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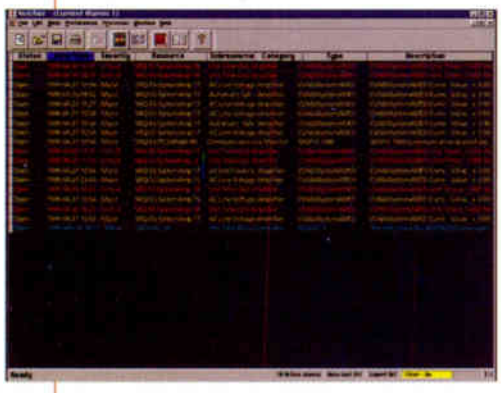

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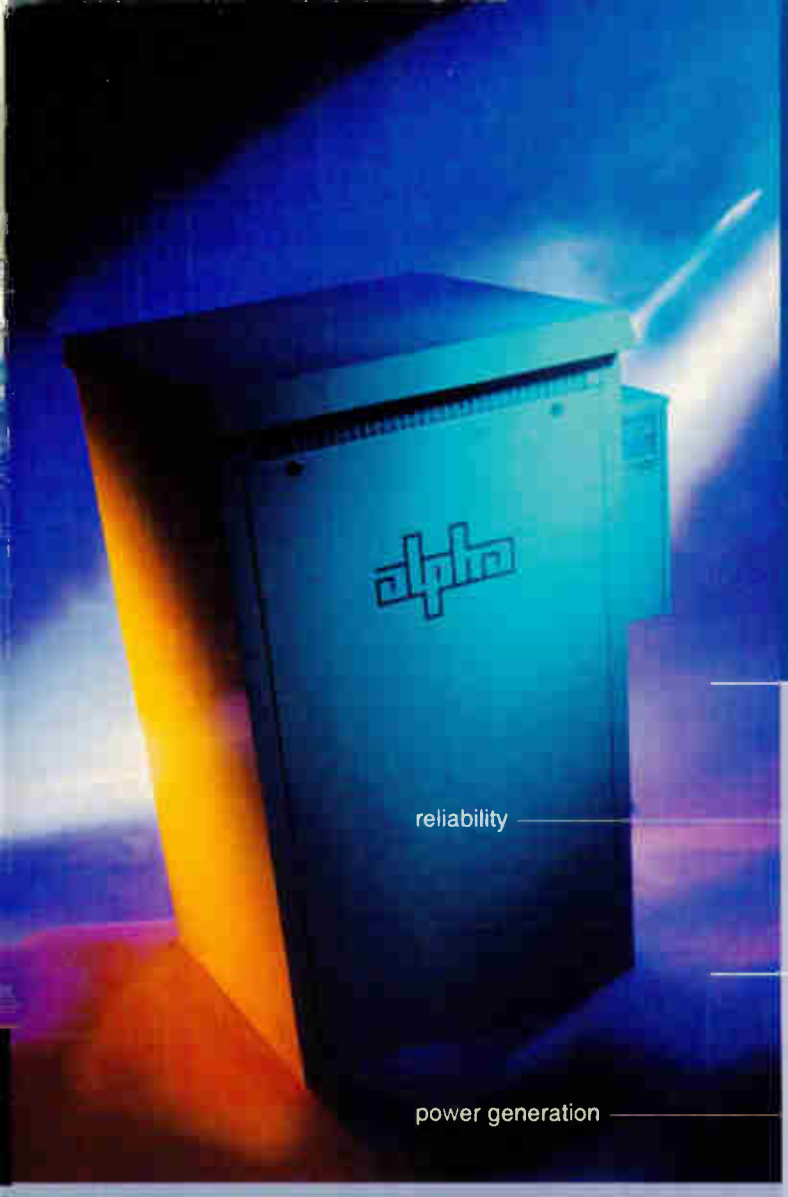

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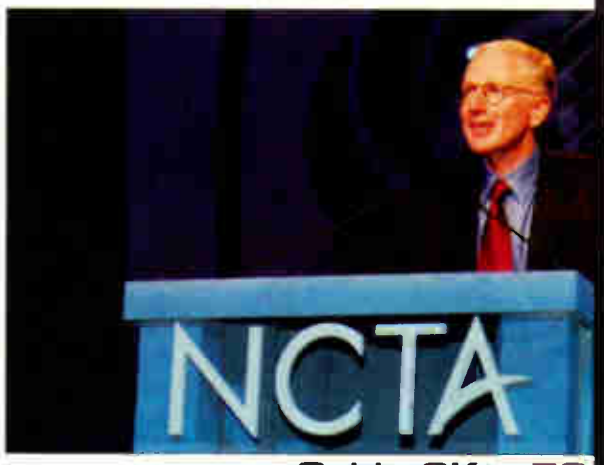

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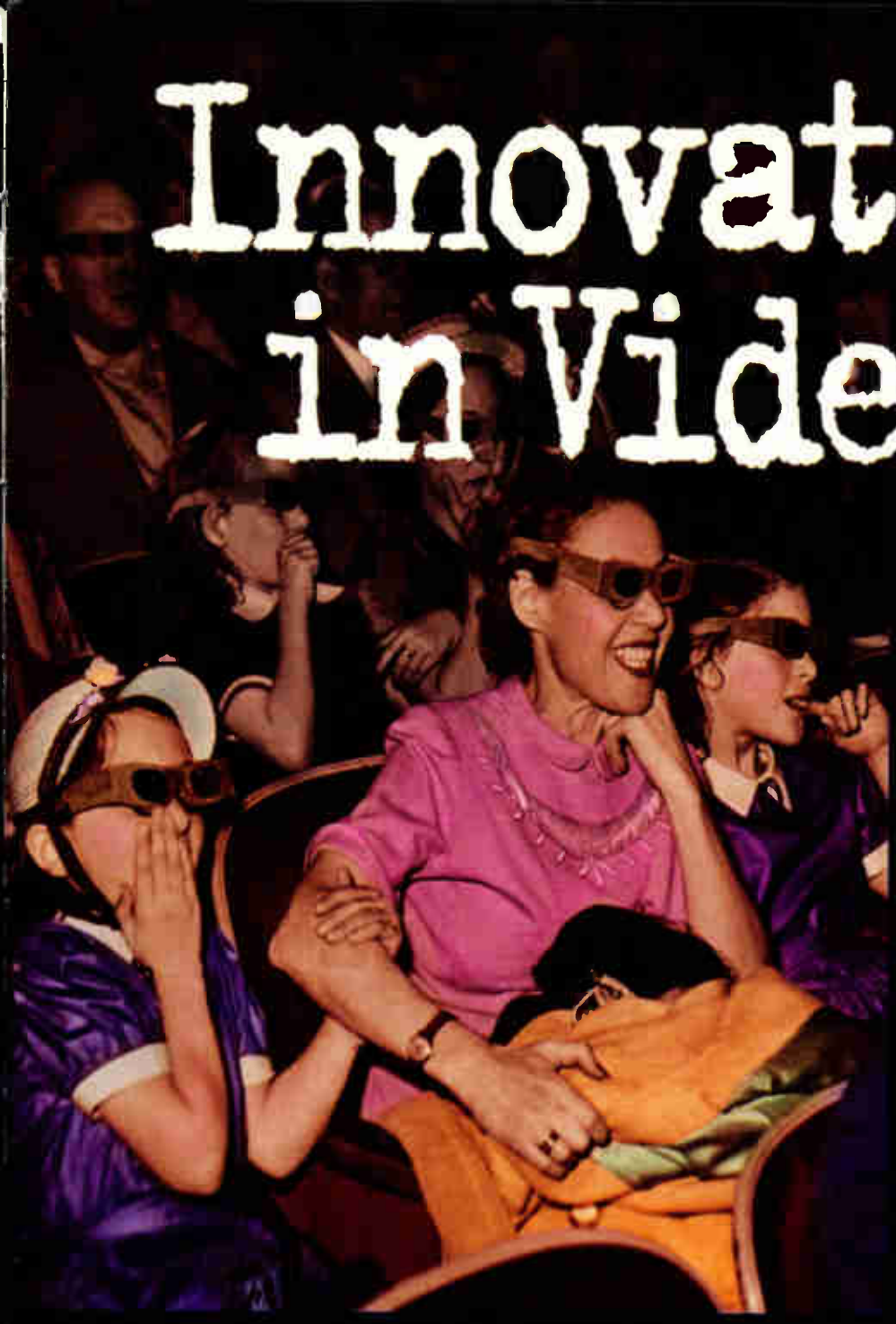
Innovation in Video?



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How Do You Spell "Rebuild/Upgrade"?

A recent question on the SCTE-List asked whether old cables could be used when expanding system bandwidth out to the 875 MHz range. I was flabbergasted by the answers.

Most replies dealt with the higher attenuation of the old first-generation cables vs. the lower attenuation of modern gas-injected cables. Some talked about return loss and checking for spikes at frequencies above 300 MHz, although I don't know how this is accomplished with an active plant.

I hoped a lab engineer from a cable manufacturing company would respond with valid technical information. I talked with companies that manufactured these early cables and to engineers in the field. And I really became concerned. I discovered that cable systems are leaving first-generation gas-injected cables in place. Some cable systems are even leaving styrene and the original fused-disc cables in the air.

We introduced styrene cables in the late '60s—fused-disc cables are the same vintage. First-generation gas-injected cables were not tested or certified out to 875 MHz. Cable manufacturing practice has been to test and certify cable out through the bandwidth required. When those cables were made, that bandwidth was through the 300 MHz range.

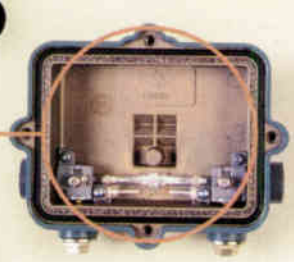
Spikes, or suck-outs, were inherent in cable back then because the rotation of the extruder screw left its own imprint on the electricals of the cable. A breakthrough occurred when electronic pumps were placed between the extruder and the tips and dies as the dielectric was extruded onto the center conductors. We did not have this ability when older cables were made.

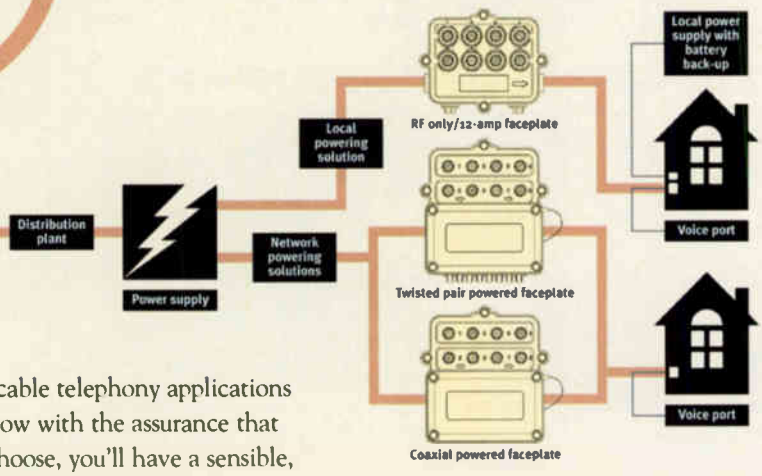
There are real problems with older cables, and I can't believe they are being left in place. Even if there weren't problems with the electricals of these cables, think about their age. They were sold and hung 30 years ago! We have aluminum cables lashed between steel strand and steel lashing wire. They expand and contract each day. (In some climates, those excursions are horrendous!) These cables have expanded and contracted 21,900 times. They have been bent, strung through trees and subjected to nature.

How can a good engineer recommend these be used as we move into broadband services such as data and telephony? Your boss wants to save money? We might as well recommend buying lasers and putting them in old amplifier housings or rehanging old drop cables. Cable manufacturers say they meet resistance when they recommend old cables be replaced with modern quality cables. Some engineers accuse them of "just wanting to sell more cable." Cable manufacturers are trying to keep you out of trouble. Thirty-year-old cables have no place in a modern broadband network!

Rex Porter
Editor-in-Chief

3 faces 1 body 0 worries





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Communications Technology

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(800) 325-0156; Fax (303) 839-1564

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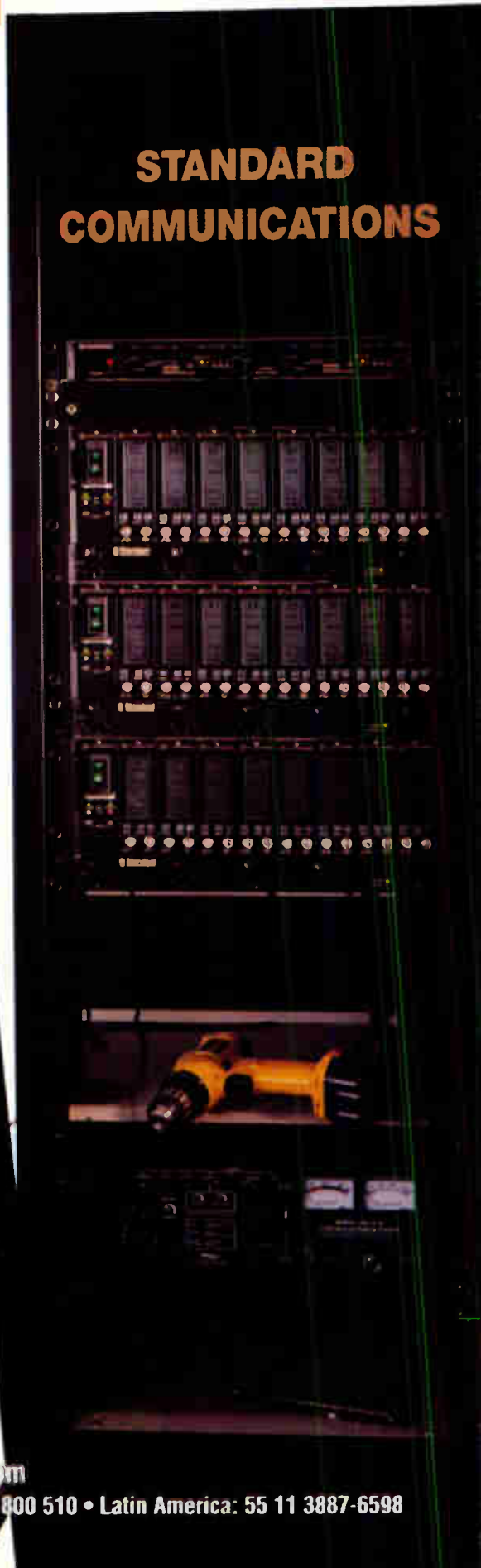

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Deal-Making Frenzy Hits Interactive TV

By Jonathan Tombes,
Deployment Editor

The tendency for middleware providers to interface with anything that moves can make it difficult to tell them apart, but recent deals by interactive TV (ITV) software providers PowerTV, Liberate and OpenTV suggest that this sector is beginning to differentiate itself.

Liberate's purchase of MoreCom and OpenTV's merger with Spyglass are Internet-oriented plays, while PowerTV's merger with Prasara gives it added television (t)-commerce and back office capabilities.

PowerTV gets Prasara apps

Eighty-percent owned by Scientific-Atlanta, PowerTV sometimes slips under the radar screen on the interactive front. Whether a near spin-off or affiliated subsidiary, PowerTV has deployed its operating system (OS) and middleware on more than 1.6 million S-A set-tops. The deal with Prasara shows that it can acquire its own powerful subsidiaries.

With Prasara, PowerTV gets a diverse portfolio of deployed ITV applications. Prasara helps deliver pizzas, TV-banking, customer care, video-on-demand (VOD) and a host of back-office systems to Time Warner systems and subscribers in Honolulu, Tampa and New York City. Prasara has provided interfaces for Starz Encore Media and Home Box Office, joined with Terayon to provide digital ad insertion program for MediaOne and has strong ties with others on the hardware side.

"Prasara has a very close working relationship with Concurrent, nCube, and Unisys," said Steve Necessary, PowerTV's chief executive officer. VOD hardware vendor nCube has an agreement with Prasara to market its products jointly.

The division of labor between PowerTV and Prasara will be largely client-server oriented. "If you're interacting with video on demand, what paints on the screen is driven by Prasara," said Necessary. "If you're doing SofaMail or the Surf function, what paints on the screen is what's been developed by PowerTV, because we're the client side of the application."

Spyglass Device Mosaic and Mail demo

Pursuant to the merger agreement, Prasara will become a unit of PowerTV but retain its name and offices in Orlando, Fla. Speculation continues about PowerTV's intentions to go public.

Liberate buys tech "gems"

Liberate's purchase of MoreCom brings several benefits. According to Senior Vice President for Corporate Development David Limp, the benefits are three-fold: engineers well-versed in Moving Pictures Experts Group (MPEG) and digital television technologies, several "pure gems" of applied technology, and key international ties.

As for the "gems," Limp cited the MoreAccess IP gateway server that provides data encapsulation functions and the MoreMedia streaming video server that can "leverage the whole range of video that's out there on the Web and make it look great on television sets." It was that technology that led to a recent MoreCom deal with Starz Encore Group. >

NEWSBYTES

> **Scientific-Atlanta Expands Set-Top Production**

Scientific-Atlanta is increasing production of its Explorer set-tops to 5.2 million per year beginning in January 2001. The additional capacity at the company's Juarez, Mexico, manufacturing facility will help meet the demand for interactive set-tops, which are being deployed by cable operators into consumer homes at rates of more than 40,000 a week.

Current production is some 60,000 units per week with plans to increase capacity to 80,000 units per week in July 2000. S-A believes that the expansion will improve manufacturing flow in the Juarez facility, reduce costs, improve quality and reduce cycle times.

> **Electroline, Trilithic Partner**

Electroline Equipment and Trilithic are working together to develop technology solutions for a range of return path management and control applications. The proposed projects include the co-development and co-marketing of intelligent ingress mitigation systems for the control of return path ingress, and products that enhance the interoperability of the existing ingress detection and location systems offered by both corporations.

> **Access Switch Earns DOCSIS cert**

Broadband Access System's Cuda 12000 IP access switch has received CableLabs DOCSIS cable modem termination system (CMTS) certification. The Cuda 12000 supports delivery of best-effort data service, IP telephony, tiered data services, and multicast services over cable networks. It supports DOCSIS 1.0 and 1.1 and is currently shipping in volume.

Antec Takes on The Backbone

By Arthur Cole, Contributing Editor

Antec is expanding its range of product offerings beyond the headend and into the backbone networking market where it will compete with the likes of Cisco and other powerhouse organizations.

The company recently inked a three-year, multimillion dollar deal with Chromatis Networks giving Antec exclusive rights to sell the Chromatis Metropolis optical transport system to the cable industry. Antec has also taken an equity stake in Chromatis and the two companies will collaborate on advanced cable applications for Metropolis.

Metropolis is essentially an optical network platform used primarily to connect central offices of communications networks—in cable's case, this means headends. Most cable operators are actively seeking such solutions because it allows them to create regional communications networks that are better able to compete with incumbent telephone companies for the voice and data markets.

"We've traditionally focused on the connection from the headend to the home," said Mike Wearsch, president of Antec's digital systems division. "We've never been in the headend interconnect or backbone space. Since we were getting into voice and data IP through the Cornerstone product, it made perfect sense to dovetail that with a backoffice or interconnect product like Metropolis."

Wearsch said Metropolis brings two crucial technologies to the Antec family. The first is Chromatis' Selective Wave Division Multiplexing, a new way of muxing data that expands inter-headend capacity to 80 Gbps or more.

"When you need to add more bandwidth at one site, you only need to add a new wavelength at the primary headend and the headend where the bandwidth is needed," Wearsch said. "You don't need to add bandwidth around the entire ring."

The second is a unique switch platform that aggregates and grooms traffic.

"If you have a 10baseT connection, other systems will take that capacity even if you only need a DS3 connection," Wearsch said. "That's wasteful because DS3 is only 45 Mbps. You end up wasting 35 Meg. Chromatis rings all traffic onto tributary cards and packs and grooms the data so that you have all kinds of traffic going through. When you fill up all the space on a connection, it sends it around the ring."

For Chromatis, the deal delivers instant access to the cable market through the company's vast distribution channels, said Barry Hardek, director of market development at Chromatis.

"Antec brings coverage," he said. "They have traditionally been an end-to-end cable supplier, but now one of the ends has changed. We can work together on connecting headends and feeding larger design products."

Antec has already ordered about $5 million in Metropolis equipment and is training its technical staff on integration and system operation matters.

Antec isn't the only other company that values this optical network player. As we go to press, Lucent has signaled its plans to buy Chromatis in a stock transaction worth $4.5 billion.

PEOPLE

> **Caniff New Engineering Veep**
Martin A. Caniff has joined Widcomm, a San Diego, Calif.-based wireless networking technology company, as vice president of engineering. Caniff will lead Widcomm's efforts in Bluetooth technology.

> **Kostka to Head Modem Project**
William Kostka has been promoted to head CableLabs cable modem project. He will become director, broadband services.

> **Caltrider Named CTO**
PB Telecommunications, a unit of Parsons Princkerhoff, has named Rhett Caltrider as chief technology officer and director of technical services support.

> **Babcock Joins NCTI**
The National Cable Television Institute has announced that Alan Babcock will join the organization as vice president of learning and development.

> **Singh New Telco/Cable Veep**
Leitch Technology, a provider of digital video and audio solutions, has appointed Ravinder Singh as vice president and general manager for the video over telco/cable division.

> **Barco Dead at 74**
Cable pioneer Yolanda Barco passed away on May 27 in Meadville, Pa. She was 74. The daughter of pioneer George Barco, Barco was a mainstay on cable's regulatory and policy fronts and garnered many of the industry's awards. A stalwart of the Cable Center and Museum, the center's library is named in honor of Barco and her father.

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Pace Pushes Digital Envelope in United States

By Jonathan Tombes,
Deployment Editor

Pace's ShoppingMate, a multi-service device.

The digital divide between the United States and the United Kingdom will begin closing if Pace Micro Technology has its way. For starters, the U.K.-based manufacturer plans to begin shipping by year's end on its order from Time Warner Cable for 750,000 high-end digital set-top boxes.

But that is just the start. Pace Micro Technology has a real interest in seeing the United States regain its former lead over the United Kingdom in digital penetration rates. It has plenty of boxes and related technology to sell.

"In 1998, the United States had around 7 percent of households receiving digital pay-TV, compared with virtually none in the United Kingdom," said Neil Gaydon, president of **Pace Americas**, Pace's North and South American division. "By the middle of 1999, the United Kingdom had overtaken the United States and is now on course to see 50 percent of households signed up during 2004."

The British government's decision to phase out analog service has accelerated that adoption rate.

At the NCTA show in New Orleans, Pace exhibited a prototype of its Time Warner box, built to "Pegasus" specifications and fitted with Broadcom chip technology, an integrated Digital and Audio Video Council (DAVIC) modem, and electronic program guide (EPG). Pace was also showing a personal video recorder (PVR) and various t-commerce tools.

Calling all home shoppers

Pace's ShoppingMate, a kitchen-based device that uses bar-code scanning and wireless communication technology, is emblematic of its digital thrust.

"The ShoppingMate has grown from a single service device, that of a shopping aid, to a stage where it could perform the functions of a mobile TV and radio, a home controller, personal organizer and even as a method of sending and receiving e-mail," said Gaydon, in a recent briefing.

Jim Stroud, an analyst for the Carmel Group, said that Pace is on to something big, namely: "the complete death of analog and move to digital." He also said that Pace may be pursuing avenues other than cable to enter the subscription TV market.

Noting that Pace has scored with a digital subscriber line (DSL) television rollout in the United Kingdom, Stroud added, "you might see Pace trying to get into some creative agreements with (U.S.) telco providers."

Pace has also completed interoperability testing with Cisco's digital headend and cable modem technology.

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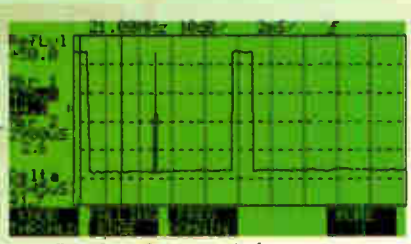

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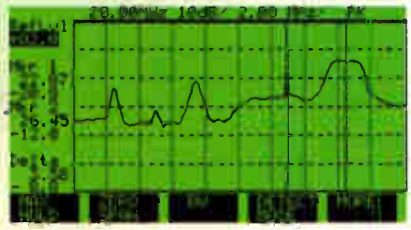

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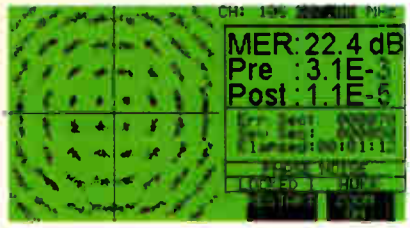

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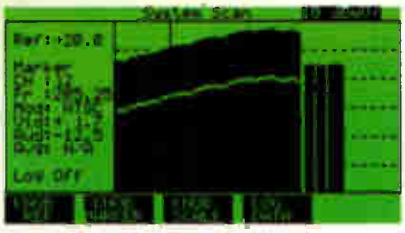

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Videotron, Time Warner Boost IP Telephony

By Natalia A. Feduschak, Senior Editor

In a deal that will support IP primary-line telephony service, **Samsung Telecommunications America** announced that **Videotron** intends to buy 50,000 integrated telephony cable modems (ICTM).

Commercial deployment of Samsung's SCM-200R will soon be launched following a voice-over-IP (VoIP) trial currently underway in Quebec, Canada, said Caroline Fernandes, Samsung's product marketing manager.

First-line gambit

The trial provides carrier-class, primary-line service using packet-switched telephony over hybrid fiber/coax (HFC). Videotron has activated a number of telephony features over the IP platform, including caller identification, call waiting, international and toll-free calls, emergency calls and the equivalent of Canada's 911 service.

"The new service is the core of the service that we are putting together for deployment and this really is the key strategic orientation that we've taken," said Francois Laflamme, Videotron's vice president for IP telephony. "The goal with that purchase, amongst others, is to deploy a first line replacement to the telephone companies. Our hope is to grab a large chunk of the market and then go forward with new services."

"The goal with that purchase, among others, is to deploy a first line replacement to the telephone companies."

—Francois Laflamme, Videotron

Videotron is using a **Cisco Telecordia** soft-switch solution and is supporting a simple gateway control protocol (SGCP).

After two years of lab testing, Videotron initiated an early trial last summer with 200 users in Quebec, which was then upgraded to 2,200 users in January. Videotron, which applied for competitive local exchange carrier service last December, hopes to have 20,000 end users deployed by late summer or early fall and half a million over the next several years.

Because of the competitive market in the United States, IP telephony has made greater strides in Canada, where multiple system operators (MSOs) are very technically directed, explained Fernandes. "[Videotron is] very aggressively pursuing this market, competing with Bell Canada," she added.

The Videotron trial will assist the industry in establishing a standards-based solution that will benefit companies around the world, said Hung Pon, Samsung's director of engineering.

"Telecommunications companies have been looking into IP backbones for several years, and it's really coming into fruition," he said. "If we do that in the backbone, then the next natural step is to push that toward the edge so that it would be coming toward the end customer, toward the homes. The ITCM device would give this concept a push in the direction we've been aiming at for quite some time."

Second-line trial, other news

Time Warner recently launched an IP trial in Portland, Maine, for second-line service, using equipment made by Toshiba, Cisco and Lucent.

"It's a second-line service meant for people who want to use it for a teen line or a fax line. We see it as an adjunct to or a value-added service on top of the Road Runner service that's being offered up there," said Mike Luftman, a spokesman for Time Warner.

Samsung's SCM-200R cable modem

Luftman said that the upcoming commercial phase of the trial would test pricing assumptions and other business variables.

In other telephony news:

- CableLabs announced the final feature set for PacketCable residential IP voice service. The residential features are to be either basic or extended and are intended for vendors planning to build residential IP voice products according to PacketCable 1.0 interface specifications.
- MIND, an IP telephony billing and customer care software provider, announced a strategic alliance with TMNG.com, an e-business unit of the Management Network Group, to provide IP-based back-office infrastructure solutions.

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Road Runner Gains Freedom With Divestiture

By Natalia A. Feduschak, Senior Editor

Subscribers to Road Runner's broadband service will remain unaffected in the near term by the Department of Justice's recent approval of AT&T's merger with MediaOne. But officials say the ruling will open the door for Road Runner to discuss nonexclusive affiliation agreements with other providers.

"Open access is going to change how this business proceeds, and it's a challenge for the cable industry," said Sandy Colony, a spokesperson for Road Runner. "For anyone who is providing that last-mile technology, it's a real challenge, and it's obviously a challenge for the service providers themselves."

The merger, whose approval is now expected by the Federal Communications Commission (FCC), will create a broadband communications powerhouse. The Road Runner stake appears to have been the only impediment to completing the merger.

"The decree proposes a schedule and process that is fair and feasible."
—James W. Ciccone, AT&T

MediaOne owns 34 percent of Road Runner. AT&T, which expected it would have to divest itself of Road Runner, must do so by Dec. 31, 2001.

"The decree proposes a schedule and process that is fair and feasible," James W. Cicconi, AT&T general counsel and executive vice president, said in a statement. The Justice Department's demands "will not impair our business strategy in any way," he said.

Colony said the consent agreement will encourage Road Runner to move forward with negotiations to cut deals with other providers to carry the high-speed Internet access company.

She cautioned, however, that despite a belief to the contrary, AT&T would not be able to migrate old Road Runner subscribers to Excite@Home Corp., its high-speed Internet company, any time soon. Could there be less here than meets the eye?

"We still have this affiliation agreement," she said. "That stays in effect."

Interactive Enterprises Connects with Conexon

By Natalia A. Feduschak, Senior Editor

Interactive Enterprises has hit pay dirt with its mediation and provisioning software, Conexon.

In recent months, the Irish software company has cut deals with C-COR.net, Cable Atlantic of Newfoundland, Canada, River Delta Networks, and Motorola that will help the respective companies link customers with systems.

Tom Higgins, Interactive Enterprise's CEO, said Conexon alleviates pressure points facing cable operators in the field, at the headend and in call centers.

