Year

ALL PHOTOS BY KEITH LANPHER

Nick aboard Romp, the 22-foot sailboat he

Roger Brown

Even though he's a cable industry veteran of 20 years, TeleCable's Executive Vice President of Engineering Nick Worth is the model for tomorrow's cable executive. Not only does he understand technology and its role in developing new full service networks, this U.S. Navy veteran and now part-time sailor has charted a course for success by reinventing himself–and his department. The focus now is on the customer and doing things right the first time.

In this new era of competition, cable TV companies are struggling to redefine themselves as they go up against the deep-pocketed telcos. Many predict, however, the turf war will be won in the trenches, through better customer service, less costly operations and better work processes. TeleCable can take the lessons it has already learned when it refined its own internal work processes and show many MSOs how to improve themselves, before it's too late.

It is for this guidance and leadership that Nick Worth was chosen the 1994 CED Man of the Year by a jury of his peers.

While some of Worth's colleagues are performing pioneering work in digital trials, PCS experiments, telephony and/or high-speed data, Worth's focus has been on equipment reliability, improving customer contacts, the cable/consumer electronics interface and reducing outages and trouble calls. It's not the kind of work that typically makes headlines, yet it's the bedrock upon which the industry's future will be built.

By virtue of being a private company, TeleCable has never sought public attention. Instead, it has plied the waters carefully, never risking the entire company on one big bet. Now, TeleCable is on the verge of being merged into giant Tele-Communications Inc.–and the two companies apparently couldn't be more pleased despite their vastly different styles.

Being headquartered in downtown Norfolk, Va. is the perfect home for Nick. His 9th-floor office overlooks the Norfolk harbor–the perfect vantage point for a guy who just can't get the sea water out of his blood, even to this day. This 51-year-old native of Roy, Washington has successfully combined his home-spun western roots with some East Coast sophistication to develop a pragmatic view technology's role in communications networks.

Indeed, Nick's interest in the sea came at an early age. After moving to Tacoma as a teen, he was exposed to Sea Explorers, where he first learned how to sail.

built and now races.

"We had an old sailboat we'd take around, but we didn't have any formal training," Worth recalls. "We'd just bang it off docks, snag people's fishing lines and try to figure out how to get it going forward."

When he turned 16, Nick tried to get a job on a Norwegian freighter, but was told he needed seaman's papers, which he lacked. When he turned 18, Worth enlisted in the Navy, and served for four years in the Pacific Fleet during the Vietnam War era.

Upon his return to the States, Nick decided to capitalize on the electronics background he'd received while in the service, enrolling in the Capital Institute of Technology. He then went on to George Washington University, where he earned a degree in electrical engineering. In 1970, Nick hired on at Atlantic Research Corp. as a junior engineer, and was exposed to broadcast, microwave, radio and television technology.

The results of a survey on cable TV was the catalyst for Nick's entrance into the industry, however. While at Atlantic, he was "astonished" to learn that 35 percent of the households surveyed said they would be likely to buy a service that was little more than a retransmission medium. When he learned TeleCable was looking for a director of engineering, he jumped at the opportunity to work for the company, which at the time served about 100,000 subscribers.

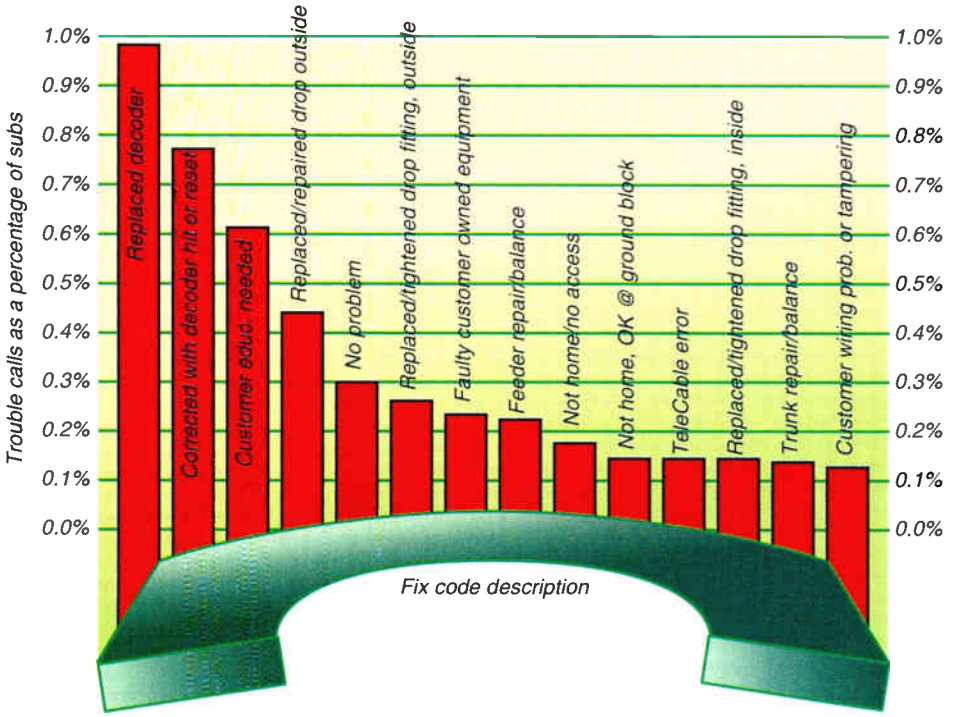
My, how things have changed

Of course, engineering in 1974 was much different than today. Nick would often go into the field, roll up his sleeves, and get into the grubby underbelly of the cable plant. He tells stories of losing signals in Roanoke Rapids, S.C. to hunters who used the cable system for target practice, exploding vacuum tube amplifiers in Auburn/Opelika, Ala. and giant spiders invading the weather scan channel. "Today, we're into things like integrating our capital budget with our competitive strategy instead of getting spiders off the weather scan," notes Nick.

With that growing sophistication came an increased need for reliable products–subject Nick has been hammering his suppliers about for years. When TeleCable adopted W. Edwards Deming's management teachings, Burke Entertainment Research was brought in to survey a sampling of customers from each of the 21 TeleCable systems monthly, then link the results together to provide significant input over a year's time. The surveys continue to this day.

The focus now is on the customer and doing things right the first time.

Figure 1: Sample TeleCable trouble call report



The results were sobering, according to Nick. Despite TeleCable's best efforts, subscribers still complained of outages, poor picture quality and waiting too long on the phone to get through to CSRs, among other things. Even though regular system testing showed strong results, the customers saw room for improvement.

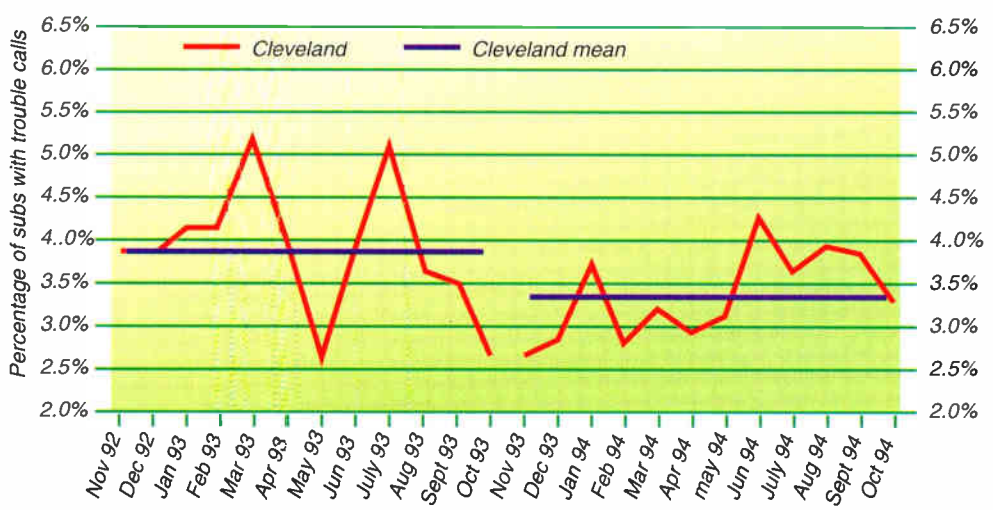
Immediately, TeleCable began a program to improve reliability and quality by installing fiber optic equipment and improving its internal work processes. "Rather than just buy our way out of the problem, we decided to actually fix it," says Worth. "For years, I labored under the depressing knowledge that we weren't building our cable systems with the right stuff," notes Nick, "with fiber, we have the right stuff." By the end of 1994, TeleCable had installed 1,000 miles of fiber, putting it in 12 of its 21 systems. Already, the perception of quality has increased among customers, Worth says.

Overall, TeleCable is shooting for the benchmark 99.99 percent availability of signal to customers, which translates to just 53 minutes of outages per year. The goal, though lofty, is in sight. "Some of our systems are already there–and they're the smaller ones with no fiber," Worth says. The others are also close.

One major impediment to achieving that level of reliability is addressable decoders (see Figure 1), which are the primary contributor of problems in TeleCable systems today. The company is heavily addressable and some of its aging set-tops aren't as reliable as the new generation boxes. But the problem doesn't stop there. Worth says all network equipment could be improved to where it's mean time before failure is reduced to 1-2 percent annualized, instead of the current 6 percent or so. "We pursuaded our supplier of line extenders to spark test their products to determine their susceptibility to surges," Nick says. "They're starting to do that, but they should have done it years ago. It's the type of thing the telephone company has done for years. We need to get to where our customers have a hard time remembering the last time their cable went out."

As a Deming disciple, Worth holds service companies like Federal Express in high regard and is constantly comparing TeleCable's performance to that level. "People pay a premium to get a package somewhere at about the same time the post office would get it there–just because they know Federal Express will *always* get it there. That's a challenge we've partially met. Then about the time we're congratulating ourselves about our picture quality, along comes DBS with sparking pictures. So, it's still a challenge."

Figure 2: Trouble call report, report period: 1 Nov. 92 to 31 Oct. 94



Change of work process

To further improve system performance and reduce trouble calls from customers, it became clear TeleCable needed to improve the way it has historically done business. In Cleveland, Tenn., trouble calls from installs took a nosedive after the company focused more on doing the job right than performing a certain number of installs per day (see Figure 2). Borrowing a chapter out of Jones Intercable, TeleCable adopted the "lifetime drop" concept, which is based on using quality parts, sealed from the weather, and taking a bit more time to test for leakage and other problems before moving on to the next job.

"We began attacking every problem we could find like that, sometimes with teams

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of people, sometimes with better technology," notes Nick. For example, a team in rural Beckley, W. Va. began calling customers before they drove out the house to make sure they'd be home when the tech arrived. "It isn't exactly rocket science, but guess what? The not-at-home trouble calls went to zero," Nick says.

Of course, not every problem goes away that easily, and some may never yield much without a huge capital investment. But simply altering the way work had always been done made a big difference in some areas. The result is a better system with higher employee control and morale, where the customer feels he's king.

But it isn't always easy to make the changes. "Having the energy to do all this when the phone is ringing, cities are making fusses and the government is throwing curveballs is really tough," Worth notes. "We can't always make changes universally, but where we can, we really see improvement."

Like the company at large, Nick decided a few years ago to reinvent himself by enrolling in night classes at William and Mary in nearby Williamsburg, Va. "I realized there were lots of things I didn't know and I became worried I might make bad decisions," he says. To correct for that deficiency, Nick decided to enter an MBA program because it offers a smattering of finance, marketing and other areas that began to overlap with the engineering function.

TeleCable is shooting for the benchmark 99.99 percent availability of signal to customers.

"These were all things I thought were peripheral to engineering," notes Worth. "I don't think it's possible if you're in top management to focus only on your functional area. If you do, you run the risk of not optimizing your overall strategy. If I were to give any advice to up-and-coming engineers, it would be to step outside your functional area, maybe take a night class. Go the extra mile and it will make you a better decisionmaker.

"It's been great because I'd take a marketing course and immediately be able to understand what our marketing group was doing and how I could work better with them. It has helped me try to figure out how to be more competitive."

Because of this attitude, Nick and the other executives at TeleCable have been wildly successful at positioning the company to participate in a competitive environment by monitoring technological innovation and implementing new technology when the business case is made for it.

For example, other companies first experimented with delivering content over satellites, but TeleCable was the first MSO to install earth stations in every one of its systems. Addressability and pay-per-view services were pioneered by others, but TeleCable is arguably the most heavily addressable MSO out there and pulls in more revenue per sub than almost everyone else. "Others have taken the arrows for us and we thank them. I guess we could be accused of hiding in the trees waiting for the battle to be over before we come out and shoot

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B ☐ **Management** (Vice Presidents, General Managers, Business and Operations Managers, New Business/Products Directors, Strategic Planners)

C ☐ **Marketing/Sales** (Marketing/Sales Vice Presidents, Directors, and Managers, Sales Reps)

D ☐ **Engineering/Technical** (Engineering Vice Presidents, Directors, Managers, Engineers, Technicians, Software Analysts, Programmers)

E ☐ **Other:** (please describe)_____

Which of the following best describes your firm's primary business activity? (check only one)

Network Providers/Customers

01A ☐ CableTelevision System
01B ☐ Cable Regional/Headquarters Offices
01C ☐ Local Exchange Telephone Company
01D ☐ Long Distance Telephone Company
01E ☐ Cellular Operator
01F ☐ PCS Operator
01G ☐ Private Radio System Operator
01H ☐ Electric/Gas Public Utility
01J ☐ Satellite Communications Provider
01K ☐ LAN/MAN/WAN End User/Customer
01L ☐ Competitive Access Provider

Computer/Communications

02A ☐ Mfg./Distributor of Computers or Related Equipment
02B ☐ Software Developer / Manufacturer / Marketer
02C ☐ Systems Integrator/ Reseller/ Service Provider
02D ☐ Computer/ Information Systems End User

Media Operations

03A ☐ Broadcast Network/ Affiliate
03B ☐ MDS/MMDS/DBS Operation
03C ☐ Broadcaster/ Cable Programmer/ Producer
03D ☐ Newspaper/ Magazine/ Book Publisher
03E ☐ Graphic Arts Firm
03F ☐ Audio Visual Producer

Multimedia/Video Game/NewMedia Companies

04A ☐ Multimedia Publisher/Producer/ Marketer
04B ☐ NewMedia Publisher/Producer/ Marketer
04C ☐ Video Game Hardware Company
04D ☐ Video Game Developer/Marketer

Others allied to the field

05 ☐ TV/ Cable Vendor/ Supplier
06 ☐ Wireline Telephone Industry Vendor/Supplier
07 ☐ Wireless Industry Vendor/Supplier
08 ☐ Computer/ Data Processing Vendor/ Supplier
09 ☐ Multimedia Vendor/ Supplier
10 ☐ R&D Lab
11 ☐ Financial Institution/ Broker/ Investor
12 ☐ Law Firm/ Lawyer
13 ☐ Advertising/ PR Agency
14 ☐ Government Official
15 ☐ Consultant
16 ☐ Other: (please describe)_____

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on behalf of GI Communications Division

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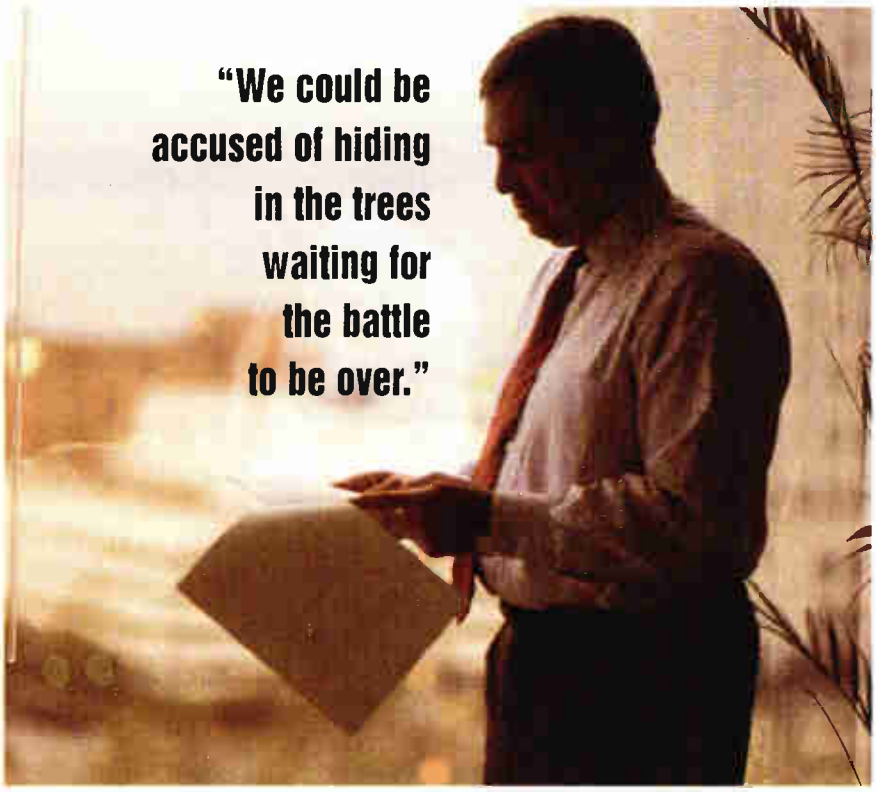
Nick Worth's contributions to Cable TV technology have been outstanding over the years.

GI General Instrument



the wounded," laughs Worth.

Ad insertion and fiber optics are other examples of how TeleCable lets others grab the headlines while it perfects the technology. "Once we saw the benefits of fiber and it had become a good, reliable technology, little old TeleCable was General Instrument's largest customer for lasers," notes Worth. "But I will forever be indebted to Dave Pangrac and Jim Chiddix (of TIme Warner Cable) for beating on suppliers of lasers to make them more linear. Those guys deserve all the recognition they've ever had."

Not surprisingly, Worth has great things to say about his peers at other MSOs, to whom he is grateful for their input over the years. "They're great folks and I've always been able to call them and compare notes or at least share some common misery."

Strong leaders

But TeleCable has put some strong leaders in place, too, which is especially important during this time of change. The company has focused on growing its leaders from within by concentrating its training on good managerial and technical skills. By hiring military veterans or people with at least an associate's degree, and then building on that knowledge with a well-rounded training program, TeleCable now has the human

Congratulations, Nick

From your team mates at **TeleCable.**
Your leadership on Continuous Improvement,
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has been an inspiration to each of us.
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"Maybe it's only humanly possible to build something and later refine it."

resources it needs to meet the future head-on, says Nick. "These guys have caught every curve ball we've ever thrown at them," boasts Worth.

That group will get a chance to test its mettle in the next few years, as TeleCable is folded into TCI and as new digital and telephony technology are brought on line. But Worth, like Patton in World War II, believes his guys, including his regional engineers and people like Charlie Kennemer and Larry Schutz, are up to the challenge.

Perhaps the most traumatic change for a TeleCable employee will be in becoming a TCI employee. But Nick says the transition may be smoother than many predict. On the surface, TeleCable and TCI couldn't be more different. TeleCable has historically focused on quality, customer service, responsiveness to cities and the customer's point of view as it sets its goals for installs, introducing of new services, etc. TCI has been blasted for not really caring about the customer, the franchising authority or anyone else as it has built its empire. Nick says that's changing, however.

"TCI has built from scratch an enormous group of properties–and it did it over about two decades," says Nick. "I'm not sure it's humanly possible to assemble a group of systems like that and achieve a Federal Express-type operational efficiency at the same time. But their approach now is different–they want to become the dependable supplier and take a more customer-focused approach.

"If TCI is as successful in customer service as it was when it put its systems together, it will be quite a force. And why wouldn't it succeed? Maybe it's only humanly possible to build something and later refine it. To all the Monday-morning quarterbacks in Washington, I say: Try building an industry from scratch in a decade and achieve perfectly smooth operations at the same time. It took the telephone industry 100 years to build its facilities."

Strange bedfellows?

Why the marriage between two companies that are seemingly so different? The power of the TCI brand name, for one. TeleCable's executives realized about a year ago that if the telephone companies were allowed to compete in video, the company needed a way to ally itself with companies like Sprint if it intended to survive. TCI, by virtue of its size, can attract the attention of the Sprints of the world. TeleCable, conversely, probably couldn't have gotten a seat at the table.

With the deal being a stock swap, Nick will come out in good financial shape. But he has yet to decide on his next step after the inevitable transition period fol-

Congratulations, Nick!

Your leadership in
fiber optic network design
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Nick Worth

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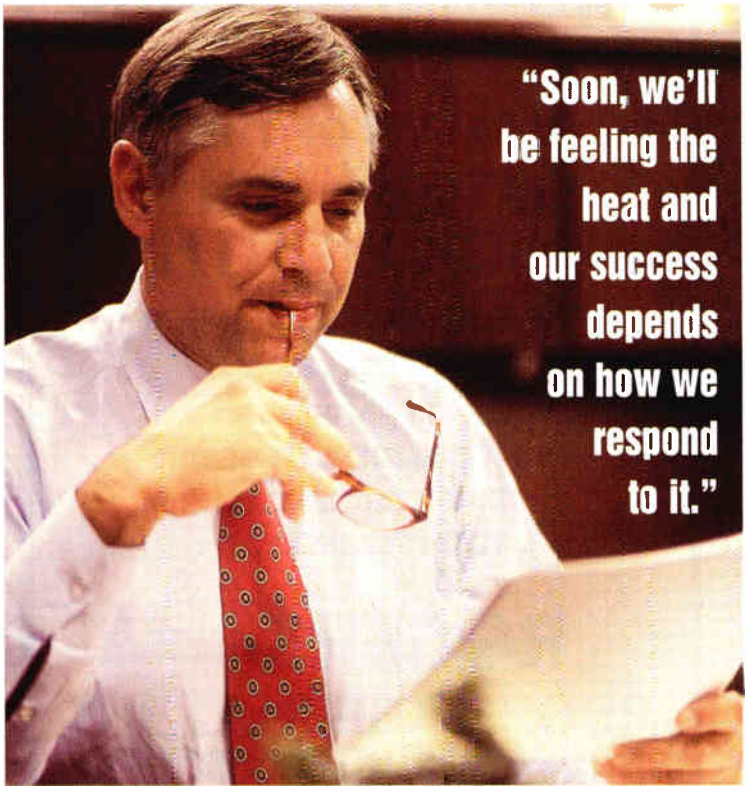

lowing the merger. "I've made no real plans beyond that," notes Nick. But this much is clear: he doesn't plan to retire and spend all his time racing Romp, the 22-foot sailboat he built and now races locally.

"As appealing as it would be to become a derelict charter skipper down in the Caribbean, I'd probably go nuts," Nick says. "I still want to do something that's intellectually stimulating. The thing that attracted me to the cable industry was that this was a great business still in its infancy . . . I'm not sure something like that is out there for me."

Whatever the future holds, Nick will probably save time to climb aboard Romp with Tina, his wife of 25 years, and race with the wind. Occasionally, their two children, Nick and Virginia, join them on the midget ocean racer on the waters off Norfolk. Virginia, 20, is a student at Old Dominion, while son Nick is attending Johnson and Wales University, where he is taking culinary courses in anticipation of entering the restaurant business.

In fact, 1994 was a fairly successful year for Nick: after some early-season disasters, he won six of the last seven races he entered and won the Friday night series at the Norfolk Yacht Club. But he learned not to get too cocky about his success–after running well in one race, a big squall came up and blew him right out of contention. "I learned never to test the sailing gods," laughs Worth.

That same lesson can be applied to the new competition the cable industry is experiencing, says Nick. MSOs need to adjust their business practices to reduce the cost of doing business and operate more efficiently to offset the rate rollback implemented by the Federal Communications Commission last year. Operators also need to keep a watchful eye on its capital investments, which require high marketshare to pay them off.

The next step

It will take a lot of hard work before cable systems become world-class providers of telecommunication services, says Nick, but if the captains of the industry adopt the proper attitude and work processes, the task can be accomplished, he notes. Just as foreign competition came in and devastated U.S. manufacturers before they reinvented themselves, competition is now threatening U.S. service companies. "Soon, we'll be feeling the heat and our success depends on how we respond to it," he notes. "I'm a little surprised that few cable firms are looking at the types of work process improvements other companies like Federal Express and Taco Bell have used. They seem to be pre-occupied with corporate strategy, not competitive strategy–and where they are formulating competitive strategies, it's from the old school. This industry's outcome will depend on how the cable companies react to competition."

But it's probably not too late. After all, remember how Nick started sailing by banging into docks and snagging fishing lines? Eventually, he learned how to get his boat away from the dock and moving in the right direction. Maybe the industry can too. CED

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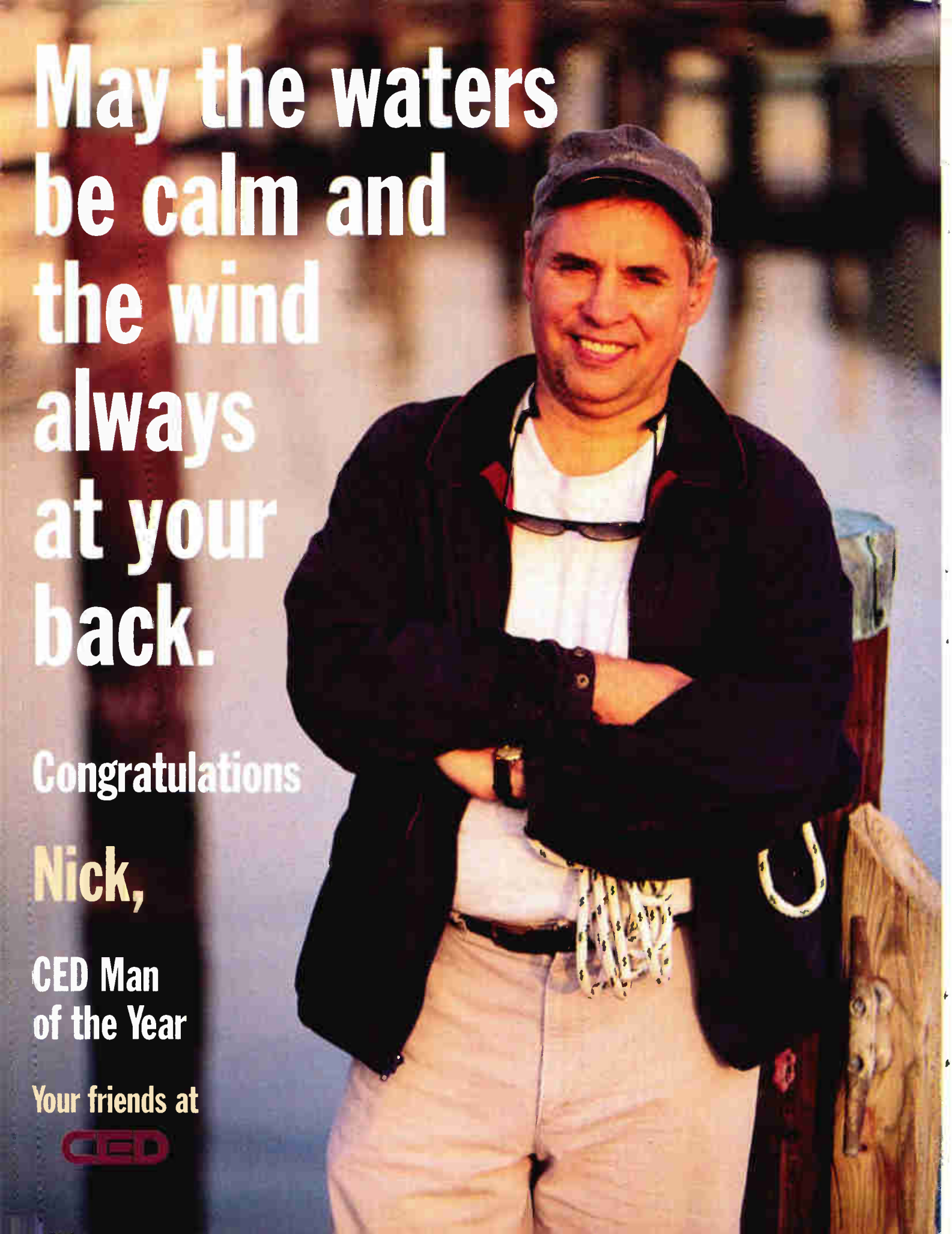
May the waters be calm and the wind always at your back.
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New products bring hype closer to reality

Breakthroughs made in several areas

By CED *staff*

It may have been huge and overwhelming, but the Western Cable Show offered up a dizzying array of new technologies designed to help cable operators evolve their networks into full-service telecommunications platforms. Along with an impressive list of new products, companies came prepared with new partnerships, alliances and agreements to field test new systems.

Outside of the impressive CableNET '94 booth, where 51 different companies were shoe-horned into 5,000 square feet and tied together on a hybrid fiber/coax network, most new products were focused on four key areas: set-tops, cable modems, telephony over coax systems and power/taps.

On the set-top front, everything from the newest generation of analog boxes, to the emerging digital units, were shown by the familiar cast of manufacturers. The new analog devices offer more features, including on-screen graphics, and, in the case of General Instrument, a built-in digital audio tuner to eliminate the need for subscribers to purchase a separate unit to listen to audio services like Music Choice.

Hewlett-Packard announced the formal name for its digital set-top, which is due to be delivered to Tele-Communications Inc. in mid-1995. Dubbed "Kayak," the new system will "inspire feelings of adventuresome exploration," said Laurie Frick, HP marketing manager, during a press conference. The company will use the Motorola 68000 microprocessor to drive the new set-top's main CPU and technology from Stanford Telecommunications Inc. for interactive applications. The Stanford Telecom QPSK Return Path Modem will enable subscribers to transmit information to infrastructure network equipment. Ultimately, there will be a family of set-tops that vary in the amount of features offered.

The number of companies announcing plans to enter the set-top box business grew by one with the addition of Mitsubishi Electric Corp. of Japan. During a meeting at the Show, Mitsubishi officials said they have completed three different alliances to make the new box a reality.

As one part of its strategy, Mitsubishi has signed an agreement with Oracle Corp. for the development and joint marketing of compatible interactive television products. In addition, the company recently became a member of the Oracle Set-Top Alliance. Under the terms of the agreement, Mitsubishi Electric will develop a line of set-tops which will work with Oracle's interactive multimedia software products. Mitsubishi's first set-tops are scheduled to be available sometime in mid-1995. In another strategic announcement, Mitsubishi has entered into a licensing agreement with Microware Systems Corp. for use of the latter's DAVID (Digital Audio/Video Interactive Decoder) interactive television system software.

Mitsubishi Electric will incorporate DAVID system software into a planned line of interactive television set-top boxes. The DAVID software provides a common operating system environment for interactive television decoders that can interface with telephone, cable television and wireless networks.

And in a third announcement, Mitsubishi has entered into a cooperative arrangement with Digital Equipment Corp. to ensure compatibility of future products for interactive multimedia applications. This relationship, according to company officials, will yield products with standard interfaces and protocols for interactive television system operators. The set-tops Mitsubishi plans to develop will be compatible with Digital's video servers.

In other set-top news, Zenith Electronics introduced its new "ScreenPlay" authoring system software, an analog, PC-based dialogue authoring tool which offers the ability to quickly generate, modify and edit on-screen displays and applications. Electronic billboards, programming menus, system promotions and other interactive uses can be downloaded to set-tops in the home directly from the headend.

Designed to work with the company's "MultiMedia 2500" set-top, Screenplay was demonstrated in Zenith's booth. The software features an easy-to-use scripting language and two color palettes–each offering 64-color combinations for custom, on-screen displays using a 255 fixed-character set.

Meanwhile, General Instrument Corp. demonstrated its base user interface for DigiCable digital decompression terminals. The DCT 1000 Series unit allowed viewers to interact with its features, including channel tuning and the ability to call up an electronic program guide.

Because the DCT 1000 set-tops support downloadable applications, operators will be able to deploy an assortment of advanced user interfaces customized to their service markets. GI also displayed models that support the international PAL and SECAM formats.

General Instrument also unveiled its latest generation of addressable terminals, the CFT-2200 family, announced in August. The terminals build on GI's earlier series analog and addressable set-tops and offer on-screen displays, messaging, enhanced graphics, feature downloadability, virtual data channels, an NVOD ordering system, two-way communications, renewable security via a "smart" card and upgradability to digital audio, digital video compression and multimedia.

The basic unit contains expanded memory for up to 40 pages of messages and barkers and contains multiple language character sets for international viewers. Based on a Motorola 68000 processor, the boxes support both ROM-coded user features and applications downloaded to them.

A feature expansion module facilitates delivery of "virtual data channels" for sending sports stats, stock quotes, weather or other text-based information.

Computing over cable TV

Real competition appears to be coming to the cable modem marketplace as well. Hewlett-Packard said it will leverage its expertise in computing to bring an end-to-end cable modem system to market, said Webb McKinney, GM of the company's home products division. Details regarding product roll-out, performance and price were unavailable, but when questioned, McKinney said HP will "be to market before the market takes off with a better product" than those offered by present manufacturers. The company's market research "shows a strong demand for high-speed on-line services," which cable networks can support, said McKinney.

