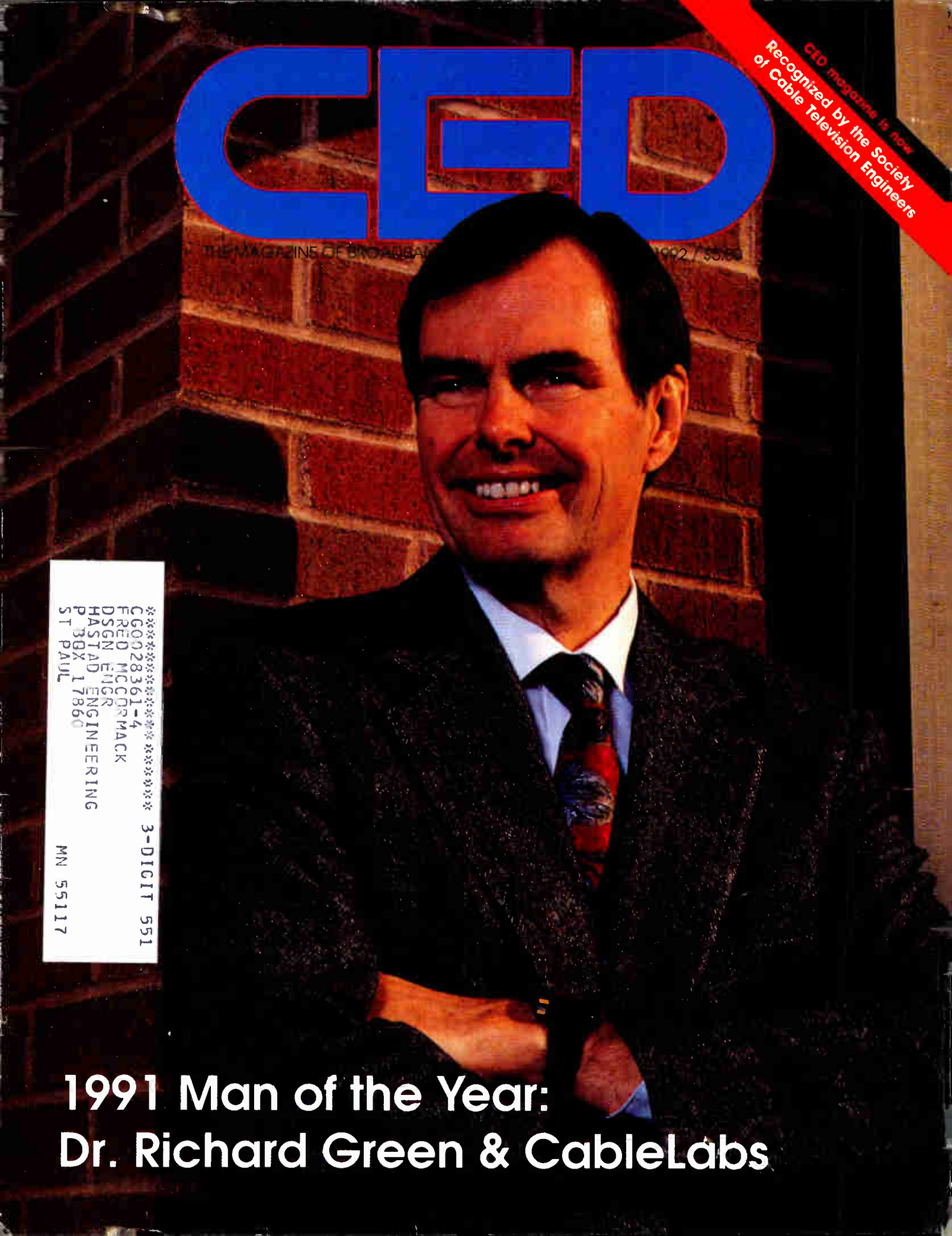

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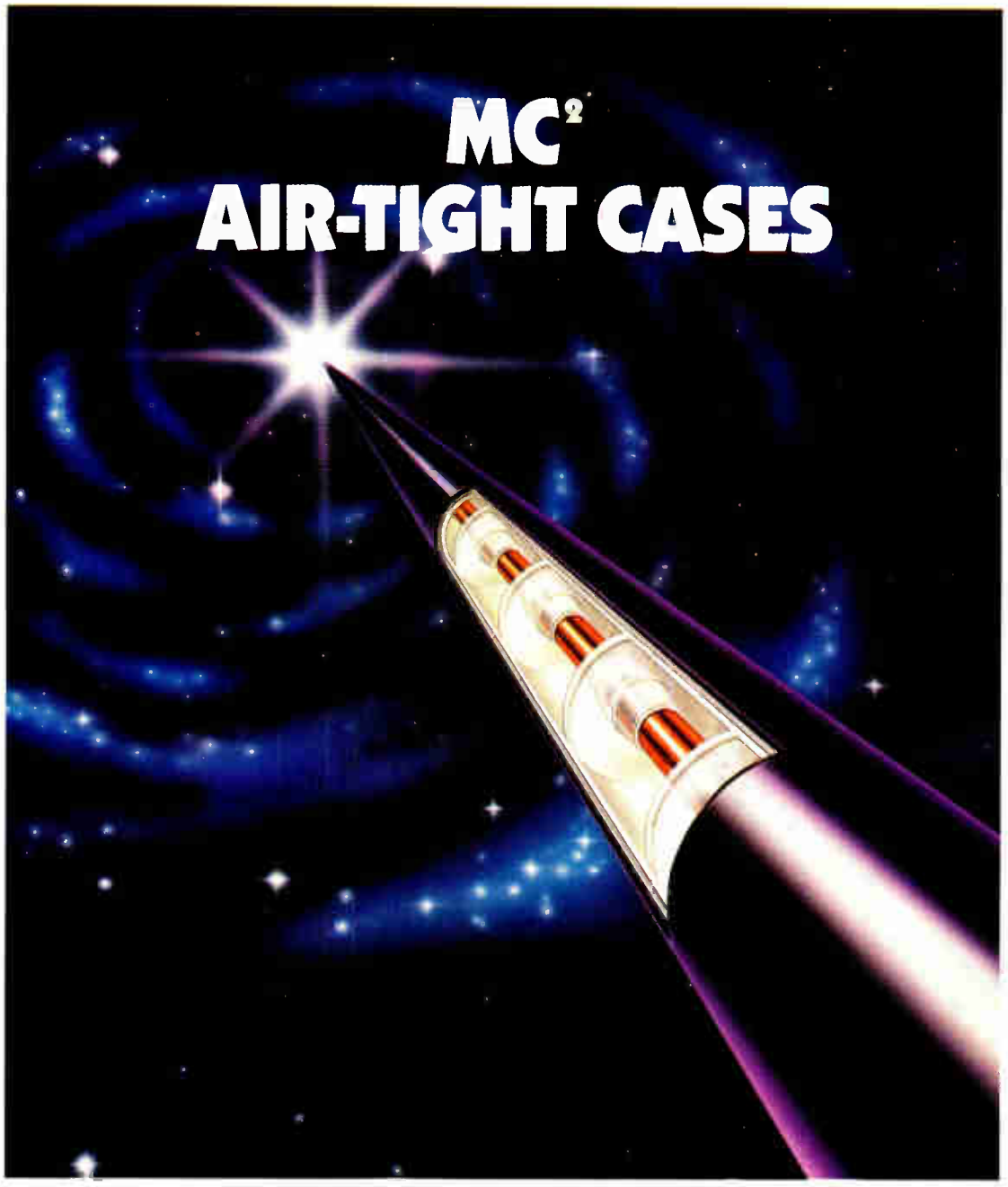

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January 1992 CED Volume 18, Number 1

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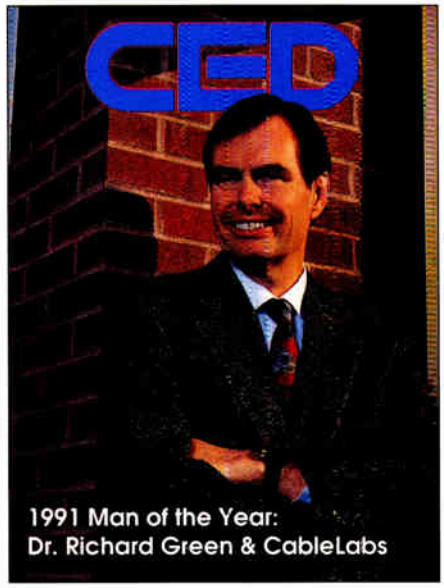

1991 Man of the Year:
Dr. Richard Green & CableLabs

About the Cover:
Dr. Richard Green of Cable Television Laboratories. Photo by Don Riley.