The Conexon platform, which runs on Sun Microsystems's Solaris operating environment, helps multiple system operators (MSOs) manage interactive service offerings by providing plug-and-play interfaces into Data Over Cable Service Interface Specification (DOCSIS) and proprietary cable modems, digital set-top boxes, network management systems, operator support systems and content services.

No-hands installation

"What Conexon does is remove the manual installation of these devices," said Higgins. "It allows you as a subscriber to acquire a cable modem, bring it home, plug it into the network and automatically provision it, connect it to the services, end-to-end."

Carrie Packer, C-COR.net's vice president of engineering for the Broadband Management Group, said Conexon will allow her company to glue together heterogenous components that are used in the field.

"They have a lot of capability built in their product line already," said Packer. "We can just lift and integrate, so that we can give a total solution to our customers as a systems integrator," she said.

Under its deal with Interactive, C-COR.net will deploy the Conexon platform in its Atlanta-based network operations center (NOC). The platform will benefit the company's current operator customer base by incorporating the auto-provisioning of cable modems. In turn, C-COR.net will become Interactive Enterprises's preferred system integrator for the Conexon product line in North America.

Cable Atlantic will deploy Conexon to enable the provisioning of end-to-end mediation and support for a slew of packages including

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residential and small office, home office (SOHO) Web and e-mail services. Conexon will integrate and mediate between Cisco uBR cable modem termination systems (CMTS), DOCSIS modems, Cisco Network Register, Convergys' Cablemaster billing and customer care system as well as Road Runner content services.

"It was a major coup for us to convince (Cable Atlantic) that our product would speed deployment of services," said Higgins. "Although they were advanced enough to be able to rapidly deploy the services themselves, they chose Conexon to further enhance the service and speed up deployment."

The deal struck with Motorola allows Motorola to market Interactive Enterprises's software as part of its broadband offerings. In a statement, Andrew Audet, general manager of Motorola's infrastructure products division said that Conexon "is clearly the most comprehensive provisioning and mediation solution in the marketplace today."

RiverDelta Networks also intends to integrate Conexon with its broadband service router.

Basic Subs Slow, but Bundled Services Beckon

By Jonathan Tombes,
Deployment Editor

Amidst slowing subscriber growth, cable companies have opportunities to boost revenues through bundling new services, says the Strategis Group in a recent study.

Titled "U.S. Cable Trends," the study estimates that by 2004 basic cable subscriptions will total 66.7 million, against 21 million for direct broadcast satellite (DBS). That translates into a five-year gain of 10 million DBS subs, against only 1.1 million for cable. The DBS market has grown by a compound annual rate of 50 percent since 1995.

Among new services, cable could see similarly fast growth. The study estimates that by 2004, nearly 12 million households will have high-speed Internet access via cable modems, compared with 1.5 million in 1999. Associated revenue is ex-

FIGURE 1 PROJECTED CABLE VIDEO REVENUES

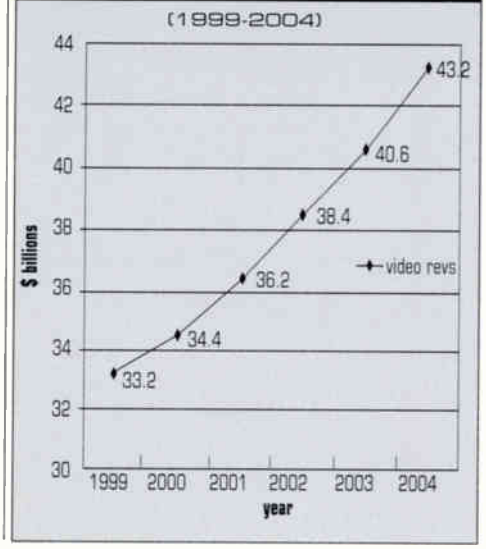
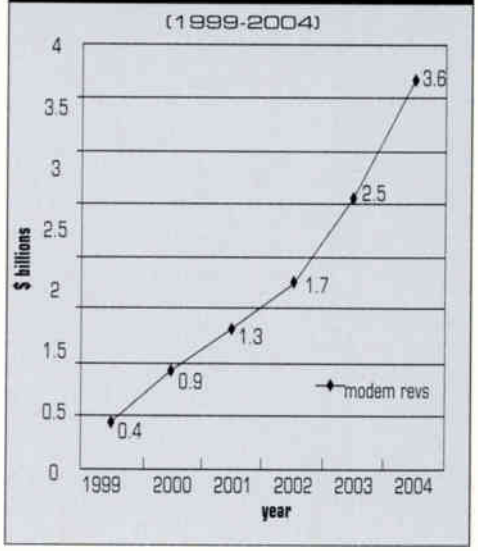


FIGURE 2 PROJECTED CABLE MODEM REVENUES



pected to grow from about $400 million in 1999 to nearly $3.6 billion in 2004. Over the same period, video service revenues will grow from $33 billion to $43 billion. (See figures 1 and 2, page 26.)

"Basic (cable) subscribers are stagnating, but within those basic subscribers, digital subscribers are growing tremendously," said Keith Kennebeck, Strategis Group analyst and author of the study. Those digital services will account for much of the growth within cable's video revenue stream, but over time the Strategis Group sees greater opportunities in voice and data.

Bundling those services with video is a logical way to migrate into broader offerings. For instance, the study notes that price discounts for bundled services are warranted by lower customer acquisition and maintenance costs. But bundling is easier said than done.

What it really means

"Bundling is not just saying, 'Hey, we have these two services,'" said Kennebeck. "It's really a process where you market the products to the customer in a (way) that's easy for them to pick out and to pay for on one bill, and possibly have one single source of contact if they have problems."

Telephony presents another opportunity for bundling. The Strategis Group's market research found that local and long distance service and cable television were the top three services sought in a bundled offering. At the end of 1999, nearly 200,000 homes subscribed to local telephone services provided by their cable company.

Kennebeck said that standardization and technological development will drive that subscriber number higher. Bundling should play a role, too. The study cites bundled telephony offerings from AT&T, Cox, Adelphia, RCN and MediaOne.

For more information or to purchase "U.S. Cable Trends," contact the Strategis Group at (202) 530-7500 or on the Web at www.strategisgroup.com.

SCTE Region 10 Director **Wes Burton**

By Rex Porter

Wes Burton is the Society of Cable Telecommunications Engineers' Region 10 Director. He holds a General Class Federal Communications Commission (FCC) license, is certified as an SCTE installer and is one of the few engineers to have been certified at both the technician level and the engineer level of SCTE's Broadband Communications Technician/Engineer (BCT/E) certification program. He completed NCTI's Chief Technician Course in 1985 and has served as an electronics instructor at the Richmond Technical Center in Virginia. Let's get to know him a little better.

"Suddenly I had my own FM radio station, and I was still in high school."

—Wes Burton, MediaOne

Communications Technology: Wes, tell us about your childhood and education.

Wes Burton: I born in Flemington, New Jersey, in the 1950s. Then, around 1962, my father, an engineer, moved our family to Vernon, Connecticut, which is about 20 minutes east of Hartford. I began kindergarten there and remained until I graduated from college.

CT: What got you hooked on electronics?

WB: Well, I sort of had an interest by the age of eight or nine. On the back of my cereal box was a coupon. I sent the coupon with $5 and received my first battery-operated AM radio. It became my favorite toy! Then I ordered a small portable reel-to-reel tape recorder, and I carried that thing around like a girl would carry her Barbie doll.

I began to take the radios and recorders apart to see what made them operate. A little older, I began to stick an antenna on our roof and receive broadcasts from distant places. Others would call this DX-ing radio.

I made my first stereo out of an old 1938 short-wave AM radio. To get stereo, I used the signal from this radio for my left channel. I found an old 1948 wire recorder and then a turntable in a barn. I wired the turntable to the radio on the left and the wire recorder on the right and, wow, I had stereo! I was and have been hooked on stereo ever since. To improve my stereo, I purchased a wireless microphone from Radio Shack and hooked it to an amplifier I had built. Now I had power boosted so that I could go more than 200 feet. I hooked the output up to my roof-top FM antenna and pointed it down toward the valley where my friends lived. Suddenly I had my own FM radio station, and I was still in high school. I broadcast music and could talk to my friends with the wireless mike. So, I knew I wanted to be in communications.

CT: You studied communications at Temple University in Philadelphia. Tell us about those studies.

WB: The freshman year covered social concepts, and then we moved into the psychology of communications. Like most of the other students, I looked forward to my sophomore year because we all thought we wanted to do production work. I found production to be extremely hard work, with heavy emphasis on schedules.

During my junior year, I learned about advertising, marketing and the history of the communications industry. Its history has always been amazing to me, from the Marconi wireless to David Sarnoff. Recently, I thought about the similarities between Bill Gates and Sarnoff. While Gates has dominated the software/computer industry, Sarnoff had a definite influence in the development of NTSC and TV broadcasting.

But back to my senior year, the

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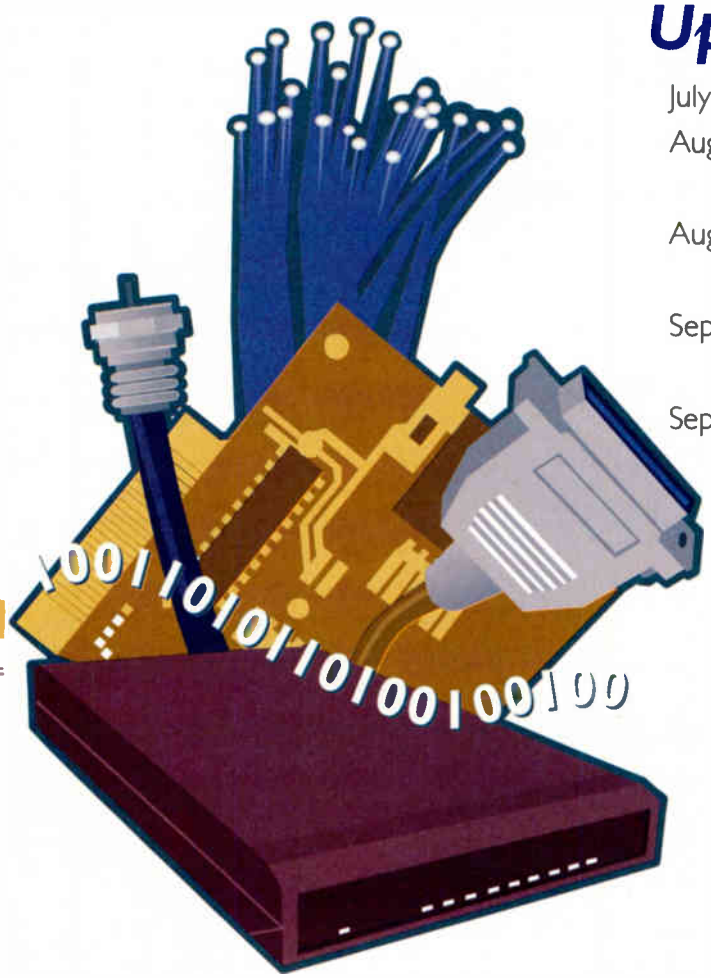

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Aug. 15-16	Sacramento, CA	Data Technology for Technicians
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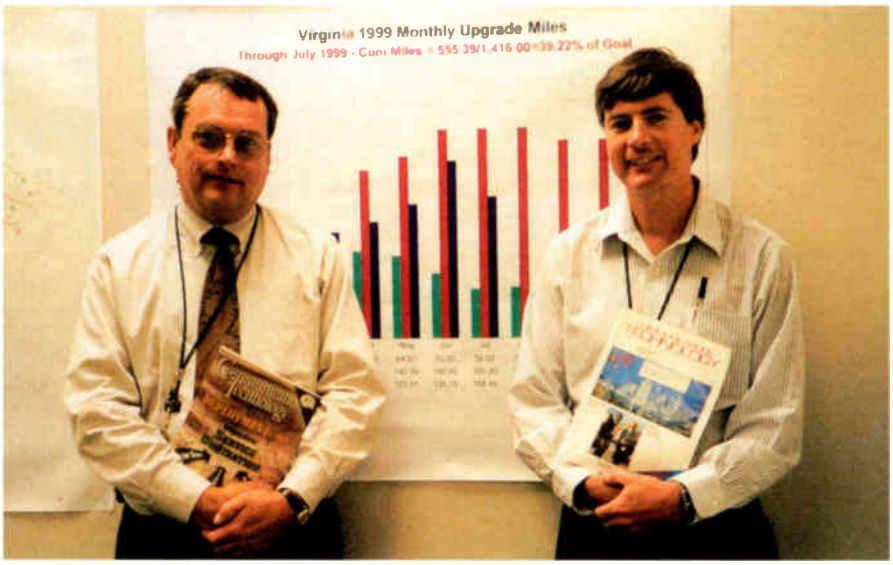

Wes Burton (r) with his boss Lawrence Loyd (l), director of engineering, at MediaOne.

courses were primarily in senior management and law. During my senior year, since the radio industry was then looking to implement AM stereo, I chose to write a technical paper on AM. I went down to the FCC to research the dockets and covered all of the different technologies such as Kahn, Zenith and other proponents for stereo systems. Each hoped to have their technology adopted by the FCC. So I concluded my paper with an assumption of which technology would finally win. As it turned out, this was one of the first situations where the FCC made a decision to just leave it up to the marketplace to see which technology would emerge as a winner. And, as we all know, AM stereo technology died.

CT: After graduating, how did you end up in cable TV?
WB: I hit the streets trying to get into radio and television in the Hartford market. But, within three weeks after graduating from Temple, I was working for a company known as Cox Cable-Greater Hartford. I started with that company on June 5, 1978.

Greater Hartford Cable TV, August 1979: Notice the 10-meter antenna pointed at Satcom 1, the only satellite needed at the time.

Wes and his wife, Michele; stepson, Steven; and daughter, Amy; in October 1991.

They broke me in as an installer, and I did installs for a couple of months. Then they promoted me to technician, and within four months, I was doing outage maintenance and allowed to be "on call" on my own.

CT: How long did you remain in Hartford?
WB: Not long! In August 1979, Cox transferred me to Jefferson Parish in Louisiana. They had about 6,000 subscribers, all located up on Lake Pontchartrain, at the opposite end from the headend. The headend was beside the Mississippi River, and the trunk had to cross the I-10 freeway and had to be fired up all the way to the lake in order to feed the 6,000 customers.

Every afternoon, a thunderstorm would roll through, and we would have feeder outages. Fuses just kept popping all over the place. The contractors hadn't bonded or grounded the plant, so we had to get them back to do so and make sure I wouldn't have to be climbing up all the poles replacing fuses.

Then I became lead technician and the first sweep technician for Jefferson Parish, using the old Avantek sweep system. I moved on as preventative maintenance supervisor to bench technician and in 1982 became the headend technician.

CT: Then you began to travel a lot?
WB: In 1984, I transferred into Cox's Human Resources department and became a technical trainer. I trained technicians at Cox systems from Florida to California. Rich White, based in Hampton Roads, Virginia, covered the northern territory from New England to Washington state. I trained technical people for Cox for about five years.

CT: Then, I understand you got a call from an old-time friend of mine?

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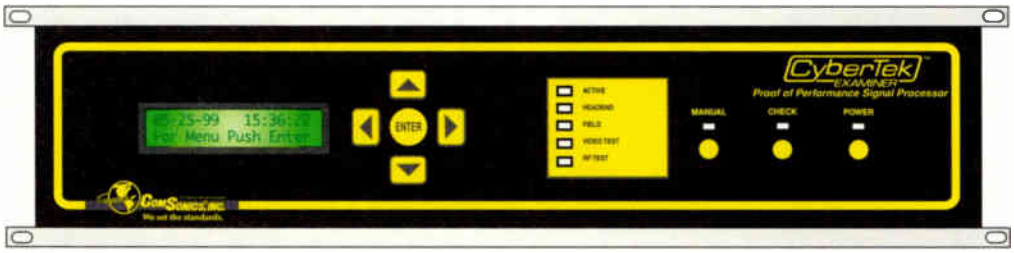

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WB: Yes, Dick Ashpole (one of the few SCTE Charter members) interviewed me for a job as technical trainer for Continental Cablevision in Richmond, Virginia. I accepted and our family relocated. I had a choice of staying in human resources as a human resources manager or as a part of the engineering side of the business. Since I loved the technical side, my choice was easy. I would oversee the headend, hub and hybrid fiber/coax (HFC) backbone in Richmond. I chose technical engineering manager, the same job I have today with MediaOne.

CT: Speaking of MediaOne, when did you move over from Continental?
WB: In 1989. Most people know about my work with MediaOne, but not about my earlier years. So this has been a great opportunity to tell them about my background.

CT: Describe the importance of the SCTE and how you forecast our future.
WB: Ten years of engineering experience gave me the tools to pass the technician level and engineering level of the SCTE Broadband Certification Program, most commonly known as the BCT/E.

It seems we are in our third phase or generation of the cable industry. The first generation was, "If you don't have cable, you don't have TV!" The second generation was highlighted by the launch of new programs by satellite. Now, because of deregulation, Internet protocol (IP) telephony and the Internet, we have a new interactive industry.

I am looking forward to another generation of broadband. I just can't wait to get networks across the nation upgraded so we will be able to deliver all of the broadband services. Then we can focus on what we really need to do. And that is train our technicians and field engineers on how to maintain and promote this new industry we call broadband.CT

Rex Porter is editor-in-chief of "Communications Technology." He can be reached via e-mail at tvrex@earthlink.net.
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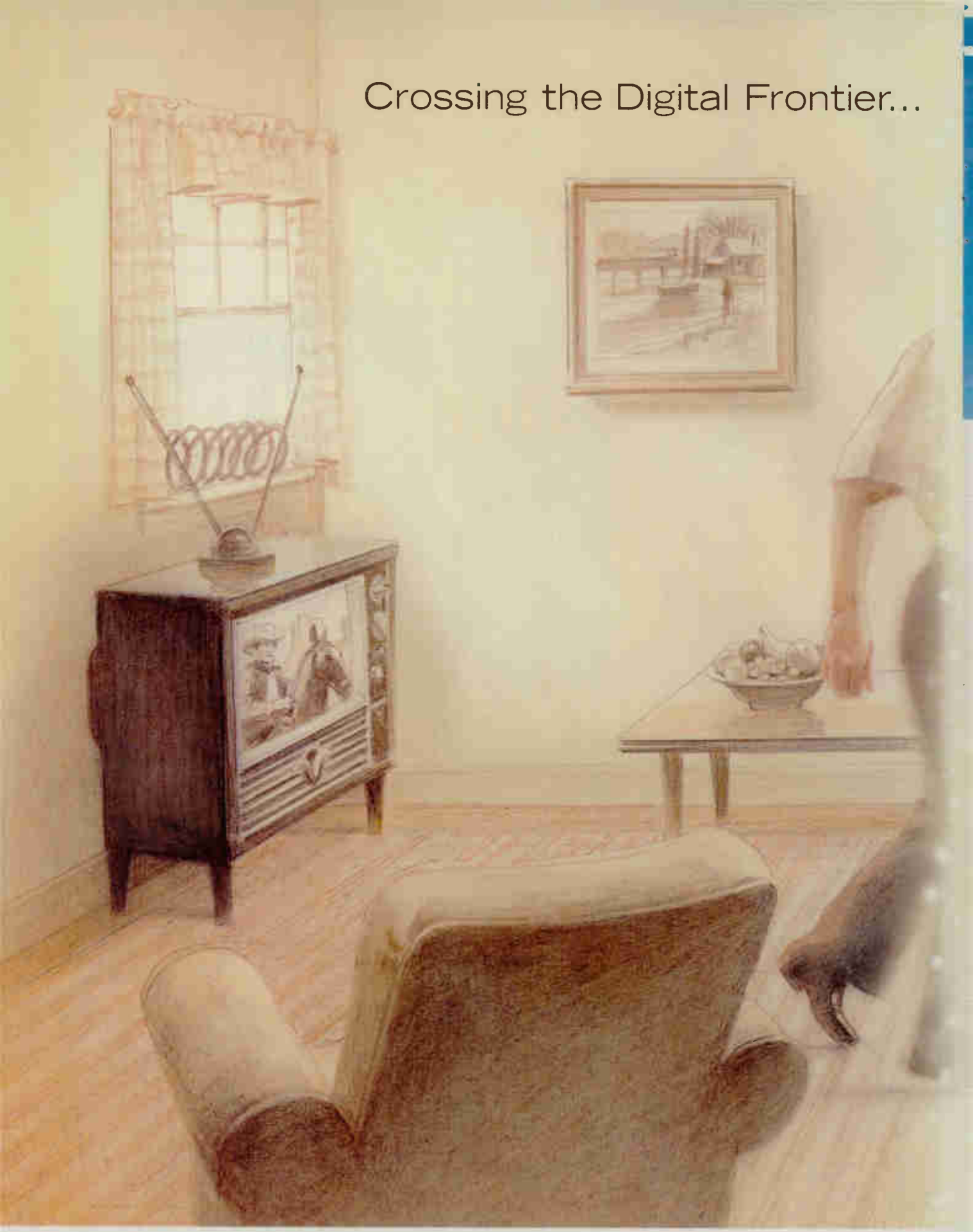

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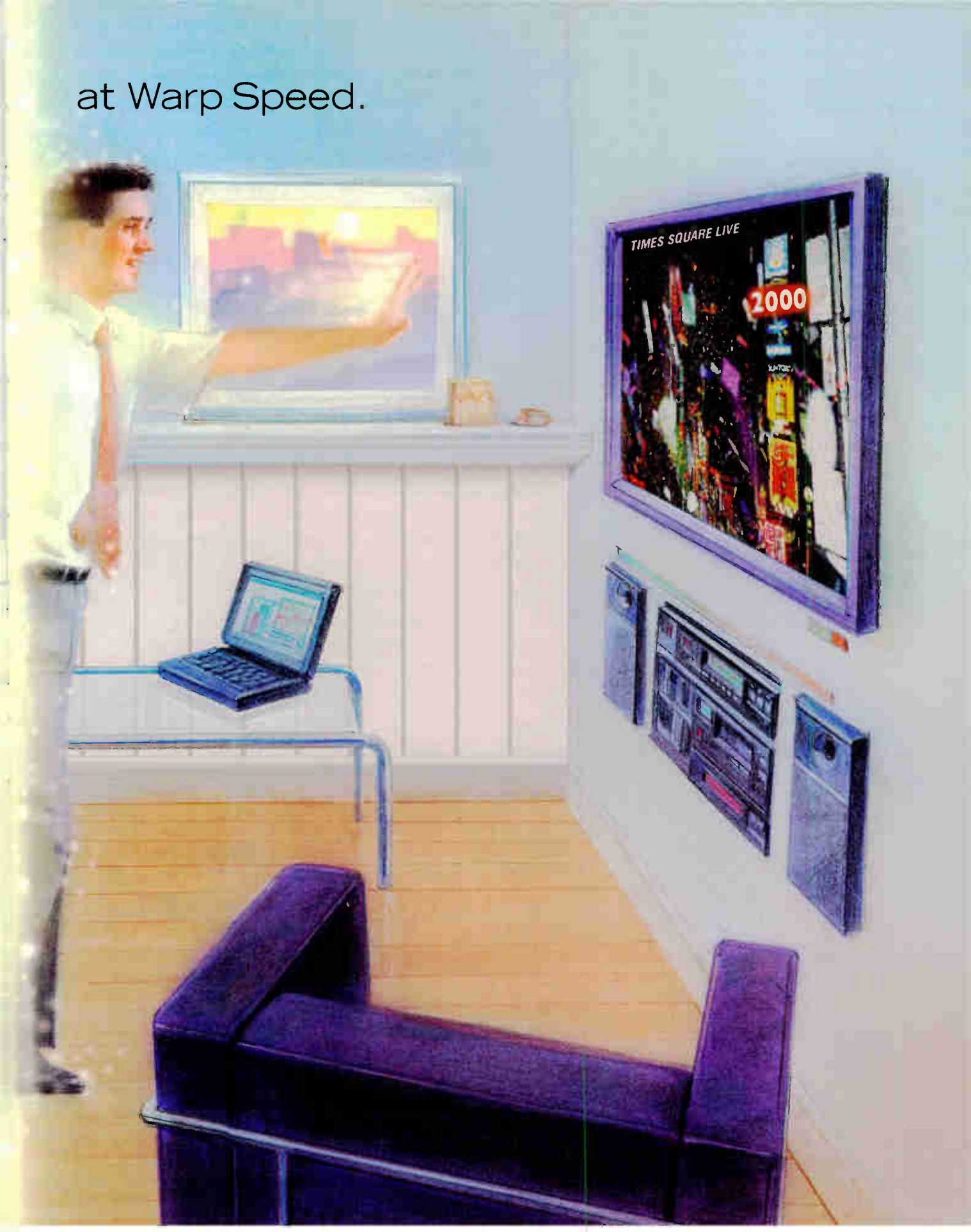

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Many decades ago, the term "wireless" pertained to good old-fashioned radio. Then, family entertainment literally was the radio. In later years, the radio became a TV set, itself a wireless device until the advent of cable.

Magical tools

I continue to enjoy a still fascinating part of wireless technology in a hobby called ham radio. My own interest in electronics was largely inspired by nights spent listening to a small transistor radio back in the 1960s. I was fascinated by the fact that at night I could hear radio stations from other states that I couldn't hear during the day. Magic!

"Wireless technology is here to stay, sometimes as a complement to our existing wired networks."

In our own industry, it wasn't that many years ago that the term "wireless" conjured up visions of point-to-point and point-to-multipoint microwave links. I have many fond memories of path engineering, equipment installations, and all-night proof-of-performance tests. Somewhere along the way, the terms amplitude modulated link (AML) and frequency modulated link (FML) became embedded in my genes, and klystron magnets a fixture on the refrigerator.

These days, wireless encompasses a whole lot more. The most obvious are the seemingly ubiquitous cellular and personal communications service (PCS) telephones, followed by the cordless phones used in our homes. As well, multichannel multipoint distribution service (MMDS) and direct broadcast satellite (DBS) fit under the wireless umbrella. For that matter, MMDS often is referred to as "wireless cable." Beyond these, however, is a whole new wireless world: the last mile.

The last mile

When you and I think of last mile connectivity, we generally think of our own cable networks or perhaps the telephone company's networks fulfilling that role. With regard to data and Internet connectivity, cable modems and digital subscriber line (DSL) are the current hot players in high-speed, last mile connectivity. These do just fine for fixed applications such as homes and businesses, but they tend to fall short for portable and mobile applications. This is where wireless comes into play.

You may have heard of something called Bluetooth (www.bluetooth.com). In a nutshell, Bluetooth is a specification for low-cost short-range radio links between desktop computers, notebooks, cellular telephones and Internet appliances. Bluetooth technology will operate in the 2.4 GHz industrial, scientific and medical (ISM) band, between 2.4000 and 2.4835 GHz. Transmitter power will in most cases be limited to 1 milliwatt (mW), although power levels up to 100 mW are possible depending on equipment power class. In general, Bluetooth devices will have a nominal 30-40 foot operating range. The technology will support data rates up to 1 megabit per second (Mbps). According to Cahners In-Stat, Bluetooth will link an estimated 670 million products by 2005.

Also under the last mile wireless umbrella are wireless local area networks (LANs) that are based on the Institute of Electrical and Electronics Engineers 802.11 specification. These are supposed to provide data rates up to 45 Mbps and will have an operating range up to about 300 feet. Wireless LANs will use the 2.4 GHz ISM band, too.

If that's not enough, how about wide-area wireless? This will provide coverage up to three miles or so and accommodate multiple voice and data technologies.

Now toss in the existing wireless technology used to provide low data rate point-to-point connections, cordless telephones and wireless modem jacks, and it's clear that wireless technology is here to stay.

Take it on the road

The nice thing is the ability to go beyond the fixed operation imposed by the typical wired network. Wireless technology provides portability and in some cases mobility. You've no doubt seen or heard about automakers looking at incorporating mobile e-mail access from a moving vehicle. (The

CableConnect℠ Solutions

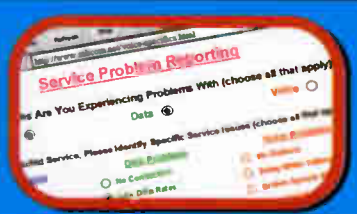
Lucent Technologies

NEW SERVICES YIELD NEW REVENUES










a supplement to

Communications Technology & IC International Cable

Editor's Letter

Are You Maximizing Profits?

By Rex Porter

There once was a public-service announcement, "It's ten o'clock; Do you know where your children are?" Perhaps we need one for the broadband industry, "We are moving into the 21st Century; Are you making maximum profits from your networks?"

Each year, billions of dollars will be spent on the very services we will provide over our modernized networks. E-commerce, business-to-business applications, interactive TV, viewer-rating data, pay-per-view, Internet protocol (IP) telephony and a host of other uses could involve us past the mere transmission of these services. Surely we will begin to be involved in the content of these businesses, rather than assume we are destined to only be a conduit.

When programming was launched via satellite to cable systems around the nation, multiple system operators (MSOs) either developed their own program networks or bought interest into existing networks. Why? Because they realized the money was in the content and not simply in being a conduit into the homes. The financial potential of the data explosion ought to be viewed similarly.

Are we planning to participate in e-commerce? Have we profiled the business-to-business industry to discover how we might increase the value of our own systems? After all, as service providers, we need to be more knowledgeable than others moving into this arena.

Once again, when we were able to add nonnetwork programmers and independent stations to our systems back in the '70s and '80s, the value of our cable systems jumped from the $300 range to $2,000 to $3,000 per subscriber. Properly marketed to the customers, the addition of data and voice via broadband will further increase the value of the network.

There are a lot of challenges in converting cable TV systems into broadband networks. But we have manufacturers ready to supply equipment for the additional services. For too long, we have isolated ourselves from such suppliers because we perceived them to be competitors to the cable TV industry. But these are the suppliers of equipment and services with the experience we need. They have pioneered equipment for the telephone companies. They understand reliability and features customers have come to expect from their telephone companies. And they understand the challenges facing broadband networks, having to interface with these same local exchanges to provide long-distance and international voice service.

