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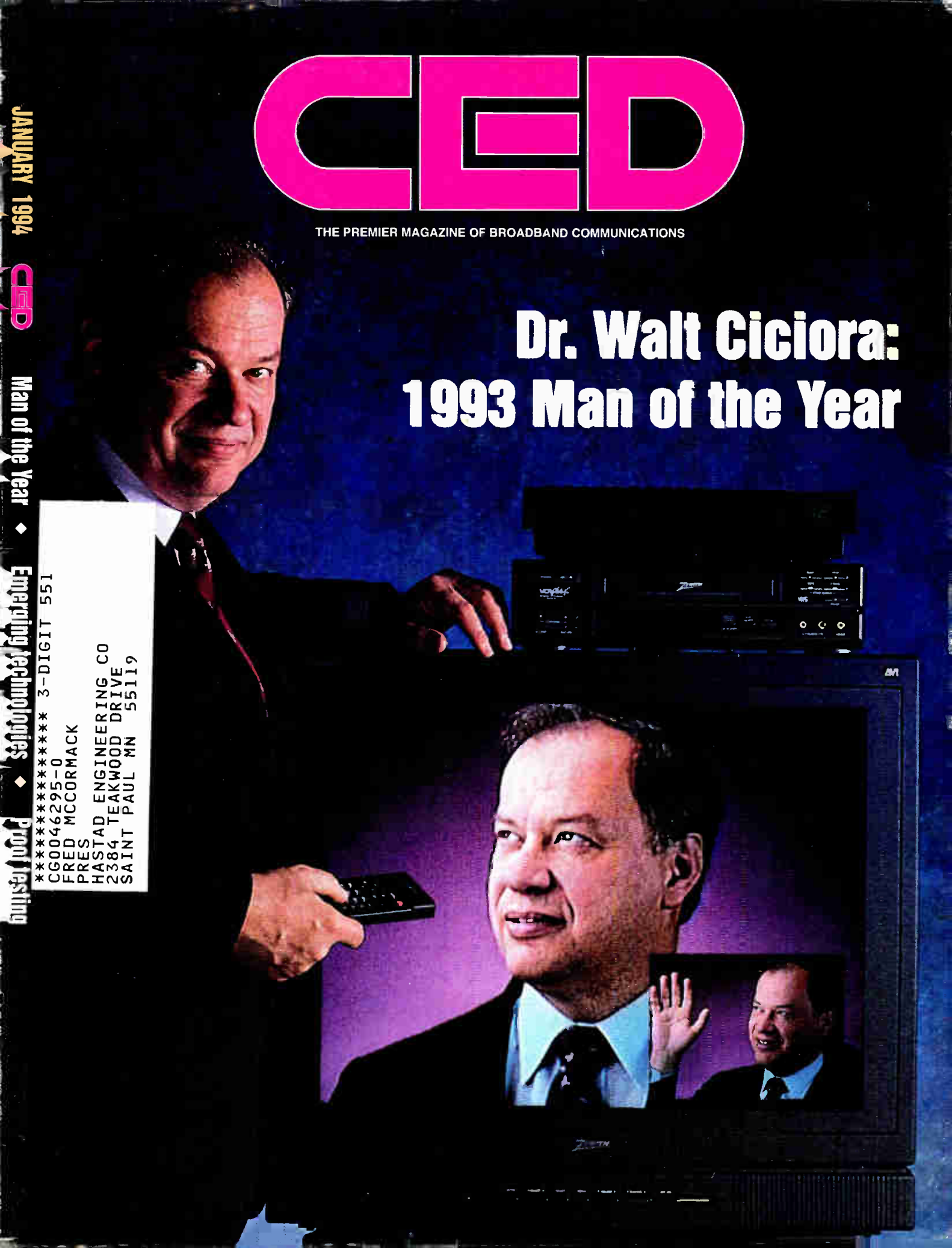
JANUARY 1994 CED Man of the Year ◆ Emerging Technologies ◆ Product Testing

Dr. Walt Ciciora: 1993 Man of the Year



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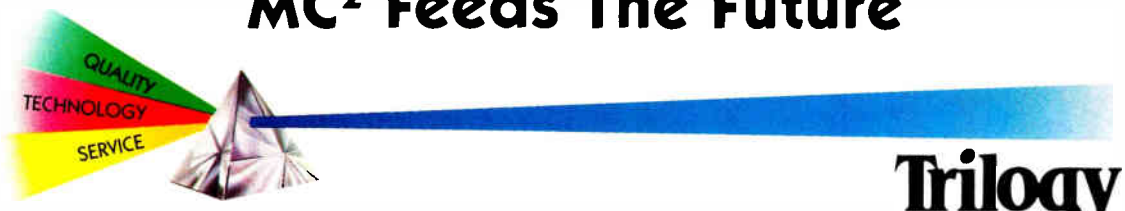

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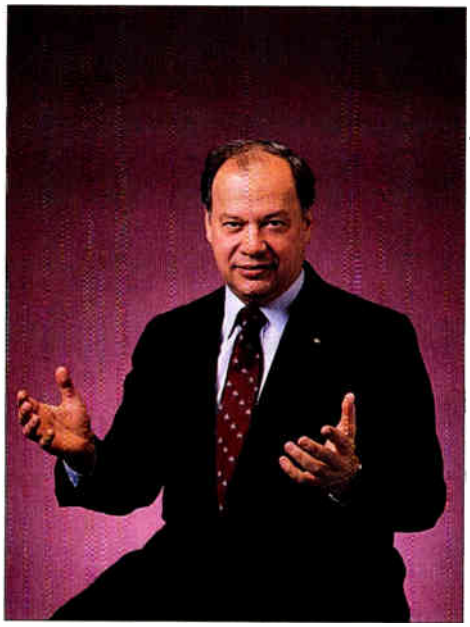

CARLETON KRULL

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By Roger Brown

The former Time Warner technology executive was chosen as our annual honoree because of his almost single-handed efforts to shape the FCC's policies toward cable/consumer electronics compatibility. This article highlights the background and most recent accomplishments of the only two-time winner of our award.

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By Fred Dawson

Merge, acquire, go to lunch. That's the name of the cable/telco game, it seems. With the decision by PacBell to use an integrated telephony/video approach, it appears the architecture touted by cable operators has received official sanction by the telcos. This development is explored in this new regular feature that will explore developments related to telecommunications.

64 Western Show review

By Roger Brown

Last month's Western Show in Anaheim was different in many ways. It was the first time Bell Atlantic registered close to 400 attendees; the first time a telco CEO was selected as the event's keynote speaker and perhaps the first time the "cable" industry was talked of in the past tense. And so it goes in the *communications* business these days.

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76 Competitive access confab

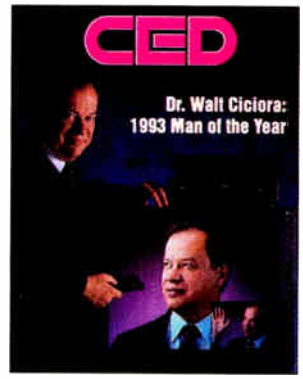
By Fred Joyce

At first blush, you might think all the cable/telco mergers would have the competitive access providers nervous. Not so! It turns out the CAPs believe there's still plenty of room for competition and that as the low-cost provider, these small companies can provide the best service, too. This article discusses those thoughts as espoused during the ALTS conference in Phoenix recently.

78 Cable TV in Argentina

By Roger Brown

North American equipment suppliers showed up in force at November's Jornadas de Television por Cable ATVC/Caper '93 annual convention, despite an already zealous domestic market and a schedule that kept them in Latin America over the Thanksgiving holiday. This article captures the enthusiastic mood and news announcements of the show.



About the Cover

Walt Ciciora explores compatibility issues. Photo by Carleton Krull.

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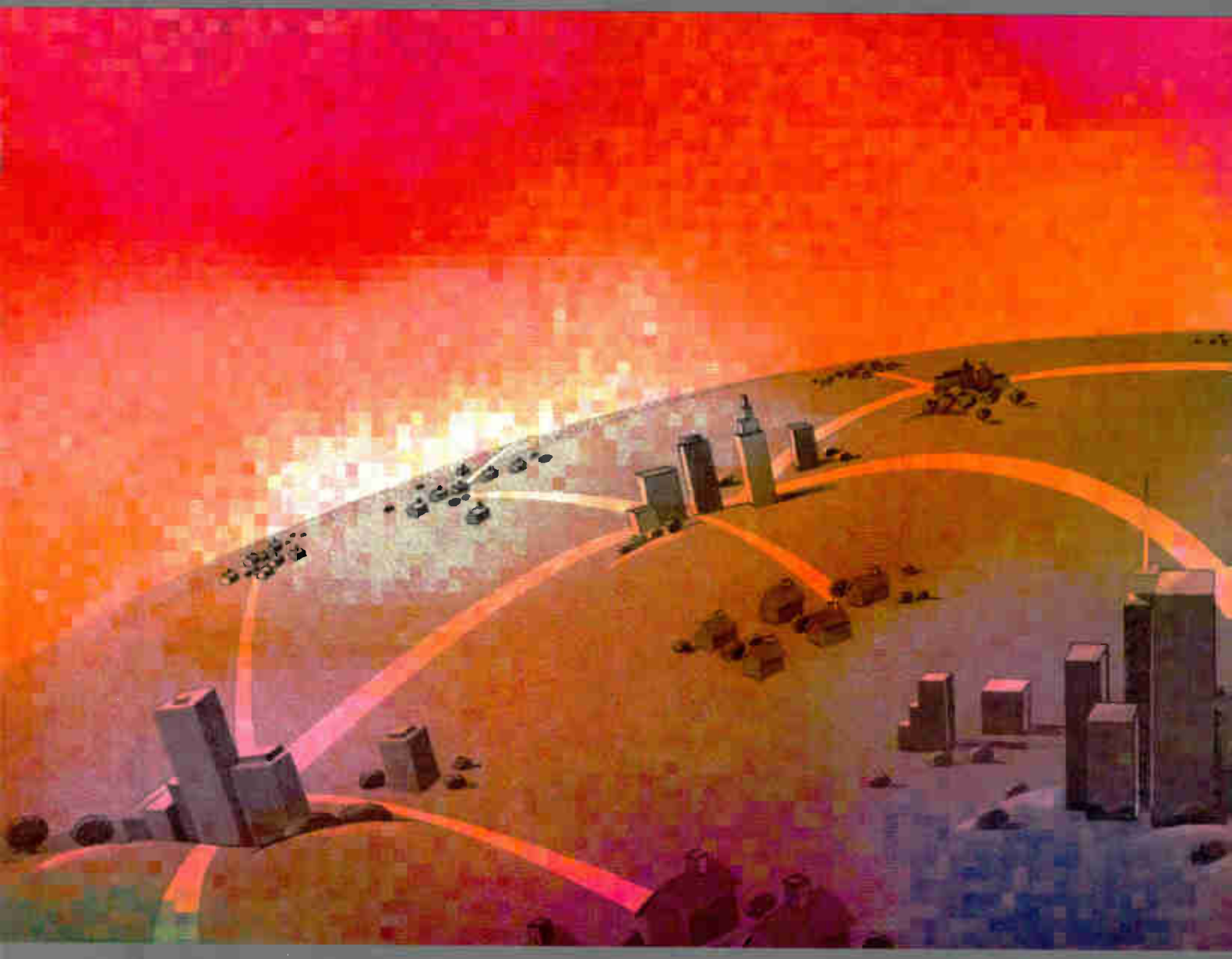

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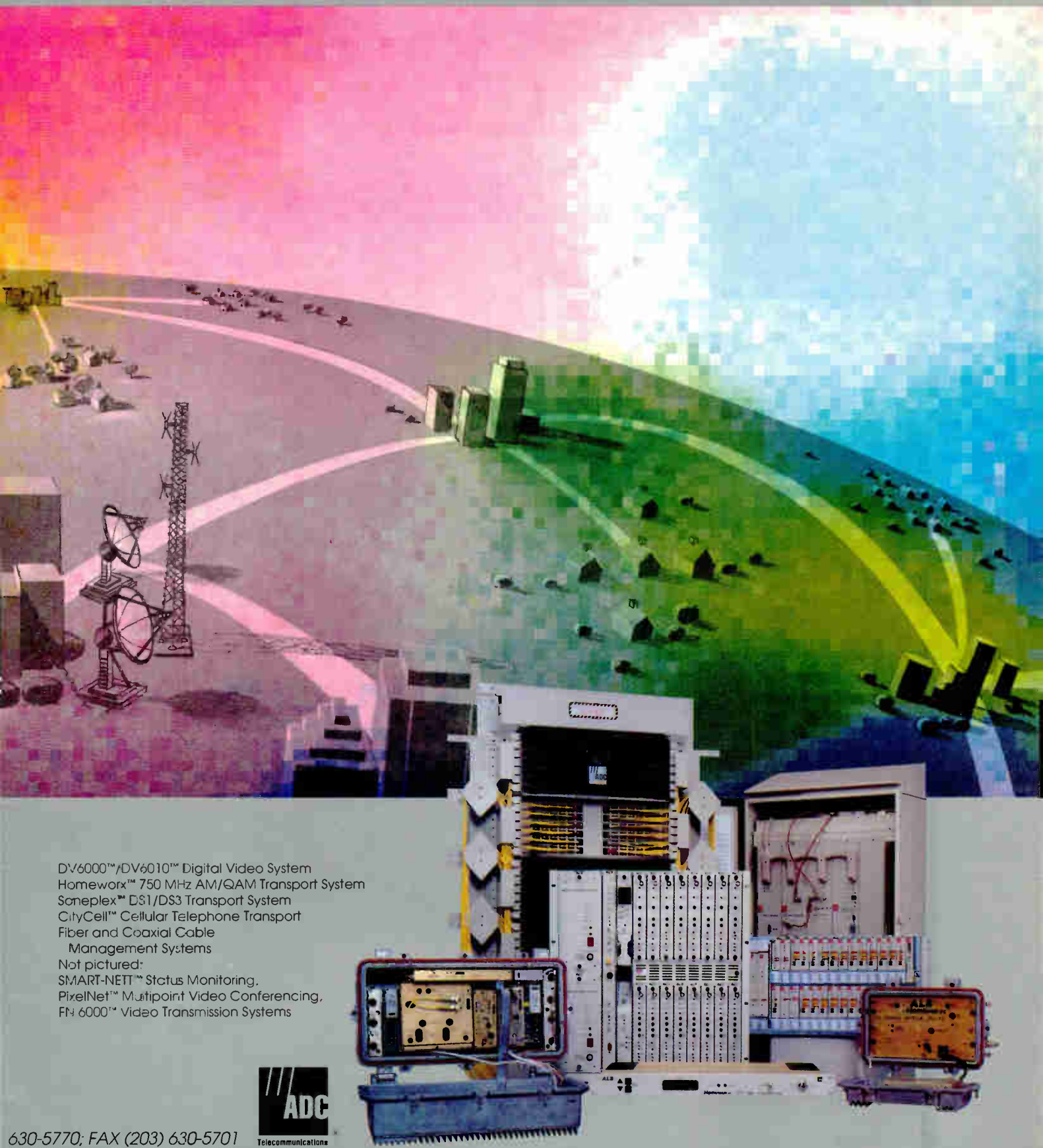

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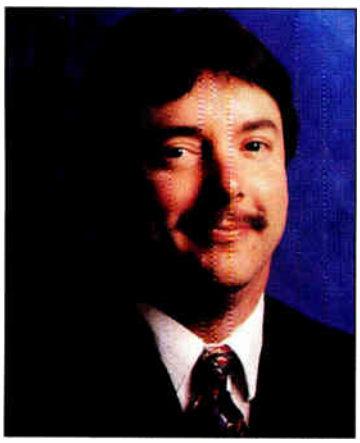

The Western Show was a watershed event

I have seen the network of tomorrow–and it doesn't look anything like today's.

The 1993 Western Cable Show will forever be remembered for its announcement-an-hour pace, its packed aisles, the CabeLabs CableNet '93 display and perhaps as the last "cable" trade show.

Interestingly, the press room in Anaheim became the central gathering point as vendors streamed in with announcements about just-cut deals. Previously unknown companies made tremendous efforts to seek out industry journalists either to gather intelligence or make what they hoped to be a worthwhile acquaintance. Normally, the press goes out to find the news; in this case the news found the press.

Getting around the show floor was more difficult than it has been in years. People came–and stayed–on the floor right up until closing time because there were so many new concepts and products to see. Vendors who haven't had much to crow about lately reported actually writing business in their booths.

One of the not-to-be-missed exhibits was CableNet '93, which tied together products and software from at least two dozen companies to show the capabilities of a broadband network. The exhibit, organized by CableLabs and heavily funded by Northern Telecom, was consistently mobbed by attendees who saw exotic applications like distance learning, cablephone, video-conferencing, home printing and video-on-demand supported by a digital, ATM switched Sonet OC-48 fiber ring backbone operating at 2.4 gigabits per second.

No one knows how much of the technology talked about at the show will find its way into the network of tomorrow. More than one veteran was reminded of the early 1980s when Qube and other interactive systems dominated the news, only to eventually fail in the marketplace. It's my bet that a lot of money is being invested that won't pay off.

Perhaps more than anything else, though, the show may have been the watershed event in the classic cable/telephone tussle as the lines separating the two industries all but disappeared. Ray Smith, chairman of Bell Atlantic, charmed the audience during his keynote speech, key hardware suppliers announced telephony products, old "cable" guys went to work for the "telephone" companies. Even Ted Turner threw in the towel during the opening panel, noting that the last 20 years have been a great ride, but now it's over.

Personally, I think Ted might be right: the industry has changed forever. Telephone companies will soon own or have massive financial stakes in nearly all the Top 10 cable companies. With that comes a new mindset, a new way of doing business and new technology. If you haven't done so already, you'd better start re-educating yourself. Or, as Ray Smith said when he was asked how to stay ahead of the competition: "Don't take a day off."

Roger J. Brown

Roger Brown
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PCN service offered across three cable networks

Delivery of wireless telephony across three adjacent cable networks was achieved last November when Cablevision of Boston, Continental Cablevision and Time Warner Cable cooperatively placed, routed and delivered a PCS phone call across the Boston region.

The unprecedented collaborative effort demonstrated the interoperability of a wireless telecommunications system between disparate cable systems and showed how telephony services can be bypassed around the local phone company. (See Figure 1.)

The demonstration began in historic Faneuil Hall in downtown Boston, where Massachusetts Lt. Gov. Paul Cellucci placed a call to Newton Mayor Theodore Mann. The call was routed through Cablevision's network to Continental's franchise area. Continental routed it through several communities to Teleport Boston's switching center, which sent it on to Heartbreak Hill in Newton, where it was received.

A second call was then placed by Cellucci to Malden Mayor Edwin Lucey, which resulted in the call being routed through the Cablevision and Continental networks to Time Warner's headend in Malden.

The network architecture used is based on the distributed antenna concept pioneered over the last two years by Rogers Cablesystems of Canada and Cable Television Laboratories. This network uses existing cable plant and microcell repeaters instead of expensive base stations to economically cover geographic areas. Recently, Cablevision demonstrated PCS' suitability as a replacement for cellular systems, showing how phone calls can be handed off from cell to cell at vehicular speeds.

Anticipated PCN services range from telephony to wireless fax, E-mail, paging, data, video, audio and voice mail services.

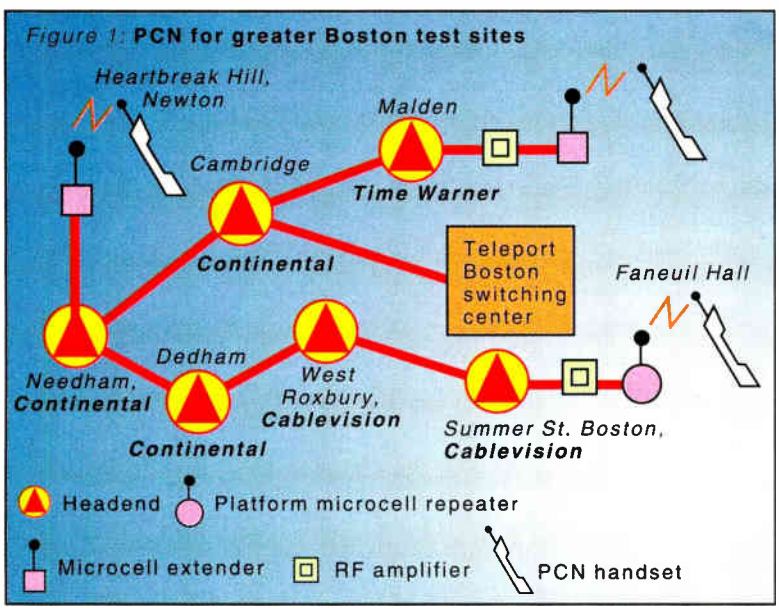

Figure 1: PCN for greater Boston test sites

FCC issues NPRM on electronics compatibility

The long-awaited Notice of Proposed Rulemaking on cable/consumer electronics compatibility was issued early last month by the Federal Communications Commission. Cable operators will be heartened to hear it contains few surprises.

In the NPRM, the FCC is proposing both short- and long-term solutions to the problem of cable/consumer electronics interfaces. In the short-term, cable operators will be required to provide set-tops with timers or bypass circuitry to consumers who request them and they will be allowed to recoup the cost of such devices in accordance with the new rate regulations. Also, cable operators will be prohibited from scrambling basic cable programming and must offer consumers an education program.

However, the Commission has put cable on a short leash to come up with a decoder interface (accommodating analog and digital video) in time for publication of rules in April. That gives engineers only a few weeks to set a new standard or accept by default the adoption of the EIA 563 interface, which was developed years ago.

That old standard won't handle current analog encryption systems, much less digital signal processing, said Vito Brugliera, vice president of technology planning for Zenith Electronics, which is now circulating a "straw-man" proposal.

Comments on the NPRM are due Jan. 10 and reply comments are due to the FCC by Jan. 25.

Also, the FCC will issue a Report and Order on Emergency Broadcast System compliance for cable operators, radio and broadcast stations perhaps as early as March, said Helena Mitchell, director of EBS at the FCC. The Commission is scheduled to discuss the EBS ruling in February, and sources close to the issue said the FCC will likely issue a ruling that is sympathetic to cable's request for a low-cost, generically automated system.

In the ruling, operators will be required to purchase EBS equipment but not necessarily use it, Mitchell said. "We're planning to apply the same logic here as we do to the broadcast stations now: If we require you to buy it, you'll probably use it," said Mitchell.

Ken Wright, chairman of the SCTE EBS subcommittee and an active protector of cable's EBS interests, said his concern supercedes the immediate reply comment period and extends to future video providers–including DBS and video dialtone participants. "Basically, it's my feeling that if we have to do it, they have to do it."

US West, Cox Cable battle it out in Omaha

Omaha, Nebraska, which might be known best to most Americans as the home of a large insurance company, is shaping up as the battleground for two huge telecommunications companies as they strive to construct competing next-generation voice and video networks.

US West Communications has already announced its intention to spend billions of dollars upgrading its narrowband network with broadband capabilities across its 14-state region. Cox Cable, which has the Omaha franchise, is now countering with an upgrade plan of its own.

During last month's Western Cable Show in Anaheim, Scientific-Atlanta announced it was selected by the RBOC to design and build MPEG-compatible interactive set-top terminals that will be used as a gateway for a wide variety of interactive services.

The terminal is based on a combination of S-A's video compression technology and The 3DO Company's 32-bit graphics control and display technology. The addressable terminal is capable of running applications locally as well as generating high resolution graphics locally.

At this year's Western Cable Show, Northern Telecom formally introduced a portfolio of products and technologies for the cable television industry, initiating the beginning of a whole new universe in broadband multimedia networks.

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The unusual Omaha architecture will bring separate analog and digital cables into the home's box. Inside the terminal, the digital path will incorporate an off-the-shelf reduced instruction set computing (RISC) processor along with the 3DO and MPEG processors.

S-A already has been chosen by US West to provide the hybrid fiber/coax distribution network as well as an interdiction system that will control a tier of analog video services.

Meanwhile, Cox Cable has chosen Zenith Electronics to provide digital set-tops for its test of interactive television in Omaha. The decoders will be married to an interactive platform developed by California start-up ICTV. The decoders will also feature the StarSight Telecast electronic program guide and VCR control system.

The ICTV architecture takes advantage of IBM's high-speed digital servers to provide viewers with a gateway to interactive services. In Omaha, the Zenith set-tops will be used with specially developed ICTV remote controls. Customer management and on-screen billing services will be provided by New Century Communications.

Cox plans to offer movies on demand in Omaha by June 1994 and will expand the test and the number of services after that time. Anticipated service offerings include music videos on demand, arcade video games, interactive guides to local restaurants and entertainment venues, electronic classifieds, distance learning and home shopping services.