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'You've come a long way, baby'

It was probably hard to imagine 23 years ago that the fledgling Society of Cable Television Engineers organization would become what it is today. The 79 people who attended that first meeting in 1969 were busy overcoming problems related to dues, internal miscommunications and accusations by general managers that the Society was trying to unionize CATV technical personnel.

The vision that grew out of that meeting, however, was one of concern and foresight: Concern for a young industry that needed technical guidance and a professional image; and foresight that this industry would grow dramatically and come to depend so heavily upon its engineering personnel.

Now, so many years later, this vision continues and the membership of the SCTE has soared to more than 8,000 persons. Their dedication and formula for success continues to make the SCTE organization a recognized force in this industry. Today the issues undertaken by the Society are international in scope and important enough to affect the future of television.

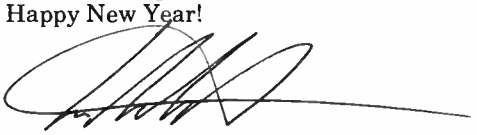
It's not hard to imagine how honored *CED* magazine was recently when our publication received the Society's official recognition. *CED* has long supported the efforts of the SCTE and we have strived to provide a magazine of value to our readers, just as the Society was worked hard to bring benefits to its members and the industry at large. The phrase, "Recognized by the Society of Cable Television Engineers" appears on the cover of this issue. That means that our vision, like the SCTE's, has come to fruition. It feels good to know our efforts to train, educate and enlighten the industry's technical personnel have been formally recognized by the Society and its leaders.

Speaking of feeling good—I'd like to extend my personal congratulations to Dr. Richard Green and the men and women of Cable Television Laboratories for their recognition as *CED*'s Man of the Year. This issue honors the entire CableLabs staff for its contribution to technological research and for bringing a higher profile to the role technology plays in cable television.

Cable has had a habit of thinking blue-sky and doing much less. But now, finally, cable operators are paying their dues and receiving intelligent, strategic thinking in return. For an industry that has been much too dependent on short-term, bottom-line results, it speaks volumes that the Labs has received from day one the outpouring of support it enjoys.

Whether you agree with the approach CableLabs has taken on certain issues or not, every operator should realize he's going to be a lot better off in the long run because of its presence. A unified, coherent march toward the network of tomorrow hangs in the balance. Keep up the support!

If good news comes in three's then maybe this is a good time to end with a wish for a bright New Year filled with renewed activity and promises of success. Happy New Year!



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New Senate bill mandates use of MultiPort

Just when everyone in the cable industry had pronounced MultiPort dead and buried, along comes proposed legislation that gives it new life.

Vermont Senator Patrick Leahy has introduced legislation designed to give cable subscribers relief from set-top descramblers and paying remote control rental fees, all in an effort to improve the consumer electronics interface.

Leahy introduced his bill—called the Cable Ready Equipment Act of 1991—in late November while blasting the cable industry for carrying what he believes is an uncaring attitude toward the issue.

"I constantly run into people who tell me about the problems with cable television," said Leahy to his Senate colleagues (as reported in the Congressional Record). "I rise . . . today to speak out about cable TV, an issue which has the American people fed up, out of patience and ready for action. They are tired of rising prices and dismal service, tired of being charged for channels they never ordered, converter boxes they do not want and remote control units they are forced to rent . . . ."

It seems Leahy recently purchased a high-end television for his home in the Washington area and was told he needed a converter box to receive cable service. He then discovered what millions of others already knew: That converters negate many of the features built into TVs and VCRs and make it nearly impossible to watch one scrambled channel while recording another.

Specifically, Leahy's bill would:

- encourage cable systems to use methods of signal denial—such as traps or interdiction—which do not require a converter box,
- forbid cable operators from scrambling basic cable channels,
- require cable operators to offer subscribers the option of receiving their unscrambled channels by direct hookup to the TV, eliminating the converter box,
- force operators to offer subscribers the option of purchasing a remote control from a separate source instead of having to rent it from the cable operator, and
- direct the FCC to establish regulations that would phase in MultiPort.

In case you've forgotten over time, MultiPort is an Electronic Industries Association (EIA) standard that allows set-top descrambling converters to be interfaced with TVs and VCRs without any loss of TV or VCR functionality. A couple of years ago, consumer electronics manufacturers like RCA, GE, Panasonic and Quasar built hundreds of thousands of televisions with MultiPort circuitry to accommodate the device.

The problem was, cable operators in general didn't show great interest in buying MultiPort devices, believing it would immediately lead to the loss of remote control rental income. Secondarily, converter manufacturers were slow to build the decoders and when they did, they were priced higher than the $25 to $35 price tags industry experts expected (probably because they were never produced in volume). It is believed there are about 2,000 MultiPort decoders in the field.

Those problems were compounded by difficulties in "finding" consumers who had purchased MultiPort-equipped TVs and matching them up with MultiPort decoders. Subscribers routinely didn't ask for MultiPort decoders because they often didn't know their new TVs had the capability. It was a classic chicken-and-egg paradox.

Although MultiPort was developed jointly by the NCTA and EIA, the present standard doesn't account for the coming trend in cable TV—delivery of compressed digital signals. In that environment, some device must be placed "in front" of the TV receiver in order to decompress the signals.

Predictably, industry associations NCTA and CATA strongly opposed the bill, noting that it will cost operators millions to implement such technology and that they could not support legislation that would prevent a cable operator from securing his signals or recovering their investments in the cable plant.

One highly-placed engineer who requested anonymity suggested that perhaps now is the time to ask the government to define "cable-ready" TVs and force consumer electronics manufacturers to cease using the term until the definition comes forth. His suggestion for a definition of cable-ready would be that the TV can tune all channels offered by the cable operator, that it be free of direct pick-up interference, and that it have the MultiPort circuitry built in.

As of press time, the bill's chances for success were unclear, however, as several people noted, it's a subject that many senators may find difficult to oppose.

Device measures cable outages

Just in case you weren't convinced that outages remain a real sore spot for many operators, get a load of this:

A Los Angeles-based manufacturer has designed a device to measure how long cable service has been "out"—regardless of whether or not the television is turned on.

According to a news item appearing in the *Pensacola News-Journal*, the device, called Cable Watch, is about the size of a pack of cigarettes and attaches to the cable input at the back of the TV. It then measures the amount of time the cable service is brought down and the idea is that consumers can complain and maybe has his cable bill reduced accordingly.

The inventor of the device says the idea came to him during the Super Bowl a few years ago when he planned on having a party and the cable service went out. A meeting later with a friend who happens to be an electronics engineer resulted in the product, which sells for about $30.

Actually, it sounds a bit like Big Brother, only in reverse.