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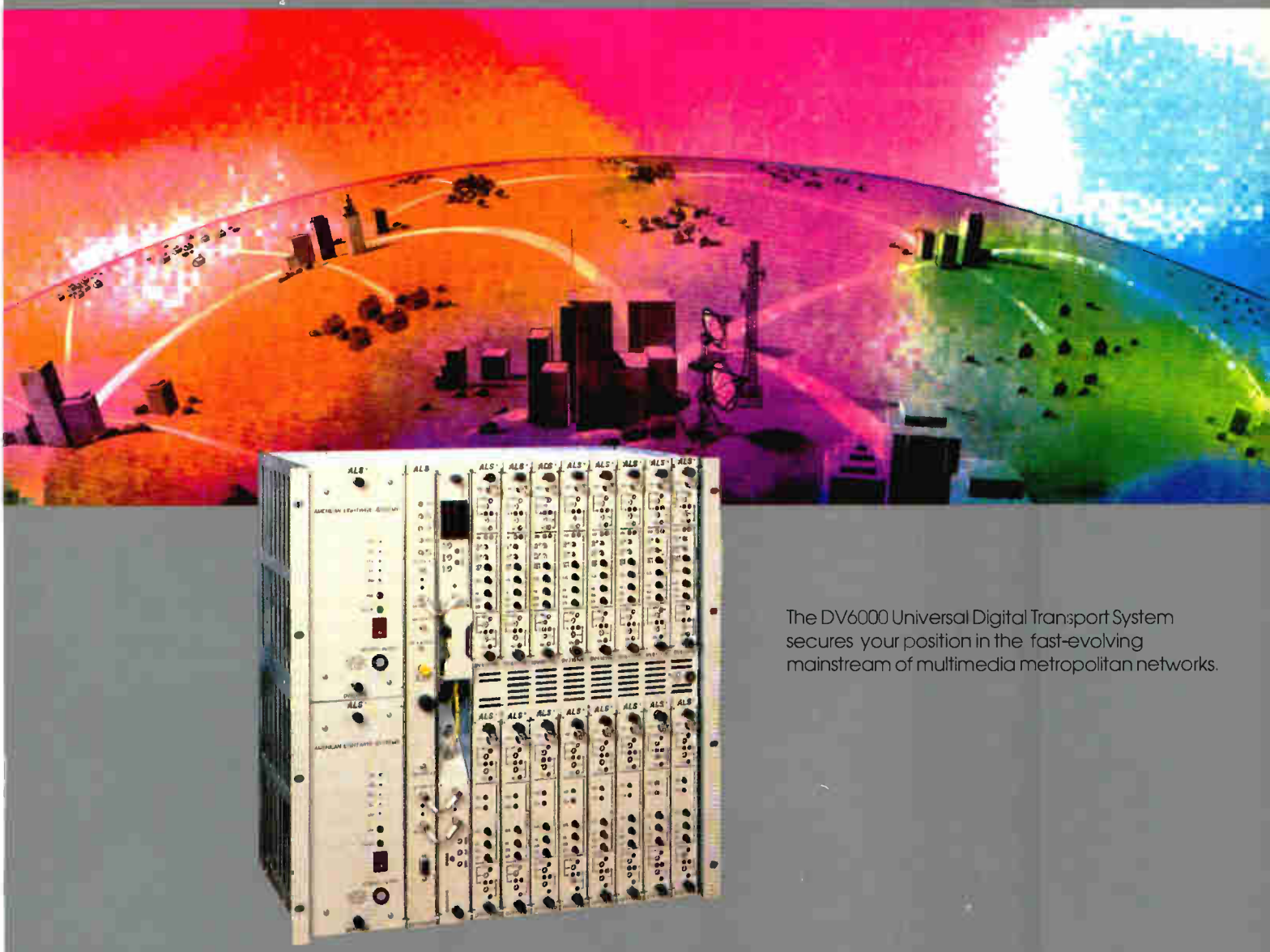

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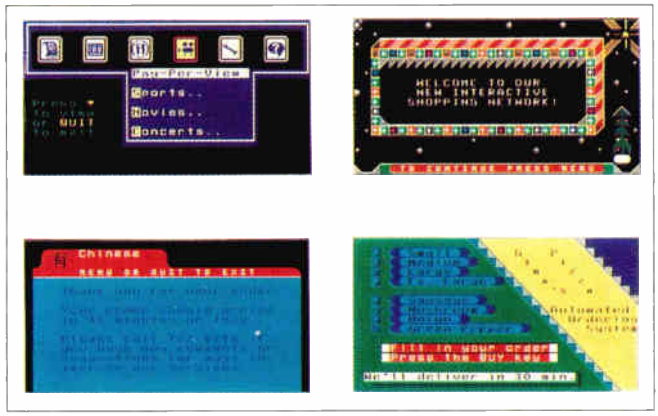


ScreenPlay, from Zenith Electronics Corp.

Other companies that either demonstrated or announced intentions to build modems include General Instrument, LANcity, Intel and Zenith, among others.

LANcity Corp. unveiled the LANcity Bridge (LCB), capable of transmitting standard computer data over standard cable TV networks for extremely long distances. The LCB provides citywide data communications between Ethernet subnets as far as 160 miles–more than twice the distance of the company's original 1993 offering. The LCB can use any of 83 available, standard 6 MHz channels over a receive frequency range of 54-550 MHz, and a transmit frequency range of 10-174 MHz, to coexist with a variety of other services currently running on the cable television network.

For its part, Zenith Electronics Corp. previewed a new high-speed cable modem that will deliver universal computer compatibility that was "previously unavailable in cable systems," according to company officials.

The new modem will take advantage of industry-standard Ethernet card technology and is fully compatible with Zenith's "MetroAccess" family of data communications solutions. The cardless cable modem delivers high-speed (4 Mbps or 500 kbps) data capability to PC users via standard Ethernet, which means that no special card has to be installed in the PC. Thus, the modem will allow connectivity with Apple Macintosh computers and laptops, as well as IBM-compatible PCs.

"The new modem will work with, not in place of, our other products (including HomeWorks, HomeWorks Elite and ChannelMizer)," said Dean DeBiase, senior vice president, sales and marketing, Zenith Network Systems. "Cable operators and computer users now have a wide range of options, crucial in such a quickly developing industry."

Employees of Rogers Cablesystems Ltd. and IBM Canada who live within the MSO's Newmarket, Ontario system will participate in a trial of work-at-home technology called "cableLink-work," a high-speed data link between employee homes and the respective corporate offices.

Participants will be able to use their home PCs to send high quality graphics and animation clips, as well as share documents and other on-line applications. The trial will begin in January and last six months.

Twenty IBM employees will be involved in the test, which will link home PCs via a cable modem to "all existing IBM computer technology available," which includes "previously inaccessible" services like application sharing and interactive multimedia services. A few Rogers employees will also sample telecommuting, and will access the MSO's customer database and multimedia-based on-line applications including the Internet, CompuServe and America Online.

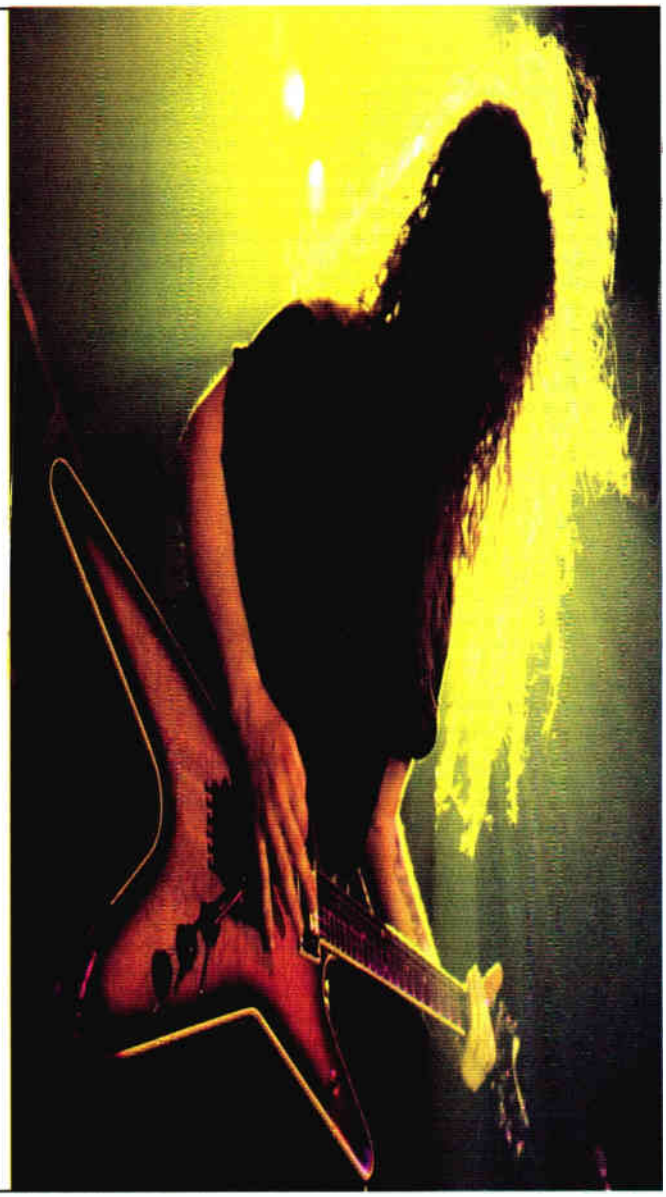
Digital Equipment Corp. has introduced the ChannelWorks Internet Brouter, which allows businesses high-speed access to the Internet over standard cable television systems. Based on the ChannelWorks bridge, which delivers 10 Mbps Ethernet connectivity, the new brouter provides access and routing at speeds several times greater than leased T-1 lines.

Applications of the technology are already being tested, according to officials from Digital. The National Science Foundation is funding a collaboration between schools in Pittsburgh, to which Digital and TCI serve as affiliates.

The brouter routes data transmissions over cable channels using one 6-MHz channel each for upstream and downstream communication. These data communications run alongside the video, and multiple customers can use the network without worrying about information security. Users install a brouter in each LAN site, the cable operator installs a TransMaster translator in the headend, and then contracts with an Internet service provider to get the system up and running.

Telephony over cable TV

NewChannels Corp. will trial telephone-over-cable services within its Greater Syracuse, N.Y. system, and will use Tellabs Operations Inc.'s "Cablespan 2300" gear, unveiled at the National Show last May, to do it. The phased tests will start next month and



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continue until early next summer.

In the first, technical phase, 30 employees from NewChannels and affiliated subsidiaries will test the Tellabs gear within the MSO's internal communications network. The second phase of the trial will gauge customer acceptance of various telecommunications services deliverable over hybrid fiber/coax (HFC) networks, such as business-to-business, residence-to-residence and business-to-residence cable phone connections. Other parts of the trial will offer videoconferencing, database access, wide area networking and telecommuting. Mostly, however, Tellabs and NewChannels want to verify operation of the Cablespan gear in both cable and telephone networks, and will pay close attention to the handling of the upstream (home to headend) voice channel.

In other telephony technology news, West End Systems Corp., an affiliate of Newbridge Networks Corp., launched the WestBound 9600 Broadband Access Platform in North America. The WestBound 9600 Platform provides residential and business subscribers with access to voice, video and data services over an integrated HFC network architecture.

The platform uses an Orthogonal Frequency Division Multiplexing modulation scheme and advanced digital signal processing to achieve bandwidth efficiency, security of communications and resistance to ingress. Up to 60 64-Kbps channels can be delivered in blocks of 1 MHz, allowing network operators to deploy voice and data services incrementally as demand warrants.

As promised at last year's show, Northern Telecom unveiled its "Cornerstone" line of broadband products, designed to support digital voice, video and data over hybrid fiber/coax and switched digital networks.

The new line was developed to offer operators a flexible, cost-effective and revolutionary way to provide new services, including plain old telephone service (POTS) and advanced services like wireless telephony, broadcast video, data, videoconferencing and ATM-based broadband multimedia services.

The company is also developing a network interface unit that attaches to the side of the home and serves as a demarcation point between the home and the plant.

According to Stephen Fleming, associate VP of global marketing for Northern Telecom, the system will accommodate any mix of services, level of bandwidth, modulation method, depth of fiber deployment and type of drop.

Telephony promises to have an effect on the way MSOs build their plants. Historically, cable operators have been chastised for not providing reliable networks. To combat that perception, Cox Cable Communications detailed its comprehensive "ring-in-ring" optical network design, developed to improve signal reliability from 99.99 percent, or 53 total outage minutes per year, to roughly 5.3 outage minutes per year–an order of magnitude better than existing specifications.

The design is already affecting five Cox upgrades, including its Hampton Roads, Va.; San Diego, Santa Barbara, Calif.; Oklahoma City, Okla.; and Omaha, Neb. systems, said Alex Best, senior vice president of engineering for Cox. By 1998, an estimated two-thirds of Cox's cable systems will use the unique design, which provides two diverse paths for video, data and telephony traffic.

"We think this design will set a new standard for fiber architectures going forward," said Best, who explained that the design was developed by Cox engineers who have both cable and telco network topology backgrounds to provide reliability, flexibility and the capability to handle voice, video and data services.

With the new design, Cox will actually build two rings. One dedicated ring will have fibers originating at the headend and run to each individual subscriber node over diverse routes, terminating at the headend, like a home-run. The second ring also starts at the headend and rides on the dedicated ring, but does not terminate at the nodes. Instead, the fibers in the second ring pass through each node around the dedicated ring, and continue from one node to the next around the ring, ending back at the headend.

Building upon the reliability theme, Standard Communications introduced its Stratum Series of modulators that provides 80 channels in just six feet of rack space along with complete redundancy, all for about $1,500 per channel.

The secret is the frequency agile modulator. Standard houses eight modulators together in an "intelligent" backplace, or chassis. Each chassis can accept any modulator and any modulator can be configured as a hot standby in case of failure. Redundant power supplies are offered in each chassis–and multiple chassis can be daisy-chained to make a complete, self-healing cable system. If a failure is detected, the backplane automatically routes all signals from the faulty modulator to the back-up unit.

Teltone has announced plans for several

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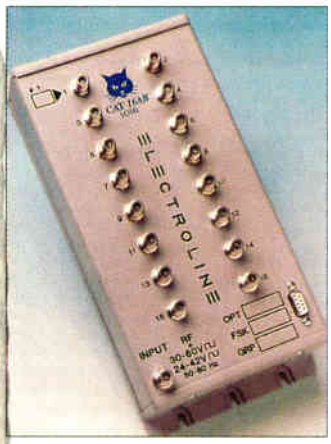


Electroline's "CAT"

new additions to the CableLink product line. Installed in the cable TV (or power utility) customer's home, CableLink analyzes dialed digits and routes calls either to the local exchange carrier or to the cable network (for connection to a long distance carrier). The customer can receive calls from either network and retains all normal phone use.

The product is compatible with all residential telecommunications equipment, including fax machines, modems, etc. In addition, it's transparent to enhanced services such as Caller ID and Distinctive Ringing. CableLink will soon be available in a rugged housing suitable for mounting outdoors.

Cipher is a Microsoft Windows-based software application used for streamlined programming of CableLink and other Teltone products. It's especially suited for applications where large numbers of units are deployed, typically at multiple locations.

Finally, a multiple line version of CableLink is planned for development in 1995. KeyLink will be an alternative access router adjunct to business phone systems, based on CableLink's intelligent call routing capability.

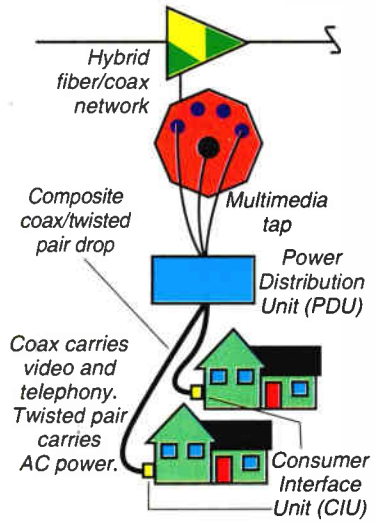
High-tech taps coming on line

Manufacturers including Electroline, Scientific-Atlanta, Antec and Philips Broadband used the Western Show to tout what used to be at best an overlooked part of plant construction: taps.

What makes the new taps different is the fact that they extract and/or pass power signals, important as operators consider passing lifeline telephone signals over existing plant. Typically, cable systems do not pass power beyond the drop–but will need to in order to keep future telephone services up, even when the power is down.

Electroline's approach, called the "Telephony-plus-video SuperTap," and developed with assistance from ADC Telecommunications, sends 60 volts of alternating current as well as 1 GHz worth of RF signals through the tap and down a standard,

Scientific-Atlanta's power-passing taps



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coaxial cable drop.

Scientific-Atlanta's new "Multimedia Taps," displayed for the first time at the Show, include an A/C port to which operators can connect a power distribution unit (PDU), which provides a twisted pair interface to the box on the side of the home and includes current limiting and surge protection features. Up to eight homes can run off of one PDU, S-A officials said.

The multimedia taps deliver A/C power from the cable system to a curb-side optical network unit (ONU), which typically serves about 20 homes. Copper wires carry the telephony signal the last few hundred feet to the home, without the need for PDUs, S-A executives said in a statement.

Antec's solution, aptly named "PowerTap," also integrates coaxial and twisted pair cable, and works by extracting power from the tap, then directing it down the twisted pair cable to the home. RF signals are sent along the coaxial portion of the configuration.

Outside of the above major themes, there were numerous other announcements made by multitudes of companies. Highlights included the following:

Headend equipment

Calling it "the next chapter in the remaking of Antec," Steve Necessary, president of Antec's Products Group, introduced the Imagess Headend Product Line. The products feature modular broadband satellite receivers, demodulators, channel processors, stereo encoders and modulators used to position the cable network for digital transmission, as well as a video file server platform via a regional interconnect architecture.

Antec has also developed a new 750-MHz Laser Link Low Power fiber laser to provide operators with a cost-effective method of dedicating a single laser to individual network nodes. At a minimum, the low power device will deliver 50 dB carrier-to-noise, 65 dB composite triple beat and 61 dB composite second order over a 5 dB optical path. According to company executives, most cable operators split high-power lasers 2.8 times on average, meaning that 1,400 homes will contend for the same bandwidth a single laser delivers. A low-power laser, however, can deliver the full bandwidth to a single node.

Dumbauld And Associates announced the release of D&ACAD version 3.0, effective February 1995. The product is an AUTOCAD enhancement package that has been designed to assist in drafting CATV maps. The company's drafting tools allow the user to Smart Edit drawing files. Automated layering and prompting for location numbers, house counts and footage are also provided in the package.

EDS and IT Network announced and demonstrated a deployable video-on-demand solution for cable operators. The offering is the first product of the two companies' strategic alliance.

Consolidating the video file server technology of EDS, Interactive Channel programming and technology already available in a Sammons Communications trial in Denton, Texas, "this is the interactive television field's first combination of a commercially launched video file server with a proven interactive network," according to a statement by EDS.

Grass Valley debuted its J Series multichannel DS-3 codec based on JPEG compression to transmit video, audio or data. The new unit features full-motion and full-color resolution and CD quality audio to allow operators to

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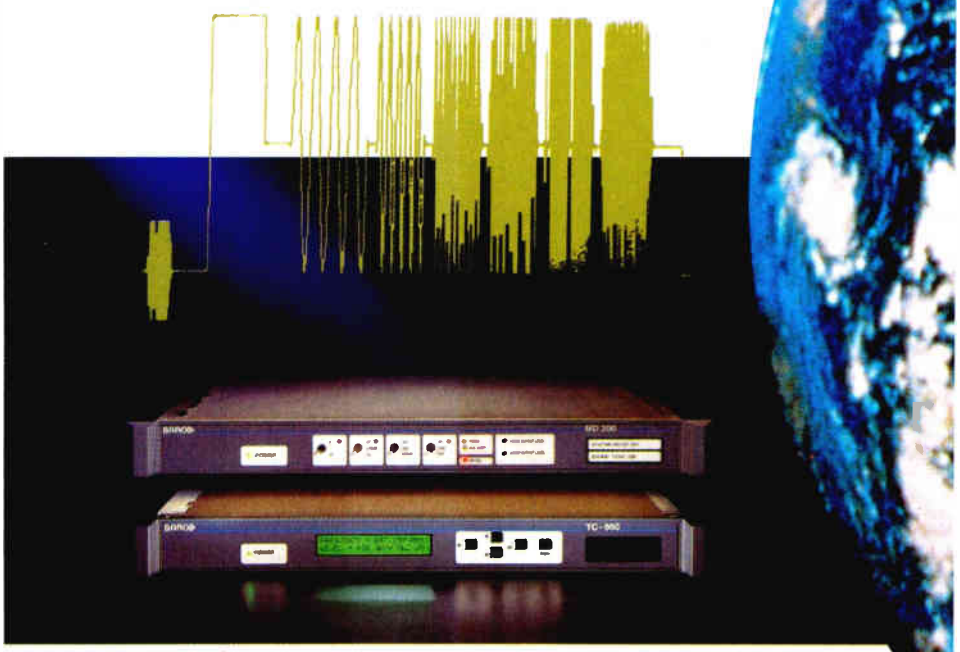

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With a single channel at DS-3 speeds, the J Series offers Beta SP video tape machine quality; with two channels, quality is ideal for video trunking; with three and four channels, quality is good enough for videoconferencing and distance learning applications, according to company officials. The unit is also provisioned with two DS-1 channels for data transmission. Up to four channels of video and four channels of audio per video channel are provided in each module, and up to 10 modules can be configured in a single six-rack unit chassis. The modules are based around a single main add/drop board. Deliveries will begin in April 1995, according to officials.

Cable network operators faced with the daunting challenge of developing operational and business support systems for transactional video and telephony services are the target of a new software product from GTE Network Management Organization. The ISM 2000 system is being offered via four staged releases which will be completed by the middle of 1995, according to GTE executives. The new software system provides configuration, fault and performance management and security.

In response to the recently-issued Emergency Alerting rules from the Federal Communications Commission, Mega Hertz Inc. said it has developed a new audio/video alert system specifically for cable operators.

The "sub alert" system is designed to interrupt the IF loop of modulators and processors in multichannel broadband networks and allows the user to select the individual channels which will be over-ridden with emergency information with both audible and visual messages.

The FCC hasn't clarified the scope of cable's participation in the new emergency alerting system, but operators will likely be required to provide an all-channel audio over-ride and single channel video over-ride during times of emergency warnings.

Also, Information Age Systems has developed a system in response to the ruling. The three-component system consists of digital encoders and decoders manufactured by TFT; a central communication system developed by IAS that provides a short audio alert to all channels; and a more comprehensive system for video alerting all channels (for systems with more than 10,000 subscribers), manufactured by Video International.

New from Philips Broadband Networks is its "Net-Prophet" network monitoring and control system, designed to provide cable operators with basic and advanced network administration and security for optical and RF devices.

Through a previously announced joint development effort between Philips and AM Communications, Net-Prophet includes a personal computer system with IBM-compatible software, an interface unit located at the headend and network monitoring/control devices located in "strategic parts" of a broadband network. The monitors poll headend, fiber optic and RF network components.

The system provides automated FCC proof-of-performance tests, fault management functions, performance monitoring, remote control of network devices, a menu-driven interface and a "topologer," which graphically depicts the network topology.

Mega Hertz has developed an IF demodulator/modulator to be used in conjunction with the INR, CF, HQ and Vector baseband processing systems. The new unit allows cable operators to demodulate the IF signal of a processor to baseband for external processing, and then remodulate it back to IF for re-insertion into the processor's IF loop. When used independently, the demodulator/modulator can eliminate electrical impulse noise, co-channel interference or ghosting in headends, according to company officials.

Monroe Electronics has introduced its new Model 631 Program Timer Jr., designed to handle single-channel switching for syndicated exclusivity (Syndex), non-duplication or program sharing requirements, at a single channel price.

Designed for ease of use, operators can program the device with time of day, programming or individual days or an entire weekly schedule "with only five keystrokes," Monroe officials said.

Pioneer New Media Technologies has developed a high-speed, high-capacity WORM (Write Once, Read Many) digital videodisc system suitable for video archival and server applications. The system is MPEG-2 based, with the capability of conforming to General Instrument's DigiCipher II and other video compression formats. The recording process facilitates up to 20 gigabytes of data on a single disc (or more than two hours of video at 20 Mbps on a two-sided disc).

The Public Broadcasting Service has announced it will develop a video server system based on the technology that will be integrated into the Smart School system. The PBS server will consist of six dual-headed WORM disc drives and storage for up to 500 discs. Retrieval, loading and unloading will be performed by a robotics system.

General Instrument was demonstrating the

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concept for its ITEM 1000 (Integrated Transport Encryption Microprocessor, which will ultimately sit between video servers and broadband networks to provide an interface between digital servers and DigiCipher II settops. The device will essentially encase MPEG-2 video streams around DigiCipher access control and encryption before sending them out over a 6-MHz channel.

The R.L. Drake Co. unveiled its new passive combiner, a headend device which combines the outputs of up to 16 audio/video modulators or channel processors onto a single, coaxial cable. Called the PC16, the combiner can also be adapted for larger output capacities by daisy-chaining the outputs of additional PC16 units. The device can also be used with Drake's AC16 active combiner, due out early next year.

Together, Drake officials said, the two units can be used for system configurations that require combining up to 77 different channels.

Also new from Drake: a compact integrated receiver descrambler (IRD), designed to save rack space while still incorporating the VideoCipher RS commercial module. A removable front panel allows easy access to the VideoCipher module without having to remove the IRD from the rack.

Standard Communications Corp. has completed development of its newest frequency

Standard Communications' ICM470

agile, CATV broadcast quality, television modulator system. The TVM550/550S series TV modulator is frequency agile to 550 MHz and compatible in a range of system applications.

The TVM 550 series is designed to eliminate expensive and less reliable switching bandpass filter networks, while still matching or exceeding the RF performance of a fixed channel system. With six levels of filtering, coupled with stable phase-locked RF circuitry, the TVM550 offers out-of-band noise and spurious-free performance previously available only with fixed frequency modulators.

Also new from Standard is the ICM470, an adjacent channel, VSB AM modulator designed for use in all PAL video systems. The modulator's RF output, which is microprocessor PLL controlled, is frequency agile from 50 to 470 MHz. The module's PLL synthesized tuning provides stable RF output frequencies that are virtually spurious-free.

In addition, Standard Communications has introduced a new generation satellite receiver designed for global SNG, special network and cable television systems. The MT900 Intercontinental receiver features a synthesized PLL tuning circuit with digitally locked continuous tuning AFC and microprocessor control. The unit can be used for rebroadcast in any area of the world from almost any satellite format, company officials said.

Also new from Standard is its Continental MT620 satellite receiver, designed for the international marketplace because it works with multiple television standards and "almost any satellite." The new receiver is an outgrowth of the company's Intercontinental satellite receiver, but fits into a one rack high design. And the new Agile Omni Global VU series satellite receiver, which meets both RS-250C and CCIR567 standards and operates between DOMSAT, INTELSAT and regional satellites, made its debut. It features manual, automatic or computer remote control of C/Ku-band transponder settings, company officials said, and "eliminates the need for several, special types of receivers within the same installation." It demodulates NTSC, PAL/SECAM and most MAC transmissions.

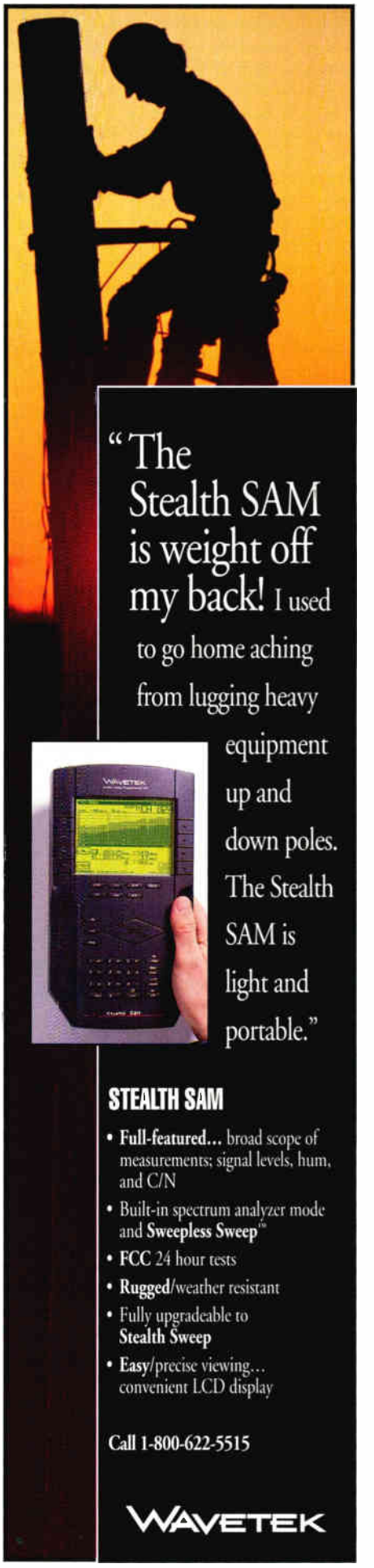
New from Storage Concepts is a "real-time" storage solution for video-on-demand, interactive television and "other bandwidth on demand environments," called the Concept 910-SW. The system delivers up to 150 simultaneous video streams at rates over 300 Mbps, and stores up to 500 Gigabytes of information–translating to 220 digitized and compressed films, or 330 hours of programming.

Superior Electronics introduced two new status monitoring products to its Cheetah system, including a new headend communications controller and a transponder. The 486-based controller provides high-speed polling of transponders, line monitors and headend equipment, while the new transponder is designed to be compatible with all major manufacturers of power supplies, fiber optic receivers and amplifiers.

New from TV/Com International is a variable rate QPSK modulator pair, a component in the company's "Compression Networks" digital compression, control and communications system that delivers digital services over satellite and cable systems.

The new mod/demod carries multiplexed data at rates of up to 90 Mbps, which TV/Com executives call a "new benchmark" in expectations for consumer/commercial satellite capacity.

The variable rate feature of QPSK modulation allows for forward error correction and



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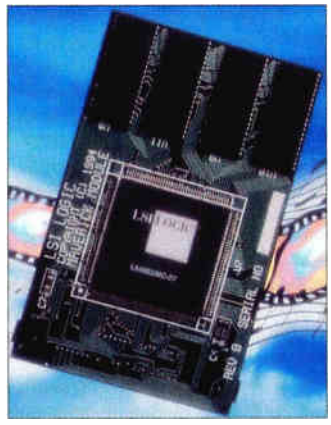
filter characteristic adjustments to the transmitter and receiver in real time, meaning that users can add or subtract channels and adjust bandwidth on the fly, with no downtime or switcher costs.

Subscriber equipment

ABC Cable Products Inc. previewed its new line of 2-in-1 Universal remotes, as well as other CATV products. The new ProMotes are designed to operate all popular cable convertors, as well as the TV. Music Choice and Digital Music Express are available as an option. In addition, ABC Cable showed a new Jerrold "On Screen Display" remote control unit, plus its current line of enhanced OEM compatible units, and demonstrated its optical transmitters and receivers.

LSI Logic showcased its integrated, audio/video MPEG-2 decoding chip, which it describes as an "industry first." The device is used within digital set-top boxes and works by receiving simultaneous audio and video signals in a compressed, digital format, then decompressing them and converting them back into analog signals for television viewing.



LSI Logic's MPEG-2 chip

The chip integrates an MPEG-2 video decoder, an audio decoder, a RISC set for stream processing, a programmable graphics controller and an audio/video synchronization chip, company officials said.

Triple Crown Electronics showed the "Omniview" (two-way cable) and "Phoneview" (telephone return) versions of the interactive system designed for use by hotels. In addition to express checkout and pay-TV, the system supports advanced interactive functions like video-on-demand and access to digital services like video games and CD-i.

Pioneer New Media Technologies Inc. demonstrated addressable terminals and digital-based products for the cable industry.

Products on display included: the BA-V1000 Command Station, featuring near video-on-demand functions, as well as on-screen display; a 16 VSB modulator and a single MPEG-2 video decoder chip; a digital LD player, with four independent heads and both analog and digital output; the BA-9615C, part of the BA-9000 series with audio masking, RF bypass and VCR controller; and the M7 controller.

Power

Alpha Technologies introduced a new, 90VAC version of its XM Series uninterruptible power supply. The XM9012 will address end-of-line voltage loss problems associated with some contemporary cable systems. Increasing the powering voltage will lengthen the necessary distance between power supplies, allowing an extended power range and the increased transmission capacity needed for full-service architectures.

According to officials at Alpha, this would be an advantage in suburban locations where low subscriber densities and longer runs are the norm. In addition, the reduced number of necessary power supplies could help alleviate some of the pressure generated by municipal and state regulations limiting the amount of visible hardware intrusion.

Alpha Technologies also unveiled its newest non-standby power supply at the Western Cable Show. This new supply has been developed specifically for extreme environments and consists of a sealed assembly based on single-ferro designs. Available in 8- and 14-amp versions, it can be used in subterranean locations with high dust, moisture or gas concentrations, or where flooding is a concern, according to Alpha company executives. Several mounting configurations can be supported, including strand-, pole-, rack- and shelf-mount versions.

Finally, Alpha Technologies and Johnson Controls have teamed with Interstate Battery System of America to launch "Alpha Advantage," a program that blends battery design, manufacture, delivery, recycling, ordering and service support.

