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- Cable plugs & plays at CES
- ET '05 forecasts cable's technology trends
- Inside: PacketCable Multimedia wallchart

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VOD needs a reality check

Cable's ability to deliver VOD over a true, two-way network gives it a major technological advantage over DBS. But that "advantage" sustained a blow to the chops at last month's surprisingly cold and snowy Consumer Electronics Show in Las Vegas.

In a move that brashly says "phooey" to the "Only Cable Can" campaign, EchoStar announced a plan to roll out a "video-on-demand" service starting next month. Using the DISH Player-DVR 625 receiver, EchoStar will reserve about 100 hours of hard drive space for "VOD" movies that it will download to the box.

It's true, of course, that EchoStar has simply added some fancy bells and whistles to its DVR and stuck a "VOD" label on it.

We've seen this before. In 2002, DirecTV began offering "Starz! on Demand on DirecTV" to customers who owned receivers embedded with the TiVo service.

EchoStar's "VOD" service initially will offer 100 hours of content. Not a big deal, considering some cable operators are well into the thousands of hours. Plus, many MSOs offer DVRs, giving them the best of both worlds.

But guess which message is getting through to the consumer? From my vantage point, it's EchoStar's. Call them brazen. Call them shameless. But definitely call them smart. EchoStar is using its notion of VOD to stifle and neutralize one of cable's differentiating strengths.



*Perception is reality,
and right now, the
perception is that
EchoStar can do VOD*

JEFF BAUMGARTNER,
EDITOR

Perception is reality, and right now, the perception is that EchoStar can do VOD.

And I'm not just pulling this out of the clear blue sky. Recent first-hand knowledge tells me that some reporters in the consumer press aren't getting cable's message. A reporter with a local newspaper called to ask me some questions about cable and DBS competition, and more specifically, about VOD and DVRs. He veiwed them as interchangeable.

And that's just one case. The cable industry has to do a better job educating people—and I mean those who don't live and breathe cable 24/7—about the difference unless it wants to see this "advantage" vanish within a dirty cloud of misconception.

Now, it's only fair to mention that cable is meeting EchoStar's aggression with some of its own. CTAM and the MSOs and vendors that make up the On Demand Consortium are waging a campaign of their own, and VOD education is a key part of it, CTAM SVP and GM of Corporate Initiatives Seth Morrison tells me.

Because CTAM does not want to tip off the competition, it's being mum about what specific tactics it has in store for 2005, but the organization did participate in a press event at CES (in addition to the Only Cable Can exhibit just outside the main halls) that attracted 750 registrants. The 2005 campaign will also expand beyond VOD to tell cable's story on HDTV, high-speed data and DVRs.

But it can't happen a moment too soon, because, in my experience, it's easier to create perception than it is to change it.

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A man wearing a wide-brimmed hat and overalls is shown in a cemetery at night. He is holding a shovel and appears to be digging. The scene is dimly lit, with a blueish-purple hue. In the background, several tombstones are visible.

CED MAGAZINE Volume 31, number 2

feature

20 **TELEPHONY** **Grave danger?**

As voice-over-IP technology takes bites out of its flesh, does circuit-switched telephony have one foot in the grave? Or is there life in the old body yet? Perhaps it lives, for reasons including the expense of the conversion to VoIP, the hassle of the back-office transition and a body of pre-existing deployments.

By Karen Brown

COVER PHOTO ILLUSTRATION BY STAN WATTS

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The growth in VoIP is an exciting development for cable operators. The overall acceptance of VoIP, though, is dependent on delivering a service that meets the quality and reliability expectations of consumers. That's why the Touchstone Telephony Modem 402P provides up to 20 hours of battery back-up time; so even during an extensive power outage phone service is still available. This back-up time is accomplished via a patent-pending Lithium Ion battery cartridge which was designed by the engineers at ARRIS in cooperation with cable operators. This new cartridge design is being accepted across the industry as the preferred format for rolling out primary line VoIP.

The Touchstone Telephony Modem is the first commercially available DOCSIS® 2.0 and PacketCable™ 1.0/1.1 based E-MTA to integrate Lithium-Ion battery back-up capability. These batteries are lighter-weight, easier to replace and have a longer service life than traditional sealed lead acid batteries. It is just one member of the Touchstone family of E-MTAs being deployed today by cable operators worldwide.

The Touchstone Telephony Port supports either two or four lines of primary line Voice over IP (VoIP) along with High-Speed Data Access. The Telephony Port is the only commercially available E-MTA designed with Rugged, Secure Packaging specifically for outdoor applications.

The unobtrusive design replaces the incumbent local exchange carrier's (ILEC's) existing telephone network interface unit (NIU) and leaves the residences wiring and existing communication devices unchanged. The outdoor location makes installation scheduling easier because access to the subscriber's premise is not required for telephony activation.

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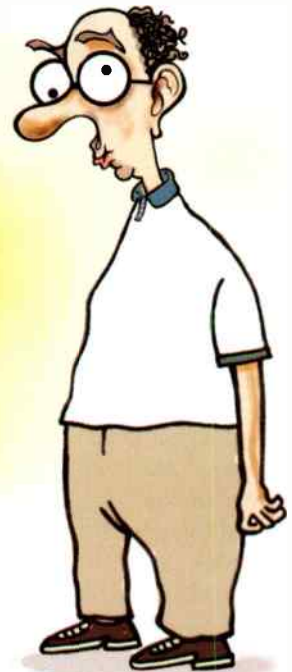
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upfront

LATEST NEWS AND INSIGHT

N2 Broadband gives Tandberg solid U.S. cable foothold

Beating out a handful of potential suitors to the table with a cash-rich offer, Tandberg Television has inked a deal to acquire N2 Broadband in a deal valued as high as \$130 million.