S-A, Zenith team on compression

Scientific-Atlanta teamed up with Zenith Electronics and AT&T Microelectronics to submit a response to Cable Television Laboratories' RFP on digital compression early last month. The unusual alliance was struck to expedite the development of a digital program delivery system for compressed NTSC or HDTV signals, according to executives from all three companies.

The announcement was made the same day reporters had been invited to Washington to view General Instruments' DigiCipher hardware, which was preparing to undergo testing at the Advanced Television Test Center in Alexandria.

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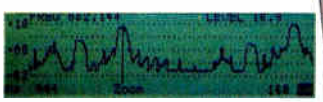
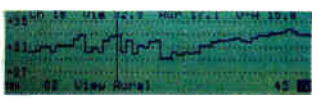
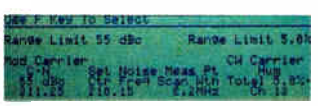


Spectrum Scan



Channel Scan

Single Channel



C/N and Hum Measurements

As envisioned, the new system will use Zenith's proprietary 4-level VSB (vestigial sideband) modulation method to deliver both the Zenith/AT&T Digital Spectrum Compatible HDTV system and S-A's vector quantization compression method for traditional NTSC signals. The alliance provides for complete end-to-end transmission; from the signal origination point over satellite to cable system headends and from there to subscribers' homes. It would allow two HDTV signals or four to 10 compressed NTSC signals to be sent in the space of one satellite transponder.

Zenith officials said they are prepared to include a VQ decoder in its line of HDTV receivers to decode the compressed NTSC signals, if the VQ/4-VSB system is selected for cable transmission.

Zenith officials say its 4-VSB modulation method allows for large amounts of digital information per bandwidth to be transmitted more robustly over cable networks than other techniques, such as 32 QAM or 64 QAM.

SCTE proposes title changes

The board of directors of the Society of Cable Television Engineers (SCTE) is recommending a change to its bylaws that would re-name the membership association's top two posts.

Currently, the top elected post (Wendell Woody) carries the title of president, while the top staff post (Bill Riker) is known as the executive vice president. The bylaw change recommendation would elevate the president to chairman of the board, while the executive vice president would become president of the organization.

The new structure will also advance the current position of eastern and western vice presidents to eastern and western vice chairman, reserving the vice president title for full-time staff use. Society leadership believes the chairman and vice chairman titles better reflect the actual positions of the elected board members, who serve voluntarily.

The change is considered to be an important method to help Riker negotiate better contracts and deals on behalf of the Society. It will in no way alter the chain of command, responsibilities or representation by the membership, according to Dr. Walter Ciciora, region 12 director. Similar actions taken by NCTA, CATA, CTAM as well as several state and regional cable television associations have resulted in a more businesslike structure, according to its proponents.

The referendum will be presented to the Society's membership during its annual election process to fill open seats on the board.

SBCA calls for VC-II's end

In what has been described as a major effort to head off piracy of satellite video signals, the Programming Packager Committee of the Satellite Broadcasting and Communications Association (SBCA) is urging all programmers to halt new authorizations of VideoCipher II descramblers no later than the end of the first quarter of 1992.

Committee members said the suggestion was prompted by reports that VideoCipher II boards have become targets of free swap-outs and other practices and that such boards are commanding high prices on the black market for their value as master authorization numbers for "clone" based pirate modifications.

A switch entirely to VideoCipher II-Plus, which has yet to be compromised, is recommended to begin no later than April 1. This action would then cap the number of VideoCipher II modules in existence and reduce or eliminate the value of the boards, the committee members said. "When programmers stop authorization of these older generation modules, piracy will have no room to grow," said Bob Philips, CEO of the National Rural Telecommunications Cooperative, who serves as committee chairman. "We need to continue to hit piracy hard, using all the tools we have."

In related news, the SBCA Satellite Marketing Council approved a $400,000 budget for the production and execution of projects designed to help the industry through the impending encryption technology transition. In-kind services totaling $250,000 had been committed by SBCA member companies as of late November; the additional $150,000 is being sought.

Clarification

Last month's cover story, "Cable and the Emergency Broadcast System," (*CED*, December 1991, p.32) mentioned that Sage Alerting System's RDS warning system is only applicable to FM radio stations. That is untrue, according to Jerry LeBow of Sage.

He says the system works with all communications media, including cable TV, via control signals placed on a data stream which replace the audio with audio from the warning actuation center. Alphanumeric info is transmitted for the benefit of the hearing impaired. The Sage I system also operates sirens, electronic signs and special receivers, all of which are addressable.

Interestingly, the Sage equipment is being built into new car and home radios. In an emergency, the radios can be selectively turned on even if they are off, or if the listener is listening to a cassette tape or compact disc.

The system is currently being installed in Jefferson County, Texas to warn the 250,000 residents of hazardous materials emergencies at any of the county's 20 chemical facilities as well as any tornadoes and/or hurricanes.

Jottings

Who's made a significant impact on science and technology and never been recognized for it? Be thinking, because the NCTA is seeking nominations for the 1992 **Vanguard Awards**, the cable industry's highest honor for individuals. Nomination forms are due back at NCTA by January 31. The awards will be presented May 6 in Dallas . . . Plan now to attend the **International Electronic Cinema Festival**, scheduled for June 8 through June 13 in Tokyo, Japan. The Festival is a prestigious global event which recognizes HDTV production technology. Entries, which must have been completed by June 1 of this year, are being sought; call Viacom International at (212) 258-6363 for info . . . **Scientific-Atlanta** has teamed with Turner Broadcasting to bring The Checkout Channel to your supermarket. S-A will supply uplink and downlink equipment, including its new 9708 integrated receiver/decoder. The channel, which brings TV to supermarket checkout lanes, is set to debut early in 1992. CED

By Roger Brown

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FROM THE HEADEND

Off-air antenna matters

Off-air antennas are something we tend to take for granted, unless, of course, we end up with co-channel or other interference problems that we can't seem to get rid of.

This month, we'll take a look at an antenna array technique that is typically used to improve co-channel and other interference problems, and we'll try to gain a better intuitive understanding about how the technique works.

Co-channel interference can be reduced significantly, and sometimes completely eliminated (at least to the satisfaction of the subscriber), by mounting two identical antennas, side-by-side, on the same plane (collinearly), pointed directly at the desired (primary) signal, and then simply spacing the antennas a certain distance (D) apart such that the undesired signal is rejected (See Figure 1).

Rejection of the undesired signal will occur if the two antennas are mounted such that the undesired signal must travel an additional 1/2 wavelength (180 degrees) or 3/2 of a wavelength (540 degrees) further to reach one antenna than it does to reach the other. Intuitively, what will happen in this case is that the undesired signal will reach one antenna 180 degrees out of phase with the signal reaching the other antenna (since it must travel 180 degrees further), resulting in cancellation of the undesired signal. The primary signal's wavefront, on the other hand, because the antenna array is pointed directly at it, will hit both antennas at the same time (in-phase), and the result will be additive.

So how do you calculate the distance D between the two antennas? Well, as you can imagine, this distance is non-linear, and is dependent upon the angle between the desired and the undesired signals. On the one extreme, if the angle between the two stations were zero (meaning the undesired station is directly behind the desired station), then the technique obviously wouldn't work. Since the antenna array would be pointed directly at the undesired station too, its signals would hit both antennas in phase and there could be no differentiation between the two stations.

In fact, if you were to plot it, the distance required between the two antennas would grow exponentially as you approach zero degrees separation between the two stations. As the spacing between the two stations increases to about 10 degrees or more, however, the task can become somewhat manageable, since the antenna array can begin to differentiate between the two stations.