In the deal, Interstate will improve Alpha's existing customer service effort by adding 1,500 delivery vehicles and a comprehensive battery recycling program. "With Interstate as part of our team, we'll be able to give our customers comprehensive solutions to their powering needs," explained Larry Roper, cable television market manager for Alpha.

Lectro announced a 48 VDC version of its ZTT/UPS power supply. The 24-, 36- and 48-volt DC units are available in 6-, 9-, 12- and 15-amp models, provide a regulated 60 Hz output and are status monitoring capable.

Power Guard debuted its Unity Wave power system, designed to accommodate problems of

power factor, multiple power locations, corrosion and effective reach, company officials said. The product allows operators to send power to the home or business, in typical node configurations serving 500 homes, with a single power supply, according to company officials.

Distribution and fiber optic gear

New from ADC Telecommunications Inc. is a line of high performance, video signal distribution products designed to support the deployment of hybrid fiber/coax networks. Products in the line include the SC2008 and SC1016 video splitter/combiner panels, the VJ2001 video jacks and panels, and the Analog Video Interface System.

Although the products were designed for implementation with the Homeworx loop access platform, they can be used universally in any hybrid fiber/coax architecture. They fit into the network at the headend, central office or any distribution node and are expected to be used domestically and internationally by cable television companies and by telephone companies offering video services.

The SC2008 and SC1016 video splitter/combiner panels provide passive splitting and combining of video signals and are equipped with eight or 16 inputs, respectively. The panels split and combine video signals from a range of 50 MHz up to 1 GHz of bandwidth and feature a panel configuration rather than individual components. Both are 75-ohm products and offer high isolation and return loss and low insertion loss electrical performance.

The VJ2001 video jacks and panels are individual components that provide the capability to monitor or patch video signals and provide a central point to insert a video test pattern into the video network.

New from Broadband Networks Inc. is an "FM Multiplexer," designed to reduce the cost of delivering four channels of broadcast-quality video over distances of up to 30 miles. The product works by accepting baseband video and audio inputs from four sources at the transmission point, them multiplexing them onto a singlemode fiber cable. At the receive point, the four channels are converted to their original format.

Broadband Networks executives describe the multiplexer as significant because it "eliminates the need for individual modulators and demodulators." The product is housed in a single, 19-inch rack-mountable unit.

Also new from Broadband Networks: a "video brick" optical transmission product designed to deliver data suitable for fax service to 10 Mbps Ethernet networking over distances up to 25 miles.

Electroline Equipment Inc. introduced its new Compact Addressable Tap ("CAT") at the show. The CAT automates MDU service provisioning.

Foxcom Inc. showcased its System 7000 L-Band fiber optic link. Designed to transmit the entire L-Band output over distances from 300 feet to 10 miles, the system allows flexible placement of satellite antennas and CATV headend equipment. The link features input and output AGC for simple plug-and-play installation.

GC Technologies has taken the wraps off a new portable, automatic polishing machine that can improve terminated connector back reflections to -65 dB, according to company officials. The CT-9000 Polishing Machine can retro-polish installed terminations and bring connector performance up to Sonet and Bellcore standards, officials said. Whether done manually, on a tabletop or while in an equipment rack, the unit can, in less than two minutes, polish ST, SC, FC and D4 connectors in a two-step process.

New from Reliance Comm/Tec Corp. is its OTN100TV CATV cabinet, which houses fiber optic lasers, RF amplifiers, power supplies and battery back-up used with hybrid fiber/coax architectures. The cabinet is designed for use in environments that do not exceed 100 degrees F. The company also announced its new TV1832 CATV Power Pedestal, designed to house AC power supplies that power and amplify cable TV lines. And finally, Reliance Comm/Tec displayed its new series of enclosures, which are equipped with an automatic, self-locking Slam Lock mechanism.

Rycom Instruments has introduced a new fiber optic multiplexer that offers a method to connect large numbers of terminals, printers and RS-232 devices cost effectively over long distances. Versions can support a range of channel sizes and fiber operating wavelengths. It also supports data transmission.

Philips Broadband Networks debuted a new combined fiber optic receiver and RF amplifier for hybrid fiber/coax networks. Dubbed "Diamond Net," the unit is designed to support deeper fiber penetration, including near-passive or all-passive network configurations.

The lid assembly can manage up to eight fibers and includes two fiber cable entry ports. It's upgradable to provide two receivers, two return transmitters and an A/B switch, while an optional switch module permits both fiber and coaxial redundancy. Finally, an optional upconvertor expands the return path capacity by 300 percent.

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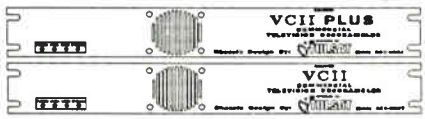

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RF signals between 46 MHz and 860 MHz are supported to facilitate both domestic and international applications. A transponder option is also available for advanced system monitoring and control functions.

Photon Systems announced the new LT-4000 Fiber Optic Transmitter and LT-4000-A Fiber Optic Amplifier. The 1550 nm transmission system is designed for long haul delivery of analog video and digital signals at bandwidths to 750 MHz.

Eighty video channels can be carried up to 200 km with CNR of 50 dB, while distortions remain better than -65 dBc. The system is available with optical output powers over 40 mW to address such applications as headend consolidation, new service area feeds and wide area broadcasting.

The LT-4000A amplifier incorporates an optical receiver. RF signal is available to feed coaxial plant at any point in the optical transmission path where an amplifier is placed.

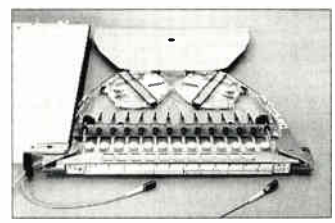
Ipitek has developed a "Professional Series" of modules for its Imtran line of fiber digital video transmission systems to ship high quality video point-to-point. Applications include video delivery from studio to transmitter, studio-studio, satellite-studio, must-carry handoffs and event links. The system offers better than RS-250C short-haul video and audio specs, according to the company. Four or eight discrete NTSC composite video feeds may occupy a single fiber.

Ipitek also displayed couplers that utilize the EIA resistor color-code to identify split ratio, operational wavelength and bandpass. The color-code can be used to verify the part without the need for checking diagrams or serial numbers. Red fiber leads always signify the throughput port, with the clear buffer used as the drop port.

Ipitek unveiled several other new products at the Western Show, including a new line of AM DFB laser transmitters, extended bandwidth platforms to 750 MHz and 900 MHz, a network management software system, a modular fiber optic return path laser and a -48 volt DC powering option for its AM CATV transmission equipment.

The new DFB transmitters, designed for use in Ipitek's FiberTrunk system, come in a range of optical powers from 4 milliwatts up to 16 milliwatts, in 2 milliwatt increments–enabling operators to purchase only the power needed for specific applications. Its Windows-driven "FiberSentry" software handles status monitoring and control for optical networks and includes sense and control points, remote monitoring, user-programmable alarm functions and an equipment performance history.

The new optical return path receiver allows transmission of return path information from an optical node site to the headend and can transport subscriber data, telephony signals, status monitoring information and video. And Ipitek's new -48 volt DC powering option can be included in the company's FiberTrunk and FiberHub systems, making it a plausible solution for users who only have "telephone closet power" at headend and hub sites, company officials said.


Porta Systems' "Focus Plus"

New from Porta Systems Corp. is its "Focus Plus" fiber management system, a one-shelf device that accommodates connecting, splicing or storing optical cables in just short of two inches of rack space. The system can be installed in 19- or 23-inch racks or equipment cabinets.

Siecor Corp. announced the OptiFit assembly for hybrid fiber/coax (HFC) network design. The new termination stub is designed specifically to connect the Optical Network Unit (ONU) to the optical drop cable at the receiver node; this makes possible the use of preconnectorized drops at the node location.

Where the Public and Private Networks Meet

SUPERCOMM® '95

With ICA EXPO

Anaheim California March 20 - 23 1995

Anaheim California March 20 - 23 1995

SUPERCOMM '95

With ICA EXPO

An event with no equals

What sets SUPERCOMM apart from other shows is its ability to provide understanding of all the most important innovations in communications. It is the show that best gives shape to the convergence of voice, data and video. Plus, it does this in a setting that is both practical in nature and manageable in size. That's why exhibitors and attendees alike give it the highest marks.

The most versatile gathering of professionals

Whatever your challenges, you'll find serious minded people with whom to "work" the solutions. From public network planners to private network managers. System engineers to operations specialists. CEOs and CIOs to marketing and sales professionals. Information technologists. Systems integrators. Educators. All trading thoughts in the informational programs and on the exhibit floor.

The most comprehensive demonstrations

Telecom, datacom, video, multimedia and software manufacturers will show you the newest ways to network the converging technologies and increase your competitive edge. Carriers of all kinds will benefit – wireline and wireless, telephone and cable, cellular and satellite, and a host of others. And this year, the world's largest end users will be out in full force, benefitting from the addition of ICA EXPO and companies that are bringing the latest in customer products and services.

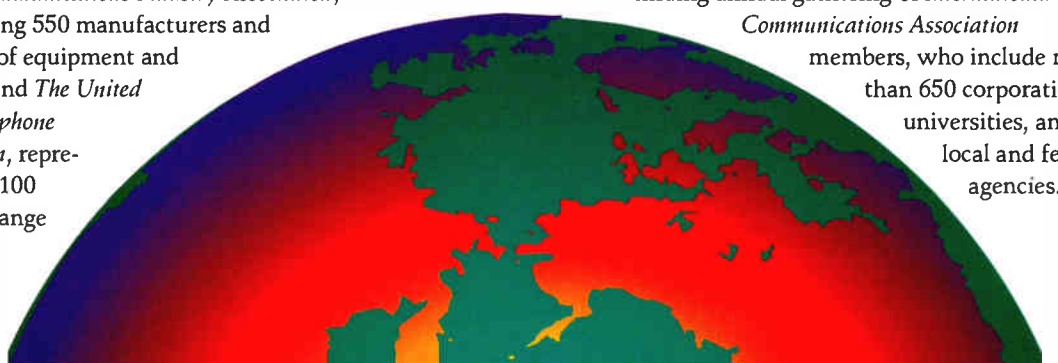
The best bargain you'll find this year

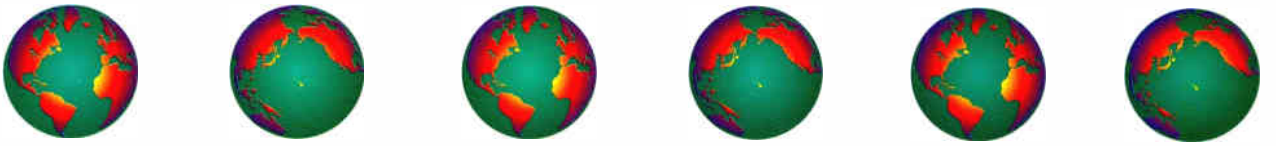
That's because there's no charge to explore the SUPERCOMM with ICA EXPO floor of 200,000 square feet of leading edge technology. There's also no charge to attend general sessions and the 31 basic seminars in the SUPERCOMM program. (Co-locators' programs are offered at nominal costs.) Sign up now so you'll receive continuing updates in our SUPERCOMM Newsletter. Be among the 25,000 attendees from all over the world, finding ...

Communications Solutions where the public and private networks meet.

SUPERCOMM is co-sponsored in its eighth year by *The Telecommunications Industry Association*, representing 550 manufacturers and suppliers of equipment and services, and *The United States Telephone Association*, representing 1,100 local exchange carriers.

ICA EXPO joins the event this year as the continuing annual gathering of *International Communications Association* members, who include more than 650 corporations, universities, and state, local and federal agencies.





A special invitation to international attendees

The numbers who traveled from outside the U.S. doubled at SUPERCOMM last year, and we hope you will be among them this year. Air routes are plentiful into Anaheim and neighboring Los Angeles, and hotels are very economical. Of course the sooner you make your plans, the better choices you have. We will host an International Center at the show to welcome you and provide such assistance as interpretation and arranged meetings with manufacturers. Please phone or fax us at the numbers on the back of this brochure if you have questions. We look forward to seeing you!

Experience the Newest Products, Services and Technologies

Exhibits Open Tuesday, March 21 and Continue through Thursday, March 23

To understand why our theme is ***The Global Event for Communications Solutions,*** you must spend time at the exhibition. It is the most comprehensive one available to those who want to see how everything comes together.

It is the place ***Where the Public and Private Networks Meet.*** National and international carriers, corporate giants and small businesses alike can discover what will increase their networks' quality and efficiency while allowing connectivity and interoperability.

550 Companies, Thousands of Displays ... efficiently organized in

- User Zones
- A Wireless Pavilion
- A Fiber Pavilion
- And the main SUPERCOMM exhibit floor

To Complement the Exhibit ...

Visit the SUPERCOMM Theater adjacent to the exhibit floor, where Pacific Bell will host a video series showcasing technology news. Also in the SUPERCOMM Theater, you'll have an opportunity to see how education can be entertaining as a nationwide classroom demonstrates the use of new technology.

See the program portion of this brochure for other opportunities off the exhibit floor, including the Internet Demonstration on Tuesday afternoon and the Interactive Presentation on Wednesday morning hosted by Northern Telecom.

Take advantage of SUPERCOMM's free basic education and the more in-depth offerings of the ICA Conference and Tutorials, the OFC Short Courses, and the PTC Conference. All will enhance your experience at the exhibits.

This is simply the only place to be if you want to know how your company can overcome complex network and operations issues in order to meet customer demand for services as diverse as interactive shopping, information services, distance learning networks and expanded entertainment opportunities – just to mention a few.

Join local and long distance telephone companies, competitive access providers, CATV, PCS and satellite service providers – all seeking ways to integrate their once separate and distinct networks into one mega-network.

Find the technologies that will help build the Advanced Intelligent Network, provide mobility, enhance sophisticated voice services, increase high-speed data transmission, parlay video opportunities, improve the efficiency of existing facilities and develop true multimedia services. Here is just a sampling of what you'll see:

- ATM/Broadband
- LANs, WANs and Interconnect Equipment
- Highly Sophisticated Network Software
- Voice Processing, Recognition, Storage and Retrieval Systems
- Fiber/FITL
- Hybrid Fiber/Coax Platforms
- Fast Packet
- SONET
- Power and Test Equipment
- Satellite Communications
- Cellular, PCS, Mobile and Wireless Systems
- Cable, Wire and Outside Plant Equipment
- Operations Support Systems
- Switching Equipment for Voice, Video and Data
- Video Display Terminals, Video Set-Top Boxes, Instruments and Customer Premise Equipment
- Video Conferencing
- And Much, Much More!

SUPERCOMM with ICA EXPO

As of 12/1/94

3M Telecom Systems Division

A

AAC Corporation
abc TeleTraining, Inc.
ABL Canada Inc.
A Business Conference Call
AccessLine Technologies, Inc.
Accugraph Corp.
ADC Telecommunications, Inc.
ADTRAN/PTT
Adirondack Wire & Cable, Div. of ACS Industries Inc.
ADS The Power Resource, Inc.
ADSCO Line Products
ADTECH, INC.
Advanced TechCom, Inc.
Aeroquip Corp.
AG Communication Systems
Alcatel
Alcoa Fujikura Ltd.
Alliance for Telecom. Industry Solutions
Alpha/Argus Technologies
Alupower, Inc.
America's Network
American Computer
American Power Conversion Corp.
Americatel
Ameritec Corp.
Amherst International Inc.
AMP Incorporated
Amphenol Fiber Optic Products
ANADIGICS
ANDO Corp.
Anritsu Wiltron Sales Co.
Ansul Fire Protection
ANT Bosch Telecom
ANTEC
Antel Optronics Inc.
APCO International
Applied Computing Devices, Inc.
Applied Digital Access, Inc.
Applied Innovation, Inc.
ARNCO Corp.
Ascom Warren, Inc.
AT&T
The ATM Forum
ATx Telecom Systems, Inc.
Audio Precision
AUDIOSEARS Corp.
Augat Communication Products
Autodesk
Avex Electronics Inc.
AVO International
Aydin Telecom

B

B-Line Telecom
Badger Technology, Inc.
Balboa Capital Corp.
Ball Corp. – Efratom
Bard Manufacturing Co.
Bay Networks
Beco Manufacturing Corp./GCT
Beechwood Data Systems
Belden Wire & Cable Company
Belgacom USA
Bell Atlantic
BELLCORE
Bellcore Quality Registration Services
BellSouth
BEL-Tronics Limited
Benner-Nawman Inc.
The Berry Company
BICSI
BMS Catastrophe, Inc.
The Board Room, Inc.
Boston Technology
Bourns, Inc.
British Consulate General
BroadBand Technologies, Inc.
BROADCASTING & CABLE Magazine
Brock Telecom
Brooktree Corp.
Brooktrout Networks Group
Bud Industries, Inc.
Burndy Corporation
Business Communications Review
Butler Telecom Inc.

C

C-Cor Electronics, Inc.
C&D PowerCom, A Div. of C&D, Charter Power Systems, Inc.
Cabelcon Connectors
Cable & Wireless
Cable Publishing
Cablevision
CACI
Cadtel Systems, Inc.
Canoga-Perkins Corp.
Carlingswitch
Carlon Telecom Systems
Caterpillar Engine Division
CED
CEECO
CelCore, L.P.
Centigram Communications Corp.
CERJAC, Inc.
Channell Commercial Corp.
CIDCO, Inc.
Clark Specialty Company, Inc.
Clauss Fiberoptic/Telecom Div.
Clear Communications
CLI (Compression Labs, Inc.)
The CMS Group
Cognitronics Corp.
Coil Sales & Manufacturing Co., Wescom
Commercial Electric Products
Commscope-General Instrument
Commsoft
Communication Power Solutions
Communications Data Group
Communications International
Communications Manufacturing, Co. (CMC)
Communications News
Communications Test Design, Inc.
Communications Week/A CMP Publication
Communications Week International
COMSAT Corporation
Comshare, Incorporated
Comunicaciones Magazine
Comverse USA
Condux International, Inc.
Consultronics
Convergence
Cordell Manufacturing Inc.
Cott Manufacturing Company
CPDI
The Crown Divisions
CTIA (Cellular Telecom. Industry Assn.)
Cylink

D

Data Communications Magazine
DBA Communication Systems Inc.
DCM Industries, Inc.
Delta Products
Deutsche Telekom
Diamond Communication Products
Dielectric Communications
Digital Lightwave, Inc.
Digital Sound Corp.
Ditch Witch
Drake Communication Products/Silton Co.
DSC Communications Corp.
Dura-Line Corp.
Dynacom Corp.

E

Eagle-Picher Industries, Inc.
East Penn Mfg. Co., Inc.
ECI Telecom Inc.
E.J. Krause & Associates, Inc.
Elcotel, Inc.
Electric Motion Co., Inc.
Electrodata, Inc.
Electronic TeleCommunications
Elgin Telecom. Power Sys./Div., Hyperion Power Tech., Inc.
EMCOR Products/Crenlo Inc.
Enghouse Systems Ltd.
Enthone-OMI Inc.
EPE Technologies, Inc.
Equifax National Decision Systems
Erico Products, Inc.
Ericsson Components AB
Everest Electronic Equipment
EXCEL, Inc.
EXFO E.O. Engineering, Inc.

F

Farnell Advance Power, Inc.
Fiberoptic Product News
First Pacific Networks
FITEL Photomatrix
Foresight Products, Inc.
Fortec, Inc.
France Telecom
Fujitsu

G

GBH Distributing, Inc.
GC Technologies, Inc.
GE Tental/Lease
Geist, Inc.
Generac Corp.
General DataComm, Inc.
General Instrument Corp.
General Machine Products Co.
The George-Ingraham Corp.
Gilbert Engineering Co., Inc.
GLA INTERNATIONAL
Glenayre
GN Navtel
GNB Battery Technologies
GNP Computers
Graphic & Data Solutions
Grass Valley
Graybar Electric Co., Inc.
G.S. Battery U.S.A., Inc.
GTE Supply, GTE Telecommunication Services
W.L. Gore & Associates, Inc.

H

Haddcomm International, Inc.
Harbor Mold Con, a Berg Electronics Company
Hargray Information Systems International
Harmonic Lightwaves, Inc.
Harris Corporation
Hazeltine Corporation
Heath Consultants Inc.
Hekimian Laboratories, Inc.
Hendry
Henkels & McCoy Inc.
Hennessy Products, Inc.
Hewlett-Packard (formerly BT&D Technologies)
Hitachi America, LTD
Hitachi Telecom (USA) Inc.
Hub Fabricating Company
Hughes Network Systems Inc.

I

IBM Corp.
IDB Worldcom
Ideal Industries
IEEE Communications Society
IEX Corp.
Immix Corporation
Inchcape Testing Services/TestMark
Independent NECA Services, Inc.
Independent Technologies Inc., & Berry Test Sets
Industrial Technology, Inc.
INET
Information Gatekeepers
Integrated Network Corporation
Interactive Age
Interactive Week
Inter-Commercial Business Systems, Inc.
International Communications Assn.
Interstate Electronics Corp.
Intervoice Inc.
IPITEK
IPL Products Ltd.
ISI Infortext
ITW Linx

J

Jade Simulations, International Corp.
JDS FITEL International
Jensen Tools, Inc.

Johnson Controls, Inc., Specialty Battery Div.
JOSLYN Electronic Systems, Corp.

K

Keptel, Inc.
Klein Tools Inc.
Knaack Manufacturing Co.
Kohler Power Systems
Korea Telecom
KPMG Quality Registrar
Kullman Industries, Inc.

L

La Marche Manufacturing Co.
Larus Corp.
Laser Precision Corp.
Learning Tree International
Lectro Products, Inc.
Lemco Tool Corp.
LightScan Advanced Tech. Inc.
Lightwave
Lightwave Journal
Litton-FiberCom
Litton Guidance Control System
Lockheed Media Systems Integration
Lortec Power Systems
Lotus Development Corporation
Lyncole XIT Grounding
Lynn Electronics Corp.

M

MagneTek
Mark Products, Inc.
Masterack, Div. Leggett, & Platt Inc.
Mastery POINT
McGrath Rentelco
McGraw Hill
MCI
Melcher, Inc.
Metalink
MetaSolv Software, Inc.
Metromail Corp.
Metro Tel Corp.
Metrotech Corp.
MFS Communications Co., Inc.
Micom Communcations Corp.
Micro Computer Systems, Inc.
Microwave Logic, Inc.
Microwave Networks Inc.
Midtronics, Inc.
Mil 3, Inc.
MINUTEMAN UPS
MIS Labs
Mississippi Dept. of Economic and Community Development
Mitel Corp.
Mobile Tool International
Mobile International Co., Inc., Fibrebond Corp.
Molex Fiber Optics
Motorola Inc.
MPR Teltech Ltd.
Multichannel News
Mustang Enterprises, Inc.
MX-COM, INC.

N

National Cable Television Institute
National Telephone Cooperative Assn.
NEC America, Inc.
NetEdge Systems, Inc.
Network Equipment Technologies
Network World
Newbridge
Newmar
Newton Instrument Co.
Nextest Communication Products
Norand Corporation
Northern Telecom Inc.
NovAtel Communications Ltd.
Noyes Fiber Systems
NRG, Inc.
NTT (Nippon Telegraph and Telephone Corp.)
Nutmeg Utility Products, Inc.
NYNEX/DPI Co.

O

Objective Systems Integrators
Odetics Inc.
Old Castle
OMNI
Omnipoint Corp.
Onan Corporation
ONEAC Corp.
OptaPhone Systems-Div. of Carlson Communications, Inc.
OPTOTEC Spa
Org. for the Protection & Adv. of Small Tel. Co. (OPASTCO)
Orr Protection Systems, Inc.
Ortel Corporation
Outside Plant Magazine

P

Pacific Bell
PairGain Technologies, Inc.
Panduit Corp.
Peco II
Pencell Plastics
Performance Telecom
Periphonics Corp.
Philips Technologies-Airpax Protector Group
Phillips Business Information Inc.
Phillips DVS
Phone + Magazine
Photonics Spectra
Physical Optics Corporation
Pirelli Cables North America
Plug-In Storage Systems, Inc./PSSI
Positron
Power & Telephone Supply Co.
Power Battery Company, Inc.
Power Conversion Products Inc.
Power Guard, Inc.
Powersafe Standby Batteries
Precision Fabrication Tech.
Precision Specialties
Preformed Line Products Co.
Premisys Communications, Inc.
Primus Sievert
Prism Systems Inc.
Protel, Inc.
PSI Telecom
PTT Netherlands
Pulsecom
Pyramid Industries, Inc.

Q

Q-Tel Subsidiary of GTE
Qualcomm Incorporated
Quintrex Data Systems Corp.

R

R.J. Enterprises
RAD Data Communications
Radiall, Inc.
Radiodetection Corp.
Random Corporation
Rainbow Technology Corp.
Raychem Corp.
Raynet Corp.
REDCOM Laboratories, Inc.
Reference Point
Reliance Comm/Tec Corp.
Remote Switch Systems, Inc.
Ripley Company/Cablematic Div.
Riser-Bond Instruments
Roadrunners International
Rohn
Rostra Tool Company
Ruf Neck
ryan.hankin.kent, inc.
RYCOM Instruments, Inc.

S

Schlumberger Technologies
Schroff, Inc.
Scientific-Atlanta, Inc.
Securicor Telesciences
Security Dynamics, Inc.
Seiscor Technologies Inc.
Siecor Corp.
SIEMENS Stromberg-Carlson
SNC Manufacturing Co. Inc.
Source Inc.
Southwestern Bell Telephone
Sprayon Krylon
Sprint
Sprint/North Supply
Stanford Telecommunications, Inc.
Steinbrecher Corp.
STET Group
StrataCom, Inc.
Stratus Computer, Inc.
Sumitomo Electric Lightwave Corp.
Summa Four, Inc.
Sun Manufacturing
Sun Microsystems, Inc.
Sunrise Telecom, Inc.
Suttle Apparatus/CSI
Swiss Telecom
Switchcraft Inc.
SWL Inc.

T

T-COM Corp.
Tadiran Electronic Industries
Tau-tron Inc.
Tekelec
Tektronix, Inc.
Telco Systems, Inc.
Tele-Matic Corporation
Tele-Path Industries
Telecom Asia
Telecom Gear
Telecom Solutions
Telecommunications Industry Association
Telecommunications
Telecommunications Power Systems
Telect
Teleconnect Magazine
TeleDynamics
Teleflex Information Systems, Inc.
Telematics International, Inc.
Telenex Corp./Ar Test Systems
Telephone Extension Corp.
Telephone International
Telephony Magazine
TelePress Latino America
Telesync, Inc.
Tellabs, Inc.
Telstra OTC Australia
Teltone Corporation
Teltrend, Inc.
Tempo Research Corp.
Texas Instruments, Inc.
Texas Microsystems, Inc.
The Light Brigade, Inc.
Thomas & Betts
Times Fiber Communications Inc.
Toner Cable Equipment Inc.
Transtector
TranSwitch Corp.
Trilithic, Inc.
Trilogy Communications, Inc.
Triplett Corp.
TriQuint Semiconductor
Trompeter Electronics
TSSI
TTC (Telecommunications Techniques Corp.)
TUV Product Service
TW Comcorp
Tyton Corp.

U

U.S. Intelco Networks
US TEC
Underwriters Laboratories Inc.
Unisys
United States Telephone Assn.
Uraseal, Inc.

V

Valcom, Inc.
Vari-Tronics Company Inc.
Verilink Corporation
VFP, Inc.
VIKING Electronics, Inc.

W

Wandel & Goltermann
Warren Publishing, Inc.
Weidmuller Inc., Paladin Tools
Westell, Inc.
Western Multiplex Corporation
Western Pacific Telecommunications
Western Rural Telephone Assn.
Western Telematic Inc.
Wilcom
John Wiley & Sons
Wiltron Company
Wyle Laboratories

X

Xinex Networks
XTEND Communications

Z

Zenith Electronics Corp.

SUPERCOMM-At-A-Glance

Sunday, March 19 — ICA Tutorials

Monday, March 20 — ICA Conference, PTC Conference, SUPERCOMM Program as Listed

No Exhibits this Day

8:00 - 9:00

1st General Session with Keynote Address by John Morgridge, President & CEO, Cisco Systems

SERVICES Program Day

9:30-10:45

101 Cellular & PCS (*Primer*)
102 Multimedia: Business Case
103 Low Orbit Satellite
104 Global Users (Manufacturers Seminar)

11:00-12:15

105 ATM/SONET (*Primer*)
106 Demand for Mobility
107 Distance Learning
108 Europe (Manufacturers Seminar)

12:30-1:45

109 Small Telco Market (Seminar with Box Lunches to Purchase)

2:00-3:15

110 CCS & SS7 (*Primer*)
111 High Speed Data Transport
112 Broadband Video Explosion
113 Latin America (Manufacturers Seminar)

3:30-4:45

114 Fiber Optics (*Primer*)
115 Calling Name Delivery
116 Asia/Pacific (Manufacturers Seminar)
117 Special Seminars (end at 5:30)

1st hour by National Association of Television Program Executives

2nd hour by National Association of Broadcasters

Tuesday, March 21 — ICA Tutorials & Conference, OFC Courses, SUPERCOMM Program as Listed & Exhibits

Exhibits Open 9:30

2nd General Session with Official Opening Ceremonies; participants to be announced

STRATEGIES Program Day

118 Public Policy — Regulatory
119 Multimedia: Deployment

120 Public Policy — Legislative
121 Marketing Challenges for Competition

122 Competition in the Local Loop (Seminar with Box Lunches to Purchase)

4:00-5:15

123 Voyage on the Internet (Demonstration)

Exhibits Close 5:30

Wednesday, March 22 — ICA Conference, OFC Courses, SUPERCOMM Program as Listed & Exhibits

Exhibits Open 9:30

3rd General Session with Special Interactive Presentation; hosted by Northern Telecom

ARCHITECTURES Program Day

124 New Network Management Systems
125 Multimedia: Delivery
126 Hybrid Fiber/Coax Platforms

127 Emerging AIN Drivers
128 ATM Transport on SONET
129 ADSL Complement to Fiber/Coax
130 Architectures for Network Survivability

131 Future of the Internet (Panel)

Exhibits Close 5:30

Thursday, March 23 — ICA Tutorials & Conference, SUPERCOMM Program & Exhibits Close

Exhibits Open 9:30

SUMMARY Program Day

4th General Session with Summary Address by Dr. Robert Lucky, VP - Applied Research, Bellcore

Exhibits Close 3:30

Education, Education, Education!

The General Sessions

Each morning begins with an opportunity to broaden your knowledge and get energized for everything that follows. These general sessions are free for all attendees. On Monday hear John Morgridge, President and CEO of Cisco Systems, Inc., the world's leading supplier of multiprotocol routers. In keeping with the event's mission to be the place where the public and private networks meet, his remarks on "Logical Networks and Where They are Taking Us" will be fitting. Tuesday features ceremonies to open the exhibition and more remarks of importance from industry leaders. Wednesday brings a chance for the audience to participate in an interactive session sponsored by Northern Telecom. It will focus on communications technologies for the economy, the environment and education – while allowing you to compare your views with those of experts and the latest compilation of market research. Thursday provides summary remarks for the week and insights to the future by Dr. Robert Lucky, Vice President of Applied Research at Bellcore.

The SUPERCOMM Seminar Series

These 90-minute presentations of basic education prepare you for getting the most from the exhibition. And best of all – like the exhibits, seminars are free. The series is focused around a theme of "Services, Strategies and Architectures" and begins on Monday prior to the opening of the exhibit floor on Tuesday. Note that some first-day seminars are designated as *Primers* and serve as particularly good introductions to their subject matter; others are especially designed for manufacturers. Seminars generally take the form of panels with varying perspectives and include an opportunity for audience questions. The series culminates with a summary address, which also serves as Thursday's general session.

See the Accompanying At-A-Glance Schedule

101 *Primer* Cellular & PCS Examines the advanced features and capabilities possible with each of these important technologies. Reviews both terminal and personal mobility aspects.

102 Multimedia: The Business Case New multimedia services form the basis for exciting telco and CATV opportunities in education, medicine, government, business and leisure applications. Includes broadband, desktop, advertising, media and merchandising perspectives.

103 The World of Low Orbiting Satellites An opportunity to share the views of experts on this promise for worldwide coverage.

104 Challenges Facing Global Telecom Users Multinational customers and service suppliers address the issues of enterprise networks, interconnectivity and merger mania among international carriers. (Manufacturer focus.)

105 *Primer* ATM/SONET Includes overviews of ATM, the preferred technology for switching and multiplexing of integrated data, video and voice services, and of SONET, the optical transport system for these services.

106 Meeting Demand for Mobility Explores mobility in rural America and across public and private environments, while highlighting the role of local exchange carriers.

107 Creating Partnerships for Distance Learning Hear experts on technological, regulatory and legislative issues. What's needed, what works and who can facilitate the links between industry and schools.

108 Europe: Common Market or Common Myth? Western European economic integration and deregulation moves have raised many hopes. Take a reading on how well this market is progressing and the impact on neighbors to the East. (Manufacturer focus.)

109 Small Telco Market Expansion Join colleagues and hear about tne unique opportunities that good positioning can create for small but pro-active businesses. Luncheon discussion. (Box lunches available to purchase.)