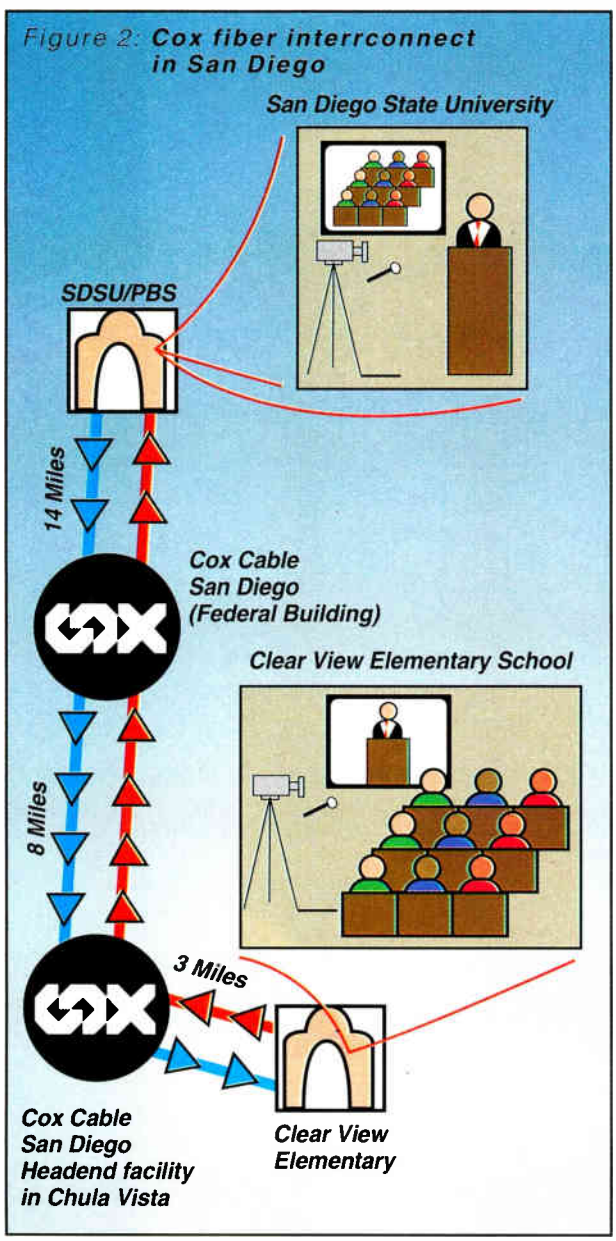

Figure 2: Cox fiber interconnect in San Diego

Cox Cable links schools with fiber digital network

In the future, it could be argued that interactive television was first applied to education before it made its way into mainstream broadcasting. The latest cable system to commit to distance learning is Cox Cable San Diego, which recently unveiled a $20,000 two-way digital fiber network linking San Diego State University and Clear View Elementary School in Chula Vista.

The implication for the Chula Vista Professional Development School–a collaborative project between SDSU and the Chula Vista school district–is that professors, students and student teachers located 25 miles apart can now see and hear each other without leaving their classrooms. (See Figure 2.)

A recent demonstration of the link-up showed three separate applications of the technology, including a history professor at SDSU lecturing students at Clear View, a discussion between SDSU and Clear View students, and a university supervisor monitoring a student teacher.

Other potential applications of the network include tying into information networks, connecting to homes located in the school district and linking to the City Administration building.

Jottings

Now that it's 1994, it's time to keep an eye on the development of DBS. Production was scheduled to start last month on the system's digital satellite receiver, which will be built by **Thomson Consumer Electronics.** Shortly after that, production was slated to be initiated on the first MPEG-2 decoder chips, which will be integrated into the set-top receivers. The 18-inch dish has already commenced production. The satellite was scheduled for a Dec. 20 launch and the service is supposed to begin in April . . . In its model Castro Valley system, **Viacom Cable** is working with Intel and General Instrument to test high-speed modems that will allow 500 PC users to access data via the cable network. Services to be tested include America On-Line, Prodigy, Internet, games and software distribution . . . Speaking of Prodigy, **Cox Cable** in San Diego is the first system to test delivery of the on-line service over cable plant. Cox is using Zenith's HomeWorks cable modems in San Diego, which will be entirely two-way capable by the end of 1994 . . . **HBO Ole**, the Spanish-language version of the popular premium service, will convert to digital transmission with **General Instrument's** DigiCipher I to "pave the path for the distribution of an array of new channels," said HBO officials. HBO Ole will upgrade to DigiCipher II when it is available . . . In order to gain operating efficiencies, alternative access providers **Time Warner Communications** and **Hyperion Telecommunications** have merged support functions into a joint venture company called **Time Warner-Hyperion Communications. Services** will include billing, accounting, contract negotiation, sales to large customers and IXcs, regulatory services and network management . . . Brazil recently transmitted its first digital audio signals using equipment provided by **Wegener Communications.** A local broadcaster used a mobile production facility during the 10th Assembly of Broadcasters of the State of Sao Paulo to digitize the program audio and uplink it . . . Keep your eye on this: An Isreali researcher has apparently developed a method to increase the number of channels that can be transmitted over a single fiber. The method is based on holograms, which would be used to combine the light from as many as 20 different signals and launch it into the fiber and then receive the signals and separate them again. The work was done by Dr. Yaakov Amitai of The Weizmann Institute of Science in Rehovot, Isreal . . . **US West Communications** filed a tariff for Synchronous Service Transport, a new Sonet platform service. SST is a high-capacity channel that could be used for transporting BISDN and ATM. CED

–Compiled by Roger Brown

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In defense of Montreux

By Wendell Bailey, VP of Science and Technology, NCTA

One of the nice things about writing for this magazine is that, occasionally, the editors let me go off on a tangent that doesn't necessarily fit with their current issue. The article that follows is just such a one.

When I came back from a recent trip to South America–where cable TV technology is rapidly blossoming, by the way–I found a very troubling letter concerning a European cable issue.

Bad moon rising

Since 1981, I've been involved with the Montreux International Television Symposium and Exhibition in Montreux, Switzerland. During those years, I've seen a symposium that was almost exclusively related to broadcasting and its technology become one that has been very carefully balanced between broadcasting and cable operations.

The executive and symposium committees as well as the symposium's management have worked diligently and deliberately to see that these two industries cooperated at the venue. The result has been an international exhibition and symposium that brings together broadcasters and cable operators from every corner of the globe.

I resist saying "every corner of the free world," because one of the things that makes a venue in Switzerland unique is that, long before the Eastern Bloc began to change and become more open, there were participants from places behind the Iron Curtain who were not able to deliver their thoughts and ideas in any other venue in the world–except Montreux.

During events in this lovely place I first met people from Russia, Albania, China (mainland) and from countries that, quite honestly, strained my knowledge of geography. Many cable people from the U.S. have been subsequently invited to those countries. The single, unifying fact of all of those relationships is that they first occurred in a neutral country in the lakeside town of Montreux.

This event is not the only broadcast television venue available in Europe, but it is available only every other year, specifically during the odd-numbered years. The other event–traditionally the International Broadcast Conference (IBC) held in Brighton, England–does not include cable players as a significant part of its planning nor its programs, and, in the early years, the IBC did not attract the same level of presenters and committee members that Montreux has traditionally attracted.

It's quite easy now that the Eastern Bloc is undergoing such a radical change to get speakers and committee members from those countries. But the fact of the matter is, participants from those formerly restricted countries have been contributing to the Montreux symposium for years.

An unacceptable shift?

What's the problem? It's this: The IBC now wishes to establish a yearly convention, which means that in both odd- and even-numbered years they would like to hold a show in Amsterdam.

As nice and convenient as that city is, it cannot compare to the convenience Montreux offers. You cannot have a convention that receives the care and attention that Montreux lavishes on this one in another venue. Why? Because all the other proposals (and in particular the IBC proposal) are proposals for organizations to host conventions. In Montreux, the city itself is the host.

Therefore, when members of the executive or symposium committees speak to the management of the Montreux television symposium about concerns, we are not talking to the management of an association that must then go talk to the tourist department in a given city. We are actually talking to the city itself.

A matter of convenience

In Montreux, we're told what can and can't be done. When something can and should be done, it's been my experience that it gets done. In return for this level of attention and flexibility, the city of Montreux has become the one place in the world where every other year, papers and presentations representing the leading edge of technology have been presented to an appreciative, knolwedgeable audience. It has become the one place where contacts and lasting friendships have been developed between people with like interests from every part of the Western and Eastern worlds.

Further, it has become, though the efforts of the management of that symposium as well as the broadcasters and cable representatives on its executive committee, a place where broadcasters and cable operators have been able to put what differences they have aside and to work together on bringing the convergence of media to a higher plane of understanding for all concerned.

When I travel throughout the world, cable is widely known and appreciated because of what has been accomplished in the U.S. How most of the rest of the world learns about some of those achievements has been by sitting in the lecture hall beside Lake Geneva in Montreux.

Nobody else has offered a venue or an organization superior to this.

Because of this, I hope the decision-makers on whether the IBC will have its way will try listening to their customers and learning what they think of work, flexibility and loyalty. The International Sympositum and Exhibition in Montreux, Switzerland epitomizes all of this. CED

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Network Know-how

The Internet: What it is

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

At the Western Show this year, CATV access to Internet, Prodigy and CompuServe were all being shown in various booths to a cacophony of ooohs and aaahs. Why all the fanfare? The answer is really very simple–speed! Let's face it, as a society, when we want something, we want it now! But what is it that we want? What is the Internet, or can it even be described?

In the late 1980s the world's fastest computers were only available to a small number of elite researchers. The National Science Foundation (NSF), in an effort to further the "state-of-the-art," was looking for a way to make these excellent research tools available on a much broader scale and for most any scholarly research.

As a result of the immense costs associated with the deployment of even a single supercomputer, the NSF created only five supercomputing centers that were to be shared via various research institutions throughout the United States. The next task for the NSF was to link the supercomputers and their clients together into a network. Initially, the NSF network (NSFnet) linked each of the supercomputing centers together via 56 kB/s telephone lines using ARPAnet's well-known Internetworking Protocol technology.

The NSF was then faced with the dilemma of how to connect the various colleges and universities into the network. If it simply provided a direct connection between each university or college and its nearest supercomputer in a star configuration, the access charges for the leased 56 kB/s telephone lines would be enormous! Instead, the NSF decided that each school would interconnect with its next nearest school, which would then be linked to its next nearest school, and so on.

With this type of configuration any school or computer could eventually communicate with any other by simply forwarding the conversation through its neighbors.[1] The solution, as crude as it sounds, worked very well, and the network was born.

It wasn't long before the traffic on the network increased to the point that it became overloaded. Researchers soon became aware they were sharing much more than just supercomputers. They had access to other scholars with whom they could collaborate on difficult projects, and access to a multitude of databases. The Internet had truly become a network of networks.

In 1987, the backbone network was upgraded to T-1 speeds (1.5 Mb/s) by Merit Network Inc., working in conjunction with IBM and MCI. The network has continued to evolve. Today, the backbone network is operational at DS-3 (45 MB/s) and will be evolving to even higher speeds.

While the Internet of five years ago was fairly easy to describe, it's not so easy today. In 1988 it consisted of a somewhat primitive (by today's standards) network of non-commercial Local Area Networks, all using TCP/IP (Transmission Control Protocol/Internet Protocol), that were connected together in a seamless fashion for their respective users.

Today, however, it's a different story. Using "bridges" or "gateways" and routers, non TCP/IP LANs are also connected to the Internet, with the necessary protocol translation occurring at the gateway for seamless interface for the non-TCP/IP LAN user. Even CompuServe has a gateway to Internet (GO MAIL).

The network today in much of the country consists of a high-speed, self-healing, DS-3 multiple ring backbone (evolving to even higher speeds) whose performance is continually being monitored by various regional Network Operations Centers. Individual connections to the Internet can be made at most any speed from sub-56 kB/s up to 45 Mb/s via a single route, or via multiple fully redundant, self-healing routes–whatever you can afford to pay.

No one really governs the Internet. It has no president or CEO, but it does have a voluntary membership organization called the Internet Society, or ISOC, whose purpose is to promote the worldwide expansion of Internet technology. In addition, there is no "Internet Inc." that collects money from anyone.

Today, schools and businesses will simply pay their Internet access connection fee to some regional network service provider (which could be an MSO, for example), who in turn will pay a national provider (ANS CO+RE for example) for the necessary circuit capacity to gain access to the national and international infrastructure. If something goes wrong with the network, it's the regional provider, the one closest to the customer (the MSO), that must be prepared to make things right!

In order to provide this level of service, the regional provider must be capable of monitoring the performance of its own network, through a network operations center (NOC–either its own or someone else's), as well as that of the national network.

So what is the Internet? E. Hoffman of Merit Network probably summed it up well when he listed these three most common definitions for the Internet[2]:

1. A network of networks based on the TCP/IP protocols (with gateways to many other protocols).

2. A community of people who use and develop those networks.

3. A collection of resources that can be reached from those networks.

Any questions?

Next month we'll take a look at the hardware requirements for a typical user or set of users within our CATV infrastructure for a high-speed interconnect with the Internet. CED

References

1. Krol, Ed, "The Whole Internet User's Guide and Catalog", O'Reilly & Associates, Inc., 1992.
2. Hoffman, E., "FYI on "What is the Internet?", RFC 1462, May 1993.

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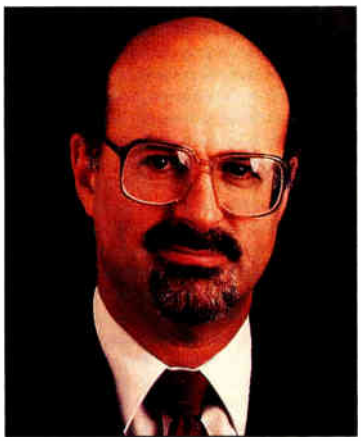
The future of scrambling



By Jeffrey Krauss, independent telecommunications policy consultant and President of Telecommunications and Technology Policy of Rockville, Md.

I believe there will be a continuing tension between those who want to eliminate the set-top box, and those who believe that it will always be needed. Among the legitimate functions of the set-top box are: (1) tuning to channels that TV sets cannot tune; (2) eliminating direct pick-up interference in TV sets; (3) decompressing compressed digital video; (4) descrambling pay programming for those who are entitled to receive it; and (5) providing interactive multimedia capabilities.

The first two might become unnecessary in the future, as TV sets improve and support the standard cable TV channel plans. Decompression might be built into TV sets, if a single "flavor" of MPEG-2 is adopted by everyone. Interactive multimedia is still speculative and evolving. For now, there is a focus on scrambling.

The cable industry and the consumer electronics industry, in response to the requirements of the 1992 Cable Act, have agreed to establish a standard interface to connect descramblers to TV sets. But there is still disagreement on whether a standard for scrambling, or merely a standard for a scrambling interface, will result. There is agreement on the notion of "replaceable security," but disagreement on whether any part of the descrambler can be built into the TV receiver, making that part non-replaceable.

Scrambling standard vs. interface standard

A descrambler has several functions, and now the industry dispute has moved to the question of where to draw the interface. Which functions are in the TV set, and which functions are outside?

The two primary functions of a descrambler are (1) managing keys and authentication and deciding what programs the customer is entitled to receive ("entitlement functions"); and (2) the actual descrambling of those scrambled programs that the customer is entitled to receive.

The consumer electronics manufacturers want to build the actual descrambling circuits into the TV set. The entitlement functions would take place outside the TV set. The interface would pass key information out to the "entitlement" box, but video programming would stay within the TV set.

The cable TV industry disagrees. It wants both the descrambling and the entitlement functions to be handled in the external box. The interface would pass scrambled programming out to the box, and descrambled programming back in.

The cable industry believes (and I agree) that it is too dangerous to build the descrambling circuits into TV sets, because it gives pirates a single target to shoot at. In the home satellite industry, the pirates had a single target–VideoCipher 2–and they shot it to shreds.

Both the cable industry and the consumer electronics (CE) industry agree on the need for replaceable security. But they disagree on how it should be implemented. The CE people believe that a system will be sufficiently secure if only the entitlement part can be replaced. They believe there is no need to replace the actual descrambling circuits. However, the cable people want the descrambling part to be replaceable.

There is a big operational difference in these two approaches. The CE industry approach requires a smart card, with a simple microprocessor and a simple interface containing perhaps only 12 electrical contacts. The cable industry approach requires a VERY smart card with more complex circuits and more electrical contacts.

There are two different approaches to replaceable security embodied in two video scrambling systems now in use for satellite video distribution. One (VideoCipher RS) has a unique identity built into each decoder box at the time the box is manufactured. Thus, smart cards need to be distributed only after the system built into the decoder box has been compromised. In the other (VideoCrypt, in use in the United Kingdom and soon to be in use by the Hughes DirecTV DBS satellite system here) the user identity resides in the smart card. As a result, a smart card must be used from the very first day, and must always be in place.

A smart card system for video scrambling must use microprocessors in the smart card, at a cost of about $10 per card. A cheaper approach, at about $2 per card, is possible using only EPROMs in the card, but this is likely to be too easy to break.

The smart card industry is growing vigorously. It has a trade association (the Smart Card Industry Association) and an annual convention. Smart cards are used for door access, campus meal plan purchases, parking lot control, library cards, gasoline purchases, telephone service and other services. Under the Clinton Administration's health care initiative, your "Health Security Card" will probably contain your medical records. But virtually all of these applications require only simple EPROM memory in the card, not the sophisticated signal processing needed for video security.

Timing

Whatever agreement is reached between the CE and cable industry representatives, implementation is years away. It takes the CE industry about 3 years to incorporate design changes into new TV sets. The descrambler interface, and possibly the descrambling functions, probably won't be in TV sets until MPEG-2 decompression chips are built into TV sets. And the CE industry will only put these capabilities into the "high end" products. So we are probably looking at a transition period of a decade or more.

In two words? Expect battles. CED

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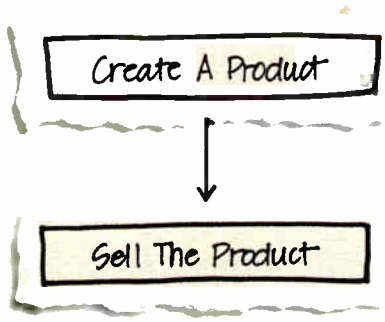

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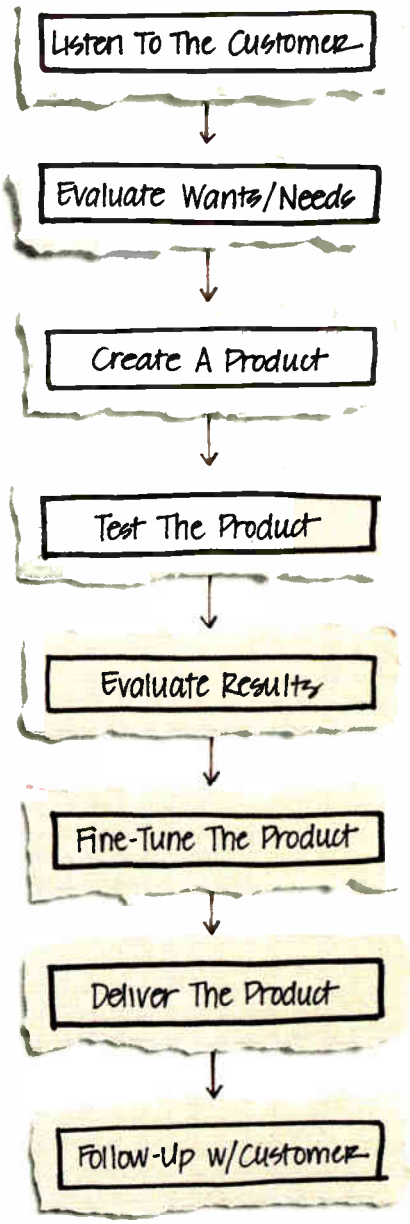

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ATM's cost, missing features worry designers of the full service network

Asynchronous Transfer Mode (ATM)–elegant, versatile and very, very fast–is still many a designer's choice as the core standard for tomorrow's full service networks.

But there are some unresolved problems.

Rhonda Hilton, CableLabs' project manager for advanced network development, put it this way: "The hard part right now is that ATM is not done."

It has become near-axiomatic–"like motherhood and apple pie," said Hilton–that ATM "may well be the protocol of choice for delivery of divergent services like voice, multimedia and digital television." Hilton regards ATM as "a viable contender" for that role, one that is even "gaining more momentum all the time."

A main reason why cable's embrace of ATM has seemed almost a fait accompli is that full service testbeds like Time Warner's Orlando, Fla., system are already being designed with ATM at their core. CableLabs President Dr. Richard R. Green noted that Time Warner is using ATM switches to route DS-3 (45 Mbps) data channels all the way to in-home devices.

"This is high-end stuff," said Green, noting that the Orlando design features 32-bit RISC processors operating in the 100-MIPS range inside set-top terminals.

Such a design permits manipulation of three-dimensional graphics including, for example, "community playing of virtual reality games," Green observed.

But the Orlando design relies on vendors' proprietary ATM approaches rather than on an industry-standard ATM, Green said. Future cable systems, he added, may use ATM quite differently.

ATM standard still in debate

Many aspects of the full ATM standard are still being debated in ANSI and ITU standards bodies, noted Hilton. The ATM Forum, a group of vendors, carriers and researchers promoting ATM standardization, is pushing to accelerate this standards process, she said.

In these groups' deliberations, cable's representatives have questioned the efficiency of the ATM standard's 53-byte, fixed-size data packets. Out of 53 total bytes per packet, five contain header information to be used in routing, error checking and prioritizing the packets. Some view this as excessive overhead for cable's particular needs.

On the other hand, making sure content arrives at the right time is especially crucial to video, Hilton noted.

While ATM "does some accommodation of time, it doesn't have a lot of built-in real-time capability," she said.

By contrast, she added, the Moving Picture Experts Group's (MPEG) transport protocol, "has adequate timing information for most multimedia applications." Still, Hilton expressed optimism that ATM and MPEG will be interoperable "because they contain different features that make both attractive for a cable environment."

Standards groups question the efficiency of ATM's 53-byte, fixed-size data packets.

Mario Vecchi, who joined CableLabs in October as vice president for network architecture, design and development, said ATM technologies need work in several major areas.

For example, Vecchi explained, the management information bases, or MIBs, essential to managing the ATM switching process, have not been designed. Provisions for flow control and congestion control at ATM's gigabit speeds also are inadequate, with a resultant risk of data loss, he said.

Keeping cable TV in mind

Hilton said that ATM's architects "have done some nifty work" to accommodate cable's needs. In particular, she said, they are defining ways to adapt ATM to the kind of multicast (point-to-multipoint) traffic that is broadcast television's mainstay.

But more remains to be done.

"The question before us," Green said in a speech to the ATM Forum, a cross-industry group that is committed to bringing ATM to market, "is whether we can find subsets of ATM that are cable specific, meeting your criteria for universality and ours for low-cost startup on the path to full service network functionality."

Some of ATM's overhead isn't needed in cable's headend-to-home pathways or even further up in the backbones of cable networks, Green told the group.

"What we need is a hierarchy within a cable-specific ATM subset that adds functionality to the bit stream as we move through the tiers of our topology," Green added, "ultimately achieving full ATM mapping at the point of interface with external networks."

Green noted that money is tight in cable, partly because of recent federal re-regulation. He appealed to ATM's developers to "work with us to implement transmission subsets that are truly cost-effective for the entire cable industry."

Other barriers to ATM adoption

Hilton mentioned other barriers to near-term ATM adoption, ranging from the large investment of cable operators in existing plant to the unavailability of affordable ATM chip sets.

In fact, she added, subscribers to some cable systems may never demand the kind of services that could justify investment in ATM equipment, except perhaps to interface to outside networks. Even offering telephone service over cable doesn't require ATM, she said.

Further, said Vecchi, ATM's future direction or that of cable designers could see cable and ATM parting company.

Green said it's possible that ATM will provide cable with the functionality it needs at a reasonable cost, but he cautioned, "I hope ATM doesn't become a catch-all for 1,000 proprietary attempts to capture pieces of the cable market."

One positive element, Green said, is a growing movement toward promoting open systems–"open interfaces and interoperability with other networks"–which is influencing designers of broadband networks.

Hilton said there is always a possibility that some still unknown technology might emerge and supplant the currently popular ATM. But her bet is that, "if ATM developers make smart decisions, the cable industry will be in their camp."

As to a timetable, Hilton predicted that the ATM Forum will resolve its standards issues by 1995, and formal standards bodies will define ATM fully by 1997. CED

This article was written specially for CED by the staff of Cable Television Laboratories Inc. in Boulder, Colo.

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New fiber distribution cable

Bridges bandwidth to home

By Bruce Carlson, Product Development Manager, Comm/Scope–General Instrument

Up until this point, fiber optic cable researchers and engineers have focused on the high fiber count requirements of switched dedicated-line telecommunication architectures. High fiber counts are required to support the local subscriber telephone configuration of one dedicated line per subscriber for plain old telephone service (POTS). This is also true for fiber to the home (FTTH), which is needed to support a synchronous optical network (SONET) configuration.[1]

The dedicated line requirement is driven by the bandwidth of the last mile or two of twisted pair cable. For POTS, this is 4 KHz or 64 Kbps for an 8-bit digital signal. Higher bit rate systems are also being studied, such as ADSL at 1.5 Mbps, HDSL at 2 Mbps, and VHDSL 5 Mbps.2,3. Either way, all the available bandwidth is consumed by each subscriber, which eliminates asynchronous transfer mode (ATM) broadband packet switching technology.

In a coaxial cable distribution and drop system, there is an abundance of bandwidth (GHz and Gbps) which can be utilized to support multiple signal formats. Switched services would not have to be circuit or line switched and could be packet switched. These services could then be frequency division multiplexed to co-exist with existing broadband type services. This would eliminate the requirement of one dedicated line per subscriber after the transition is made from optical to RF.

The bandwidth of a coaxial cable system is not limited by the cable itself, but by the active devices needed to support long transmission distances. A coaxial cable will operate and maintain its electrical characteristics well beyond 1 GHz and into the microwave frequency range. Coaxial cable usable bandwidth is determined by signal loss, which is a function of length, cable size, and frequency.