You might also notice that as the angle between the two stations increases, the spacing D between the two antennas can decrease accordingly. Intuitively this can be understood by visualizing that as the undesired station gets further and further off-axis, the effective distance that its wavefront must travel to reach one antenna versus the other increases. In order to keep this additional distance of travel equal to odd multiples of 1/2 wavelength, the spacing between the antennas can therefore decrease.

Here is a very simple formula that can be used to calculate the optimum spacing between the two antennas:

D = 5901 x n/f x sin(È)

where:

D = Distance between the antennas in inches,

n = Any odd number, usually 1 or 3, to keep the distance realizable, but no smaller than about 3/4 wavelength,

f = Center frequency of the undesired channel, in MHz.

È = Angle in degrees between the desired and undesired signals.

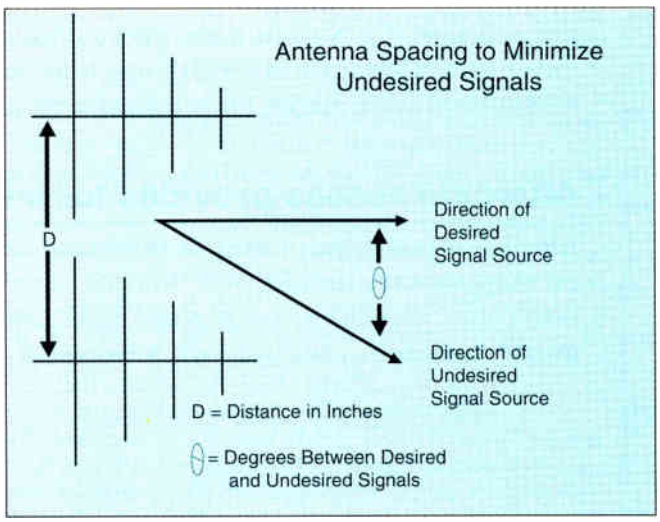
Let's consider an example where we have a co-channel problem with our local Channel 7, whose center frequency is about 177 MHz. The undesired station is about 20 degrees off-axis from our local station. How far apart should we space our two identical antennas to improve the situation?

D = 5901 x 1/177 x sin(20)

D = 97.5 inches, or about 8.1 feet.

As I mentioned earlier, this technique doesn't work if the angle between the two stations approaches zero. Similarly, different techniques will be required if the angle between the two stations relative to the main lobe of the antenna is the equivalent of 180 degrees.

In this case, if you are having problems with co-channel or other forms of interference, it means that the undesired interference is coming from directly behind the antenna, and the only way you're going to get rid of it is to improve the antenna's front-to-back ratio; its gain in the forward direction versus its gain off of the back-side of the antenna. **CED**



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

References:

1. SCALA Technical Bulletin, "Reduction of Co-Channel Interference" by Antenna Spacing.

2. Scientific Atlanta Headend/Earthstation Training Manual.

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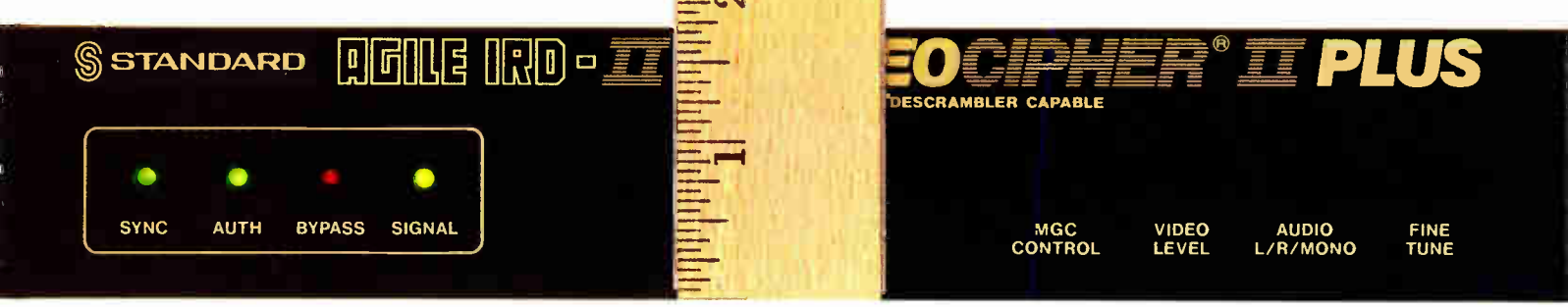

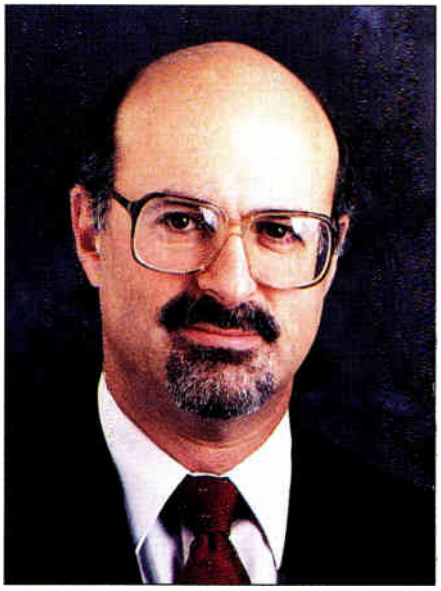

Video dial tone: A fable

For more than a century, the concepts of "public utility" and "common carrier" have been part of economic policy analysis in this country. These terms have been used to denote services that are considered to be essential for the public welfare, or monopolies granted by a government agency. Government regulation of entry, pricing and service offerings has always been a part of this concept.

The common carrier concept developed out of the transportation industry. Initially railroads, and later trucking and airline companies, were given government authorizations to carry certain kinds of freight or passengers over specified routes. In return, these carriers agreed to offer their capacity on non-discriminatory terms to all customers. And their prices were regulated by government agencies.

Similar policies apply to communications common carriers. Services are offered to all customers—a communications common carrier cannot pick and choose its customers. Terms and conditions must be non-discriminatory—all customers must be charged the same price. No favoritism is allowed, even if the customer happens to be a business affiliate of the common carrier.

By Jeffrey Krauss, Independent Telecommunications Policy Consultant and President of Telecommunications and Technology Policy of Rockville, Md.

Funding for new telephone common carrier plant comes partly from existing customers, through depreciation charges on existing plant. Other funding comes from debt and equity financing. The lenders know that they will be repaid, since the common carrier has a government-granted monopoly, and profits are guaranteed by government rate regulation.

I've written a little fable to show how this might apply to video dial tone. (This is based to some extent on the economic research of Leland Johnson of Rand Corporation.)

Funding and construction

Construction of a transmission plant to support video dial tone will be very expensive. It means installing fiber to the home, at a cost of two to five times the cost of the traditional telephone network.

But, hey, no problem! Didn't you ever hear of "price caps"? In the future, the telephone companies will be allowed to earn higher profits than ever before, so long as the profits are derived from increased operating efficiencies rather than price increases. These profits can be used to pay the cost of installing fiber to the home.

So the telco (let's call it US Telephone Co. to be specific) builds a fiber network in the first city, carrying 100 channels of video, and then tries to market the video capacity to programmers.

US Telco approaches a premium programmer (let's call it Premium Box Office) and offers a bare channel passing 100,000 homes at $300,000 per month. No scrambling, no marketing, no billing services, just a bare channel. PBO responds that it finds the $3 per home per month to be attractive, since that is far less than it pays to cable companies, but what about the other services it needs, like scrambling, marketing and billing. US Telco says OK, we'll provide the billing for 30 cents per month, and the scrambling and converters for $4 per month, but we aren't sure about marketing the programming services.

So PBO says, yes, we aren't sure, either, that we want you to handle the marketing of our service. Then PBO analyzes what it would cost to open up a marketing office and hire a marketing staff in this city. And PBO decides not to lease a channel from US Telco. PBO realizes it derives tremendous efficiencies by paying local cable companies to do its marketing in each city.