110 *Primer* CCS & SS7 Covers the impact and capabilities of CCS and SS7 and reviews their role in the network evolution to AIN.

111 The World of Highspeed Data Transport Data Speeds of 64 kilobits to 45 gigabits are commonplace today. Who needs highspeed data highways and who will supply them?

112 The Impending Broadband Video Explosion Gain insight to broadband video services including CATV, video on demand and interactive games, shopping, banking, etc. Explore everything from service platforms to the local plant required.

113 Latin America: Emerging Markets With NAFTA a reality and deregulation and privatization spreading, hear the latest on this dynamic region. (Manufacturer focus.)

114 *Primer* Fiber Optics An introduction to fiber's broad-based and all-embracing applications. Covers the growth, development and integration of fiber to the "loop".

SUPERCOMM Seminars Continued

115 Calling Name Delivery Services Explore the service and market potential for Calling Name Delivery Services packaged with Caller ID services.

116 Asia/Pacific: Booming Opportunities Suppliers and other industry experts look at the opportunities and market challenges in this exciting part of the world. (Manufacturer focus.)

117 NATPE: We're New Here The National Association of Television Program Executives hosts TV programmers who tell how they've moved from broadcast and cable to telcos as they describe how to maximize their value in the new environment.

NAB: The Broadcast Connection The National Association of Broadcasters hosts the second hour of this time slot and contributes understanding to the evolving convergence of television and telephony.

118 Public Policy for Cyberspace Explore strategies for coordinating public policy changes required to accommodate the emerging technologies of the 21st Century.

119 Multimedia: Strategies for Deployment What will be the real driver for multimedia? Entertainment, organizational shifts, medical applications, distance learning or some other new need?

120 The Communications Revolution and the New Congress Can the new Congress speed the revolution to new services by updating a Communications Act passed in 1934? Examine the challenge of sweeping away sixty years of accumulated underbrush in a radically changed marketplace.

121 Marketing Challenge: Prepare for Competition Tackle the business of turning the creations of technology into marketplace success stories.

122 Strategies for Competition in the Local Loop Learn how new alliances, new approaches and new thinking are changing the telecom landscape. Luncheon discussion. (Box lunches are available to purchase.)

Joint Offering with ICA

123 Voyage on the Internet (Demonstration)

This live demonstration shows emerging commercial services on the Internet. It includes both end-user applications, such as electronic brokers, and infrastructural facilities, such as electronic payment systems. Provides an opportunity for potential customers and vendors to assess the advantages and drawbacks of the competing approaches to electronic commerce. Presentations include CyberCash, FAST, First Virtual and others by the persons actually developing the applications.

124 Network Management Systems for Evolving Network Technologies Evaluate the requirements, issues, standards and status of network management systems to support such technologies as ATM, PCS, SONET and ISDN.

125 Multimedia: Architectures for Delivery Discuss several approaches for broadband services. Included are complete fiber solutions, fiber-coax and digital on analog architectures.

126 Hybrid Fiber/Coax Platforms Consider the emergence of HFC platforms to economically meet customer demand for expanded services. Encompasses telephony, interactive video and cable television.

127 Emerging AIN Drivers Address pivotal developments from an AIN perspective. Specifically the customization of services, the internetworking with wireless technology, the work in progress towards an open network architecture and the role in support of broadband services evolution.

128 ATM Transport on SONET Explore the status, applications, issues and future of ATM transport on SONET from the perspective of local exchange and interexchange carriers and manufacturers of ATM/SONET equipment and system test equipment.

129 ADSL: Complementing the Fiber/Coax Network The role and viability of ADSL in providing broadband and other services over copper-based facilities is examined from the perspective of manufacturers and users.

130 Architectures for Network Survivability The Network Reliability Council issued its compendium of technical papers in June, 1993, and asked providers to assess the applicability of recommendations within their network. Hear results of that study for various network architectures.

Joint Offering with ICA

131 Future of the Internet (Discussion)

The Internet continues to evolve at a rapid pace. It is getting larger, with the number of networks now above 30,000 and growing. It is getting faster, with backbone networks commonly using 45 Mbps lines and experimental networks at speeds above 1 Gbps. It is moving into new environments, including extensions into the mobile and wireless domain. And it is developing and deploying a broad variety of new services including digital libraries and electronic commerce. This panel explores some of these new directions.

The above seminars are free. See additional co-located, paid programs.

The ICA Conference and Tutorials

The International Communications Association co-locates its highly acclaimed Annual Conference with SUPERCOMM this year and offers every attendee the opportunity to purchase all or selected sessions among the 80-plus that will be conducted Monday-Thursday. Additionally, ICA has planned 23 tutorials to provide in-depth education for attendees on Sunday, Tuesday and Thursday. See the registration form to request specific times and prices for all the ICA options. Tutorials only are listed here. If purchased separate from a conference package, they start at $350 for a full day or two half-day tutorials.

Sunday, March 19

(*Full-Day*)
Introduction to Communications Systems and Policies
Local Area Networks
Spanning the Globe: The Worldwide Telecommunications Environment
Understanding Fast Packet Technology
New CPE Paradigms

(*Half-Day*)
Protecting Your Telecommunications System from Theft, Fraud & Abuse (a.m.)
Protecting Your Computer Networks from Theft, Espionage & Sabotage (p.m.)

Tuesday, March 21

(*Full-Day*)
Hands-On High Speed Cabling for Buildings
Voice Processing – Terms, Technologies & Potential Applications
Introduction to Data Communications
Introduction to Client/Server Architecture

(*Half-Day*)
Business Process Re-Engineering (a.m.)
Total Quality Management in Telecommunications (a.m.)
Computer-Telephony Integration (p.m.)
Personal Career Management Workshop (p.m.)

Thursday, March 23

(*Full-Day*)
Mobile Communications Technologies, Products, Applications and Futures
Bridges, Routers and Hubs
TCP/IP and Related Protocols
Asynchronous Transfer Mode

(*Half-Day*)
Networking in Latin America (a.m.)
Integrating Wireless into the Business Environment (a.m.)
Multimedia and Telecom (p.m.)
Personal Career Management Workshop (p.m.)

The PTC Conference

The Pacific Telecommunications Council joins SUPERCOMM on Monday, March 20, with the *Asia/Pacific Telecommunications Overview.* This is a full-day of instruction for any attendee who is interested in the region as a user or provider of communications services. Academics and policy makers will also find the program of interest. See the registration form for requesting information on this option, which includes a luncheon and is priced at $100 to $200 depending on membership and timing of registration. The PTC is the only international, non-governmental and non-profit organization promoting the development of telecommunications throughout the entire Pacific hemisphere.

The OFC Short Courses

The Optical Society of America is a sponsor of the Optical Fiber Communications (OFC) Conference and Exhibition, and now brings one of the components of that prestigious event to SUPERCOMM. This series of six short courses will take place Tuesday and Wednesday afternoons in classroom settings with complete sets of notes. Costs are $100 pre-registration or $150 on-site for one course, $175 or $275 for two. If you want to learn the fundamentals of fiber optics or are thinking about integrating a fiber system, learn from the leaders – but plan ahead because space is limited to 60 people for these popular courses. See the registration form for requesting information.

Tuesday, March 21

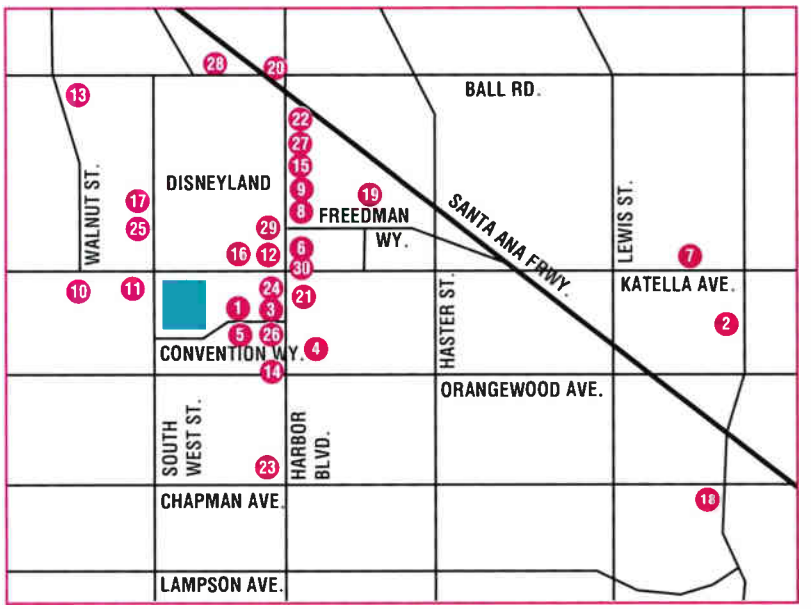
(*2-4 p.m.*)
- Fiber Applications in Telecommunications (TA-909)
- Integration and Installation of a Fiber Network (Introduction)
- Introduction to Cable Television

Wednesday, March 22

(*2-4 p.m.*)
- Fiber Optic Computer Networks
- Network Alternatives for Competition in the Loop
- Introduction to Field Measurements of Lightwave Systems and Components

It's Easy to Attend... Pre-Register by February 20

To receive your name badge by mail and secure accommodations, respond by February 20. On-site registration is also available beginning Sunday, March 19. All exhibits, general sessions and SUPERCOMM seminars are free. Co-locators' events are offered at varying prices. Request these at the same time you register for the overall event.



			Single and/or Double
1.	Anaheim Hilton & Towers	Main Lania Towers	$160/$180 $170/$190 $190/$210
2. ♦	Anaheim/Orange Hilton Suites		$130/$140 (All Suites)
3. ♦	Anaheim Inn at the Park		$104/$116
4.	Anaheim International Inn		$75
5. ♦	Anaheim Marriott		$150/$160
6.	Anaheim Plaza Hotel		$84
7.	Anaheim Ramada Inn		$60
8.	Best Western Anaheim Inn		$68
9.	Best Western Park Place Inn		$68
10.	Best Western Pavilions		$63
11.	Best Western Stovall's Inn		$63
12.	Candy Cane Hotel		$77
13.	Conestoga Hotel		$70
14.	Convention Center Inn		$57
15.	Desert Inn and Suites		$74/$79
16.	Desert Palm Suites		$79
17. ♦	Disneyland Hotel (Exclusive ICA Headquarters until February 1)		$135
18.	Doubletree Hotel Orange County		$89
19.	Grand Hotel		$90
20.	Holiday Inn Anaheim Center		$77
21.	Holiday Inn Maingate		$90
22.	Howard Johnson		$64
23.	Hyatt Regency Alicante		$120
24.	Jolly Roger Hotel		$84
25. ♦	Pan Pacific		$115
26.	Quality Hotel Maingate		$90
27.	Ramada Maingate		$77
28.	Sheraton Anaheim		$95
29.	Travelodge Maingate		$55
30.	Castle Inn & Suites		$67
	Additional Hotels Available		

♦ ***A Special note about hotels that fill early.*** The five properties marked are likely to have no rooms left in the SUPERCOMM block after the first of January. So please indicate only one of them at best among your choices. Also please note that there are additional, unlisted small hotels that attendees may be assigned to as others fill. All properties are within the confines of the map shown, i.e., no more than 5 minutes from the Convention Center. Rates include show sponsored shuttle service; they do not reflect the 13% local tax.

Reservations should be through ITS, our official coordinator; hotels cannot fulfill requests from our blocks. *Deposits* are required at $150 per room, $300 for a one-bedroom suite and $450 for a 2-bedroom suite. Credit cards are charged upon receipt of reservation. *Confirmations* are sent by ITS, not by hotels. *Changes/Cancellations* prior to March 1 should be with ITS; later changes must be with hotels directly. Note the name of any hotel employee with whom you speak and ask for a confirmation number. Cancellation is 72 hours before scheduled arrival for refund of your deposit. Refunds for cancellations made after March 1 will be handled by the hotels.

Special Air Fares

Schedule your flight with one easy toll-free call and receive a 5% discount off the lowest published promotional fare, including first class, or 10% off the unrestricted coach fare on our official carriers: United Airlines and Delta Air Lines. Exclusive, unrestricted zone fares on United and Delta are available only through I.T.S. as well as the lowest promotional fares on any airline. Frequent flyer club members will receive full mileage credit. To book your reservations and for advance seat assignments, please call **I.T.S. at 1-800-621-1083 from 8 am to 5 pm CST.**

Or call the airlines direct.
United 1-800-521-4041, reference Group I.D. #554XZ.

Delta 1-800-241-6760, reference Group I.D. #J1319.

Please identify yourself as a **SUPERCOMM** attendee.

Special Auto Rates

	Daily	Weekly
Economy	$26	$125
Compact	$31	$139
Midsize	$33	$169
Fullsize	$38	$199
Luxury	$40	$229

Rates available 3/13/95 – 3/30/95

Rates available at all Alamo's Southern California locations.

Some airports impose a tax or fee, ranging up to 10%, which applies only if you choose to exit on the Alamo bus. Weekly rates require a 5-day minimum rental or daily rates apply. A 24-hour advance reservation is required. Availability is limited.

For reservations call your professional travel agent or call Alamo.

Alamo Rent A Car
1-800-732-3232
Group I.D. #242434
Rate Code GR

See you in Anaheim, California March 20-23

SUPERCOMM '95 With ICA EXPO

Register before February 20, 1995, for choice of hotels and to receive name badge by mail. Do not use this form if you are working an exhibitor booth. Call (202) 457-4912 for an Exhibitor Registration/Housing Form. **Registration is free for all exhibits and the SUPERCOMM program.**

1 Registrant

Name _____ (last) _____ (first) _____ (nickname)

Spouse/Guest _____ (last) _____ (first) _____ (nickname)

Title _____

Company _____ Address _____

City _____ State/Country _____ Zip ☐☐☐☐☐ - ☐☐☐☐

Telephone _____ FAX _____

Please fill in one code from each list below:

☐ **Buying Role**
- AA Final Decision Maker
- BB Recommend
- CC Specify
- DD No Role

☐ **Job Function**
- A Corporate Management
- B Sales & Marketing
- C Engineering
- D Carrier Network Operations
- E Research & Development
- F Central Office
- G Transmission/Cable & Wire
- H Telecom Management (User)
- I Data Management (User)
- J Planning/Analyst
- K Mobile/Cellular
- L Fiber Optics
- M Other

☐ **Business Affiliation**

Carriers
- 10 Bell Companies
- 11 Independent Companies
- 12 Long Distance
- 13 International
- 14 Mobile/Cellular
- 15 CATV/Radio/TV
- 16 Competitive Access Providers

Users
- 20 Educational
- 21 Financial/Banking
- 22 Hospitals/Health Care
- 23 Insurance
- 24 Trade (Retail/Wholesale)
- 25 Transportation/Pipelines
- 26 Utilities (Gas/Water/Electric)
- 27 Manufacturing
- 28 Other

Manufacturers/Suppliers
- 40 Telecom Manufacturers
- 41 Dealers & Distributors
- 42 Contractors & Electrical Services
- 43 Consultants & Architects
- 44 Data Comm Equipment/Services

Other
- 50 Government
- 51 Telecommunications Associations
- 52 News Media
- 53 Spouse/Child
- 54 Other

Is your company a member of:
☐ USTA ☐ TIA ☐ ICA

2 Hotel

Do you require housing? ☐ Yes ☐ No, Staying at _____

Arrival Day _____ Date _____ Depart Day _____ Date _____

Hotel choice by ☐ Rate ☐ Location Room Type Requested _____

1st Choice _____ 2nd _____ 3rd _____

Additional Occupant _____

Complete separate form if other than spouse/guest listed above

Deposit required. Make checks payable to SC/ITS. Credit cards charged immediately.

☐ Check ☐ Visa ☐ MasterCard ☐ American Express ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

(Digits may vary by card type)

☐ $150 Room ☐ $300 1-BR Suite ☐ $450 2-BR Suite Expiration Date _____

Cardholder Name (print) _____ Signature _____

Frequent traveler member of _____ Member # _____

Americans with Disabilities Act considerations _____

3 Co-Located Events

Remember all exhibits are free, as are all general sessions and the SUPERCOMM series of seminars. INS

To find out more about other paid events, check boxes below or call:

☐ ICA Conference – 800-422-4636 ☐ OFC Short Courses – 202-416-1960 ☐ PTC Conference – 808-941-3789

4 Response Instructions

MAIL
SC/ITS
P.O. Box 825
104 Wilmot Road
Suite 300
Deerfield, IL 60015

FAX
Credit Card Only
24 Hours
800-521-6017
Outside U.S./Canada
708-940-1364

PHONE
Credit Card Only
8:00 a.m.- 5:00 p.m. CST
800-424-5249
Outside U.S./Canada
708-940-2155

Please indicate how this form came to your attention _____

Registration Form

SUPERCOMM® '95

With ICA EXPO

For Attendee Information:
Phone (202) 326-7281
Fax (202) 326-7308

For Exhibiting Information:
Phone (301) 986-7800
Fax (301) 986-4538

Official Publishers are:

America's Network

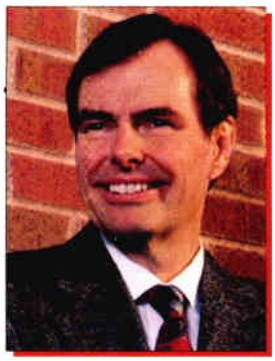
CommunicationsWeek

CableNET94

The Convergence Laboratory

Road map to the future of broadband communications

A special section of CED magazine



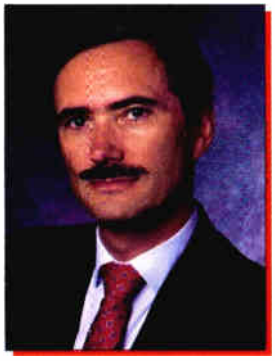
One of the benefits that accrues to CableLabs from assembling CableNET is that our technical staff becomes much more informed about hardware and software that member cable operating companies are about to acquire. For instance, very few cable operations engineers have had the luxury of seeing multiple companies' cable modems function at the same time on the same network. Or, for that matter, few cable engineers have been tasked with making these modems work in a cable environment.

Our technical people had that opportunity at CableNET and also at the Salt Lake City integration site which was made available by Unisys.

In addition, we have been told, the very opportunity afforded to vendors to demonstrate their products in a working cable environment was sufficient catalyst to cause vendors to speed up product development by three to five months. In a period where one of the key issues facing the industry is the ability to buy technology to enter new businesses as quickly as possible, this is a real benefit.

Whatever happens in the future with CableLabs and demonstrations, I believe that CableNET '94 served the industry as more than just one more exhibition in a very successful Western Cable Show.

Dr. Richard Green
President and CEO
Cable Television Laboratories



California Cable Television Association has worked consistently to insure that the Western Cable Show serves as an important forum for technology, programming and policy. We have been delighted to work with CableLabs staff to present the people, products and services available for distribution over the cable television platform.

One of the key critical success factors of the CableNET demonstration is the opportunity to see first-hand and learn about the value of interoperability. By meeting with the engineers, marketing staff and technical support staff of the convergence industries–computer hardware, software and telephone switching industries–Western Cable Show attendees enjoyed a technology analysis while touring the convention.

As "the convergence laboratory," CableNET demonstrated the potential of the industry's hybrid fiber/coax network to more than 21,000 attendees, 700 members of the press, policymakers and decisionmakers, and representatives of more than 32 countries. By showcasing the interoperability of technology, CableNET shows that cable TV technology is the most efficient and effective advanced communications network to deliver new services to American homes, businesses and schools.

Spencer Kaitz
President
California Cable Television Association

Imagine having the ability to get inside some of the world's great technology laboratories to view the latest in emerging technology. Having the insight into how new technology will work would certainly make it easier to make network and architecture decisions today–and would help people prepare for new products and services.

Taking a tour through the 5,000-square-foot CableNET '94 exhibit at the 1994 Western Cable Show was like walking through 51 separate research and development centers that were tied together via a common network. It showcased the power of the hybrid fiber/coax architecture being deployed by every major cable operator today.

The CableNET "convergence laboratory," designed and produced by Cable Television Laboratories and the California Cable Television Association, was conceived to be an educational blueprint of the capabilities, products and services available through a broadband digital network.

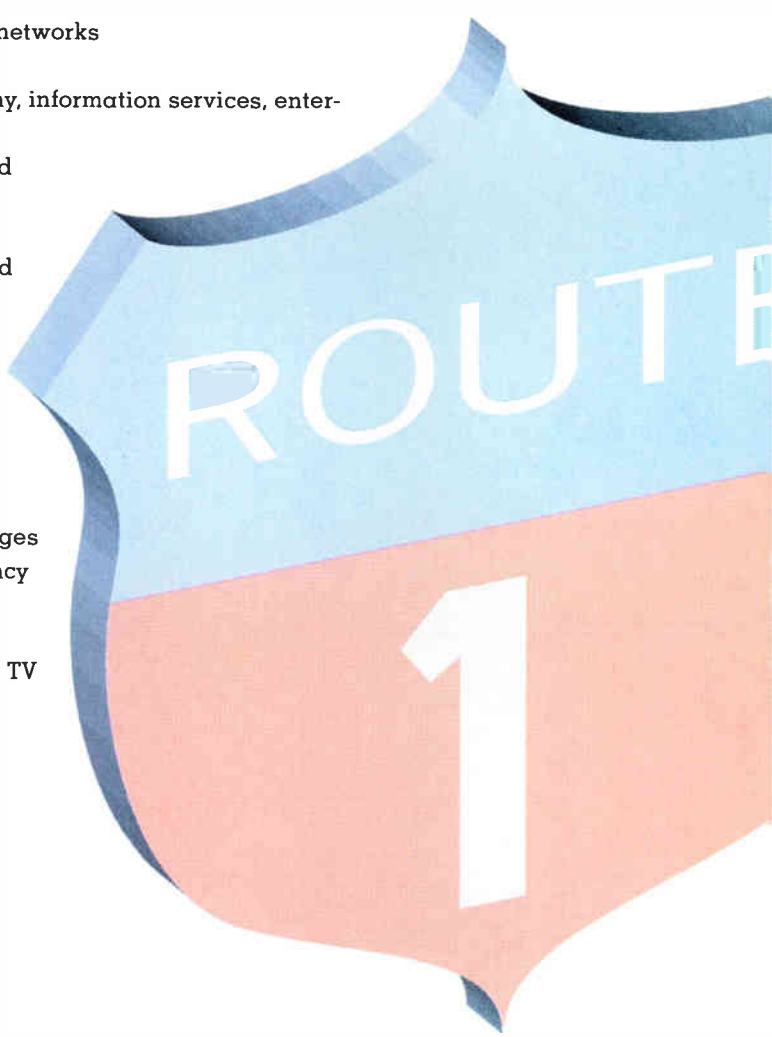
But it was much more than that. It became a living laboratory, the result of six months of planning and execution featuring an unprecedented level of system and product integration that resulted in a fully interoperable, advanced communications network. Singlehandedly, CableNET '94 demonstrated that interoperability is possible between the cable television, computer and telephone companies.

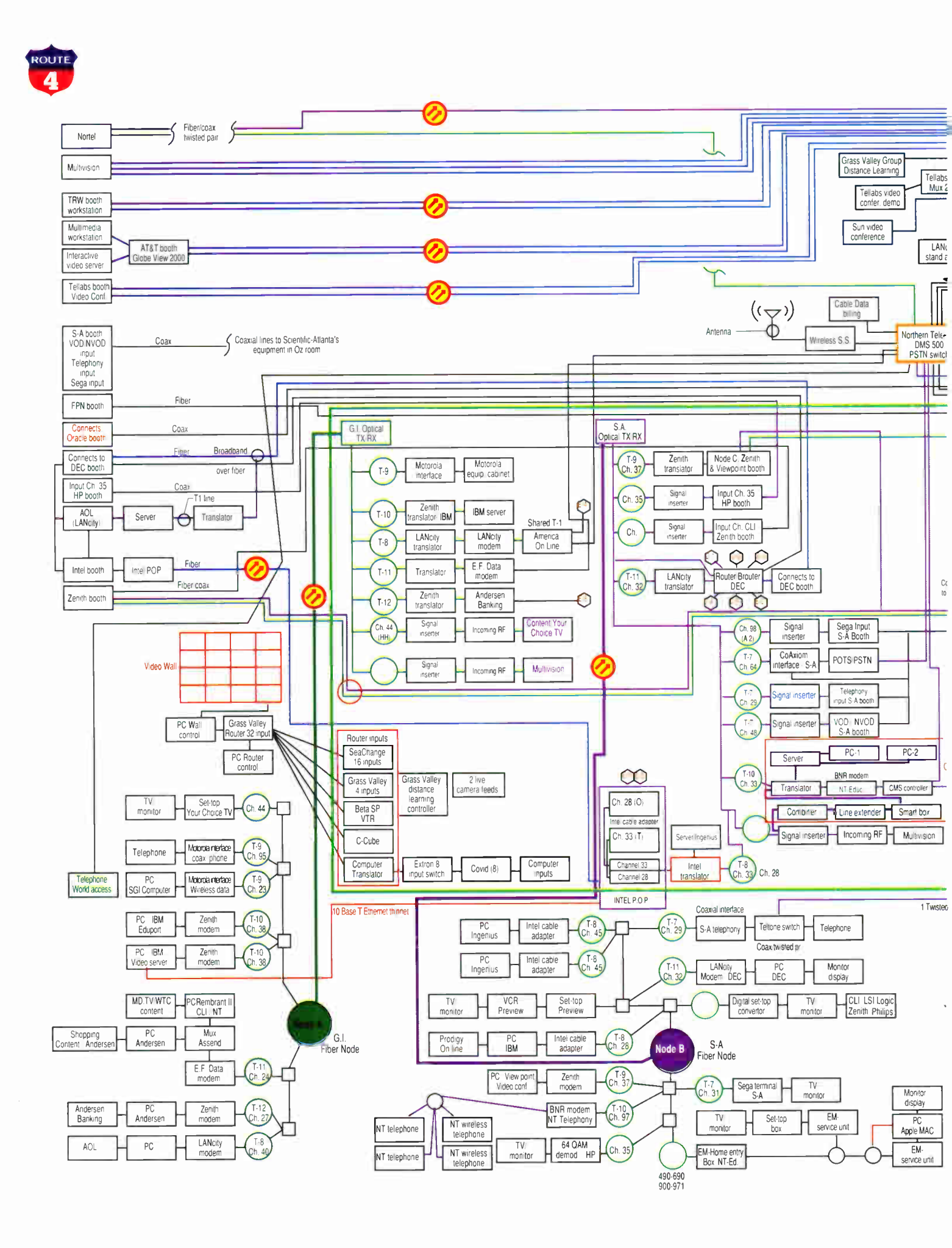
Back in mid-1994, a management team consisting of representatives from General Instrument, Intel, Northern Telecom, Scientific-Atlanta and Unisys met and developed the following goals:

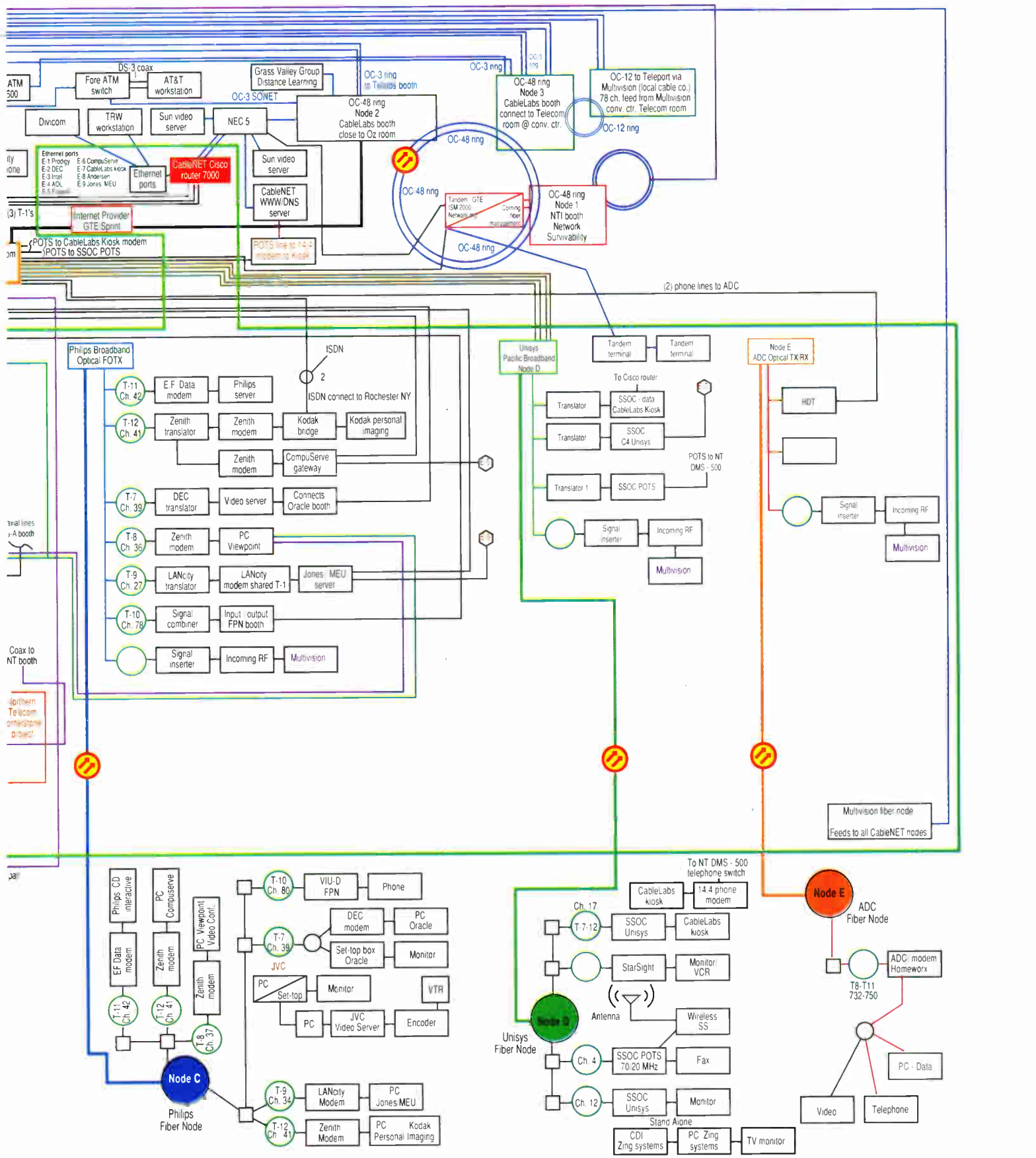
— Educate the convergence industries
— Demonstrate compelling new services and technologies
— Establish the advanced capabilities of existing cable TV networks
— Promote standardization and interoperability
— Demonstrate new revenue opportunities through telephony, information services, entertainment and education
— Demonstrate CableLabs' position as technical advisor and expert.

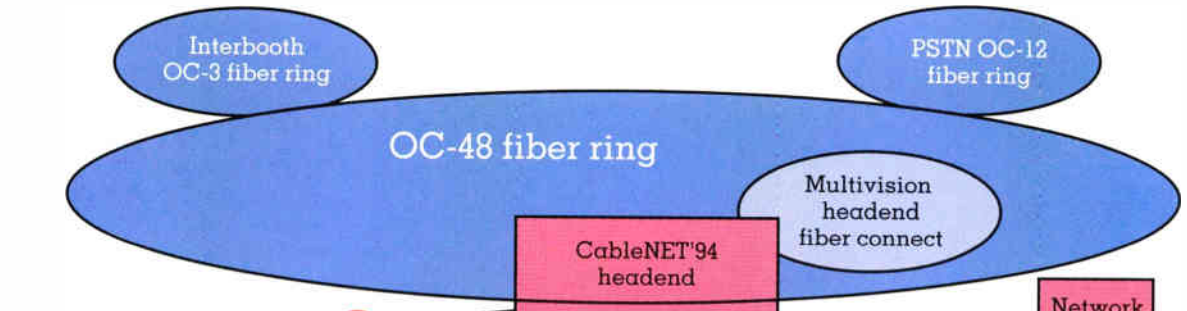
After two months of evaluating proposed demonstrations and reworking them to push for greater connectivity or functionality, literally thousands of man-hours were dedicated to designing the network, developing a frequency plan, and staging the network at Unisys' Salt Lake City facility. Then, two semi trucks hauled all 100,000 pounds of equipment to the Anaheim Convention Center, where it was put on display.

Although the network plan depicted on the following two pages shows a level of product integration and application redundancy that is unlikely to be deployed in a real-world environment, it shows that competitors can be drawn together to highlight the services and capabilities that may be delivered over the cable TV infrastructure.