The agreement, set to close in the first quarter of 2005, will give

U.K.-based Tandberg a deeply-established U.S. cable presence as well as a huge head start in the video-on-demand market. N2 has VOD relationships with several large MSOs, including Time Warner Cable, Comcast Cable, Charter Communications and Cox Communications.

Before the deal, Tandberg, a provider of video compression and encoding and TV delivery systems, found most of its domestic success with broadcasters. N2, meanwhile, is expected to benefit from Tandberg's position in Europe and Asia, and in the burgeoning IPTV market.

Closely-held N2 Broadband specializes in VOD backoffice software and asset management systems. It has found success with a platform called OpenStream, which enables cable operators to pair the N2 backoffice with a variety of server vendors. SeaChange International and Concurrent Computer Corp., by comparison, sell their servers and backoffice systems as part of a proprietary package. nCUBE—soon to be part of C-COR Inc.—sells servers, as well, but is positioning itself to compete with N2 by licensing its nABLE backoffice plat-

form and integrating it with other server vendors.

"The acquisition of N2 Broadband will enable us to dramatically expand our North American market presence and augment our total solution offering to include the world's most advanced and open VOD software solution," said Tandberg President & CEO Eric Cooney.

On the financial end, the cash-and-stock deal will be valued in the range of \$110 million to \$130 million. In comparison, C-COR's deal to acquire nCUBE was valued at \$89.5 million when it was announced Oct. 21.

N2 and Tandberg have also inserted a \$3 million mutual break-up fee. N2 Broadband is expected to pull in revenues of \$20 million to \$25 million for 2004.

Upon closing, N2 President & CEO Reggie Bradford will become president of Tandberg Television Americas, to be headquartered in Atlanta. That company will have 180 employees, including N2's current 140, and the 40 that Tandberg presently employs in North America.

Arroyo Video Solutions Inc. has released the vitals behind its next-gen video server and software platform and has shed some light on its activity with MSOs.

The company claims its VOD platform—which uses standard Intel "Xeon" servers and Arroyo's own "Video Accelerator" software—can produce operational improvements 10 times greater than its peers.

Arroyo unveils the goods

According to the company, each Arroyo server supports up to 3,000 streams (3.75 Mbps per stream) in three rack-units (RU) of space. That means it can support up to 42,000 streams per rack. A 4-RU set-up, Arroyo added, can simultaneously ingest up to 160 channels of live TV and store up to 9.6 terabytes of video content—enough to meet the demands of network-based digital video recording applications.

The Arroyo OnDemand platform, shipping since October 2004, is currently in trials with three of the top-10 cable MSOs in North America.

Arroyo's deployments are in a mix of cable VOD greenfields and cable markets with legacy VOD systems, said David Yates, Arroyo's VP of marketing and business development.

Although Arroyo has been approached by the telcos, "we've endeavored...to get our first product out to the cable market to show we can deliver them the scalability and open architecture they need," Yates said.



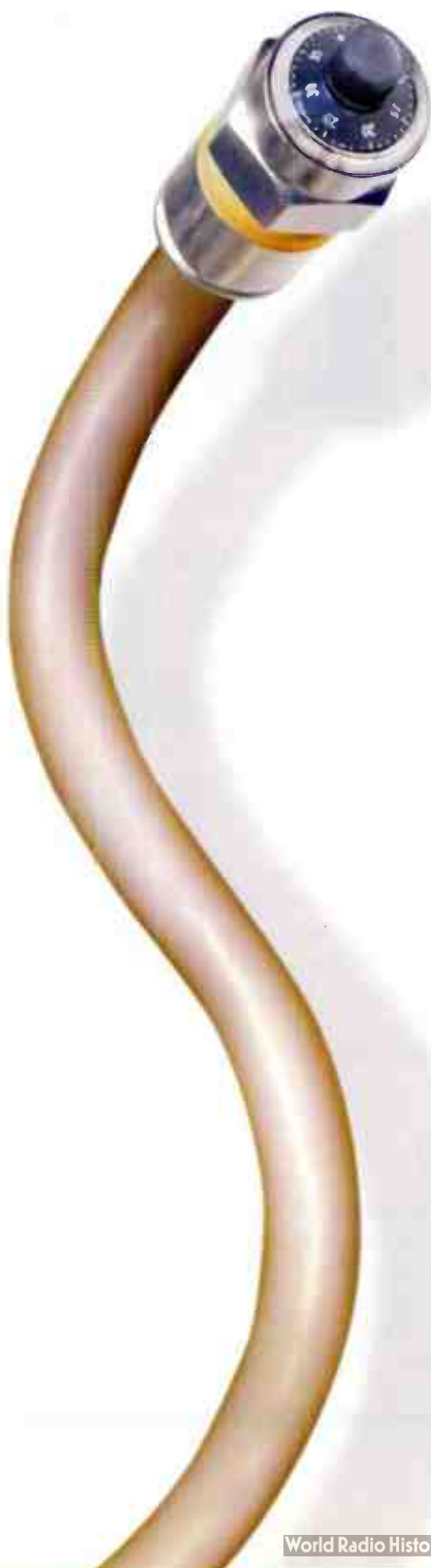
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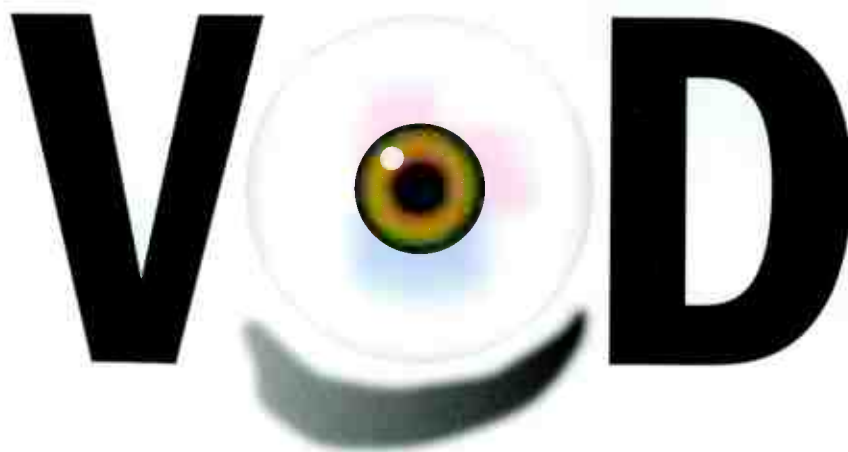


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**SUNRISE TELECOM
B R O A D B A N D**

Blockbuster fee eliminations puts competitive eye on VOD



Blockbuster's decision to drop late fees from movie rentals this year could have an "incremental negative" impact on cable's video-on-demand efforts, according to Fulcrum Global Partners.