Then US Telco approaches a basic programmer (let's call it The Revelation Channel) and makes the same offer: 100,000 homes passed for $300,000 per channel per month. Revelation says, how can we pay $3 per home for transmission when subscribers are only willing to pay 30 cents per month for our service? To which US Telco responds, we are a common carrier, and we must offer our services on a non-discriminatory basis. Same price for everyone, regardless of demand or quality.

At this point, US Telco starts to think it has a problem.

Packaging

But the savior arrives, in the form of Mr. *(no, I'm not naming any names here)* and says to US Telco, let me lease 50 channels from you. US Telco says, wait a second, what business are you in? And the savior says, I am a program packager. I used to be executive vice president of a cable MSO. I know what the programmers want, and I know what the subscribers want. I know how to market programming services. I know how to charge discriminatory prices to programmers. I know how to make deals with some programmers, and refuse to deal with others.

If US Telco is smart, they'll do business with him. If US Telco is stupid, they'll try to steal his idea and go into the program packaging business themselves. And they'll fail, either because they don't know how to run a competitive business, or because somebody complains that they are illegally trying to evade their common carrier responsibility to offer non-discriminatory pricing, and hangs them up in litigation for years.

Conclusion

Video dial tone can't get the telcos into the cable business, at least not directly. Telcos have to behave like common carriers—doing business with all programmers, and charging them the same price. Cable systems can't operate this way. What video dial tone might do is to provide cable industry veterans with a low-risk platform to operate a competing cable service, while the telephone ratepayers bear the risks. CED

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The CATV engineer's dilemma

Digital delivery technology for CATV networks, Part IV

The rapid evolution of cable television distribution networks to higher bandwidth-capable technologies such as fiber optics has encouraged a new round of forward looking architecture proposals. As digital video processing and delivery techniques continue to ride the crest of advancing processing power, an obvious direction for cable television is an evolution to hybrid digital/analog systems and possibly all digital networks in the foreseeable future.

ATV and HDTV

For the past three months, AT&T has taken a detailed look at digital network techniques, optimized for the needs of switched telephony, with a focus on its implications on a cable television network. The situation currently facing the video broadband industry is a need to define advanced television (ATV) and high definition television (HDTV), as well as evolve products and services from the NTSC-based world.

This need is similar in many respects to the telephony digital transport dilemma discussed in previous articles. For the cable industry, numerous, well-established products and services currently exist, along with proprietary optimizations and work-arounds, that need to be evolved into a more uniform transport strategy. In order to do this, the cable industry must make technical decisions based on today's needs while keeping in mind future expansion possibilities.

This will allow for maximum interoperability with other networks, such as the telephony digital network, if the need arises. Some of the potential issues facing cable television engineers are:

Considering other services

Alternate access, personal communications networks and cellular interconnects are future means of connecting two end users of voice and data services. The facilities and services aimed at these applications represent a potential opportunity for those operators seeking to expand their revenue base. For these businesses, SONET (synchronous optical network) might seem the ideal choice starting from scratch in the 1991 and beyond time frame. However, while SONET is a choice, there are also DSn based products available now that meet the needs of operators.

Carl J. McGrath, AT&T Bell Laboratories

Digital transmission choices

Since the majority of operators entering the access market choose to dedicate separate fibers for cable and non-cable applications, the choice of baseband time division multiplexing (TDM) for the access fiber is an obvious one. This is driven by the maturity and cost/performance of DSn based equipment and the standards-supported SONET hardware.

However, for those deploying digital overlays on existing analog broadband systems for digital programming, the use of TDM presents a dilemma. The inherent performance of the AM based system, at the tap, is significantly (by 10 dB to 30 dB) under-utilized by simple TDM baseband transmission. This under-utilization can be addressed by using very high bit rates (greater than 1 Gb/s) or more spectrally efficient digital coding techniques such as quadrature phase shift keying (QPSK) and quadrature amplitude modulation (QAM).

Digital capacity

A component of the TDM dilemma is based on how much digital capacity each subscriber on a broadband digital network really wants to deal with. The issue of selecting one channel out of a digital broadband system—taking a 5 Mb/s digital channel from a 3 Gb/s stream—is not economically attractive for TDM applications in the foreseeable future.

Unfortunately, there are no standards for coding rules, sampling rates and handling of special features even among non-compressed digital video systems. While proprietary implementations may result in near-term differential cost and feature advantages among various vendors' approaches, the cable engineer must be wary of the long-term prospects of being locked into a potentially obsolete technology.

CableLabs involvement

Compression considerations further complicate the interconnection issue. However, CableLabs recently provided a focal point for development of consensus on compression-based delivery systems. With this focus, the industry can anticipate further progress toward a universal system that is right for cable television.

Fiber optics and signal processing have combined to expand significantly the technology options cable television system designers and engineers must evaluate. Choices must be made if deployment is to move ahead, yet it is imperative that a long-term evolutionary strategy be used if early implementations are to survive the test of time.

Summary

Many pertinent examples of similar technology and deployment choices exist in the evolution of the telephony based digital networks. The transition from one level of technology to another is fraught with examples of choosing one without thought for future scenarios. This led to still-existing incompatibilities which should be analyzed to avoid similar problems for the cable television industry.

Fortunately, cable engineers today are well versed in researching and analyzing new technologies. This thought process will enable the right decisions to be made by the well-informed cable engineer. CED

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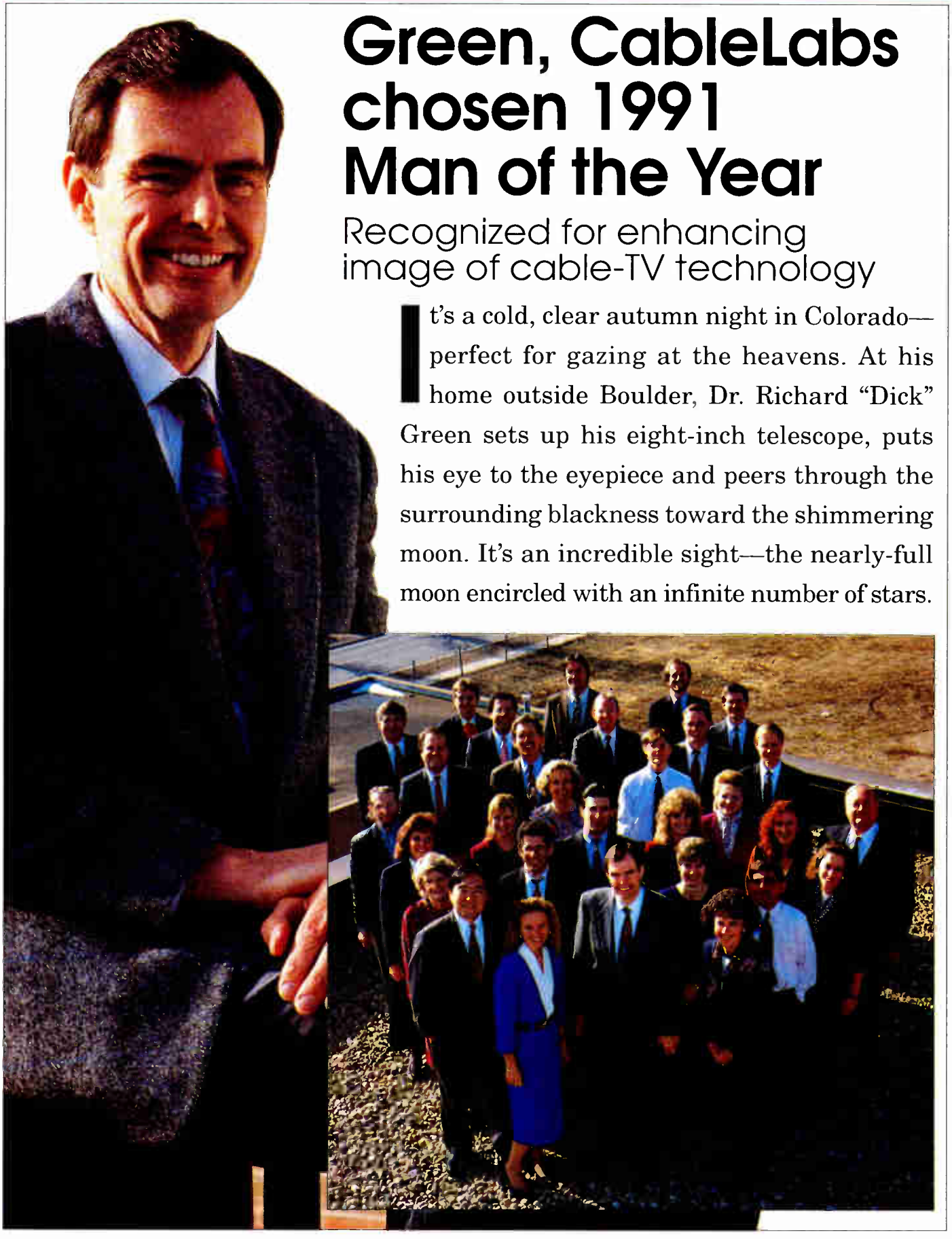
Video Communications