ROUTE 4
Nortel
Fiber/coax twisted pair
Multivision
TRW booth workstation
Multimedia workstation
Interactive video server
AT&T booth Globe View 2000
Tellabs booth Video Conf.
Grass Valley Group Distance Learning
Tellabs video confer. demo
Sun video conference
Antenna
Cable Data billing
Wireless S.S.
Northern Tele- DMS 500 PSTN switch
S-A booth VOD/NVOD input Telephony input Sega input
Coax
Coaxial lines to Scientific-Atlanta's equipment in Oz room
FPN booth
Fiber
Connects Oracle booth
Connects to DEC booth
Broadband over fiber
Input Ch. 35 HP booth
AOL (LANcity)
Server
T1 line
Translator
Intel booth
Intel POP
Fiber coax
Zenith booth
G.I. Optical TX/RX
S.A. Optical TX/RX
T-9
Motorola interface
Motorola equip. cabinet
T-10
Zenith translator IBM
IBM server
T-8
LANcity translator
LANcity modem
Shared T-1
America On Line
T-11
Translator
E.F. Data modem
T-12
Zenith translator
Andersen Banking
Ch. 44 (HH)
Signal inserter
Incoming RF
Content Your Choice TV
Multivision
T-9 Ch. 37
Zenith translator
Node C. Zenith & Viewpoint booth
Ch. 35
Signal inserter
Input Ch. 35 HP booth
Ch.
Input Ch. CLI Zenith booth
T-11 Ch. 32
LANcity translator
Router Brouter DEC
Connects to DEC booth
Video Wall
PC Wall control
Grass Valley Router 32 input
PC Router control
Router inputs
SeaChange 16 inputs
Grass Valley 4 inputs
Beta SP VTR
C-Cube
Computer Translator
Grass Valley distance learning controller
2 live camera feeds
Extron 8 input switch
Covid (8)
Computer inputs
Ch. 98 (A 2)
Signal inserter
Sega Input S-A Booth
T-7 Ch. 64
CoAxiom interface S-A
POTS/PSTN
T-7 Ch. 29
Signal inserter
Telephony input S-A booth
T-7 Ch. 48
Signal inserter
VOD/NVOD S-A booth
Server
PC-1
PC-2
T-10 Ch. 33
Translator
BNR modem
NT Educ
CMS controller
Controller
Line extender
Smart box
Signal inserter
Incoming RF
Multivision
Ch. 28 (O)
Intel cable adapter
Ch. 33 (T)
Channel 33
Channel 28
Server/Ingenius
Intel translator
T-8 Ch. 33
Ch. 28
INTEL P.O.P
TV monitor
Set-top Your Choice TV
Ch. 44
Telephone
Motorola interface coax phone
T-9 Ch. 95
Telephone World access
PC SGI Computer
Motorola interface Wireless data
T-9 Ch. 23
PC IBM Eduport
Zenith modem
T-10 Ch. 38
PC IBM Video server
Zenith modem
T-10 Ch. 38
10 Base T Ethernet thinnet
1 Twisted
Coaxial interface
PC Ingenius
Intel cable adapter
T-8 Ch. 45
T-7 Ch. 29
S-A telephony
Teltone switch
Telephone
Coax/twisted pr
PC Ingenius
Intel cable adapter
T-8 Ch. 45
T-11 Ch. 32
LANcity Modem DEC
PC DEC
Monitor display
TV monitor
VCR Preview
Set-top Preview
Digital set-top convertor
TV monitor
CLI LSI Logic Zenith Philips
Prodigy On line
PC IBM
Intel cable adapter
T-8 Ch. 28
Node B
S-A Fiber Node
MD.TV/WTC content
PC Rembrant II CLI NT
Shopping Content Andersen
PC Andersen
Mux Assend
E.F. Data modem
T-11 Ch. 24
G.I. Fiber Node
Andersen Banking
PC Andersen
Zenith modem
T-12 Ch. 27
AOL
PC
LANcity modem
T-8 Ch. 40
PC View point Video conf
Zenith modem
T-9 Ch. 37
T-7 Ch. 31
Sega terminal S-A
TV monitor
BNR modem NT Telephony
T-10 Ch. 97
TV monitor
Set-top box
EM-service unit
NT telephone
NT wireless telephone
NT telephone
NT wireless telephone
TV monitor
64 QAM demod HP
Ch. 35
EM-Home entry Box NT-Ed.
490-690
900-971
Monitor display
PC Apple MAC
EM-service unit


ROUTE 5
DS-3 coax
Fore ATM switch
AT&T workstation
Grass Valley Group Distance Learning
OC-3 SONET
OC-3 ring to Telstra booth
OC-3 ring
OC-48 ring Node 3 CableLabs booth connect to Telecom room @ conv. ctr.
OC-12 to Teleport via Multivision (local cable co.) 78 ch. feed from Multivision conv. ctr. Telecom room
OC-12 ring
Divicom
TRW workstation
Sun video server
NEC 5
OC-48 ring Node 2 CableLabs booth close to Oz room
OC-48 ring
Ethernet ports
E-1 Prodigy
E-2 DEC
E-3 Intel
E-4 AOL
E-5 Prodigy
E-6 CompuServe
E-7 CableLabs kiosk
E-8 Andersen
E-9 Jones MEU
Ethernet ports
CableNET Cisco router 7000
Sun video server
CableNET WWW/DNS server
(3) T-1's
Internet Provider GTE Sprint
POTS to CableLabs Kiosk modem
POTS to SSOC POTS
POTS line to 14.4 modem in Kiosk
Tandem GTE ISM 2000 Network ring
Corning fiber management
OC-48 ring Node 1 NTI booth Network Survivability
OC-48 ring
(2) phone lines to ADC
Philips Broadband Optical FOTX
ISDN
2
ISDN connect to Rochester NY
T-11 Ch. 42
E.F. Data modem
Philips server
T-12 Ch. 41
Zenith translator
Zenith modem
Kodak bridge
Kodak personal imaging
Zenith modem
CompuServe gateway
T-7 Ch. 39
DEC translator
Video server
Connects Oracle booth
T-8 Ch. 36
Zenith modem
PC Viewpoint
T-9 Ch. 27
LANcity translator
LANcity modem shared T-1
Jones MEU server
T-10 Ch. 78
Signal combiner
Input/output FPN booth
Signal inserter
Incoming RF
Multivision
Unisys Pacific Broadband Node D
Tandem terminal
Tandem terminal
To Cisco router
Translator
SSOC - data CableLabs Kiosk
Translator
SSOC C4 Unisys
POTS to NT DMS - 500
Translator 1
SSOC POTS
Signal inserter
Incoming RF
Multivision
Node E ADC Optical TX/RX
HDT
Signal inserter
Incoming RF
Multivision
Coax to NT booth
Multivision fiber node
Feeds to all CableNET nodes
To NT DMS - 500 telephone switch
Philips CD interactive
PC Compuserve
EF Data modem
Zenith modem
Zenith modem
PC Viewpoint Video Conf.
T-11 Ch. 42
T-12 Ch. 41
T-8 Ch. 37
Node C
Philips Fiber Node
T-10 Ch. 80
VIU-D FPN
Phone
T-7 Ch. 39
DEC modem
PC Oracle
Set-top box Oracle
Monitor
JVC
PC
Set-top
Monitor
VTR
PC
JVC Video Server
Encoder
T-9 Ch. 34
LANcity Modem
PC Jones MEU
T-12 Ch. 41
Zenith Modem
PC Kodak Personal Imaging
Ch. 17
CableLabs kiosk
14.4 phone modem
T-7-12
SSOC Unisys
CableLabs kiosk
StarSight
Monitor/ VCR
Antenna
Node D
Unisys Fiber Node
Wireless SS
Ch. 4
SSOC POTS 70-20 MHz
Fax
Ch. 12
SSOC Unisys
Monitor
Stand Alone
CDI Zing systems
PC Zing systems
TV monitor
Node E
ADC Fiber Node
ADC modem Homeworx
T8-T11 732-750
PC - Data
Video
Telephone



Andersen
AOL
SeaChange
C-Cube
Grass Valley
General Instrument
Motorola
Northern Telecom
Your Choice TV
IBM / Eduport

Scientific-Atlanta
Northern Telecom
IBM / Prodigy
Prevue
Teltone
Ingenius
Viewpoint
Digital Equipment Corp.
Hewlett-Packard
CLI
Intel

Jones / MEU
Philips
FPN
Kodak
Oracle
JVC
Sun Microsystems
CompuServe
Viewpoint

Unisys
StarSight
Zing Systems
CableLabs kiosks

ADC
AT&T
TRW

Northern Telecom
Corning / Siecor
DiviCom
LANcity
U.S. Computer Services / Cable Data
Cisco
Tandem
Tellabs
Fore Systems
NEC
CableNET W.W.W. server

This year, more than 50 companies participated in CableNET '94. Here are the participants and what they provided:

• **ADC Telecommunications demonstrated a multiplatform infrastructure, supplying a hybrid fiber/coax transport system for delivery of video, data and telephony. Contact: Kevin Johnson, mgr. marketing communications, 612/946-3081.**

• America Online showcased its consumer-based online service enhanced with pictures, sounds and full-motion video for delivery over high-speed broadband networks. Contact: Lyn Chitow, director, corporate development, new technology, 703/448-8700.

• Andersen Consulting demonstrated its prototype services integrator, Interactive World, which offered a user-friendly graphical user interface; also, the Virtual Bank Branch demonstration created by Andersen Consulting's Infocosm Multimedia Factory. Contact: Diane Lenz, 303/291-9191.

• AT&T showed ATM-based videoconferencing via its remote GlobeView 2000 Broadband system located in the AT&T booth. Contact: Susan Friedman, market manager, 908/224-3070.

• Belden provided network support equipment in the area of coaxial lines and interconnects. Contact: Al Bierman, product marketing specialist, 317/983-9100.

• CableData/U.S. Computer Services showed how its business support systems can manage the many services anticipated for the advanced communications networks and display pertinent billing information on a customer's TV set. Contact: Ed Means, telecom industry marketing manager, 916/636-5836.

• C-Cube demonstrated Video RISC MPEG real-time encoding and decoding. Contact: Scott St. Clair, manager, corporate communications, 408/944-8106.

• Cisco Systems Inc. demonstrated with LANcity the first cable TV multiprotocol Internet working platform to form a high-speed metropolitan-area network using the cable network backbone to connect LANs and WANs. Contact: George Abe, product development manager, 310/444-9204.

• Compression Labs Inc. utilized real-time compression and decompression in a demo of interactive television. Contact: Susie Ughe, 408/428-6788.

• CompuServe showcased network connectivity for home and work via a broadband network, with connections to the CompuServe Information Service, remote local area networks and the Internet. Contact: Jeff Miller, director of R&D, 602/790-5061.

• Corning/Siecor provided a headend fiber system and the fiber optic cabling. Contact: John O'Hare, cable TV marketing communications manager, 607/974-7488.

• Digital Equipment Corp. provided collaborative network connectivity (videoconferencing, white board, concurrent Computer Aided Design, and file transfer facilities) through the Internet to ECNet in Phoenix, Ariz. (ECNet is the collaboration between Times Mirror Cable, Arizona State University and Digital). Contact: Jim Albrycht, senior consultant, emerging network technology, 508/486-5494.

• DiviCom demonstrated interactive configuration and control of an MPEG-2 audio, video, multiplexer and decoder system using Simple Network Management Protocol (SNMP) through a network (Ethernet). Contact: Robin Wilson, product manager, 408/944-6700.

• Eastman Kodak demonstrated remote access to network storage of personal images and accessing these images for creating personal/creative items (gifts, art, etc.). Contact: Steven Shaffer, 716/726-3337.

• First Pacific Networks showcased equipment that allows a cable television system to carry telemetry data for energy management communications between the home and an electric utility data center in the same 6 MHz channel as telephone communications. Contact: Todd Benjamin, director of engineering support services, 408/943-7600.

• FORE Systems demonstrated ATM networking with a 2.5 Gbps, non-blocking, second generation ATM switching fabric. Phone 412/772-8686.

• General Instrument demonstrated DigiCipher II and MPEG-2 decoding using a dual mode set-top, verifying interoperability of the decompression technology. Contact: Fritz Amt, project leader, multimedia marketing, 215/957-6748.

• Grass Valley Group demonstrated videoconferencing and educational applications for remote video and data control, switching and storage. Contact: Michael Goodwin, marketing support manager, video transport systems, 916/478-3366.

• Hewlett-Packard demonstrated the transmission of compressed digital video, using a Broadcom Corp. 64 QAM (Quadrature Amplitude Modulation) system that resides on a Very Large Scale Integration (VLSI) chip set. Contact: Bill Koerner, senior industry consultant, 408/553-2917.

• IBM used an IBM media server and the CableNET broadband network to demonstrate advanced multimedia education applications, and, in conjunction with Prodigy, showed a "video-enhanced" interactive on-line service. Contact: Jeff Ramminger, program manager, interactive TV marketing, 404/238-3149.

• Ingenius showcased its interactive "What on Earth" multimedia education and information service for use in school and home learning over a broadband network. Contact: Lisa Tyng, 303/267-5800.

• Intel showed a high-speed data service, and technologies which demonstrate the flexibility of the home PC as the ubiquitous interactive home appliance. Contact: John Mascarenas, cable marketing division, 602/554-4965.

• Jones/Mind Extension University displayed education on-demand as a revenue stream and Internet access to education/courses. Contact: Steven Gorski, VP advanced development projects, 800/784-8044.

• LANcity provided a 10-Mbps symmetrical and manageable cable TV modem for data communications over the existing cable TV infrastructure for citywide use of on-line services and Internet connectivity. Contact: Rouzbeh Yassini. 508/475-4050.

• Motorola demonstrated wireline and wireless cable telephony solutions, as well as Ethernet data and full-motion video over the hybrid fiber/coax broadband network. Contact: Ralph Behrens, marketing manager, cable-telephony, 708/632-5403.

• NEC America demonstrated the capabilities of its Model 5 ATM switch, which supports LAN and video distribution applications. Contact: John Misukanis, product planner, public switching group, 214/518-5215.

• Northern Telecom showcased narrow and wideband switching, PCS over coax, dialable bandwidth on demand over coax, Cornerstone voice and data and Sonet backbone services. Contact: Tanzy Wallace, senior manager, complex opportunities, 615/734-4295.

• Oracle demonstrated interactive television services, including shopping, entertainment on demand, interactive learning and interactive information services. Contact: Kate Kelly, director, new media, 415/506-7132.

• Philips Broadband Networks displayed interactive video applications over the broadband network based on the Consumer CD-I (CD-Interactive) player. Contact: Graham Carter, major accounts manager, 315/682-9105.

• Prevue Networks showcased a gateway navigator and an on-screen program guide. Contact: Michael Feinner, 800/447-7388.

• Prodigy contributed its on-line interactive services, including a prototype application incorporating full-motion MPEG compressed video from an IBM media server, with high-speed access for the consumer over the CableNET broadband net. Contact: David Waks, 914/448-8868.

• Scientific-Atlanta demonstrated its end-to-end solution for advanced service delivery on future hybrid fiber/coax networks. Contact: Robert Luff, chief technical officer, 404/903-5850.

• SeaChange Technology demonstrated MPEG encoding, distributed scheduling and advanced digital advertising insertion. Contact: Ed Delaney, 508/287-4499.

• StarSight Telecast showed its on-screen program guide and one-button video recording service. Contact: Lee Jensen, 510/657-9900.

• Sun Microsystems showed the functions of Level 1 and 2 gateways to the network, resource management, and the use of ATM technology for control and audio/video distribution over the broadband network. Contact: Jim Kaubisch, technologist, 415/336-0323.

• Tandem/GTE demonstrated single-source network and customer management capabilities, live service provisioning, and event monitoring of multi-vendor networks. Contact: Andrew Baker, manager, business development, digital media networks, 402/894-1139.

• TCG-Teleport provided broadband alternate access connectivity, nationwide. Contact: J. Curt Hockemeier, VP affiliate services, 303/267-1701.

• Tellabs showed ATM-based videoconferencing. Contact: John Carroll, supervisor, field east, 708/512-8225.

• Teltone demonstrated cable-based telephony alternate access subscriber choices. Contact: Kermit Ross, VP sales and marketing, 206/487-1515.

• TRW showcased remote imaging and computer graphics through high-speed networks and servers. Contact: Lori Henderson, marketing communications, 310/764-9483.

• Unisys showed its spread spectrum technology for digital services delivering high-speed data over coax, standard telephony over coax, wireless rural telephony and a hybrid fiber/coax network. Contact: Tom Posz, senior marketing support consultant, 510/613-1358.

• Victor/JVC showcased an MPEG-2 server system showing video on demand. Contact: Neil Neubert, manager advanced technology products, 201/703-4041.

• Viewpoint showed multipoint videoconferencing and a laboratory example of dynamic software video compression and decompression. Contact: Richard Penn, 214/488-7198.

• Your Choice TV demonstrated content delivery service that allows viewers to order and watch popular television programs at their convenience. Contact: Dave Rudnick, 301/986-0444.

• Zenith demonstrated the provision of data communications over hybrid fiber/coax with a variety of work-at-home and distance learning applications. Contact: Timothy Frahm, product manager, network systems, 708/391-8905.

• Zing/Antec demonstrated interactive television utilizing Zing's encoded program and the Zing decoder. Participants were given the option to interact with three to five encoded programming selections of their choice. Contact: Susan Marshall, SVP technology and operations, 303/488-2512.

ADC Telecommunications and its American Lightwave Systems subsidiary are providing the network infrastructure for the information superhighway. ADC has become one of the few suppliers offering end-to-end transport solutions to customers building broadband video and telephony networks. A number of cable television and telephone companies have validated ADC's hybrid fiber/coax architecture–and its role as a dependable systems supplier–by installing the company's equipment to support services such as video-on-demand, video dialtone, digital video, distance learning and videoconferencing, as well as traditional telephone and cable TV services.

The company continues to develop, acquire or partner in order to enhance its portfolio of technologies and enable its customers to deliver competitive services using cost-effective and reliable solutions.

Contact: Kevin Johnson, Manager, Marketing Communications. **612/946-3081**

General Instrument leads the world in end-to-end broadband telecommunications systems, starting with digital compression technology and ending with advanced analog and digital set-top terminals. The GI system delivers voice, video and data via the Broadband Telecommunications Architecture, the evolutionary system GI designed.

GI's bicentric LinX™ approach to interactivity enables subscribers to use either personal computers (PC LinX) or television sets (TV LinX) for interactive services. General Instrument is also renowned as the world leader in addressability. GI's full range of analog and digital set-top terminals ensures subscribers the latest innovations and consumer-friendly technologies.

GI committed technology and management resources to CableNET '94 to demonstrate the power of the hybrid fiber/coax network and demonstrate the interoperability of compression technologies through GI's DigiCipher® II compression system.

Contact: Dan Moloney, VP Addressable Systems. **215/674-4800**

Intel Corporation is developing technology that adds new capabilities to PC communications. The Intel CablePort™ (PC to broadband cable) adapter, ProShare™ PC-based videoconferencing and Pentium™ processor-based multimedia servers for video-on-demand are all examples of new PC communications technologies that make the PC the premier interactive platform. Additionally, Intel's microprocessor architecture is the brains of new cable TV set-top designs enabling low-cost, high-quality graphics and "smart TV" features, including on-line navigation tools. Intel is exploring all communications vehicles including cable, telephony and ISDN.

Intel is working with industry leaders to develop standards which will make it easier to proliferate these new products and technologies. Intel has been a major participant in such industry events as CableNET '94, where it was a member of the management team and a technology supplier in the event.

Intel is currently working with several North American cable operators and a number of on-line services/content providers to field test PC communications technologies and networks.

Contact: John Mascarenas, Cable Marketing Division. **602/554-4965**

Northern Telecom was pleased to be one of the major sponsors of CableNET '94 and congratulates CableLabs and CCTA on its success. The exhibit allowed Northern Telecom to demonstrate its ability to integrate complex, multivendor networks. Northern Telecom is committed to delivering Total Network Solutions for its customers–from industry-leading hardware to operational support systems and the manpower and networking expertise to put complete networks together, run them, maintain them and help sell the services they make possible.

CableNET, which featured Northern Telecom's DMS-500 switching platform and TransportNode OC-48 SONET ring, allowed Northern Telecom to demonstrate its Total Network Solutions in an environment that was in many ways more complex than real-world networks because of the tight time schedule and the number of vendors involved.

Contact: Tanzy Wallace, Senior Manager, Complex Opportunities. **615/734-4295**

Long a leader in developing high performance communication systems for the U.S. military, Unisys is developing a family of broadband commercial communications products with wide application in the cable television industry and wireless telephony markets. Unisys successfully demonstrated its spread spectrum wireless telephony product and digital cable services system as part of CableLabs' CableNET '94 exhibit at the Western Cable Show. This unique technology provides a robust, return path link that can make interactive cable and wireless telephony networks of the future a reality.

Unisys expertise in network engineering design and equipment integration provides telecommunication operators with the technical resources to develop systems and services as technologies converge to create new multimedia possibilities.

Contact: Doug Kuziak, Director of Broadband Services. 801/594-4422

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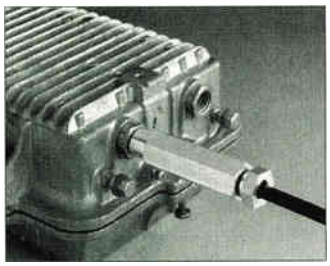

Siecor's OptiFit

Available in lengths up to 40,000 feet, the assembly eliminates additional splice points and hardware at the node. It includes two parts: the furcation unit, supporting 2-12 optical fibers in protective subunits; and the metal fitting that links the furcation unit to the hardware.

Also new from Siecor is the Modular Distribution System (MDS), which provides for ultra high fiber density while maintaining fiber management. The MDS is a single rack-height, full-front access shelf designed for 19-inch racks. Each shelf can accommodate multiple components, managing up to 36 interconnection points, up to 36 heat-shrink fusion splices and up to 24 optical splitters. A single 72-inch rack or cabinet can accommodate more than 1,400 fiber terminations and all associated splices and splitters.

Siecor introduced a family of optical fiber cable assemblies with ultra PC (physical contact) reflection performance, including SC, FC, D4 and ST compatible connectors. Providing a guaranteed reflectance of less than or equal to -55 dB, these new ultra PC assemblies offer high performance for data, telecommunications and video applications. Color-coded connector boots identify reflectance performance of singlemode connectors for system management. Typical insertion loss is less than 0.20 dB for a mated pair.

And finally, Siecor Corp. unveiled an optical fusion splicer called the X76, which weighs less than seven pounds and is fully automatic, with three-dimensional profile alignment and on-site loss calculation. Two cameras allow simultaneous viewing of the x- and y-axes, as well as fiber end-angles. At the touch of a button, the splicer cleans, aligns and fuses the fibers. Splice loss is then automatically calculated and displayed on an LCD.

Times Fiber Communications Inc. announced the availability of its T10 Coaxial Drop Riser Cables. The cables are suitable for use in vertical runs in shafts and from floor to floor in buildings, and have fire resistant characteristics which can prevent fire from carrying between floors. The cables conform to both SCTE and Bellcore specifications, as well as the requirements of the National Electric Code (NEC) Article 820-Community Antenna Television and Radio Distribution Systems. The products are listed by UL as Type CATVR.

New from Toner Cable Equipment was a 1 GHz drop amplifier, suitable for long cable drops. Toner also demonstrated its new series of round multitaps, which at 1 GHz in bandwidth fit into both round underground enclosures and the smaller pedestals used in today's underground cable plant.

The company also introduced its 1 GHz headed combiner and 1 GHz multitaps, which feature redesigned electronic circuits and surface-mount technology.

Test equipment

CM Technologies introduced a new PCI-3100 card to help cable technicians perform metallic time domain reflectometer (TDR) tests on cables and cabling components.

The card has a maximum range of 96,000 feet and a measurement rate of 6.4 giga-samples per second, said Greg Allen, technical director for CM Technologies. It comes with software for data acquisition and analysis, for both MS-DOS and Microsoft Windows environments.

The software lets technicians save and recall TDR waveform files for future comparison and gives them the ability to "zoom in" on any portion of a saved waveform for a more careful inspection. Another soft-

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ComSonics' Sniffer Jr and WindowLite Installer Meter

ware module lets technicians compare a referenced, "good" waveform to a newly acquired waveform.

ComSonics Inc. introduced the WindowLite Installer Meter, a signal level meter designed specifically for use by cable installers. The yellow-colored meter is waterproof and shockproof and delivers a full frequency range from 50 to 750 MHz. As the company demonstrated with the aid of a fish-tank, the meter also floats.

The user selects and sets six video carriers from the full tuning range available. WindowLite Installer clones can be easily produced using the available multicharger option.

ComSonics also introduced several other new products, including the Video Window, a handheld digital video multimeter; the TDR Lite, a modular addition to the WindowLite PLUS and Modularity line of test equipment; the SNIFFER I.D.; the GeoSNIFFER; and the Path Finder II, an underground cable locator.

Exfo E.O. Engineering debuted its new "Pocket Pal," a visual optical fiber fault locator that identifies problems on multimode and singlemode fibers via a bright red laser. The 800 µW source device is available at 635 nm or 670 nm with ST and FC style connectors.

Superior Electronics Group debuted its HE-1000 and PC-1000 spectrum analyzers, which enable operators to perform non-interfering distortion measurements (including CTB, CSO and in-channel frequency response and hum) at the headend or end-of-line at a frequency range of up to 1 GHz.

Specifically, the HE-1000 is a rack-mountable spectrum and modulation analyzer, designed for measurements including frequency, level, video depth of modulation and audio deviation.

The PC-1000 includes a frequency-agile RF modem for end-of-line monitoring and can be used in two-way systems for automated distortion tests, troubleshooting, system diagnostics and alarm monitoring.

Also new from Superior: its LC-1000, 1 GHz end-of-line monitor developed for status monitoring applications like checking RF levels and subscriber signal quality. The device can be located just beyond fiber nodes or at termination points and includes a frequency agile RF modem and an RS-232 port for data access in the field.

Tektronix has announced the immediate availability of a wide range of measurement devices critical to the rapid development and deployment of personal communication services (PCS) in North America. For example, PCS mobile phone and base station manufacturers can design and verify compliance with the DCS (digital communication services) 1900 standard. Also, PCS service providers can use the new equipment to maintain DCS 1900 equipment and verify multi-vendor interoperability. The new measurement capability is an outgrowth of Tektronix's year-old strategic alliance with Rohde & Schwarz, a supplier of measurement equipment for PCS in Europe.

Specifically, Tektronix is now shipping the CMD series of digital radiocommunications test sets, including a mobile phone and base station test set; the CRTP series digital radiocommunications test systems, including mobile phone, base station and combination mobile/base station test system; and a broad range of general-purpose instrumentation, including signal processors, power meters and spectrum analyzers.

Wavetek unveiled companion products to its Stealth System Sweep product, including its StealthWare software and a reverse sweep option. The reverse sweep component, available as an option to Wavetek's Stealth System Sweep, includes a built-in transmitter which communicates with a headend transmitter.

Wavetek introduced companion products for its Stealth System Sweep product

When a reverse sweep is activated from a field test point, the headend transmitter receives the telemetry signal identifying the unit, the frequencies being swept and the timing information. The headend transmitter measures the sweep and sends the results back to the field receiver. Wavetek's new StealthWare software is compatible with Microsoft Windows and provides analysis, reporting and archiving capabilities for cable managers, engineers and technicians.

Other news

ADC Telecommunications and Tektronix Inc. announced they will jointly provide broadband network measurement and monitoring products to telecom and cable operators, through a memo of understanding. In the deal, the two companies plan to develop and manufacture broadband systems to manage, test and monitor the physical plant integrity and signal transmission quality.

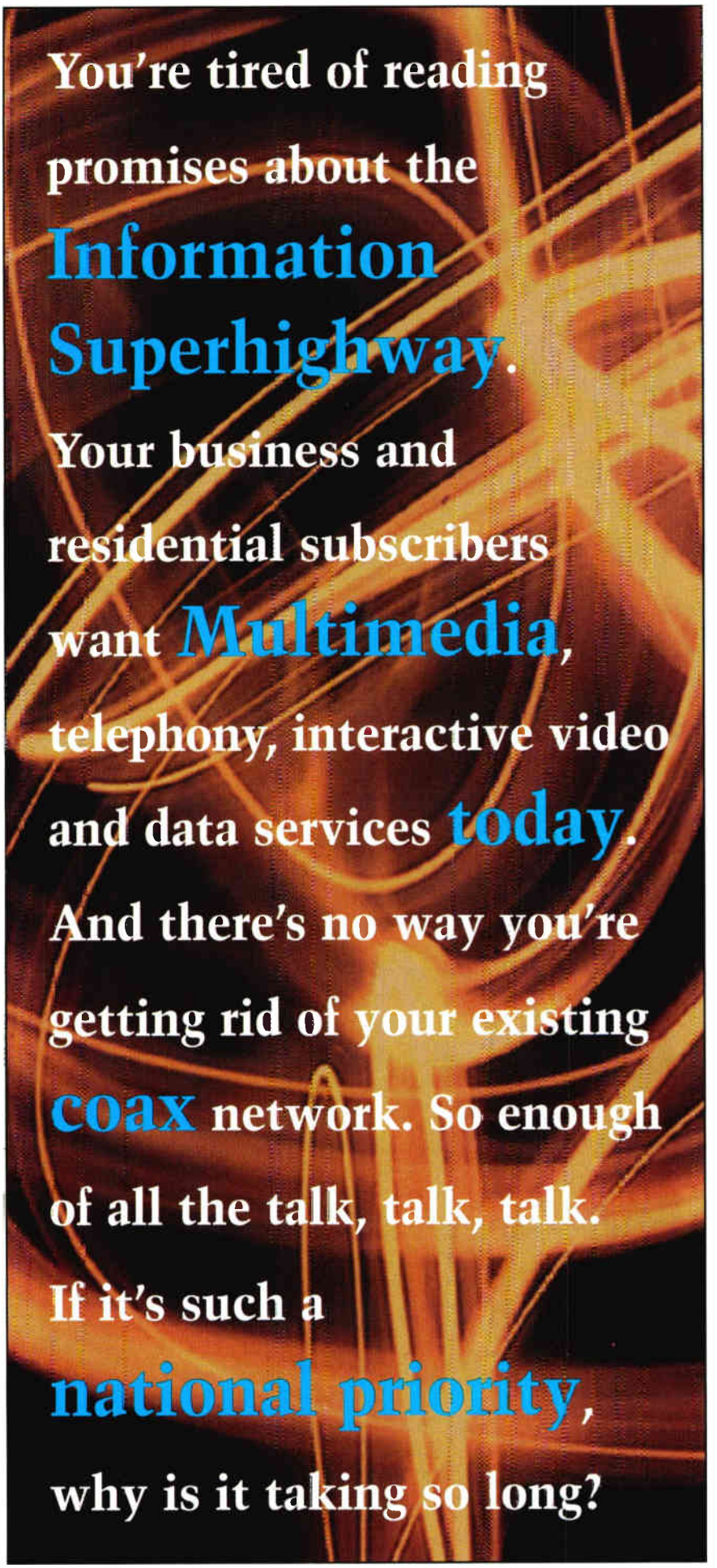
Meanwhile, ADC subsidiary American Lightwave Systems inked a $2 million order from Viacom Cable for its San Francisco Bay area upgrade. In the deal, ALS will provide digital transmission gear over the next two years, as Viacom upgrades the Bay area system into an optical ring that spans about 250 miles. The network will use ALS' DV6000 digital transmission system, which operates at 2.4 Gbps and simultaneously transports up to 16 channels of digitized broadband traffic, said ALS executives. The ring will start at Viacom's Pleasanton, Calif. headend and will connect headends in Napa, Petaluma, Pinole, Pittsburg, San Francisco and San Rafael. Viacom will use it to carry its corporate telephony, MIS and customer service traffic.

Viacom also announced it will purchase more than $5 million worth of amplifiers from C-COR Electronics Inc. Viacom will install the amplifiers at several of their locations around the country. The equipment package will include 750 MHz FlexNet trunks, bridgers and line extenders, as well as 550 MHz trunks, minitrunks and line extenders.

Increasing demand for coaxial drop cable has resulted in CommScope announcing the construction of a new cable manufacturing plant in Scottsboro, Ala. The new facility will be state-of-the-art, according to CommScope, and will employ more than 150 people when production starts in mid-1995.

In addition, CommScope has announced it now complies with ISO 9001 - ANSI/ASQC Q91 for the design and manufacture of coaxial drop cable, coax distribution cable and fiber optic cable. Also, CommScope's product line catalog has been put on computer diskette.

SkyConnect Inc. announced that it has been chosen as a technology partner by America Online Inc. for delivering enhanced multimedia services and cable modem trials. SkyConnect will work with America Online to provide tools for information providers to create and distribute content to video servers through the SkyConnect network. SkyConnect has developed proprietary technologies for delivering, storing and playing back digital video files for cable operators, programmers and online service providers. CED



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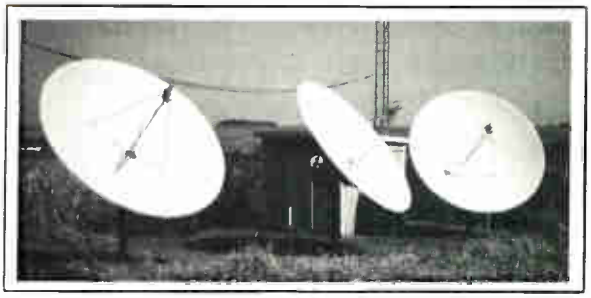

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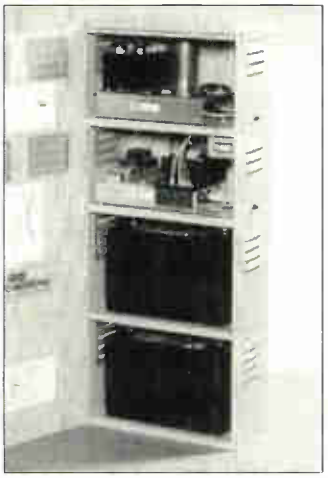

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A valuable asset to cable systems

The need for support systems

By Gregory Hardy, Director of Marketing, Transmission Products, Scientific-Atlanta

A key part of a cable operator's strategy in preparing for new business opportunities and competition has been the upgrade of the network. The 750 MHz hybrid fiber/coax networks now being constructed provide a reliable infrastructure in which to launch rapidly approaching digital and interactive services. For today, the cable operator realizes a dramatic improvement in network reliability through heavy deployment of fiber optics, shorter cascades of resilient RF amplifiers, and standby power supplies.