The missing link

What is needed is a bandwidth bridge to let the flow of services go all the way to the home. This becomes feasible by utilizing a fiber optic cable designed specifically for the distribution portion of a network. This creates a true end-to-end broadband network that is not limited by the bandwidth of the cable, fiber or coax. With this infrastructure in place, the lines do not need to be physically dedicated to subscribers or services.

A shared line in the distribution plant becomes significantly more economical because it begins to utilize the vast bandwidth of fiber. A shared distribution plant in a telecommunications network will drive down the

Figure 1a: ***Twisted pair circuit switched network***

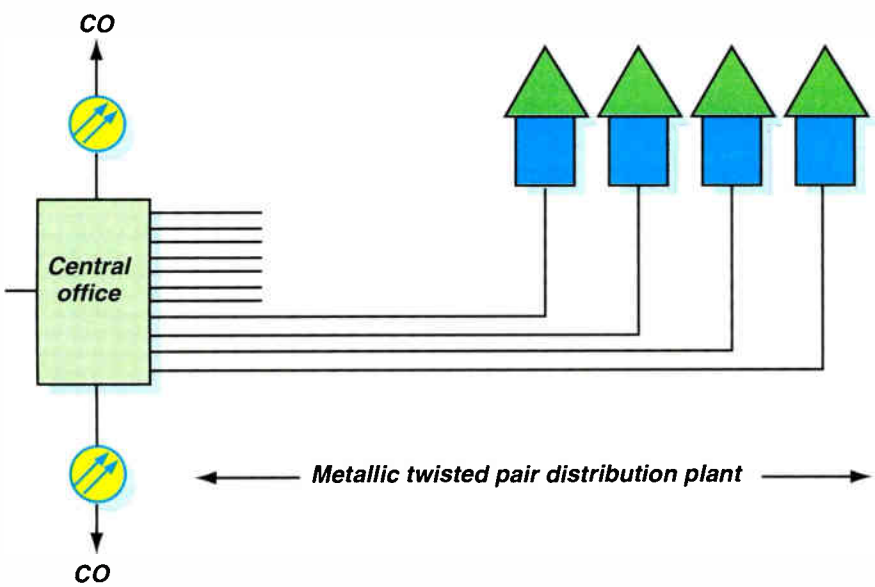
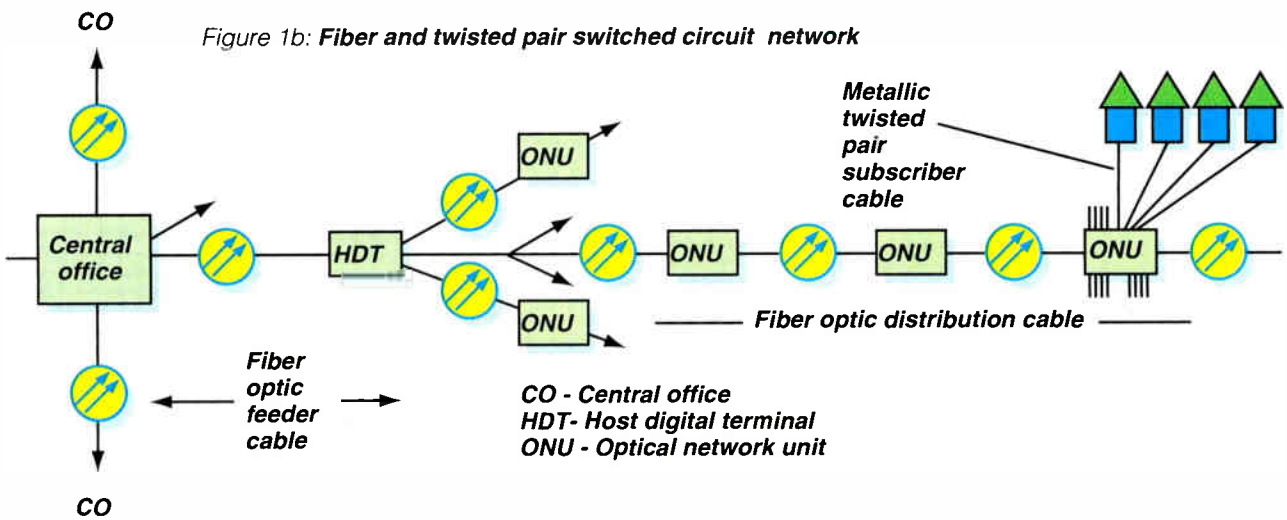


Figure 1b: ***Fiber and twisted pair switched circuit network***



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fiber count requirement and make the cable plant more economical. A single, low fiber count cable can be routed directly to nodes, ONUs (Optical Network Units) or HDTs (Host Digital Terminals) where the optical-to-electrical conversion is made.

Fiber optic cable designs must be rethought to accommodate a true end-to-end broadband network. What is required is a low fiber count distribution cable. Designing a cable specifically for low fiber counts will result in significant savings in terms of size, weight, handling, storage, installation and service. The remainder of this paper will focus on the specifics of distribution architectures, cable design and field issues.

Distribution architectures

As the telecommunication industries converge to provide broadband communication services, the basis for how cable will fit into these emerging architectures is changing. In order to define the requirements for new fiber optic distribution cables, the differences and similarities between switched telephone system architectures, broadcast CATV architectures and future full service networks (FSNs) must be understood. To keep the discussion to a minimum it will focus primarily on the distribution portion of the networks.

Switched telephone. The subscriber network consists of a CO (Central Office), a cable plant and its subscribers. Each subscriber has a dedicated line that runs from the telephone to some central location in the network. For an all-metallic plant the central location is the CO, but for a cable plant with fiber optics the subscriber line will terminate in an ONU (Optical Network Unit).[4] Schematics illustrating both these architectures are shown in Figures 1A and 1B.

The bandwidth of the metallic twisted pair cable has dictated what the architecture and signalling scheme can be. The switching needs can only be met by a physical circuit

Figure 2: ***Tree and branch coaxial cable broadband network***

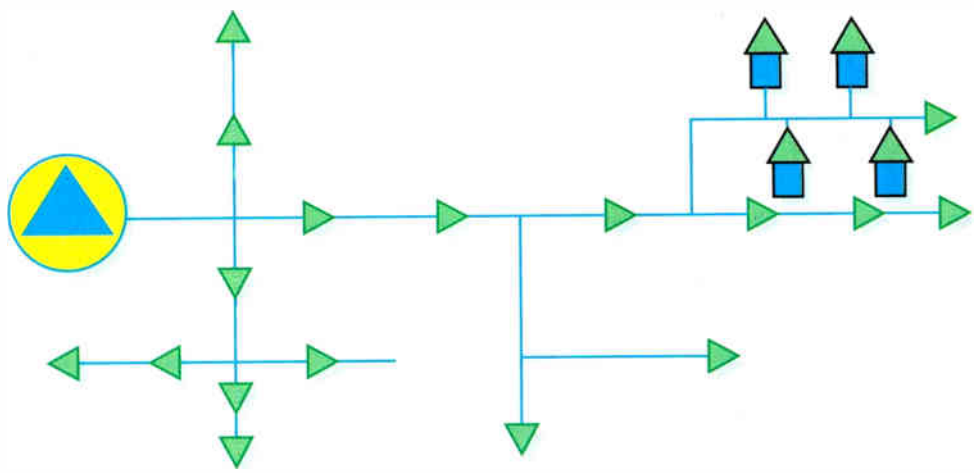
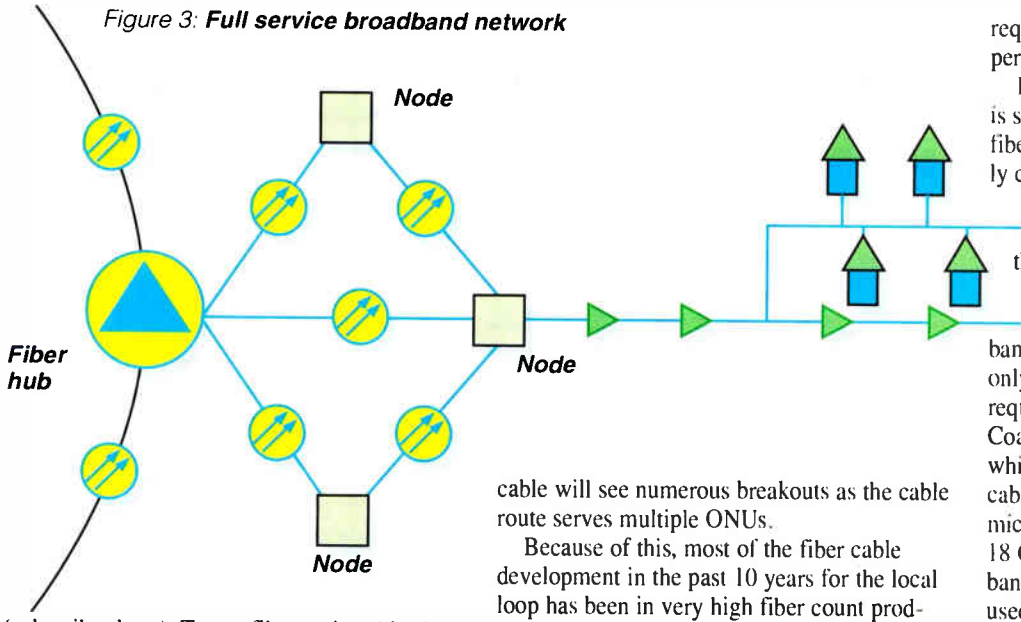


Figure 3: **Full service broadband network**



(subscriber loop). To put fiber optic cables in a dedicated line subscriber architecture requires cable with high fiber counts. This is seen by looking at how a single distribution fiber cable in Figure 1B is used to feed multiple ONUs after it leaves the HDT. One leg of cable will see numerous breakouts as the cable route serves multiple ONUs.

Because of this, most of the fiber cable development in the past 10 years for the local loop has been in very high fiber count products. For the last few years the state of the art in fiber cable research and design for the local loop has been 1,000 to 2,000 fiber ribbon slotted core, and stranded loose tube cables. Each of those individual fibers are capable of handling bandwidth much greater than that required to switch 1, 2 or even 10 channels per home.

In fact the bandwidth of an individual fiber is so high that with digital compression one fiber could today carry as many as 320 digitally compressed NTSC channels, and that limitation is due to the currently available bandwidth of lasers, not the bandwidth of the fiber.

Broadcast CATV. Cable TV networks were originally based on providing high bandwidth video services to the home. The only cable technology that met the bandwidth requirements at the time was coaxial cable. Coaxial cable is a true broadband medium which can operate well above 1 GHz. Coaxial cables are commonly used in RF and microwave communication applications up to 18 GHz and beyond. Because of the inherent bandwidth of coax cable, one cable run can be used to carry all the broadcast channels. This is what drove the tree-and-branch architectures of cable TV systems shown in Figure 2.

The disadvantage of a tree-and-branch coax subscriber network is the number of amplifiers that are needed to overcome the loss in the feeder network. This induces distortions,

decreases reliability, and limits the bandwidth of the cable.

Broadband full service network. A full service network will need the bandwidth to provide switching, voice, data and video to the customer at the appropriate level of service, reliability and cost. This network architecture will consist of the following cable plant:

✔ long haul fiber optic cable,
✔ physical ring fiber optic cable,
✔ fiber distribution cable,
✔ coaxial tree/branch distribution cable, and
✔ coaxial drop cables.

The fiber distribution and coax portion of this network is shown in Figure 3.

With this architecture, a broadband pipe with a bandwidth of 1 GHz exists all the way to the subscriber. A full service network now exists that can utilize the capacity of fiber because it is not limited by the bandwidth of the last mile of coax. With the nodes deep in the network, only a few amplifiers are needed to get the signal to the furthest subscriber in the serving area.

With a true broadband network, non-broadcast services can be placed into the available spectrum. ATM switching technology can now be utilized to provide telephone, videophone, PCS, and data communication needs. With this network architecture there is no longer a need to have a physical (line or circuit) separation in the distribution plant for subscribers or services. This will realize bandwidth utilization in the distribution fiber and drive down the fiber count requirements to the node.

With this shift in understanding of how cable can better be bandwidth utilized in local distribution systems, cable designs can be reconfigured to support low fiber counts. The actual fiber count is obviously determined by the network design, but for nodes serving from 200 to 2,000 homes, the fiber count is somewhere between two and ten fibers.

New distribution cable design

In designing a fiber optic cable for an emerging application, it is key that the application needs and requirements be defined and understood. As discussed previously, the first requirement is to be able to handle up to 10 fibers. Using this as a starting point, significant size and weight reductions are achievable. The size of the cable, typically designed to protect up to 48 fibers, can be brought down by more than 50 percent. Another requirement was that the cable should be easy to handle and install and fit into existing splice tray enclosures and node housings.

The most significant requirement is that the cable provide superior optical performance over the life of the product. Because application of fiber optics in telecommunications originated in telephony, the Bellcore TR-NWT-000020 (TR-20), Generic Requirements for Optical Fibers and Optic Fiber Cable has been used as an adopted standard for cable TV applications.

Because the Bellcore TR-20 document was written for the specific needs of the Regional Bell Operating Companies (RBOCs), the requirements do not necessarily match with those of a broadband or full service network.

The last leg of fiber optic cable in a switched line distribution network will see numerous breakouts as the cable route will serve multiple ONUs (Figure 1B). This creates several requirements in the Bellcore document that do not have application in other networks.[4]

✔ Pulling Tension

Bellcore Requirement "Standard pulling tension rating of cables containing 240 fiber or less shall be 2670 N (600 lbf) minimum.

The standard pulling tension rating of cable containing 300 fibers or more shall be 4500 N (1000 lbf) minimum."

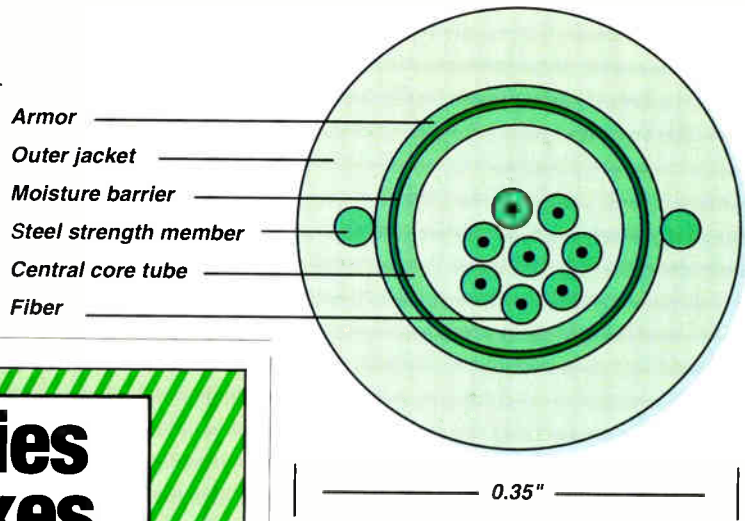
Low Fiber Count Broadband Distribution Cable–A low fiber count cable will have a weight reduction on the order of 38 to 50 percent that of existing central and loose tube cable designs. The required pulling forces will be greatly reduced allowing for a new pulling tension rating of 400 lbf for the low fiber count cable.

✔ Number of Fibers per Cable

Bellcore Requirement–"An optical cable shall contain one of the following number of fibers: 6, 12, 18, 24, 30, 36, 48, 60, 72, 84, . . . , 600. Optical cables shall not contain any spare fibers."

Low Fiber Count Broadband Distribution Cable –Exact number of fibers will be dictated by the network. For a broadband switched circuit fiber to the node architectures the number of fibers will most likely be between two and ten fibers.

Figure 4: ***2-8 Fiber central core tube distribution cable***



✔ Ripcords

Bellcore Requirement–"On single sheath cables, at least one ripcord shall be provided under the sheath. For armored and multi-sheath cables, two ripcords, approximately 180 degrees apart, shall be provided under each sheath or sheath/armor combination."

Low Fiber Count Broadband Distribution Cable–For smaller cables, rip cords are unnecessary and add cost as they are not necessry or utilized in their application.

A number of low fiber count cables are presently offered, but the designs are based on high fiber count usage. These constructions are inherently space inefficient and result in large and heavy cables.

The single loose tube armored cable design with linear strength members embedded in the jacket was chosen for the new distribution fiber optic cable to accomplish the performance and economical requirements mentioned above. An illustration of this low fiber count armored cable is shown in Figure 4 along with mechanical and optical specifications (48 fiber and 72 fiber cable data is included for comparison).

Core design

A cable core consists of a filled core "buffer" tube of sufficient diameter made from a durable material to provide enhanced mechanical protection of fibers. The fibers must be protected from the rigors of the installation and service environment. Specifically, they must be guarded from high tensile strains

and from excessive bending that can increase attenuation. To understand these effects, some of the critical design parameters are described next.

The internal area of a buffer tube is made significantly larger than the area taken up by the fibers themselves. This additional area is required to allow for excess fiber length that is needed to buffer the fibers from the mechanical strains applied to the cable during installation and service. The excess fiber length in a cable is defined as a ratio of the difference between the fiber length and the cable length to the cable length expressed in percent.

Traditionally, a small amount of excess fiber length, on the order of 0.1 percent, is provided in the loose tube design to insure that fiber does not exceed short-term safe design strain limits (typically 0.33 percent for 50 kpsi proof-tested fibers). By increasing and precisely controlling this excess length, one could exploit it to offer an advantage. For example, a 0.1 percent increase in excess length would allow a corresponding 30 percent reduction in tensile loading (for 50 kpsi proof-tested fibers). However, an increase in excess length generally means a smaller fiber bend radius and more demanding design requirements.

The strength of optical fibers degrades (or flaw size grows) under the influence of time, stress and humidity. For a constant stress, this phenomenon is commonly known as static fatigue. Based on static fatigue considerations for a 40-year life, the minimum allowable bend radius is about 45 mm for a 50 kpsi proof-tested fiber. Again, this value is conservative since the probability of failure in bending is significantly less than in uniform tension. This provides one constraint on the minimum bend radius for the fiber. The other constraint is the increase in attenuation due to bending.

The fibers in a core tube are placed in a helix with a certain radius depending on the amount of excess fiber length, the core tube diameter, and number of fibers. Environmental effects must be considered since the worst case occurs at the lowest operating temperature. This minimum bend radius can be used in conjunction with the fiber parameters to estimate the increase in attenuation. In general, attenuation increases at 1300 nm and 1550 nm are insignificant at bend radii greater than 30 mm in presently available commercial single mode fibers.

Filling and flooding compounds are used in this design to prevent the migration of water or other liquids along the cable core. In addition, filling compound is chosen such that its rheological properties in the operating temperature range allow easy fiber movement in the buffer tube when they are strained. Furthermore, at high temperatures, the compounds should remain in the cable and pass the Bellcore's Filling and Water-Blocking Material Flow Test at 65°C. The compounds should be non-volatile, non-toxic and chemically compatible with the optical fibers and other cable components. The compound also should be stable over the service life of the product.

Sheath design

The sheath design must be such that it protects fibers from the rigors of processing, installation and service environments. Specifically, fibers must be guarded against excessive tensile and compressive strains, and natural enemies. The fiber optic cable sheath consists of the armor-corrugated steel tape and two linear wire strength members embedded in the jacket.

A linear tensile response (load vs. strain curve) of the cable is desirable so that a pre-

dictable amount of excess fiber length can be obtained. Sheaths with linear steel members do provide the desired linear response. However, the use of semi-rigid or lightly impregnated strength members alone do not offer enough compressive resistance and therefore result in a non-linear behavior with a "knee" in the response curve.

Cable testing requirements

The low fiber count distribution cable was subjected to a series of mechanical and environmental tests to assure superior performance in the field. Table 1 summarizes the major standard tests performed on this cable. They are conducted according to the Bell Communications Research (Bellcore) TR-NWT-000020, Generic Requirements for Optical Fiber and Optical Fiber Cable, Issue 5, December 1992, and the Electronic Industries Association (EIA) Test Procedures. The cable must meet or exceed all of the requirements.

Decreased cable size offers distinct construction advantages realized as: decreased reel size and weight, decreased tension on pole-line hardware in aerial applications, decreased pulling tension in underground applications, ease of handling, and less sag between structures.

Cable handling and installation. Evaluation of the changes in size and weight of the small diameter fiber optic cables from prior generations of conventional size fiber optic cables allows for the following improvements related to construction:

✔ Diameter of the cable has typically been decreased from 5/8th inches to 3/8th inches. The decrease in cable size allows a decrease in reel size. The standard reel size for a 17,000-foot length of cable is decreased from 60 inches to 42 inches. Weight of the cable was decreased from 2,185 lbs. to 960 lbs. Weight per unit length was decreased by 44 percent. Weight of the reel itself was decreased from 477 lbs. to 125 lbs. This decrease in weight should be advantageous any time the cable is moved, shipped, or loaded.

✔ Weight per unit length is the major contributor to increases in sag and tension in typical overlash applications. Overlashing a small diameter cable should not significantly increase the cable bundle size and accordingly will not cause an adverse increase in tension due to ice loading. Minimizing increases in weight will minimize increases in sag and tension when the small diameter optic cable is overlashed onto an existing coaxial trunk and distribution cable bundle.

✔ Pulling tension is inherently related to cable size, flexural rigidity, and weight. An overall decrease in all of these parameters allows the realization of a decrease in pulling tension.

✔ Handling characteristics can be improved by decreasing the weight per unit length and the flexural rigidity. A decrease in size will appropriately decrease both. The minimum bending radius for a fiber optic cable is supported by maintaining the flexural rigidity at a point to insure that the bending radius cannot approach a critical point as defined by the characteristics of the glass.

The decrease in size of the cable from that of the previous generations of conventional size optic cables raises questions about the decrease in the amount of force that the cable can be subjected to, that force primarily being tension. The decrease in pulling tension for the smaller size cable is typically 33 percent. Pulling tension is a function of the forces that

Table 1: ***Low fiber count optical cable requirements***

Test	Mechanical requirements	Optical requirements (1550 nm)
Filling and water-blocking material flow	+65°C 24 hrs., no flow on 4 of 5 samples	NA
Cable jacket yield strength and ultimate elongation	Unaged-1600 psi and 400%, aged-1200 psi and 375%	NA
Cable jacket shrinkage	Max. 5% shrinkage	NA
Cable jacket adherence	80 lbs. per inch of armor	NA
Low and high temperature cable bend	Max. Dia. 20X O.D. 4 hrs. @ -30C and +60C	90% ≤ 0.0 dB change 10% ≤ 0.1 dB change
Impact resistance	25 impacts, no jacket cracks	90% ≤ 0.0 dB change 10% ≤ 0.1 dB change
Compressive strength	1000 lbf per 4 in. armored, 500 lbf. per 4 in. non-arm. 1800 lbf. obj.	90% ≤ 0.0 dB 10% ≤ 0.1 dB change
Tensile strength of cable	600 lbs/strand max. 22 in. diameter Sheave	90% ≤ 0.0 dB change 10% ≤ 0.1 dB change
Cable twist	±180° twist, 10 cycles	90% ≤ 0.0 dB change 10% ≤ 0.1 dB change
Cable cyclic flexing	25 flexes, maximum sheave diameter 20x O.D., armor cracks >5 mm, no jacket cracks	20% ≤ 0.0 dB change 10% ≤ 0.1 dB change
Temperature cycling	+23°C reference, -40 to +65°C, 2 cycles	≤ 0.1 dB/km individual change, ≤ 0.05 dB/km average change
Heat aging	+85°C, 7 days, -40 to +65°C, 2 cycles, +23°C reference	≤ 0.20 dB /km individual change, ≤ 0.10 dB/km average change
Cable freezing	Freeze aged sample. Test@ - 2°C & thawed	≤ 0.10 dB individual change, ≤ 0.05 dB average change
Color permanence and marking durability	Aged fibers' colors meet EIA/TIA 598	NA
Water penetration	1 hr. minimum (aged & unaged,) 24 hrs. after 1/1/94 unaged	NA
Lightning damage susceptibility	Determined by manufacturer	Optical continuity
Gopher resistance	No requirement objective 8 of 10 with damage index ≤ 3	Obj. optical continuity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prevent the pull-out of the extra fiber length in the cable. Ideally the forces that oppose the pull-out are decreased as the size, weight, and structural rigidity is decreased with the smaller cable.

Outside plant splice enclosures and nodes. This particular cable design is readily adaptable to splice enclosures on the market. The buffer tube size is small enough that it will fit neatly into the tray grooves that formerly required the furcation process. Also, the low fiber count dictates that all of the splicing should be completed in one tray (therefore eliminating the need for splitting the fibers into more than one tray). The tube itself is accommodates the typical bend radius in splice enclosures.

Typically, optical nodes require that a tight buffered cable be inserted directly into the node itself for direct connectorization, thereby plugging directly into the associated pigtail inside the node. The tight buffered cable is spliced to the outside plant cable in an enclosure within close proximity of the node itself.

All of the node connector manufacturers have an available connector for readily inserting the smaller diameter cable directly into the node itself. With a few modifications, most nodes that do not have the capacity for an internal splice tray may be adapted. This procedure will save the expense of purchasing the tight buffered cable and the outside plant closure. The smaller diameter buffer tube can be routed around inside the node housing, directly into the splice tray and spliced to a pigtail inside the node. The pigtail can then be mated with its respective connector to the hardware inside the node to retain the ability for easily disconnecting and reconnecting fibers as necessary.