Green, CableLabs chosen 1991 Man of the Year

Recognized for enhancing image of cable-TV technology

It's a cold, clear autumn night in Colorado—perfect for gazing at the heavens. At his home outside Boulder, Dr. Richard "Dick" Green sets up his eight-inch telescope, puts his eye to the eyepiece and peers through the surrounding blackness toward the shimmering moon. It's an incredible sight—the nearly-full moon encircled with an infinite number of stars.



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But telescopes are instruments used to look backwards in time—to gather information about the formation of planets or the universe, for example. While astronomy is one of Green's hobbies, conversely he makes his living scoping out the future. As president and chief executive officer of Cable Television Laboratories, the three-year-old research and development consortium of the cable TV industry, it's Green's charge to carefully assess where technology is headed and devise new business opportunities made possible by implementation of those new technologies.

Green was chosen as the 1991 *CED* Man of the Year by an independent committee of three industry engineers: Dr. Walter Ciciora, VP of technology at American Television and Communications (and the 1990 *CED* Man of the Year); Dan Pike, VP of engineering at Prime Cable; and Ed Horowitz, senior vice president at Viacom International.

Green, along with the CableLabs organization in totality, were given the honor by his peers in recognition of the leadership and vision the two have brought to the industry during a time of rapid technological change.

"We are all delighted CableLabs came along when it did—right in the nick of time," said Ciciora. "It has grown and done so well to a large extent because of Dick Green's leadership and the staff he's chosen. Furthermore, I am sure the future holds ever more technological acceleration and we'll be more dependent upon the Labs than we ever imagined."

Specifically, Ciciora believes Green and the Labs have put a focus on cable technology "for all to see," including CEOs, regulators and investors. "The cable industry is *possible* because of technology, but that fact has been fairly well hidden until now," added Ciciora.

Also, Green's role as diplomat is counted as one of his major strengths by Ciciora: "Dick's built bridges with the non-technical management of the industry and increased their awareness of the role of technology. He's also built bridges with broadcasters and other media."

Television and research

The 54-year-old Green is one of a rare breed: Those who are able to combine their avocations with their chosen vocations and forge a career from the two. Green's come a long way from the days when, as a high school student in Colorado Springs, he brought home a discarded television receiver and proceeded to refurbish it piece by piece. That exercise taught him a lot about how television worked. It also foreshadowed his eventual career path.

The common element throughout Green's career has been pictures. From video production to high-tech still image processing to early ruby laser research, the lanky father of two sons has been fortunate enough to be in the right place at the right time and savvy enough to know how to bring emerging technology to practical use.

Not counting his television repair job, Green got his start in television while attending Colorado College. He worked at KRDO, Colorado Springs' channel 13, at nights and on weekends to gain experience and help make ends meet. While there he

learned about audio, video, program switching and commercial insertion, sports coverage and more. At the same time, the right side of his brain told Green to pursue his education. He graduated from Colorado College in the Army ROTC program with a

Stephen Dukes, director of Advanced Network Development

bachelor of science degree in 1959.

By virtue of placing first in the ROTC training course, Dick was given the opportunity to choose his assignment. Judging the research lab to be most difficult, Green chose it. As a result, he was one of the first to research ruby laser applications and helped the Army design and build the first laser rangefinders. Also, Green worked on the Courier fleet of satellites that were used to send teletype signals from the United States to Puerto Rico.

Science apparently agreed with Green, who moved on to Albany, N.Y. where he attended State University of New York, leaving in 1964 with a masters in physics. He finished his formal education in 1968 after receiving a doctorate from the University of Washington.

A quick review of Green's background reveals the influence that pictures have had on him. In nearly every job he's held, images are the common thread. Dick's dual interests in science and images were served even by his doctoral thesis, which consisted of an explanation of why the moon is featured with thousands of tiny, bright "dots" when viewed via infrared. (It turns out that infrared shows meteorite hits as "hot spots" because the impacts kick up rocks that cool slower than the surrounding dust.)

While training for his vocation, Green was up to his ears in his avocation. From the time he landed in the Seattle area, Dick worked at KIRO-TV during nights and weekends. His talents as a production engineer helped Green pay the bills and stay abreast of the television industry. At the same time Green was attending school and working in television, he also was a senior staff scientist for Boeing Scientific Research Laboratories. After graduation, he traded in his cap and gown for a job as assistant professor of research in the school's research lab. How he ever found time to take a nap remains a mystery to most who knew him then.

Perhaps he was too busy figuring out how to squeeze video into smaller and smaller bandwidths to sleep. At the University of Washington, Green was among those who first began

devastated the technical center of the Public Broadcasting Service outside

MAN OF THE YEAR

industry and his interest was piqued. "It was one of the most intelligent documents that I'd seen in a long time," recalls Green, who had already set up one consortium (ATSC) and was employed by another (PBS). "I read it and thought, 'these guys know what they're doing.' "

A later conversation with Richard Leghorn, an industry veteran who helped launch the Labs, convinced Green that "these guys think like I do" in terms of how the consortium should be organized. Now he wanted the job. But getting it wasn't easy: Several candidates were considered, "all of whom I thought were better that I was," Green remembers. But indeed, Green won the job.

Why was Green lured from broadcasting to cable? He says it was because technology transfer became a lost art in broadcasting as the medium struggled to keep viewers. "In all honesty . . . there wasn't a lot of incentive to stay in broadcast technology research. This (CableLabs) was an opportunity to support a whole industry."

Indeed, broadcasting had become a static and frustrating industry for Green, says Baryn Futa, CableLabs COO and a friend of Green's since they met at PBS in 1984. "Cable is so much more dynamic," Futa asserts. That fact, coupled with the challenge of starting an R&D consortium not based solely on lab work from scratch is what spurred Green to leave, Futa believes.

The role of CableLabs

"We have an opportunity to help lead the industry in the application of new technology," says Green about the Labs' role. He knows it won't be difficult to convince the operators to invest in technology because it has a habit of doing that (satellites, fiber optics and now digital concepts). "Our job is to facilitate that process, and where necessary, develop the applications," he adds.