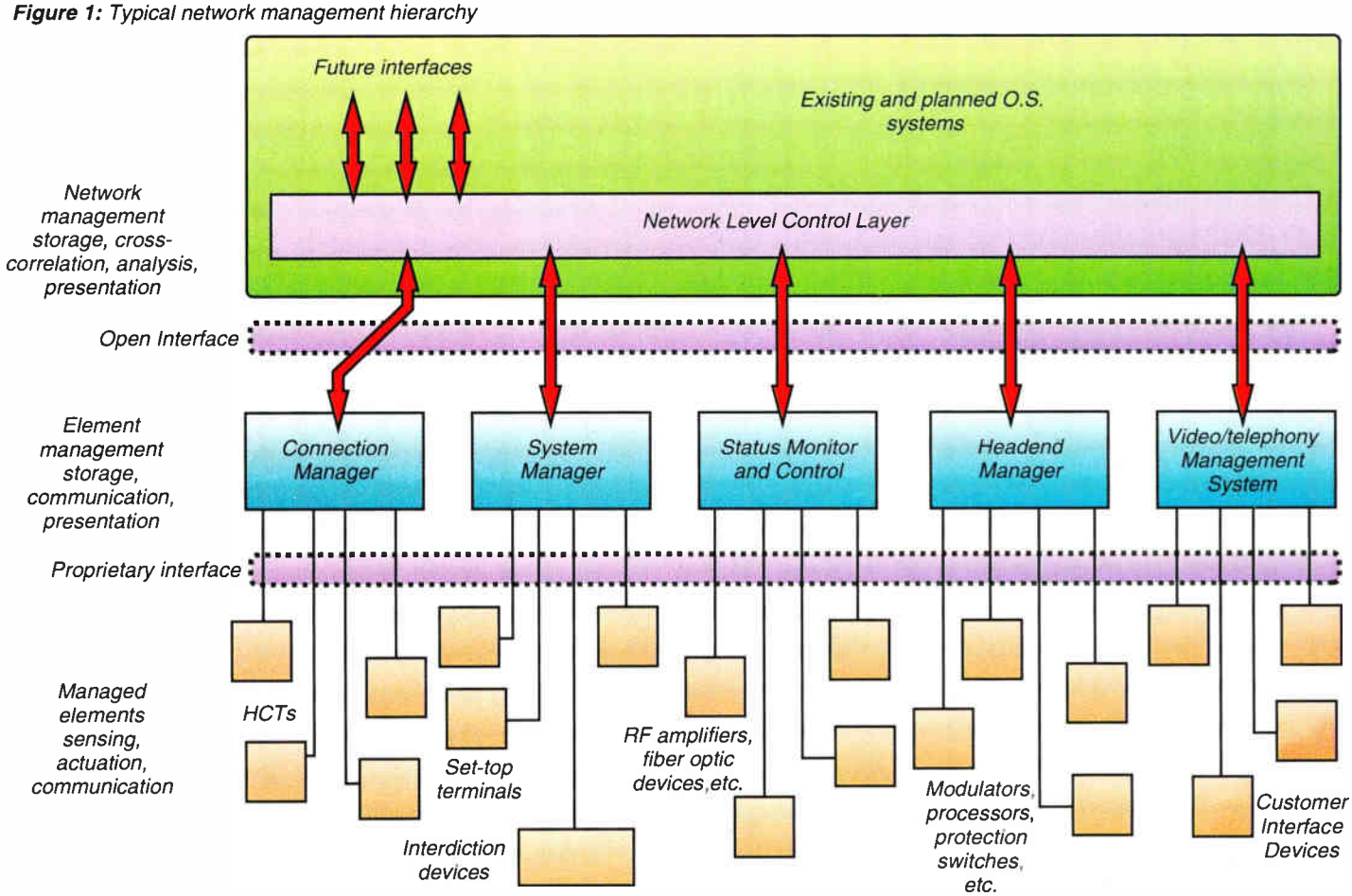
In addition, a growing number of MSOs are installing status monitoring or "element manager" systems to monitor system performance in the headend, and/or fiber optic and distribution plant. Typically, element managers and transponders or managed elements are provided by the equipment manufacturers. Element managers are able to improve system reliability by: (1) monitoring performance trends and turning potential outages into routine preventive maintenance, and (2) in the event of an outage, quickly locating the trouble spot and the nature of the problem. If cable is to move toward 99.99 percent reliability (53 minutes downtime per year) which is necessary to compete in the interactive voice, video and data markets, then these types of issues must be addressed.

To take it a step further, operators are currently utilizing sophisticated addressable control and billing systems to manage the subscriber interface and transactions. Shortly, the MSO will begin to add video file servers, interactive digital and telephony equipment, and perhaps ATM switching that will dramatically increase the complexity of the system. Chances are this new equipment will be sourced from a wide variety of vendors, each with its own element manager control system. These pieces must be integrated into one highly reliable, transaction oriented full service network. Each element manager must be able to talk to the other (cross-correlate) to ensure coherent system operation. Herein, lies the basis for an Operational Support System (OSS).

Key requirements in OSS

An OSS must first interface with existing element managers and managed elements. A

Figure 1: *Typical network management hierarchy*



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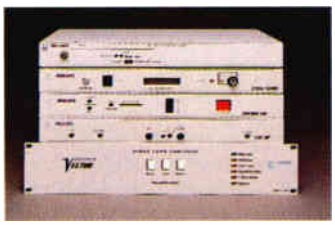

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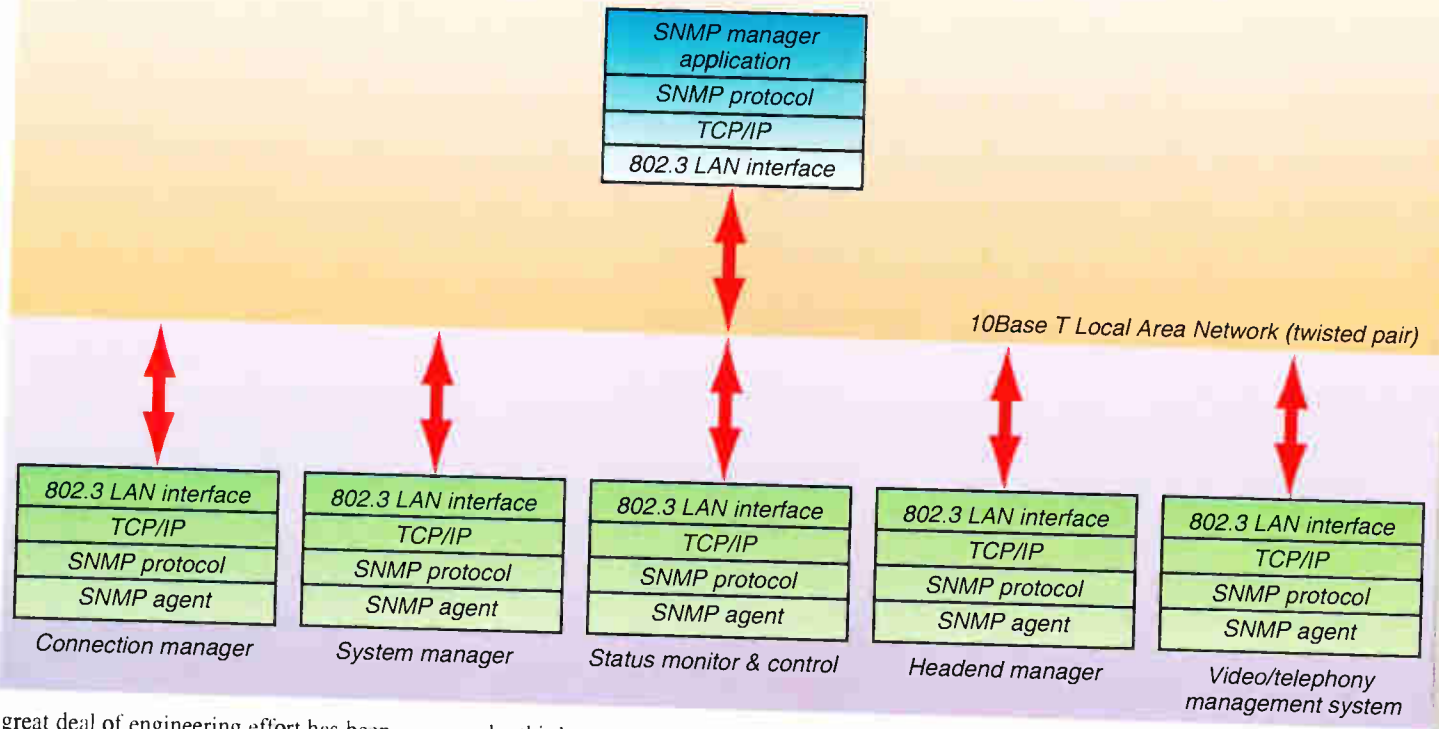
Figure 2: Implementation of interfaces and communications protocols



great deal of engineering effort has been placed into these subsystems in order to maximize their capabilities and effectiveness. This way, the manufacturer of the element manager is free to upgrade its features and capabilities to quickly respond to customer needs. Furthermore, the ability to continuously evolve the element manager ensures a strong foundation for higher-level network management.

Depending on network sophistication and number of overall subsystems, total OSS deployment ight require ears

OSS requires an open, published interface on the element managers. This approach contributes to overall interoperability and allows the operator a choice of OSS vendors, ch as system lists, pro- ware nager e system e new ser- e developed by third-party vendors. One view of a typical hierarchical OSS is depicted in Figure 1.

The value in OSS

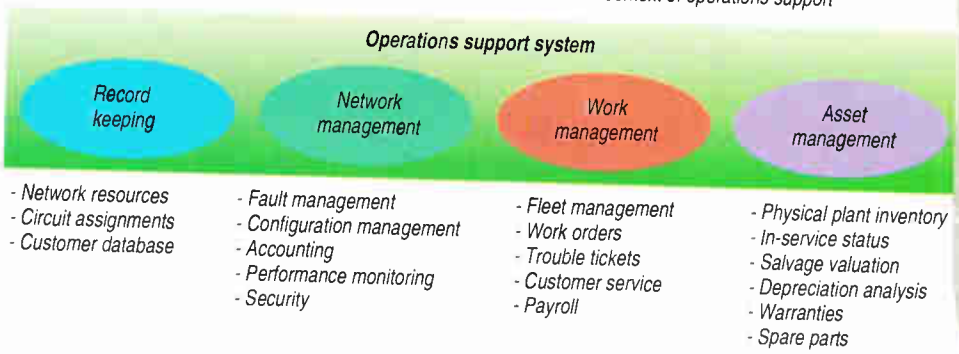
As systems grow in complexity, it becomes impossible to manage the components individually. OSS should provide a modular approach to operations monitoring, access and service provisioning that will lead to higher reliability and improved customer service. OSS helps reduce operating costs through efficient resource (labor and materials) management, because cable spends a significant portion of its annual revenue on operations and maintenance. Finally, an OSS allows the MSO to develop "advanced business applications." Utilizing standard data accessed from the OSS, the MSO can develop specific programs and utilities that will enhance business management in the areas of customer service, engineering, operations and quality/compliance.

Getting started

Setting up an OSS will not happen overnight. Depending on network sophistication and number of overall subsystems, total OSS deployment might require several years; however, much can be done now. Consider a three-phase deployment of OSS.

Phase I requires a common industry interface to the existing element manager systems. One approach is shown in Figure 2. Each element manager must be fitted with an Ethernet card that will support the IEEE 802.3 interface to a 10 Base T Local Area Network. TCP/IP (Transmission Control Protocol and Internet Protocol) software will be used for messaging control between the network manager (or OSS) and element managers. IP will define the

Figure 3: Advanced business management applications defined within the context of operations support



addresses of the element managers. Utilize the SNMP (Simple Network Management Protocol) standard to define the structure of messages between the network manager and element managers. The proprietary information in the element manager must be converted to a standard format or MIB (Management Information Base) accessible by peers or network management devices. Phase I, once complete, provides authorized information accessed for any viable network management or OSS solution.

Phase II involves the creation of a "network management platform" with which to import element manager data and functions. Phase II provides network mapping functions to give the operators end-to-end visibility. Development of this network management layer simplifies information access, provides reach-through capabilities to the element manager layer and, most importantly, provides network intelligence by cross correlating information received by different functional areas of the network.

Once this flexible OSS structure is in place, adding another subsystem becomes straightforward

Phase III is the development of advanced business management applications. It is at this point the MSO recognizes the competitive operational value of the OSS. As all of the information is available to this level in a consolidated and open format, one may contract any software company to develop business application packages specific to their system needs. Figure 3 suggests some real-world application possibilities such as engineering, customer service and operations.

Just imagine

Advanced business management applications allow the integration of third-party applications such as fleet management or custom operations and maintenance packages. The ability to graphically display plant electronics monitoring, cross-correlated with CAD system data, would be immensely helpful in isolation of outage problems. The overall ability to cross-correlate between element managers via the network manager provides many possibilities for improved customer service and system reliability.

Once this flexible OSS structure is in place, adding another subsystem (file server, interactive service, etc.) becomes straightforward. The element manager for the new subsystem will contain an open interface that can talk to the existing NMS or OSS. The operator need only update and modify the NMS business applications program to recognize the new subsystem.

As one prepares to move into the interactive voice, video and data era, serious consideration should be given to an OSS. Lower operational costs, increased system flexibility and improved customer service are major assets to cable. CED

Acknowledgments

Also contributing to this article were: Richard Clinage, marketing manager; and David Slim, staff applications engineer, transmission products, Scientific-Atlanta.

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Hardware is real; MSOs begin to commit

Industry regains some momentum

By Fred Dawson

The cable industry, much in need of revitalization in the wake of a year's worth of regulatory setbacks, may have got the boost it needed at the Western Show last month.

Where, on a superficial level, the exhibit floor offered the same tech-infused razzledazzle that has long been stock and trade at big cable conventions, there was a huge difference at this year's gathering in Anaheim, marked not only by major technical advances, but also by major MSO commitments to applying this newfound technical muscle in the marketplace.

One sign of the quickening in industry activity could be found at a little-noticed booth in a far corner of the exhibition center, where Sprint and its four MSO partners in a still-unnamed telecommunications consortium entertained a parade of MSO CEOs eager to learn more about the deal the group wants to cut with them.

"There's been a tremendous amount of interest as people get a better idea of what we're proposing," said David Woodrow, senior vice president of broadband services for Cox Cable Communications, a member of the consortium along with Tele-Communications Inc. and Comcast Corp. "They're starting to realize we're talking about spending what almost seems an obscene amount of money on networks."

Big money on the table

Indeed, the news that the consortium had antied up $118 million as the largest downpayment on PCS spectrum of any prospective bidder served notice that the group was going for broke in the transformation of networks, starting in '95. Taking into account announcements by other MSOs of telephone and PC data service trials, and a new commitment to digital television by Cablevision Systems Corp., hype, it seemed, was finally ready to give way to some sort of new reality, though what the business parameters would turn out to be was anybody's guess.

Nobody was more vocal in underscoring the riskiness of what lies ahead than Tele-Communications Inc. CEO John Malone, even as he argued for concerted action on network expansion. "Just because some guys are coming in and spending a lot of money doesn't make what they're planning to do a sound business proposition," Malone said at one point in an exchange with conference goers. He dismissed video on demand as the key to winning in a competitive marketplace anytime soon, telling an opening day crowd, "Right now, the jury is out on whether the economics, if that's all you're going to do, are going to support the infrastructure to provide it."

But, of course, neither Malone nor cable's competitors are talking about VOD as the sole purpose behind their vast capital outlays. Speaking at the same session, US West Chairman Dick McCormick said, "I think there's plenty of evidence that all of the little piece parts that are in play are coming down very nicely."

The pieces were widely in evidence at the show. "You go through years of hearing about the wonders of technology, and then suddenly, it all seems very real," said Shellie Rosser, vice president for multimedia strategies at Antec Corp. "That's what's happening here."

Making telephony work

Judging by the traffic at the Sprint/MSO booth, this realization was widespread. Now that the technical vision was becoming reality, CEOs were ready to talk about ways to expedite network expansion.

"As it dawns on people that we're talking about giving them the revenues to put the networks in that will allow them to compete in all these business areas, their enthusiasm for the concept goes way up," said Woodrow. "We offer everyone a means to achieving the economies of scale that match the competition."

But there's an important technical condition on the deal, he added. For operators to obtain capital recovery from the consortium on an annual basis, they must agree to build to rigorous specs, including meeting Bellcore standards for reliability.

The good news, Woodrow said, is it is now feasible to build this way at realistic costs. Cox Cable, for example, is going to a double ring fiber distribution configuration, which provides route redundancy to coaxial interfaces, while offering a cost-effective way to exploit optical bandwidth for future service expansion.

Woodrow said the cost analyses so far indicate such a network is at parity with star/bus hybrid fiber/coax (HFC) designs, even without redundancy, which is very hard to accomplish over HFC. "So far, in three areas where we've applied the dual-ring design, two showed cost savings of $3 million each (over traditional HFC), and one showed about $4 million in additional costs," Woodrow said. "There's no reason not to proceed."

But there was wide agreement that adding voice to the HFC system would not occur overnight. In New York state, this was problematic, given the opportunities cable operators have under new telecom rules.

Cablevision Systems Corp., which wants to launch a trial of residential telephone service on Long Island in this quarter, is having trouble finding a supplier, said Joe Cece, president of the MSO's Lightpath telephone subsidiary. So far, he said, no vendor has been able to

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guarantee delivery of the headend and side-of-house hardware that will make it possible to provide telephone service on a schedule that anticipates commercial rollout by the fourth quarter. "We're looking at a number of possibilities," Cece said. "It's really a matter of finding one that we can work with in that timeframe."

Beyond having enough gear to support a limited market trial, Cablevision must also have access to a high volume of gear at reasonable prices before it can move to commercial rollout of telephone service, Cece noted.

Cablevision plans to deploy some 20,000 AT&T set-tops by year's end.

"Long term, we're going to see the kind of prices we need to support competitive service," he said, "but, again, it's a question of timing."

Costs would be too steep for long-term viability at $500 per customer for the headend and home-mounted termination equipment that's required to put voice onto HFC systems, Cece said. But it could be awhile before vendors achieve this level, let alone go lower.

Equipment hitches?

Scott Bachman, vice president for operation technology products at Cable Television Laboratories, suggested it would be at least a year before the cable industry could begin deploying telephony over HFC networks on a commercial basis. "No vendor company wants to say they don't have the capability of supplying equipment for trials (in '95)," he said. "But for these things to really shake out, we're probably dealing with an 18-month timeframe."

Bachman said the fastest path into cablephone services appeared to rest on low-cost adaptation of next generation digital loop carriers (NGDLCs), the optical feeder transport systems now in deployment over telephone star/star topologies. As a case in point, NewChannels Corp., pursuing the fast track in New York, plans to begin testing the NGDLC-based Cablespan 2300 system supplied by Tellabs Operations Inc., starting this month with service to some 30 NewChannels employees and following up with a market trial in the second half of '95.

Bachman said some operators are looking at a straightforward NGDLC adaptation without requiring that a migration path toward cell-based transport be incorporated into the system. He said a second option supports an NGDLC migration path built around a dynamic frequency allocation capability in the headend, which supports evolution from a frequency-divided mix of time-division and cell-relay digital transmission channels to an integrated cell-relay approach.

There are also varying degrees of MSO interest in two other design options, Bachman said. Given the pace of development in the cell-relay system known as ATM (asynchronous transfer mode), some cable companies are planning to build their entire digital platform around ATM, Bachman noted, even if it means getting a slower start. And others, he added, are looking at providing the upstream path over the air, via fixed wireless access systems employing cellular or PCS spectrum.

"The issues are price points and timing," Bachman said. "There's a lot of merit in migrating as quickly as possible to some kind of cell-based transport. But maybe, for some people, trading off some network efficiency for market position in the front end is less risky, even if it means having to go back in later and reconfigure things to accommodate cell transport."

Fast starts in PC and VOD

Getting a jump on the competition is ever more on the minds of MSOs, with the result that similar compromises involving short-term shortcuts are being applied to launching LAN-extension, on-line and video-on-demand services. In fact, it could be that operators find ways to put expanded networks to use tapping these new revenue streams while they're waiting for the regulatory and technical issues to be resolved that will allow them to launch telephone services.

With PC-based services getting underway in some markets, MSOs will soon have a broader supply of cable modems to choose from, including new models from Hewlett-Packard, Zenith Corp. and Digital Equipment Corp., all of which take established LAN protocols into the CATV environment. MSOs now committed to launching PC-linked services commercially in the year ahead include Comcast, Continental (already underway in Cambridge), Jones and Cablevision, with many others slated to begin trials within that timeframe.

On the TV side of the digital service equation, DEC, Scientific-Atlanta, Northern Telecom and AT&T Network Systems have unveiled new approaches to digital TV designed to make end-to-end connectivity cost effective in '95. Several entities have reportedly agreed to put this gear to use, though on the cable side, only Cablevision has articulated its strategy in public.

"We're extremely confident the equipment will be available within AT&T's timeframe," said Wilt Hildenbrand, vice president, technology, at Cablevision Systems Corp., which plans to launch digital TV service by mid-year. "They were right on time with the first trial units, and the second batch may even be a few days ahead of schedule."

Cablevision plans to deploy some 20,000 AT&T set-tops by year's end. By adopting a custom-tailored, software-driven approach founded on AT&T Network Systems' alliance with Silicon Graphics, Cablevision will be able to add a digital-only layer of enhanced pay per view and video on demand to its analog service tiers in Long Island at reasonable costs, Hildenbrand said.

Going for all-digital

Hildenbrand said the key to launching digital services earlier than later is to get past the chicken-and-egg issues associated with using hybrid analog/digital boxes by concentrating on an end-to-end all-digital solution. "It's much easier to think about adding a digital service if you're not worrying about backward com-

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In addition, regulatory boundaries are shifting dramatically from previously limited competitive industries to a highly competitive environment, and not just between cable and telcos. DBS, with 150 digitally compressed program choices and a crystal clear picture, has already begun to offer a competitive challenge. Further, the FCC has changed the rules to encourage other wireless services like MMDS and 28 GHz.

So high-speed processing, low-cost memory and competition have sparked an era in telecommunications where there is a tremendous competitive opportunity for all existing network operators and service providers. It is risky not to learn and take advantage of these enablers, given the potential rewards.

Accordingly, there has never been a period when training of the telecommunications professional could be so critical to the success of the network operators. After all, one franchise, system technology, fleet of service vehicles, and collection of test equipment is much the same as another. What ultimately separates companies is the people who maximize the potential of all these attributes over the competition. So what are the essential elements in a training program that create the new broadband network technical professional?

Key elements of training

While the main elements of developing a training program remain constant, the approach or mindset in each of these areas must change in order to be effective in this competitive environment. Understanding the current training issues and practices will provide the basis for planning and implementing training and educational programs for emerging technologies that will succeed in building a world-class workforce.

Audience. The extent of those in the industry affected by emerging technologies will be broader than just bandwidth expansion, addressability or quality standards. Competition will affect all network/service providers, not just in urban or major metropolitan areas, but in rural areas as well. For example, DBS is already showing signs of affecting rural network operators. While many smaller operators could afford to wait out or completely sit out some of the past technology changes, these operators must upgrade their networks and workforce to remain competitive, or take advantage of recent FCC decisions for critically needed basic rate increases, if their systems are at capacity.

Subject matter/material. The core technologies are no longer simply being upgraded while others are being added. Many of the core technologies, such as analog bandwidth expansion, are now being replaced by multiple technologies, such as digital networks, switching and telephony, with which the current technical professional workforce has little or no theoretical or hands-on experience.

Further, jobs are changing, organizations are restructuring and new partnerships are forming. Now, more than ever, training plans should include programs that target not only the new technologies, but programs that address the human side of these changes as well. Skills learned in programs such as planning for innovation and change; stress management; becoming a service culture; communication; teambuilding; project management; and negotiating and selling skills are just as important to overall success as technology training on topics such as advanced fiber architectures or new powering models.

Instructional methodology. The still predominant information transfer methodology for emerging technologies is on-the-job training and self-discovery through trade journals, self-study and conferences that tend to present information very broadly. While these methods appear affordable and effective enough in the short-term, they typically do not provide either the broad foundation of understanding and comprehension of technologies, or the comprehensive coverage necessary for today's more complex and competitive world. It is a little like memorizing all the questions to the amateur radio test without really understanding the information on which the questions are based. Sure, you can pass the test, but can you re-engineer the basic parts to seek a critical advantage over others with the same objective?

If on-the-job performance becomes a pattern of memorized responses, how can success be achieved when technology is changing at the current rate? The questions change so quickly that without a more formalized technical foundation in math, electricity and electronics, digital and analog, tests and measurements, design, and theory of network and equipment operation, it is nearly impossible for the technical professional to keep up with the competition. And the competition is also placing great emphasis on professional training for their workforces. With the new services

'70s, satellite-delivered programming, addressability and scrambling were introduced. In the '80s, fiber appeared on the scene, as well as an overall updating of the core technologies.

Bandwidth was expanded at a phenomenal rate, amplifier technologies changed dramatically, and the comfortable tree/branch archi-

Figure 2: Outside plant technician -hybrid fiber/coax course

In addition, the following courses are available with no implied sequence:

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Fiber optic product overview

Fiber optic system operation and maintenance

Understanding hybrid fiber/coax design

that will be offered which require a higher level of network reliability than ever before, such as telephony and specifically, safety of life calls (911), formal education programs structured for the broadband technical professional will be required.

Multiple media delivery methods. The delivery of training must also be structured to meet the changing demands of the business and job requirements of the technical professional. Currently, many training sessions are delivered in an instructor-led format with varying degrees of interactive, hands-on exercises. Others are designed to be delivered in a PC-based format only. Each have distinct benefits to the learner based on the learner's style and

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immediate application needs.

In a recent survey by Scientific-Atlanta Institute, respondents indicated a strong preference for facilitated hands-on training. However, time away from the job and the costs associated with traveling to the training will continue to be inhibitors to accessing quality training without some means of bringing the training to the learner.

Although many companies seem to be seeking multimedia training delivery only to address those issues, a well-organized training plan would include multiple media designed to more effectively meet the learner's needs and business objectives. For example, in a single course like "Field Tests and Measurements," a knowledge-based and skill-based program could be presented over a period of time using distance delivery via satellite to introduce the theoretical concepts; computer-based delivery to practice math and distortion calculations; and facilitated hands-on delivery to experience actual field applications. Such a program could be tied together in between sessions through a direct Internet link with the facilitator.

The advantages of using this approach for an entire training plan are numerous. First, it enables the learner multiple methods of learning opportunities. For example, when learners attend a two-day seminar where there is no pre- or post-follow-up or interaction, they have little recourse to grasp the information if it does not transfer successfully within those two days. Second, studies show that there is a higher level of retention when information is presented in smaller units over time, rather than in one marathon session.

Third, the training is delivered specific to the information being taught. Where hands-on experience is required, which is still quite frequently for success in technical training, only that information is taught in that format. Where knowledge and concepts are required, alternate delivery methods can be used. Finally, more students can be trained on a regular schedule because time away from the job is reduced, and costs are controlled by delivering the training to the student.

Measurement and feedback. The primary goal of all training is to change or improve a behavior or skill set. It is not unusual now for learners to participate in a training event with specific goals and objectives and yet never be evaluated as to their successful attainment of those objectives. An area that will demand more focus in the overall training plan is measurement and feedback. Without it, there is no way to gauge the effectiveness of the training or to manage critical success factors such as hiring practices and performance reviews that must occur in the process of attaining a world-class workforce.

The certification process, both of training programs and demonstrated knowledge and performance, will gain increasing support as an effective measurement tool and drive the development of additional areas of technical certification that are not included in current programs.

Management. In today's competitive atmosphere, training is too important for the success of the organization for management not to get fully involved in the overall process and planning. They must give it a high priority which is communicated and demonstrated throughout the organization. Those companies that have considered training to be a strategic tool are now well-positioned to take on technological and competitive challenges.

One organization lowered turnover from 18 percent to five percent, lowered accident frequency, lowered operating costs and substantially increased customer satisfaction and retention as a result of making training a strategic element in the corporate culture.

Another organization requires its managers and supervisors to attend all training programs prior to enrolling their employees. This company believes that to provide effective and immediate feedback, a manager or supervisor must have experienced the same skills training. And, many other organizations are recognizing management's role in making training a part of the overall competitive strategy.

Because of the rapid technological change that will continue for the foreseeable future, and because of the challenges of real competition, training on all levels must be incorporated into the company's strategic plan and the organizational culture if service providers want to maintain competitive service standards. Further, the approach to training should utilize an orderly process which builds on itself, as opposed to a hit-or-miss approach, and incorporate multiple media for matching learner's requirements with business objectives. More emphasis on measurement and feedback will drive the need for certification programs in emerging technologies. Finally, management's role in recognizing and identifying training in all areas as critical in the success of the company will increase the organization's performance, which directly translates into more efficient network operations and higher revenue potential. CED

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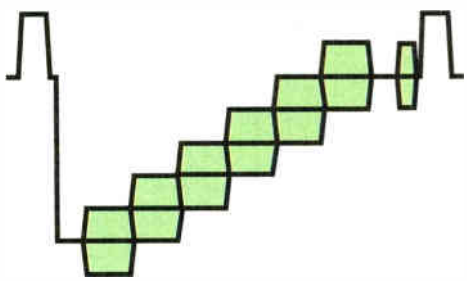
By Adolfo Rodriguez, Product Marketing Manager, Tektronix Inc.

Figure 1: *A modulated 5-step staircase test signal.*



Editor's note: *This article is the final part of a series examining the entire suite of video tests that are required by the Federal Communications Commission. Complete specifications are outlined in the NCTA's Recommended Practices.*

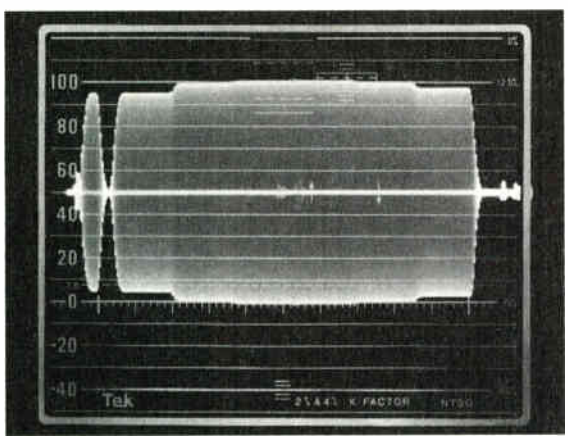


Figure 2: *This modulated staircase signal exhibits a 10 percent differential gain error.*

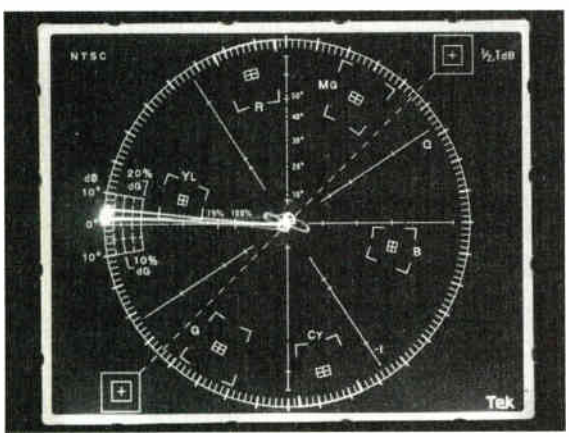


Figure 3: *A vectorscope display showing a 5 degree differential phase distortion.*

There are a number of color signal measurements required by the FCC for cable television operations. Differential gain, differential phase and chrominance-to-luminance are three relatively easy color signal measurements to make, because the mandatory interval for these baseband measurements is once every three years. The FCC mandate states that measurements must be made on at least four channels (plus one channel for every 100 MHz upper frequency limit above 100 MHz).

The equipment required for these measurements is also fairly basic. You'll need a waveform monitor and a vectorscope. A vertical interval test signal (VITS) inserter will allow a test signal to be inserted on a single line in the vertical interval, rather than transmitting a full-field test signal. This allows a wide variety of baseband measurements to be conducted without interrupting regular programming.

To get the VITS signal to baseband at the output of the headend, a precision tunable demodulator is needed. For equipment connections, feed the wideband signal at the output of the headend combiner through a directional coupler to the precision tunable demodulator. The output from the demodulator is fed to the measurement equipment. Regardless of what type of equipment is used, always make sure the signal is terminated into 75 ohms.