Table 2: **Fiber optic distribution cable-mechanical specifications**

	2-8 Fiber central core tube cable	2-48 Fiber central core tube cable	2-72 Fiber stranded loose tube cable
Outer diameter, in.	.35	.49	.56
Weight, lbs.	58	115	150
Min. bend radius, in.			
Loaded	3.5	9.8	11.2
Unloaded	1.8	4.9	5.6
Max. tensile load, lbs.			
Installation	400	600	600
Operation	90	135	135
Crush resistance, lbs.	1,000	1,000	1,000
Impact resistance	25 @ 2.2 lbf. ft.	25 @ 2.2 lbf. ft.	25 @ 2.2 lbf. ft.
Flexing, @ 5 in.	25	25	25
Temperature, °C			
Operating	-40 to 70	-40 to 70	-40 to 70
Storage	-50 to 70	-50 to 70	-50 to 70

Table 3: **Fiber optic distribution cable-optical specifications**

	Depressed clad		Matched clad
Max. attenuation, dB/Km			
@ 1310 nm		.35	
@ 1550 nm		.25	
Dimension, µm			
Mode field diameter	8.8 ± .5		9.3 ± .5
Fiber diameter	125 ± 2		125 ± 2
Coated fiber diameter	250 ± 15		250 ± 15
Cut-off wavelength, nm	1250 ± 70		1260 ± 70
Dispersion, ps/nm-Km			
Zero dispersion wave length, nm	1310 ± 10		1310 ± 10
@ 1285-1330 nm	<2.8		<3.5
@ 1525-1575 nm	≤18 @ 1550 nm		≤18 @ 1550 nm

Summary

In order for a communication system to be successful and have a long service life, it must be able to compete economically with other services. This will be especially true in the next several years as traditional wired services go head-to-head with wireless services such as MMDS, DBS and microwave TV.

Multichannel Multipoint Distribution Services (MMDS),for example, will be upgraded to have return band capabilities. A DBS system will be launched this year by Hughes Communications and will have channel capacity in the hundreds. Microwave TV spectrum from 17 GHz to 19 GHz has been opened up by the FCC. Thus, the cable plant design must be re-evaluated in order to ensure that the providers of wired telecommunication services have a competitive edge. The vast bandwidth of fiber optics must be utilized in order make these systems competitive. This can be achieved by utilizing a low fiber count cable and a 1 GHz coax in the distribution plant. CED

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Dr. Walt Ciciora: Honored for efforts on compatibility 1993 Man of the Year

PHOTOS BY CARLETON KRULL

By Roger Brown

It took 10 years and an Act of Congress to make cable and consumer electronics more compatible with one another. But if the Cable Act was the hammer that smashed the gridlock, Dr. Walt Ciciora was the hand that picked up the pieces and crafted an equitable agreement for the cable and consumer electronics industries.

As the cable industry's point man on the compatibility issue, Walt spent more than a year living and breathing FCC compatibility proceedings, writing documents, chairing meetings and negotiating with his counterparts from the Electronic Industries Association toward a compromise agreement everyone could live with. Spurred by a federally mandated deadline, Walt succeeded where others probably would have failed.

"Walt probably saved this industry millions of dollars" by negotiating an agreement that divides the burden of compatibility between both industries, notes Tom Elliot, vice president of engineering and technology at Tele-Communications Inc. "And he did it largely on his own."

It is for this selfless devotion of his time and efforts to a largely unglamorous battle that Walt was chosen–for an unprecedented second time–*CED* magazine's Man of the Year by an independent panel of his peers.

The Invisible Man?

Indeed, over the past year, Walt was the primary author of Time Warner Cable's 121-page document on compatibility that was submitted to the FCC during its Notice of Inquiry on the issue. He also led much of the negotiation with the consumer electronics faction, and he's chaired numerous committees working on a host of surrounding issues. His unique consumer electronics background, long history of exploring compatibility subjects and natural leadership abilities made him a natural to take the point position.

Although he's passionate about the importance of developing an industrywide compatibility strategy, Walt's greatest fear over the last year was that his efforts would go unnoticed. "If your goal is to prevent a train wreck and you succeed, there are no sparks," he says. "I viewed this whole effort as something that must be quite invisible to be successful. That's why I'm so surprised to get this recognition. But the cable industry has been good to me and I felt it was my time to pay it back."

Shortly after the interviews for this article were completed, Time Warner released Walt, noting that it could no longer continue to fund his efforts on behalf of the entire industry. It is lamentable Walt lost his job at Time Warner, but it's much to early to be delivering a post mortem; he will continue to see the process through, this time under the auspices of the National Cable Television Association.

Prior to his leaving last month, Walt put in 11 years in senior technical positions at ATC and Time Warner Cable, during which time he gained industry respect for his diverse talents. He has served as the chairman of the august NCTA Engineering Committee, was a key member of the organizing committee of Cable Television Laboratories, chaired a number of inter-industry committees and investigated new technology and their possible applications.

Prior to that time, he spent 13 years at Zenith Electronics Corp. in research and development. Projects included the study of ghosts, digital encryption and teletext, work that led to Walt being issued nine patents while at the Chicago-based manufacturer.

He became familiar with the cable industry some 15 years ago when teletext first emerged from the labs and attempted to capture the public's attention. He took on the role of director of sales and marketing for Zenith's newly formed cable group, which won the contract to

Walt understands how TVs, VCRs and cable set-tops interface better than anyone else.

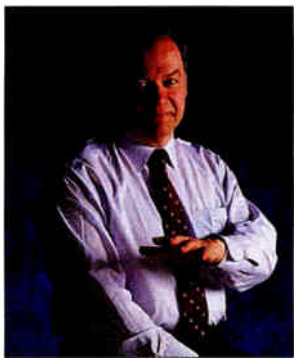
build decoders for a new scrambling system designed for ATC back around 1980.

With that background, Walt is one of the few people around who intimately understands the business strategies of both consumer electronics manufacturers and cable operators. He is perhaps the only person who has been able to command respect from both sides of the negotiating table when the two industries meet face-to-face.

"In my mind, if we have real success with this (compatibility agreement), it will have been because of the efforts Walt put in," notes Joe Van Loan, vice president of the engineering at Cablevision Industries and a compatibility veteran as well. "The leadership he gave, along with Bruce Huber (a committee co-chairman representing the electronic industries), was among the best I've seen."

Doug Semon, who inherited Walt's post as co-chairman of the EIA/NCTA Joint Engineering Committee, says Walt has a rare combination of strengths that makes him perfect for such inter-industry committees. Those attributes include: his professional credibility, brought about by his education and experience; his willingness to take the leadership role and devote travel and personal time to the issues; and his general affability.

"Certainly there are ample opportunities for chairmen of inter-industry committees to abuse that power," notes Semon. "But that serves no one. A bad compromise is much worse than none at all. It takes a special person to do these things well. I have a true deep appreciation for what he has done, having tried to do it myself."



"If your goal is to prevent a train wreck and you succeed, there are no sparks."

Push comes to shove

As a result of an amendment to the 1992 Cable Act, the FCC began a notice of inquiry last winter into the compatibility issue. By law, the FCC was directed to develop, in consultation with both the cable and consumer electronics industries, a method to make the two more compatible with one another.

Initial comments from both sides were, in some cases, contentious, complete with name-calling and calls for a moratorium on deployment of digital technology. Judging from the comments, it appeared the two sides were as far apart as ever, even after 10 years of on-again, off-again negotiation through the joint EIA/NCTA Committee, the group that successfully developed the ill-fated MultiPort decoder interface five years ago.

Nevertheless, it was recognized that the two factions had to meet to hammer out an agreement, or risk having the FCC legislate a compromise. But it was clear an agreement was a long way off. In order to forge a deal, a committee, called the Cable/Consumer Compatibility Advisory Group (C³AG for short), was created by Wendell Bailey of the NCTA and George Hanover of the EIA. The intent was to create a committee consisting of high-level executives who could make decisions and trade-offs without having to consult their bosses.

In order to be as productive as possible, Walt wanted to limit and define the personnel who would sit at the negotiating table. Although the EIA resisted that, calling it too restrictive, Walt was adamant that the meetings be fruitful. "CEOs are busy people and you lose them if they conclude the meetings are not productive," says Ciciora. "They'll send representatives, and then you're back to where no one at the meeting can make decisions."

Bill Bresnan, president of Bresnan Communications, a small MSO, was chosen to chair the "cable caucus," while the consumer electronics camp tapped Dr. Joe Donahue of Thomson Consumer Electronics to be their leader.

"Walt was our key engineer and a pillar of strength during this process," recalls Bresnan. "He brought a perspective no one else could have."

The two sides came to the initial meeting with viewpoints representing two polar extremes. Cable operators were asking why the TV manufacturers cannot just make monitors and leave the tuning and other functions in a set-top box; and the manufacturers were wondering why cable operators couldn't just stop scrambling their signals and eliminate the set-top altogether.

"That's where each side started," notes Ciciora. "Both of those views are simple-minded solutions for simple-minded people. They totally ignore the realistic business needs of the other side and actually ignore the consumer in the middle."

By that Walt means TV manufacturers derive their profits by selling large-screen TVs loaded with features and cable operators must be able to protect access to their signals if they hope to make any money. So it was obvious both sides had to give in to find the common middle ground.

Walt's leadership and teaching skills were developed in the 1960s, while he was in graduate school at the Illinois Institute of Technology in Chicago. After obtaining his bachelor's degree in electrical engineering in 1964, Walt was awarded a National Science Foundation fellowship. He also became a teaching assistant to help support his family, which was growing at the rate of one per year. He emerged from school in 1969 with a master's and a doctorate in electrical engineering.

As an assistant teacher, Walt possessed the ability to take complex material, organize it in clear, concise terms and explain it to others. It's a skill set that has served him well over the years.

Anatomy of a compromise

While the notice of inquiry was out, the FCC made it known it desired a jointly written document proposing methods of dealing with the incompatibility problem and that it would, in all likelihood, attempt to incorporate the jointly written proposals into rules that will be issued this coming April.

Initially, the C³AG was operating under the belief it had until the end of August to submit comments to the FCC. However, the timetable was inexplicably accelerated, and the deadline was moved up to late July. In order to make real headway, each side appointed a smaller negotiating team. For cable, this team consisted of Bailey, Ciciora, Nick Worth of TeleCable and Jimmy Doolittle of Time Warner. The EIA had representatives from Sony, Zenith, Thomson, Mitsubishi and Matsushita.

Complicating the matter was a change in the leadership on the consumer electronics side of the table. Although Donahue started as its chairman, he soon had to relinquish the chair to Bruce Huber of Zenith because he was becoming involved with the HDTV Grand Alliance. Several months later, Huber excused himself because he took a new job with a different employer. Jim Bonan of Sony became the third co-chairman.

With the deadline fast approaching, the two sides met on July 2 and made real progress, agreeing on broad general topics. After that breakthrough meeting, the agreements needed to be put on paper. Walt spent the better part of the Fourth of July holiday weekend writing the first draft. "We eventually went through 10 drafts, with five being major rewrites," Walt relates. After securing general agreement from his cable colleagues, Walt turned the document over to the other side the following Wednesday. By Friday, the two sides agreed to meet again three days later.

When Walt arrived Sunday night, he was presented with a new draft of the document by Huber. "It was a completely different document," Walt says. "I knew we had a problem, so I spent that night working on my laptop computer merging the two documents." Early Monday morning Walt printed out the new, merged document and circulated it among the attendees.

"They were astonished," Walt recalls.

It turned out to be an important move because it

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Dr. Walt Ciciora

1993 Man of the Year

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Network Know-how

"I knew we had a problem, so I spent that night working on my laptop."

eliminated any fight over which draft would be used as the mark-up copy. "That's where the power of the laptop comes in," says Ciciora, who seems to always have one nearby.

That day was characterized by long, arduous arguments over the placement and meaning of phrases and individual words. Everyone involved was frustrated and "tempers got a little raw," Walt adds. The two sides emerged from the room that evening, each perhaps feeling they'd given away too much to the other side.

Walt and the committee took some criticism from others who were not part of the negotiations–people who thought too much was given up, that they could do better. But eventually the cable operators signed off on the agreement. It turned out the consumer electronics committee was having much more difficulty getting agreement internally. The consumer side asked the FCC twice for deadline extensions as it scrambled to reach consensus.

Down to the wire

On the day the document was due, the consumer electronics negotiators were still trying to get a better deal, throwing out a new list of items they wanted and items they couldn't give up. Pressed against the wall and recognizing the potential for disaster, Walt recognized that the cable side had gone as far as it could. The consumer side would have to accept the document with only minor changes or risk having the whole deal come apart. Huber and his colleagues agreed.

At 4:30 p.m., the final give-and-take word changes were being incorporated in the joint agreement. At 5 p.m., the final document was printed out and just before 5:30 p.m.–the deadline for filing–a courier sped from NCTA headquarters to the FCC to file the agreement with the Commission.

"It was that tight, that difficult and that contentious," Walt says. "But it's understandable that it should be contentious because what we were talking about are fundamental issues that affect both industries and what they can and cannot do. Both sides had moved from their initial polar positions toward the middle."

In the end, the consumer electronics committee had no CEOs in attendance, while the cable side was represented by Bresnan, Doolittle, John Goddard of Viacom Cable and Dave Rozelle of Intermedia Partners. What they worked out was hailed by both sides as a good compromise for industry and the consuming public.

Walt is credited by many as a key reason why the agreement was reached. "These meetings had all the potential for fireworks, but we were able to get past that and understand each other as people," says Bresnan. "They never were as combative as they could have been. I think Walt had a real influence in the process

Congratulations, Dr. Walt Ciciora

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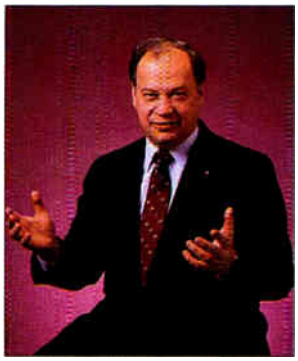

"People who work in committees grow to hate them...I'm no different."

because he's so even tempered. He conducts himself like a gentleman."

That's no mean feat. Committee work is sometimes so frustrating and painfully slow that it takes intestinal fortitude to keep going. "People who work in committees grow to hate them," Walt agrees. "I'm no different. It's frustrating but it's the only way things like this can be done. It takes a great deal of self discipline to keep on doing it."

To help get the point about compatibility across to regulators and legislators, Walt and Wendell decided they should organize a "science fair" to show how advanced cable equipment can be used to interface with TVs and VCRs. The demonstration featured information about direct pickup interference, which plagues poorly shielded TVs and can be corrected with a set-top device, as well as universal remote controls, TVs with picture-in-picture, the old MultiPort plug, interactive guides and other demos. "It was very successful at conveying the message," Walt recalls.

To get those demos off the ground, Ciciora credits his good friend Ted Hartson, VP of engineering at Post Newseek Cable. "He noticed that I was almost incoherent (from sleep deprivation and work overload) and he asked if he could help," Walt says. "He helped turn what was going to be a disaster into something that worked."

The cable industry was able to prevent the great train wreck in the joint filing by getting the consumer electronics side to agree in writing that none of the in-the-clear approaches "is suitable for universal deployment" and furthermore, that "scrambling and encryption are an important part of providing cable services and will remain an essential part of delivering video signals."

The agreement proposed both short- and long-term measures to improve compatibility. In the short term, cable operators agreed to provide set-tops with bypass circuitry, built-in timers or universal remotes with timers to consumers who request them. This will allow programs to be recorded while others are being watched and recording consecutive programs that appear on different channels.

In the longer term, the two industries will devise a definition of "cable ready," to include better tuners to shield against direct pickup interference and a Decoder Interface plug that allows for external signal processing to make TV and VCR features more functional.

Also, the agreement called for digital transmission and tuner specs to be defined in 1994 and target dates for decompression and security interface standards to be set in 1995.

"Those words were carefully chosen to give us as much flexibility as possible," Walt notes. "If technology settles fast enough, it may not be a problem. If it

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"In the future, some portion of the digital electronics will be integrated into the TV."

doesn't, we'll have some interesting challenges."

While the bulk of these proposals were embraced by the Commission, in its 200-page Report to Congress, the FCC still seemed to be impressed with the "in-the-clear" arguments presented by the consumer electronics manufacturers during the NOI process. According to Walt, there are some in the Commission who seem to prefer implementing Rules that would require cable systems to deliver signals that can be received by a cable-ready TV without a set-top device in all new systems and upgrades in five years and everywhere within 10 years.

This seems to be borne out in an FCC press release that emerged on Nov. 10, 1993. Itn that release there was this paragraph:

> "The Commission stated that while the supplemental equipment/Decoder Interface approach appears to be the most practical approach for resolving the major compatibility problems between cable systems and consumer electronics equipment, it nonetheless believes the most desirable solution would be for cable operators to use technologies that provide subscribers all authorized signals 'in the clear,' without scrambling. The Commission stated that it therefore intends to encourage the use of technologies that eliminate the need for additional cable equipment in the home."

How the FCC will "encourage" the shift to in-the-clear technolgies is unclear, but Walt is cautious and warns operators not to take anything for granted. "If you're a regulator without a technical background who doesn't understand the impracticalities of that (approach), it sounds nice," Walt says. "It's just too bad it doesn't work."

Why it won't work

Why don't they work? There are several reasons why in-the-clear technologies are not the panacea they are often perceived to be, says Walt. The first is that they appear to fly in the face of a transaction-oriented relationship between the cable operator and the viewer. "We all believe this is the most exciting high-growth area," now that video on demand, interactive shopping and other multimedia applications that require a conversation between the customer and operator are just beginning to gain recognition. In order to perform these transactions, consumers will select from a menu of items and then be force-tuned to the proper channel at the proper time.

Furthermore, solutions like interdiction are recognized to be more expensive than set-top signal control because a system would often have to be rebuilt to accommodate the hardware. Additional issues plaguing interdiction include powering and questions about its

1993 Man of the Year

Congratulations

Dr. Walt Ciciora

ability to keep unauthorized customers from tapping into services they don't pay for.

While broadband descrambling is a concept that appears to answer some of those questions, the technology is still in its infancy. To date, the technology has yet to be put into a trial and there are concerns over the number of channels it can control.

And other, more simple approaches like traps continue to be popular, but most are not remotely controllable, which makes special event viewing a logistical nightmare for cable operators.

Digital standards?

More importantly, the recently released Notice of Proposed Rulemaking finally emerged during the Western Cable Show in Anaheim last month, about three weeks later than originally promised. While it isn't the FCC's last word on the subject, the NPRM generally reflects the policies favored by that body as it prepares to write the final rules.

In general, it contains few surprises for cable operators. The major short-term provisions include a prohibition on scrambling in the basic programming tier; the provision of set-tops with timers, bypass circuitry, etc. that interface better with TVs and VCRs; and a consumer education program on compatibility matters.

New consumer electronics equipment will require, starting in 1997, a Decoder Interface; the ability to tune to 1 GHz; and tuners with improved shielding against DPU. Cable operators will be required to use the Decoder Interface by placing a component decoder in their systems, or use in-the-clear technologies like interdiction, traps, broadband descrambling, etc.

Furthermore, although it recognizes that digital technology is just emerging, the FCC is proposing to develop a digital transmission standard in order to avoid future compatibility problems.

"The problem with digital standards is that it's way too early to set them," Walt believes. "Semiconductor technology is such that every 18 to 24 months the number of transistors you can afford doubles." For example, the first microcomputer chip, the 8088, had 30,000 transistors in it. The Intel 486 chip has 1.2 million and the new Pentium has 3.1 million. "If you project that out 10 years, you're talking about a chip with 90 million transistors on it," says Walt.

"The digital challenge is going to be an interesting one. There's more there than meets the eye."

Even if technology levels off and the number of transistors stops at 10 or 20 million, Walt argues it's better to wait a few years before locking into a standard. "It's crystal clear to me that you can make much better pictures with 20 million transistors than you can with 2 million. We cannot, at the present time, freeze the technology and say we're going to live with this level of technology for the next several decades.

"The digital challenge is going to be an interesting one," he continues. "There are a number of issues that go beyond what meets the eye. There are digital services and there are *switched* digital services. There are a lot of unknowns, which is why standards can't be developed yet."

But in the near-term, much work has to be

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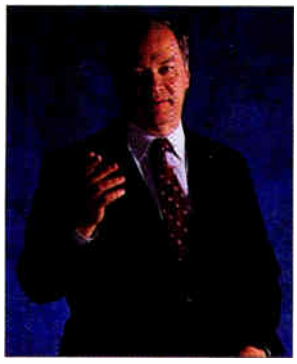

"The problem with digital standards is that it's way too early to set them."

done to develop a Decoder Interface that will work in both the analog and digital domains. A committee of engineers, chaired by Walt, has been meeting regularly to do just that.

The group met Dec. 8-9 in New Orleans and, after another round of "extremely difficult" negotiations, struck some compromises for the development of a decoder interface, just in time to have it included in the FCC Rules in April.

According to Walt, the committee agreed to a broadband IF output that will accommodate undemodulated signals and an RF passband that will allow cable operators to migrate to digital transmission. Also, control signals that allow forced tuning, on-screen displays and menu selection will be included as part of the standard. The committee will now turn its attention to the intimate technical details that will make these agreements possible, Walt says.

Smart TVs or smart set-tops?

Now that the two sides have successfully negotiated a settlement in the compatibility wars, can the fences dividing them be mended, or are their interests so fundamentally different that they will one day be at loggerheads again?

"We have two alternatives," Walt notes. "One is to get involved and cooperate and the other is to have this all over again–with the potential that next time around it will be a lot worse. A lot depends on the regulatory and political climate over the next few years. But if the two industries can cooperate, the costs and opportunities for both industries and the consumer can be optimized."

But the issue is so complex, nothing is simple. For example, within the cable industry the interests of cable operators and equipment suppliers must be taken into account. "What is best for one isn't necessarily best for the other," Walt said. "When I worked at Zenith, it was my job to sell as many boxes as possible at the highest margin as possible. But for operators, keeping capital costs under control is extremely important."

Concern is already growing on the consumer electronics side as they see cable operators preparing to deploy intelligent digital set-tops over the next couple of years. "When they see the digital set-top box we're deploying, they see all it can do and they are concerned that the TV becomes a simple monitor, with all the functionality resident in the set-top.

"The ultimate nightmare for the consumer electronics manufacturers is that they are reduced to selling monitors," Walt continues. If that happens, TVs will be sold on price alone, a prospect that simply mortifies an industry that already sells units at tiny or non-existent profit margins.

Of course, set-top manufacturers have a different

point of view. General Instrument, which sells more set-tops than anyone else, displayed its controversial "Joey" product at The Western Show last month. Joey consists of a TV monitor with a slot into which the intelligent "guts" are placed. This modular approach eliminates redundant tuners, power supplies and other electronics and provides a method by which the descrambling functions can take place inside the TV.

The opposite extreme, and what the TV makers want, is to put the digital electronics that are now being placed in set-tops directly into the TV, leaving only the control and special services to be plugged in externally.

In fact, the ultimate goal of TV manufacturers is to have no external ports whatsoever, said Walt. "They want a TV with no external ports, because they (ports) allow us to put functionality outside the TV, which moves the TV to a monitor. And the monitor is death."

The TV industry is so afraid of being reduced to monitors, it even has a negative sales commission tied into inexpensive, featureless TVs, says Walt. A salesman often must actually pay his employer if he sells one of those models. That fact, combined with tremendous factory overcapacity and intense price competition that is perpetuated by manufacturers who want to protect market share, makes features the most important TV sales tool.

But the day when TVs are completely closed units with no external ports is still far off in the future because as digital technology evolves and improves, there will be a need to be able to swap decompressors and replace them with better units, Walt remarks.

"In the future, some portion of the digital electronics will be integrated into the TV," Walt speculates. "When digitial technology stabilizes, maybe someday the decompression can be absorbed into the TV and perhaps the descrambling functions too, if we have a smart card for security. But that can occur only after there is a lengthy track record of successful encryption that cannot be broken. A good test will be DBS, which is selling it's receivers to consumers.

"The hazard is that consumer electronics companies are always under pressure to reduce costs," Walt notes. "Someone may decide to take a less expensive route to access control and that may make the system easier to break. In the digital age, there's enough computing power in people's homes to take a signal, hack it and break it."

What's next?

So, what does the future hold for Walt Ciciora? Just like the compatibility issue, there are both short- and long-term answers. In the short-term, Walt will continue to champion the compatibility proceeding with support provided by the NCTA. He has also taken on some consulting projects.

He also promises to spend more time with his wife Jeanette, whom he met in college and with whom he's had four children. He says that with all the work that's gone into the compatibility negotiations, the quality time at home has all but disappeared.

And perhaps he'll have more time to visit with each of his children, all of whom are grown now. Karen, 27, is a mechanical engineer and licensed pilot who works for the American Society of Mechanical Engineers in Manhattan; Steve, 26, works for the National Oceanic and Atmospheric Administration building instrumentation for NASA's U-2 that monitors air pollution; Paul, 25, is a chef living in West Virginia; and Susan, 24, recently graduated from the University of Tulsa with a masters in industrial organization.

But in the long-term, Walt would like to find himself working full-time for a single employer. His interests continue to revolve around making the television viewing experience both easier and more rewarding. As such, he's looking forward to the day when electronic program guides become pervasive. Walt himself is enamored with the concept of a "mood guide" from which viewers can select genres of programming, depending upon their immediate mood.