The voice technology, like data, is changing at such a rapid pace that only companies experienced in telephone equipment can provide the guidance we will need to compete in delivery of that service. After all, this service must compete around a series of "Nines." And no service can harm the delivery of another service.

We now have switches, routers, different cables, network operations centers (NOCs), and redesigned power supplies, all because of these new services. Successful delivery depends on the equipment's interface and compatibility. Many of us tend to think of Lucent Technologies as a big company (it is, with more than 150,000 employees), with lab technicians, engineers, only dedicated to manufacturing voice and data equipment. But it is much more. It has a division dedicated to helping data and voice providers realize maximum profits from the services their products provide. It has aligned itself with other high-profile equipment manufacturers to provide the interface, reliability and compatibility of equipment from the NOC or headend to the end of the line. Recently, I spoke with one of its engineers back in New Jersey. He said, "When we speak to the industries, we remind them—instead of telephone, think voice!" But when you think of Lucent Technologies—think "voice, video and data."

So remember that public service announcement for the broadband industry and begin maximizing your profits today. •

Supplement to
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Interview With a Leader

Building a Business: It's More than Technology

Building an integrated Internet protocol (IP) platform enables cable operators to offer a variety of new services and generate additional revenues. We sat down with Tim Gropp, Lucent's customer team vice president for cable communications sales, to see where those opportunities are.

In addition to IP telephony, what other applications does CableConnect℠ Solutions support?

We set up CableConnect™ to do IP telephony, but the platform sets the stage for many data services.

In many large corporations, 50 percent of the associates work at home. Almost everyone is dialing in. They have a telephone, fax, modem, and several voice mail systems to check. With the cable modem infrastructure, and Lucent's products and services, you can deploy services like virtual private networks (VPNs). In a work-at-home environment you can link voice, unified messaging, high-speed Internet, streaming video, downstream news, and intracompany broadcasts.

Today, that's typically done through overlay networks. Our vision is one of a converged network.

What revenue opportunities do you see for cable operators launching new applications?

In addition to work-at-home applications, other services leverage the huge amount of backbone bandwidth. You can deliver true video-on-demand services. Say you wanted to offer Lethal Weapon 8 on a world-premiere basis during the opening weekend. You could offer it to cable subscribers at $19.95. Even if you get a half or one percent take rate, you have probably tripled the studio's take.

Other revenue generators include interactive gaming and transaction services that require real-time voice and video. On a home shopping network, consumers could click on what they wanted to buy. If they had a question, the network could bring up a video conference, and they could talk to a person via the screen.

Unified messaging also has revenue potential. On our messaging platform, we have true unified messaging. You can pick up your e-mail from your television or phone. You can get faxes into your e-mail. You can click on a voice mail and have it played through your e-mail.

You also can launch business intranet services. Utilizing a VPN, you can pull in work-at-home and small-office applications onto one network. Shared folder services is one example. We've done trials with cable operators using multimedia servers. These allow people to talk over the data network via IP telephony, even as they share a folder in Excel or Word.

To really make money you need to be able to package and bundle the services.

How important will bundling be?

Tim Gropp

Bundling will be critical. Our Kenan billing and order management platform will enable operators to bundle and bill for these services as one package.

Everything now is either billed flat rate or billed separately. The consumer is tired of so many bills. Operators can achieve new sales by starting "try-and-buy" campaigns. Don't just tack IP voice on a current modem customer. Try and get a new customer. You may get a new modem customer and a new video customer.

We're working with a cable operator who is considering bundling three telephone lines, high-speed Internet, a premium video package, plus 100 minutes of long distance for one price. For additional long distance minutes or movies, you'd pay an incremental charge.

Is the business market important for cable operators?

Absolutely. There ought to be some really creative packages like using VPN capabilities and services like RoadRunner Professional, to attract business customers. Many nationally based companies have employees working at home or in satellite offices. They still want access to capabilities they would have at the corporate office—unified messaging, intranet services, video conferencing. By partnering with super carriers, cable operators could develop innovative services for small businesses.

How can Lucent help MSOs launch these new services quickly to generate revenues?

We have a team of consultants and subject matter experts that can collaborate with operators at the technical, business, and operations level. We can help operators develop a plan based on their return on investment targets. We can bring in engineering, program management, and installation services to help deploy their applications. We can also provide operations expertise on an outsourced basis after launch to help systems become proficient in operating the network and training their own people. It's a build, operate, and transfer arrangement.

CableConnect℠ is an end-to-end solution. We not only have the products, but the consulting resources to help operators build a business, not just an application.

There's a big difference between IP telephony and offering phone service. Anyone with good technology can pass voice as a packet. But to put together a business, you need billing, operations, network management, and features. That's what we bring.•

New Data Applications Spur Revenue Growth

The freedom to make your own work schedule. A commute that's a quick stroll across the living room instead of across town. More time to spend with family and friends.

For the freedom it affords, millions of office workers are trading in their corporate suits to establish small- or home-based businesses, and are increasingly telecommuting–working from home by accessing their corporate work sites. Cable operators that can deliver services targeted to these workers stand to generate significant new revenues. (See sidebar, Work at Home Generates New Revenue.)

This new work style will continue to grow in the coming years and change the way businesses are run. This emerging world, however, also presents new challenges. Workers accustomed to a typical office environment with all its staples—voice mail, fax machines, email—are suddenly finding themselves having to establish or recreate an office at home. For those selling products from home, customer service, billing questions, and ensuring adequate supplies of products are all issues that must be handled. Cable operators, with their communications capabilities, can help fill this void, while generating revenues in a changing world of telecommunications.

This new world of commerce requires that companies not only supply their clients with technology and equipment, but help them make money. Lucent is creating a new standard by showing its clients how to use its equipment to generate revenues as they provide data over cable, and reduce their operating costs through CableConnect℠ Solutions and NetworkCare Broadband Services Division.

Cable operators face a choice in today's changing technology landscape. These choices are the addition of digital television, data, and IP telephony. Whether operators choose all of these services or one, they must pick a platform that allows future integration of all. Lucent is prepared to provide a service that allows this.

CableConnect℠ Lowers Costs

CableConnect℠ provides solutions that satisfy the data applications and data networking needs of the cable industry. Lucent enables cable operators to offer residential Internet service, telecommuting, and home office Internet service. These solutions meet two key business needs for the cable industry—increasing revenues from end users and reducing operating costs. The CableConnect℠ Solution adds value to the "always on" broadband access services via core and enhanced Internet Protocol (IP) services. It includes robust IP infrastructure management and provides a multiservice networking infrastructure that reduces the need for over-provisioning by providing Quality of Service (QoS). It also reduces the overall equipment footprint via modular design, high throughput and port densities, and lowers operational costs via a comprehensive OSS.

CableConnect℠ Solutions also provides an infrastructure that supports multiple services by allowing the use of the most efficient access of networks for different architectures, such as cable, digital subscriber line (xDSL), fiber, fixed wireless and dial up.

Meeting Different Needs: The Home Office User

We know that the needs of telecommuters and home office users vary. Telecommuters want easy and efficient access to their corporate site, while home office workers mostly use the Internet for business transactions. With either home office customers or telecommuters, cable operators can generate revenues by providing tailored services. For both types of users, the next phase of the Internet will require multiservice QoS.

What the home office user really wants is a cost-efficient way to have a presence on the Internet to conduct business, says Pablo Martinez, solutions manager for Lucent's Cable Solutions.

"They are looking for a cheaper conduit to the Internet to develop a presence, probably to conduct electronic commerce transactions, and have the capability to have a Web site so they can advertise their products and services," he says. "They also need to communicate with business partners and customers. They need to have e-mail capability and some of the other advanced capabilities, including telephony."

The home office worker presents an opportunity for cable operators to provide more than just traditional Internet services. Eventually if a cable operator starts hosting applications in its network and rents them to small businesses, like home office users, those clients will have access to enterprise-grade applications on a rental basis at reasonable rates.

"They have access to information and enterprise grade applications that might have been unaffordable to buy or manage," says Martinez. "CableConnect℠ allows a cable operator to profitably offer this application."

The Telecommuter

With Lucent's VPNWorx Solutions, corporate users are able to meet their telecommuters' primary needs: providing efficient broadband access to the corporate site and applications with end-to-end QoS and security. This service is easy to provision and can be used in addition to residential services and access to the corporate site when travelling.

While cable operators can currently provide connectivity to corporate sites in the traditional sense, in addition to being the Applications Service Provider (ASP), they can also generate revenue by hosting additional applications on the part of the corporate site. Instead of telecommuters going all the way to the corporate site to access the applications that are currently available, cable operators could host applications on behalf of the

corporate user (see figure below). Corporate users would then access the applications over their cable network to the cable operator's regional data center. In this way, through Lucent's platform, cable companies can add value to the telecommuting experience.

E-Commerce and the Web

Electronic commerce will play a key role in home-based offices. Cable operators can help their customers create a store front on the Internet and conduct business transactions. It makes sense for cable operators to host the E-commerce site on behalf of the home office user.

Cable operators can generate additional revenues by using Lucent's platform, which enables Internet call centers. Many people abandon their shopping carts when searching for products on the Web because they have no customer representative to talk to when they have questions. Through Lucent's platform, potential customers are able to push a button on the Web page, which alerts the seller that a customer has a question. They are then called back.

"In this case you are voice-enabling E-commerce applications," says Martinez. "That is a good example of our voice and data convergence solution."

Lucent's solutions also enable customers to access billing information via the Web. They can report troubles and can track the resolution of problems. Cable operators can automate these functions through Lucent's Cable OSS solutions. Moreover, with Lucent's Cable OSS solutions, cable operators have the capability of doing flow-through customer provisioning to the cable modem and the cable modem termination system (CMTS), have the network and service management capability to assign IP addresses to cable modems and network interface units, and are able to provide automated dispatches of service requests.

An additional way cable operators can generate revenue is to host games from the network for residential end users, as well as hosting other applications, such as desktop productivity applications, that may be of interest to residential end users.

"This concept of network-hosted applications can be extended to simplify the overall home networking experience to the end user," says Martinez. You can have Internet appliances everywhere in your home from which you can access any application you want because applications are not local but rather hosted in the network.

In a way, the cable operator is providing home networking services by taking the home network out of the home. The cable operator can also provide a solution that simplifies the cabling required in the home to support these home networks that then conveys a compelling value proposition to the end user. Lucent's CableConnect℠ solutions include wireless home networking as a way to achieve that.

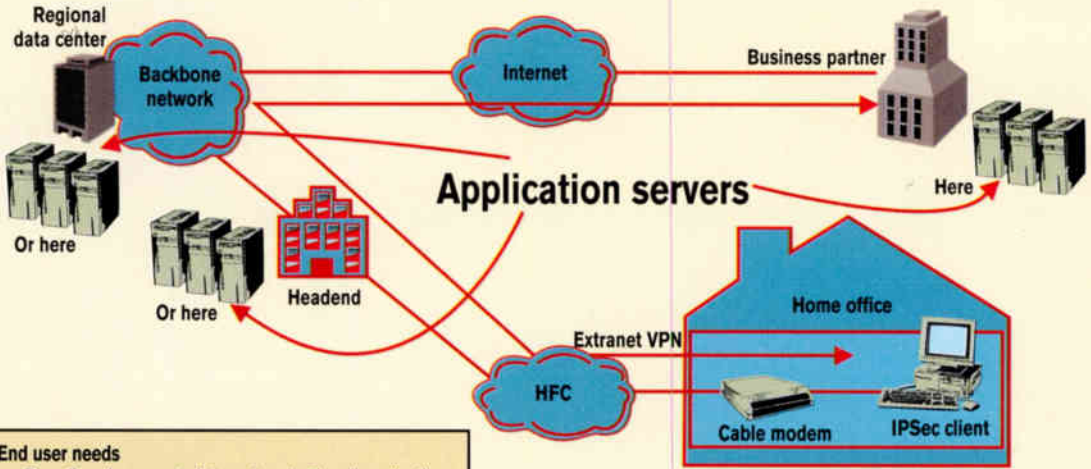
The revenue potential for new data and voice services delivered over a converged platform is great. Why not start earning your share of those revenues today? •

Work at Home Can Generate New Revenue

The increase in workers telecommuting continues at a rapid pace and will change the way business is conducted worldwide. Lucent's own research shows that global users of the Internet–one of the primary vehicles in accessing corporate sites or establishing home-based businesses–will increase from 30 million in 1994 to 250 million in 2001. In the United States alone, Jupiter Communications, Inc., predicts that by 2005, on-line consumers will spend over $632 billion as a result of research done on the Web, while $199 billion will be spent on Internet purchases. Despite a slow adoption rate, worldwide revenues from cable telephony services will jump from $293 million in 1999 to $7 billion in 2004, according to a new study from Cahners In-Stat Group. Residential and business customers are expected to pay access fees totaling $30.2 billion to Internet service providers by 2003, compared with $17.7 billion in 1999. Cable operators are well positioned to capture a share of these revenues.

Home Office Internet Service

Provides income-generating home office and end users efficient access to the Internet and applications.



End user needs
- Broadband access to Internet and offered applications
- Secure access to business partners
- Service easy to provision, configure and use
- Service in combination with residential services
- Access to home office when traveling

Source: Lucent

NetworkCare Speeds New Service Launches

Do we add data over cable? What are our options for digital television? How important is Internet protocol (IP) telephony for our business?

These are all questions cable operators are asking themselves as they confront the challenges of establishing a competitive broadband network in today's changing telecommunications arena. Lucent can help cable operators meet these challenges with NetworkCare Broadband Services, a full suite of service solutions that expedite the delivery of new and enhanced services such as telephony over IP, high-speed data and digital video.

Lucent's approach in providing support to cable operators is to leverage the skills and experience of over 6,000 engineers, technicians and field personnel to offer a full life-cycle methodology in deploying new services. These services range from initial consulting to training to network management and monitoring.

Traditional multiple system operators (MSOs), as well as the emerging new market of Applications Service Providers (ASPs), will benefit from the company's strategy to translate business objectives into business realities in planning, design, implementation and operation of broadband cable networks. The division, which was established last year, is comprised of business and subject-matter experts specifically chosen from the cable field for their expertise in broadband, data and telephony. This concentrated support will help operators expand their existing services, and move into areas that will help them generate additional revenues.

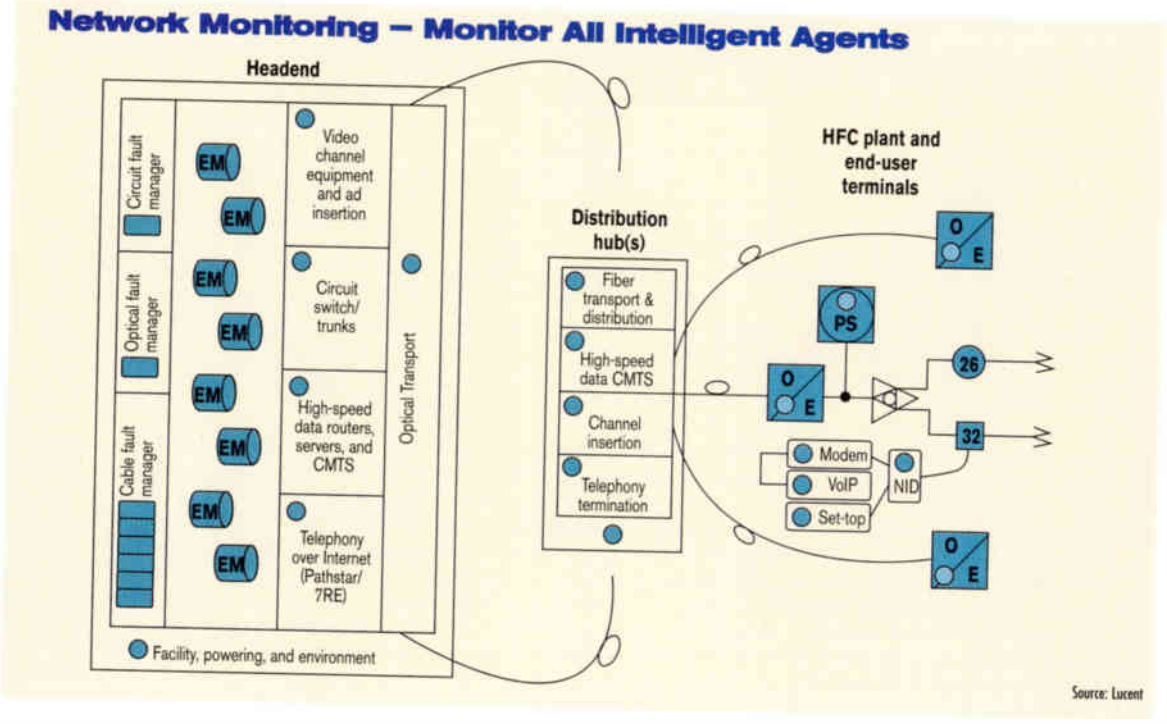
NetworkCare provides consulting, project management, network engineering and design, network performance analysis, outside plant construction, turn-up and testing, on-site maintenance, and customer training. NetworkCare Broadband Services provide deployment solutions for enhanced services that will be implemented in mission critical hybrid fiber/coax (HFC) networks, including high-speed data, voice over Internet protocol (VoIP) digital video and other data-related products.

The Basics: Deploying Your Plan

For operators to realize their business objectives, Lucent's engineering consultants can help them decide what technologies and services to deploy.

"A comprehensive and detailed business case drives the technology of the network, and ultimately, the revenue potential of the business," says H.D. (Bud) Dowdy, Jr., director of Lucent's NetworkCare Professional Service, Broadband Services Division. "Critical technology decisions that the operator must consider include one-way, two-way video only, data, IP involvement, primary-line telephony, or all of the above."

This is an era where opportunities are ripe for the broadband operator. NetworkCare personnel will assist cable operators in deciding what business plan best suits their current and future needs.



"Traditional cable operators may be faced with inadequate network architectures and technology, which impedes revenue growth available with new enhanced services. Upgrade efforts will continue to consume the operator's time and resources, but they are a necessary evil in that these efforts will ultimately increase revenue streams and mitigate competition from overbuilders (ASPs)," says Dowdy. "Many operators have already upgraded their systems from a low-bandwidth, one-way architecture to high-bandwidth, two-way systems capable of data and enhanced services deployment. These are the operators who are in the best position to take advantage of the new emerging technologies and services."

Other service options include marketing consulting, customer care and billing consulting, communications security consulting and a business organization model.

Turnkey Services: Project Management

A key part of Lucent's life-cycle solution for operators is project management. Lucent manages the critical elements of major network upgrades and rebuilds, which includes forecasting, scheduling, reporting and communicating.

Lucent and its construction partner, MasTec, perform and manage network design, coax and fiber construction and splicing. Additionally, Lucent conducts turn up, testing and certification of the outside plant and headend elements, which is critical for optimum performance. This provides a true turnkey solution to operators who desire speed to market an efficient, cost-effective deployment program.

Service Offers: Network Engineering And Design

Lucent can develop the overall performance specifications from which the new network will be constructed. This initiative begins with a comprehensive evaluation of the current outside plant and headend configurations. Lucent can recommend the size-specific network elements, identify locations and transport facilities, perform sensitivity analysis as well as a host of other service options, including network design and enhancement, site-specific design, voice and data convergence and headend design.

"When selecting elements which will make up a new-build or rebuild/upgrade initiative, Lucent's focus is on incorporating those elements that will provide the greatest efficiency, value and future-technology flexibility to the client," says Dowdy.

Planning: Network Performance Analysis Service

Broadband Network Analysis consists of a comprehensive evaluation of the outside and headend plant, typically node sites and amplifier locations, and other aspects of the network.

"Knowing the performance of your existing network is critical in deciding the rebuild roadmap," says Dowdy. "Maintenance, architecture, network integrity and upgradeability are all factors that an operator must consider when determining resources, both financial and people."

Implementation: Outside Plant Turn-Up And Testing

Following the rebuild or new build efforts, Lucent will conduct testing and evaluations, backed up with hard data to ensure that the network performs to the client's expectations. "Our benchmarks include the FCC proof-of-performance, current network performance criteria and the client's individual requirements," explains Dowdy. "The network is configured and delivered to the client as expected, no surprises."

Operation: On-Site Maintenance

Broadband networks require vigilant monitoring and the depth of critical maintenance skills. Lucent's on-site or remote technical staffs can monitor and maintain the network to ensure that it functions as the client expects.

"Because Lucent has been a partner with the client from the beginning, we have an intimate knowledge of all the network elements and how they function within the network. Monitoring certain key elements within the network yields greater efficiencies and provides much the same information as monitoring all the active elements in the network. This advantage translates into minimal down time and fewer maintenance issues. This keeps our client's customers on line and satisfied, and that keeps us satisfied," says Dowdy.

Operation: Customer Training

Today's networks are much more sophisticated than those employed 20 or even 10 years ago. To supplement the operator's staff's existing knowledge base, Lucent offers full training and development services. These services consist of performance analysis, needs assessment, curriculum development, facilitation and support.

The Final Solution

In this changing world of telecommunications, NetworkCare Broadband offers broadband operators full life-cycle development and support of their deployment needs. "Never has there been a time when broadband operators have had to face so many challenges in their business. Stockholders demand an expedient return on their investment, customers demand new services and features. Increased venture capital means more overbuilders. When operators select Lucent as their deployment specialist, they get a partner who shares the same concerns and is dedicated to providing an efficient, expedient solution which, hopefully, satisfies all," says Dowdy. "That's the value we bring to the table." •

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Official trade journal of the Society of Cable Telecommunications Engineers

2000 WOMEN IN TECHNOLOGY AWARD NOMINATION FORM

Co-sponsored by the Society of Cable Telecommunications Engineers (SCTE), Women in Cable & Telecommunications (WICT), and *Communications Technology* magazine.

Objective:

The annual **Women in Technology Award** recognizes and honors leading women in technology positions within the cable and telecommunications community and creates visibility for all women in technical careers. Each year it identifies and acknowledges the achievements of one woman who has demonstrated outstanding personal and professional growth and has contributed significantly to the industry.

To Be Eligible:

- Open to all women in a technical field of cable television, broadband, and telecommunications.
- Current national SCTE member.
- Current national WICT member.

Factors of Consideration:

- Demonstrates meaningful contribution to the industry.
- Exhibits high level of knowledge, skills, and professionalism.
- Committed to community and/or professional activities that enhance the perception of the cable and telecommunications industry in general, and women in technology specifically.
- Broadband Communications Technician/Engineer (BCT/E) Certification.
- Exhibits commitment to professional development and continuing education.
- Attends SCTE and WICT conferences.

Past Recipients:

1999	Sally Kinsman Motorola
1998	Sheri Sharp Cox Communications
1997	Yvette Gordon Sea Change International, Inc.
1996	Pam Nobles Comcast
1995	Pam Arment Pamela J. Arment Consulting

To nominate someone for this award, please provide the following information:

Name of Nominee: _____

Company: _____ Title: _____

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Why are you nominating this person? (attach additional sheets if necessary.)

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Mail or fax to be received by August 25, 2000 to:

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Phone: (312) 634-5270 • Fax (312) 634-2345

systems I've seen demonstrated use voice recognition technology so the driver isn't distracted by typing or reading a screen.) Convenience is what it's all about.

Most of the wireless technology I've mentioned falls under the auspices of Part 15 operation, which means the device operator doesn't have to be licensed by the Federal Communications Commission. That makes wireless technology all the more attractive, especially if you've ever had to go through the licensing process for, say, AML microwave installations.

And now, the other shoe

So why did I title this month's column "Wireless Dilemma?"

Well, in part because some forms of wireless technology have the potential to be serious competition. According to Gartner Group, wireless data subscribers could hit the 35 million mark by 2003.

How many of that 35 million number will be customers that we could have served ourselves had our networks been available to them? Probably a pretty good percentage. We've got the residential market covered, but cable historically has not done a good job of serving traditional business markets. Could we implement some form of wireless technology to tap into the mobile or portable markets? Perhaps.

I can think of no technical reason that we couldn't, for instance, have a wireless interface device connected to our networks at strategic locations to provide wireless connectivity for portable and mobile applications. I don't mean hanging antennas off the ends of feeder cables and radiating our spectrum throughout the ether. Talk about signal leakage! Instead, we could likely do this with much the same technology being used by other wireless services—that is, Part 15 technology in the license-free bands, something like the fiber- or coax-fed PCS transceivers that were the rage a few years ago.

Therein lies my second concern. The spectrum is filling up with Part 15 signals.

Which takes me back to ham radio.

Interference woes

A couple of years ago, while in a ham radio contest, I was operating portable equipment on a ridge at the south end of the Denver metro area. I attempted to make contact with another ham a few miles to the north. We were using the 902-928 MHz ham band, which happens to be shared with a number of users, including a

REVOLUTION

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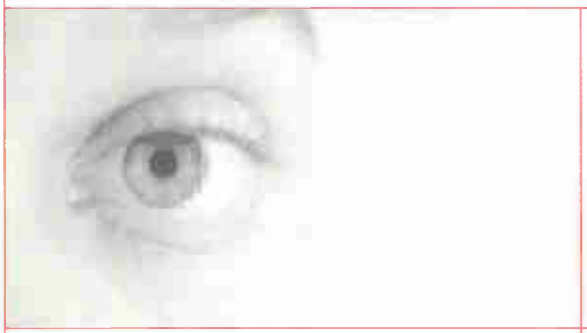

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lot of Part 15 devices. When I pointed my antenna north, the noise floor from these Part 15 devices (most of which appeared to be using spread spectrum technology) nearly pegged my receiver's signal strength meter. I called the other ham, who incidentally heard my transmissions, but I was unable to hear his response.

Communication was impossible. Can you say "harmful interference"?

More recently, I've shared correspondence with hams in northern California who operate a 2.4 GHz ham repeater in the San Francisco Bay area. (Yes, there is a ham band at 2.390-2.450 GHz.) That repeater is now virtually unusable because of the very high noise floor caused by, you guessed it, Part 15 license-free devices. This, too, is harmful interference.

Part 15 devices aren't supposed to cause harmful interference to licensed over-the-air users. When it occurs, the operator of the devices is legally responsible for getting rid of the interference.

Wireless and other Part 15 technology brings a lot of convenience and flexibility and is clearly a major player today and in the future. But if we as cable operators deploy this kind of technology and it's later found to cause harmful interference, the interference is our responsibility. Can you imagine deploying technology only to have to modify it, replace it, or even remove it if harmful interference proves to be a problem?

It can happen to you

Think it can't happen? It already has. My article "Signal Leakage and Harmful Interference: A Ham Radio Perspective" on page 80 of this issue touches on the problems with early versions of wireless modem jacks that have been found to interfere with the 80-meter (3.5-4.0 MHz) ham band. Several cable operators have had their hands full trying to track down the modem jacks and replace them with either newer noninterfering versions or with hard-wired phone outlets.

Wireless technology is not bad. Quite the contrary—I'm a big fan of what it can do. It's just that we need to pay particular attention to our responsibility as operators of license-free wireless devices that have the potential to cause harmful interference to licensed over-the-air users. CT

Ron Hranac is consulting systems engineer for Cisco Systems. He also is senior technical editor for "Communications Technology." He can be reached via e-mail at rhranac@aol.com.

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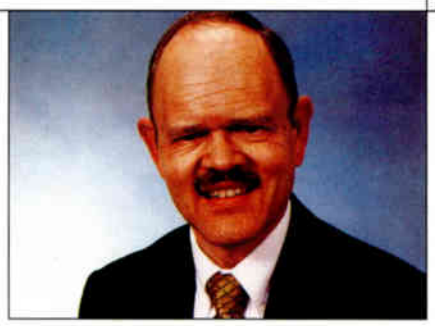


Traffic Engineering Basics for IP Telephony

Don't say I didn't warn you. More than four years ago, this column introduced telephony traffic engineering as an essential discipline for cable engineers ("How Much Wood Could a Woodchuck Chuck?" February 1996, page 22). This year at the National Show, I visited with most of the major cable modem termination system (CMTS) vendors, and they all were talking about how they had to "resurrect" traffic engineering tables and build spreadsheets as they were getting into the Internet protocol (IP) telephony business.

"Short packets are better than long packets for IP telephony because they make it through the network faster."

For those of you who don't save old issues of *Communications Technology*, that early discussion was about how to use traffic theory to determine the quantities of equipment needed to connect subscriber lines in a constant bit rate (CBR) telephony system to the public switched telephone network (PSTN). It turns out that the very same principles are relevant to building an IP telephony network. This month's column will show you some of the applications.

Earl who?

As a refresher, let's begin by reviewing some basics. Telephone equipment usage is measured in hundred call seconds, also known as centum call seconds, or CCS. The maximum time a piece of equipment can be in use during one hour is the number of seconds in an hour, or 3,600 seconds. To get the equivalent CCS, divide by 100, for a maximum usage of 36 CCS per equipment unit. This number is also called an Erlang.

No piece of real equipment realizes 100-percent usage, however, because of the need to set up and tear down calls and perform maintenance. Another reason is that it would be unusual to keep a connection up continually. Telephone calls normally are much shorter than 36 CCS per line. A more typical number is between three and five CCS per line.