Measuring differential gain

Differential gain, often referred to as "diff gain," is present when luminance level changes in the video signal cause the amplitude of the accompanying chrominance signal to change. This amplitude distortion results from the system's inability to uniformly process the high-frequency chrominance signal at all luminance levels.

In general, NTSC measurement standards define differential gain as the largest amplitude deviation between any two levels, expressed as a percent of the largest chrominance amplitude. Differential gain should be measured at different Average Picture levels; the worst error should be quoted.

Differential gain distortions can be quantified in a number of ways. Chrominance amplitudes can be measured directly with a waveform monitor, and large distortions can be seen on a vectorscope display.

When differential gain is present, color saturation has an unwarranted dependence on luminance level. Color saturation is often improperly reproduced at high luminance levels. This distortion is measured with a test signal that consists of uniform-amplitude chrominance superimposed on different luminance levels. A modulated staircase signal (see Figure 1) is frequently used.

The chrominance packets on each of the five luminance steps of the staircase are nominally 20 IRE peak-to-peak. The amplitude of the packets will not be uniform if a differential gain error exists.

To view differential gain on a waveform monitor, using an FCC composite signal, for example, select the chroma filter. This removes the luminance portion of the signal and passes only the high-frequency chrominance portion of the signal. Peak-to-peak chrominance amplitudes can be easily compared in the resulting display.

To make a measurement, first normalize the peak-to-peak amplitude of the largest chrominance packet to 100 IRE. Then measure the peak-to-peak amplitude of the smallest packet. The amplitude difference, expressed as a percent, is the amount of differential gain. For example, Figure 2 shows a signal with a 10 percent differential gain error.

To view differential gain on the vectorscope, check for elongation of the dot in the radial direction. This indicates the presence of differential gain.

Measurements can be made by using the vectorscope's variable gain control to bring the signal vector out to the graticule circle, and reading the amount of differential gain from the graticule. Most vectorscope graticules have special marks on the left side to help quantify the error.

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Figure 4: This is the waveform monitor single trace diff phase indicating 6 degrees of differential phase distortion.

Differential phase

A differential phase error, often called "diff phase," changes the phase of the chrominance signal as the luminance level of the signal changes. This phase distortion is a result of a system's inability to uniformly process the high-frequency chrominance information at all luminance levels. Differential phase distortion is expressed in degrees of subcarrier phase. Because both positive and negative (lead and lag) phase errors may occur in the same signal, it is important to specify whether the peak-to-peak phase error or maximum deviation from zero is being quoted. In general, NTSC measurement standards refer to peak-to-peak measurements.

When differential phase distortion is present, changes in hue occur when picture brightness changes. Colors may not be properly reproduced, particularly in high-luminance parts of the picture. This distortion is measured with a test signal which consists of uniform-phase chrominance superimposed on different luminance levels. Again, the modulated staircase signal (5- or 10-step) is used for this test.

If differential phase is present, the chrominance phase will be different on the different luminance levels. This phase information can be conveniently viewed after the chrominance has been demodulated, so differential phase can be measured with a vectorscope. Although a standard vector display can indicate the presence of large amounts of distortion, a vectorscope equipped with a special "diff phase" mode is required for precision measurements.

When using the vectorscope to make the measurement, check for elongation of the dot in the circumferential direction. This indicates the presence of differential phase. Measurements are made by using the vectorscope variable gain control to bring the signal vector out to the graticule circle, and reading the amount of distortion from the graticule. Vectorscope graticules

Ad Index

	Reader Service #	Page #
ADC Telecommunications Inc.	10	21
Adelphia Cable Communications		34
Alpha Technologies	8	17, 28
American Cable Supply	37	77
American Lightwave Systems, Inc.	12	41
Amphenol RF Microwave	30	65
ANTEC	44	27, 102
AT&T	1	2-4
Barco	17	46
Bresnan Communications Co.		35
C-COR Electronics	16, 47	45, 16, 94
CommPerspectives	41	86
ComSonics	2	6
Corning	18	47
Cox Cable Communications		34
Fujitsu	33	71
General Instrument	29	29, 63
Harmonic Lightwaves	34	73
Hewlett Packard	35	75
Jones Intercable		35
Lectro Products	11	23
The Lenfest Group		34
Northern Telecom	45	89
Nova Plex	15	44
Noyes Fiber Systems	36	72
Philips Broadband	26	59
Pirelli Cables North America–Communications Division	13	31, 42
Power Guard	9	19
Qintar	38	78
Rogers Cablesystems Ltd.		35
Sadelco	28	61
Sencore	7	15
Scientific-Atlanta	31	33, 67
Siecor	32	69
Sprint North Supply	6	13
Standard Communications	4	9
Superior Electronics	43	101
TCI		32
Tektronix	14	43
Telecable Corp.		30
Times Fiber		39
Toner Cable Equipment	39	78
Trilogy	3	7
Tulsat	23, 24	52, 53
Vela Research	40	79
Wavetek	5, 19, 20, 21, 22	11, 48-51
West End	25	55
Zenith Electronics		36

Product Showcase

	Reader Service #	Page #
Cable Prep/Ben Hughes	106	57
DH Satellite	101	56
Dynatech Video Group	102	56
Eagle Comtronics	107	57
Lode Data	103	56
RMS Electronics	104	57
Trilithic	105	57
Triple Crown	100	56

Literature Guide

	Reader Service #	Page #
Amphenol RF Microwave	133	80
ADC Telecommunications	149	82
C-COR Electronics	135, 136	81
Cable Data	130	80
Cable Leakage Technologies	156	83
Cable Technologies	131, 132	80
Corning	147	82
Drake, R.L.	124, 142	79, 81
GeoKlein	151	83
GI Commscope	134	80
Hewlett Packard	146	82
Integral	129	80
Learning Industries	155	83
Lectro Products	122	79
Mega-Hertz/Fox Electronics	141	81
NCTI	154	83
Northern Telecom	145	82
Panasonic Broadcast & Television	140	81
Photon Systems	158	83
Qintar	121	79
Quazite	143	82
Ripley	153	83
RMS Electronics	123	79
Rycom Instruments	125	79
SCTE	137, 138	81
Sprint North/Supply	148	82
Superior Electronics	150	82
Tech Electronics	126	79
Time Mfg.	144	82
Trilithic	128	80
Triple Crown Electronics	127	80
Vela Research	152	83
Viewsonics	157	83
Wavetek	139	81

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11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100
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generally have marks on the left-hand side to help quantify the error. (See Figure 3.)

Although diff phase can be measured on a vectorscope, some advantages are to be gained by examining the demodulated R-Y signal in a voltage versus time display on the waveform monitor. This approach provides more gain, and therefore, more measurement resolution is possible.

Further, the sweep display allows the R-Y signal to be correlated with the original test signal in the time dimension. This shows exactly how the effects of differential phase vary with luminance level, or how they vary over a field.

There are two different types of R-Y displays: "single trace" and "double trace." Both make precise measurements of differential phase. With the single trace method, distortions are quantified by comparing the R-Y waveform to a vertical graticule scale. This is done by setting the vector to the reference (9 o'clock) phase position. The vectorscope variable gain control is used to set the signal vector out to the edge of the vectorscope graticule circle. The waveform monitor gain must be in the calibrated (one volt full scale) setting. The R-Y display appears on the waveform. Each major division (10 IRE) on the vertical graticule scale corresponds to one degree. This allows the amount of differential phase to be determined by measuring the largest vertical deviation between two parts of the signal. See Figure 4.

The double trace display is produced by displaying the single trace R-Y information non-inverted for half the lines, and inverted for the other half. Because the inverted and non-inverted traces can be moved vertically with respect to each other by shifting phase, measurements can be made by introducing calibrated amounts of phase shift with the vectorscope's phase control. The basic technique involves establishing a reference at one extreme of the tilt by bringing the inverted and non-inverted traces together at that point. The amount of phase shift required to bring the two traces together at the other extreme tilt is the amount of differential phase.

Measuring inequalities

Chrominance-to-luminance delay error (C/Y, sometimes called C/L) is present when a system delays or advances chrominance with respect to luminance. It's the difference between the time it takes for the chrominance portion of the signal to pass through a system, and the time it takes for the luminance portion to pass through. The amount of distortion is expressed in units of time, usually nanoseconds. The number is positive for delayed chrominance and negative for advanced chrominance.

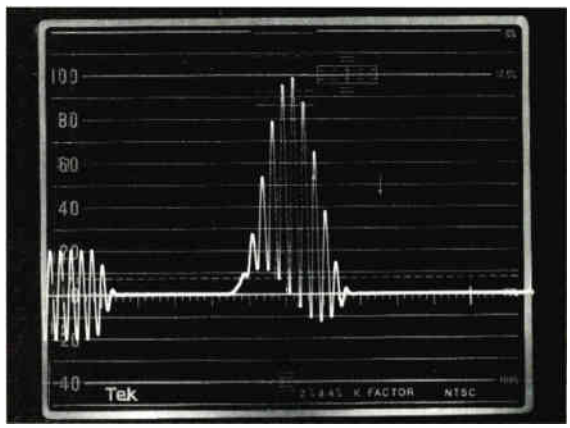

Figure 5: *A sinusoidal distortion in the base of the 12.5T mod pulse indicates chrominance-to-luminance delay. In this example, chrominance is delayed by approximately 250 ns.*

Smearing or bleeding on the edges of colored objects in a picture are common symptoms, as is poor reproduction of sharp luminance transitions. A C/L error causes a sinusoidal distortion to the normally flat baseline of the 12.5T modulated pulse (see Figure 5). If a chrominance-to-luminance gain error is present in addition to the delay, the sinusoidal distortion of the pulse's baseline will not be symmetrical.

Any signal containing a 12.5T sine-squared pulse with 3.58 MHz modulation can be used to measure chrominance-to-luminance gain and delay inequalities. Many combination signals, such as FCC Composite and NTC-7 Composite, contain this pulse. Modulated sine-squared pulses offer the advantage of allowing

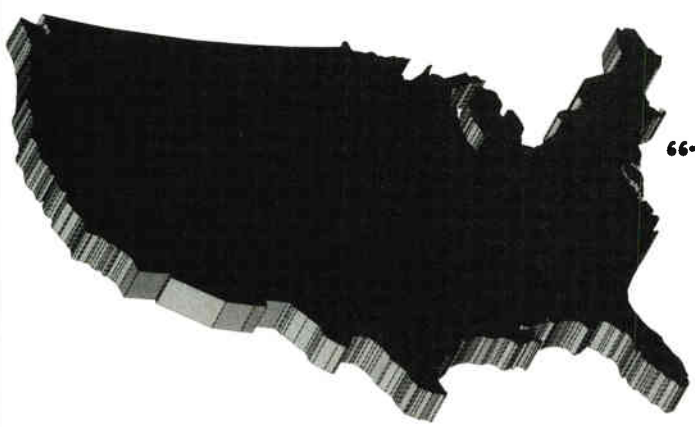

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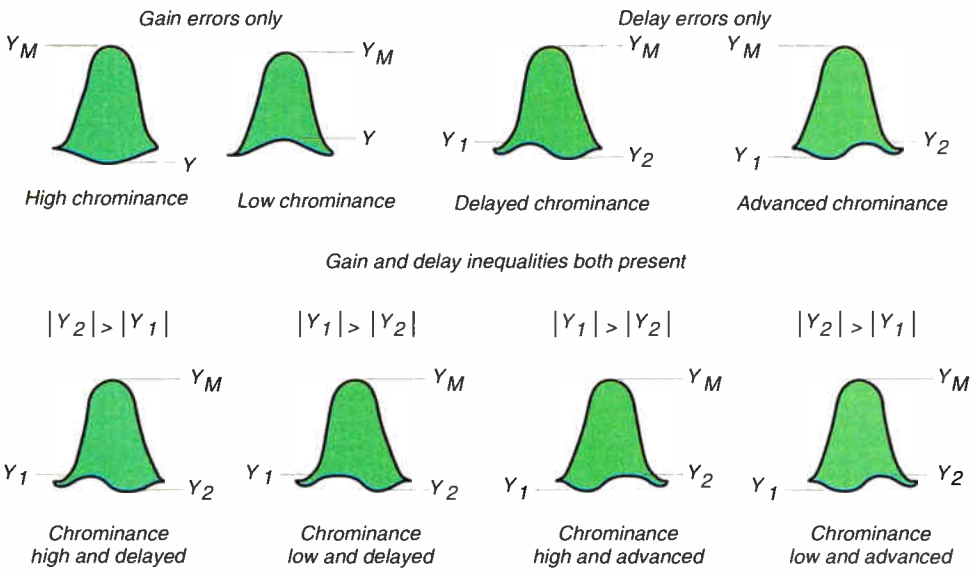
Figure 6: *Effects of gain and delay inequalities on the modulated 12.5T pulse*



evaluation of both gain and delay differences with a single signal.

To check for chrominance-to-luminance gain and delay, use the waveform monitor's variable gain and vertical position controls to set the pulse's baseline on the 0 IRE graticule line. Then adjust its amplitude to 100 IRE. Measure the peak-to-peak amplitude of the sinusoidal distortion. With this vertical gain factor, for a 12.5T packet, every 10 IRE of peak-to-peak distortion represents approximately 100 ns of delay. If the first peak of the sinusoidal distortion is positive, chrominance is delayed. Delayed chrominance is reported as a positive number, and advanced chrominance is reported as a negative. When both types of errors are present, the positive and negative peaks will have different amplitudes. The zero crossing of the baseline distortion will not be at the center of the pulse. Figure 6 shows the various types of distortions.

Conclusion

Although diff phase, diff gain and chrominance-to-luminance gain/delay measurements are done relatively infrequently, performing them properly will not only keep you in compliance with the FCC, but will also improve the technical quality of your product. With the guidelines in this article, you'll be better equipped to do just that. CED

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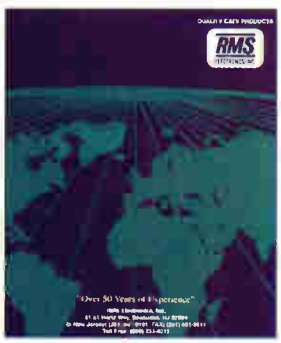

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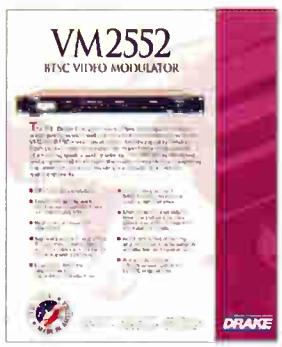

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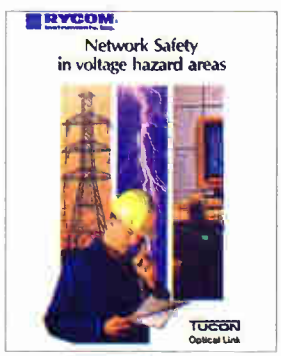

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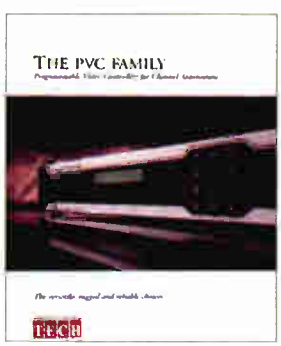

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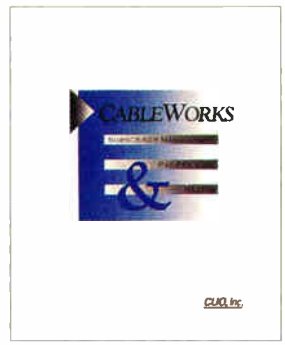

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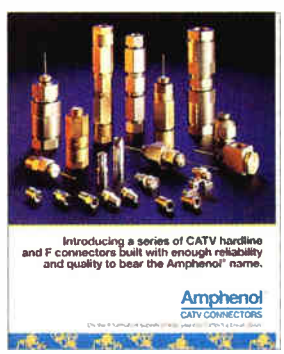

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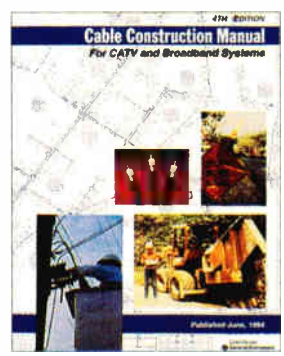

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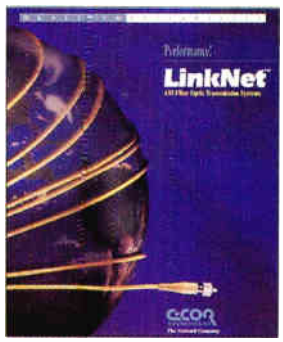

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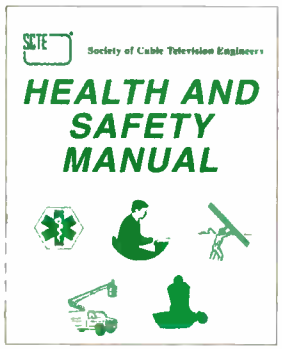
This publication is designed to help cable systems ensure safe conditions for their personnel. This manual provides this vital safety information through its four books: *General Safety Information, General Practices, Field and Plant Safety, Vehicle Safety* and *Emergency Medical Care*. Shipped in a special custom binder. Member Price: $190. For ordering information, please contact **SCTE** at (800) 542-5040.



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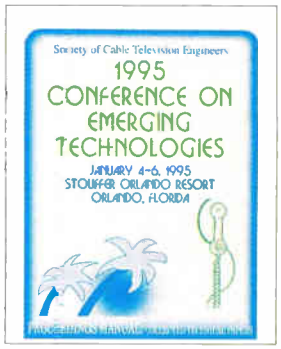
SCTE Emerging Technologies 1995 Proceedings Manual

This publication collects each of the technical papers presented at SCTE's groundbreaking 1995 Conference on Emerging Technologies. Areas of focus include digital compression, alternate transmission techniques, telephony, broadband multimedia and future technologies. Member Price: $25. For ordering information, please contact **SCTE** at (800) 542-5040.



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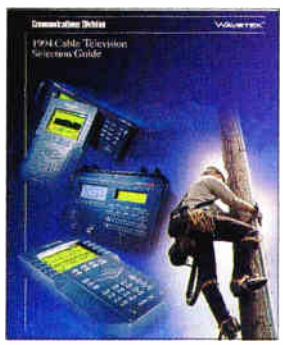

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Panasonic Full Line Product Guide

This Product Guide is for Panasonic's Audio/Video product line that includes; Cameras, VTR's and Monitors. Explanations are given on advantages, and facts for features and specifications of D-3, M II and S-VHS products. Includes all new products such as Supercam and the AG-DS850, S-VHS, HI-FI, Editing, Recorder-Player with Digital Slow.

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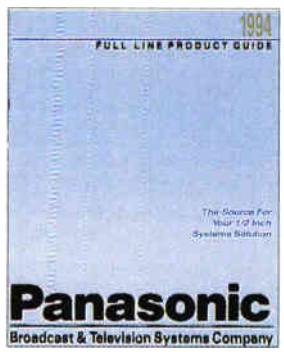

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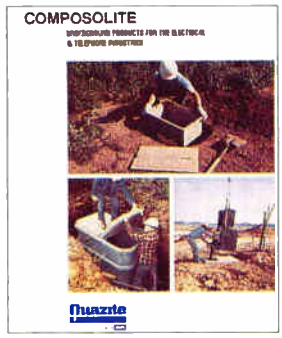

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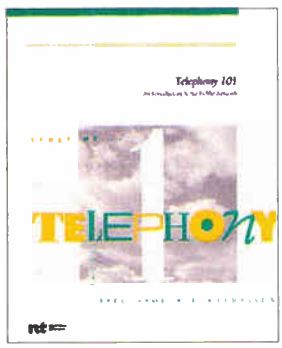

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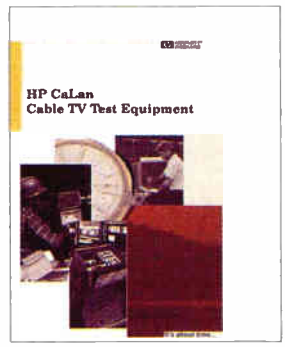

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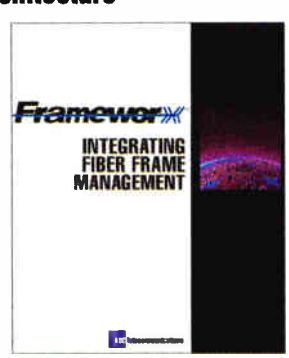

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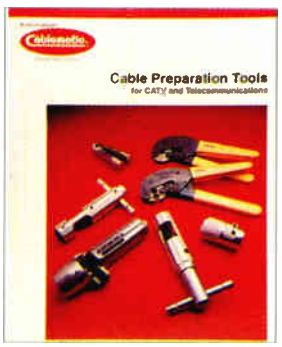

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NCTI Spanish/English CATV Illustrated Dictionary

The National Cable Television Institute (NCTI) offers a new Spanish/English illustrated dictionary of cable television and broadband technology terms. The first section presents English terms with Spanish translation and Spanish definition. The second sectiion offers Spanish terms with English translation and English definition. Cost $29.95 plus S/H; quantity discounts. Please contact: **NCTI**, 801 West Mineral Ave., Littleton, CO 80120-4501, (303) 797-9393, Fax (303) 797-9394.

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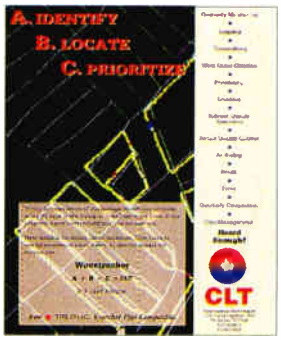

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Convergence conference tackles the I-phrase

Clearing a path through the chaos

SGI's Challenge Server product family illustrates the convergence of several technologies.

By Dana Cervenka

Still trying to figure out what this thing called the "Information Superhighway" really is? Well, forget about it, at least for the time being. While they disagreed over everything from the ultimate method of delivery of these new info comm services to potential revenues and dominant players, participants in the recent "Convergence '94: Opportunities on the Information Superhighway" conference did largely agree on two things: there's confusion on the interstate, and we won't reach our destination overnight.

Listen to how some of them characterize the infobahn and its prospects: "The embodiment of chaos," according to Bob Mercer, president, Hatfield Associates Inc.; "the elephant and the blind man," says Edward McCracken, chairman and CEO, Silicon Graphics Inc.; and, "it will be built and paid for in stages," predicts George Lipski, vice president, Residential Broadband Networks, Newbridge Networks Corp.

Discovering what we don't know

It's not just the general public that's confused; even the companies and institutions involved don't have a clear vision. In the midst of all the chaos, however, there are certain key issues that confront all of the "builders."

For one, the current regulatory climate "is hobbling the deployment of the NII and is contrary to the public interest," declared Larry Yokell, president of Convergence Industry Associates, during a session on the state of the infrastructure. Further, no one really knows what applications consumers would be willing to pay for, nor how much they would be willing to pay–numerous studies, polls and reports produce conflicting data.

In addition, the costs involved in building many of the proposed new networks may be higher than originally estimated. "While the economics of fiber, coax, copper and cellular networks are relatively well-understood," explains Yokell, "the economics of media servers, broadband operating systems and transport protocols, inter-network roaming and signaling, GUIs and APIs, next-generation billing and network management systems, and new types of content are just beginning to come into focus. Furthermore, it could take years before the costs of all of these goodies drop to practical levels." Additional complications are the need for incredibly sophisticated billing systems, and customer service programs that can follow clients as they travel a multitude of interconnected networks.

A rational roadmap

SGI Chairman Edward McCracken, who delivered the closing keynote at the conference, warned that all the confusion, hype and uncertainty surrounding the info highway could delay its realization, and even hurt its prospects in the future. The technology, says McCracken, is not the problem. It exists, and it works. The epic challenge facing everyone involved is actually one of marketing these new capabilities.

To meet this challenge, McCracken offers potential providers a "conservative" four-point plan for success. "First, focus on consumers as the real architects of the highway," he suggests. For example, a series of tests which encompass at least a few thousand homes could be conducted in the next year or so in order to divine consumer reactions, while allowing service providers to choose appropriate platforms.

"Second, choose a platform that gives you the flexibility to experiment with services," adds McCracken. "The critical piece of the solution will be applications and content that run on the chosen platform." His logical solution includes a robust server, a smart set-top, and a software platform that can handle heavy-duty graphics, high interactivity and a range of media in various transport schemes.

"Third, while cost obviously must be carefully considered, it should not be the major decision criteria in the early test phases....The cost of technology is declining rapidly and will be reasonable when full deployment of the system begins."

And "fourth, mass deployment should be based on test results and market research." In other words, look before you leap.

Here and now

The conference also featured several participants who detailed real-world applications that are already up-and-running. As Larry Conley, manager of the Fordstar Dealer Communications Network put it, "Hype is nice, but TARR builds highways." TARR, or Time Adjusted Rate of Return on Investment, was the prime mover behind Ford Motor Company's decision to install a 6,000-plus site satellite communications network. The network of VSATs is used to transmit two-way data between headquarters and remote classroom sites, and one-way video from headquarters down to the sites. Up to eight channels of compressed video per transponder can be delivered using General Instrument's DigiCipher II format.

While distance learning was the application that really sold Ford on the network, it has transformed the way the company conducts its operations, according to Conley, by saving Ford money on travel costs, enabling the company to better communicate with its dealer base and promoting more interaction.

And isn't it appropriate that a car company should be one of the first on the...no, I won't say it. CED

Waiting for the future? Vela Research — a subsidiary of Home Shopping Network, Inc. — has the technology solutions you need, and has them today. Vela has a complete family of innovative MPEG-based compression and video server equipment designed to offer the cable industry a solid migration path to the future.

VIDEO SERVERS

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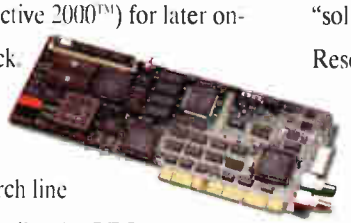

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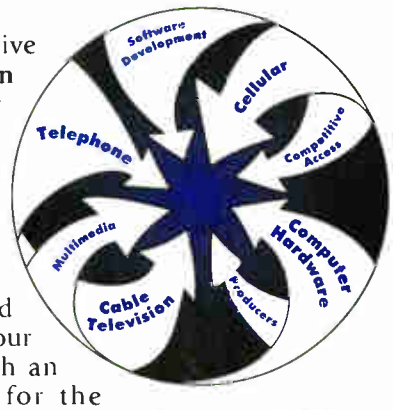

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C1-95-2

The issue: 1995 construction plans

Over the past year, DBS and telcos have made high-profile entrances into the video delivery business, directly competing with cable operators. 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 1995?

❑ 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. Is your system presently addressable?

❑ Yes ❑ No ❑ Don't know

4. If not, do you plan to upgrade to addressability?

❑ Yes ❑ No ❑ Don't know

5. What will the upgrade consist of? Please 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

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

❑ 550 MHz ❑ 750 MHz ❑ 1 GHz ❑ Other

7. 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

8. Why is your system being upgraded?

❑ Franchise requirement ❑ Need more channels

❑ Competition ❑ New services ❑ Other

9. If your system isn't planning an upgrade, why not?

❑ Just did one ❑ No demand ❑ Too expensive ❑ Other

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

❑ 1995? ❑ 1996? ❑ 1997? ❑ Later? ❑ No current plans

11. How interested is your system in providing interactive services?

❑ Very ❑ Somewhat ❑ Not interested

12. How interested is your system in providing telephony services for either businesses or residents?

❑ Very ❑ Somewhat ❑ Not interested

Your comments:

FAX US

303-393-6654

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

We will tally the results and print them in a future issue. Your suggestions for future questions are always welcome.

We also want some written comments from you on this subject. Names won't be published if you request your name to be withheld, but please fill out the name and job information to ensure that only one response per person is tabulated.

Your name and title

System name:

Your MSO:

Location:

Your job function:

RESULTS

The issue: Signal theft

One of the biggest operational headaches cable operators have to deal with 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. Here's how our readers responded to our survey.

A majority of those who responded said their management is "very concerned" about cable theft, and nearly two-thirds said their system is losing between five percent and 15 percent of the basic revenue they should be getting–and premium service theft is even higher. As a result, nearly half said they lost more than $50,000 annually to theft.

While the problem is recognized by many, there appear to be widely different approaches to battling the problem, according to our survey.

A vast majority still rely on audits to reduce theft, followed in popularity by security programs and offers of amnesty. Fourteen percent have done nothing to combat theft problems. Nearly all who responded said they use scrambling, traps, locking pedestals and set-top boxes to help them battle pirates.

Most also said their systems have filed charges against thieves, but less than half report using "electronic bullets" or taking steps to ensure the problems don't stem from their own employees. However, the sting operation appears to be popular with a wide majority of respondents.

The results:

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

Below 35%	35%-55%	56%-75%	Over 75%
0%	**7%**	**71%**	**14%**

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%
21%	**64%**	**0%**	**14%**

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

Less than 50%	50%-75%	75%-100%	Over 100%
31%	**57%**	**14%**	**0%**

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%
14%	**43%**	**36%**	**7%**

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

Less than $20K	$20K-$35K	$36K-$50K	Over $50K
43%	**14%**	**0%**	**43%**

6. What recent steps has your system taken to reduce signal theft?

None	Regular audits	Offer amnesty
14%	**57%**	**21%**

Started security program	Other
29%	**14%**

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

Very concerned	Somewhat concerned	Not concerned
57%	**36%**	**7%**

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

Yes	No	Don't know
64%	**29%**	**7%**

9. What hardware do you have in place to battle piracy?

Scrambling pedestals	Traps	Locking pedestals
79%	**93%**	**71%**

Set-top descramblers	None
86%	**0%**

10. Has your system ever used, or considered using, the "electronic bullet" method of detecting pirates?

Yes	No	Don't know
36%	**57%**	**7%**

11. Has your system ever set up a "sting" operation to detect pirates or expose an employee who is illegally hooking up homeowners to cable?

Yes	No	Don't know
29%	**71%**	**0%**

12. Has your system taken specific steps to ensure that your own installers aren't involved in piracy?

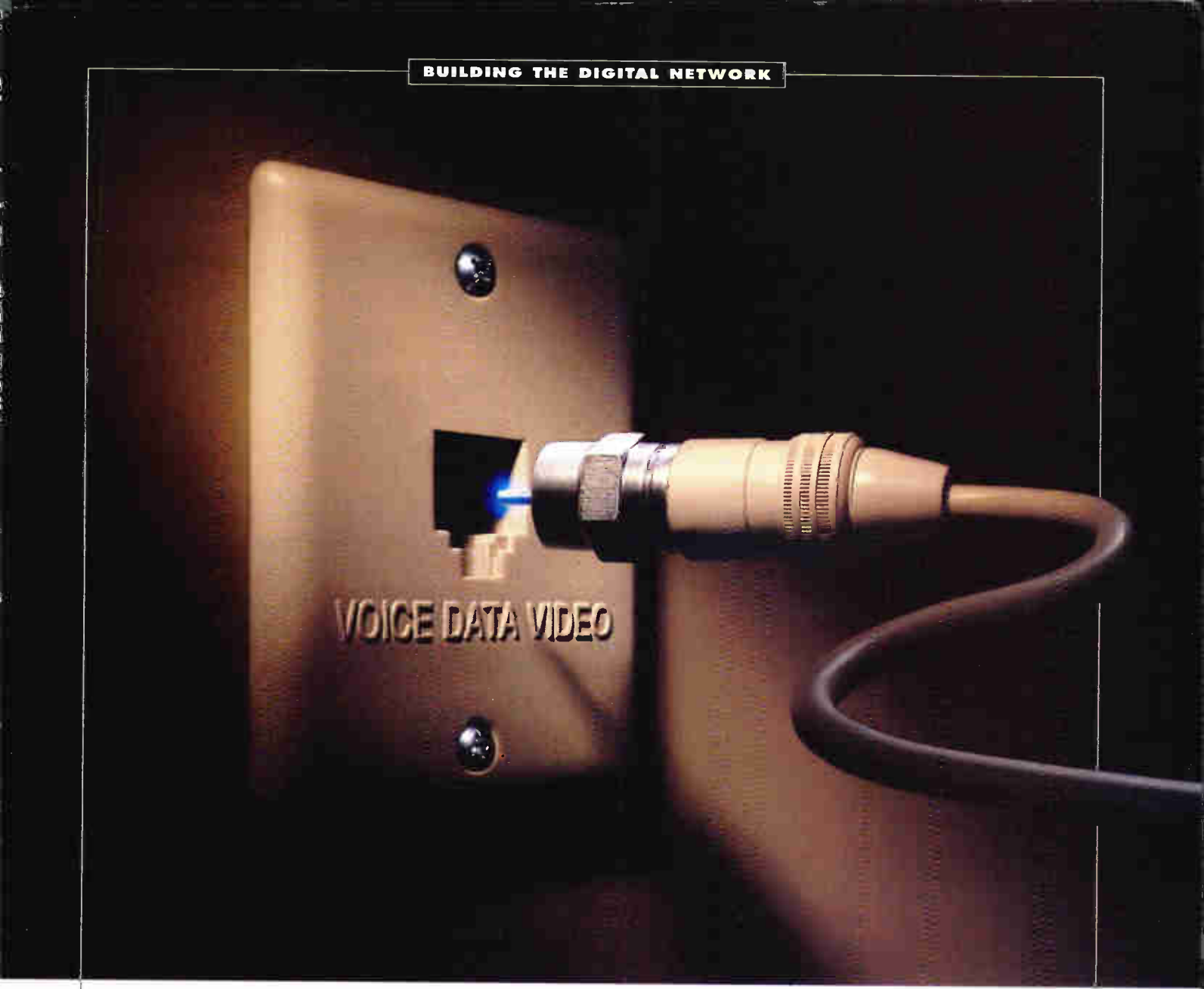
Yes	No	Don't know
29%	**64%**	**7%**

Your comments:

"We have cases pending now. Most police and sheriff's departments do not know how to handle theft of cable."
–Stephen Bowen, Michiana Cablevision, New Buffalo, Mich.