Blockbuster has extended due dates to one week for games and two days or one week for movies, plus a one-week grace period. At that point, Blockbuster will automatically sell the customer the product, less the rental fee. Or the customer can return it and pay a restocking fee.

The decision damages a key message cable has used against video stores—convenience, and no late fees. Stores like Blockbuster also continue to have a key advantage over VOD: earlier release windows.

"While we have long believed that VOD was constrained by the movie studio-imposed release window...the elimination of late fees further mitigates the advantages of movie-based VOD," Fulcrum Analysts Richard Greenfield and Doc Horn wrote, in a research note.

They added that DVD sales and rentals also have the additional advantage of offering features (i.e. director commentaries, behind-the-scenes documentaries). Cable operators and vendors, however, have been in the process of adding similar features on-demand.

Fulcrum said it expects cable to respond by playing up subscription and "free" VOD services.

Bird gooses EchoStar capacity

The launch of another SES Americom satellite will give EchoStar Communications Corp. a boost in its national and spot-beam capacity.

The Americom 16 bird lifted off from Cape Canaveral in December and successfully gained a geostationary orbit at 82 degrees West. It carries a hybrid Ku- and Ka-band transponder payload to support high-speed data transmission and digital video for EchoStar, starting in the first quarter of 2005.

The Federal Communications Commission has issued its biennial report on the state of broadband competition in the United States, and it looks like digital subscriber line providers are

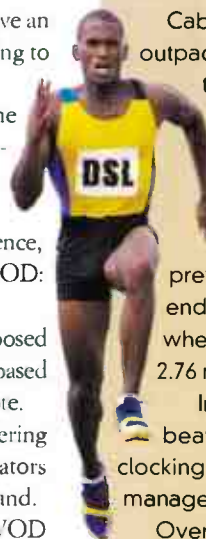
FCC: The telcos are catching up continuing to bite into cable's high-speed Internet subscriber lead.

In the six-month period between December 2003 and June 2004, DSL providers' market share rose from 33.7 percent to 35.1 percent, while cable's market share actually lost ground, dropping from 58.3 percent to 57.3 percent market share.

Cable providers continued to outpace DSL in net additions for the first half of 2004, racking up a little more than 2.14 million new accounts compared to DSL's 1.88 million. But that is a 22.3 percent drop from the previous six-month period ending in December 2003, when cable operators added 2.76 million new subscribers.

In terms of growth, DSL also beat out cable for the period, clocking in at 19.9 percent. Cable managed just 13.1 percent growth.

Overall, the number of subscribers tapping a connection of 200 kbps downstream or higher—the FCC's classification of broadband service—increased 15 percent during the first half of 2004, from 28.2 million to 32.5 million lines. That is a slower growth pace than the previous six months, when broadband lines increased 20 percent, from 23.5 million to 28.2 million.



"The consumer wants products that are better and faster in an era when technology is changing very rapidly. So getting to market is key for network operators, especially in the on-demand space. That's where C-COR can play a critical role," Woodle notes.

Another piece of the C-COR strategy is having one voice to the customer. "We have been talking more than ever with customers to determine not only what products and services they need, but also how they want them packaged for greatest value and how they want to work with us," says Woodle. "We have account managers assigned to specific companies, and they're backed by the capabilities of our three collaborative business units—C-COR Access and Transport, C-COR Solutions, and C-COR Network Services—each with support professionals and product line managers to meet each customer's specific expectations."

Since 1953, C-COR has filled the role as a trusted partner providing quality products and services to the cable industry, and its vision has been clear and far-reaching, evidenced by the company's three unified business units—all with the single purpose of helping the cable industry operate their networks more efficiently while reducing costs.

"Our customers are creating the future, and we saw it coming. Our expanded portfolio of integrated, application-oriented solutions, reinforced by our 50-year experience and knowledge of the cable industry, uniquely qualifies us to meet their needs," concludes Woodle.

C-COR's new-era business units portfolio

HARDWARE

C-COR Access and Transport provides network infrastructure technology that enables a smooth transition from legacy HFC networks to IP, demand-oriented networks. C-COR's cost efficient access portfolio includes flexible, scalable, and reliable AM head-end/hub platforms, optical nodes, and RF amplifiers as well as its fiber-to-the-premise solution for network access over the last mile. C-COR's transport portfolio includes its popular, widely deployed digital video system (DV6000) as well as its next-generation transport platforms, the MPS and the PLEXiS. The PLEXiS platform uses Gigabit Ethernet transport modules with DWDM and CWDM for true server to hub transport of advanced services in support of VOD and high speed business access. The MPS is a packet-based transport solution that incorporates RPR protocols, thereby enabling advanced bandwidth management and quality of service control for the delivery of data, voice, and video services over ring network infrastructures.