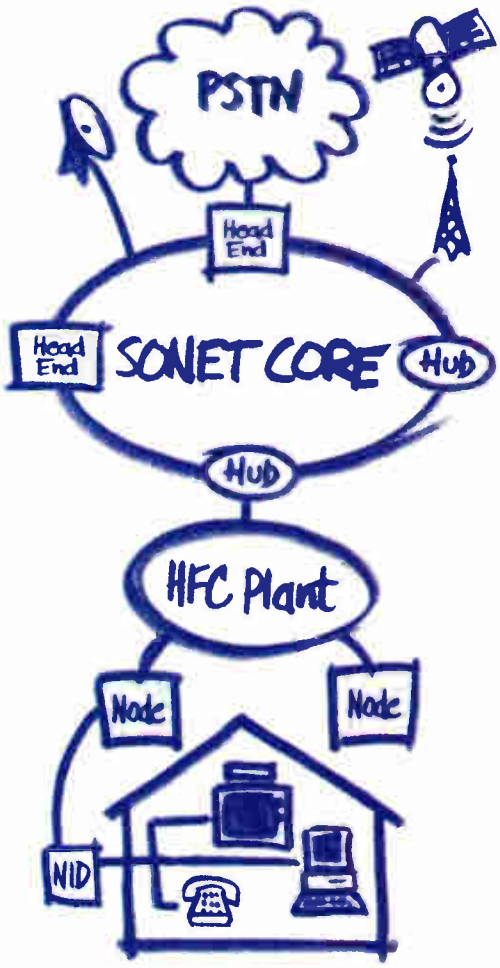
The exception (which can be significant) is a dial-up connection between a personal computer and a remote network. With cable companies offering both telephony and high-speed data, we can assume most power users will prefer to use the much faster high-speed data service for connection to a remote network. The typical dial-up data connection will, therefore, be for occasional remote workers, whose data sessions will be, statistically, considerably shorter.

Resource management

When the average CCS per line is multiplied by the number of subscriber lines, you get the total demand for resources (paths or trunks) that will be generated by the system. We could engineer a system that never blocks subscriber attempts for service, but it would be a waste of resources, because all subscribers will not be on the phone at the same time.

Instead, we use probability analysis, summarized in traffic tables, that correlates network traffic with the probability of a call blocking (not completing) because of insufficient resources. A typical blocking probability for telephony networks is P.01, which means that 1 percent of the call attempts will receive an "all trunks busy" signal when the cumulative usage of all the telephone lines is at the figure in the table. (This signal is also known as "fast busy" because the tone is interrupted twice as fast as the busy signal you receive when the called party is off-hook.)

In IP telephony, one application of CCS per line is to determine the bandwidth needed to support telephony packets. A common CMTS specification is the number of downstream and upstream channels. If you think of these channels as a set of upstream and downstream pipes that can each carry multiple streams of data, the individual streams within



As part of providing multiple services to your customers, it's important to provide multiple assurances to yourself.

convergence

As you move quickly to upgrade your plant and to satisfy user demands for converged services, there's one important fact to keep in mind: your customers have well-defined ideas about quality of service. If it's faulty in one way or another, they'll switch their access provider faster than you can say "churn rate."

In this environment, it's imperative to have the tools you need to anticipate, prevent and solve network problems. That includes everything from go/no go field-portable hand-helds that let your installers reduce the truck roll time to fast, reliable headend equipment that helps your network managers diagnose and eliminate trouble spots up and down the line – from the PSTN to the set-top box.

One thing's for sure. It's better to have the ability to identify and correct problems yourself rather than hearing about them from your customers.

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the channel "pipe" are very similar to the trunks used to carry CBR telephony conversations.

"You need to engineer for each subscriber line, not merely for each subscriber."

Standard telephony traffic tables can thus be used to determine the number of streams needed per pipe, once the number of subscribers, Erlangs of usage per subscriber, and blocking probabilities are specified. Once the number of streams is known, the total bandwidth needed for the channel can be derived for bit rates associated with a given codec, packet duration and packet bit size.

What?

OK, we moved a bit fast here. Just to be sure everyone is following the transition from telephone call paths to digital bandwidth, here are some definitions. Codecs are the combination of hardware and software that converts the analog signals in a telephone set to digital form. Typically, the digital representation of the signal is shown as a series of ones and zeros, or the equivalent electrical pulses. Each one or zero is called a bit.

Packets are groups of these ones and zeros. The number of bits per packet, and how long the equipment will take to transmit a packet, can vary. Short packets (10 msec) are better than long packets (30 msec) for IP telephony because they make it through the network faster (less latency). Less latency means better voice quality.

How the math works

Back to bandwidth calculations. Because a CMTS typically is configured for a single downstream channel and multiple upstream channels, it's easiest to see how the traffic tables are used by considering a downstream channel as an example. To do the calculations, first take the Erlangs per subscriber and multiply it by the number of subscribers to get the total Erlangs the CMTS needs to process. Telephony traffic tables can then be used to find the number of streams needed to support the calculated Erlang load at a given probability of blocking. Multiply the number of streams by the bit rate for a particular codec and packet, and you get bandwidth.

Here's an example.

Consider 400 subscriber lines, each generating 5 CCS (0.14 Erlang). You want 1 percent probability of blocking the call (P.01), and are using a G.711 codec, with a 10 msec packet (110.4 kbps data rate):

Total Erlangs = 400 x 0.14 = 55.56
Number of streams at P.01 blocking from the traffic tables = 69
Downstream bandwidth = 69 x 110.4 Kbps = 7.67 Mbps.

Remember that quite often one subscriber can have more than one line. You need to engineer for each subscriber line, not merely for each subscriber.

In the upstream direction, a common application of the traffic tables is to find the number of lines that can be supported per upstream channel of a given bandwidth. Doing this requires working in reverse from the downstream example. Divide the channel bandwidth by the codec bit rate to get the number of streams supported per channel. The traffic tables will give the total usage that can be supported by that number of streams. With total usage determined, it is a simple matter

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to find the number of lines by dividing the total usage by the average usage per line.

Choose wisely

Before leaving the subject of sizing an IP telephony network, I want to point out that the processing power of the CMTS can be just as much a constraint on system capability as bandwidth, blocking or usage. There is a CMTS parameter called the forwarding rate that limits the number of packets, both upstream and downstream, that can be processed by a given CMTS.

"Less latency means better voice quality."

Once the traffic engineering has been done, the total packets generated by the expected usage must be compared with the forwarding rate of the CMTS to verify that the CMTS will be able to process all the packets presented to it. Forwarding rates for an IP telephony system are determined by the CMTS internal processor and the CMTS architecture. Specifications range from the low 50 kilopackets per second for an individual CMTS, to megapackets per second for distributed systems.

A discussion of the pros and cons of different CMTS architectures is beyond the scope of this column, but for the time being, remember to have your vendor explain why its CMTS is capable of handling the number of packets your subscribers will present to it.

Justin Junkus is president of KnowledgeLink and applications engineering director for Antec. He can be reached via e-mail at jjunkus@knowledgelinkinc.com.

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2,000 lines a day with that," said Werner. "We expect to come close to doubling that provisioning rate with the same body count as we start to roll out flow through provisioning. Now in five out of 10 markets, we have flow through provisioning systems, which greatly increase the productivity per person."

AT&T also offers lifeline circuit switched service. "We're determined to be superior to the incumbent. We test every incumbent line before we disconnect it. We test every line of ours after we connect it, and in a number of parameters, we are superior to what the incumbent is providing both in quality and in reliability," said Werner.

Time Warner tests IP

Time Warner has taken a more measured approach to telephony. The operator uses Arris and Tellabs equipment to deliver circuit switched telephony to 4,000 trial customers in Rochester, N.Y., reported Jim Chiddix, chief technical officer for Time Warner. Although the trial has been underway for four years, the operator hasn't launched commercial service.

"We've made some choices to focus our capital—both financial and human—on getting our plant upgraded as rapidly as possible. And, we've been investing in the cable modem business," said Chiddix.

But, the cable giant *will* enter telephony. It's getting ready to add customers to an ongoing employee trial of Internet protocol (IP) telephony in Portland, Maine. "[The trial] leverages the infrastructure that we've put in place for our cable modem business in Portland, which is a very successful modem market," said Chiddix. "In the trial, we're working with Toshiba modems, Cisco cable modem termination systems (CMTSs), and a Lucent gateway. We've only had to break up a few fist fights with those players," he joked.

Although Time Warner is positioning the trial as a second line service, it will deliver a robust feature set. "The Lucent gateway implements all of the CLASS features," Chiddix noted. "And, the Toshiba modems and Cisco CMTSs... do packet fragmentation, but they don't quite yet do quality of service." Chiddix added that because the Portland system utilizes legacy modems, QoS isn't yet critical, but it will be.

Why the interest in an IP solution? "We're able to use the same infrastructure for voice that we're using for data. And we think that's important in offering a very high quality second line service, but without the very expensive standby powering," he explained. Plus Chiddix noted that an IP solution makes more efficient use of bandwidth.

"The business issues of how we're going to be in the voice business will be worked out shortly. It could be a partnership for lifeline service coupled with [IP], or it could be packet telephony alone," he said.CT

Jennifer Whalen is editor of "Communications Technology." She can be reached at jwhalen@phillips.com.

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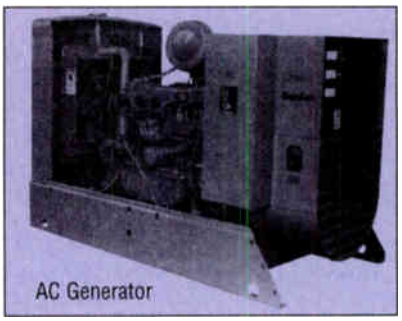

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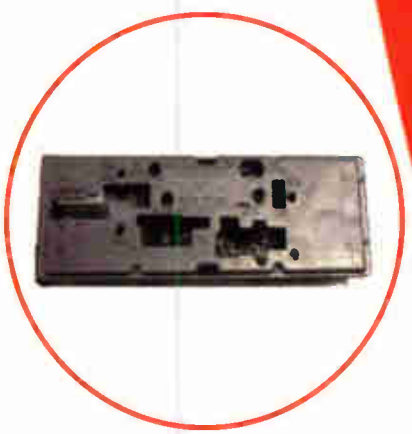

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Interactive TV

Platforms

Now the Quarterback Really Can Hear You

By Arthur Cole

So the network's been upgraded to two-way, 750 MHz or better, the head-ends, nodes and hubs are outfitted with the latest transmission gizmos, and the boss is ready to start counting all the new money. There's only one small step remaining on the road to interactivity: selecting the platform.

As you can probably guess, there are scads of systems out there, each with its own feature sets and hardware and software requirements. But probably the most important thing to know about the different platforms is that each has a unique design philosophy that will largely dictate how your system will grow and evolve in the future. That's right—before you buy now, you'd better know what you're going to need in the future.

"Make sure you have a roadmap that takes you into the latter part of this century," says Beth Loughney, director of product marketing at OpenTV.

From the consumer point of view, all of the leading platforms will provide essentially the same services: e-mail, Web browsing, interactive programming, online gaming and so forth. If any of these applications are not part of the basic platform, it most likely will accept third-party applications. All of the major systems also will communicate with the new lines of set-top boxes, provided they are OpenCable compliant. If anyone tries to tell you that OpenCable is not necessary, think twice about buying their system. All of the major set-top manufacturers—particularly Motorola and Scientific-Atlanta—are backing OpenCable. When set-tops hit the retail market, it will greatly enhance your ability to attract new digital customers if they know they can use any box off the shelf.

It's also important to note that selection of one platform does not mean you are excluded from using all or part of another. OpenTV, for example, can run ACTV and ICTV as a secondary feature set, even though the latter systems also can be used as a base level platform.

Although the systems are continually evolving, it seems that the three main base level platforms are OpenTV, Liberate and Microsoft TV. ACTV, ICTV, Wink, WorldGate and a host of others are seen largely as upper level software packages that may or may not be suitable as a basic platform. Every day, new interactive players emerge, so be warned, this is not a complete rundown of every vendor out there.

Here then is a rundown of some of the major systems.

ACTV

ACTV is available in three iterations. The basic level system that allows viewers to participate and interact with a

TV show requires only a digital set-top in the home. Like any other digital service, the headend needs to be able to pass through the service using either a satellite receiver or via fiber. The viewer essentially interacts with the programming using the memory and intelligence of the set-top.

The next step up is addressable advertising. This uses essentially the same technology as mentioned earlier, except that now the headend is outfit-

When selecting an interactive TV platform, make sure it's flexible enough to adapt to new services that may come in the future.

ted with a transport remux unit. This allows operators to insert local ads into the digital stream.

In some cases, response information may be sent to a centralized database somewhere, in which case a data circuit would need to be established between the headend and the data warehouse. This can be accomplished with a simple outbound Internet connection.

The most advanced level is called HyperTV, designed to bring about TV/Web convergence programming. Using either a Web-capable set-top or a TV set and personal computer (PC) side-by-side, the cable operator sends specialized programming through the cable plant using WorldGate, ICTV or another platform. Responses are routed back to the headend and beyond using existing return path equipment.

"We're not talking about just surfing the Web. We are creating content," says Kevin Liga, chief technology officer at ACTV. "We are a content player out there."

ICTV

ICTV has adopted a duel-client architecture that places all of the brains of the system in the headend with only basic level set-tops in the home. The company says this provides two advantages to cable operators looking to roll out digital services. First, it allows customers to get online with extremely cheap hardware, and secondly, it allows new services and greater processing power to be added without requiring customers to invest in new boxes on a regular basis.

Wes Hoffman, president of ICTV, says this is the most efficient solution because all of the processing is centralized at the headend, rather than split between the set-top and headend.

"If you split the processing, you lose some of the interface characteristics

with the application," he says. "For Web browsing, if anything happens in the (headend-based) browser environment, the worst thing that happens is the customer is turned away. If the application is running from the set-top, you now have to reboot the box."

ICTV uses the ISX-2000 headend system, a rack-sized unit that contains up to 45 PC modules running Windows applications, such as Internet Explorer, located in the system's content server. The package also uses an NT server for data management and storage.

Hoffman says that a pair of ISX-2000s requiring only two racks of space in the headend will serve upwards of 50,000 customers.

Liberate

The Liberate platform is extremely flexible in that it will work across all manner of infrastructure and set-tops. This lets the operator decide how much intelligence to locate in the home or in the headend. The system runs on off-the-shelf Sun or Windows NT servers and utilizes most of the common Web standards: hypertext transfer protocol (HTTP), hypertext markup language (HTML), JavaScript and so on.

One of the unique advantages to Liberate is that it allows users to mix and match different set-tops in the home: an advanced DCT-5000 in the living room, with the simpler DCT-1000 upstairs, for example.

Company executives say this flexibility will help operators better manage their systems in the long run.

"The server-side solution has a problem as more customers use the service," says Steve Weinstein, chief technology officer at Liberate. "If you want to maintain that rich experience, increas-

BOTTOM LINE

> **Get Interactive**

Although all the interactive systems on the market are relatively similar as far as consumer features go—e-mail, Web browsing, interactive programming and so forth—or at the very least can import third-party software applications, there are a number of differences in the way each system impacts the headend and the network architecture.

When evaluating the platform offerings, consider how you want your system to look in the future. Will you place all your intelligence and processing power in the headend, or rely on consumers to invest in ever-smarter set-tops? Which operating system do you want to use? And do you want to split additional revenues with your system vendor or pay for the entire package up front?

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TABLE 1 INTERACTIVE TV IN THE UNITED STATES

Vendor	Operator	System location
ACTV	None in the United States	
ICTV	Bresnan	Various locations
	St. Joseph Cablevision	St. Joseph, Mo.
Liberate	Insight	Various locations Various trials among Cox, Comcast and Media One systems
Microsoft	None	
OpenTV*	None	
Wink	Time Warner	New York
	Charter/Cox	Los Angeles
	Charter	Fort Worth, Texas; St. Louis; Bay City, Mich.; Kingsport and Morristown, Tenn.; Birmingham, Ala.
	Comcast	New Haven, Conn.
WorldGate	Comcast	Philadelphia
	Buckeye CableSystem	Toledo, Ohio
	Charter	St. Louis; Maryville, Ill.
	Bresnan	Various locations

*OpenTV has not announced any cable deployments in the United States, but claims to serve more than 2.8 million cable and satellite set-tops in Europe, the Middle East, Africa, Asia and Australia. The company has launched with EchoStar in the United States.

ing take rates become a bad thing."

Liberate also is unique in that it provides a broadcast, rather than point-to-point, service when it comes to interactivity.

"We're not trying to duplicate the Web," Weinstein says. "A broadcast model saves bandwidth going to the box and to the servers, and there's no impact on the system if 10,000 people all want to view CNN."

Microsoft TV

This one is largely an enigma because few people have actually seen it. (Can anyone say "vaporware"?) The company is looking to leverage the WebTV product, which uses phone lines for the return path, into an interactive cable system. But so far, all we are told is that it will consist of a client-software package for TV, and set-top systems and a server system for the headend.

The server is to be based on the Windows 2000 operating system, along with Microsoft SQL Server 7.0 and WebTV software. The system will support Advanced Television Enhancement Forum (ATVEF) specs, along with the usual HTML, HTTP, JavaScript and Data Over Cable Service Interface Specification (DOCSIS) standards.

Microsoft officials were unavailable to comment on the system.

OpenTV

With a host of installations throughout Europe, Asia and Africa, OpenTV has a lot of experience in real-world cable TV applications. However, the company has yet to announce a U.S. rollout and is essentially starting from scratch in this market.

Hardware-wise, the basic OpenTV package requires installation of the OpenTV Frame Moving Picture Experts Group (MPEG) encoder that converts different file formats such as tag image file format (TIFF), graphics interchange format (GIF), Joint Photographic Experts Group (JPEG) and such into MPEG stills for display on a TV screen. But for a true interactive experience, most operators will want to install the OpenStreamer system that allows interactive content to be delivered using standard digital cable equipment. With this software, data that is multiplexed with audio and video can be updated in real time for instant transmission of sports scores, stock quotes and so forth.

OpenTV works with off-the-shelf hardware and fits into existing infrastructures and system architectures.

"Most operators have already made the decision on what they want their infrastructure to look like," Loughney says. "We don't want to make that decision for them. We've already integrated with operators all over the world, and we've seen some pretty strange configurations."

OpenTV also provides an authoring tool set for content providers to develop all manner of interactive applications.

Wink

The one unique aspect about Wink is that it really isn't unique. It incorporates features and systems found in nearly all of the other interactive systems. Wink authoring tools are used to create enhanced programming, and the Wink Broadcast Server inserts this data or uniform resource locator (URL) links into the video stream. All that is required at the headend is a server, if the operator is interested in providing local content, and an interface to a centrally located Wink Response Server to reply to interactive commands.

Wink is mostly interested in providing interactive network services, so the company isn't really picky about which client software or protocols are used.

"In the long run, we don't care whether operators deploy an ATVEF client or a Wink client or some other, as long as we can provide our network services," says Allen Thygesen, executive vice president of sales and systems development at Wink. "We don't really want to be in the business of fighting over which protocol anyone should be using."

> Getting the Gear

For more information on the companies and offerings mentioned in this article, check out the Web sites listed here.

ACTV
(212) 217-1600, www.actv.com

ICTV
(408) 364-9200, www.ictv.com

Liberate
(650) 701-4000, www.liberate.com

Microsoft
www.microsoft.com/TV/

OpenTV
(650) 429-5500, www.opentv.com

Wink
(510) 337-2950, www.wink.com

WorldGate
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WorldGate

WorldGate also has a system that centralizes the intelligence at the headend under what it calls an "Ultra-Thin Client" architecture. As noted earlier, this reduces the cost of set-top hardware and makes it easier to add new services.

WorldGate's Channel HyperLinking technology offers real-time connectivity to Web sites related to the programming being viewed. Not only does this offer possibilities for additional ad revenues, cable operators may even charge portal and transaction fees and receive additional revenue for banner ads, search engine capability and chat services.

Like the other centralized services, more users will eventually lead to more hardware at the headend as more CPU cards are added. However, when compared to what will be required for video-on-demand (VOD) operations, WorldGate will take up very little space in the headend.

"There's no integration (of systems) required from the cable operator," says Ed Lee, vice president of operations at WorldGate. "Backend support is supplied by us. If a cable system runs into any trouble, they can place a call and get a quick resolution."

Wrap up

Clearly, there's more to these systems than can be explained in a single magazine article, and every cable system will have unique features that engineers will want to keep in mind when evaluating the various platforms. But because most of these systems are based on off-the-shelf hardware and are compatible with OpenCable and other networking protocols, there probably isn't a system in operation today that couldn't run any one of these packages without a little software tweak here and there. CT

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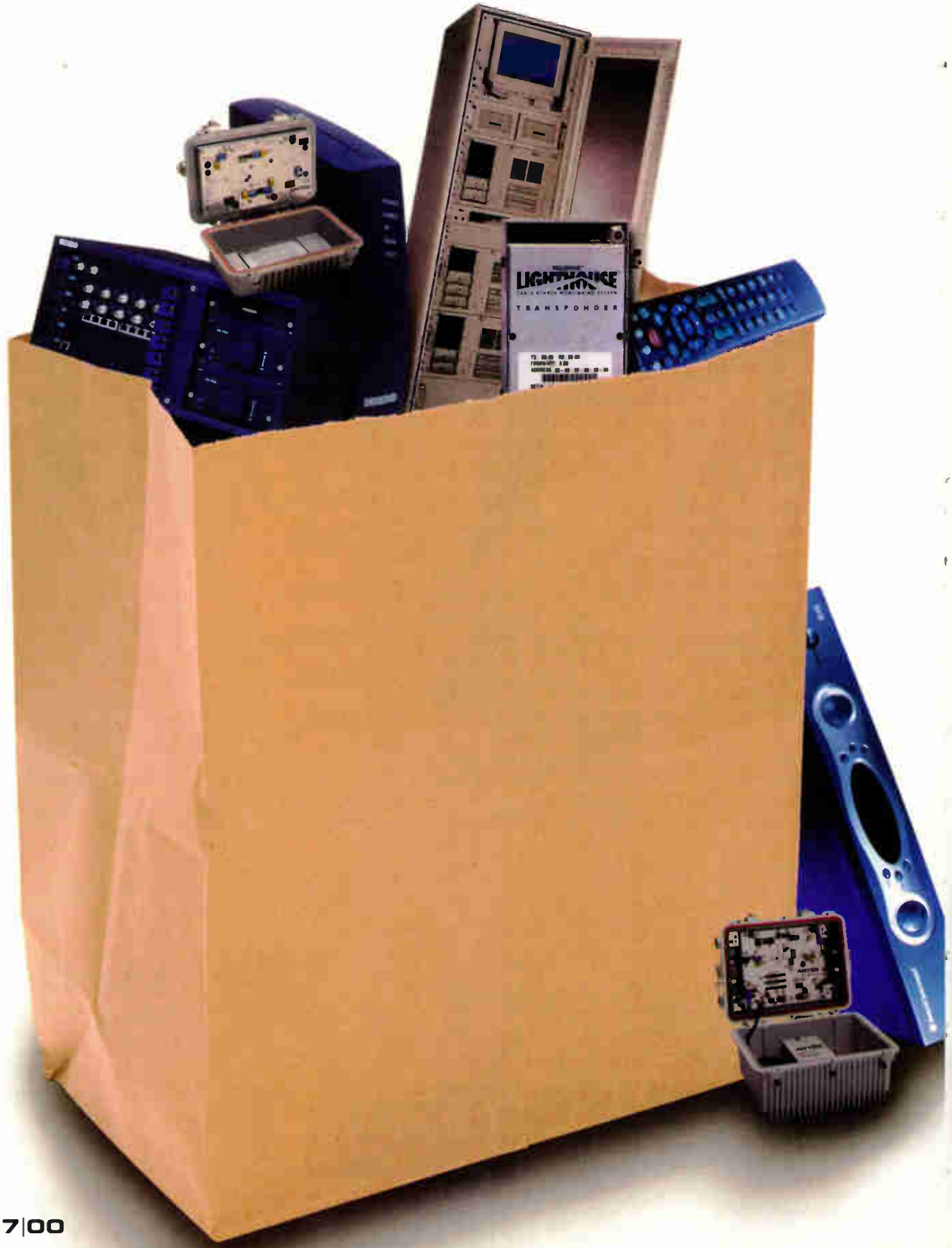

Management Chaos

Get All Your 'Stuff' in One Bag

By Bruce Bahlmann

You say you want network management? You even have a network operations center (NOC) and a growing number of things to watch on computer screens? Great. But what does all this information mean?

As a growing number of monitoring systems roll through your doors, ask yourself this question: "Do we have the staff to constantly watch all these systems as well as the capability to consolidate all this information?" Even if you can answer this question with a highly confident "yes," there is probably something in the back of your mind saying "but what if ...?" For now, we will assume that you also have the space available in your NOC to house all these monitoring systems.

To monitor or not to monitor isn't the question—you've got to monitor! The question is, are the network management requirements that we (as an industry) provide to our vendors in line with our need to consolidate? Broadband providers offer many services that just happen to traverse the same transport. So why do we resort to using multiple network management systems to monitor them? The answer lies in how much information we require of any one network element.

Proximity drives the Need for information

The further your operational responsibility is away from any one network element, the less information you need to maintain it. Thus, network management systems provide various levels of information about each network element they monitor to accommodate the spectrum of its users. The levels of information provided can range from merely confirming operation to detailed operational data (such as that used for troubleshooting). Users of these network management systems traverse these

By using a standards-based network management system, you can reduce your monitor count.

various levels of information by "drilling" down to their desired level of detail.

The need to monitor any one network element can go beyond merely providing a means of troubleshooting or confirming operation. An example of this is when vendors use monitoring to trigger corrective measures such as fail-over. This level of monitoring is closest to the network element, requires the most intimate knowledge of its operation, and often is extremely proprietary.

So how much information Do you really need?

Start with your most basic needs and work up. You need to handle fail-over and troubleshoot, and also confirm operational status. How you meet these needs may involve one or more different systems. But be careful: You can "over-monitor." Over-monitoring occurs when several network management systems query the same network element. Over-monitoring can cause network bottlenecks, performance degradation or even intermittent outages. Ideally, if a single network management system could provide all these functions, you wouldn't have to worry about over-monitoring and would be able to drill down to nearly any level of detail.

The reality of the matter is that not all your vendors will agree to open up their hardware to standard network management systems. They can't—to do so would require them to divulge the intimate details that probably made you select their product over those of their competitors. In addition, any supported, automated fail-over functionality is likely dependent on a specific network management system. (That is, the two are coupled.) So even in the unlikely event that the vendor hands over its element manager (which contains the intimate details of its equipment), chances are the network management system that it's tied to will be ill-equipped to provide you with a complete network management solution.

Somewhere between over-monitoring and using only vendor-provided monitoring lies the solution. This hybrid ought to allow for you to maintain fail-over as well as troubleshooting via vendor-provided equipment, but also gives you a "bird's-eye" view of your entire system. Let's look into several items that can help you achieve a consolidated and cost-effective network management strategy.

What to look for

Standards-based network management equipment: When vendors show you any type of production-critical equipment, ask if it's SNMP capable. SNMP stands for simple network management protocol. It is a universally accepted means of monitoring equipment on a network.

If the equipment is SNMP able, ask the vendor if the system's management information base (MIB) is freely available. The MIB provides the index(es) for SNMP to access particular information from the equipment connected to a network.

If an element manager is available for the equipment, this would be your best option because element managers can be loaded into your network management system. This allows you to monitor and manage the equipment without requiring you to purchase another computer, operating system, software and so on. It also allows you to make more informed alarm decisions because you have more information available when a problem is detected.

Platform independence: Much equipment that's purported to be network manageable operates in a closed system, meaning that in order to access the information or change the monitoring elements, you need to use customized equipment and software developed by the vendor. This has several implications, both positive and negative.

Custom software (not entirely based on something off-the-shelf or standardized) can provide highly customized information including things that are particularly important to cable operators. Problems can occur when you try to consolidate this equipment with other standards-based equipment. When the two are combined, you end up losing capability.

One could argue that perhaps you do not require all the bells and whistles of this custom software or equipment and would gladly exchange it for something that would reduce your monitor count and allow you to correlate multiple alarms. Platform independence will allow you to use equipment from several different vendors as well as allow you to seamlessly migrate to more advanced equipment as it becomes available.

The client software you use to access the network management information also must be platform independent. Web browsers are very popular candidates for network management clients; they are inherently platform independent and typically installed on most computers. Being able to utilize a Web browser to access your network management system eliminates compatibility problems that result from changing network management server and client software releases.

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ing. If a region does not have the staff to explore additional monitoring items via coordination from the enterprise NOC, it should at least maintain the standard (but growing) list of items maintained by your enterprise NOC.

Know your equipment: Experience with equipment is one of the best ways to increase detection and proactive repair of potential problems. This requires time and information sharing, such that as new information is learned about potential problems, it can be distributed to others so all can benefit.

Setting up lines of communication, documentation and distribution processes among various monitoring locations to share information gained is sorely lacking in modern-day network management organizations. This forces each location to independently learn what other locations already know.

Scalability: Seek out a top-level network management system capable of overseeing all of your network elements. Scalability and performance of this machine are crucial, so think ahead as to what equipment might be added, and gauge your purchase accordingly. Note that per the standardization item mentioned earlier, you may not have any choice in what network management system you need to purchase. By choosing the recommended standard system, you benefit from lessons learned at other locations and have the ability to share your discoveries with others.

"Over-monitoring can cause network bottlenecks, performance degradation or intermittent outages."

Less is better?

Seeking a network management system that provides fundamental operational status and enough detailed information to troubleshoot is perhaps "good enough." Where network management systems seek extreme details, they become increasingly proprietary.

So when comparing similar equipment that requires network management, express your interest in monitoring it from your existing network management system, rather than the one provided by the vendor. This will allow you to begin your journey towards consolidation. CT

Bruce Bahlmann is senior systems engineer for MediaOne's Internet Services Group. He can be reached via e-mail at bahlmann@bigfoot.com.

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The Face of Cable Is

New Technologies, Services Lead the Charge

by Jennifer Whalen and Jonathan Tombes

Daniel Sommers, president and CEO, AT&T Broadband, is bullish on telephony.

Vendors showed off the latest in broadband software and hardware at Cable 2K.

Photos courtesy of Oscar and Associates.

Jerald Kent, president and CEO, Charter Communications, sees new revenue opportunities.

Robert Sachs hit the nail on the head when he chose "The Face of Cable is Changing," as the theme of his opening address at the National Cable Television Association's (NCTA) Cable 2K show. Whether you attended the general sessions, perused new technology on the exhibit floor or partook in the technical sessions, you couldn't get away from cable's growing presence in telephony, high-speed data, and digital interactive television.