"Cable systems should be more concerned about missing or lost tools. The hardest theft to find is theft that looks legal."
–Construction coordinator, Jones Spacelink, Hilo, Hawaii

"We've set up a hotline to report theft. We also have an investigation team that targets theft. We have prosecuted several people."
–Daniel Hanagan, MetroVision, Livonia, Mich.



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Novell, GI team for broadband networking

HATBORO, Pa.–Novell Inc. and General Instrument Corp. have announced that they will explore joint technologies for broadband networking.

The two companies will leverage their technologies in cable and networking equipment to provide customers with a comprehensive, end-to-end solution.

"Novell and GI have an opportunity in their work together to increase the pervasiveness of networking into the home environment," according to Robert Frankenberg, Novell president and CEO.

AMP names new distributors

HARRISBURG, Pa.–In order to broaden its presence in the cable TV market, AMP has appointed Telewire Supply of Englewood, Colo. and TVC of Hershey, Pa. as non-exclusive distributors of its CATV components and subsystems. Telewire has six authorized locations, while TVC has four.

Under the terms of the agreements, the new distributors will stock and market the complete line of AMP telecommunications components and subsystems for CATV operators. Products include fiber optic couplers, wave division multiplexers, fiber cable assemblies, fiber and RF connectors, fiber management hardware, closures and grounding systems.

Name change for General Cable Co. division

WESTMINSTER, Colo.–General Cable Co./Apparatus Division has changed its corporate name to Mobile Tool International Inc.

The name change was effected to better reflect the corporation's focus on serving the worldwide market for aerial mobile utility equipment.

General Cable Co./Apparatus Division was first formed in 1966, when General Cable Co. purchased the privately held companies of Telsta, Mopeco and Puregas. These three companies were consolidated in 1971 in Westminster, Colo. as the Apparatus Division, and the Holan product line, which was acquired from Dorsey Trailers in 1988, was consolidated into the Westminster facility in 1993.

At press time, the employees of Mobile Tool International Inc. were finalizing their plans for an Employee Stock Ownership Plan (ESOP) buy-out of the company from the parent corporation, American Premier Underwriters (formerly Penn Central Corp.).

Philips forms new business unit

KNOXVILLE, Tenn.–Philips Consumer Electronics Company has formed a new business unit for worldwide ghost cancellation product marketing and manufacturing.

The Specialty Television Products Group, based in Knoxville, Tenn., is responsible for the continuing sale and installation assistance of Philips Ghost Cancellation Reference (GCR) signal technology to terrestrial and cable networks and local stations.

In addition to ensuring full acceptance by broadcasters of Philips GCR technology, the Specialty Television Products Group is responsible for the manufacture of several planned products, including: a set-top GCR signal decoder with built-in tuner; a similar decoder without tuner for use with virtually any brand of VCR or cable box; a set-back decoder for use with Philips and Magnavox projection televisions already available with dedicated GCR jacks; a GCR inserter; and various accessories.

PCEC's New Specialty Products Group is headed by Alford Rodgers, vice president, formerly director of PCEC's international operations. Linda West Schumann, previously PCEC's manager of new business and advanced products planning for color television, has been appointed director of product management of the new unit. And F.J. McFadden, formerly PCEC's international product marketing manager, has been named marketing and merchandising manager of the new group.

Tektronix signs sales reps

SAN FRANCISCO–Tektronix Inc. has signed seven regional sales firms as manufacturer's representatives in the United States in order to serve its base of audio product customers. All appointments are effective immediately, and the seven firms will work cooperatively with the company's nationwide direct sales force, which will remain staffed at its current level. Tektronix also plans to sign additional firms to serve the balance of the states in the West and East.

Hartmann and Associates of West Chicago, Ill. serves North Dakota, South Dakota, Minnesota, Wisconsin, Illinois, Indiana, Michigan, Ohio and West Virginia. Hartmann Associates of Long Valley, N.J. now serves New York, Pennsylvania, Delaware, Maryland, Virginia and Washington, D.C. And Marketing Concepts of Irving, Texas is serving Texas, Oklahoma, Louisiana, Arkansas, Kansas, Missouri, Iowa and Nebraska.

In the Pacific Northwest, Northshore Marketing of Seattle, Wash. is serving Alaska, Washington, Oregon, Idaho, Montana and Wyoming. In the East, Optimark of Chestnut Hill, Mass. serves Vermont, Massachusetts, Connecticut, Rhode Island, New Hampshire and Maine. PRECO Inc. of Scottsdale, Ariz. now serves southern California, southern Nevada, Arizona, Utah, Colorado and New Mexico. And Studio Supply Company of Nashville, Tenn. handles Tennessee, Kentucky, Alabama and Mississippi.

Home automation management contract

CARLISLE, Pa.–Sprint/United Telephone has contracted with Molex Inc. to offer the company's home automation management system to new home buyers in Pennsylvania and New Jersey. The options that are available include the Start Smart, Full Smart and Full Smart Plus packages.

Molex's Start Smart home automation management system combines Smart House wiring devices and cable with conventional wiring, providing the pathway for future communications with a computer that controls the home's functions. The Start Smart package includes low voltage switching of 15 lighting points that allows for three-way dimming of three light fixtures; whole house surge protection; a high-quality video distribution system; and up to four phone lines.

Some of the benefits of the Full Smart system package are that a full home audio/video system allows the home owner to control a single VCR from several locations in the house; the "Away" mode turns off all controlled lights and receptacles, sets back the thermostat and arms the security system; and the "Welcome Home" mode turns on pre-specified lights and sets the thermostat to a comfortable level.

Sprint/United Telephone will market the Molex Smart House system packages to area contractors and home builders. All three options require the same basic behind-the-wall wiring, which is installed at construction.

S-A to design systems in Bulgaria

ATLANTA–Scientific-Atlanta Inc. has been selected by Union Television to design, supply and support complete cable television systems for 14 newly-licensed cities and towns in Bulgaria. Union Television is a private telecommunications company in Bulgaria. The government of Bulgaria, as part of its privatization efforts, has issued licenses to Union Television for the construction of local cable systems in communities ranging from under 10,000 to more than 340,000 people. The 14 systems could serve more than 1 million residents in about 400,000 homes passed. Bulgaria, with a population of approximately 8 million people, has an estimated 2.5 million homes that could receive cable service. CED

People on the move

Dynatech Corp. has named **Michael Arbuthnot** as president of da Vinci, a member company of Dynatech's video division. Before joining Dynatech, Arbuthnot was director of DCT products for Ampex Corp., responsible for the sales, marketing and profitability of the DCT product line.

ADC Telecommunications Inc. has named **William L. Martin** as vice president and general manager of its Network Services Division. In a related announcement, the company's former Transmission Division has become the Network Services Division. Before joining ADC, Martin was vice president, marketing, for Ascom Timeplex, where he also held the position of vice president, Greater China Business Development, and vice president, U.S. Sales.

Philip Thompson

The board of directors of **Zenith Electronics Corp.** has elected three senior vice presidents: **Kell Benson**, senior vice president, finance and CFO; **Philip Thompson**, senior vice president, operations; and **Richard Vitkus**, senior vice president, general counsel.

Richard Vitkus

Benson has served as vice president, finance and CFO since 1989 and has held a number of key positions in his 21-year career at Zenith. Thompson comes to Zenith from Pitney Bowes, where he was vice president of operations, product development and manufacturing for its Monarch Marking Systems division. And Vitkus joins Zenith with more than 28 years of legal and corporate experience, including service as senior vice president, general counsel and director of corporate development for Vanstar Corp.

In addition, **William Niemeyer**, a Panasonic sales executive, has joined Zenith Electronics Corp. as the new director of sales/Regional Bell Operating Companies for Network Systems products. Niemeyer had been regional sales manager for Panasonic Broadcast and Television Systems, Cable Systems Division since 1985.

RMS Electronics Inc. has appointed **Chris Bailey** as vice president of European operations. Bailey has extensive European market experience and was formerly director of Industry with Augat Communications Europe.

Claus Kroeger has been promoted to vice president of operations for **Cox Cable Communications Inc.** He was previously vice president and general manager of Cox Cable Middle Georgia Inc. He has also assisted in Cox Cable's international expansion, as director of International operations, and was recently named a member of the board of directors of STOFA A/S, a Danish cable television system 50 percent owned by Cox Cable.

Stanford Telecommunications Inc. has appointed **Lee Lucca** to the position of vice president of Operational Services for their Telecom Products Group. In this new position, Lucca will be responsible for operational services within the Group, including finance, contracts, production control, facilities, human resources and business administration. Lucca joined the company in 1987.

David Eng has been named vice president sales and service with **C-COR Electronics Inc.** In this position, Eng will be responsible for all North American sales and service activities for C-COR's CATV and Network Systems Groups, including regional account executives, sales engineers, network designers and the technical customer services group. Eng has more than 15 years of experience in a number of different regional sales management positions in the cable TV industry, and more recently, in telephony sales.

DirecTv Inc., a unit of **GM Hughes Electronics**, has announced several executive promotions. **L. William Butterworth** has been named executive vice president, from his previous position of senior vice president. He will be responsible for the technical development of DirecTv. **James Ramo** has been promoted from senior vice president to executive vice president, in charge of sales, marketing, programming and customer service.

In addition, the following executives were promoted from their previously-held posts of vice president: **David Baylor**, senior vice president, Operations; **Larry Chapman**, senior vice president, Programming; **Lawrence Driscoll**, senior vice president, Customer Service and Information Systems; **John Godwin**, senior vice president, DBS Network Systems; **Steven Ste. Marie**, senior vice president, Sales and Marketing; and **Louise Wildee**, senior vice president, Finance.

Dynatech Corp. has named **George Merrick** as corporate vice president and president of Dynatech's Display business, which includes the company's video division and operations specializing in videographic computer hardware and software. One of Merrick's key responsibilities will be to identify and target opportunities related to the convergence of video, computer and telecommunications technologies. Before joining Dynatech, Merrick was most recently executive vice president and headed worldwide sales and marketing for Ampex Systems Corp.

United Video Satellite Group (UVSG) has named **Peter Boylan III** to the new position of executive vice president and chief financial officer. Boylan is responsible for UVSG's corporate financial affairs and strategies. Boylan comes to UVSG from Hallmark Cards Inc.

First Pacific Networks Inc. (FPN) has appointed **Robert Howard-Anderson** as vice president of Engineering. Howard-Anderson will be responsible for managing FPN's product design and development functions and was most recently vice president of Engineering for Network Equipment Technologies (N.E.T.) Product Operations, overseeing all R&D and engineering activities for this division, including the company's core product line, IDNX.

FPN has also named **James Hirschy** as senior vice president of marketing, customer service, sales and channel strategy. Hirschy will oversee all operations and functions of product management and sales engineering; product marketing and development; domestic and international sales; and customer support. Prior to FPN, Hirschy handled all areas of marketing and sales as managing director of Asia Pacific Sales Operations for Concert-Syncordia Services.

Finally, First Pacific Networks has appointed **Jennifer Wade** as corporate communications manager. Wade will be responsible for managing the internal and external communications functions.

CAI Wireless Systems Inc. has appointed John Brinker as vice president, operations. In addition to more than 18 years of executive cable experience, Brinker has recently been developing and managing CAI's Hartford, Conn. video dial tone test with the Southern New England Telephone Co. CED

Transmission system

LT-4000 fiber optic transmitter and LT-4000-A fiber optic amplifier

BURNABY, B.C.–New from Photon Systems are the LT-4000 Fiber Optic Transmitter and LT-4000-A Fiber Optic Amplifier. This 1550 nm transmission system is designed for long haul delivery of analog video and digital signals at bandwidths to 750 MHz.

Photon employs 980 nm pump laser technology in an erbium doped fiber amplifier to achieve high power. Eighty video channels can be carried up to 200 km with C/N of 50 db, while distortions remain better than -65 dBc. The system is available with optical output powers over 40 mW to cost-effectively address such applications as headend consolidation, new service area feeds and wide area broadcasting.

The LT-4000-A amplifier incorporates an optical receiver. RF signal is available to feed coaxial plant at any point in the optical transmission path where an amplifier is placed.

Future product options will include a diagnostic return path capability which allows monitoring of actual video performance on any channel right from the headend. Based on Photon's DS-3001 digital transmission system, the return video feed will allow technicians to assess system performance without having to roll a truck–an important consideration, given the long distances involved.

Circle Reader Service number 46

Splicing unit

ARMSTRONG, Iowa–Armlift, Division of TG Industries Inc., is offering a unit designed for fiber optic splicing. Available in either 60-inch or 72-inch heights, the Fiberglass Super Structure covers a standard fiberglass utility body and can be equipped with heater/air conditioners for climate control. Horizontal compartments can be accessed from inside and outside the body. Steel bodies are also available.

Fiberglass Super Structure

Directional drill

The telescoping aerial lift is hydraulically leveled and features 200 degree bucket rotation with an infinitely locking brake. The bucket can be equipped with optional fiberglass lid, full splicing curtain, fold-down seat and bucket heater. Rotating buckets are available on both side and end hung models.

Circle Reader Service number 47

Amplifier/downconvertor

CAMARILLO, Calif.–California Amplifier has announced the Mini-Mag Plus (Part No. 140103), a new, low noise amplifier and downconvertor, LNB, for commercial and digital satellite television applications. The Mini-Mag Plus features the company's Digi-Ready low phase noise technology for outstanding performance in digital applications, according to the company. Phase noise specifications are as follows: 1 kHz–80 dBc/Hz; 10 kHz–95 dBc/Hz; 100 kHz–105 dBc/Hz.

This low phase noise performance allows the Mini-Mag Plus to be used in a number of digital and digital compression applications. These include all digital satellite television systems and data networks, as well as SCPC reception.

Mini-Mag Plus features ultra-low noise temperatures of 20 to 25 degrees K, 65 dB gain, the familiar Cal-Amp Power Alert LED, state-of-the-art surface mount electronics and a three-year warranty. The Mini-Mag Plus has several design advantages, including an ultra-light magnesium alloy housing, powder coat paint and advanced sealing technology for environmental protection.

California Amplifier has also announced the C-Band Dual Output LNBF (Part No: 31675-1), a second generation Low Noise Amplifier and Downconvertor with integrated Feedhorn for commercial and digital satellite television applications. Phase noise specifications are: 1 kHz–73 dBc/Hz; 10 kHz–80 dBC/Hz; 100 kHz–90 dBC/Hz.

Circle Reader Service number 48

TDR, cable fault locator

LINCOLN, Neb.–Riser-Bond Instruments has announced the new Model 1205C Time Domain Reflectometer, Cable Fault locator. Although designed for coaxial cables, the instrument will also test twisted pair.

Riser-Bond's Super-Store feature provides the ability to view, compare and store 1,500 times more information than competitive TDRs, according to the company. Model

The DirectLine DL4010

NEWTON, Kan.–StraightLine Manufacturing Inc. has announced the newest member of its directional drill family, the DirectLine DL4010.

Powered by a trailer-mounted 210 hp Cummins diesel engine, the DL4010 is designed for the larger diameters and distances required by many contractors. With 39,233 pounds of thrust/pullback and 3,818 pounds of torque, the DL4010 is designed to directionally bore and pullback larger diameter pipe, conduit and bundles (six inches to 12 inch dia.) to distances up to and exceeding 1,000 feet. This will mean greater installation distances, fewer set-ups and less downhole time than with other units, according to the company.

An integrated drill rod box and PowerLoader drill rod loading system are a standard part of the package. Tooling packages incorporate TaperLok drill rod, backreamers, console mounted locating systems and the 4th Generation modular drill head.

Circle Reader Service number 45

Model 1205C time domain reflectometer, cable fault locator

1205C stores all on-screen and off-screen cable data for later viewing at all gain levels.

A Wave-View software package (included with the Model 1205C) turns the PC into a virtual TDR.

Circle Reader Service number 49

Fiber videos

KENT, Wash.–Light Brigade Inc. has added two more videos to its fiber optic video series. "Fiber Optic System Design" and "Fiber Optic Installation" are now available. The system design video focuses on issues such as physical layout, calculating loss budgets and the proper design of local, metropolitan and wide area networks. The video provides insight into the proper design of optical systems for voice, video and data communications.

The installation video focuses on the techniques required for a successful fiber optic installation. The video will address issues such as building codes, standards, proper design, routing and the right equipment needed for installations involving fiber optic cable.

Other titles include "Introduction to Fiber Optics," "Fiber Optic Applications" and "Fiber Optic Safety."

A new Fiber Optic Video Brochure is available from the company, as well as a Light Brigade video preview tape.

Circle Reader Service number 50

Dual channel power meter

FOT-70 fiber optic power meter

VANIER, Quebec–EXFO E.O. Engineering Inc.'s new FOT-70 fiber optic power meter combines two separate channels in one single instrument. The two fully independent channels can be operated separately to obtain two simultaneous readings. They can also be paired to provide a third direct reading of the power difference between the two channels.

Offering alarm capability over each channel and in the difference mode, this dual channel power meter is well-suited for monitoring, R&D, manufacturing, Wavelength Division Multiplexing (WDM) and security environments.

Circle Reader Service number 51

Gas tube

MIAMI, Fla.–Citel has introduced a patented gas-tube designed for high frequency coaxial applications. It has less than 0.5 dB insertion loss at 2.5 MHz and installs in series.

The Citel P8AX coaxial gas tube comes in various voltages for different applications. It features a high-power handling of 5000 amps and is ideal for OEM applications to protect transmitters, receivers, and LANs against lightning surges. The tube also resets automatically after every strike.

Circle Reader Service number 52

Fiber optic switch, circulator

SAN JOSE, Calif.–E-TEK Dynamics Inc.'s new Programmable 1xN, MxN Fiberoptic Switch (PFSW) offers switching capacity up to 100 ports. The PFSW is a stand-alone bench or tabletop unit designed for routing optical signals, for performing automatic optical testing and for

Programmable 1xN, MxN Fiberoptic Switch (PFSW)

fiber optic communications. It's available in singlemode and multimode models.

The PFSW also features user-friendly programming. In the local mode of operation, the built-in microprocessor allows users to easily program switch sequences and time periods of the input ports' connection to the output ports. Programmed switch sequence and time period may be stored in the PFSW, even after the electrical power is shut off.

The PFSW can also be controlled by the user's host computer/controller via an IEEE-488 or RS-232 interface. An OEM switching module is available as an option. Users can integrate this module into their systems.

E-TEK Dynamics is also launching the Polarization Insensitive Fiberoptic Circulator (PIFC), a passive device that transmits an incoming signal from port 1 to port 2, and a separate incoming signal from port 2 to port 3. The PIFC provides low insertion loss, low crosstalk and minimal polarization sensitivity. It's rugged and environmentally stable, suitable for lab and field use. Applications include optical amplifiers, OTDR, WDM networks, CATV fiber optic links, etc.

Circle Reader Service number 53

Tool kit

PHOENIX, Ariz.–Jensen Tools Inc. is offering a set of insulated tools that are engineered to protect the user against accidental electrical shock when working in the close vicinity of live wires.

Made by the German tool manufacturer CK, these tools meet the requirements of Germany's stringent VDE standard IEC 900. Each tool has been individually tested at 10,000 volts and certified safe at 1000 VAC/1500VDC.

The set contains 11 standard tools: a 7-inch side cutter, 8-inch long nose pliers, 6 1/2- inch long nose pliers, 8-inch lineman's pliers and seven screwdrivers (7/64 x 3 inches, 5/32 x 4 inches, 7/32 x 5 inches, 1/4 x 6 inches slotted; #0 x 2 1/4 inches, #1 x 3 inches and #2 by 4 inches Phillips). These are professional quality tools made of chrome vanadium steel. Each one has an insulated sheath that is permanently affixed to the tool for reliable protection against accidental electrical shock. The tools are packaged in a handy zipper kit that keeps them safe and organized.

Circle Reader Service number 54

JANUARY

10 Fundamentals of the Hybrid Fiber/Coax Network. Broadband communications training produced by Scientific-Atlanta. Location: San Francisco, Calif. Call Bridget Lanham for more information, or to make reservations at (800) 722-2009; or (404) 903-5516.

11 Deadline–Call for Papers, 14th Annual International Conference on Consumer Electronics (ICCE). Authors must mail 10 copies of a cover page, 35-word abstract and 500-word summary for paper and poster session selection purposes, to be received by January 11, 1995. Call Diane Williams, conference coordinator, (716) 392-3862.

11-12 Hybrid Fiber/Coax Field Test & Measurement. Broadband communications training produced by Scientific-Atlanta. Location: San Francisco, Calif. Call Bridget Lanham for more information or to make reservations at (800) 722-2009; or (404) 903-5516.

16 Multicom Inc. technical seminar. This session will cover the design, test and installation of cable TV systems with particular emphasis on the satellite, MATV and distribution systems.

Trade Shows

January

4-6 SCTE Conference on Emerging Technologies. Location: Stouffer Orlando Resort, Orlando, Fla. Call SCTE National Headquarters at (610) 363-6888 for more information.

February

22-24 Texas Cable Show. Location: San Antonio, Texas. Call the Texas Cable TV Association at (512) 474-2082 for more information.

Included will be break-out sessions with hands-on demonstrations using actual equipment. Location: Orlando, Fla. Call Sherman Miller (800) 423-2594 for more information on this session.

17-19 Hybrid Fiber/Coax Operation and Maintenance. Broadband communications training produced by Scientific-Atlanta. Location: Chicago, Ill. Call Bridget Lanham for more information, or to make reservations at (800) 722-2009; or (404) 903-5516.

19 Denver S(B+CT+MPT)E Meeting: "Transmission and Testing." Sponsored by the joint meeting taskforce of the SMPTE, SCTE, SBE. Time: 9:00 a.m.-3:30 p.m. Location: NCTI Building, Denver, Colo., Call Steve Johnson, Time Warner Cable (303) 799-5621; fax (303) 799-5651.

19-20 Analog Headend and Earth Station System Operation and Maintenance. Broadband communications training produced by Scientific-Atlanta. Location: San Francisco, Calif. Call Bridget Lanham for more information, or to make reservations at (800) 722-2009; or (404) 903-5516.

23-25 Fiber Optic Installation and System Design. Seminar sponsored by The Light Brigade, tailored for those seeking a full understanding of fiber optics, from engineering to implementation. Location: Richland, Wash. Call Valerie Johnsen (206) 251-1240.

24 Fundamentals of the Hybrid Fiber/Coax Network. Broadband communications training produced by Scientific-Atlanta. Location: St. Louis, Mo. Call Bridget Lanham for more information, or to make reservations at (800) 722-2009; or (404) 903-5516.

25-26 Understanding Hybrid Fiber/Coax Design. Broadband communications training produced by Scientific-Atlanta. Location: St. Louis, Mo. Call Bridget Lanham for more information, or to make reservations at (800) 722-2009; or (404) 903-5516.

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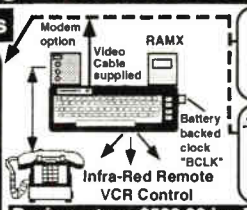

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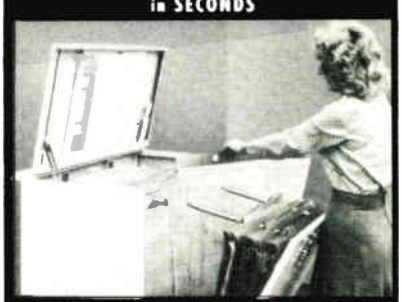

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The future is now– or the next decade

By Archer S. Taylor, Director and Senior Engineering Consultant, Malarkey-Taylor Associates

For 30 years or more, we have dreamed of using broadband cable TV networks for automatic utility meter reading, remote home security alarms, home shopping and banking, information retrieval, movies, and even two-way voice and data communications. Except for pay-TV, pay-per-view movies and some aborted startups, the future has not happened in a big way. But why not? Certainly, primitive technology has had a lot to do with it. But will sophisticated digital technology make it happen now?

The 20-year cycle

It is a widely held presumption that major classes of consumer electronics products tend to become outmoded in about 20 years, give or take a few. It is interesting to note that the 78 RPM "orthophonic" sound recordings, introduced by Western Electric in 1925, gave way to 33-1/3 and 45 RPM recordings 20 years later, following World War II. By the mid-1960s, magnetic tape was rapidly gaining acceptance over discs. Monochrome television, authorized by the Federal Communications Commission in 1941, but restrained by the war until 1946, was not displaced by color until the mid-1960s.

Videotape cassette recordings (VCR) appeared in the late 1970s, and sales began to soar in the early '80s as Sony's Beta format lost out to the now popular VHS. The time will soon be ripe for something to replace the primitive analog VHS videocassette recorder. Laser discs are good, but apparently, not good enough. CD-ROM looks like a transitional step, but its 74-minute capacity is not enough for a full-length movie. A closely guarded, new high-density digital video disc (DVD) reported in a Warren Publishing White Paper last November is expected to be introduced at the January 1996 Consumer Electronics Show. It uses a five-inch disc, able to accommodate full-length feature film, based on MPEG-2.

Another 20 for digital?

On another front, Time Warner and others are preparing to test the concept of true video-on-demand (VOD), capable of providing almost instantaneous access to a vast library of video programming, with all the operating convenience of the VCR, but without the nuisance trips to the video rental store. Delivery would be on the broadband networks of either cable TV or telephone video facilities, or both.

For the last 20 years, more color TV sets than monochrome sets have been produced and sold. But it has been 40 years since the FCC authorized commercial operation of color TV. Digital television, and HDTV, seem poised to reach the marketplace, both wired and wireless, in the next couple of years. Will it take another 20 years to dominate the market?

Confused consumers

Engineers, it seems, can do anything except create stability in the marketplace. The Warren White Paper quotes President Gary Thorne of Audio King saying, "Consumers have proved that when you confuse them, their best response is not to do anything."

Our economy demands unremitting change and endless growth. Yet, our souls cry out for more time to savor the pleasures and amortize the cost of recent innovations before going on to the next.

Consumers have a right to be confused. Should they buy new, widescreen 16:9 TV, or stay with the old NTSC 4:3 standby that has worked so well? Should they wait for widescreen and HDTV prices to come down from $3,500? Will programming for HDTV and widescreen TV be worth the cost and effort? Should they continue to buy VHS tape cassettes, or start collecting CD-ROMs or laser discs? Or, will DVD discs make everything obsolete?

How soon will enough good programming be available for CD-ROM, or laser disc, or DVD? Or will those wonderful, still-to-be DVD discs become obsolete when video-on-demand is offered by cable TV, or even telephone companies? What should they do with all those old 78 RPM and LP records they have enjoyed collecting? And how about the stack of audio and video cassettes they purchased for future enjoyment?

Evolutionary response

Subterranean rumblings continue to foretell cosmic changes. While the technology is revolutionary, the public response is likely to be evolutionary, moving deliberately and comfortably from familiar ground. Until consumers are convinced that new technology is for real, and affordable, they will respond sparingly.

The future is not really now, and may not prevail until well into the next decade.

The good news is that this intrinsic consumer inertia assures that the window of opportunity will remain open for several years. It allows time for deliberate evaluation of options as to rebuild architecture and financial arrangements, or mergers, acquisitions, joint or cooperative ventures, or even system sales and consolidation.

The bad news is that the window will surely close, but we can't be sure when. Meanwhile, the upstream architecture is unsettled. Marketing, not technology, is the most vexing of uncertainties. What do consumers want, and how much will they pay for it?

Market tests and surveys are either naive or discouraging. The most promising revenue sources appear to be advertising and service providers, not cable subscribers.

What an exciting time to be active in the technical arena! CED

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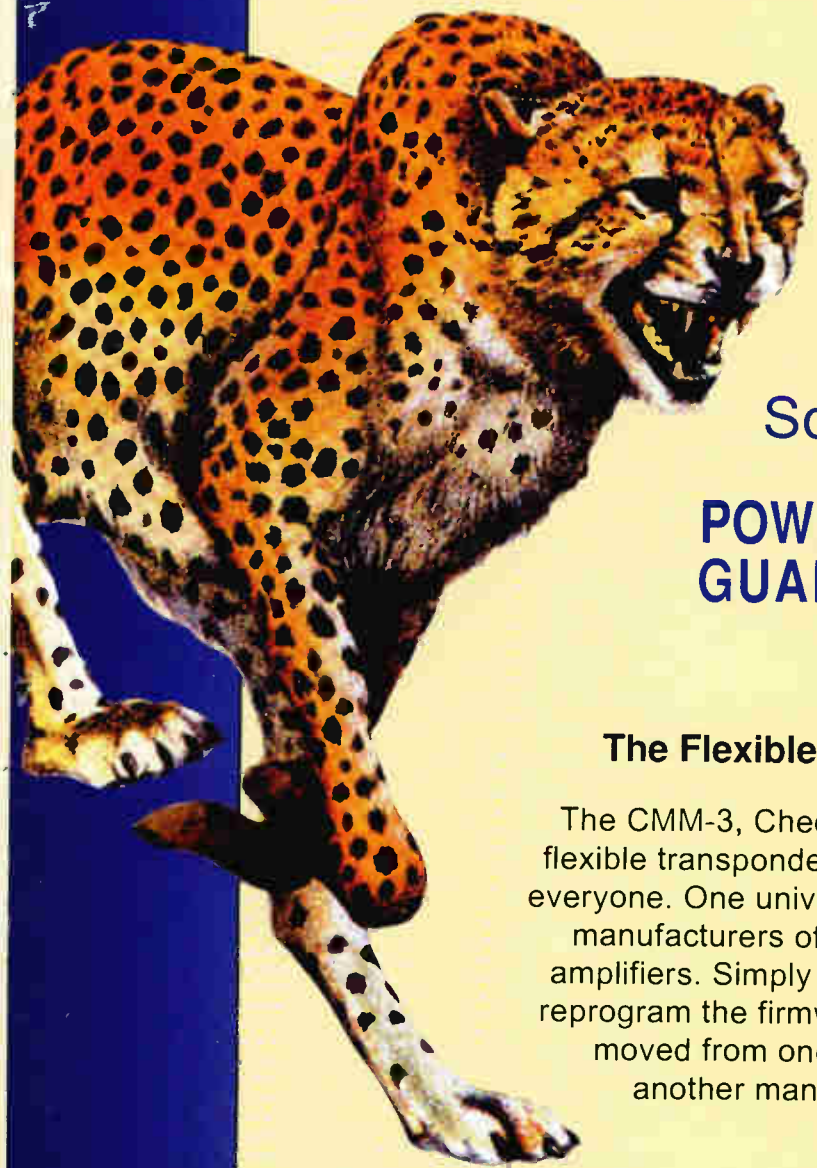

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The Flexible Status Monitoring Solution

The CMM-3, Cheetah Monitoring Module, is the most flexible transponder on the market today. It speaks with everyone. One universal module is compatible with major manufacturers of FO receivers, power supplies and amplifiers. Simply change the cable harness, remotely reprogram the firmware and one CMM-3 module can be moved from one manufacturer's power supply to another manufacturer's fiber optic receiver.

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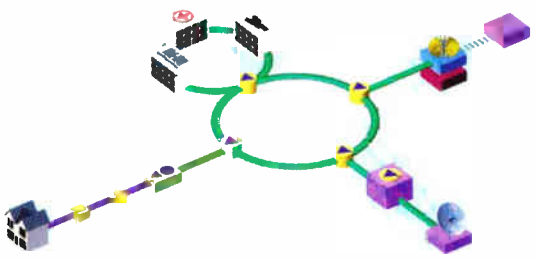
The System That's Certain...For a Future That Isn't.

Digital is a reality. Chances are, you're passing these signals through your network today, in the form of digital services. If you're like most broadband providers, you've already discovered the digital limitations of your drop – and so have some of your subscribers.

ANTEC's Integrated Drop System® (IDS) is your solution for today...that also prepares your network for the interactive digital services of tomorrow. IDS drops are thoroughly tested in a QPSK digital format for carrier-to-noise ratios, microreflections and EMI shielding. IDS can put an end to service interruptions by ensuring quality analog and digital transmissions, up to 1 GHz.

Ensure your pipeline to the home can deliver today's and tomorrow's services – call your local ANTEC consultant to learn more about the benefits of IDS.



Our Cable Integrated Services Network (CISN) provides a "blueprint" for building a broadband network that accommodates interactive services in a 1 GHz spectrum. IDS provides the solution to the final, critical link of the broadband network, the subscriber drop.

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