SOFTWARE

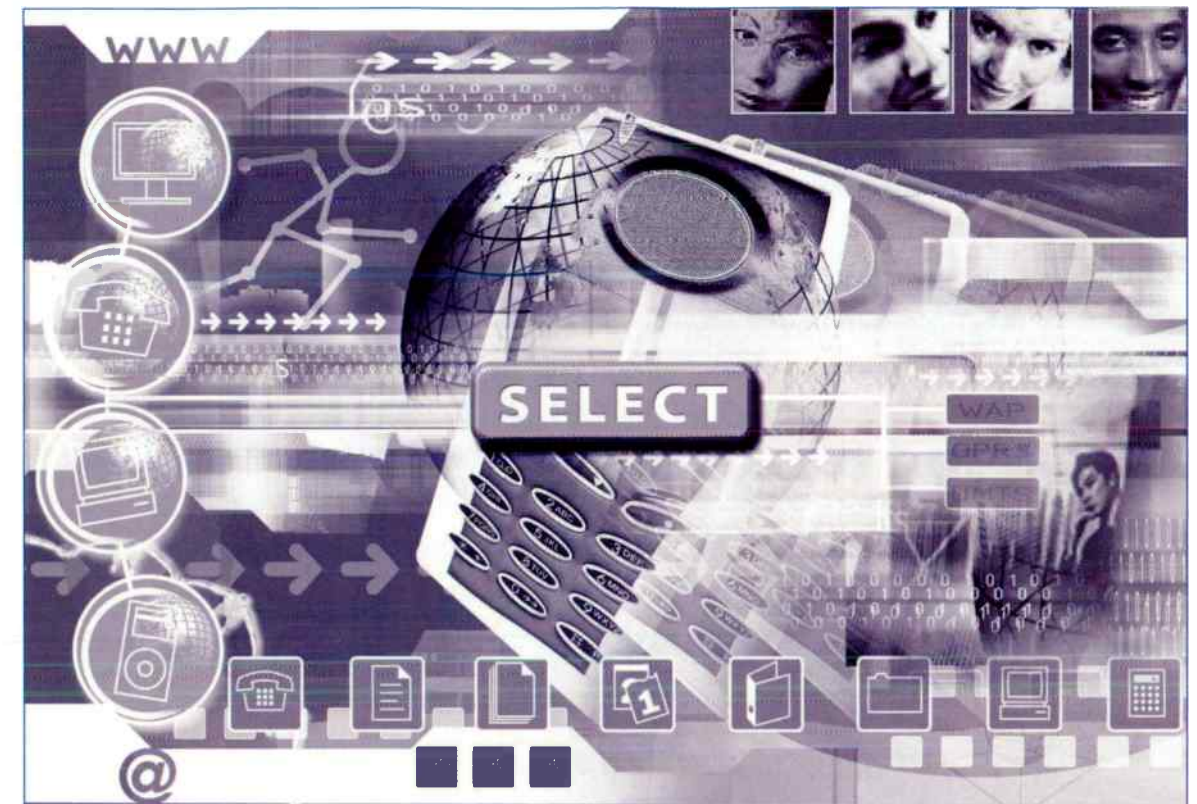
C-COR Solutions offers integrated, application-oriented IP solutions that meet open standards and interoperability for efficiently deploying revenue-generating services such as advertising, On Demand, VoIP, and high-speed data. C-COR's software applications help broadband and telecommunications network operators manage their businesses with the industry's most complete and sophisticated suite of back office automation tools for network, content, subscriber, and workforce management.

PROFESSIONAL SERVICES

C-COR Network Services offers technical services to optimize the performance of advanced IP applications over broadband networks. C-COR provides industry-leading skills to design, build and operate sophisticated networks through network consulting; systems integration; engineer, furnish and install services; project management; IP network assurance; and outsourced operations.

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A Special Supplement to CED magazine



NEW-ERA C-COR VITAL TO OPERATORS TRANSITIONING TO IP-DRIVEN, ON-DEMAND SERVICES

It's one thing to foresee a major industry shift, and another to make the right adjustments for capitalizing on the evolution. To hear executives at C-COR tell it, the company recognized the consumer-empowered environment that MSOs would face with its multitude of management issues and has successfully assembled all the capabilities needed by IP-oriented networks at just the right time.

Embracing the vision of a consumer-centric communications world as early as 1998, C-COR embarked upon a multi-year global strategy to expand its capabilities into a complete range of interoperable access and transport products, software solutions, and network services, all designed to simplify and facilitate the transition to and management of next-generation IP networks delivering on-demand services.

"Through strategic acquisitions in software and services and the development of our IP technology capabilities, we're unveiling a new C-COR that brings together the technology solutions and the professional expertise best qualified to solve the complex networking issues challenging today's network operators," says David Woodle, Chairman and CEO of C-COR. "We're supporting operators as they transition not only to HDTV and VOD, but also to telephone and data services over IP-

C-COR

standard networks. These operators may also include RBOCs, ILECs, and CLECs who are starting IP TV and other IP services. Our mission is to become a trusted partner in building reliable, next generation networks and in providing the tools and expertise to keep these networks reliable, efficient, and cost-effective. So far we believe we are meeting our mission goals.”

C-COR’s cable operator customers have invested more than \$70 billion in network upgrades (and more than \$3 billion in C-COR infrastructure) on their way to all-digital, demand-driven networks. Their top priorities are to implement packet-based transport, finish VOD, expand VoIP, and deploy video over IP, all while improving operations through automation.

Those are daunting tasks. Woodle believes that meeting the challenge requires joining the best and brightest talent with reliable technology solutions to achieve the operational efficiencies and profitability expected by customers and investors. To ensure there is an overarching strategy driving recurring, profitable, predictable revenues, for example, C-COR offers operators access to its project development and engineering specialists early in the network design and services planning cycles.

HELPING NETWORK OPERATOR CUSTOMERS

C-COR’s aim is to help its network operator customers in implementing unified solutions that put subscribers in personal control of their entertainment, information, and communications at home or at work. In doing so, it believes network operators are recognizing C-COR as an important partner throughout all phases and aspects of the network.