In case you're wondering, all that effort to upgrade your plant to launch new services is paying off. "By year's end, 75 percent of cable systems in America's largest cities and smallest towns will be at least 750 MHz, and fully two-way," noted Sachs, who is NCTA's president and CEO.

New service sales skyrocket

Customer growth for new services is staggering. "During the first three months of this year, cable operators added nearly 1.1 million digital video customers. That means we'll exceed 10 million digital video subscribers by the end of this year—or double the number we had on January first," he noted. What's more, penetration rates are growing strongly. AT&T Broadband has lured nearly 2 million digital video customers to its service, a 15 percent penetration rate. But some systems have even higher digital penetration rates—30 percent in Denver and nearly 40 percent in Tacoma, Wash., Sachs said.

Changing

Attendees surge into the exhibit hall at NCTA's Cable 2K show.

Robert Sachs, president and CEO, NCTA, praises industry upgrade progress.

James Robbins, president and CEO, Cox Communications, touts customer service.

It's not just digital video showing stellar growth. High-speed data continues its meteoric rise. "During the first three months of this year, cable operators added 445,000 high-speed Internet customers," Sachs noted. Again, penetration rates are promising. MediaOne's Boston market sees data penetration exceeding 10 percent of cable customers, while Time-Warner's Portland, Maine, market has over 22 percent penetration.

Cable's leading executives agree with Sachs. "Every day we add 6,000 new product units in our company, that's 36,000 a week," said Daniel Sommers, president and CEO of AT&T Broadband, during the "Smooth Operators" panel discussion. "We'll have over 2 million new product units this year."

When Sommers talks about "new product units," he's not necessarily talking about new subscribers, but rather how many products each customer buys. "We used to be a one product industry, but now we're a four or five product industry. Now our average customer takes about 1.5 products. I think in the future, we'll see that increase significantly to 2, 2 1/2, 3, particularly as we more effectively bundle products."

All those new products and services translate into big dollars for cable operators. "I've been in this business for 17 years, and I've never seen more opportunity for additional revenue streams," said Jerald Kent, president and CEO of Charter. "We have the best delivery mechanism. DBS, phone companies, they can't compete in the long term with the speed, capacity, and more importantly interactive capabilities that we have over our broadband pipe.... At the end of the year, Charter should be generating approximately $300 million in additional revenue over and above the regular analog business from advanced services."

Don't forget telephony

Although many cable operators have been focusing on deploying digital cable and high-speed data services, cable telephony is poised for significant growth. More than 400,000 customers now buy telephony service from cable operators, said Sachs, who noted that research from Arthur D. Little projects that cable could eventually grab 30 percent of the local telephony business. (See related NCTA story on cable telephony on page 50). "[Telephony's] a great product and a big winner. We're showing 30 percent year-over-year cash flow growth in markets where we've been a while," said James Robbins, president and CEO of Cox Communications.

Still, deploying voice service is not an easy task. AT&T took a bit of heat for its ambitious telephony forecast of having 500,000 customers by year's end. It reported only 40,000 phone subscribers at the end of the first quarter.

"We walked out of 1999 adding about 50 new telephone customers a day. We're now in excess of 650 new customers a day, pushing to 700," reported Sommers. "We were at 55,000 customers at the end of April, and we will hit somewhere between 400,000 and 500,000 by the end of the year."

What do others think of such lofty goals? Robbins believes AT&T will hit its projections. Cox has been in the forefront of rolling out circuit switched cable telephony.

"I know what [AT&T's] going through. We've been there. We've put 135,000 phone customers on. We're getting about 3,000 a week," said Robbins. "The demand is there. It's a matter of our being able to execute, follow through, and get the people on the ground and the back office [in place]. It's a much more complicated product that video. Once you get all those things in place, you can scale it quite quickly."

Look for improved Excite@Home service

Telephony isn't the only challenge facing AT&T. With the company's acquisition of Cox's and Comcast's shares of Excite@Home, comes the challenge of tackling nagging customer service problems. As popularity of cable modem and all forms of high-speed data service increases, delivering a high quality service is essential.

Excite@Home added 91,000 data customers in the first quarter, and another 2,000 or more come online each day. "We need a robust, high quality platform to deliver the best service to our customers. We're in a huge fight with DSL," said Sommers. "The three of us agreed that it was best to take the expertise that AT&T has in networking and operating transport platforms ... and work more closely with [Excite@Home] to clear up the issues."

"The reality is that AT&T can jazz up the service quality faster than anybody else," said Brian Roberts, president of Comcast. "We've not split a node in all of Comcast, and we're coming up on 200,000 cable modem customers. So it's not the cable plant that's causing any of the service problems. These guys will fix those problems."

Robbins agreed. "There had been some slippage in levels of service, that I felt—as a company very focused on customer service— were very unsatisfactory," he added. "I applaud what Dan and his people are doing to turn [Excite@Home] into much more of an operational company."

Fears for the future

So what makes these cable industry leaders sweat at night? Although answers varied, most could be tied back to meeting demand for new services.

"I worry most about satisfying our customers," revealed Sommers. Charter's Kent echoed that theme. "Taking care of customers is number one," he said. "And that an earthquake hits Taiwan, and I can't get anymore digital boxes."

"Execute, execute, execute on the promise," said Robbins. Failure to deliver new services is a sure way to disappoint customers.

James Dolan, president and CEO of Cablevision, stressed the need for back office systems and called for help from Cable Data and Lucent's Kenan Billing Systems. "What really makes me sweat.... is that all the other parts of the technology that this industry has will be ready to be deployed at the end of this year, but we're not going to have a back office for it," he said.

The latest on digital

Although the panel of cable CEOs didn't have a chance to discuss digital and interactive television, the topic was hot at NCTA. (See related story "Deal-Making Frenzy Hits Interactive TV" on page 12.) Speakers on the panel "Digi-Hear the Latest" showed that the digital platform is a work-in-progress. Key players disagreed about this industry's drivers and demonstrated that collaborative efforts continue to define this evolving business.

In general, the eight executives of this panel were largely enthusiastic over advanced television, but not quite unified over the question of what's driving the digital television space.

Hal Krisbergh, chairman and CEO of WorldGate Communications, weighed in on the side of interactive services. He called access to the Internet "the largest opportunity facing the cable industry today." However, John Sie, chairman and CEO of Encore Media, argued instead that movies were the industry's biggest driver.

Playing to concern over the "digital divide" that U.S. policymakers are trying to bridge, Krisbergh trumpeted WorldGate's collaboration with Charter Communications and the city of LaGrange, Ga., in providing free Internet access to every cable home.

Krisbergh also said that the numbers make sense, with cable being able to provide Internet service for less than $10 a month, and subscribers generating 30 cents to 40 cents a click, or $22 a month related to clicking.

Attendees got to test new technologies first hand at NCTA's Cable2K show.

On the other hand, Encore's Sie argued that:

- The general public (according to the Yankee Group) wants movies.
- Movies are the primary draw for direct broadcast satellite (DBS) subscriptions.
- Two-thirds of the nonpremium cable base has monthly video rental expenses.

Sie ran his own, cautionary numbers, saying that cable operators need one and a half digital subscribers for every new DBS sub. "DBS is 100 percent digital, and has a five-year lead over cable," he noted, urging cable to "shoot for full digital."

Building other bridges

As if impelled by a centrifugal force, players on the digital platform tend toward partnerships and alliances. In addition to bridging the "digital divide," WorldGate is closing the gap between Silicon Valley's fat-client and cable's thin-client approach to digital architecture, Krisbergh noted.

"The PC side is beginning to recognize the value of the thin-client approach," Krisbergh said. In fact, at the show WorldGate formally announced plans to integrate its Internet on EVERY TV service with the Microsoft TV Platform on the Motorola DCT 5000 digital set-top box.

ACTV, an interactive player that champions "individualized television," also demonstrated digital's extraverted nature. ACTV's Chairman and CEO William Sanders said that partnerships with Motorola and Liberty Livewire, a unit of Liberty Media Group, had resulted in intellectual property covering local advertising and also provided ACTV with a series of post-production facilities.

ACTV and Motorola are planning to launch a targeted advertising unit called Digital ADCO International. In a post-show announcement, ACTV reported that middleware provider OpenTV would be joining Digital ADCO.

A decision to work with one player, however, can be a decision against someone else. TV Guide's partnership with video-on-demand provider

SeaChange International is a case in point. "It's not possible to integrate with everyone," explained TV Guide's President and COO Peter Boylan. TV Guide makes an electronic program guide (EPG) for the cable industry.

And not everyone wants to collaborate in the same way. Gemstar International's planned acquisition of TV Guide, following years of lawsuits, revealed to Boylan that "there really was no silver bullet out there."

In other words, the lucrative digital screen is contested property. Gemstar holds—and has been vigorously defending—numerous patents for program guide technology.

IP transport variables

If you wanted technical advice on how to deploy some of these advanced services, you only had to attend the plethora of technical sessions that NCTA sponsored. In the session "Screaming Streaming: IP Beyond Posted Speeds," cable's leading engineers tackled the issue of Internet protocol transport for streaming.

IP streaming is complex. Not only does IP come in several flavors, but it also can be accessed by various means, must respond to increasingly complex demands, and coexist with the complementary Moving Pictures Expert Group (MPEG) compression standard.

Those streaming options now include MPEG-4, whose novel "object-oriented" capabilities are revenue enhancing. Of course, IP transport promises its own revenue streams. MPEG-4 uses MPEG-2 transport protocol.

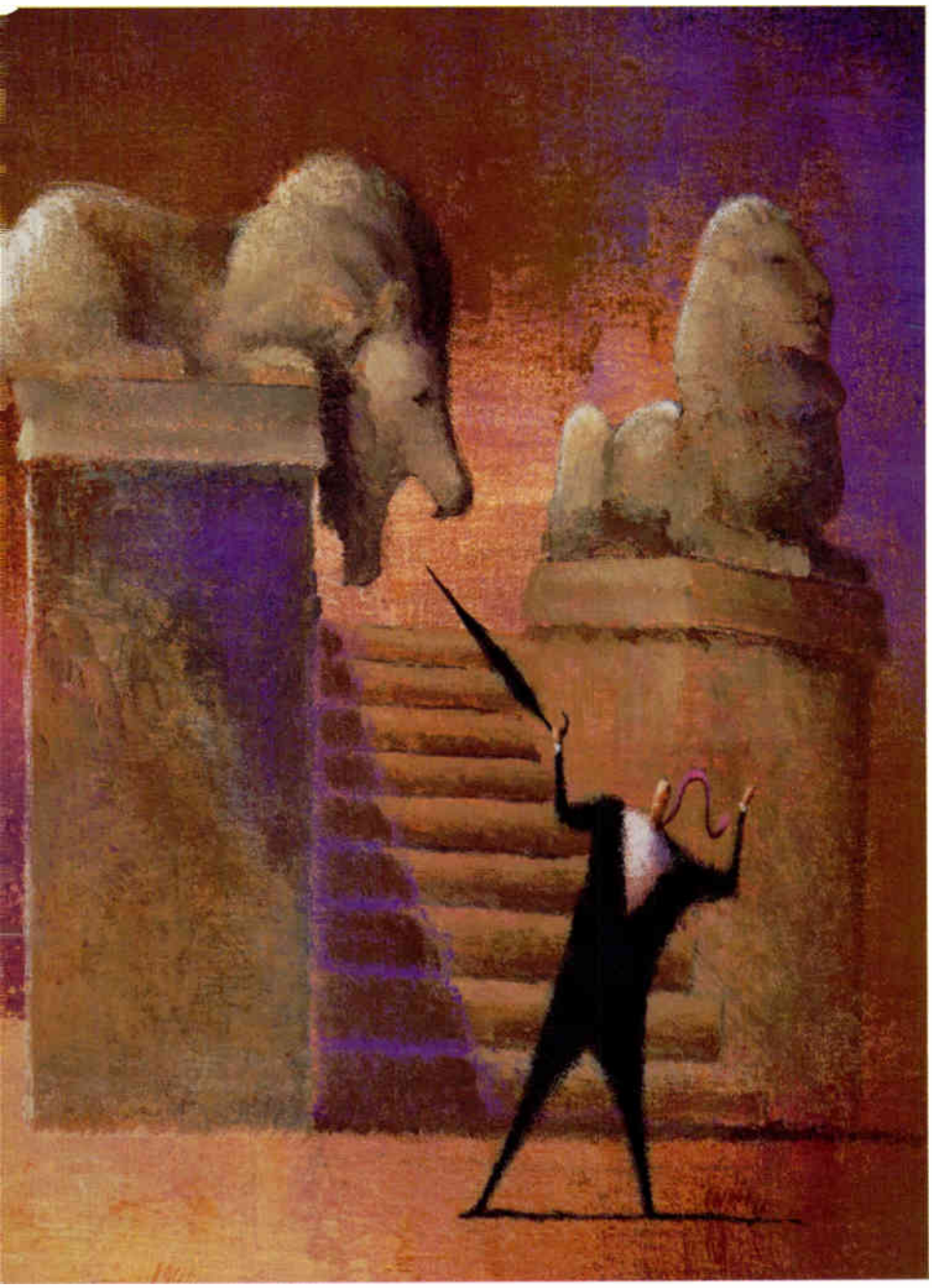
Mukta Kar, senior member of technical staff at CableLabs, negotiated through this thicket, noting that MPEG-2 transport efficiently broadcasts MPEG-compressed audio/video and private data, while IP connects to the Internet, the world beyond the cable intra-network. Both are important to cable business and will coexist, she concluded, "'til one prevails."

But the question is not just IP vs. MPEG. William Wall, Scientific-Atlanta's technical director for subscriber networks, discussed three types of IP delivery: out-of-band IP, Data Over Cable Service Interface Specification (DOCSIS) and in-band IP. He advocated the relatively newly implemented in-band IP, noting especially its frequency agility, friendliness on open access issues and inherent quality of service (QoS) features.

Other speakers had more pointed proposals. Paul Herr, vice president of marketing for Wegener Communications, anticipates bottlenecks in terrestrial IP access systems and said that the best way to push rich media content to the network's edge is with a "distributed architecture using satellites."

Chia-Chang Li, Lucent Technology's technical manager for cable network planning and modeling, addressed, from a network design

Tame new switching and routing technology for next-generation networks.



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Interactive television was hot at Cable2K.

perspective, the million-dollar question of how to manage access bandwidth to accommodate multiple services with diverse bandwidth and other requirements, such as minimal delay in voice services.

Li's answer? Lucent's Cable Network Engineering Tool (LuCNET), which uses inputs such as traffic demand, network topology, service definitions and performance objectives, in order to design a cable network that "minimizes equipment cost while still satisfying necessary performance criteria."

Applied technology

Any efficient and advanced cable network depends upon both engineering and business smarts. That goes for whether an operator is simply increasing plant efficiency, providing telephony or video-on-demand (VOD) or becoming an application service provider (ASP). In the session "If You Build It...," panelists discussed how creative deployment of applications and network architectures can yield new revenues.

Pablo Martinez, distinguished member of technical staff at Lucent, said that operators should look beyond Internet access and e-mail to new services that appeal to telecommuters, small office home office (SOHO), and medium business customers. In other words, he proposed that cable operators become application service providers (ASPs).

Martinez's business model suggests various entry points in the ASP value chain, a partnership approach to service provisioning, either a Web- or thin-client-based service delivery architecture, and a network architecture hosted in data centers. His business case shows an initial investment of about $2 million, with simple applications and limited growth, generating $41 million in cumulative discounted cash flow in 10 years and breaking even in three.

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Other speakers ran the numbers on telephony and VOD. Lucent's Jay Proano said that operators who want to combine data and telephony networks for efficiency sake have three options: a circuit-based overlay, an interim network-based call signaling gateway (NCSG) and a full IP solution.

On equipment costs alone, the full IP solution has the lowest price per sub across a range of passed households. The interim solution, however, which leverages an operator's existing investments, beats the circuit-based overlay. Adding in operating costs further drives up the costs of the overlay solution, which requires two full networks.

As for VOD, John Trail, Harmonic's director of product line management for transmitter systems, cited numbers offered by SeaChange Vice President for Interactive Technologies Yvette Gordon in 1998 and argued that open standard conditioning, centralized hardware and dense wavelength division multiplexing (DWDM) would allow operators to exceed those cost targets.

New products galore

The fun didn't stop with the technical sessions. Vendors were out in force on the show floor displaying all manner of broadband hardware and software. If you were looking for new set-tops, interactive applications, provisioning platforms, telephony gateways, cable modems, or anything else necessary to deploy today's advanced broadband services, you were in luck. Check out *Communications Technology*'s Marketplace on page 122 for a sampling of products on display. CT

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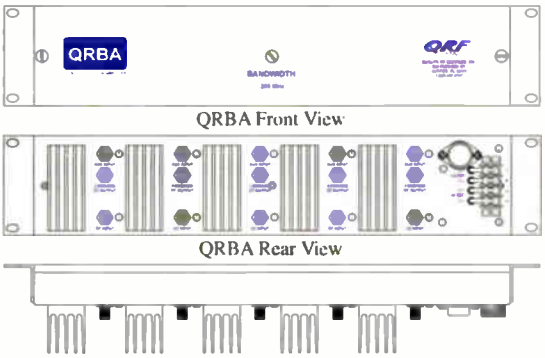

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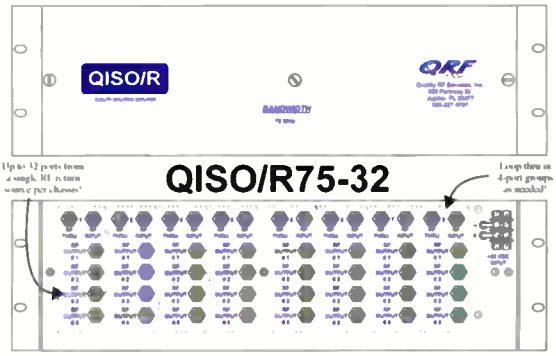

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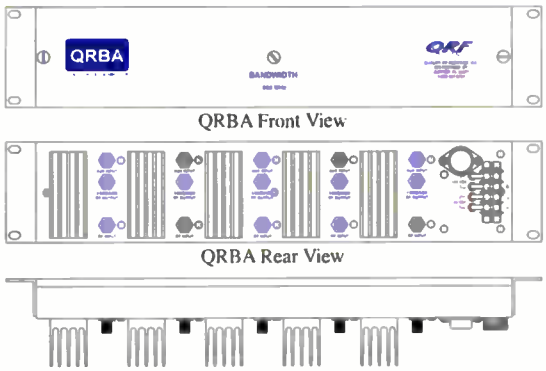

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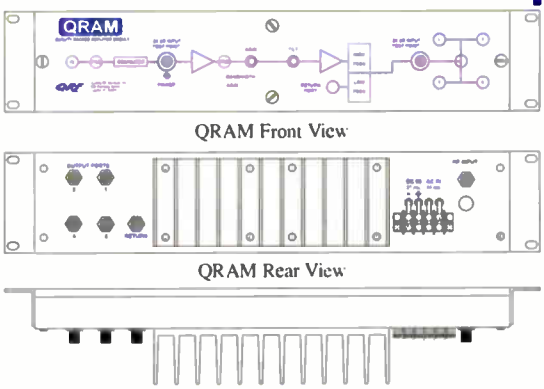

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Signal

Leakage & Harmful Interference: A Ham Radio Perspective

By Ron Hranac

The Federal Communications Commission's signal leakage rules, found within Part 76, have been with us for many years. If you've been in the industry long enough, you no doubt remember mid-1990, the time when a new, tougher version of those rules, including such things as the cumulative leakage index (CLI), went into effect.

Our industry has largely done a good job of keeping leakage under control, and a nice side benefit has been better performance from our networks. Two-way operation has forced us to tighten our plants further as we battle reverse path ingress. This has in many instances resulted in even better leakage performance.

Even so, signal leakage is an ongoing battle, ranging from craftsmanship problems (the infamous loose F-fitting) to outlets sloppily installed by subscribers. To make matters worse, now and then I run across a situation where leakage monitoring and repair land on the back burner, and I've even seen a system or two that had no signal leakage program in place at all.

Thank goodness these are exceptions rather than the rule. Still, you'd think that by now compliance with Part 76 would be second nature—and for the most part, it is—but leakage gremlins probably always will be with us.

Leakage limits

§76.605(12) of the FCC's rules is very clear about just how much RF is allowed to leak out of our systems. For frequencies less than and including 54 MHz, and over 216 MHz, the leakage limit is 15 microvolts per meter (µV/m) at a 30-meter (about 100 feet) measurement distance. For frequencies over 54 MHz up to and including 216 MHz, the limit is 20 µV/m at a three-meter (about 10 feet) measurement distance.

Most of us perform leakage measurements in the midband, so the latter spec applies. That means any signals leaking out of any part of the system—headend, distribution network or drops—over 54 MHz through and including 216 MHz must not have a field strength that exceeds 20 µV/m three meters from the system. Given that you probably make your measurements in the 108-150 MHz range, the maximum equivalent half-wave dipole level is in the -41 to -44 dBmV range, depending on the actual frequency of measurement.

If you operate a two-way network, you know that the FCC's leakage lim-

Mobile ingress source: This is a close-up shot of the ham transceiver in the author's Jeep. This diminutive radio (note the phone jack-type microphone connector near the lower right bottom of the radio (actually an RJ-45 connector)—can transmit 100 watts on all of the ham bands from 160 meters through 6 meters, and 10 watts on 2 meters.

its are nowhere close to being tight enough for successful upstream operation. Every leak is a potential ingress point, where over-the-air interference can leak into the system and mess with your signals. Most two-way system operators must keep leakage at or below 5 µV/m to minimize ingress.

Damage-control options

But what happens if you get a call from a ham operator complaining about possible leakage interference to his or her radio communication? How do you handle that? Here are two checklists for you and your system staff.

What not to do:

- Tell the ham operator your system complies with the FCC's signal leakage rules and your plant's perfectly legal.
- Ignore the ham, hoping the complaint will go away.
- Don't return phone calls.
- Get confrontational.

What to do:

- Take the complaint seriously.
- Respond in a timely manner.
- Work with the ham to resolve the interference complaint.
- Educate your customer service reps, installers and technicians about the seriousness of interference complaints.

Why two checklists? Because in a few interference cases with which I've been involved, system personnel did everything on the "what not to do" checklist. It's much better to foster an atmosphere of cooperation to resolve interference problems. After all, ham operators are licensed to use the over-the-air spectrum, and signal leakage has the potential to disrupt amateur radio communications—not to mention police, fire, ambulance, aircraft, broadcasters and other users.

Other considerations

Going the other direction, if your system leaks, it's going to be susceptible to ingress. That means licensed and legal over-the-air transmissions can interfere with signals carried on your cable system. Ham radio-related ingress interference has the potential to be severe, given the right circumstances. One reason for this is that most hams are legally able to transmit with RF power levels up to 1,500 W. That kind of transmitter power, combined with a high-gain antenna located perhaps a few tens of feet from a loose F-connector, will cause all sorts of interference grief. It's your responsibility to ensure that those legal signals don't get inside your plant.

Besides, hams can be valuable allies when it comes to solving interference problems. Most have a good background in electronics and operate radio receivers that are far more sensitive than the signal leakage detection equipment that we use.

A few enjoy "fox hunting," where the objective is to use radio direction-finding techniques to track down hidden transmitters or interfering signals. In some countries, hidden transmitter fox hunting is a serious competitive sport, combining athletics and amateur radio.

So, if you get a call from a ham complaining about potential leakage-related interference, schedule a service call to see what's going on. Just because you have a good leakage detection and repair program in place and you passed the latest flyover with ease, don't assume there can't be a problem leak.

In most cases when a ham calls about a potential leak, it's because he or she is experiencing interference in the 2-meter ham band. More than likely, the culprit is Ch. 18's 145.25 MHz visual carrier. Table 1 (on page 83) shows popular amateur bands and their relationship to the RF spectrum.

> The ARRL Connection

Ron Hranac recently was appointed to the American Radio Relay League's RFI Task Force, in part because of his involvement with the ARRL and Society of Cable Telecommunications Engineers in the area of amateur radio interference issues. Dovetail Sciences Corp.'s Robert V. C. Dickinson has a similar role via the National Cable Television Association's Engineering Committee.

These two individuals—both of whom are licensed amateur radio operators—serve as liaisons between the ham radio community and cable TV industry when signal leakage and interference problems cannot be resolved locally. If you get a call from "corporate" urging you to sort out an interference problem with a ham operator in your system's service area, it's likely because the interference complaint was, for whatever reason, taken to ARRL headquarters.

ARRL staff in turn contacted Hranac or Dickinson to "pull the appropriate strings" at the cable operator's corporate office. If this happens to you, don't feel too badly. The complaint could have gone to the Federal Communications Commission.

Possible situations

Let's go through a couple possible scenarios you might find when you visit the residence of a ham operator who is experiencing interference.

Scenario 1: You find one or more leaks in the vicinity of the ham's house that exceed 20 µV/m. You repair them and the interference problem is taken care of. Congratulations. You've just scored a public relations coup and tightened up your plant in the process.

Scenario 2: You carefully check the neighborhood and find that while there is some low level leakage, no leak is greater than 20 µV/m. You tell the ham the system complies with the FCC's regulations and drive back to the office thinking that's all you have to do.

Obviously the first scenario has a happy ending. You eliminated leakage that was clearly in violation of Part 76, you solved the ham's interference problem, and you probably also made a friend in the process. The second scenario has the potential to be a PR nightmare.

"Wait a minute, Hranac," you say. "In that example, leakage was below the FCC's 20 µV/m limit. The system is in compliance, so the interference is the ham's problem."

Not so fast. The system may indeed comply with §76.605(12), but what about §76.613? In case you're unfamiliar with that section of Part 76, read on.

TABLE 1 HAM BANDS IN THE RF SPECTRUM

Amateur band	RF spectrum
160 meters	1.8-2.0 MHz
80 meters	3.5-4.0 MHz
40 meters	7.0-7.3 MHz
30 meters	10.10-10.15 MHz
20 meters	14.00-14.35 MHz
17 meters	18.068-18.168 MHz
15 meters	21.00-21.45 MHz
12 meters	24.89-24.99 MHz
10 meters	28.0-29.7 MHz
6 meters	50-54 MHz
2 meters	144-148 MHz
1.25 meters	219-220 MHz and 222-225 MHz
70 centimeters	420-450 MHz
33 centimeters	902-928 MHz

Small problems need fixing

Section 76.613 describes interference from a multichannel video programming distributor (MVPD).

(a) Harmful interference is any emission, radiation or induction that endangers the functioning of a radionavigation service or of other safety services or that seriously degrades, obstructs or repeatedly interrupts a radiocommunication service operating in accordance with this chapter.

(b) An MVPD that causes harmful interference shall promptly take appropriate measures to eliminate the harmful interference.

(c) If harmful interference to radio communications involving the safety of life, and protection of property cannot be promptly eliminated by the application of suitable techniques, operation of the offending MVPD or appropriate elements thereof shall immediately be suspended upon notification by the District Director and/or Resident Agent of the Commission's local field office, and shall not be resumed until the interference has been eliminated to the satisfaction of the District Director and/or Resident Agent. When authorized by the District Director and/or Resident Agent, short test operations may be made during the period of suspended operation to check the efficacy of remedial measures.

(d) The MVPD may be required by the District Director and/or Resident Agent to prepare and submit a report regarding the cause(s) of the interference, corrective measures planned or taken, and the efficacy of the remedial measures.

This means that even a lowly 5 µV/m or 10 µV/m leak that is causing harmful interference must be fixed. What constitutes harmful interference? If the interference merely breaks squelch on, say, a scanning type receiver, it's not considered harmful. But it is harmful interference if communication is seriously degraded, obstructed or interrupted.

Another scenario

Let's look at a third scenario. You respond to the interference complaint and find a greater than 20 µV/m leak. However, it's not coming from the feeder or neighborhood drops. It's from the next-door neighbor's cable-ready TV set. What to do? This has the potential to be a really nasty public relations nightmare.

"Leakage gremlins probably always will be with us."

If you confirm the leakage is from a subscriber's TV set, there are several approaches. One way to reduce or eliminate the leakage interference is to see if the offending TV set is receiving too much signal. An in-line attenuator installed somewhere in the drop may be all that's required to fix the problem. Another trick to try is installing a commercially manufactured common mode choke such as the Ghost Buster at the input to the TV set. The Ghost Buster was designed to reduce VHF common mode currents and has been shown to be quite effective.

If either of these fixes fails to work, you may have to tactfully explain to the subscriber that the TV set appears to be leaking signals that are interfering with over-the-air users and may have a technical problem that requires repair or modification by a local shop or perhaps the set manufacturer.

The odds are pretty good the subscriber also has been experiencing ingress interference from the ham next door—along with pager transmitters and commercial two-way radios. An interim solution would be to provide the owner of the leaky TV set a plain converter so that all the set receives is the converter's Ch. 3 output, rather than the whole cable spectrum. This will fix the problem most of the time.

If the owner of the offending TV is absolutely uncooperative, you do have one last resort. It isn't an ele-

gant solution, but it will get rid of the interference. You can legally disconnect his or her drop. Section 76.617 provides for that, which says in part, "In cases where excessive signal leakage occurs, the cable operator shall be required only to discontinue service to the subscriber until the problem is corrected."

I'd add one piece of advice to this whole interference business. Document everything. If any of this ever comes back to haunt you in the future, thorough documentation will show the steps you've taken to resolve the interference. Include copies of all correspondence and notes from all telephone calls and meetings.

Case study

Now let's look at an interference complaint that went beyond the local level, but did have a happy ending. I'll leave out names and places (it's a true story), but remember, this could happen to you.

A ham operator was experiencing moderate to severe interference at 145.25 MHz, and neighbors who owned cable-ready TV sets connected to the cable system were experiencing Ch. 18 interference when the ham used his 2-meter transmitter.

Stationary ingress source: This photo is the front of the author's house—look closely and you can count 10 amateur antennas on the roof, plus a DBS dish. The Jeep sitting in the driveway has four amateur antennas plus a CB antenna.

Sometimes the interference obliterated the pictures. Attempts to get the local system to fix the problem apparently were unsuccessful.