Another possibility is the development of a "smart" switcher box. In the past, switchers were developed in an effort to make cable, TVs and VCRs work better together. The problem was that those units often did nothing to relieve confusion and couldn't be controlled remotely.

"The ultimate nightmare for the consumer electronics manufacturers is that they are reduced to selling monitors."

Walt thinks the time is ripe for the development of a new switcher that incorporates a microprocessor and on-screen displays in its design. It would work by asking the viewer what he wanted. The viewer would respond via remote control and the program is either tuned on the TV, recorded on the VCR or the VCR is programmed for future recording. "I'm convinced that product exists in some laboratory, although I'm not aware of who's developing it," Walt says. "It's a logical product, and now, it's affordable."

Those interests, combined with Walt's intelligence and professionalism, make it easy to predict that Walt won't be unemployed long. He and Jeanette, ever the optimists, are convinced this shake-up will lead them to a new exciting place. For Jeanette, who enjoys riding horses and volunteering as an emergency medical technician, that means being around other people who like to ride horses.

All of that sounds fine to Walt–as long as he doesn't have to move Jeanette's two horses across the country again. He had to do that a few years ago when ATC moved its headquarters from Denver to Stamford, Conn. The task turned into an ordeal that had Walt dreaming that the horses got out of their trailer and ran all the way back to Colorado.

Since then, however, Walt's nightmares have changed: "Now when I dream, I dream with digital artifacts." CED

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CED

Integrated cablephone network given official sanction

Star/bus network takes off

By Fred Dawson

Editor's Note: Beginning with this issue, the evolution of the traditional cable TV entertainment network into an interactive "full service" telecommunications platform will be a keen focus of this magazine. A key part of this coverage is this new monthly department, which has been created to report and comment on the events surrounding this fast-paced evolution.

The commercial opportunities surrounding integrated telephony-over-cable technology received an official sanction of sorts last month with a decision by Pacific Bell to replace copper lines serving five million households with an AT&T-supplied star/bus distribution plant.

The project, estimated to cost between $4 billion and $5 billion over the next seven years, goes well beyond any use of cablephone technology yet announced. Further, the move establishes that to the satisfaction of a major Bell company, the cable industry's fiber/coaxial hybrid broadband network not only performs to current telephone standards but is suited to accommodate the introduction of advanced digital services well into the next decade.

Others agree with the approach

PacBell is not alone among major telcos on this point. Joe DeMauro, strategic planning director for Nynex, says his company's rollout of broadband networks, closely matching PacBell's in scope and timing, will use the fiber/coaxial hybrid in densely populated areas, while sticking with traditional fiber-to-the-curb in the suburbs.

US West is another telco considering similar deployment. The company, which earlier this year said it would move into deployment of fiber/coax overlays of fiber-to-the-curb (FTTC), is considering going to an integrated star/bus approach, sources within the company say.

While the local exchange industry as a whole is likely to pursue a mix of local loop distribution techniques for some time to come, the telco embrace of cablephone confirms early claims by some cable industry engineers that the industry has at hand an affordable, extremely flexible option for getting into residential telephony. And, the cablephone approach is apparently beeing deemed do-able at a level of technical sophistication and compatibility that meets the next generation performance requirements of the telephone industry.

Further confirmation of this trend lies in the fact that over the past few months, several vendors have stepped in to offer both cable and telephone industries the star/bus path to broadband.

AT&T Network Systems won the PacBell order for everything from the central office-based host digital terminal (HDT) through to the optical network interfaces (ONI) mounted outside customer premises.

The contract represents one of the biggest single-vendor contracts ever announced in the telephone industry. The companies said the technology is similar to the CLC-500 system developed for the U.K. cable TV market in cooperation with Optical Networks International.

However, they said, the technology approach differs in important respects, such as the use of proprietary software developed by Pacific Bell and an overall design approach more compatible with U.S. telephone networks.

Jones names S-A supplier

A week after the PacBell announcement, Jones Lightwave and its affiliated MSO, Jones Intercable, named Scientific-Atlanta as supplier for the first U.S. market trial of cable-delivered telephony service. The trial is scheduled to begin in the Chicago area by the middle of next year.

The companies, with MCI as the long distance partner, will also provide a long distance access service to 50 of their employees in Alexandria, Va.

In the last few months, several vendors have stepped in to offer the star/bus design to both the cable and telephone industries.

ADC Telecommunications, which has been pursuing integrated broadband designs for cable and telephony sinceit purchased American Lightwave Systems three years ago, is another supplier of star/bus technology.

Continued on page 60

Cable networks and energy management

While much of the discussion concerning the advantages of the star/bus topology has focused on delivery of entertainment and telecommunications services, a growing number of network strategists are also taking a hard look at the energy management side of the picture.

The most recent activity to capture headlines in this regard involves planning for a pilot project by Tele-Communications Inc., Pacific Gas & Electric and, possibly, Microsoft Corp. Sources say the companies are looking at providing some 200 homes in Walnut Creek, Calif. with customer energy management and a "smart home" interface with the cable system.

"We've been in discussions with several electric utilities across the country, and we've found a lot of interest in our ideas," says John Bringenberg, manager of strategic planning at TCI. Although he declined to be more specific about the talks with PG&E, he says: "We would hope to become involved in some trials with major utilities."

The concept involves use of cable lines to provide a wideband telemetry link over which utilities can monitor and bill for energy use based on costs at time of consumption. According to utility industry advocates of the idea, the ability of cus-

Continued on page 58

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tomers to capitalize on off-peak electricity prices could translate into significant reductions in consumption, thereby alleviating pressure to add peak power generating facilities.

"A decade ago," Bringenberg notes, "utilities did all their planning based on how much energy might be used at a peak and then building enough generating capacity to meet that demand. Today they are pursuing much more sophisticated planning models that help them to integrate demand side reductions in energy consumption with supply side increases in capacity."

Tests in Little Rock

Entergy Corp., the first utility to apply demand reduction techniques over a broadband cable system, is operating a test outside Little Rock involving about 100 households. The company estimates it can achieve savings of $1,200 per household over a 20-year period in those segments of the population base where the system is deemed appropriate.

Entergy calculates that about one-third of its household base fits the economic and lifestyle patterns where such savings would be possible.

For examplke, Entergy has asked state regulators in Georgia, Arkansas and elsewhere to support spending on such systems as an alternative to allocating capital funds to plant expansion.

Don Marquart, executive vice president at First Pacific Networks, says the interest level among utilities is outstripping his company's ability to keep up with the inquiries.

FPN, maker of the "PowerView" technology currently undergoing testing by Entergy, is a pioneer in the integration of data and voice services over coaxial networks. In fact, trials are underway at a number of locations in the U.S. and the U.K.

"The utilities side has come on very strong," Marquart says, noting that Southern Corp., another major power company with operations in four states, is completing prove-in of the PowerView system in preparation for tests similar to the one undertaken by Entergy. Southern, pending completion of initial testing, has agreed to become an equity investor in FPN along with Entergy, which holds a large minority stake.

For a cable company, the energy connection has several ramifications extending beyond whatever direct service revenues could be derived. In fact, Bringenberg says, the revenue part of the equation isn't the primary driver behind TCI's interest.

Cable penetration benefits

Equally or more important, he notes, are benefits to cable penetration that might come with a tie-in with a utility. "We are reasonably convinced that the electric utility can help cable get access to homes that don't subscribe to cable," he says.

"By working together we believe we can find an economic way to put connectivity in all those homes so that those people do have access to the broadband highway."

In addition, he notes, adding the utility management service to the integrated service equation puts cable in the position of providing a LAN (local area network) capability in the home.

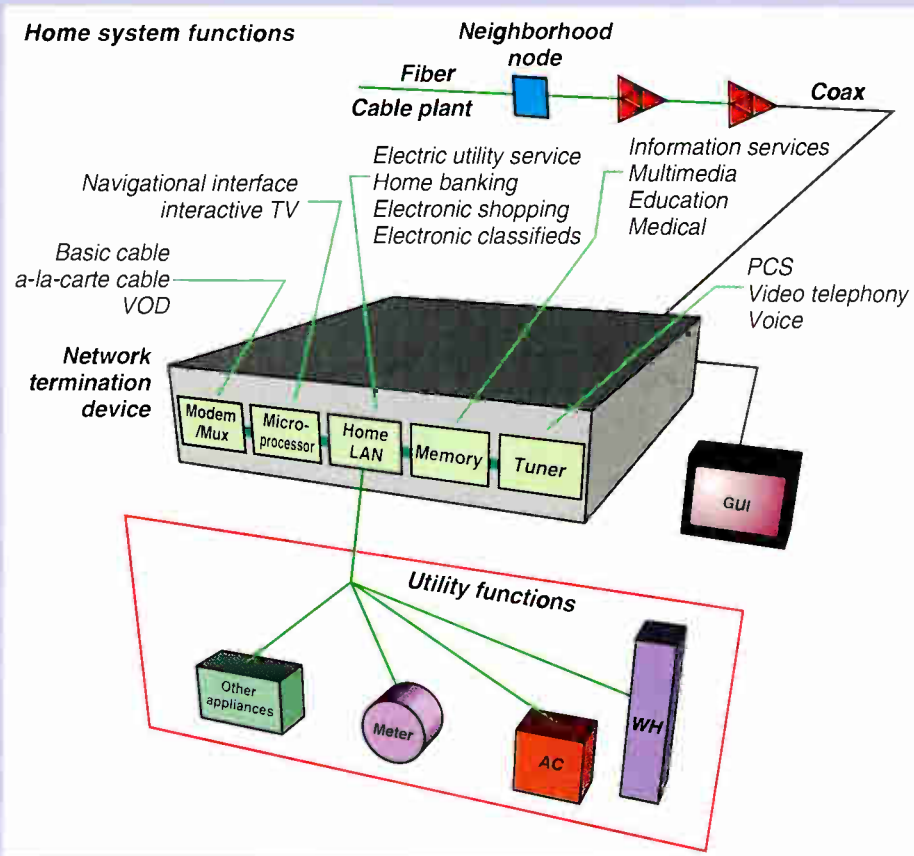
"This is basically a chip which would give the utility access to various appliances in the home over the power line carrier or possibly some RF carrier in the home," Bringenberg says.

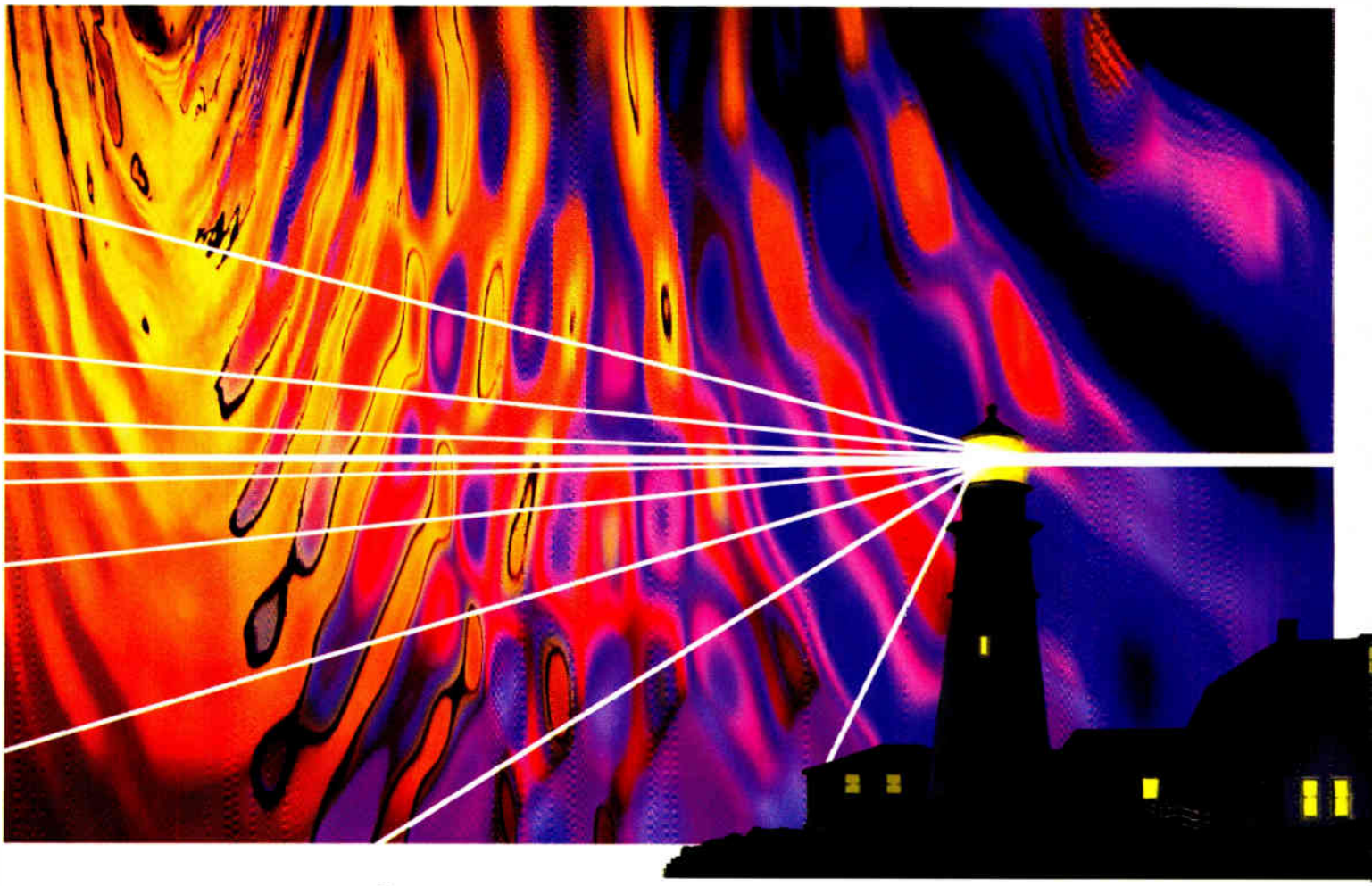
"Once you have that LAN capacity you also probably need to devote some of the processing power (in the cable service control box) so that the utilities can have access to some of the brain in order to manage things, and they probably need a little bit of the memory as well."

This is where the big win for the utilities comes in, he adds. "Once we do this, we can probably save the utility several hundred dollars on a device of this type that they would have to put in for their own communications purposes anyway."

On the cable side, the benefits flow not only to justifying a wire link to every household but to positioning the operator as the supplier of "smart home" capabilities of every description. The application of user interface software such as Microsoft is developing for household energy cost and consumption displays would also create a graphic interface for operating appliances, lights and other household facilities.

–Fred Dawson





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premises. Notes Ron Foster, vice president and general manager of telecom systems at S-A, "The CoAccess system was designed from scratch to mimic everything that a telephone system does with no changes in customer equipment."

The system terminates the coaxial drop at a residential interface unit mounted on the outside of the customer's premises. The RIU directs voice signals to standard, twisted pair lines inside the premises and passes the cable service to the in-home coaxial wiring. The system has no impact on which types of cable security and set-top devices are used by the cable operator.

Some vendors are offering the 2-30 MHz return band; others are embracing 5-42 MHz.

In a contrasting approach, General Instrument's Devereaux says the integrated service system developed in conjunction with DSC separates the individual subscriber line card from the headend- or central office-installed home digital terminal, placing it in the set-top box instead. The fiber/coax system, then, provides a frequency multiplexed, unswitched path to the set-top from the headend.

The DSC system is designed to Bellcore's broadband switching standards, which means the box in the home will have access to every type of advanced digital service envisioned for the telephone industry. Devereaux says the firms will also offer other versions of the system that identify different locations for the customer interface units.

The reverse band

Some vendors, for the time being at least, are sticking with the established upstream subband at 2- MHz to 30 MHz. Others, like AT&T Network Systems, are moving to wider bandwidth, in the range of 5 MHz to 42 MHz. The wider return bandclearly represents a big performance leap in filters.

Along with supporting advanced service provisioning, the star/bus design extends sophisticated computer monitoring of the network all the way to the user interface, which is a major source of the system's appeal to telcos.

Notes Lee Camp, PacBell's vice president of strategic planning, the star/bus system puts a digital, easy to monitor signal out in the field all the way to the customer premises. The design, Camp says, performs at far less cost than would be possible over twisted pair or fiber.

Camp says that once the company had determined the fiber/coax design was by far the least costly broadband network to put in place, it discovered that the design would net huge savings in operations.

Network savings

"We'll be able to pay for this network through savings from lower maintenance, improved inventory management and lower provisioning costs," Camp says.

The significance of the new integrated broadband architecture to the future of both the telephone and cable industries was underscored by the fact that the PacBell deal marked AT&T's first product entry into broadband telephony in the U.S., following several years of internal research and debate over which approaches to take in the marketplace.

According to Jack Harrington, a regional vice president of AT&T Network Systems, the company will provide whatever design approaches customers desire. At this point, though, Harrington says no other broadband product line is slated for production for the U.S. market.

"We think that, across the globe, customers are going to settle in on some variation of this theme we have introduced here," Harrington says.

Even in Europe, he adds, the present commitment to all-optical systems could change and probably will in some areas.

"Of course, we'll be responsive to what customers want. We won't be eliminating any possibilities by going in this direction," Harrington notes. "But clearly, we see a tremendous opportunity here."

Harrington stresses that there are definite distinctions between what AT&T is supplying to PacBell and the type of "overlay" fiber/coaxial network being explored by some telcos.

"The type of design you want depends on how you view the migration path to broadband," Harrington says. "The question is, do you want to build the business around existing services, or do would you rather move directly to next generation fully integrated services? It depends on your view of the evolution."

Making the design decision

In the telco's case, the decision rests on the company's confidence in its ability to win marketshare by offering services that are a step beyond its competitors' offerings, which is what PacBell is hoping to do. In the case of a cable company looking at entry into telephony, the situation is reversed: do you want to merely duplicate what the telco offers or do you see an opportunity tied to more advanced services?

For cable operators, the decision may be easier to make on the side of less advanced services, at least at the outset, because doing so unearths an opportunity to compete with the telco on price where long distance service access is concerned.

A new alliance

If, as MCI's Nat Davis believes, the cable industry has an opportunity to build a business around the cost advantages on this score, its move into telephony could be along a modularly upgradable path. The starting point along that path, Davis believes, is fairly basic.

"We're anticipating that MCI will be interconnecting with a number of cable companies for purposes of providing these types of services," says Davis, MCI's senior vice president, access services.

The company is offering to work with cable operators in a variety of ways, including as supplier of local switching capabilities, should the operator want to pursue full telephone service.

Davis says such arrangements point up the possiblity of working with individual operators in conjunction with deployment of technology like Scientific-Atlanta's to provide entry into telephony at the franchise level, without concern for whether many other cable operators in a given area are partnered in the effort.

"We see an opportunity to work with individual cable companies in business arrangements that don't require equity investments, exchanges of shares or other more complex deals," he notes.

Major benefits to cablephone

The flexibility to enter telephone service to whatever degree regulatory and other circumstances allow is a major benefit of the cablephone technology for the cable side of the local loop equation.

As a result, cable operators, all the way down to the individual franchise level may soon find that getting into the phone business is not theoverwhelming or even daunting prospect it once seemed. CED

Mr. Dawson is a veteran cable industry journalist who has been writing about cable/telco issues for several years.

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Circle Reader Service No. 27

Broadband networks dominate Show

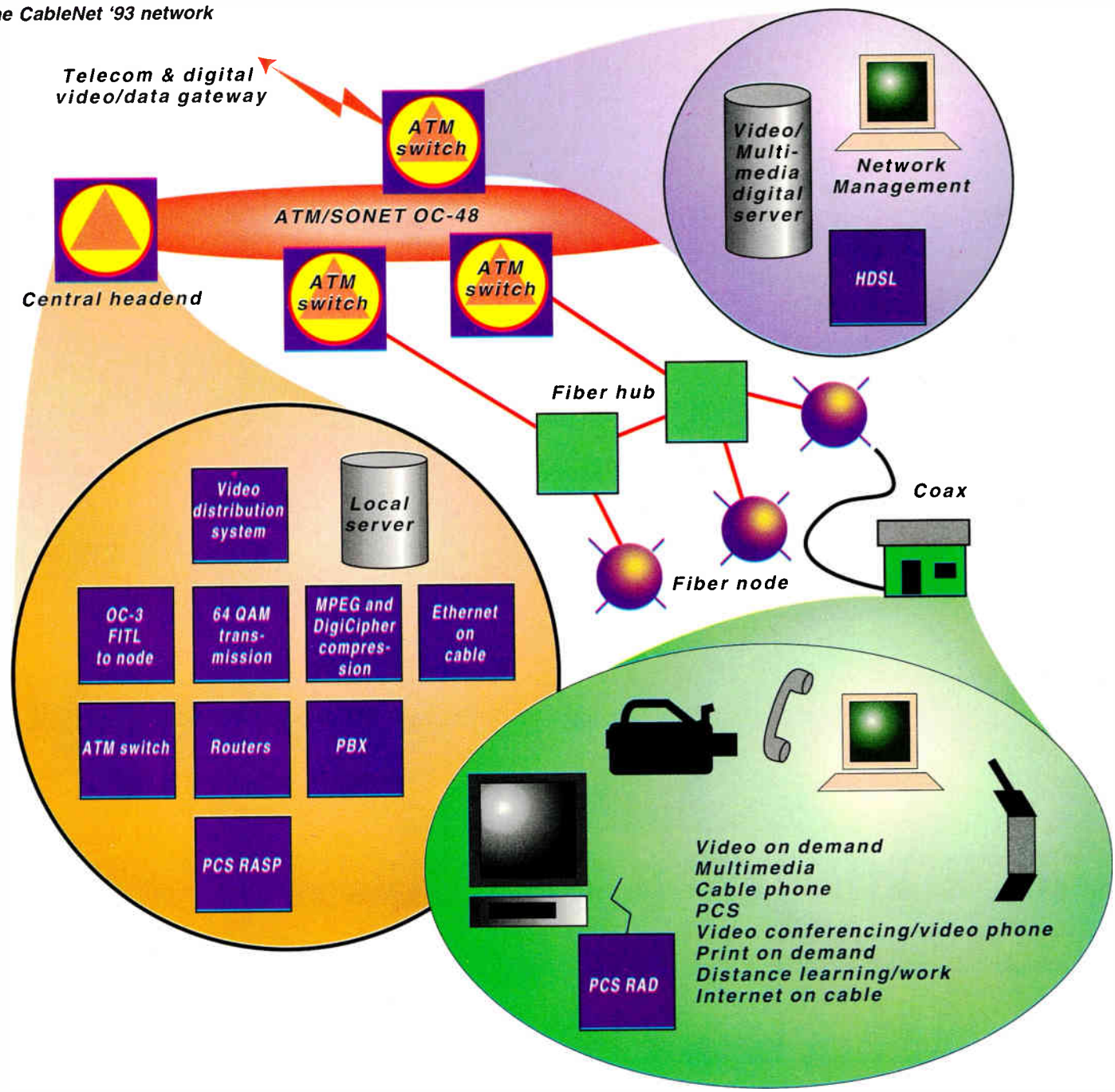
CableNet '93 a huge hit

By Roger Brown

The cable industry took a giant step forward in its efforts to convince people it can build a broadband fiber/coax network capable of delivering a wide variety of switched, interactive services during last month's Western Show through CableNet '93, a hands-on multimedia exhibit organized by Cable Television Laboratories.

The exhibit brought together two dozen different vendors, some of which are intense

The CableNet '93 network



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competitors, on a redundant digital fiber ring network operating at 2.4 gigabits per second. The intent was to show attendees that different network building blocks can be made to interoperate on the network of tomorrow–one that will incorporate educational, entertainment and workplace services to the home.

CableNet '93 featured operational ATM switches that made possible the delivery of services planned for the full service network. Applications included video on demand with full VCR-like features, distance learning, telephony, MPEG encoding and decoding, high-bit-rate digital subscriber line digital ad transport and other services. (See diagram.)

The exhibit provided a forum for a multitude of companies new to the cable industry, including: Grass Valley, Unisys, NEC, Northern Telecom and Sun. Northern Telecom, whose parent company announced at the show that it purchased a 30 percent stake in Jones Intercable, intends to launch itself into the cable market.

NT scheduled a press conference to unveil publicly for the first time its new Magellan Concorde switch, designed to offer 40 Gbps capacity, but which is scalable from 10 Gbps to 80 Gbps. The new switch will support ATM inputs and Sonet OC-3 and OC-12 transport protocols. The switch will allow cable operators to bundle video, voice and data and automatically allocate bandwidth uniquely to specific subscribers.

Operators form joint venture

If the message of the exhibit was "interoperability," cable operators must have gotten the message. During the show, TCI, Time Warner, Cox Cable, Continental Cablevision and Comcast Corp.–the partners involved in the Teleport Communications Group–announced the creation of a new joint venture. This new effort will attempt to combine disparate cable networks to offer personal communications services, data, video telephony, energy management, and residential switched services when the regulations restricting local loop competition are relaxed.

Taking the Chicago area as an example, Bob Thomson, TCI senior vice president of communications and policy, noted that while just one telephone company serves the entire metro area, no fewer than 12 cable operators have portions of the market. It is the lack of interconnection in urban areas that many feel is the reason cable operators would be unable to effectively compete against telcos with long distance providers.

Although the deal is expected to be completed early this year, the companies involved said their plans are firm and real, even if the partners add telephone companies as partners or equity investors (as TCI, Time Warner and Cox already have).