High Definition TV’s stunning clarity, VoIP’s reliable use of Internet Protocol and appealing business models, and Video-On-Demand’s content-rich, on-demand service are only a few of the new services leading the industry into a next era of communications and customer choice. Thus far, customers are applauding those choices and exploring new technologies and services, while determining just how these new products will impact their daily lives. And it is expected that the impact will be widely felt.

For example, a Yankee Group study shows that VoIP is expected to serve 17.5 million U.S. households by year-end 2008, with cable projected to capture 56 percent of the local VoIP market by year-end 2005.

In addition, 36.5 million homes will have VOD available by year-end 2008, and 19.3 million will have SVOD available at the same time, projects the Yankee Group.

“Today’s C-COR is ready to help the network operator in simplifying the transition to these multiple services through optical networks and then in ensuring a profitable transition to IP,” states Woodle.

Meeting these corporate objectives has required a thoughtful strategic plan and a heavy

dose of vision. Adds Woodle: “We knew we had to add optical transport products and software applications such as content and network management to our portfolio as well as bring on board the expertise to support these capabilities. So we sought and bought companies using a classic top-down approach.”

The first phase of this plan focused on nine key acquisitions, which have become an integral part of the company’s long-term strategy, and enhanced considerably the company’s ability to provide a wider range of products and services to a larger customer base around the world. It was accomplished by:

- Expanding its equipment portfolio into fiber optics and digital video transport with the acquisitions of Silicon Valley Communications, ADC Telecommunications Cable, and Philips Broadband Networks.
- Establishing a nationwide technical field service capability with the acquisitions of Worldbridge Broadband Services, Advanced Communications Services, Aerotec, and Valley Communications.
- Obtaining OSS capabilities in network and mobile workforce management with the acquisitions of Convergence.com and Mobile Workforce Technologies.

“These initial acquisitions broadened our total product offerings with fiber optic and digital video transport equipment, software management systems, and technical field services. They enabled us to introduce new technologies demanded by our customers and expanded our customer base worldwide. Now we’re moving ahead with the second phase of our strategic plan,” Woodle explains.

In 2004, C-COR added another vital group of companies to help meet its phase 2 objectives, which included:

• Alopa Networks	Back Office, Automated Subscriber Support
• Lantern Networks	Next-Generation Packet-Based Technology
• Optinel Systems	Next-Generation Packet-Based Technology
• Stargus	Network Capacity and Security Management
• nCUBE	Content Management and Delivery

These acquisitions are at the heart of C-COR’s plan to provide the optical packet transport technology needed to carry advanced services around a population area and to the premise, with an overlay of four critical automation solutions that manage the content, network, customer, and workforce assets. Industries such as cable need automated tools to simplify their complex, sophisticated networks. The new C-COR is designed to do that and provide them with reliability and speed—including speed to market, a growing issue among competing broadband and communications industries.

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upfront

LATEST NEWS AND INSIGHT

Comcast, Cox take control of Liberate

In a move that gives them firm internal control of their interactive television (iTV) futures, Comcast Corp. and Cox Communications have jointly signed a deal to acquire the bulk of iTV software firm Liberate Technologies.

In a deal valued at \$82 million, Liberate will sell the assets of its



Liberate®

North American business to Double C Technologies LLC, a joint venture majority owned and controlled by Comcast. Cox holds a minority stake in the J.V.

Cox and Comcast said they plan to cross-license Liberate's technology and intellectual property. The agreement also gives Comcast and Cox control of the Liberate platform and how it is designed

and deployed across their systems.

Liberate, which expects to hold on to its European business, is a key contributor to OnRamp to OCAP, a software platform for thin-client set-tops designed to help MSOs carve out a migration path to applications

aimed for the much more robust OpenCable Application

Platform (OCAP), a middleware specified by CableLabs. Cox has championed the OnRamp initiative despite lingering questions about Liberate's ability to remain viable in the long-term. The acquisition by the Comcast-Cox J.V. all but erases those concerns.

The deal also underscores cable's surging interest in iTV, a position spurred by

iTV products from EchoStar Communications and Rupert Murdoch's DirecTV, which is expected to use several interactive elements BSkyB has used with success in the U.K.

Deals that give MSOs more control of set-top software are becoming more and more commonplace. Comcast established control of its interactive program guide fate through its GuideWorks venture with Gemstar TV Guide. Comcast is also involved in an OCAP partnership (called OCAP Development LLC, and formed last August) with Time Warner Cable.

The deal also drove speculation about how well positioned (or out of position) companies like Microsoft TV and OpenTV might be once Liberate is absorbed. While Microsoft TV is already set up to get a good slice of Comcast's set-top software business, the same can't be said for OpenTV, whose shares took a big dip the week the Liberate deal was announced.

Group makes VOD icon recommendations

The CTAM On Demand Consortium has issued a list of recommended user interface (UI) symbols for video-on-demand and other advanced services.

Designed to push consistency in next-generation program guides across the cable industry, the agreed-upon icons include two right facing arrows for "fast-forward," a magnifying glass for "search," and a heart for "favorites." The consortium also pegged content-specific icons for high definition television, second audio program (SAP), and widescreen. A full list is available at www.ctam.com/news/releases/041213.htm.

"These icons will become a part of the consumer's consciousness for the on-demand category, much like those visual cues now on a VCR," said Seth Morrison, CTAM's SVP & general manager, corporate initiatives.



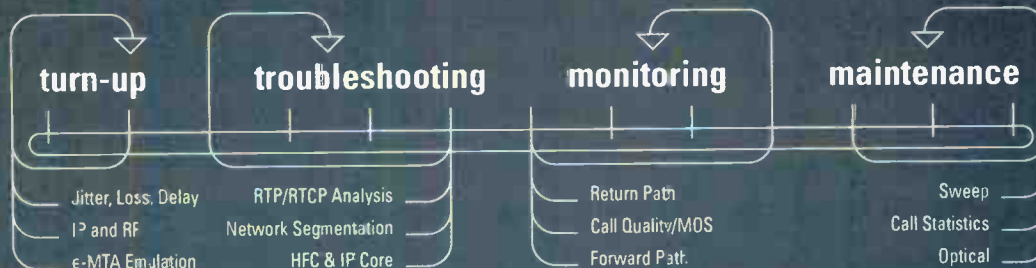
OpVista Inc. has won a multi-year deal to supply Cox Communications with the vendor's Metro-Vista optical transport system.