The ham took his complaint to the American Radio Relay League, which in turn forwarded the background information to me. I contacted one of the cable company's corporate engineers and filled him in on the details. (See the sidebar "The ARRL Connection" on page 82.)

A few weeks later, I was forwarded copies of correspondence between the affected ham and ARRL headquarters. In that correspondence, a now quite happy ham operator explained that the system had sent technicians to his neighborhood to replace several nearby drops and that his received 145.25 MHz interference had dropped from greater than signal level 9 (S9) down to S3.>

BOTTOMLINE

> Ham Radio and Harmful Interference

Most cable operators do an excellent job of maintaining signal leakage below the 20 µV/m limit specified in §76.605(12) by the Federal Communications Commission (FCC).

But there's another part of the leakage rules with which you're required to comply: §76.613. This section of Part 76 has to do with harmful interference. Your system may be in compliance with §76.605(12) and still be violating §76.613 if low level leakage-leaks well below 20 µV/m—is causing harmful interference to licensed over-the—air users such as amateur ("ham") radio operators.

How should you deal with interference complaints from a ham operator? The following two checklists will make the job easier.

What not to do

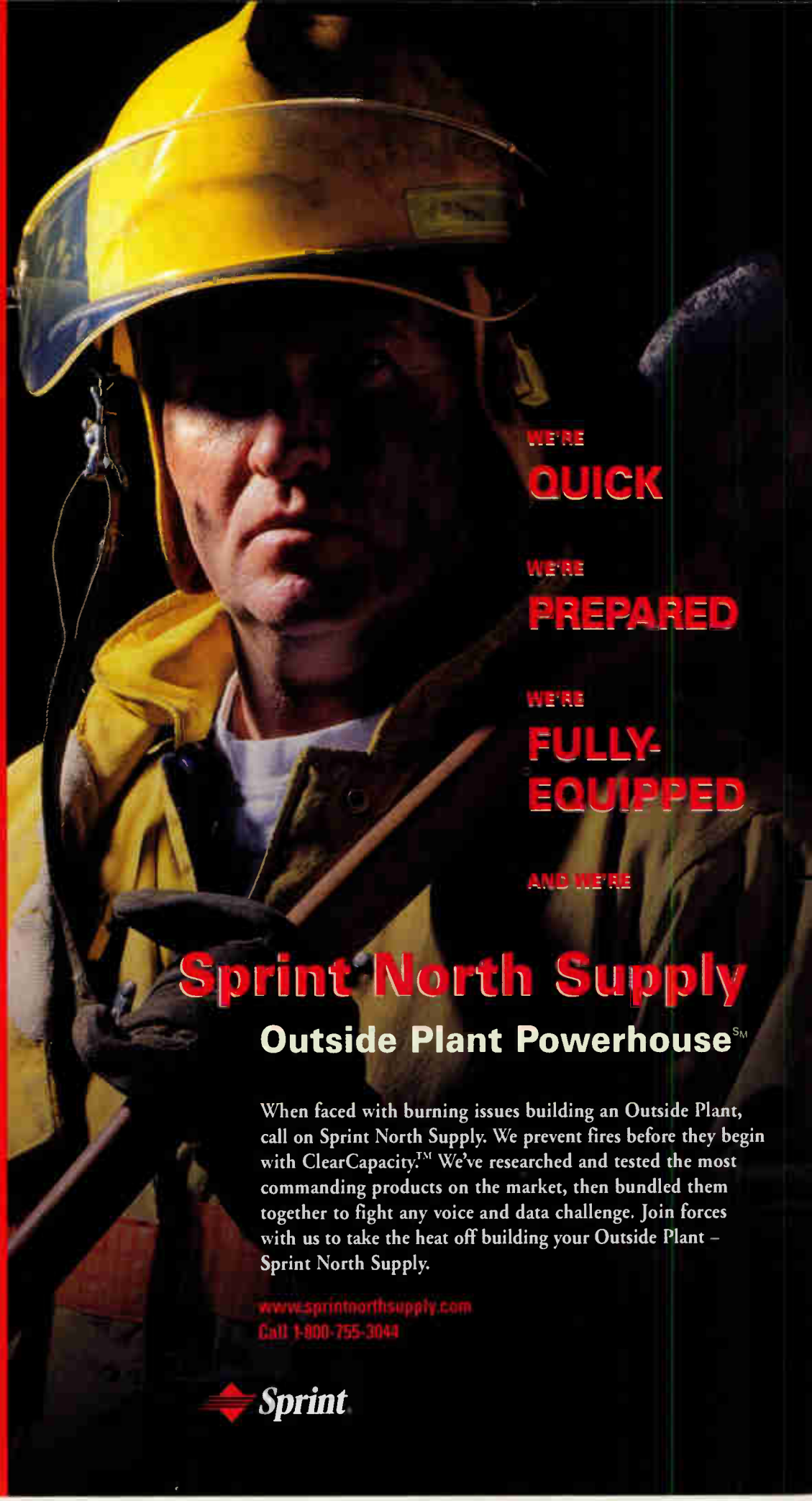
- Tell the ham operator that your system complies with the FCC's signal leakage rules and your plant's perfectly legal.
- Ignore the ham, hoping the complaint will go away.
- Don't return phone calls.
- Get confrontational.

What to do

- Take the complaint seriously.
- Respond in a timely manner.
- Work with the ham to resolve the interference complaint.
- Educate your customer service reps, installers, and technicians about the seriousness of interference complaints.

Not only is signal leakage a potential source of interference to over-the-air users, but so is the operation of certain so-called Part 15 devices. These are devices such as cordless telephones, wireless modem jacks and even garage door openers that share over-the-air frequencies with licensed users of the same spectrum.

Of particular concern to cable operators is the use of wireless modem jacks, some of which cause harmful interference in the 80-meter amateur band. When this happens, it's the responsibility of the cable operator to eliminate the interference.



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Drive, Midvale, UT 84047, 801-566-0100) wireless modem jacks had been installed in several cable systems, and while many have since been removed or replaced because of interference complaints, a lot of them still are in service. The Phonex modem jacks, which are frequently sold under a variety of brand names including Phonex, GE, RCA/Thomson and Radio Shack, use the home's electrical wiring to extend a phone outlet to areas of the home where hard-wired phone outlets are not available. These devices are very convenient to use for connecting digital set-tops to the cable subscriber's phone line.

The problem? The early Phonex modem jacks transmit signals at 3.53 MHz and 8.27 MHz in full duplex operation. There have been numerous instances where cable subscribers' home electrical wiring radiates the 3.53 MHz signal at levels sufficient to cause harmful interference in the 80-meter amateur band. When this happens, the cable operator is responsible for finding and fixing the problem.

The modem jacks operate at a frequency that is outside the range of most test equipment commonly available in cable systems, which means direction finding must be done with a portable shortwave receiver. Unless, that is, you fancy packing around a spectrum analyzer to track down the 3.53 MHz signals. This is where a good relationship with local hams will be invaluable.

Stay tuned

In the second installment of this article, I'll present information on how to build your own 80-meter ferrite rod-style direction-finding antenna—a conventional half-wave dipole at this frequency is a bit unwieldy, considering it's more than 100 feet long. I'll include tips on how to use the antenna in conjunction with a portable receiver for doing your own fox hunting. The test bed? My own neighborhood, where I can receive several interfering carriers around 3.53 MHz.

Ron Hranac is consulting systems engineer for Cisco Systems. He also is senior technical editor for "Communications Technology." He can be reached via e-mail at rhranac@aol.com.

Did this article help you? Let us know your thoughts. Send an e-mail to jwhalen@phillips.com.

SCTE Tackles

Video, Middleware & Management

New Standards Form Foundation for Broadband Universe

By Jonathan Tombes

Jockeying with today's interactive software players, weathering controversies over digital video, and filing documents headed to a Geneva-based international organization: It's all in a day's work for members of the Society of Cable Telecommunications Engineers' engineering subcommittees.

These activities arise from the SCTE's accreditation by the American National Standards Institute as a standards developing body, an August 1995 decision that still chafes some members of the consumer electronics industry. Such criticism, however, calls to mind the expression, "Be careful what you pray for—you might get it."

Attributes and personalities

Truth be told, developing standards is painstaking, thankless work that requires a mind for relevant technical specifications, a stomach for committee work and a spirit of volunteerism. It also helps to have a sense of mission, to appreciate how important standards are in a world of fluid, interoperable technologies. As it happens, the SCTE has numerous leaders possessing those aptitudes, starting with Dan Pike, chairman of the SCTE engineering committee, and Ted Woo, the SCTE director of standards.

"Ted proctors the standards process," explains Pike, who is senior vice president for science and technology for Prime Cable. Pike says the role of his seven-person engineering committee is to ensure due process in the subcommittees and then to vote on their work unchanged. "We don't substitute our own judgment," he says.

Those chairing the eight subcommittees that fall within Pike's purview accordingly play key roles in this operation. "They work much like

the subcommittees in Congress," says Pike. And as anyone familiar with Capitol Hill knows, that's where the real action lies.

Middleware motions

The latest addition to the SCTE's Engineering Committee's domain is the Cable Applications Platform (CAP) subcommittee. CAP's mission involves standardizing the middle layer of software, also known as application programming interface (API) or "middleware," that allows developers of basic operating systems (OSs) and developers of applications a means of linking their various software inside the set-top box.

Chaired by Jean-Pol Zundel, chief software architect for Comcast Cable, the subcommittee held its first meeting April 24, at which time it adopted a position on Digital Video Broadcasting Group Multimedia Home Platform (DVB MHP).

Zundel explains that the subcommittee is oriented toward an API that uses hypertext markup language (HTML) and JavaScript on the presentation side, close to the browser, and Java classes and libraries on execution engines, which require more internal programming logic.

As with other subcommittees, CAP's work is collaborative, not self-contained. In a statement, the SCTE says that CAP will coordinate "with the International Telecommunications Union-Telecommunications, the Advanced Television Systems Committee and other related organizations."

Similarly, CAP has a special relationship with the CableLabs' OpenCable project, which largely accounts for CAP's adoption of MHP. "We've been working on MHP for two years," says Zundel, who also participates in OpenCable.

The SCTE says that 22 individuals from 11 organizations representing cable operators, suppliers and the general public attended. Zundel cites five vendors (in alphabetical order): Canal +, Liberate, Microsoft, OpenTV and PowerTV. Given the hype surrounding interactive services aspiring to ride atop such middleware, making this space interoperable is a major and potentially contentious task.

As with other standards developing bodies, CAP operates on a consensual basis. "If there's no agreement, we have to ask what it is that would make them agree," says Zundel.

Digital video noise

Zundel's subcommittee overlaps with the larger Digital Video Subcommittee. "Between DVS and this new CAP group, we together cover essentially everything in digital cable," says Paul Hearty, DVS chairman. As most readers know, digital cable can be controversial.

The recent balloting on DVS 313, which defines the interface between hybrid fiber/coax (HFC) plant equipment and commercially available terminal devices, for instance, got off to a rocky start. DVS acting secretary Ted Woo says that the initial vote at the mid-April meeting went against balloting and that a consensus was reached to proceed only after two weeks of consultations.

DVS 313 closely replicates OpenCable's OCI-N Cable Network Interface Specification. Woo says that objections to the document came from DVS members who identify with the consumer electronics industry.

The Consumer Electronics Association and the National Cable Television Association agreed in February on standards allowing cable systems to connect with digital TV sets. Hearty says that controversy over DVS 313—and EIA 818, a competing document from the Electronic Industries Alliance—stems from the question of "who has the right to speak for the agreement."

Another recently balloted standard, DVS 258 (r.2), appears to have proceeded more smoothly. Originally issued last September, DVS 258 defines digital video systems characteristics. It fleshes out a previous document by adding basic explanatory text, information on closed caption and video use of data, and references to new formats identified by OpenCable.

Hearty calls this second revision of DVS 258, issued on April 19, a "superset" of ATSC A/53. He explains that DVS 258 has fewer constraints against Moving Picture Experts Group (MPEG) and more video formats than ATSC A/53. Some DVS participants say that the additional formats for vertical and horizontal size values were sticking points. The ATSC is composed of TV networks, producers and electronic equipment manufacturers.

Some of the noise over digital video standards arises from a perception that the SCTE is too close to CableLabs' OpenCable initiative. Hearty is sensitive to that critique.

"OpenCable is one of 'n' contributors to DVS," says Hearty, who is vice president of Canadian sales for Motorola. "They contribute specifications based on their own business and technical considerations. We examine those proposals, as we do proposals

July 2000 Issue

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47. ❑ Regional Engineer
48. ❑ Divisional Engineer
49. ❑ Plant Manager
50. ❑ Installation Manager
51. ❑ Network Manager
52. ❑ Construction Manager
53. ❑ Field Services Manager
54. ❑ Technical Manager

Engineering
55. ❑ Engineer
56. ❑ Headend Engineer
57. ❑ Const. Engineer
58. ❑ OSP Engineer

Technical
59. ❑ Headend Technician
60. ❑ Line Technician
61. ❑ Bench Technician
62. ❑ Sweep Technician
63. ❑ Other Technical Title (Please specify)

_____

Installation
64. ❑ Installer
65. ❑ CSR
66. ❑ Other Installation Specialist (Please specify)

_____

30. ❑ Other (Please specify)

_____

C. Which of the following best describes your involvement in the decision to purchase a product/service?
31. ❑ Recommend
32. ❑ Specify
33. ❑ Evaluate
34. ❑ Approve
35. ❑ Not Involved

D. Are you a member of the SCTE (Society of Cable Telecommunications Engineers)?
01. ❑ Yes
02. ❑ No

E. Would you like to join the SCTE?
01. ❑ Yes
02. ❑ No

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03. ❑ Independent System Operator
9B. ❑ Telecom Network/Carrier (RBOC, LEC, CLEC, Long Distance Provider, Wireless/Satellite Carrier, ISP)
19. ❑ Public/Private Utility
20. ❑ Systems Contractor
21. ❑ Hardware/Component Manufacturer/Dist.
18. ❑ Other (Please specify)

_____

Do you hold a supervisory position?
22. ❑ Yes
23. ❑ No

B. Check the TITLE that most CLOSELY matches your current position: (check only one)

Corporate Management
31. ❑ CEO
32. ❑ President
33. ❑ Owner
34. ❑ Vice President
35. ❑ Partner

Operations Management
36. ❑ General Manager
37. ❑ Business Manager
38. ❑ Operations Manager
39. ❑ Product Manager
40. ❑ Purchasing Manager

Engineering Management
41. ❑ Engineering VP
42. ❑ Engineering Manager
43. ❑ Director of Engineering
44. ❑ Engineering Supervisor
45. ❑ Corporate Engineer
46. ❑ Senior Engineer
47. ❑ Regional Engineer
48. ❑ Divisional Engineer
49. ❑ Plant Manager
50. ❑ Installation Manager
51. ❑ Network Manager
52. ❑ Construction Manager
53. ❑ Field Services Manager
54. ❑ Technical Manager

Engineering
55. ❑ Engineer
56. ❑ Headend Engineer
57. ❑ Const. Engineer
58. ❑ OSP Engineer

Technical
59. ❑ Headend Technician
60. ❑ Line Technician
61. ❑ Bench Technician
62. ❑ Sweep Technician
63. ❑ Other Technical Title (Please specify)

_____

Installation
64. ❑ Installer
65. ❑ CSR
66. ❑ Other Installation Specialist (Please specify)

_____

30. ❑ Other (Please specify)

_____

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31. ❑ Recommend
32. ❑ Specify
33. ❑ Evaluate
34. ❑ Approve
35. ❑ Not Involved

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01. ❑ Yes
02. ❑ No

E. Would you like to join the SCTE?
01. ❑ Yes
02. ❑ No

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from consumer electronics manufacturers, cable OEMs (original equipment manufacturers), and other interested parties, for technical merit and suitability to the broader industry requirements, modify them as necessary and, as appropriate, approve them as cable standards."

At its June 8 meeting, the DVS reviewed the results of the balloting on these documents and followed up on standards that have recently been approved. "Basically we do the final due diligence and confirm that everyone's comments have been adequately captured," says Hearty.

DVS working group agendas

Much activity occurs within DVS's five working groups. Hearty offers the following run-down of their respective agendas:

- Working group 1, video and audio services, "really only has the tidy-up that's necessary with the closure of the DVS 258 ballot."
- Working group 2, data and transport applications, "will be continuing to fine-tune work on transport and system and service information."
- Working group 3, network architecture and management, "has a large number of outstanding work items concerned with the point of deployment (POD) modules and copy protection."
- Working group 4, transmission and distribution, will look into more detailed explorations of the OpenCable and other specifications.
- Working group 5, digital program insertion (DPI), has "generated and we have since approved a very nice standard for DPI messaging, (and

> Make Your Voice Heard

Developing standards is painstaking, thankless work that requires technical expertise and a taste for committee work. A sense of mission also helps. Do you have what it takes? To join the fun, contact the relevant subcommittee chairman.

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Comcast Cable
(215) 981-8415
jean-pol_zundel@cable.comcast.com

Construction & Maintenance
Bruce Weintraub
Digital Access
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bjames@rci.rogers.com

Materials Management
Charles Alfonso
Digital Access
(610) 660-4925
Charles.Alfonso@DigitalAccessInc.com

BOTTOMLINE

> Standards for All

The Society of Cable Telecommunications Engineers plays an important role in recommending standards to achieve compatible delivery of information services. As an American National Standards Institute-accredited body, its recommendations carry global weight.

Most of the SCTE's standards work occurs at the subcommittee level. The Engineering Committee plays a supervisory role in ensuring due process.

- The new Cable Applications Platform subcommittee is working on the middleware in the set-top box on which resides interactive applications.
- The Digital Video Subcommittee covers the rest of digital cable, from basic video characteristics to digital ad insertion.
- The Data Standards Subcommittee is pushing PacketCable specifications up to the level of international recognition.
- The Hybrid Management Subcommittee is developing standards that will enable the coexistence of transponders from different companies on the same piece of cable.
- The Interface Practices and In-Home Cabling Subcommittee develops standards for cables, connectors and housings.
- The Emergency Alert Systems subcommittee follows an agenda driven by the FCC's rulings on the subject.
- The Construction and Maintenance Subcommittee covers coaxial construction, optical fiber construction and headend maintenance.
- The Materials Management Subcommittee attempts to improve capital management and inventory control in the cable system.

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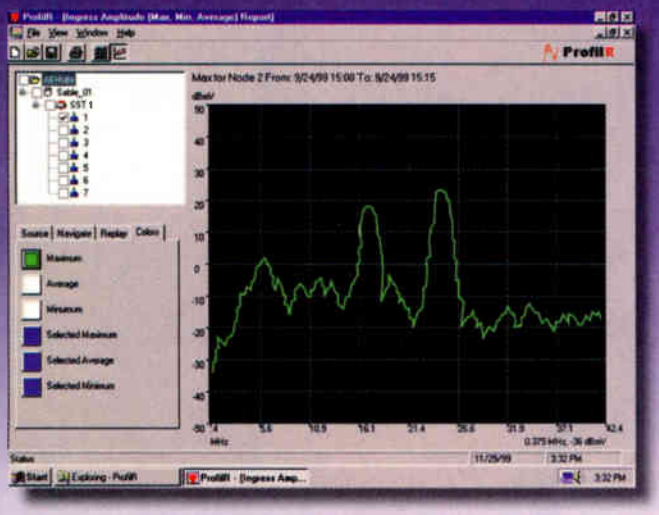

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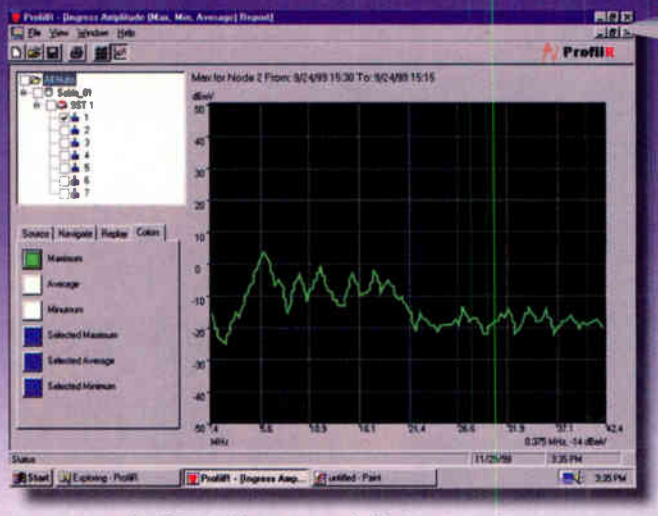

TraffiControl™ measures and plots ingress spectra of bands fully occupied by return traffic

New *TraffiControl*™ lets you see the ingress inside your system's return traffic

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No doubt about it: where the return path is concerned, ingress is a big problem. Left unchecked, ingress outbreaks can prevent your system from delivering the Internet and other premium services your subscribers have come to expect. It's tough enough now to catch ingress outbreaks and fix them before the phone starts ringing. It'll be even tougher as new services fill your return spectrum, because the majority of ingress will be hidden by the increased return "traffic."

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the group) will be continuing its work through applications guides."

Previously ad hoc, or what Woo calls a "short-timer," the DPI group after two and a half years was given working group status. "Of course, DPI is very fundamental to the cable business, and I wanted to recognize that, and the subcommittee agreed," says Hearty.

PacketCable packs for Geneva

The SCTE's Data Standards Subcommittee is also closely tied to CableLabs, particularly its trademarked PacketCable initiative to support Internet-based voice and video products over cable systems.

At its March 1 meeting in Atlanta, the DSS forwarded four PacketCable specifications to the U.S. State Department covering architectural frameworks, dynamic Quality of Service (QoS), network call signaling protocol, and audio/video codecs.

A U.S. delegation, in turn, carries these documents to the Geneva-based ITU-T, whose Study Group 9 prepares and maintains recommendations on television and sound transmission. PacketCable specifications fall within its purview.

The DSS previously standardized both Data Over Cable Service Interface Specification (DOCSIS) versions 1.0 and 1.1. "We're following practically the same path with the PacketCable specification," says David Fellows, DSS chairman and a principal of the Broadband Ventures Group. On deck are nine more PacketCable documents, slated for subcommittee review this summer.

The ongoing nature of the DSS's work reflects its moving target. "Cable modems are morphing," says Bob Cruickshank, DSS secretary. "Now there are actually phone jacks on the back of them, and there were some at the Western Show that even had video jacks."

"As these things change, the scope gets bigger and bigger," Cruickshank adds. He agrees with Fellows that the subcommittee's big goal over the next six months is getting the PacketCable specs onto the agenda of the ITU-T. Fellows also serves as chairman of the DOCSIS certification board.

Network management group Breaks new ground

The pace also has picked up in the SCTE's Hybrid Management Sub-Layer Subcommittee. "We're on the verge of coming up with something really good here," says Roger Draper, subcommittee secretary.

The HMS subcommittee's mission is to devise a standard for managing outside plant equipment on hybrid fiber/coax (HFC) networks. "We have several draft documents that we've been working on for some time, and we're actually down to the nuts and bolts of the thing," says Draper, who

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is director of product management at Alpha Technologies.

In addition to compiling and reviewing documents, the subcommittee also runs interoperability trials, most recently on June 27-29 in Exton, Pa.

Esteban Sandino, the subcommittee's chairman, says that the document defining the physical layer specification "is better than 95-percent completed." These specs concern such things as modulation format, transmission levels and frequencies of operation. Their impact is likely to be striking.

"What this means is that you can go in and buy a transponder from Cheetah or Tollgrade or Barco or any of the other particular vendors, and you will be able to mix and match them in a single cable plant because they're all going to be using the same physical parameters for communication," explains Sandino.

"Truth be told, developing standards is painstaking, thankless work."

The subcommittee's second document concerns the media access control (MAC) layer. "Essentially that is a set of specifications dealing with the protocol itself," says Sandino. "Now the headend system will be able to interlink with different transponders over the same cable plant."

Issues at the MAC layer include whether communications will occur via a poll-based system, meaning periodic interrogation of each transponder, or on a system of alarms or traps generated by the network elements themselves.

The subcommittee has been defining the serial interface specifications for power supplies to transponders. Sandino says that this third document has been "posted to the (e-mail) reflector for comments."

Testing the specs

The Interface Practices and In-Home Cabling Subcommittee (IPS) has been tasked with developing standards for the cables, connectors and housings used in broadband telecommunications distribution plants. Led by Brian James, vice president of CableLabs' Technical Advisory Committee Test Center, IPS has five working groups that cover actives, passives, connectors and cable, test procedures, and fiber interface.

Created two years ago, Working Group 4 is an outgrowth of Groups 1 and 2. After first specifying, say, a drop amplifier's frequency response, the next thing is to test it. "But people can do that in different ways and come up with different answers," says James. Hence the need to set objective benchmarks and the logic of having "the people who are experts in the RF domain to work as a separate group, after they've been told to come up with frequency response test procedure."

"So far, we've done noise and distortion procedures, which are the two primary ones," says David Franklin, who leads Working Group 4. But that's only the beginning. On deck is discussion of procedures governing group delay, power supplies and hum modulation.

How long will it take this working group to get through its agenda? "Forever," jokes Franklin, director of plant engineering for Time Warner Cable. "It's a never-ending process." He also says that the work involves "very dull, mundane things, but things that are important to ensure that the product works properly."

Emergency alert systems

Three other engineering subcommittees are pushing in their own standards development activities. Emergency Alert Systems (EAS) subcommittee Chairman Steve Johnson (who also chairs DVS working group 3) describes a regulatory-driven agenda.

"The Federal Communications Commission gave systems with less than 10,000 subscribers until October 2002 to purchase the equipment and be in compliance with EAS rules," explains Johnson, who is director of engineering and technology for Time Warner Cable Denver. As a result, his subcommittee has been reviewing lower cost solutions for small system participation. His group also covers digital EAS.

Construction standards

The Construction and Maintenance Subcommittee (CMS), led by Bruce Weintraub, vice president of engineering for Digital Access, is wrapping up its work in the development of standards for basic construction and design of cable TV systems, including upgrades and rebuilds. CMS working groups cover coaxial construction, optical fiber construction and headend maintenance.

Inventory control

The Materials Management Subcommittee (MMS) is responsible for developing recommendations and programs designed to improve capital management and inventory control in the cable system. Recent innovations in warehousing technologies that build upon prior SCTE standardization of packaging and shipping bar codes suggest the potential payoffs of further improvements in this realm.

MMS Chairman Charles Alfonso, the director of purchasing and asset management for Digital Access, says that cooperation between manufacturers and users is crucial for success in this field. Alfonso adds something else critical for any organization that relies on volunteers: "We could use member participation at the subcommittee."

Jonathan Tombes is deployment editor for "Communications Technology." He can be reached via e-mail at jtombes@phillips.com.

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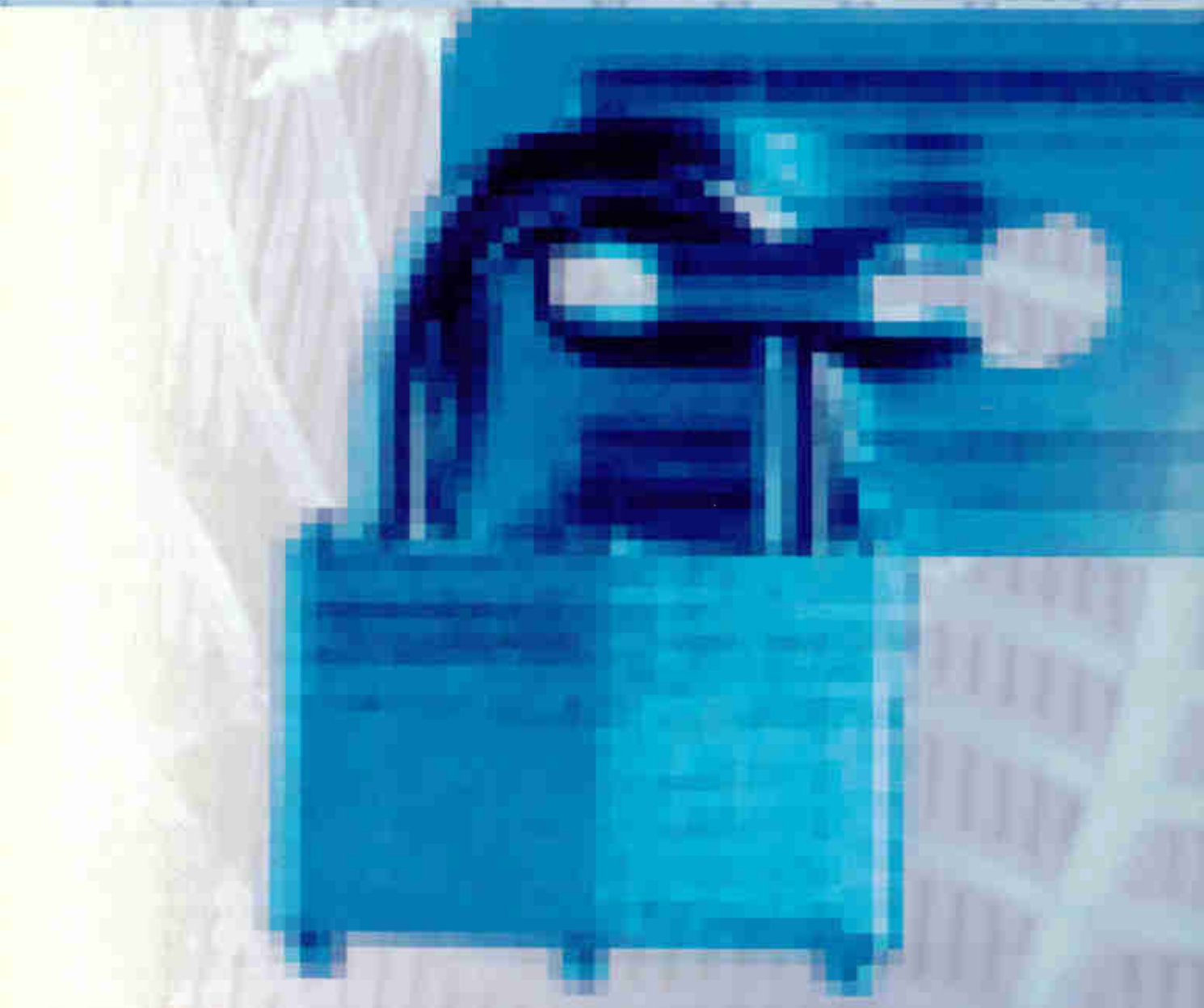
Web Security



in a High-Speed World

By Monta Monaco Hernon

Cable operators still are having to defend the shared nature of their network when it comes to Internet access, against claims of faulty security. The mantra of the digital subscriber line (DSL) providers has been that it is much easier to access traffic transmitted via cable modem.>

"The misconception about cable modems is that it is just like an Ethernet where everyone can see each other's traffic. You can't actually put a sniffer on the cable modem and see other people's traffic," says Bill Beesley, Cox Communications' manager for commercial data operation support.