That job has been facilitated quite well by Green and his staff, according to Leghorn. The original charter called for the Labs to perform three basic functions:

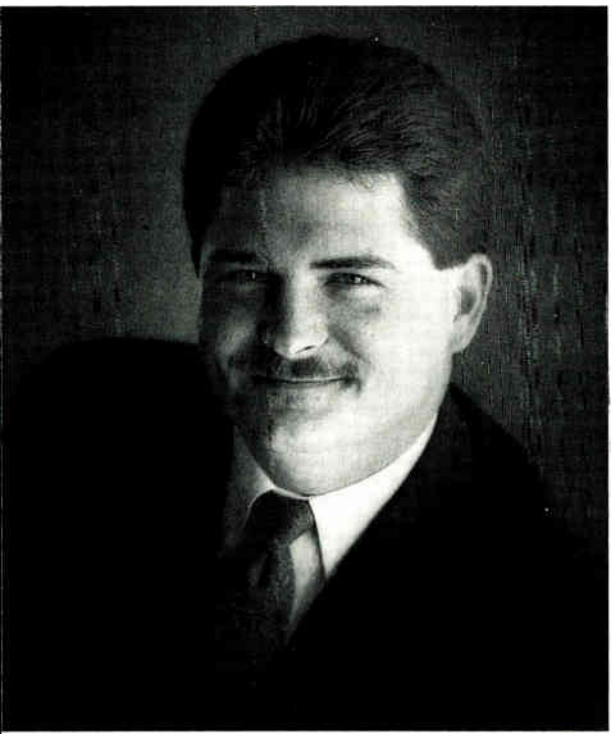
- keep track of emerging technology and developments throughout the world and, where necessary, fill holes by starting R&D projects,
- communicate to the industry the status of ongoing projects and developments through seminars, publications and studies,
- identify new business opportunities and develop new businesses.

"I think the industry has been very well served," says Leghorn. He also makes note of the overwhelming support the Labs garnered early on; MSOs representing 85 percent of the country's subscriber base signed on as members before the Labs even opened its doors. That level of support set a record for any consortia at the time of start-up, Leghorn says.

Green says the Labs has been able to bring more recognition to cable from other telecommunications providers as well as the research community in general. "We've brought an awareness that the cable industry is willing and able to apply high technology," asserts Green. "Even thought that's always been the case, the communication of that to other telecom industries is something we've been able to foster."

A case in point is digital video

"BUILT FROM EXPERI



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Alpha debuts FTF power supplies

Alpha Technologies Inc. introduced a new series of smaller-sized "APC" 14-ampere and 8-amp power supplies designed for FTF applications. The APC supplies are built around a "universal" power module assembly that fits a number of mounting systems.

Several options are available and all are designed for removal or installation right on the pole. Among these features are an output time delay (10 to 50 seconds) and a heavy-duty varistor. A load indicator and the "amp clamp" surge suppressor also are available.

The transformer assembly can be removed by loosening a single hold-down screw, the company said. Alpha also showed new "FiberUPS" standby supplies that power fiber receiver locations using direct DC techniques. That provides increased reliability, higher efficiency and long standby time, said Alpha officials. An AC version can be used to provide 7 amps for "local area" powering. Both AC and DC versions are designed to mate with a low-profile, pole-mount cabinet containing a battery pack. They also can be used with existing ground-mount and pole-mount cabinets, the company said.

Belden introduces 7-series cable

Cooper Industries Belden division announced the development of a new line of 7 series drop cable designed to proposed Society of Cable Television Engineers specifications, the company said. Six different cables in two shielding versions will be offered.

Belden also introduced a new line of corrosion-protected cables. Each of the six versions using a flame-retardant gel, the company said. Both RG-59 and RG-6 cables are available in a variety of shield configurations.

C-COR, ALS introduce AM receiver

C-COR Electronics and American Lightwave Systems introduced in Anaheim an eight-port, strand-mount AM optical receiver featuring four high-level outputs of 44 dBmV, said ALS president Farooque Mesiya. ALS earlier had developed a prototype four-port receiver but decided not to commercialize the product after lengthy discussions with operators, Mesiya said. The new receiver uses SC connectors featuring 0.1 dB insertion loss, allowing restoration of downed links in as little as 15 minutes, he said.

In related news, C-COR president Richard Perry said he "was cautiously optimistic" about his firm's prospects for a rebound in business, which is "up across all product lines," including both domestic and foreign sales, Perry said.

Calan unwraps GHz signal generator

CaLan Inc. took the wraps off a 1-GHz signal generator comparable to the industry-standard Matrix signal generator but offering both manual and automatic output of up to 180 signal carriers. The "Multi-Carrier Generator System" outputs synchronous and non-synchronous signals typically used when testing the performance of fiber, coaxial cable or microwave transmission lines.

Compared to the Matrix generator, which comes in either manual or automatic versions, the CaLan system combines both functions in a single unit, said Syd Fluck, company president. CaLan also showed its new Star 2010 signal level measurement system, which speeds level, hum modulation and carrier-to-noise measurements. Using the Star 2010, a technician "can program in all the channels you want to look at on the system" and take the measurements automatically, said Fluck.

The results can be stored and later downloaded into a personal computer for analysis. The Star also can automatically adjust for differing signal levels typical of trunk, bridger and line extender amplifiers, for example.

Coast CATV Supply expands line

Coast CATV Supply, run by industry veteran Nick Meko, announced that it has expanded its product line to include products manufactured by Control Technology, AM Communications, Applied Instruments, Cable Prep Tools, Halls Safety Equipment and MultiLink.

ComSonics inks Far East deals

ComSonics Inc. announced it has secured contracts with Pan Asian Systems and Polytron Cable TV Asia Ltd. to supply Hong Kong cable TV systems with the new WindowLite signal level meter. The initial order of 100 units makes Comsonics the sole supplier of SLMs in the Hong Kong market, said Wayne Bruffy, marketing manager.

The WindowLite is a lightweight (40-ounce) meter that is capable of simultaneously displaying the amplitude and frequency response of signals carried on as many as 126 channels, the company said. The unit also can be programmed to conduct an automatic sweep of any five channels chosen by a technician. The unit also can compare a stored reference against a current measurement, useful when gauging actual system performance against the intended standard.

Contec forms Oak service center

Contec International Chairman Frank D'Alessio announced a joint agreement with Oak Communications to establish a service center near Oak's San Diego facility, capping a seven-year association as an exclusive Oak converter warranty repair house.

In another facilities move, Contec announced it will consolidate administration, technical repairs and warehousing at a new Albany, N.Y. headquarters, having outgrown its current Schenectady location. The move should be completed by February.

D'Alessio introduced Lee Heller, formerly manager of the refurb department, as the new corporate sales director. Also present was Paul Madelone, vice president of sales and marketing.

The company's current financing arrangement with Westinghouse Corp., and plans to go public sometime in 1992, will enable Contec to expand its estimated 15 percent market share through mergers and acquisitions in the future, D'Alessio said.

Disposable traps from Intercept

Intercept Communication Products Inc. introduced a new disposable positive trap (DPT) that is designed to function for only a limited period of time before it essentially self-destructs, said Ken Augustine, company vice president, sales. The patented technique uses a customer-activated lithium battery that can be set for one event or for a period of time ranging from three weeks to a month, said Augustine.

"It operates like a large A/B switch," said Augustine, who pointed out that once it's turned on, the trap can't be turned off or used again. The DPT is priced at $10 for a single-event version and costs $15 for multi-event capability, he added.

The operating advantages are that paperwork requirements are reduced,

Lessons learned from fiber installations

A roundup of several cable system's experiences with AM fiber optics was the focus of a Western Show tech session moderated by Mark Harrigan, TCI's director of engineering for California and president of the Golden Gate Chapter of the SCTE.