Few details of the venture's structure or management were offered, although it was said the model would be Teleport, which is structured in such a way that cable operators contribute capital and gain equity in affiliates in each market based on the number of telephone access lines within their cable service area. The also have separate equity in the parent company, which handles all marketing, sales, network management and provisioning. This structure permits local operators that are not investors in the parent company to have equity in the markets in which they operate.

The companies involved extended the opportunity to participate to other cable operators. The hope is that the venture will offer a

Ad Index

broad range of brand-name services in various markets

Telephony and multimedia

Telephony over cable and interactive multimedia were the main application themes of all the new technology that was on display in Anaheim. General Instrument, with the ink on its agreement with DSC Communications still drying, showed in concept how residential telephony services can be overlaid on the hybrid fiber/coax network and then split off to feed the twisted pair wire in the home.

The "Coaxial Network Unit" that serves multiple homes or an MDU with 24 twisted pairs will be developed by the middle of 1994, GI officials promised. A unit designed to attach to individual homes is due in early 1995.

Scientific-Atlanta also featured telephony services, demonstrating how its new CoAccess system will work. Dual telephone/video capabilities are provided by new headend and residential products that will be integrated into the fiber to the serving area family of products.

Telephone services are integrated in a multi-line, expandable architecture that requires no in-home wiring changes. The headend unit performs the multiplexin and demultiplexing of the digital signals, the interface to a Class 5 or other switch, system diagnostics and the interface to the operations and provisioning controller (for more detail, see story, page 56.)

TCI buys 400,000 more digital set-tops

Meanwhile, cable operator Tele-Communications Inc. (TCI) raised a few eyebrows when it committed to purchase 300,000 digital set-top decoders from Scientific-Atlanta and 100,000 more boxes from Hewlett-Packard, it was announced in Anaheim.

In each case, the set-tops will be built with "dual-mode" DigiCipher and MPEG-2 decoding circuits, according to representatives of both vendors. The DigiCipher decompression technology will be licensed from General Instrument Corp.

Last year, TCI announced its plans to purchase 1 million set-tops from Jerrold/General Instrument. Current plans call for those units to be rolled out in the latter half of next year. This announcement represents the first industry order for set-tops given to someone other than General Instrument, which has commitments from several MSOs for several million units.

The announcement is particularly significant in that it represents the first time Hewlett-Packard, acompany well-known and respected for its test instruments, has been tapped to provide in-home equipment for a cable system. The order is "hopefully, the first of many," said Laurie Frick, H-P's marketing manager, interactive TV appliances, who added that the final design of the set-top has yet to be determined.

H-P announced its intention to actively pursue the interactive television market last summer by creating intelligent set-tops, printers and other home accessories, video servers and computer systems for billing and tracking.

If the message of the exhibit was "interoperability," cable operators must have gotten the message.

The company commissioned a study that contacted 4,000 consumers to determine the size of the market for interactive services. The company also spoke with telephone companies, cable operators and others to develop an open systems approach to its set-top design.

"We learned what it will take to make interactive television a success from the consumer's perspective," said Harry McKinney, general manager of H-P's interactive television appliances organization. "We used that knowledge to refine our product offering and we bring that information to our relationships with potential partners."

Sega orders adapters

GI and S-A also split a hardware order from The Sega Channel, which announced it has chosen the two full service manufacturers to design and produce in-home adapters and headend equipment for the delivery of video games on demand to cabled homes by next summer. Sega Channel partners TCI. and Time Warner Cable have guaranteed each developer an order of 250,000 adapters, Sega officials said. The adapters, expected to cost about $100 each, plug directly into the in-home Sega Genesis game machine owned by consumers.

In the agreement, S-A will design and produce the system architecture, headend equipment and in-home, cable-to-game-unit adapters for a 12-market test–including six TCI properties and six Time Warner properties–slated for March. GI will also produce adapters when the game service rolls out nationally.

The technology allows a system operator to receive a channel's worth of games from Sega, uplink them via satellite and transmit them to cable headends. At the headend, cable operators will use a $5,000 GI or S-A receiver/demodulator to receive the games and pass them on to subscriber homes. Subscribers will be able to select from some 50 different games at any one time, Sega officials said.

CableLabs budgets staff additions

Don't look for the telco/cable mergers to diminish MSO interest in its industry technical clearinghouse, Cable Television Laboratories Inc. Meeting Nov. 30 at the Western Cable Show, the CableLabs board of directors approved a budget slightly larger than last year's $12 million and slated nine new positions for the staff as the industry prepares to deal with competition and cooperation from the computer and telephone industries.

As CableLabs members develop their "competitive postures," with or without telco partners, said Labs President Richard Green, CableLabs will continue to focus on network architecture and "the infusion of computing power in to the network"–both activities benefitting the broadest spectrum of members.

Going forward toward "the holy grail of network interoperability," the staff will consolidate efforts around architecture, applications requirements, computer software and physical hardware specifications, Green concluded

Adelphia to test Internet access

Joining an ever-growing list of operators interested in opening access to Internet, Adelphia Communications Corp. will conduct a trial of EMI Communications Corp's new Info Net service in Syracuse, N.Y., officials from the company announced.

Although the EMI's first offering will be Internet access for home computer owners, the Info Net package includes deployment of a headend data server for development of local news and community information services. Newhouse subsidiary EMI operates regional banking networks and a voice and data network for New York state.

Speaking of tests, Prevue Networks initiated the industry's first set-top interactive guide tests in Fairfax County, Va. Through its Trakker Interactive Services affiliate, Prevue is delivering "Quikvue," a new service that utilizes the basic interactive guide functionality available through the Zenith Multimedia 1 terminal. Prevue is also working with Jerrold, S-A and Pioneer set-tops to ensure compatibility. Hardware built by those four companies enable viewers to access Quikvue or the multi-featured "Prevue Express." CED

New products debut at Western Show

A broad mix of offerings hit Anaheim

From telephony over cable to less exotic items, a huge number of new products were unveiled during the Western Cable Show in Anahiem last month. What follows is a synopsis of the new products that were announced by equipment suppliers and manufacturers.

Alpha Technologies

New from Alpha Technologies is a dual-output uninterruptible power supply capable of handling both the AC and DC power requirements of a combined cable TV and telecommunications network. Developed to meet the powering needs of these converging technologies, the Alpha XM6015-48SE is already in use in the United Kingdom, company officials said. The UPS provides up to two hours of backup time for the cable system, and up to eight hours of backup for the telecommunications network.

An optional status monitoring interface is available to alert operators at a central office–or remote dispatch center–of any powering problems, including low and high battery conditions, breaker tripping, main power loss or any other conditions that may affect power delivery to the network. This interface connects directly to the telephony status monitoring system, and monitors intrusion, temperature, humidity and other telephony processed alarms.

AM Communications

New from AM Communications is its PreVu software, designed to remotely measure and diagnose cable TV systems. The software is the first in a new family of software products from AM which run within a Microsoft Windows environment. PreVu, AM officials said, enables operators to perform spectrum analysis and frequency response measurements using the company's remote performance monitor. Also new from AM: the 9031 modulator test generator, a remote controlled headend device which provides test video signals for measuring amodulator's in-channel flatness. The unit operates in either a wide-band noise or swept carrier mode, and can drive up to eight modulators simultaneously. Also, AM announced its F.A.C.T.S. software system now supports complete FCC test autotion and report generation.

Antec

Antec announced its "Gateway" generation of optical receivers designed for use within evolving broadband networks and capable of delivering voice, video, data and compressed signals from the headend through fiber optic systems and into the coaxial cable television plant to the subscriber. The receiver is modular in design, Antec officials said, and was devoloped by the company in conjunction with Augat, AT&T and Harmonic Lightwaves.

Features of the Gateway receiver include an analog and digital platform, built-in redundancy options, multiple RF output options, return laser capability, and 1 GHz housing with 750 MHz actives.

Also new from Antec: the Laser Link II Plus HP transmitter, designed and manufactured for the company by AT&T and suitable for applications which require 80 channels and high loss budgets over 30 km lengths. Preliminary specs for 80 channels with a loss budget of 11 dB are C/N, 52 dB; CSO, 61 dB and CTB, 65 dB. Currently, the transmitter offers output power from 7 mW to 12 mW, Antec officials said.

C-COR Electronics

C&P Telephone, a subsidiary of Bell Atlantic, placed an order for a C-COR/COMLUX digital multichannel fiber optic system for use within the Washington, D.C. area, C-COR announced. The order represents the seventh such system C&P has bought from the company this year.

C&P interconnects the major domestic and international television networks, government agencies, cable TV program networks, video production studios and satellite earth stations over non-compressed video fiber optic links located in the nation's capital.

C-COR further announced that its Asian and Middle Eastern distributor, Pan Asain Systems, concluded a contract with the Asianet Group of India. In the contract, C-COR will provide the RF amplifiers and main line passives, including a specially designed minitrunk.

Showing off its 750 MHz "Flexnet" amplifiers in Anaheim, C-COR officials explained that three configuations are available: its FlexNet trunk with three active outputs; its FlexNet bridger with two active bridger level outputs and its 700 Series line extenders with automatic, thermal and manual level control options. All feature parallel hybrid device technology and external test points at all ports.

Channelmatic

Channelmatic demonstrated at the Show its new Audio Level Control module that incorporates circuitry to provide automatic signal level control while additionally improving the overall sound quality.

Featuring 10 DP switch selectable attack and recover time periods, the module can be custom configured to match the audio characteristics of different network programming. Twenty-four channels of audio control require only two rack units of physical space at a cost of about $300 per channel. The modular design of the rack frame also incorporates an automatic by-pass relay when a module is removed.

According to Mike Watson, senior vice president for Channelmatic, "the performance specifications of our new audio controller were, in the past, only available in products in the $1,000 range."

Channelmatic also showcased its full production version of Adcart/D digital ad insertion system. Demonstrations included real-time MPEG compression and automatic insertion playback.

Adcart/D's unique platform features spot library management, single channel integrity, dynamic memory management, scaleable video quality and a hardware platform that can economically accommodate up to hundreds of channels.

ComSonics

ComSonics used the Western Show venue to announce the introduction of several new products, including Video Window, designed for video signal measuring; GeoSNIFFER, a global leakage detection system; and a line of fiber optic cable testing products, including FiberLite, optical power meters, a singlemode modulated laser light source and a backreflec-

tion laser light source.

GeoSNIFFER surveys an entire cable system for signal leakge based on Global Positioning Satellite technology. ComSonics officials said the system is priced at "less than half" the cost of competitive products.

Video Window is a digital video multimeter designed to help cable operators comply with FCC requirements in 1995. The unit tests differential gain, differential phase and chroma-luminance delay, among others.

The company's laser light sources operate at 1310 nm and 1550 nm wavelengths, and are designed to operate with the company's optical power meters for end-to-end loss testing on fiber links. The optical power meters, also new, are hand-held and are available in two styles: a selectable wavelength (850 nm, 1310 nm and 1550 nm) and a dual powermeter, which measures at 1310 nm and 1550 nm, controllable via a two-way switch. The company's new WindowLite PLUS and FiberLite modules add modularity and enhanced diagnostics. Lastly, the company's new backreflection laser light source cam be used for singlemode loss testing via a stabilized 1550 nm laser light source.

Digital Equipment Corp.

Digital Equipment Corp., Times Mirror Cable Television and Arizona State University's Computer Integrated Manufacturing Research Center have created an alliance to launch business-to-business, high-speed digital networks in Phoenix, Ariz.

Times Mirror will provide fiber/coax interconnection. DEC will provide its 10 megabit-per-second ChannelWorks and FDDI local area network transmission technologies. And ASU, which originally approached DEC with the network idea, will assess the value of the network and applications for Phoenix area businesses.

Businesses already committed to conduct "electronic commerce" on the network include McDonnell Douglas Helicopter Systems and Tempe Precision Aircraft.

Startup company SeaChange Technology formed an alliance with DEC, including funding, to develop digital video software products for cable, the companies announced. The DEC funding will be devoted to continuation of DEC's digital advertising insertion software technology.

Electroline

Electroline Equipment announced a new low-cost, low-noise amplifier to upgrade feeder plant bandwidths without moving line extenders or adding power supplies. The new amps were designed to help operators when upgrading from 300 MHz or 750 MHz, company officials said. The amplifier is deisgned to work at input levels as low as 0 dBmV or -6 dBmV, and can also be used as a pre-amp immediately prior to an existing line extender.

Also new from Electroline is the "Compact Addressable Tap," an addressable multi-tap available in both amplified and non-amplified versions. Thus, operators can install a 1-GHz tap with no loss–eliminating the need for additional distribution amps in certain environments, Electroline officials said.

Further, the tap features a one-third size reduction over the company's existing addressable MDU taps. Eight-, 12-, and 16-port versions are available.

The company also announced the doubling of its production facilities for its DROPAmp subscriber amplifiers, triggered by increasing demand for the product from North American companies.

General Instrument

Several new products were showcased by General Instrument, including its Jerrold LinX module, which the company describes as a connection to drive cable's interactive programming. LinX,in conjunction with GI's CompuVerter, facilitates electronic program guides, interactive advertising, data services and interactive home shopping.

The CompuVerter, said Dan Moloney, director of Jerrold subscriber marketing, is a two-tiered set-top offering. The first boxes will resemble traditional analog boxes; but when the LinX module is inserted, the boxes become interactive-capable. The second generation of CompuVerters will be targeted at the company's DigiCable digital compression units. Moloney said those units will be available "later next year."

Also new from GI is its Commander 6 headend modulator, capable of signal processing up to 1 GHz. An accompanying demodulator, also within the Commander 6 series, features remote control and monitoring capabilities, said GI officials. The new features enable cable operators to control headend operations remotely by altering and monitoring operating parameters. Both units will be available in the first quarter of 1994, GI officials said.

On the lightwave front, GI is taking the

wraps off its Starblazer 750 MHz laser module here. The new modules, GI officials said, are built around GI's 500-channel laser, introduced last year.

Complementary products to the Starblazer line are the AM-750ATH transmitter housing, which holds up to two laser modules with a reduced input level of 15 dBmV input and is backward compatible with existing lasers. The AM-750ATH's "plug and play" features maximize carrier-to-noise and distortion performance with reduced operational set-up time, GI officials said.

Harmonic Lightwaves

Harmonic Lightwaves showcased its new PWRLink DFB transmitter in Anaheim, designed for use in short links, distribution and high density narrowcasting applications. The transmitter complements the company's existing YAGLink system and NMS 5000 network management system. Performance for the new transmitter ranges from 9 dB to 13 dB optical budgets providing an end-of-line CNR of +51 with CTB -67 dBc and CSO of -63 dBc.

Kaleida Laboratories

Kaleida Labs announced the development of its Malibu graphics and memory-controller chip, which Kaleida Labs designed, Motorola will produce and Scientific-Atlanta will include in its future set-top terminals.

The chip represents the "last piece" needed to provide a low-cost, end-to-end and open architecture package for multimedia and interactive applications, company officials said yesterday.

The Malibu chip was designed for real-time integration of high resolution text, enhanced two-dimensional and three-dimensional animation and graphics, said Michael Braun, president and CEO of Kaleida Labs. The chip "embraces MPEG standards," Braun said.

LSI Logic

LSI Logic Corporation introduced its L64000 MPEG-2 video decoder integrated circuit, the first in a planned family of MPEG-2 based products which will enable system designers to develop highly integrated solutions for interactive digital TV set-top decoders. The family consists of application-specific standard products and LSI Logic's CoreWare system building blocks, both of which enable system designers to develop customized ICs for MPEG-2 systems. LSI Logic's new video decoder is fully compliant with the latest version of the MPEG-2 standard.

Northern Telecom

Northern Telecom continued its product development assault on the emerging broadband network industry at the Show, unveiling yet another in its line of modular, broadband switches.

The standard Magellan Concorde backbone switch will offer 40 Gbps capacity, but is scalable down to 10 Gbps, or up to 80 Gbps. NT expects the 10 gigabit platform will be ready for lab trials in late 1994 and for full production by mid-1996.

On the input side (from long distance or satellite sources), the Concorde will support asynchronous transfer mode (ATM) multimedia data packaging standards. On the trunking side, it will first support Sonet OC-3 and OC-12 transport protocols; by 1996, NT plans to release an OC-48 version.

The design of NT's Magellan switches includes three main elements: the core switch (which can be scaled 10 to 80 Gbps using modular "plug and play" line cards); a customizable, real-time controller (the network management "brains," adaptable to third-party computer software systems); and the system administration and monitoring layer.

NT's Multiple Priority System technology, underpinning the Magellan switch series, will enable MSOs to bundle voice, video and data and to automatically allocate bandwidth in ways unique to marketing broadband multimedia.

NT will address small- to large-scale applications with the switches, priced between $200,00 and $450,000. The Magellan Passport switch, introduced last March, is tailored to corporate networks for computer and voice interconnection. The Magellan Gateway switch addresses multiple media "residential" networks like those planned by cable and telco operators, as well as "community" networks connecting government, schools, hospitals and businesses.

A Magellan Concorde "backbone" switch will offer high-capacity connection among all those networks and with public and long distance networks.

Among the unique features of the Concorde is its use of line cards, which can be inserted to upgrade capacity while the switch is live and running, said NT officials.

Pioneer New Media Technologies

Pioneer New Media Technologies' cable and broadcast systems group has unveiled its new four-head digital laser disc player and "alpha vision," a CD-sized playback system. Pioneer said it is the first to introduce a digital laser disc player with four independent heads. The player accommodates both analog and digital outputs and serves as a pay-per-view transmission system for satellite delivery or localized video playback. In addition, the unit can be used as an archival source for video servers.

Scientific-Atlanta

Scientific-Atlanta demonstrated a prototype of its new CoAccess telephone service delivery system that will enable switched telephone, video, data and interactive television services to be delivered over broadband cable TV networks.

The dual telephone/CATV capabilities are provided by new cable headend and residential products to be integrated into the company's Fiber to the Serving Area (FSA) hybrid fiber/coaxial broadband system architecture.

CoAccess is designed to be compatible with today's public switched telephone networks, providing a single network for video and telephony services that makes efficient use of the cable TV spectrum.

In the product design, telephone services are integrated in a multi-line, expandable architecture that requires no additional in-home wiring or equipment, enabling broadband network operators to integrate telephone-over-cable capabilities at a low cost of service.

The technology contained in the CoAccess network is provided by a residential interface unit installed outside the home which permits the broadband telephone signals carried over the network to be terminated at the end of the CATV cable drop and pass through the building as standard two-wire telephone signals. Customers would see virtually no change in the way their video or telephone service operates.

Standard Communications

Standard Communications took the wraps off its compact modular VSB-AM headend modulator distribution system, dubbed the "Stratum Series."

The Stratum NAM550 is the major integration component of a system which will provide redundancy, remote re-channelization, standby power capability and self-aligning output levels when monitored by the system status controller, said Mason Truluck, V.P. of sales and marketing.

Fundamental to the Stratum Series is a compact rack system capable of containing eight vertically-mounted modules and a power supply in a space only seven inches tall. According to Truluck, this configuration would allow up to 80 VSB-AM television channels to be contained in a single six-foot

rack.

Standard has tried to address the dynamic needs of the CATV networks of the future by designing Stratum to be self-aligning via a system monitor port. When accessed by the system monitor, the RF output channel frequency, visual carrier level, visual/aural ratio, visual modulation and audio deviation can also be controlled and monitored remotely, said Truluck.

Also new from Standard is a modulator designed to accept integrated options including an off-air cable TV processor and a BTSC/MTS stereo generator. Called the TVM550, the unit is the first of a new generation of modulators designed to break the bandwidth barrier while providing rebroadcast-quality video and spurious-free RF performance.

The TVM550 is available with an integrated stereo generator or an off-air processor. By combining components for these functions, the TVM550 saves rack space, external wiring and AC power requirements, and reduces heat generated in the headend, company officials said.

Telecorp

Telecorp introduced its new "payment processor" software here, designed to increase the efficiency of a cable operator's non-pay collections programs. The payment processor software package is sold in conjunction with the company's System 9000 predictive dialer. It automates the collections process, providing cable operators more control over their collections effort.

The software keeps track of payments received on a daily basis, allowing the dialer to call only those customers who meet the collection manager's criteria. It also tracks all promises to pay and automatically calls back those customers when payment is not received on time.

TV/COM International

TV/COM International featured a live demonstration of its new, real-time and MPEG-based video compression system, first announced at this year's National Show but on display for the first time in Anaheim.

The system includes real-time encoding and decoding, MPEG compatibility, MUSICAM audio and user-selectable video data rates (from 2 Mbps to 15 Mbps), among other features.

The company also announced it has received a $2 million order for its "Orion" brand satellite scrambling system from The Chinese Channel.

The order will be delivered in the first quarter of next year, TV/Com officials said. Follow-on orders are anticipated, as the Chinese Channel expands its current 8-hour programming day into full, 24-hour programming. The order reflects the company's widening international focus, said Henk Henselaar, chairman and CEO of TV/Com.

Viewsonics

Viewsonics announced a new line of high performance miniature broadband amplifiers with a frequency range of 45 MHz to 1 GHz. The company used its traditional small pattern two-way splitter housing for the new single output 10 dB gain mini amp. The 3/4-way splitter housing was used for the new two-output 10 dB gain mini amp. The new four-output 10 dB gain and the single output 20 dB gain mini amps are housed in a slightly larger version. Ports are parallel to the mounting surface on all models.

All amps can be either standard power type or power insertion and come with the patent pending plug-in adaptor. This adaptor utilizes "F" connected power feeding and is available in 110/220V versions.

Zenith Electronics

In a move expected to accelerate the deployment of digital cable television systems, Zenith Electronics Corporation and LSI Logic Corporation have formed an alliance to develop advanced integrated circuitry based on Zenith's 16-VSB (vestigial sideband) modulation/transmission technology.

Under the agreement, Zenith will work with LSI Logic to develop a 16-VSB chip to be used in digital decoders. These systems increase the amount of digital information that can be transmitted on cable TV systems without additional video compression—expanding the capabilities of digital cable TV systems beyond the expected 500 channels to 1,000 or more channels.

Zenith said it plans to use LSI Logic's chip in its digital cable TV decoders scheduled for introduction in 1994. Zenith also will license its 16-VSB technology to other manufacturers of digital decoders, and LSI will sell the chips as application specific standard products (ASSPs) or customized ASSPs to Zenith licensees. CED

–Compiled by Roger Brown, Leslie Ellis and Peter Lambert

POP survey cites manpower as big eyeopener

Ops reveal '93 report cards

By Leslie Ellis

More than 80 percent of cable's technical managers are satisfied with their system's performance during 1993's bi-annual FCC proof-of-performance tests, according to a survey initiated by CED last October. Problems identified during the tests were corrected, for the most part, said 79 percent of the technical managers who returned the survey.

That's the good news. The bad news? Manpower is still in short supply. Further, cable professionals and a representative from an independent company whose primary function is to assist cities in deciphering the voluminous test data think the survey results are slightly over-optimistic.

"I think (the CED survey) paints a rosier picture than where we are presently," said Saconna Blair, manager of quality assurance/FCC compliance for Jones Intercable and a panelist at a Western Show technical session related to the tests. "I think we've made much progress, but we still have a long way to go."

The survey was mailed to 1,500 randomly selected CED readers. Results are still trickling in, but for the purposes of this analysis, 363 responses were tabulated, representing a 24 percent response rate. No names were requested or given on the survey, which probed the broadband technical community on several aspects of the bi-annual tests.

Interesting results

Several of the statistics unearthed by the survey are illuminating. Almost one-third (28 percent), for example, admitted "tweaking" test points to enable test passage–a cacophonous fact to the ears of Jonathan Kramer, president of Communications Support Group and admittedly a guy who roams the nation at the behest of various cities to analyze proof tests. "None of you should have tweaked your systems before the tests," Kramer said at the same Western Show technical session. "You should have tested it as you found it."

However, an overwhelming majority (96 percent) said test points weren't selected based on their ability to pass the test, but instead because they reflected the quality of the entire system.

And, while most (78 percent) technical managers agree that the tests ultimately benefit cable customers, two-thirds (68 percent) think the current test methods cause too many service interruptions. "The rules were written with a worthy goal in mind, but missed the mark in logic," wrote a Florida-based technical manager of the interruptive nature of the tests.

"There needs to be a way that's acceptable to the FCC for performing non-interfering tests to the individual channels," agreed an Arizona chief tech.

Surprisingly, responses were almost split on how often the tests should be performed. Just over half (56 percent) think testing twice a year is too often in light of the man-hours, number of test points and service interruptions involved. "I think yearly testing would be sufficient," wrote a chief tech from Ohio. "The current system puts a great burden on systems with multiple headends. "

"I really feel that a good, once yearly FCC test is enough!" wrote a headend technician from Illinois, who added that a yearly test is "good technical practice."

But 42 percent say the bi-annual nature of the tests is acceptable. "I've found that after doing the POP tests, my service calls have dropped from 80 per month to about 25 per month," wrote a system tech from a small system in Louisiana.