He adds that the concept of a shared network being less secure even before the implementation of the Data Over Cable Service Interface Specification (DOCSIS) was "ludicrous." However, he, like others in the cable industry, is happy to have the Baseline Privacy Interface (BPI) feature in DOCSIS in their arsenal when battling the DSL guys for high-speed customers. (See related story "Can You Protect PacketCable Services?" on page 112 of the June 2000 issue of *Communications Technology*.)

"Because of the various ways DOCSIS vendors interpreted that spec, filtering methods do not work identically."

—Bruce Bahlmann, MediaOne

"It is true that because of shared access that if nothing was designed into the network to prevent it, someone could tap in and eavesdrop or act as an impostor. However, the issues are solidly addressed with privacy features in proprietary modems and DOCSIS specs. They deal in a very robust way with encrypting traffic over a shared medium," says Dennis Picker, chief operating officer of Terayon.

DOCSIS 1.0 was adopted to ensure interoperability of cable modems in an attempt to speed up deployment and enhance commercial viability of the service. The BPI component of the standard ensures that traffic is encrypted across the cable network. A key management system also comes into play. While the same encryption algorithm is used across the board, everyone has a different dynamic key that changes frequently, says Nancy Davoust, technical lead for PacketCable security architecture for CableLabs.

The evolving DOCSIS specs also deal with authentication.

"When you plug into the network, we know who you are. It makes sure the cable modem is certified to belong on the network. It uses a digital certificate burned in at the time of manufacturing," Davoust says.

Filters add protection

Users in an always-on environment are even more subject to attacks through their file- and print-sharing mechanisms, such as transmission control protocol/Internet protocol (TCP/IP) NetBIOS (NBT) and System Message Block, on their operating systems. If a personal computer (PC) has file- or print-sharing enabled, anyone in the cable-based local area network (LAN) can tap in and pull out names and addresses of related services.

Luisa Murcia, vice president, data services and technical operations, for AT&T Broadband, says the modems her company offers address this problem. They also include a component that will filter the traffic from the home to the network. In other words, it can manage traffic so that functions such as print-sharing and file-sharing occur only within the home.

"You can't open that network to the rest of the cable access node. The home becomes a LAN," she says.

Some of the proprietary modems still being used today, however, do not have this filtering capability, and some cable operators do not choose to enable it for "performance reasons" according to CableLabs. In addition, CableLabs suggests the best option is to "unbind NetBIOs from TCP/IP," effectively disabling the functions.

Matt Cable, Internet security manager for High Speed Access Corp., says consumer education is the best defense.

"We provide the customer with the information they need to know. When our people go to do an install, they turn off file-sharing, and we have a document that gets handed to the customer explaining why they shouldn't have file-sharing. We also are working on a second document that will contain more detail about what customers can do to keep themselves safer," he says.

Not all filters are Created equal

Multiple system operators (MSOs) and cable Internet service providers (ISPs) have not been able to utilize

BOTTOMLINE

> **Web Security Concerns**

Cable operators, manufacturers and Internet service providers (ISPs) constantly are working to make access to the Internet via cable modem more secure. The Data Over Cable Service Interface Specification (DOCSIS) standard, which includes security features such as Baseline Privacy Interface (BPI), go a long way toward making the public feel safer.

However, companies also are improving filtering capabilities, which they say could be more effective if later DOCSIS versions clarify a few points. In addition, modem manufacturers are fine-tuning firewall capabilities that should be ready for release in certain models as soon as the second quarter of this year.

In the end, security must constantly evolve to combat new threats. Some give the industry a good grade in trying to keep up, but add that no matter what medium is used to access the Internet, no measures are completely impenetrable. In other words, where there's a will, there's a way.

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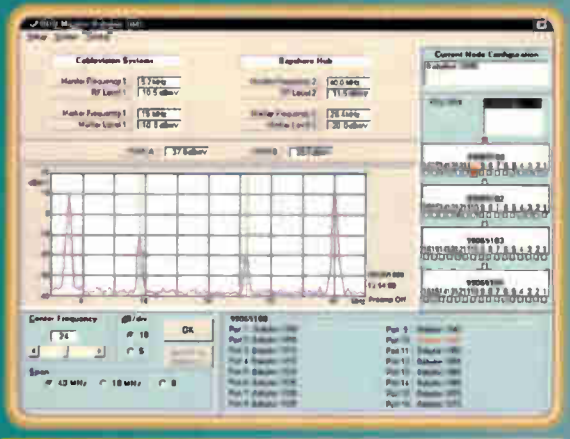

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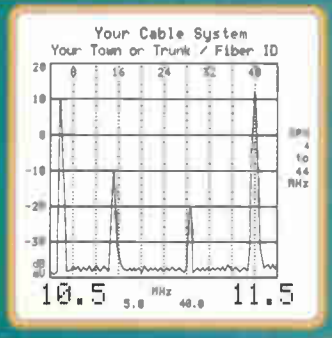
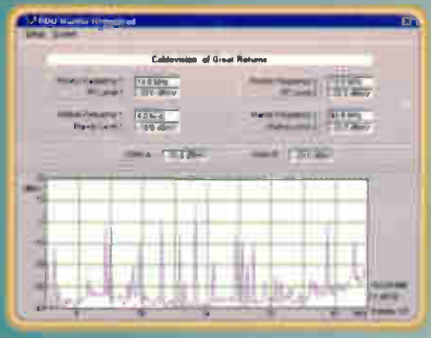
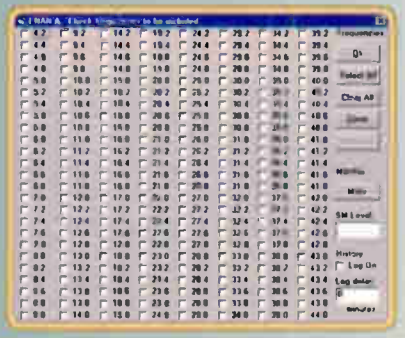


Video Output with Test Carrier Levels



Monitor Screen: Impulse Noise Present



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filtering mechanisms to their full extent as of yet because of some uncertainty in the DOCSIS spec, says Bruce Bahlmann, staff engineer at MediaOne.

"Because of the various ways DOCSIS vendors interpreted that spec, filtering methods do not work identically. There is enough variation among the different cable modems that only the minimum filtering set works consistently across all vendors. The functionality exists in the spec, but the spec does not make it explicit," he says.

Ideally, he explains, the ISPs and MSOs would be able to set up IP filtering that only allows IP traffic out onto the network from the client's computer, keeping all other network protocols within the customer's home. This type of filtering is not only a security mechanism, but it also protects the network.

"There are different things that would affect the performance of a neighbor's system. The (traffic) could use up time slots or degrade the performance of the network," he says.

In addition, another application would allow traffic into a cable modem destined only for a specific network interface card (NIC) and IP address.

"The issues of shared access are solidly addressed with privacy features in proprietary modems and DOCSIS specs."

—Dennis Picker, Terayon

"If a cable modem is set up to allow traffic destined only to the NIC and IP addresses assigned by the provisioning server to those computers, that is a really high level of security that can prevent customers from hacking on the network or sniffing a neighbor's traffic," he says.

Firewalls add protection

Those who want more protection than the current filtering capabilities of the MSOs can provide must turn to firewalls.

Currently, customers can use software programs to create firewalls on their systems. However, problems can occur with installation and configuration.

"They can be complicated beasts. A customer could install it correctly, but not configure it correctly. In this case, the firewall would not be giving this person the protection they need, but they might not realize it. Also, the threats keep evolving. If people want to maintain the effectiveness on their computers, they must continue to update to protect against the latest and greatest. It is expecting a lot that the average broadband consumer will be able to deal with that," says Terayon's Picker, noting that putting the firewall in modems will eliminate these hassles.

Terayon was expected to have a firewall ready to go for its proprietary modems by the end of the second quarter and for its DOCSIS modems later in the year, Picker adds. Configuration can be done automatically, eliminating customer error and the need to manually update the system.

"This is very hands-off and plug-and-play vs. getting involved in more of the technical details," he says.

Having the firewall in the modem also will allow clients to set up a home network. Picker explains that the architecture of placing it in the PC inhibits the exchange of information within a house, disabling the ability to share information between computers.

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putting the firewall in the modem. Customers can freely share information within the home without the intervention of the firewall. Anything external is protected," he says.

Terayon believes putting the firewall in the cable modem as opposed to in the headend is a better option, even though it could achieve similar results. The reason is cost and the fact that the firewall doesn't take up as much in the way of central processing unit (CPU) resources.

"If you put a big firewall in at the headend, that would be a costly device if you want to operate without slowing down data," Picker explains.

Other vendors have cable modem firewalls as part of a longer term plan. Donald Hopp, director for cable modem engineering for Motorola, says his company currently is concentrating more on working toward the next DOCSIS standard.

"DOCSIS 1.1 adds particular capabilities that provide dedicated bandwidth and enable guaranteed quality of service (QoS). This also will help with voice over IP (VoIP) and high quality telephony. We are not including firewalls in our products now, but we are definitely looking at the possibility," he explains.

"While the same encryption algorithm is used across the board, everyone has a different dynamic key that changes frequently."

—Nancy Davoust, CableLabs

Virtual private networks

Customers trying to operate a small or home office while connecting to their company's headquarters often are interested in end-to-end security provided by a virtual private network (VPN).

"To implement a VPN involves another layer of features and another choice. It can be provided through a cable modem or a software package installed on the attached computer. Both are out there on the market. The firewall feature would be very important for business use," Picker says.

Bahlmann explains, however, that from the MSO standpoint, sometimes customers running VPNs need to have less security in the way of filtering, which might affect the VPN software.

"Five to seven percent of customers request less protection. This could change as more telecommuters are coming onboard," he says.

Security for any type of access, especially when the Internet is "always on" is good but not foolproof, Bahlmann notes. More problems continually crop up, including bugs on new operating systems (OSs) such as Windows 2000.

"The older the OS is, the more robust and reliable it becomes. The newer, the more unknowns enter in. Hackers crave these moments when new OSs launch," he explains.

"In the grand scheme of things, if someone wants to get information from your computer and there is a will, there is a way. If one provides enough obstacles, unless the person is very dedicated and wants to keep pursuing, they will probably give up. If you can provide some limitations or obstacles in their way, you will stop a large portion of them," Bahlmann adds. CT

Monta Monaco Hernon is a freelance writer specializing in telecommunications.

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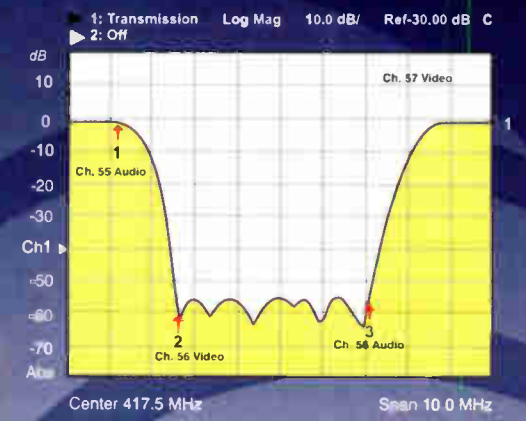

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New Kids on the Block

Meet SCTE's Four New Board Members

By Ron Hendrickson

Just as the cable industry itself is in a constant state of flux, so too is the Society of Cable Telecommunications Engineers' Board of Directors. The last election added four new members to the board for the 2000-2001 term, and they officially took office at Cable-Tec Expo in Las Vegas last month. The new members are Eric Brownell, M.J. Jackson, Percy Kirk and Bob Foote. Given that these four men now represent a third of the nation for SCTE, we thought it wise to learn more about them.

Eric Brownell, Region 3

Eric Brownell is cascade area engineer for AT&T Broadband in Bothell, Wash. His region has seven chapters and encompasses Alaska, Idaho, Montana, Oregon and Washington. Region 3's previous director was Norrie Bush.

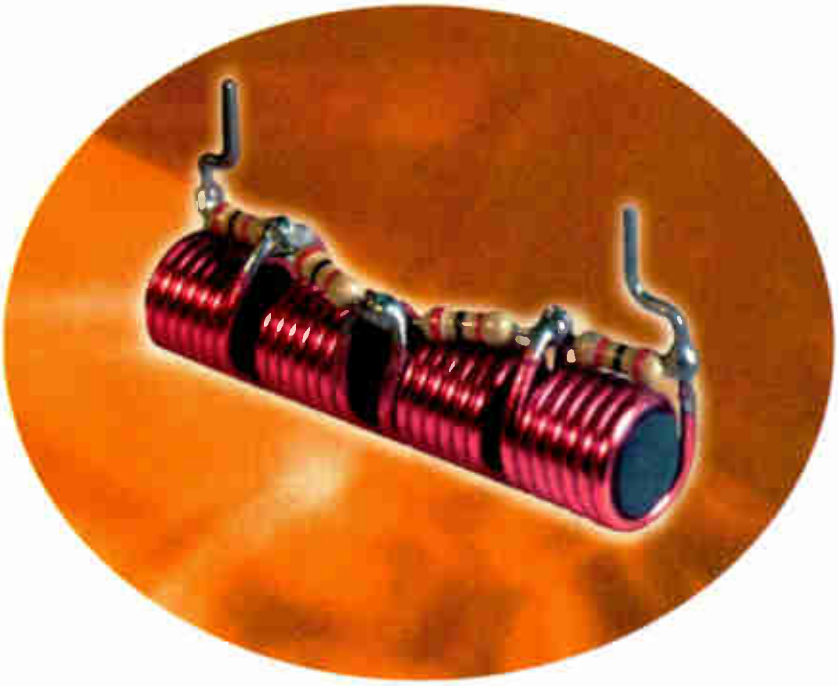
***Communications Technology**: How did you first get involved in cable and SCTE?*

Eric Brownell: In the late '70s, I went to work for Western Telecommunications as a microwave technician. We delivered broadcast TV and radio signals, via common carrier microwave, to various California cable companies. Having acquired an interest and knowledge of video and audio, I took a job with a Northern California cable system a couple of years later. In 1986, when I advanced into engineering management, my boss recommended I join what was then the Society of Cable Television Engineers. Not many years later, some of my colleagues and I founded the Sierra Meeting Group. Our new meeting group soon acquired chapter status, and I have been an active participant and a member of the SCTE ever since.

CT: What prompted you to run for a seat on the board?

EB: When the previous Region 3 Director (Norrie Bush) approached me and asked if I would be interested in the possibility of succeeding him by

HUM MODULATION?



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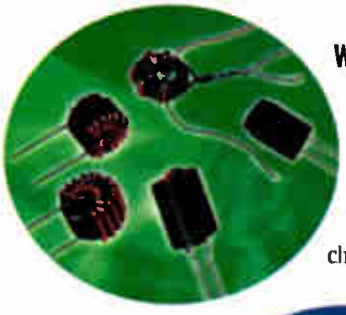

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running for his position on the board, I considered it carefully. I recognized that sitting on the board would be an opportunity to satisfy my desire to serve the best interests of the entire SCTE membership as well as the chapters within Region 3.

One of my primary reasons for having pursued this director position is the opportunity it affords me to help the chapters within the region keep their training and certification materials current. Additionally, I felt that my experience, while working within one of our industry's cutting-edge companies, could potentially provide me with an insight into a valuable training agenda.

CT: What do you see as the key issues to be addressed in your region?
EB: Maintaining the activity levels of the seven chapters and meeting groups within Region 3 is an issue key to the training and subsequent success of its membership. Keeping the certification and training material, as well as the agenda, of these chapters current is of paramount importance. Additionally, chapters within the region should continue to benefit from experienced operational and strategic leadership. Finally, providing the membership of the Region 3 chapters with a voice on the national Board of Directors will help to influence the society's overall agenda in a manner consistent with the region's needs.

CT: What do you see as the key issues for SCTE as it relates to the industry as a whole?
EB: As we rapidly transition into a full-service cable communications industry, offering new and different products, I see the need for the ongoing management of the standards process. Additionally, it is vital that we work to make sure that this important function is properly funded. Although the Society has been a leader in this process, there remains the potential for failure if the SCTE leadership does not remain committed to this task. To this end, I believe the new members on the board need to recognize, understand and support this vital function of the society.

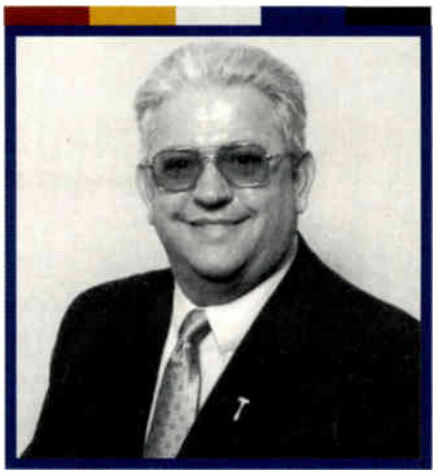
I am also of the opinion that among the society's key issues is to remain in the forefront of technology training for advanced services. Additionally, I feel we can improve the awareness of the services offered by the Society both within and outside of the general membership.

CT: Where do you see the industry going in the next five years, and what does that mean for SCTE?
EB: I see the industry enjoying widespread deployment of advanced services over the next five years. Many of these services will be the high-speed data and telephony products that are currently gaining a foothold across the industry. It is also likely that the networks and transportation systems we build to deliver these products will be far more advanced and reliable.

Additional alliances and partnerships will be formed with other communications industries and companies. In light of this, my view of what this means for the Society is an even greater need to remain a leader of technology training and to improve its profile relative to parallel technological organizations and industries.

"Among the society's key issues is to remain in the forefront of technology training for advanced services."
—Eric Brownell, AT&T Broadband

M.J. Jackson, Region 4



M.J. Jackson is broadband sales engineer for Alcoa Fujikura in Irving, Texas. His region encompasses Oklahoma and Texas, with four chapters and one meeting group. Region 4's previous director was Jim Wood. This isn't M.J.'s first time on the board; he served as Region 4 director before Jim Wood.

CT: How did you first get involved in cable and SCTE?
M.J. Jackson: I decided to leave the U.S. Air Force in mid-1977, in search of a better way of life that wouldn't involve constantly relocating my family. In February 1978, United Artist Columbia Cablevision advertised for a drafting person in San Angelo, Texas. At the end of my interview, I was informed I was over-qualified for the drafting position. George Fishman stated that with the extensive electronic training I received in the Air Force flying with and maintaining all of the electronics, I would be perfect in the United Artist Columbia Cablevision Corporate repair center. I was hired for that position. At that time, I joined the Society of Cable Television Engineers, as it was called then, because I wanted to know more about this new career field I had jumped into.

CT: What prompted you to run for a seat on the board?
MJ: Over the years, I served in all facets on the board of the local SCTE North Central Texas Chapter, giving training classes for local chapters and meeting groups across the United

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"If we do not convince the local systems to release the technicians to attend the meetings, then we both lose."
—M.J. Jackson, Alcoa Fujikura

States. In 1996, I was asked to run for the Region 4 board seat. I thought about it, evaluating the involvement of time and whether I was qualified to do the job. I accepted and won. I ran again in 1998 and lost the election. I was asked to run again in 2000; I did not hesitate to accept, and I won.

CT: What do you see as the key issues to be addressed in your region?
MJ: My objective is to obtain higher attendance levels for local SCTE meetings by stressing to the local systems that training and new skills can be obtained by their technicians. The first question is to find out what subjects the systems would like their technicians to learn. By working with the multiple system operators (MSOs) and local systems, SCTE local meetings can provide knowledge and training to improve skills for their employees. If we do not convince the local systems to release the technicians to attend the meetings, then we both lose.

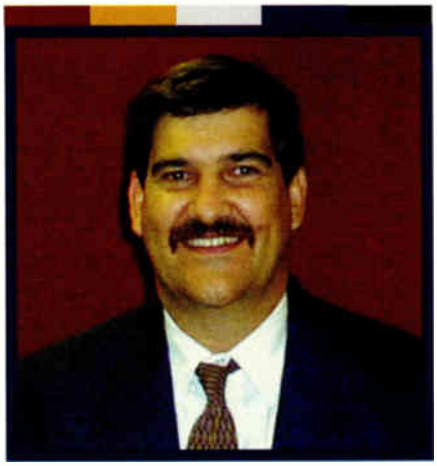
CT: What do you see as the key issues for the SCTE as it relates to the industry as a whole?
MJ: SCTE has to be prepared with education, training and certification programs when new technologies are implemented, while maintaining a constant update on present programs.

CT: Where do your see the industry going in the next five years, and what does that mean for SCTE?
MJ: In five years, we will have to rebuild or upgrade all systems to the new technology to give our subscribers what they are demanding. For instance, a year ago, the telecommunications industry ran 120,000 voice channels per second per fiber. Today, the industry is running 10 million voice channels per second per fiber.

With the introduction of dense wavelength division multiplexing (DWDM), we have the capability of eight wavelengths at 1,310 nm with each carrying a full 750 MHz of data. With the new fiber-optic cables coming on board, the industry has the capability to use in single-mode 1,310 nm, 1,480 nm, 1,550 nm and 1,625 nm or a total of 32 wavelengths per fiber.

These new capabilities really point out the necessity of training, certification and standards; our technical personnel have to know how to use the new stuff. Going back to what I said earlier, SCTE has to be prepared with programs when new technologies are implemented, while maintaining a constant update on present programs. The future of the industry is limited only by our imagination.

Percy Kirk, Region 5



Percy Kirk is Kansas region operations manager for Multimedia Cablevision in Wichita, Kan. His region has seven chapters and encompasses Illinois, Iowa, Kansas, Missouri and Nebraska. Region 5's previous director was Larry Stiffelman.

CT: How did you first get involved in cable and SCTE?
Percy Kirk: I joined Multimedia Cablevision in 1981 and worked in the warehouse while attending Wichita State University. Upon graduating, I researched career options. I found that cable TV was one of the top three "growth" industries at that time and listed as a business that would be growing in the future. This was a very exciting place to work as we were in the process of building out the system. Because of the growth potential and the excitement of all of the people in our company and the community as a result of our services, I felt like this would be a good business to be in.

Our company had always been supportive of training and was constantly looking for ways to better support our staff. Wendell Woody (former Region 5 director and at-large director) approached managers within our company, and he suggested that we form a chapter because there wasn't one in the immediate vicinity.

Upon Wendell's recommendation, the Wheat State Chapter was formed. The membership immediately flourished because it was supported by the company and was a great method of improving job knowledge for the technical people on our staff. I was one of the initial members, as were many others at our company at that time.

CT: What prompted you to run for a seat on the board?
PK: Our region has most recently been represented by Larry Stiffelman, and we have found him to be an excellent representative of the organization on behalf of people from our area. Larry has served the society in this position for the past six years and therefore was not eligible for this election. In visiting with Larry about issues that I felt were important to the industry, he suggested that I run for the position.

Key among these issues is the development of people. I have strongly en-

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couraged people on our staff to develop goals, both personally and professionally, and set time frames for establishing the goals they set. In almost every case, continuing to gain knowledge is the catalyst towards achieving goals.

The SCTE is an excellent source for gaining knowledge from local meetings, seminars, and events such as Cable-Tec Expo and the Conference on Emerging Technologies. In addition to providing people a base of knowledge, the certification program is a great tool for measuring success towards the goal.

CT: What do you see as the key issues to be addressed in your region?
PK: I want to continue to build upon the success of the chapters in our region by providing them the support they need to attract new members, push testing and certification, and get a wide range of speakers to meetings that will allow people to increase their respective knowledge on areas of interest. I am very pleased to represent this region, as it has a number of chapters that are very active and well supported by their members. It is my plan to explain the virtues of the organization to the management of companies within our area.

"It is critical to have skilled people ready to develop, install and service these products to our customers."
-Percy Kirk, Multimedia Cablevision

CT: What do you see as the key issues for SCTE as it relates to the industry as a whole?
PK: I believe that the key issue in our industry is competition from other providers of video, data and voice services. Our competitors generally provide a reasonable product; they are well-financed and are good at marketing their products. In order to compete with these companies, we need to have good quality products that are reliable and are priced fairly to our customers. It is critical to have skilled people ready to develop, install and service these products to our customers as they are available. In order to do this, we will need to have people who are well trained.

Consolidation has also been significant in our industry in the past several years and will probably continue during the coming year or so, as secondary moves will probably continue, as clusters become more defined. As this has taken place, and as organizations are looking for people ready to accept new responsibilities, SCTE involvement and certification have proven to be a great method for identifying capability.

CT: Where do you see the industry going in the next five years, and what does that mean for the SCTE?
PK: The lines defining what one company provides vs. another are being blurred. As an example, several years ago the telephone companies provided telephone services and data to customers, and cable companies provided video services to our customers. Other organizations such as America Online provided Internet access using phone lines as the medium to communicate across. At this point, the telephone companies are either directly providing or partnering with video providers and content providers to sell voice, video and data products. We are also crossing lines as we provide high-speed data ourselves,

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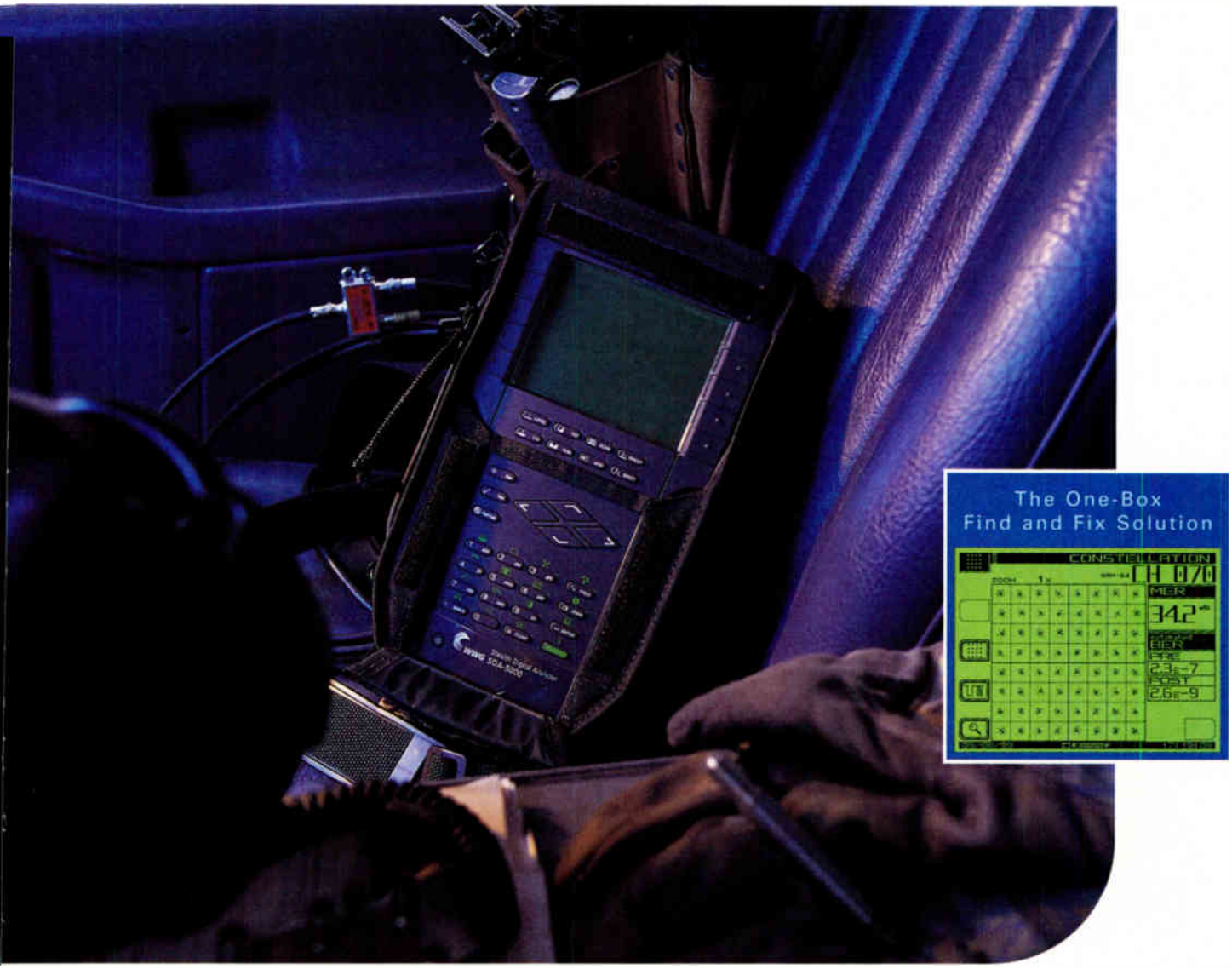

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I believe that it is very advantageous to have multiple products (such as video, high-speed data and voice) in order to compete successfully against other service providers. I am sure we will continue to see companies moving this direction. This will cause the SCTE to develop training and certification programs for areas outside of the norm, and work they perform on standards will benefit our industry as the competition will cause increased pressure on having ubiquitous products.

Bob Foote, Region 12

Bob Foote is regional vice president for Antec in Ipswich, Mass. His region encompasses Massachusetts, New Hampshire, New York, Rhode Island and Vermont and has four chapters and one meeting group. Region 12's previous director was John Vartanian.

CT: How did you first get involved in cable and SCTE?