OpVista's platform is designed to deliver up to 800 Gbps on a single fiber. It can deliver those speeds up to 1,000 kilometers without dispersion compensation or signal regeneration, the company said.

Cox will use the equipment as part of a plan to migrate to a fully converged DWDM network to support higher levels of high-speed data traffic, video-on-demand services and commercial services.

OpVista scores Cox deal

Can customers look to you for reliable VoIP service?



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upfront

LATEST NEWS AND INSIGHT

MediaCell gets the drop on wireless

Although the market is rife with equipment that can extend DOCSIS signals wirelessly to serve commercial customers, MediaCell is taking a different tack with a "WirelessDrop" system designed to serve wide swaths of residential users.

MediaCell's system essentially replaces legacy drops on cable networks, and can deliver speeds up to 10 Mbps, company officials said.

The beauty of the system is that it gives customers the ability to connect to the service while they are on the go, explained company President & CEO Anthony DiPaolo. Like the cellular phone model, the service is based on who the customer is, not where the customer is.

"I can roam my property and the neighborhood. The user has the ability to travel within that [wireless] network," DiPaolo said.

The platform is made up of curb-side cabinets outfitted with antennas that provide 360 degrees of coverage. MediaCell uses the 802.11g spectrum today, though it could use other emerging wireless technologies such as WiMAX. A four-antenna unit can serve between four to 20 homes. The backhaul is handled by traditional DOCSIS technology. Subscribers hook into the system with standard WiFi cards. Each WirelessDrop costs \$1,000 to \$1,500, depending on the features.

While some other wireless technologies serve as a wireless bridge to cross a stream or a parking lot, MediaCell replaces the drop itself. "Our stuff is native Ethernet," said company CTO and Board Chairman Don Bishop.

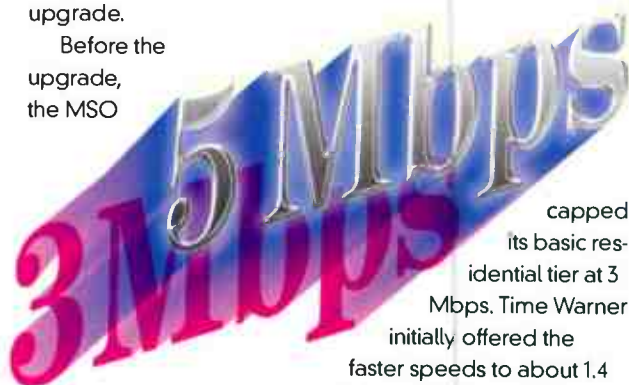
MediaCell's WirelessDrop has yet to crack the domestic cable market, but it has been tested by a major European MSO to serve single homes and multi-dwelling units, considered one of the weaker weapons in cable's service portfolio. There, the operator created a wireless canopy that registered 85 percent coverage within a 150-meter radius, ahead of the original goal of 45 percent.

MediaCell's 'WirelessDrop'



Speed thrills. Time Warner Cable has ratcheted up its Road Runner flagship data tier to 5 Mbps and has launched a new video application designed to take advantage of the speed upgrade.

Before the upgrade, the MSO



Road Runner speeds up, puts video on call

ing customers another way to leverage the increased speed. Taking a page from Comcast Cable, the operator has teamed with Vibe Solutions Group on a network-based video mail application.

Time Warner has integrated the Vibe platform with its own e-mail application, enabling customers to send basic video mail as well as customized greeting cards.

capped its basic residential tier at 3 Mbps. Time Warner initially offered the faster speeds to about 1.4 million customers in New York and New Jersey. Time Warner, which has 3.7 million cable modem customers, also increased its premium tier to 8 Mbps from 6 Mbps.

NCTI to assess Cogeco skills

Broadband training specialist NCTI has inked a professional services agreement with Canadian MSO Cogeco Cable.

Under the deal, NCTI will provide skills assessment services to Cogeco staff in 12 locations. Financial terms were not disclosed.

The assessment comes in the form of a software-based exam "generation engine" designed to create a unique set of questions for each employee tested. Cogeco will use the data to determine future training needs, NCTI said.

WideOpenWest and Rogers Cable also use the NCTI skills assessment service.

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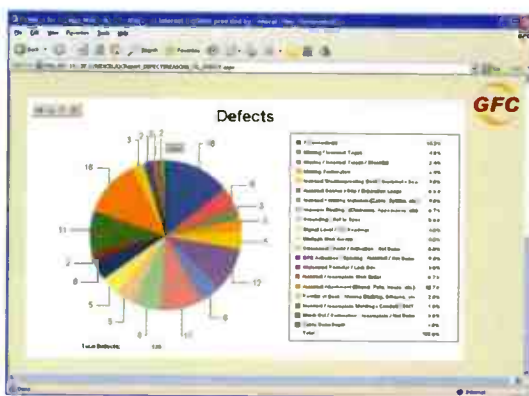
GFC keeps tabs on QC

Acquiring other broadband contractors and fulfillment firms was not the only thing that kept GFC busy last year. GFC also moved ahead on the launch of a new process that aims to fix and maintain quality work from field technicians and vastly reduce dissatisfied customers and costly truck rolls.

That Web-based database and reporting interface, dubbed ePAC (electronic Performance Analysis Center), monitors and manages the performance of about 1,900 GFC technicians who do field work for cable operators such as Adelphia Communications.

"Our ultimate goal is to improve the customer experience...and drive down costs," said Bruce LeBuhn, GFC's director of quality control and customer service.