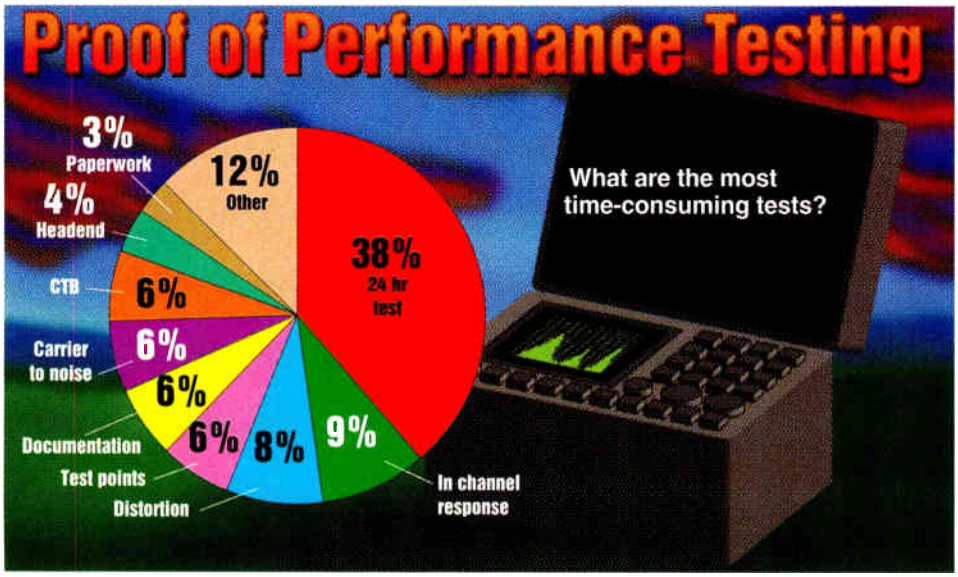
"Even though the tests are a pain, I think they are beneficial in locating problems and evaluating service," agreed an Arkansas-based chief tech. And, from a regional engineering manager in Mississippi: "Like CLI, POP requirements make us maintain our systems the way we should have been doing all the while."

The top-three POP troublemakers were the 24-hour, in-channel response and CTB tests, technical managers said. The same three tests are also the most time-consuming, according to the survey.

"The scope of the testing is silly!" wrote a chief tech from North Carolina. "In-band response and other baseband parameters wouldn't degrade in the plant without you knowing about it from customers."

And, groused a chief tech from Wisconsin, "The 24-hour tests are a joke. Anyone can pass those tests if their system is balanced once a year."

On the first pass, an average 85 percent of test points selected for the 3 dB adjacent (peak-to-valley) response test passed, the respondents said. And, 87 percent agreed that having examined their systems during the hottest and coldest months, their AGCs are working correctly–which is good, because watchdog Kramer says the 24-hour test is one of his favorites to scrutinize. "I personally find that the best information I get from a sys-



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Circle Reader Service No. 31

tem comes right out of the 24-hour section," Kramer said. "I look at a lot of things in that, especially AGC."

Needs going forward

Man-hours, equipment and training are still big issues for cable's technical managers–but on a happy note, the majority (83 percent) said their companies would be supportive in providing money, manpower, materials or training if a serious problem was uncovered during the tests.

The tests required an average of 155 man-hours to perform, including testing, documentation, copying and result distribution. That number exceeded the anticipations of more than half (64 percent) of the respondents by about 47 percent.

"Two months of maintenance time was sacrificed because of the proofs," wrote a regional engineer with systems in Tennessee and Mississippi. "The time and effort spent on documentation and paperwork could be better spent on maintenance."

"With all the tests and the paperwork, there is an acute lack of manpower and test equipment available," wrote a chief tech from Virginia.

Because of that, many survey respondents (63 percent) will take a serious look at automated test equipment and status monitoring systems this year. However, those respondents who chose to comment on automation offered caution. "Automated equipment cannot check everything to determine the exact condition of the plant," wrote a technical operations manager from Virginia.

And, said a Florida-based engineering supervisor, automated equipment is making advances "but still doesn't work. Generic reporting software isn't practical. We need more options in both areas."

Test equipment calibration

Most operators (73 percent) calibrate test equipment annually; 67 percent said they use an outside calibration lab to do so. Heads up, engineers: this is another area of the tests Kramer watches diligently. "One top-five MSO documented a spectrum analyzer that had been calibrated in 1987," Kramer said. "From a top-two MSO, I saw a proof that had a three-year old calibration date. Calibration isn't a tough issue. There's money out there for it."

Also, Kramer said, calibration chains are acceptable. "You don't have to send everything in for calibration. If all of your signal level meters are calibrated against a spectrum analyzer that's been calibrated, document it. "

For the most part, local franchise administrators didn't consult with cable operators regarding test results (at 92 percent). Further, 80 percent of the respondents weren't required to submit test results to local franchisers.

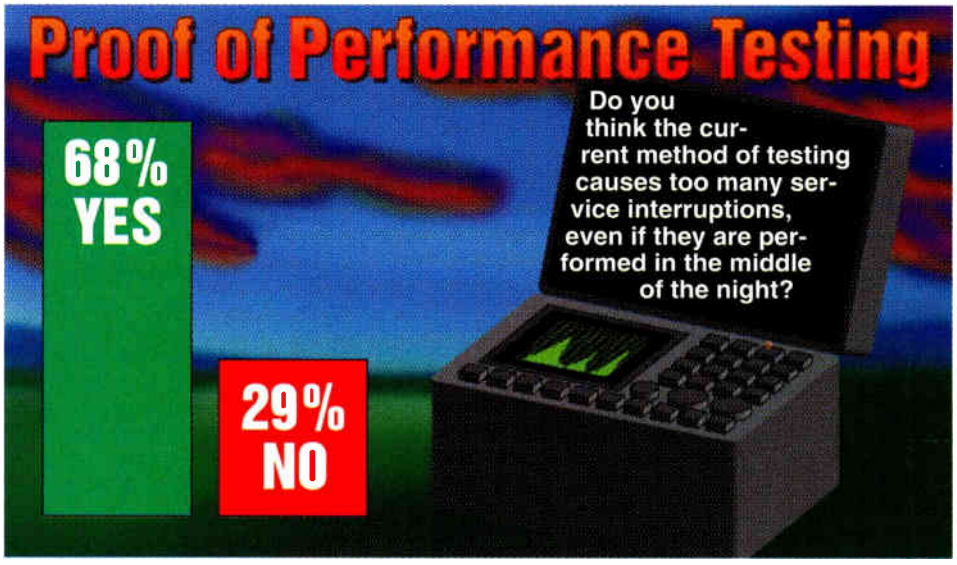
Most test-related bitterness was aimed squarely at Washington, D.C.-based powers and not local franchise authorities. A case in point is this comment from a riled plant manager in Oklahoma: "How much more junk is the government going to dump on us? It's someone else's turn–leave the cable people alone."

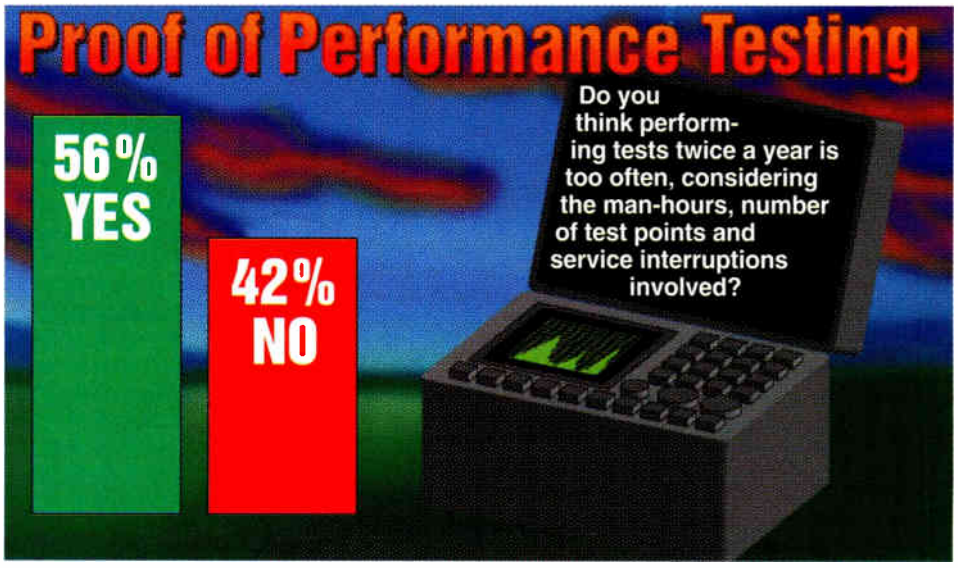
For its part, Jones' Blair said the MSO learned two important lessons from the first year of proof-of-performance tests. First, its preventive maintenance programs weren't as effective as earlier thought. Also, Blair said, training issues still abound. "Our number one resource is our technical associates. So we have to listen to their needs and train them adequately," Blair said. To that end, Jones developed a training video used by the MSO and available to other operators. The training tool was designed to be used by Jones staffers 45 days or so before proof tests, so that any forgotten test elements were refreshed.

System pride prevails

On the whole, most of cable's technical staffers are proud of their systems. Three-quarters of the respondents said their proof test results represent overall system performance; 86 percent believe their systems provide high-quality video to all subscribers.

The latter statistic is what really matters, said Blair, more than anything else. "We have to make sure that as an industry, we don't lose sight of what the tests are for–they're for our customers," Blair said. "As we look at competition, we have to make sure we're the better provider." CED



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Big money rushing into CAPs

ALTS conference upbeat

By Fred Joyce

The innovators of local loop competition, the competitive access providers, held their fall Association for Local Telecommunications Services (ALTS) meeting in Phoenix in November.

More than 350 key players attended this year's conference which included high-level executives of the CAPs, LECs and MSOs, who for the most part were optimistic that sufficient opportunities to provide competitive telephony services are plentiful in emerging markets.

More importantly, Wall Street and other strategic investors were present. This indicates that the capital required to develop new fiber optic infrastructures and enhance existing competitive local enterprises, is possibly waiting in the wings, if not already associated with a CAP.

Mergers create new opportunities

More dramatic changes are expected along the lines of the recently announced Bell Atlantic–TCI merger. "Since divestiture this is the single greatest business opportunity that has occurred in the communications industry, ever. The market opportunity is absolutely huge, and we're now not only talking telephony, we're talking (about) cable television and other services into the home," said Time Warner Communications Senior Vice President A. Graham Powers.

"In six months welcome your new players, your competitors and people who will eventually perhaps buy you out, or you'll buy them out, it's going to be a good time–enjoy," remarked Powers.

Gary Lasher, President and CEO of Eastern TeleLogic Corp. located in King of Prussia, Pennsylvania, discussed the imminent merger between Bell Atlantic and TCI: "We've just seen a monopoly acquire a monopoly, it's still a monopoly. We can compete against a monopoly."

"There will be a lot of telephone and cable mergers all across the board in probably every major city, but for the smaller CAPs, I don't think it's time to throw in the towel or hat," said Brad Evans, president of City Signal of Grand Rapids, Michigan.

Developing cooperative strategies

Perhaps one short year ago, it was relatively easy to tell the "good guys" from the "bad guys" at the ALTS conference. The good guys being the combating CAPs, and the bad guys recognized as the deep pocketed Local Exchange Carriers (LECs) and cable television MSOs.

At the conference, held at the sprawling Pointe Hilton Resort, most attendees and panelists indicated that the CAP industry was evolving and emerging, with the support of both the MSOs and LECs.

"It's been our experience that a lot of them (LECs) are changing and working with us to do cooperative arrangements on interconnects within their regions," said Robert Annunziata, president, CEO and chairman of Teleport Communications Group (TCG). "We have not been stonewalled everywhere. In some places we have, but some other RBOCs have been progressive and willing to listen and talk" he added. TCG is owned by MSOs, including TCI, Time Warner, Cox, Comcast and Continental.

Regulatory environment improving

Royce Holland, president of MFS Communications Co., was asked if CAPs should expect to see any hope for regulatory relief. "I see a lot of hope. It's going to happen. Things are just moving too quickly. The whole structural change of the industry today with five to seven Baby Bells now in some form or another going out of (their) service territories is going to force it to happen, if we (CAPs) couldn't have made it happen on our own."

Holland went on to say he's not counting on the U.S. Congress, though. "That would be an unexpected windfall. So we're out there slugging it out state by state. What you've seen is the big states like New York, Illinois and Massachusetts is a movement toward a competitive local environment, a network to networks co-carrier status."

CAPs go for the switches

Possibly the hottest topic of discussion was the advent of CAPs entering the local switching access segment of competitive services. Both in sessions and in private conversations, attendees conferred about the freeing-up of state regulations, which in some areas of the country already allow competition for not only private line services, but also for local switching, such as intraLata toll and Centrex type services.

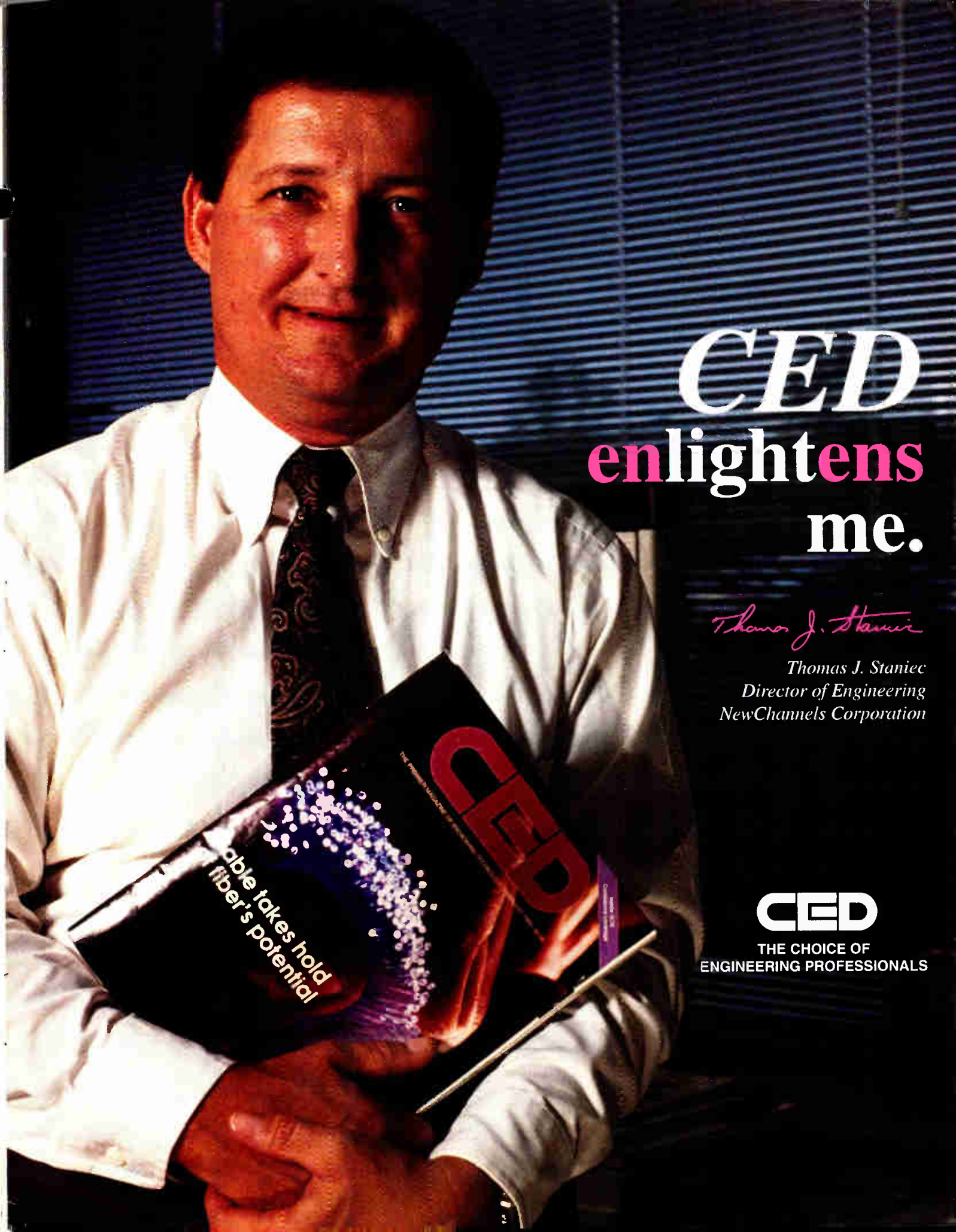
TCG's Annunziata indicated that, "If you look at the marketplace we are all familiar with, it's $90 billion, and only $5 billion is in private line special access. Clearly, you know where you (CAPs) want to go is where the revenue is switch related." TCG is operating eight switches today across the country.

Overall, most industry experts were extremely optimistic about the CAP market at this year's conference.

"We're not only going after just the largest businesses, we are really focusing on the medium and smaller businesses with our switched services. We installed a switch in New York this year, we'll be installing more around the country next year," said MFS's Holland.

Overall, most industry experts were extremely optimistic about the CAP market at this year's conference. There are still plenty of opportunities for entrepreneurs and marketing executives who can develop a CAP fiber network in a second- or third-tier city. True local competition for both private lines and switched services seems to be only a few years away for the majority of the country, if it hasn't already arrived.

Mr. Joyce is a telecommunications consultant based in Colorado Springs.



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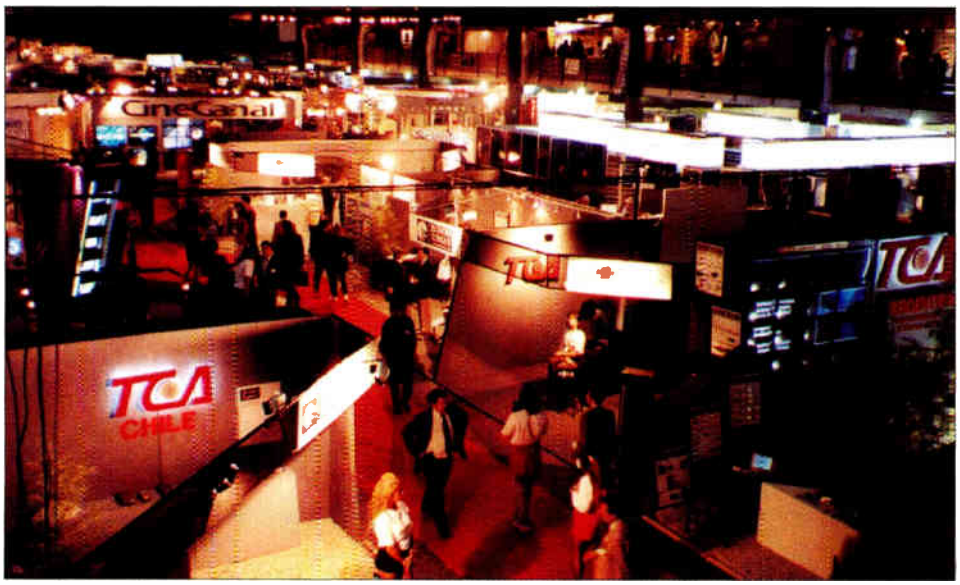

ROB STUEHRK

The floor was bustling at the annual Jornadas de Television por Cable convention in Argentina

Cable suppliers head south for the winter

Latin America an activity hotbed

By Roger Brown, CED

Even with existing order backlogs as long as your arm, North American cable TV product suppliers and manufacturers flocked to Buenos Aires, Argentina in late November to drum up more business at the Jornadas de Television por Cable ATVC/Caper '93 annual show.

In response to increased attendance, the five-day show was moved from the Sheraton Hotel to the local exhibition center, which featured more room for the increased number of suppliers and attendees who came from all over the region, including Chile, Brazil, Uraguay, Paraguay and other southern points.

North American influences

Technology developed by the North American cable industry continued to play a large role at the show, with Scientific-Atlanta and Antec announcing a new joint venture and Glenn Jones and Wendell Bailey delivering keynote speeches to the group.

While the real story here was the push for more programming, operators were also keenly interested in the technology that delivers it. Vendors reported sharp interest in both basic cable technology like addressable convertors and new electronics, as well as advanced technology like digital compression–which is viewed as something as a panacea because satellite transponders are in short supply and channel capacity is so scarce.

ROB STUEHRK

The confab was sponsored by the Argentina Cable Television Association (ATVC). Leaders of the trade association include, from left, Julio Tapia, president; Horacio Guibelalde, 2nd vice president; Renee Lima, secretary; Osvaldo Rossi, technical adviser; and Jorge Offenhenden, editorial director.

Scientific-Atlanta and Antec are convinced there's enough of a market in Argentina they formed a new joint venture, called Communicaciones Broadband, S.A. This new company was created to serve as the exclusive marketing and sales organization for each company's broadband network products and services for all of South America, Central America, Mexico and the Caribbean, according to officials from both companies.

The venture will be headquartered in Miami, but will open warehouse facilities in Argentina, Brazil and Mexico. In many cases, operators in these countries have had to stock large quantities to products to avoid long lead times. This venture has been designed to take that burden off the operators.

David Morales of Scientific-Atlanta will serve as company president, and Eric Perhohner of Antec becomes executive vice president. Jerry Fernandez of Antec is the senior sales executive for the organization.

Cable and telephony

The venture expects to service primarily cable systems but may eventually target telephone companies as customers, especially if telephone service over cable plant gains momentum as it is in the United States, said Morales. "Telcos aren't talking broadband yet," said Fernandez. He suggested that cable operators ought to implement fiber systems, tie them together across franchises and offer telephone services themselves. "Right now the telcos are still 20 years behind; it would take them five years to rebuild," he noted

On the show floor, which was open for five lengthy days, North American products were in evidence nearly everywhere, often in booth space rented by local equipment distributors. Industry giants S-A, General Instrument, Philips Broadband and Antec all were major participants, as were small companies like Holland Electronics and Blonder Tongue. Canadian manufacturers Lindsay and Triple Crown were also on hand.

Even with more than 20 years of experience delivering cable TV, Argentina operators continue to look toward North America as the model of the future. Cable is freely competitive, with more than 1,500 operators serving approximately 3 million subscribers, primarily located in the large urban areas. Buenos Aires, a city of 13 million people, is served by a handful of operators who, in many cases, have overbuilt each other.

Wireless cable in the form of MMDS was

authorized by the Argentine government about two years ago. Since then, it has been recognized as an inexpensive method to distribute video signals initially. Even for operators who prefer hard-wired cable systems, MMDS has been viewed as a method to penetrate a market quickly before the investment is made in cable.

Like Argentina, Brazil is also viewed as having huge potential. Unlike Argentina, however, Brazil is still forming its cable policies. The government there has been historically plagued by instability and staggering inflation rates have put many in economic straits, making cable television a commodity only the wealthy could afford. However, in recent years, there has been progress.

Cable and HDTV

Bailey spoke about the evolution of advanced television, noting that the service grew out of an FCC rulemaking that proposed taking the UHF bands away from broadcasters and giving them to land mobile operators. In order to protect the UHF spectrum, the broadcasters latched on to HDTV, a bandwidth-hungry service that promised to revolutionize television.

Since then, compression technology has been able to fit HDTV signals in a 6 MHz channel. Consequently, broadcasters now want to take the second channel slot they were given for HDTV and use it as a second NTSC channel. With compression, they could offer a mini-pay service with several different programs running simultaneously.

Even though they were told by the FCC they must cease NTSC broadcasts and give the channel space back in 15 years, Bailey was dubious. "I cannot imagine in my wildest dreams ever living to see a broadcaster give it back," Bailey said.

Since the FCC began its work on HDTV, the number of companies proposing transmission systems has dwindled from 23 to four. The remaining companies have since joined together in a "Grand Alliance" to develop the best single system. Several technical issues remain to be resolved and field tests must be completed before a standard is set.

Technology developed by the North American cable industry continued to play a large role at the show

But for HDTV to succeed, the cable industry must embrace it, said Bailey. "If we (cable operators) don't want it, it will not happen." Why? Because broadcasters are already walking away from HDTV, fearing that it will cost them millions of dollars to convert although they'll be unable to derive any revenue from the new service.

Jones, who drew a parallel between this show and the frenetic confabs in the U.S. of some 15 years ago, spoke of the ever-increasing rate of information creation. He noted that the development of microprocessors has accelerated so rapidly, it now makes the power of a computer affordable to nearly everyone. His message that cable operators have a role as information providers to the people of the world was heartily received by the Argentine audience. CED

Fiberoptic detectors, receivers

ANAHEIM, Calif.—EPITAXX has announced a family of fiber-optic detectors and receivers designed specifically for analog and digital transmission of cable TV signals over fiber.

All EPITAXX CATV receiver products are based upon a low-distortion photodiode structure which offers IM2 distortion to better than -80 dBc. Products include fiber pigtailed EPM700 detectors and impedance-matched ERM720 series receivers for AM CATV, and low back-reflection pigtailed ETX75FJ-SLR detectors for FM transmission of video signals.

Circle Reader Service No. 40

Fiber optic transceiver

SOUTH PLAINFIELD, N.J.–New from Radiant Communications Corp. is its Series DV4E/SM transceivers, which transmit any combination of video, audio, and data bidirectionally over one singlemode fiber, company officials said. Edge emitting LED's allow for up to 20 km link while keeping the cost of the system more economical. The Series DVL4E/SM was designed for distance learning, CCTV, and video teleconferencing applications, company officials said.

Circle Reader Service No. 41

TDR with serial interface

LINCOLN, Neb.–Riser Bond Instruments has unveiled its new Time Domain Reflectometer, the Model 1205. The Model 1205 is a low cost, compact, multipurpose cable fault locator, designed for field testing all types of metallic paired cables, company officials said.

Model 1205, Time Domain Reflectometer

The Model 1205 features an RS-232 serial output port for computer interface that allows stored waveforms to be downloaded to a PC for post-storage evaluation and analysis.