Bob Foote: I started in cable TV in 1980. My hometown (Ipswich, Mass.) was in the process of awarding the town's franchise. I was following the events, and at 22 years old, I was looking for a career. I went into the newly opened office and applied for a job as a technician.

I was called back for an interview a short time later. After being hired, I was told the reason I got the job was because I had stated during the interview that I had never done a résumé before, so I went to the local library and got a book on how to do one. My future bosses figured if I knew how to go find information I didn't know, then I would be able to find needed information about cable TV.

This company was eventually sold. Shortly after the sale, I left and took a job at Cable TV Supply selling cable TV hardware. In 1988, my present employer, Antec (Anixter Cable TV at the time), purchased Cable TV Supply.

After the acquisition by Antec, I was given a territory to cover as an outside sales representative. It was during this time I became active in the SCTE. I joined the New England Chapter Board in 1989. Since I began my involvement in 1989, I have been the chapter vice president for five terms and president for three terms.

CT: What prompted you to run for a seat on the board?

BF: To me, running for a seat on the national board of directors was a natural step. I held the position of New England Chapter president from 1996 through 1999. It was time for new blood to lead this chapter. I was concerned we would become stagnant as a board if I held this position for too long. Therefore, the next step beyond local chapter involvement is involvement on a national level. I will continue my involvement with the New England Chapter as long as I can contribute.

I feel I can also contribute to the society as a national board member. The New England Chapter has had some very good success over the years. I would like to spread the successes we have had in New England to other chapters.

Also, there are many challenges the society as a whole will be facing over the next several years, and I feel I can help us through these challenges.

CT: What do you see as the key issues to be addressed in your region?

BF: There are two main issues in

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Region 12. The first is the viability of local chapters. The New England Chapter has enjoyed a lot of success, but other chapters are facing a continual struggle. This struggle is mostly due to lack of involvement by people and companies in each chapter's area. There are several chapters that are either defunct or very close to being so. I hope to help these chapters become successful again.

CT: What do you see as the key issues for SCTE as it relates to the industry as a whole?

BF: The hybrid fiber/coax (HFC) industry has seen many changes over the last couple of years. We now provide high-speed data and telephony over our networks, along with new innovations in delivering entertainment. With these new services, we have attracted many new faces into the HFC industry. Many of these faces come from the telephone or data industry. We need to make sure these new people feel welcome. They need to be able to bring in new ideas and be allowed to help us all grow and continue to explore new avenues.

The SCTE needs to find a way to embrace these people. We need to make it clear that you don't need to be a cable pioneer to be a valuable member of the society.

"We need to make it clear that you don't need to be a cable pioneer to be a valuable member of the Society."

—Bob Foote, Antec

The second issue is diversity in chapter leadership. With consolidation, it is difficult to maintain a diverse board of directors at the local level. It not only affects the make-up of the board of directors for a chapter; it also affects attendance at technical sessions. Segmentation and specialization of the work force within these consolidated companies makes topics of technical sessions critical.

CT: Where do you see the industry going in the next five years, and what does that mean for SCTE?

BF: Every member of the technical community in the industry deserves a pat on the back and congratulations. For many years, we have dealt with ridicule and scorn from other industries and the media. It has been a sport to beat up on cable TV.

During this time, we have built and perfected a delivery system of information that is fast becoming the main infrastructure of our information system of tomorrow. We are now looked at with envy from rival delivery systems. This is attracting a convergence of technology. As the Internet continues to mature, bandwidth and speed into the home will be the key in the success of many uses of the Internet-from "smart house" technology to communications systems that will allow people access to various communications technologies wherever they are.

Training and standards will continue to be the key in successfully conquering this convergence. The SCTE will be the dominant force in the industry in guiding us in training, certification and standards. CT

Ron Hendrickson is executive managing editor of "Communications Technology."

Did this article help you? Let us know your thoughts. Send an e-mail to jwhalen@phillips.com.

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Introducing Cable Modems, Part 3

This month's installment continues a series on cable modem installation. The material is adapted from a lesson in NCTI's new Digital Installer Course. © NCTI.

The previous installments covered the considerations encountered when determining equipment locations, provided a checklist for certifying drop system reliability and discussed two options for connecting cables to a stand-alone cable modem and computer. This part looks at considerations for connecting a telephone line to a cable modem using a phone return.

Connecting telephone line to Modem with phone return

A customer usually chooses a computer location because of easy access to a permanent telephone connection. The following describes two of three configurations and their recommendations.

1) Using an existing telephone jack when it is less than 25 feet from the CPE. If an existing telephone jack is less than 25 feet away, use a 25-foot or shorter telephone wire jumper. Always ensure that the jumper wire is aesthetically pleasing. Wire draped across a room can be unsightly, a hazard, and a customer annoyance. Many companies have a 15-foot maximum distance. (A 25-foot maximum jumper wire is a telephone industry standard.)

2) Installing a new telephone jack if the closest existing telephone jack is over 25 feet from the CPE or is not easily accessible. If the telephone station jumper would run 25 feet or longer and/or the proposed CPE location is not easily accessible to the existing telephone jack (Figure 1), installing a permanent outlet to the location may prevent future service calls and customer frustration. This is accomplished by installing an extension from the closest telephone outlet using telephone station wire to the new location and connecting it to a surface-mounted modular jack. If the existing telephone jack is already in use, install a duplex jack to service both the existing CPE and the newly installed extension (Figure 2).

Next month's installment will continue with considerations for connecting a telephone line to a cable modem that uses a phone return and also will discuss modem front panel status lights and powering.

FIGURE 1 EXTENDING A SINGLE PHONE OUTLET

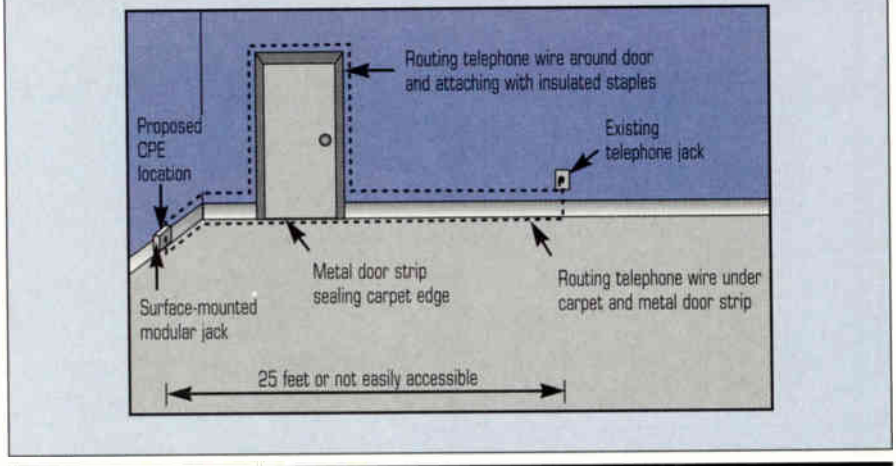
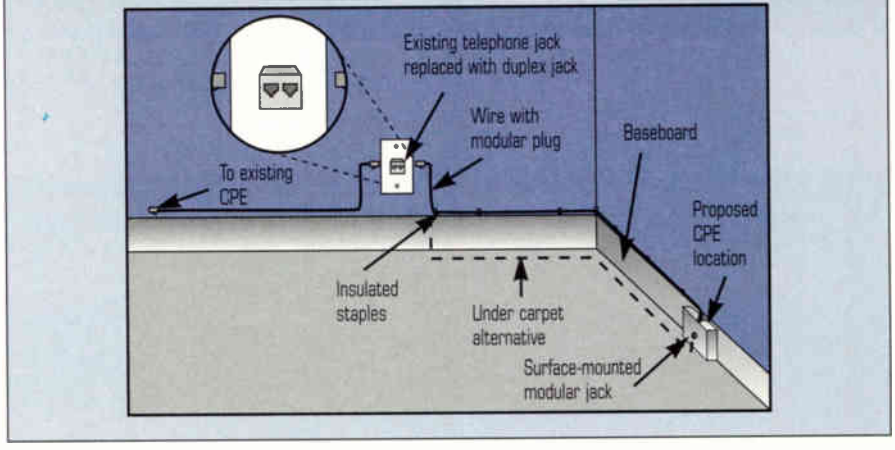


FIGURE 2 EXTENDING AND CONVERTING A SINGLE PHONE OUTLET INTO A DOUBLE OUTLET.



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MARKETPLACE

CISCO TOUTS CABLE MODEM

Cisco's CAR100 cable modem is geared toward cable service providers deploying Digital Video Broadcasting/Digital Audio and Video Council (DVB/DAVIC) broadband access to the residential and small office/home office (SOHO) market. It enables bi-directional data communication speeds up to 41.4 Mbps, and is designed to connect to a headend such as the Cisco INA2320 interactive network adapter over the hybrid fiber/coax (HFC) network. The product features Internet protocol (IP) routing, supports 8 MHz channel allocation, connects to 10 Mbps Ethernet and is manageable via Simple Network Management Protocol (SNMP).

For more information, contact Cisco at (800) 553-6387 or on the Web at www.cisco.com.

CABLE 2K'S HOT TECHNOLOGY

Technology sizzled at this year's National Cable Television Association (NCTA) show in New Orleans. Whether it was new modems, Internet protocol (IP) telephony gateways, interactive set-tops or some other gizmo, you were sure to see the latest out on the exhibit floor. Here follow some of the new broadband gadgets making their debut at NCTA's Cable 2K.

REPLAYTV

Replay TV is the digital video recorder and service that enables viewers to pause, rewind, slo-mo and instant replay live television. The service involves no monthly fees and can be self-installed. ReplayTV is compatible with cable, satellite and antenna programming feeds, uses an exclusive universal remote and can record up to 30 hours of television on its hard disk.

Random access memory (RAM) chips serve as the operating memory for the unit's digital signal processor. A Philips R3000 central processing unit (CPU) runs ReplayTV's operating software. The recorder also contains Moving Pictures Experts Group (MPEG)-2 encoder and decoder, a proprietary video processor, national television standards committee (NTSC) encoder and decoder (for analog), video input and output (IO) jacks and a radio frequency (RF) television tuner.

For more information, contact ReplayTV at (877) 737-5298 or on the Web at www.replaytv.com.

DIGITAL CABLE TERMINAL

Traditional analog features and advanced applications coexist on Pioneer's Voyager digital cable terminal. Advanced features include video decompression supporting Moving Pictures Experts Group (MPEG)-2, cable modem functionality, universal serial bus (USB), S-video and baseband stereo connections, and memory at 4 MB flash and 8 MB dynamic random access memory (DRAM). The Voyager incorporates PowerTV's operating system, a 32-bit reduced instruction set computer (RISC) microprocessor, Internet protocol (IP) addressing, and the PowerKey multilayer encryption system. Pioneer's Passport navigation software offers such features as an interactive program guide, VCR programming, channel banner browsing and pay-per-view service.

For more information, contact Pioneer at (800) 421-6450 or on the Web at www.pioneerbroadband.com.

HTML BROADCASTER

ICTV's WebCaster delivers web pages and graphical content to digital set-top boxes. The system uses ICTV's Moving Pictures Experts Group (MPEG)-2 encoder to convert hypertext markup language (HTML) content into low bit-rate broadcast channels. The system can be used to broadcast motion-based content such as animation or video. Operators can also create information or service channels with video stills arranged in a slide show format. Up to 200 channels on a 6 MHz channel are possible. A centralized management console facilitates configuration and navigation.

For more information, contact ICTV at (408) 364-9200 or on the Web at www.ictv.com.

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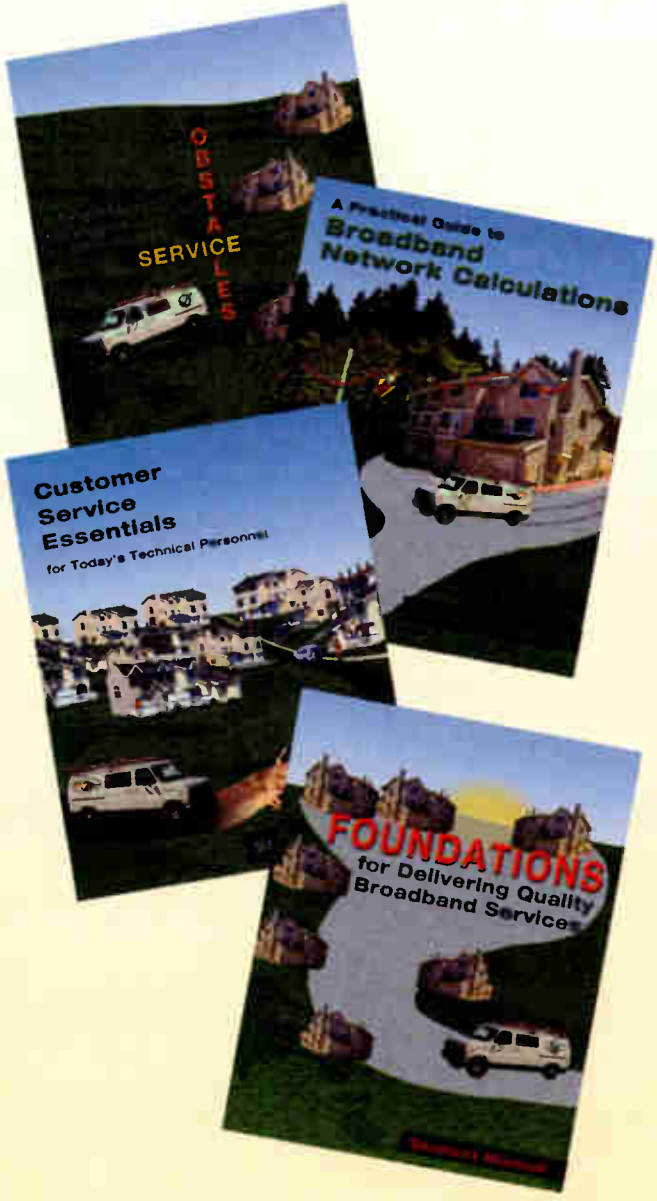

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DIGITAL SET-TOP

Philip's MTC8030 digital set-top box runs Microsoft TV advanced client software. The advanced Digital Video Broadcasting Group (DVB) set-top uses Philips CryptoWorks Conditional Access System and has a return channel based on the Data Over Cable Service Interface Specification (DOCSIS) cable modem. Based on the TriMedia platform, the MTC8030 combines traditional television viewing with such features as broadband Internet access, multimedia plug-ins, impulse pay-per-view (IPPV) and a cable modem to personal computers. It can be customized for Internet protocol (IP) telephony, Moving Pictures Experts Group (MPEG) 4 video streaming, videophony and digital video disk (DVD) playback.

For more information, contact Philips at (315) 682-9105 or on the Web at www.philips.com.

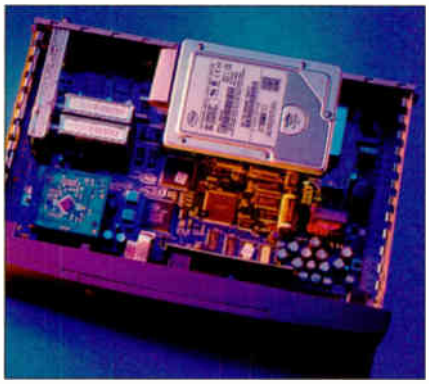
SCREEN PHONE

Ericsson's screen phone combines cordless telephony, electronic mail and Internet access in one device. Consisting of a small base station and compact cordless, color screen, the cordless screen phone HS210 offers rapid on-line access and instantaneous e-mail notification. The screen weighs 1.2 kg and measures 280 x 50 x 200 mm. The device has a flash memory of 16 MB and random access memory of 32 MB. Commands and functions are entered on the virtual keyboard or by the touch of a finger or application of a specially designed pen. The screen phone is one of the first products launched using Bluetooth technology.

For more information, contact Ericsson at (+011 46 70) 590-9900 or on the Web at www.ericsson.com.

PERSONAL VIDEO RECORDER

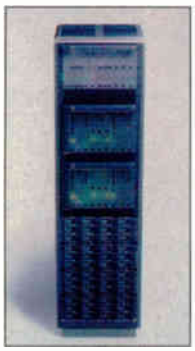
Pace Micro Technology is running NDS Group's extended TV concept, XTV, on a Pace hard drive-enabled digital set-top box, effectively embedding personal video recording (PVR) capability. XTV combines meta data (data about data) embedded in the



video stream and local storage in the set-top box to allow creative enhancements to content, such as highlights, interactivity and intelligent recording. The XTV Pace set-top box includes a 20 GB hard disk, allowing the device to record about 20 hours of television, and includes two tuners, allowing simultaneous recording.

For more information, contact Pace at (407) 667-9355 or on the Web at www.pace.co.uk.

HED VOD SERVER



DIVA's Video Server, the DVS 5000, is designed specifically for video streaming. Modular in design, it processes over 1,000 3.4 Mbps streams in a single 19 inch rack, but is scalable to over 20,000 streams. Its modules contain the DVS 5000 processor, a JBOD containing 12 fibre channel disk drives, and a Moving Pictures Experts Group (MPEG) switch. Its high-speed advanced services implementation (ASI) fiber outputs operate at the gigabit rate and offer over four times the bandwidth of Digital Video Broadcasting Group (DVB)-ASI. Diva offers instant access to more than 2,000 titles.

For more information, contact Diva at (650) 779-3099 or on the Web at www.divatv.com.

CALENDAR

July

19: Great Lakes Chapter Eleventh Annual Golf Outing. Contact Paul Hales at prhales@digitrace.com.

20: Penn-Ohio Chapter Golf Outing. Contact Linda Strobert, 717-263-7571.

20: Greater Chicago Chapter Technical Seminar, Willowbrook Holiday Inn, Hinsdale, Ill. Topic: Installations. Contact Jim Beletti, 630-871-2727 or beletti@att.com.

27: Central California Chapter Technical Seminar, MediaOne L & D Center, Fresno, Calif. Topic: System Powering. Contact Roger Paul, 559-253-4685.

August

2: Ark-La-Tex Chapter Golf Tournament, Eastland Country Club, Haughton, La. Contact Terry Temple, 318-213-4170.

3: SCTE Seminar CATV 101, Richmond Va. Contact Jessica Dattis, 610-363-6888.

9: Central Florida Chapter Technical Seminar. Contact James George, 357-351-1300.

12: Llano Estacado Chapter Technical Seminar and Testing Session, Cox Communications, Lubbock, Texas. Topic: The DOCSIS Standard & Cable Modems and Annual Meeting. Contact Bob Baker, reb002@tca-cable.com, 705-763-4411.

15: W.V. Mountaineer Chapter Technical Seminar, Ramada Inn, S. Charleston, W.V. Contact Charles Bradley, 304-247-6231.

16: W.V. Mountaineer Chapter Technical Seminar, Holiday Inn, Bridgeport, W.V. Contact Charles Bradley, 304-247-6231.

PLANNING AHEAD

> ***Sept. 7: SCTE Board of Directors Meeting***
> Orlando, Fla. Contact Kaye Keller, 610-363-6888.

> ***Oct. 12: SCTE Seminar CATV 101***
> Atlanta. Contact: Jessica Dattis, 610-363-6888.

> ***Sept. 27-29: Great Lakes Expo***
> Chicago. Contact Great Lakes Cable TV Association, 317-845-8100.

> ***Nov. 28-Dec. 1: Western Cable Show***
> Los Angeles. Contact California Cable TV Assoc., 510-428-2225.

COMMUNICATIONS MANAGER

SCTE is looking for a communications professional to handle all press relations, publicity, promotions and most non-technical writing for the cable telecommunications technical professional society.

Writing responsibilities include direct mail and catalog, exhibitor and seminar promotions, speeches, ghost writing, newsletter articles, membership materials, video scripts, on-hold messages, space ads, Web site content, and telemarketing scripts. Work closely with graphics designers to develop finished marketing materials.

The Communications Manager will develop and implement the space advertising plan and create new publicity and public relation approaches, including SCTE's Web site. A small amount of travel is required to represent the Society at industry meetings.

Candidates should have a minimum of 5 years experience in public relations and in writing for diverse audiences. BA degree. Writing samples will be requested from qualified candidates. Interested candidates should mail their resume and a cover letter including salary requirements to:

SCTE Human Resources
140 Philips Road
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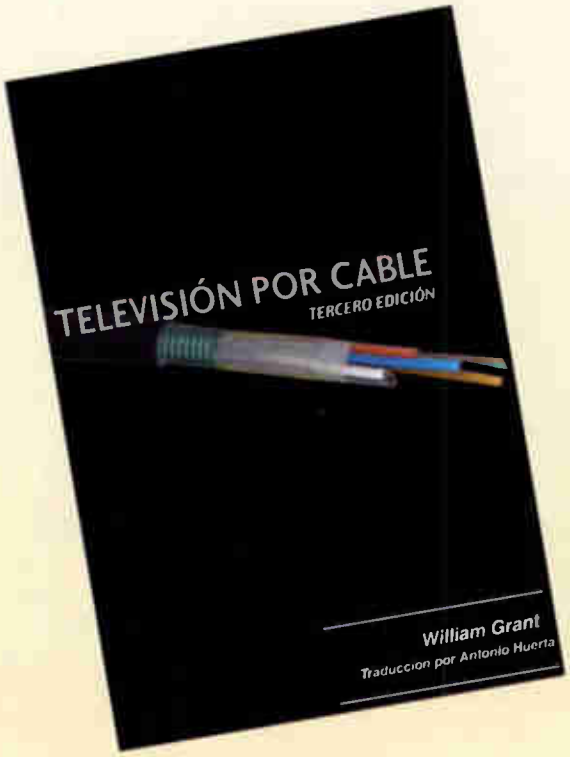

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A Rookie Board Member's Observations

Shortly after being elected to represent Region 11, I joined the Society of Cable Telecommunications Engineers' (SCTE) board of directors last year at Cable-Tec Expo. Half of the board is elected each year, ensuring smooth governance of the society and, at the same time, inviting new ideas and new faces.

New members, myself included, joined the board looking for change tempered by stability. John Clark, his staff and the other board members warmly welcomed me and willingly answered all of my questions. Jim Kuhns, as chairman of the board, played an excellent role in that and many other areas.

And a lot was happening the year I joined the board, to say the least.

A different approach

John had replaced Bill Riker as SCTE president, and John was moving the society in a new direction. No, not a new direction so much as with a newfound emphasis. The pride we have in SCTE has always been there. What John and his team had begun to do was to shine the marketing spotlight on the accomplishments of the society and to announce loudly our plans to remain the industry leader in training, certification and standards.

This increased visibility mirrored the growing importance of cable telecommunications in the new economy. Change was happening at Internet speed, and the board was committed not merely to keeping up, but to using the organization's talents to remain on the cutting edge of technology.

We need you

To do this, the society relies on volunteers at all levels. I have met many of these individuals who have volunteered their time and talents because they believe in the SCTE mission of "training, certification, standards." Volunteers keep the society moving forward, and I have been encouraged this past year by many chapter members who want to become more involved on the national level—and we can use all of them.

Time is the biggest investment, and it brings the biggest rewards to volunteers. I recognize the support from many companies, too. They allow their employees to contribute company time to advance the society and industry. The monetary support from multiple system operators, manufacturers, and other service providers is also critical to everyone's success.

I saw many milestones during my freshman year on the board. As I took office, SCTE was in the midst of hosting its most popular Expo. About 11,000 individuals turned out, with nearly 460 companies exhibiting. An exhibitor floor space record was set as well, only to be surpassed by the demand for exhibitor space at this year's Expo in Las Vegas.

The Society is on a roll! Membership also has hit an all-time high, dashing past the 17,000-member mark in March. SCTE continues to be the largest professional organization in the industry.

Setting records requires expertise, creativity and dedication. John Clark built on Bill Riker's foundation to make this happen. The new headquarters staff is outstanding. The help provided to me as a new board member was exceptional.

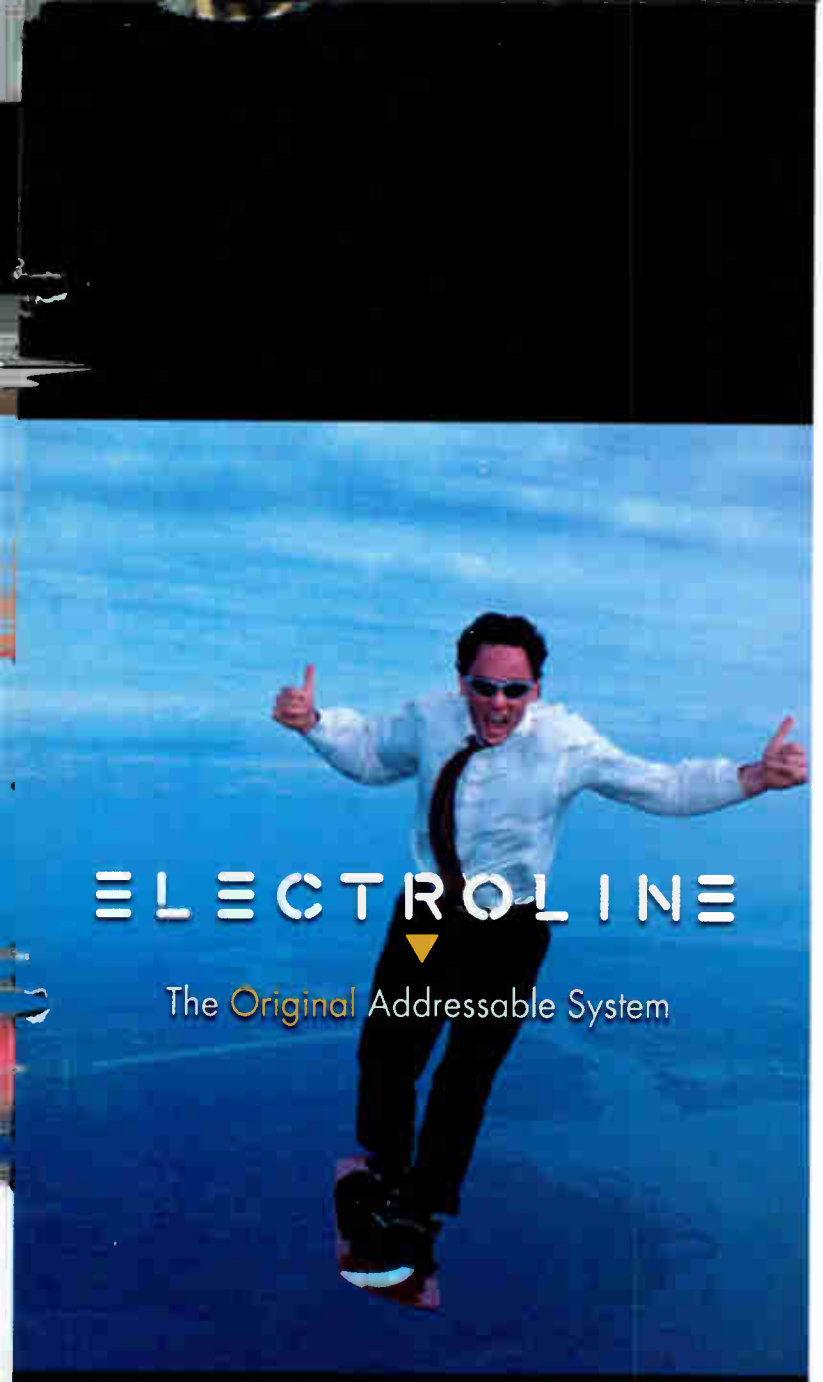
Headquarters staff members respect the work our chapter leaders do to bring information to our members, and the staff often has remarked how committed chapter leaders are to the industry and the society. Igniting this new synergy was the first-ever SCTE Chapter Leadership Conference. The event attracted 50 dedicated Society members to Exton, Pa., in March. Everyone appreciated the opportunity to share and learn in such a unique setting. I eagerly await next year's conference.

Good things to come

When I talk with new board members this year, I'll share my thoughts on what I see happening next. The marketing of our expertise and raising the bar in training, certification, and standards will take us to a higher level of recognition and distinguish our society as the broadband leader.

Over the past year, I witnessed unprecedented structural and directional changes in our industry and technology, and I can say the same thing for SCTE. I appreciate the opportunity to represent Region 11 again this year on the SCTE Board of Directors. I am also honored to serve those members, and I thank them for their confidence in my ability to help lead them and our thriving professional society.

Marianne McClain is SCTE's Region 11 director. She can be reached via e-mail at mmclain@bakerinstallations.com.



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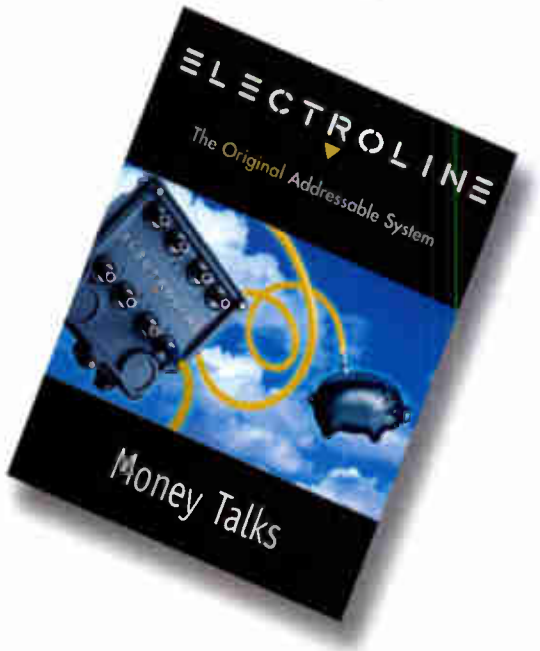

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Heat Aging	60° C, 30 days
Water Immersion	Room temperature, for 30 days, 2 foot waterhead
Freeze-Thaw Cycling	-40° C to 60° C, 2 cycles per day, 100 cycles
Salt Fog	per ASTM B-368, 30 days
Soil Chemical Resistance	30 day immersion in: 0.1N Na2SO4 0.1N NaCl 0.1N H2SO4 0.1N NaOH
Fungus Resistance	per ASTM G-21

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