Following a beta test, GFC has deployed the ePAC system throughout its 70-plus facilities, and now tracks metrics such as jobs assigned, completion rates,



Among its applications, ePAC gives a granular view of work defects.

reasons for incomplete work, workmanship defects, late appointments, trouble calls and safety violations.

In addition to giving operators and GFC a high-level view, the system can also drill down to very specific, granular data. For example, the system not only can show which jobs were not completed, but also show why they were not completed (the

customer was not home or had to reschedule, the job was cancelled, etc.).

"We are not just reporting incompleteness percentages, but breaking down why something wasn't completed and then seeing how [the situation] can be improved," LeBuhn said.

The system can provide similar data on work defects on RF connectors, missing or incorrect tags, grounding and weather-proofing.

In addition to supplying that information to operators, GFC can also use the data to keep tabs on the productivity of its technician staff. But what's to stop the techs from supplying false information so they can look better than they are?

GFC has solved that by incorporating an independent quality control (QC) department made up of about 80 employees reporting to LeBuhn. "They are the eyes and the ears of the project manager," he said. "Our job and fiduciary responsibility is that we're accurately and honestly assessing our work so we can improve. They don't report to the local [office]; they report to me."

The American National Standards Institute (ANSI) has re-elected Stephen Oksala to vice chair of the organization's board.

ANSI re-elects Oksala

Oksala, vice president of standards at the Society of Cable Telecommunications Engineers, enters a second, three-year term with ANSI.

SCTE is the only cable TV standards development organization accredited by ANSI.

Terayon plants 'CherryPicker' upgrade

Terayon Communication Systems has added a few bells and whistles to its DM 6400 Network CherryPicker designed to help operators with their all-digital migration strategies.

The new CherryPicker 4.0 software release features a number of upgrades, including a distributed chassis that enables operators to acquire, manage and distribute digital video from any point in the network to any other point. The architecture eliminates the time and cost for duplicate equipment, Terayon said.

The new release also features a "point-and-click" console for the configuration, monitoring and management of multiple CherryPickers, and an added program redundancy capability.

The upgrade "can help accelerate the transition to an 'all-digital network' and enable service providers to offer more compelling services and localized content to their subscribers," said Terayon CEO Jerry Chase.



Terayon's DM 6400

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Getting to know BPL

There are two groups of people who don't savor the idea of broadband over power lines (BPL): Ham radio operators, and those who already deliver broadband in another way.

That makes BPL technology an easy foe for cable, which already delivers broadband, and contains more than a handful of hard-core ham radio enthusiasts.

Plus, competitive pressure from DSL is already raising the possibility of a sort of Moore's Law for bandwidth—where downstream speeds double every 18 months, while pricing remains static. If so, that's a tall to-do list for the keepers of the cable band-



By Leslie Ellis

Have a comment? Contact Leslie via
e-mail at Ellis299@aol.com

To find out more, visit:
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width (who are also the people that tend to dabble in ham radio).

The issue, which helped to elicit more than a thousand comments to a Federal Communications Commission inquiry on BPL two years ago, is interference. Power cables aren't shielded; RF geysers are bad. Even the telcos don't like BPL, saying that since telephone lines run parallel to electric wires, interference is likely. In its October 2004 Report & Order on BPL, the FCC set forth a plan to protect against interference, but didn't offer quite as much protection as ham radio operators would've liked. To quote directly from the Order: "The benefits of Access BPL for bringing broadband services to the public are sufficiently important...as to outweigh the limited potential for increased harmful interference that may arrive."

It is a sometimes dreary fact that this column is intended to impart the facts about "the competition," wherever it hails. And here's another one to put in the cross-hairs. Like it or not, BPL is coming. Here's a quick look at what the heck BPL is, how it works, and who's doing what.

What it is

BPL is the delivery of broadband throughput to homes, over existing power lines. Consumers of it get an adapter box, sized like any other power adapter. The wire coming out of it ends in an Ethernet connector.

What makes BPL such an attention-getter, initially, is its enormous potential reach. Electricity is a necessity. Its service reach is virtually 100 percent of homes and businesses passed.

Up until now, throughput levels for BPL lingered in the 300 kbps range, making a target market those people who hadn't yet upgraded from dial-up connectivity. Now, with throughput rates jumping up so dramatically—HomePlug AV gear showed at the Consumer Electronics Show works at rates approaching 200 Mbps—BPL is less than ho-hum.

It turns out that many of the nation's 3,000-plus electric companies started running fiber links between substations a decade ago, for telemetry information. They got more serious after the August 2003 grid outages. So the Internet-facing links are there.

The trick with BPL is finding a way to pass broadband signals off the fiber, around the high-voltage (HV) plant, through the medium voltage (MV) plant, and across transformers, to homes.

Technologists familiar with the technological approaches in play say that the environment is as rich with differences as were cable modems, prior to the DOCSIS standard. Some use spread spectrum, others use multiple carrier techniques, some use other techniques entirely.

Who's doing what

Most of the ink dedicated to BPL reflects the activities of a Midwestern partnership between Cinergy Corp. and Current Communications Group, which intends to build out BPL (with voice service) to 1.5 million homes in Ohio, Indiana and Kentucky. Portions of Cincinnati are already up with a four-tier broadband service, ranging from \$30 to \$40 per month, depending on speed (1-3 Mbps).

Manassas, Va. is also a BPL hotbed, using technology made by Main.net for the city-operated electric municipality there. Customers there pay around \$30 per month for 300 kbps to 400 kbps of throughput, plus voice.

In Menlo Park, Calif., AT&T partnered with Pacific Gas & Electric to offer 3 Mbps of throughput, delivered to homes wirelessly from devices mounted on lampposts. Other hotspots of BPL activity: Allentown, Pa.; portions of New York City; Charlotte and Raleigh, N.C.; Potomac, Md.; and Cape Girardeau, Mo.