Michael Mead, engineering supervisor at Continental Cablevision of Stockton, California, said goals the system had for its AM fiber rebuild were to reduce the number of headends, take actives to 550 MHz, passives to 1 GHz, improve reliability and picture quality with a 50 dB carrier-to-noise ratio (CNR).

The system chose ONI's Laser Link transmitter, ONI/Texscan OIU-15 receiver and AT&T LXE fiber cable for the downstream; Synchronous Series 1300 FM equipment, ONI/Texscan's return data link lasers, Scientific-Atlanta's 550 MHz feedforward BA's and Regal passives for the return path. The initial architecture chosen was a node plus four trunk amps, two line extenders and a 10-amp cascade out of the headend.

Later, fiber-to-the-feeder (FTF) was used for the remainer of the rebuild. The FTF approach included express feeder, five feedforward amps in cascade with a 15 dB tap level. "We felt that using low level RF at the node location would allow us, sometime in the future, to deploy fiber deeper into the feeder system with less expense and time," Mead said.

The first link was upgraded from 35 to 60 channels and achieved node performance of 50 dB CNR, 62 CTB and 60 CSO by merely adjusting the drive level to the laser. At the tap, the specs were 49.4 CNR, 53 CTB and 53 CSO. Mead says he opted for fusion splicing after finding rotary splices to be unstable.

Today, the system has 46 active nodes, 16 of which are underground, fed by 13 Laser Link optical transmitters. Mead reports no failures of optical equipment.

Dave Spallinger, director of engineering, presented Continental's Pompano Beach system, a large CAN-configured 1,500 mile plant now with 75 miles of fiber and 35 laser nodes replacing multiple AML hubs and reduced cascades of 12 amps or less.

With AML, this Florida system, like many others, experienced rain-fade problems. The first site constructed—a dual laser-receiver combination over a 6-kilometer distance to eliminate an AML hub site—was a joint venture between Anixter, AT&T and Continental. The operator insisted it would make no payment for the hardware if it was dissatisfied with its performance. "We very quickly paid that bill," Spallinger confirmed. However, on this link they learned not to exceed 600 pound pulling tension when drawing fiber through conduit. "Yes, we broke cable," Spallinger lamented.

When the fiber link was lit, the system did not notify its subscribers. Within two weeks, "We started to receive phone calls from subscribers saying things like, We don't know what you did, but our picture is much better now, thank you,'" Spallinger recalled.

Importantly, it was determined they could successfully "mix and match" different lasers and receivers. After finishing the rebuild with Scientific-Atlanta's equipment, "We found in some cases, one manufacturer's laser will work better with another manufacturer's receiver," Spallinger reported.

The last phase deployed the final 22 optical nodes, of which five were to be shared lasers with optical couplers placed in the headend.

One problem encountered was how to compensate for the difference in signal levels using dual lasers. "One manufacturer creates a compensation circuit to raise those levels where they cross over; the other (manufacturer) does not. If you raise your levels in your headend to help one, with the other you actually have a bump," Spallinger explained.

Tech tolerance

Even with a full AM fiber system at their training center, "We have found that some techs just do not have a tolerance for this type of activity." Spallinger also echoed Mead's praise of the support offered by suppliers and emphasized the need for restoration preparation.

Patrick Kelley, one of TCI's corporate fiber planners, focused on what to do to prepare for a fiber build. After reading and talking to others about fiber, operators should define technical objectives and signal quality improvement goals.

A walkout, Kelley said, is critical for design. Where are the underground utility pipes and conduits that might be used? What utility clearances are required and what rights-of-way available? Good communication with local planning groups allows for preparation for near-term changes that impact plant construction. Splice locations need to be defined, and bucket truck accesses and hazards identified, he added.

Among available designs, one is chosen in conference with in-house or subcontracted designers. A rule-of-thumb for slack loops (extra fiber) is 50 feet per mile, point-to-point, said Kelley. Accounting for that footage must be noted before OTDR measurements of splice loss. Loss budgets must be determined consistant with design. Allow additional signal headroom in the design for splice losses or damage.

Also, the capacity of the strand to support additional weight must be known. For construction and installation, follow vendor's specs. Determine losses of various splicing methods; TCI uses rotary mechanical at the headend and fusion in the field. Varify link losses using power meters and document splice locations.

Michael Campbell, Viacom's regional engineering manager, discussed a simple cascade reduction in the Pittsburg, California system. The original 12-channel system design had cascades of 22 amps to the east and 30 to the west with a hilltop headend site. Bandwidth expansion and amp spacing led to 41 amps east. The reach east passed through an industrial area with frequent outages and surges.

It was decided to reduce cascades and bypass the industrial area using an AM fiber link between the 20th and 21st amps. Thus, there would be no cascades exceeding 20 amps anywhere in the network.

Jerrold's Starfire equipment was chosen to meet a CNR of 45 dB and provide an RF backup. Sixty-five percent of the fiber went underground in existing conduit and aerial was overlashed on existing trunk cable with fusion splicing. Extra fiber was installed for a planned conversion to a 550 MHz fiber backbone rebuild.

With no problems observed, the new fiber will avoid about 17 outages and 400 service calls a year in that section. "Even a single fiber optic link can be a beneficial addition to your system," Campbell said. **CED**

By George Sell, Contributing Editor

allows simulcasting of up to 130 audio feeds, all of which are carried as digital signals, S-A said.

Finally, Scientific-Atlanta took the wraps off B-FAX, a method for sending facsimile transmissions over a Scientific-Atlanta B-MAC satellite network. According to S-A Digital Video Systems Division officials, the cost to send a five-page fax to 500 locations, which takes about 16 hours, runs up phone charges in excess of $100.

A B-FAX sends the same amount of information to the same destinations in about five minutes without incurring any phone charges, the company said. The B-FAX system uses a standard B-MAC audio channel.

Sumitomo expands line

Sumitomo Electric Fiber Optics Corp. introduced a new fiber cable suited for cam] ments, where cable runs a meters or shorter in lengtl network flexibility is key. Corsello, Sumitomo vice sales and marketi "FutureFlex" cable featur into which bundles of fi blown as required, said Corsello.

Also, Sumitomo Electric Fiber Optics Corp.'s "LitePipe" series of optical fiber cable now includes "ArmorLux" versions containing up to 96 fiber cables and LitePipe ribbon cable containing up to 216 fiber cables, said company officials.

The ArmorLux cable contains color-coded fibers in groups of six or 12 with an identifying binder in a gel-filled tube. The tube is surrounded by a corrugated copolymer-coated steel armor and polyethylene sheath with a dual-steel-wire strength member embedded in the outer sheath, said company officials.

The ribbon cable features as many as 18 ribbons, each containing 12 color-coded fibers, in a gel-filled tube, covered by ArmorLux sheath. Sumitomo loose tube cables hold four to 216 fibers which

analog and digital transmission gear, fusion splicers, optical connectors and cable assemblies as well as turnkey system construction.

Simplified FCC standards testing

A new software enhancement for the "Cheetah" automatic testing system will help operators meet proposed Federal Communications Commission technical standards, said officials at Superior Electronics Group, which builds the Cheetah. The "Technical Standards System" simplifies test scheduling and documentation, the company said. The Cheetah system also can monitor standby power supplies, AML hub sites and optical receiver nodes.

Tektronix signs first cable rep

COMED tape compiler. To facilitate the interface, TPC's ADministrator software generators a tape compiler list from available contractual information and scheduled traffic logs, then uploads the information to COMED via floppy disk, RS-232 or as a file in a networked environment.

Falcone's COMED then creates the tapes and uses either DTMF tones, FSK or SMPTE for cueing purposes. Any tape format, including three-quarter inch or VHS, can be used with the setup. Other interfaces are expected soon, TPC officials said.

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