A feature of Model 1205 is the automatic and manual dual cursor operation which allows measurement between any two points on the waveform. It will automatically calculate and display return loss measurements and distance to the fault.

The 1205 has a large Hyper-twist Liquid Crystal Display that provides detailed information of the instrument settings and cable conditions.

Circle Reader Service No. 42

Modular power supply

ANAHEIM, Calif.—New from Power Guard is a -48V modular power supply system, designed for high power capability and a wide operating temperature range (-40C to +60C). A pluggable wiring harness permits ease of installation and replacement; a temperature probe option tailors the battery charger output for extended battery life, Power Guard officials said.

Circle Reader Service No. 43

Analog/digital transition path

SAN DIEGO, Calif.–TV/COM International has announced it will offer products that provide "backward compatibility" and permit a smooth transition for customers as they upgrade their systems from TV/COM's digital compression technology .

Products with "backward-compatible" capability will enable current analog Sigma, Orion or ProGuard users to operate and control their existing analog decoders while simultaneously operating and controlling digital decoders, thus ensuring that their investment in analog technology not be made obsolete by digital's introduction, company officials said.

The products will be offered for cable systems, TVRO users, and private networks currently utilizing TV/COM's analog encryption systems. The backward-compatible products, which are part of TV/COM's Compression NetWORKS family of digital compression equipment, include commercial MPEG-2 cable and satellite decoders and control systems.

Circle Reader Service No. 44

1 GHz, RG-7-sized drop cable

ANAHEIM, Calif.—New from CommScope is a 1 GHz, RG-7-sized drop cable line, designed to meet the recently adopted SCTE

OTDR plug-in modules

Tektronix has announced a series of plug-in acquisition modules for its Fibermaster OTDR, which enable telecommunications carriers and suppliers to test extended fiber cable lengths with greater accuracy and more sophisticated analysis, Tek officials said.

"Now that cable manufacturers are able to produce longer reels, telecommunications and cable TV operators can install longer links without splicing, lowering the loss in their networks," said Bob Cook, product marketing manager. "With the new long-range plug-ins, these users,

FL series plug-ins

now have the tools for accurately testing longer links."

The new FL series plug-ins are designed for 1310 nm and 1550 nm single-mode operation. They provide greater dynamic ranger (greater than 37.5 dB at 1310 nm and greater than 37 dB for at 1550 nm) for testing long fiber links, said Tek officials. Dynamic range can be increased with extended averaging.

In addition, the new modules offer reduced noise, improved linearity and increased resolution, which means users can analyze fibers in more detail and detect subtle losses.

Three configurations are available: the FL1300, which tests at 1310 nm; the FL1500 for 1550 nm fiber; and the FL1315 for testing both 1310 nm and 1550 nm operating wavelengths in a single module.

The modules were designed specifically for PTTs (Postal Telephone and Telegraph), interexchange long-haul carriers, fiber manufacturers, cable manufacturers and cable TV operators who need to support increasing fiber optic cable lengths.

Circle Reader Service No. 39

standard extablished by the Interface Practices Committee, company officials said.

The new cables have 16 AWG copper-covered steel center conductor, CFC-free foam polyethylene dielectric, laminated aluminum tape bonded to the dielectric and a PVC or PE jacket.

Circle Reader Service No. 45

Interferometer system

NORTH BRUNSWICK, N.J.–Norland Products has announced the addition of a motorized tilt into its Cleave-Chek interferometer system, which enables it to measure the end face of a fiber that is cleaved or polished at more than two-degree angles. The new design, Norland officials said, makes the system well suited for inspecting fiber ends before splicing or terminating, and for examining angled cleaving tools.

The tilt operates by activating a push rod on the stage that increases or decreases the angle of the tilt on the fiber. A tilt controller switch controls the direction and a digital readout measures the cleave angle to 1/100th of a degree.

The Cleave-Chek system consists of a fiber interferometer, 9-inch video monitor, solid-state CCTV camera, stepper monitor and control panel. Cables and adapters are also included.

Circle Reader Service No. 50

Low-cost UHF bandsplitter

ANAHEIM, Calif.—New from Communications and Energy Corp. is a diplexer type which splits or combines the lower and upper halves of the UHF band (470-890 MHz) to combine two UHF antennas to a single transmission line or to allow two low power transmitters to utilize the same antenna.

Crossover frequency is 630 MHz and passbands, on separate connectors, are 470-600 MHz and 660-890 MHz. Passband loss is 1 dB max, except 2 dB max at passband edges near crossover.

Circle Reader Service No. 46

Cable TV analyzer

PALO ALTO, Calif.—Hewlett-Packard Company has announced its HP 8591C cable televsion analyzer, which it says is an economical, portable, single-box measurement solution that performs RF and video measurements according to FCCregulations and IEC standards.

Designed for cable television engineers and technicians, the HP 8591C is a cable TV test solution for regulatory compliance testing as well as system monitoring and maintenance. The analyzer supports NTSC, PAL and SECAM formats.

Circle Reader Service No. 47

Satellite receiver

MIAMISBURG, Ohio—New from R.L. Drake Company is its ESR1252, a frequency synthesized commercial grade satellite receiver for broadcast and CATV applications. Features of the new ESR1252 include a multi-voltage transformer and voltage selection to allow operation on most common worldwide voltages, (115, 127, 220, 240V and 50/60 Hz), a removable AC power cord, LED power indicator and IBM compatible software for remote control of receiver functions via a personal computer.

Modular in design, the receiver comes with standard fixed audio; optional audio demodulator boards provide for dual or wide audio coverage and includes selectable filter band-

ESR1252

widths and de-emphasis, company officials said.

Circle Reader Service No. 48

Digital ad inserter

ANAHEIM, Calif.—Texscan MSI is using the Western Show to debut its new, MPEG-1+ based digital commercial insertion system, designed with open architecture standards in mind. The system includes the company's new "Prizm" video controller. "(Because of this,) customers aren't locked in to a single encoding manufacturer or limited network switching configurations," said John Boland, director of sales and marketing for Texscan.

Circle Reader Service No. 49

Optical light source

VANIER, Canada–New from EXFO Electro-Optical Engineering is its FLS-210A portable, variable optical light source. The unit is available in both laser (10 dB variable range) and LED (low, medium or high) configurations. Single and dual wavelength versions are also offered.

The light source comes equipped with the company's "FasTest" feature, which enables automatic attenuation tests when used with an accompanying EXFO power meter. The unit comes with three-way powering (NiCd, alkaline, or AC), a rugged polycarbonate case, a protective PVS holster, a backlit LCD, a low battery indicater and an auto-off function.

Circle Reader Service No. 51

Antifreeze gel

STILLWATER, Minn.–New from American Polywater is its IceFree antifreeze gel, designed to prevent ice formation in conduits and protect fiber optic cables from ice-induced microbends.

In freezing temperatures, exposed conduit in locations such as bridge crossings can experience freezing of condensation and seepage, Norland officials said. Further, they said, ice in conduit can exert bending forces on cables, resulting in signal loss. Its product melts any ice present and displaces all water from the exposed conduit, preventing ice build-up.

Circle Reader Service No. 52

JANUARY

5-6 SCTE Annual Conference on Emerging Technology. Location: Phoenix, Ariz. Call SCTE headquarters (215) 363-6888.

11 Cascade Range SCTE Chapter Technical Seminar. Call Cynthia Stokes, (503) 230-2099.

12 South Jersey SCTE Chapter Technical Session. "Signal theft." Location: Ramada Inn, Vineland, N.J. Call Mike Pieson, (609) 967-3011.

13 SCTE Satellite Tele-Seminar Program. Transmitted on Galaxy I, transponder 14, from 2:30 to 3:30 p.m. Eastern time. Topic: "Basics of Telephone, part 1," with William Grant of GWG Associates. Call SCTE headquarters, (215) 363-6888.

13 Central Indiana SCTE Chapter Technical Seminar. "Basic CATV Design and Theory" with Tony Gower of TSB Inc.; BCT/E Category IV review. Location: Holiday Inn, Pyramids, Ind. Call Al Opurt, (317) 825-8551.

15 Cascade Range SCTE Chapter Testing Session. BCT/E exams to be administered. Location: Paragon Cable, Portland, Ore. Call Cynthia Stokes, (503) 230-2099.

18-21 Fiber Optic Intallation, Splicing and Maintenance. Sponsored by Siecor Corp. Location: Hickory, N.C. Call (800) SIECOR1, ext. 5539 or 5560.

19 Golden Gate SCTE Chapter Technical Seminar. "FCC Proof of Performance Testing, Year 2." Call Mark Harrigan, (415) 358-6950.

19 Piedmont SCTE Chapter Technical Seminar. "Safety and Training." Call Mark Eagle, (919) 477-3599.

19 Big Sky SCTE Chapter Technical Seminar. "Safety" and "CPR." Annual elections. Location: Locomotive Casino/Restaurant, Laurel, Mont. Call Marla DeShaw, (406) 632-4300.

20 Big Country SCTE Chapter Technical Seminar. "Coaxial Construction, Aerial and Underground and Fiber Installation". Location: Holiday Inn, San Angelo, Texas. Call Robert Amo, (915) 655-2276.

20 Magnolia SCTE Chapter Technical Seminar. "Digital Compression" with Tony Filanowski of General Instrument. Location: Ramada Coliseum, Jackson, Miss. Call Steve Christopher, (601) 824-6010.

Conferences/Shows

January

1-3 SCTE Conference on Emerging Technologies. Location: Phoenix, Ariz. Call SCTE at, (215) 363-6888.

13-15 Carribean Show. Location: San Juan, Puerto Rico. Call CCTA, (809) 775-4099.

16-18 Inter-American Link '94. Location: Mexico City, Mexico. Call (305) 929-6657.

February

20-25 Optical Fiber Conference. Location: San Jose, Calif. Call (202) 416-1980.

23-25 The Texas Show. Location: San Antonio Convention Center, San Antonio, Texas. Call (512) 474-2082.

March

21-24 National Association of Broadcasters. Location: Las Vegas, Nev. Call (202) 429-5356.

22-244 Pan Asia Satellite & Cable TV Conference. Location: Hong Kong Convention and Exhibition Center. Call 011-65-222-8550 or 011-852-529-5009.

April

11-13 Cable & Satellite Europe. Location: London, England. Call 011-44-021-705-607.
27-29 Brazil Link '94. Location: Sao Paulo, Brazil. Call (305) 929-6637.

May

2-5 Supercomm/ICC '94. Location: New Orleans, La. Call (202) 835-3168.

15-18 Canadian Cablexpo. Location: Montreal, Quebec. Call (613) 232-2631.

22-25 The National Show. Location: New Orleans, La. Call NCTA, (202) 775-3669.

June

15-18 SCTE Cable-Tec Expo. Location: St. Louis, Mo. Call (215) 363-6888.

July

5-8 CATV Seoul '94. Location: Seoul, Korea

13-15 Rocky Mountain Cable Expo. Location: Vail, Colo. Call (303) 863-0084.

August

1-3 Eastern Cable Show. Location: Atlanta, Ga. Call (404) 255-1608.

September

20-22 Great Lakes Cable Expo. Location: Indianapolis, Ind. Call (317) 845-8100.

October

4-6 Atlantic Cable Show. Location: Atlantic City, N.J. Call (609) 848-1000.

17-19 ECC '94. Location: Olympia, London. Call 011-44-71-222-2900.

The issue: 1994 construction plans

This coming year promises to be exciting as competition in the form of DBS comes on line, telephone companies step up their efforts to distribute video and interactive TV ramps up. 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 1994?

☐ 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

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 3 years ☐ 3-7 years ago

☐ More than 7 years ago

8. Why is your system being upgraded?

☐ Franchise requiremen ☐ 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:

☐ 1994? ☐ 1995? ☐ 1996?

☐ 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: Status monitoring

As cable systems upgrade their networks with fiber and provide a slew of new, interactive services, it will be increasingly important that those operators regularly monitor their networks to ensure high reliability. Consequently, operators unanimously agree that system status monitoring devices will become more important to them in the future and they are already gaining interest in such systems.

Although the FCC-mandated technical tests didn't spur the additional interest by themselves, the survey shows operators would indeed like to automate those and other plant tests.

Price and reliability remain the two largest drawbacks to existing status monitoring devices, according to the respondents. In any new system, those responding said they'd prefer a more elaborate system than one just offering simple alarms. Also, they seem to prefer a system that offers external information, like carrier-to-noise information over one that just monitored and reported details about internal hardware.

Respondents also said it would be helpful to have a common protocol so that different brands of monitoring equipment could be used in the same system or among more than one system. Finally, operators were split over the amount of intelligence they want from such a system.

In the past, cable operators have avoided purchasing network status monitoring devices because they were often perceived to be too expensive or poor performers that didn't provide much useful information. However, as traditional cable networks evolve into more complex architectures demanding more reliability, will there be a need for better network telemetry and control? Here's what you thought.

The results:

1. Have you ever worked in a system that utilized status monitoring equipment?

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

2. Does your system presently utilize any status monitoring devices?

57	43	0
Yes	No	Don't know

3. If so, what type of status monitoring system do you use?

0	50	25	25
Power supply	End of line	Entire system	Other

4. Do you think status monitoring will become more necessary in the future?

100	0	0
Yes	No	Don't know

5. Are you more interested in status monitoring as a concept now than you were a few years ago?

100	0	0
Yes	No	Don't know

6. Would you prefer to automate all, or nearly all, of your system tests?

100	0	0
Yes	No	Don't know

7. Has the imposition of technical standards by the FCC sparked an interest in the use of status monitoring equipment within your system?

29	71	0
Yes	No	Don't know

8. Would status monitoring be helpful during your mandated FCC proof of performance tests?

71	0	29
Yes	No	Don't know

9. What do you think is the major problem with status monitoring systems?

71	0	29	0
Price	Performance	Reliability	Other

10. Would you be more interested in purchasing an expensive, complex monitoring system, or a less expensive system that offers just simple alarms?

43	29	29
Expensive system	Less expensive	Don't know

11. What's more important to you: internal hardware info (temperature, bias, etc.) or external system info (carrier-to-noise, etc.)?

29	57	14
Internal	External	Don't know

12. Would you favor the development of a common communications protocol that all status monitoring developers could use?

86	14	0
Yes	No	Don't know

13. Should such a system just provide data or would it be more useful if it could actually help manage a system via modules for fleet management, spare parts inventory, etc.?

43	43	14
Just data	Manage	Don't know

Comments:

"It's always been a great concept . . . but it often takes more time to maintain the status monitoring system than to maintain the plant.

–Stephen Whitlock, Sammons Communications, Petersburg, Va.

"Our system is invaluable. We rely on it day-to-day. It helps in QC, sweeps, outage alarms, and FCC proofs."

–R. Norman Cheatham, Comcast, West Palm Beach, Fla.

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REGIONAL FIELD SERVICE MANAGER

LATIN AMERICA

Manage our Latin American Field Service organization based in Buenos Aires, by scheduling field calls, system installation and training while tracking travel costs, evaluating personnel and product performance, overseeing all training activities and preparing reports on our progress.

If you possess 10 years of experience in the cable television industry with 5 years in a management capacity (customer or field service preferred) and hold a BSEE or the equivalent technical training, you may be qualified for this position.

DOMESTIC FIELD SERVICE MANAGER

NORTH AMERICA

We have an opening for a skilled Field Service Manager based in Hatboro, PA for our teams of Field Engineers serving customers in the U.S., Puerto Rico, Mexico and Canada. You will schedule field calls, system installation and training while tracking travel costs, evaluating personnel and product performance, overseeing all training activities and preparing reports on our progress.

If you possess 10 years of experience in the cable television industry with 5 years in a management capacity (customer or field service preferred) and hold a BSEE or the equivalent technical training, you may be qualified for this position.

APPLICATION ENGINEER

Reporting to the Regional Manager, Field Engineering for Latin America, based in Buenos Aires, you will provide application engineering and system design support services to international customers. Your key duties include assisting our sales force with customer presentations, training customers and company personnel in system operation and maintenance, reviewing system specifications and developing appropriate proposals to meet customer requirements.

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Don't stop thinking about tomorrow!

By Archer S. Taylor, Engineering Consultant, Malarkey-Taylor Associates

Tomorrow is not so much a "point in time" as a speculative zone bounded on the one hand by the genius of technology, and on the other by conjectural expectations.

It is, by now, a well established article of faith that engineers, physicists, chemists and technologists can do most anything, given sufficient rations of time, money and motivation. But the results of market testing for new and innovative communications services have been dismal, at best. The public are not at all eager to pay the cable TV company something extra for services they believe they don't need.

Providers to pay–not subscribers

The emphasis is shifting, however. It may turn out to be the service providers, not the cable TV (or telco) customers, who will pay for the use of the telecommunications facilities. Banks, for example, could charge depositors for home banking, but pay the infrastructure operators for communications linkage to the home. Home shopping networks could pay the operators for access to point-of-sale credit and debit card readers in the home in order to assure payment. Ticket and coupon vendors could pay operators for the use of printers in the home, while earning commissions from the source. Maybe this redefinition of the "market" for information and transaction services will make an economically viable difference.

On the other hand, the market for videocassette tape rental already is huge, and well known: $12 billion and growing by $1 billion a year. The 1993 TV Factbook estimates there were 94.5 million videocassette recorder/players in use in 1992, including many households with more than one VCR.

Video-on-demand

What if a cable TV subscriber could order up any movie from a catalog of hundreds of titles, whenever he is ready to watch, complete with VCR pause and fast forward/reverse capability? That would be true video-on-demand (VOD). If the price were right, and access to movies could be negotiated on acceptable terms, the market would clearly be ready. The Time Warner Full Service Network (FSN) rollout in April 1994 will be much too expensive for VOD or anything else. But, in a most dramatic way, it will demonstrate technological capability ratifying the trend toward central switching, long foretold by telcos.

Several of the major MSOs are already preparing technological arrangements similar to Time Warner's FSN and Viacom's Castro Valley. Smaller MSOs and individual operators, however, must await the inevitable evolution toward more cost effective demonstrations. It is not at all clear that either cable TV or telcos can put together a viable infrastructure for VOD.

But until we find out, operators who are not likely to participate in the early high-cost developments ought to be mindful of the trend toward central switching that has been reinforced, if not actually solidified by the recent cable TV/telco mergers, acquisitions, and cooperative ventures.

Thus, it would be prudent to plan rebuilds and upgrades around an orderly, phased evolutionary path that could readily be adapted to a cost effective central switching architecture if and when it becomes tenable. Eventually, this is likely to mean fiber star trunking to optical nodes in serving areas with fewer than 500 households each (2 to 5 route miles of coaxial plant). In very large systems, or regional clusters, it could also mean optical fiber rings, possibly digital, feeding fiber star trunks. Non-scrambled analog and compressed digital signals need to be clustered in separate portions of the available spectrum. In the meantime, scrambled analog premium programs might well be assigned to the future digital spectrum.

An arrangement that would bypass non-scrambled analog signals around the set-top convertor/descrambler would not only conform with current interface compatibility goals, but will probably be necessary in the future when compressed digital signals are introduced, with or without central switching. The idea would be to plan rebuilds/upgrades in such a way as to be part of an eventual configuration suitable for central switching or any other competitive architecture. With a master plan in place, parts of the plan could be implemented from time to time as warranted by financial and other considerations.

Tomorrow is fast bearing down on us. Will the telcos buy out the cable TV companies at generous prices, like they did the independent telephone companies after World War II? Is there life after convergence for cable operators left out of the telco mergers.

Coaxial beats copper

The political emphasis on competition has given the cable industry a severe case of heartburn. But at the same time, the telco industry itself is not entirely free of gas pains. Cable TV has an important and clearly valuable asset: it already has broadband coaxial access to more than 95 percent of the households in the U.S. Until the telcos can rebuild their distribution network, they have to improvise by inflating the narrow bandwidth of their copper pairs with ADSL (asymmetric digital subscriber line).

While the cable TV service drop plant may not be in exactly A-1 condition, it is certainly serviceable. By moving aggressively toward an effective architecture for both telephone and video services, the industry is positioning itself for a significant role in the development of tomorrow's Information Superhighway.

It is time to be thinking hard about the new tomorrow, and preparing for it. Don't stop thinking about tomorrow! CED

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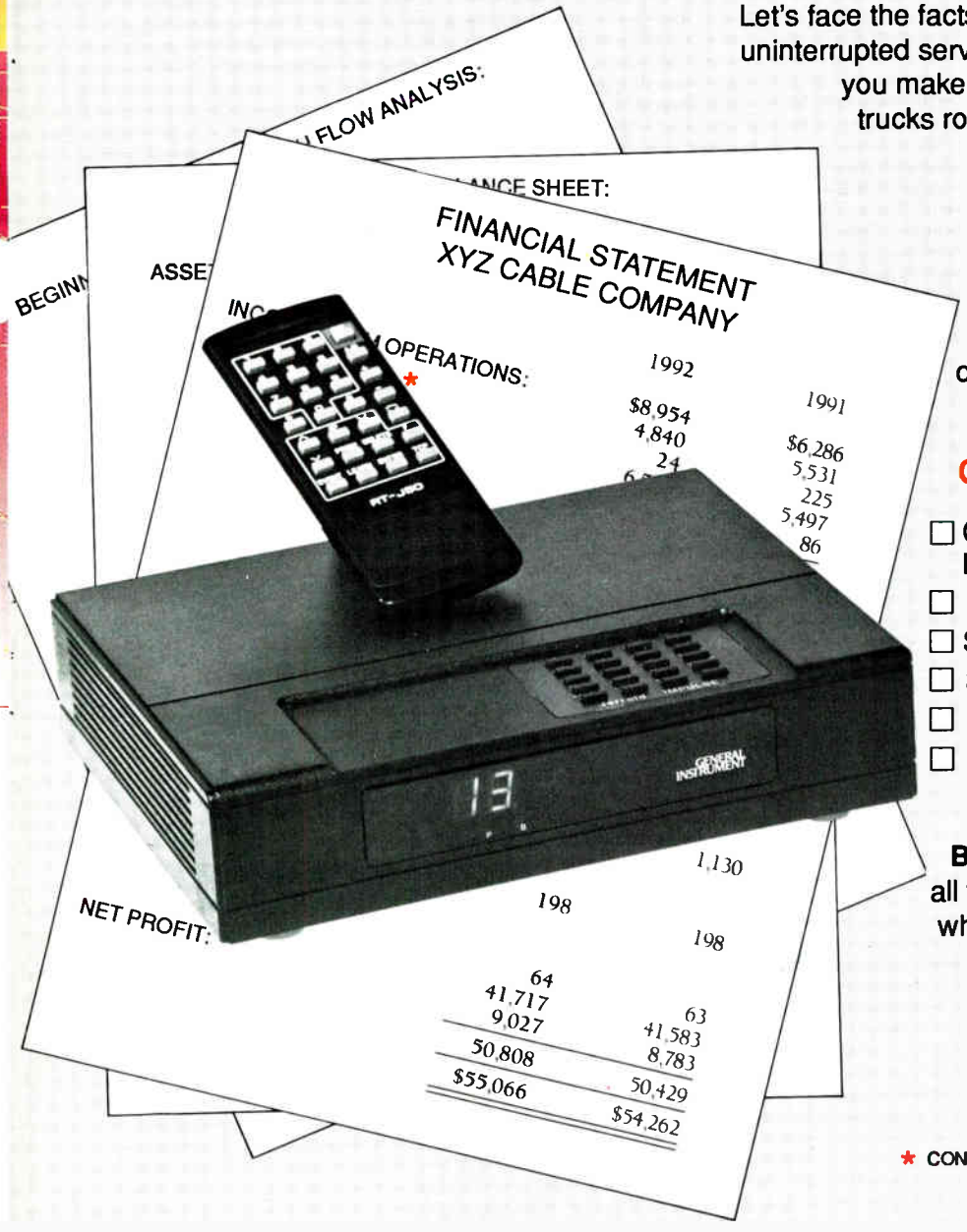

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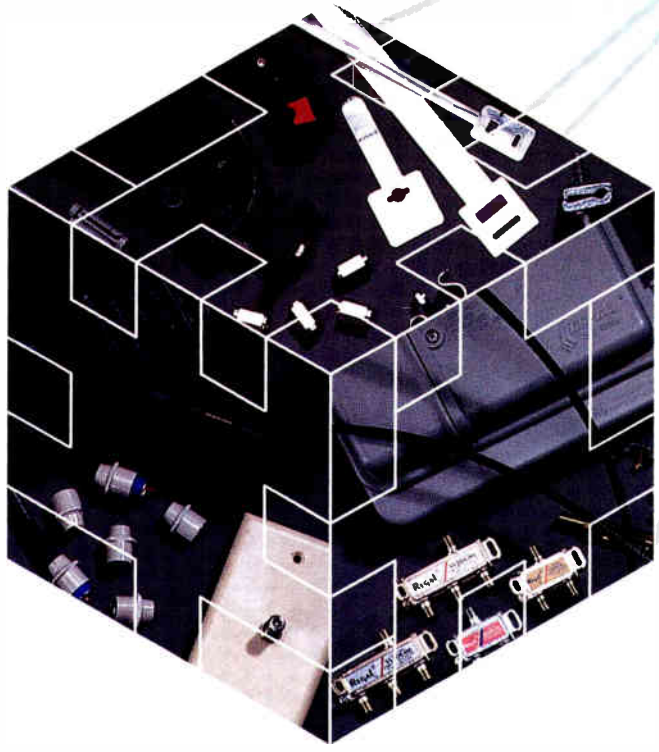

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