Regardless of the FCC's ebullience on the matter of BPL, it isn't necessarily a shoe-in. Like telcos entering the video market, utilities are stepping into a zone already served by two industries—three, if you count wireless hot spots.

And there's the corporate culture issue. Until now the mindset of the stereotypical electric company has been one of "keep the lights on, don't get hurt, safety first."

But, it won't go away, either. So in closing, a bit of unsolicited advice. Remember the days when you used to tell the layperson that there are three wires coming into his house—cable, phone and power—but only one (cable), maybe two (phone), can deliver video, voice and data to multiple devices? That's probably an inadvisable comment, these days. ■



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World Radio History

Swatts



GRAVE danger?

BY KAREN BROWN, SENIOR EDITOR

A classic, oft-quoted line out of the Monty Python comedy "The Search for the Holy Grail" has a plague victim protesting, "I'm not dead yet." The same may well be said these days for circuit-switched telephony.

The technology that gave cable operators an entry to voice service is now rapidly being pushed aside for the latest technology darling, voice-over-Internet Protocol. But it doesn't appear circuit-switched technology is headed for the bone yard just yet—circuit-switched gear still powers some of the most widely deployed services, and given conversion difficulties, they won't quickly convert to VoIP.

Economics drive the decision

A good case in point is Charter Communications Inc. Despite its focus on next-generation IP service, Charter has a constant-bitrate telephony market—albeit a small one. The MSO inherited it as part of a system swap with then-AT&T Broadband to consolidate service in its hometown of St. Louis. The switched system included customer premise equipment, but not the switches—that had been handled under a contract deal with AT&T Broadband's parent, AT&T Corp.

While it is being eclipsed by newer voice-over-IP technology, there is still plenty of life left in circuit-switched systems.

Once Charter acquired the network, it bought and installed a Nortel switch and its own backoffice system. On the subscriber side, Charter is using ARRIS HDTs and NIUs to serve about 90,000 homes in the St. Louis market, with plans to soon add some MDU units.

Given the maturity of that market, it doesn't make sense for now to move it over to IP voice, says Mark Barber, Charter's corporate vice president of telephony services.

"We at this point and time don't have any intentions of converting those customers to IP, and the primary reason when you back up is this: we are almost at saturation in that market, meaning that in terms of penetration, we are north of 30 percent in that market, so the penetration is probably not going to be that much higher," he notes.

If the market were hovering closer to the 10 percent penetration level, "when you look at the capital cost per customer it is higher, (and) you might have a reason to switch," Barber says.

Another reason to make the leap to VoIP is if the circuit-switched technology is inferior—but that isn't the case, either.

"I don't have a motivation there (to change it out). Or, the other side of this is, if I were missing a revenue stream—if the IP format gave me the opportunity to launch other voice-related services—I'd consider swapping it," Barber says.

ILLUSTRATION BY STAN WATTS



GRAVEdanger?

For smaller cable operators, the decision is entirely driven by economics, and specifically, what assets they have to start with, according to Alan Tschirner, director of engineering for the National Cable Television Cooperative.

"Early adopters were circuit-switched by necessity, and there were two or three runs at VoIP that didn't work," he notes. Others have partnerships with competitive local exchange carriers, "or they are dual providers—they are phone companies and they have a switch."

That said, Tschirner notes he knows of



O'Malley

no NCTC members buying new Class 5 switches, and overall, "for those who are doing phone, VoIP is the leader."

"It's an entry decision," Tschirner adds. "If they are circuit switched they are likely to stay circuit switched in their expansion."



Brovont

Such is the case for Sunflower Broadband, a smaller cable operator based in Lawrence, Kan. Sunflower now serves about 10,000

voice customers in Lawrence, and it plans a modest expansion to some of the outlying communities.

The fact that Sunflower started telephony service early—back in 2002—was part of the reason for going with a circuit-switched architecture. At the time, VoIP technology was a bit too young to make the base for a reliable voice service, so the cabler decided to stick with constant-bitrate.

Flash forward to 2005, with Sunflower now planning an expansion into the communities surrounding Lawrence: There too, it is sticking with circuit switched rather than make the VoIP leap—for now.

"It was technology we already had—we didn't have to rewrite billing systems; we didn't have to rewrite autoprovisioning. We didn't have to make any changes other than to add a little bit of equipment to the network to expand into those areas,"

says Shane

Woodard, Sunflower's inside plant manager.

"We have kept our eye on IP, but as far

as the expansion went, it wasn't a big enough of an expansion that we would have to seriously increase our network infrastructure."

Constant bitrate has its staunch supporters, including Tellabs. Its Cablespace product line includes several products ranging from GR-303 gateways down to end user devices, and it has a stable of customers including Comcast Corp. and Cox Communications Inc., as well as over-seas carriers.

Contrary to the rumor of its impending demise, circuit-switched telephony is not at all dead, with major deployments up and running for the likes of Comcast, RCN Corp. and Japan's Jupiter Communications, according to Mike O'Malley, Tellabs' portfolio marketing manager.

One reason may be that while it's the technology wave of the future, VoIP still has some rough edges.

"There is a big difference that we are seeing in the ability to make voice-over-IP work in a lab environment and making voice-over-IP work in the field," O'Malley says. "It's a big difference in terms of signal-to-noise ratio and other factors operating successfully in the lab than it is operating actually out on installed cable plant that has been out there for years and years."

In addition, Tellabs sees a growing opportunity for circuit-switched gear among Tier 2, Tier 3 and international operators.

"The reason for that is deploying voice-over-IP is going to be a very capital- and labor-intensive deployment, and only the largest providers worldwide are going to have the resources to be able to support that," O'Malley says.

Telephone gear vendor ARRIS takes more of a transitional view regarding constant-bitrate technology. Among vendors, ARRIS supplies the lion's share of the last-mile constant-bitrate gear to the market



ARRIS' Cornerstone 4 voice port

with its Cornerstone line of subscriber and last-mile equipment.

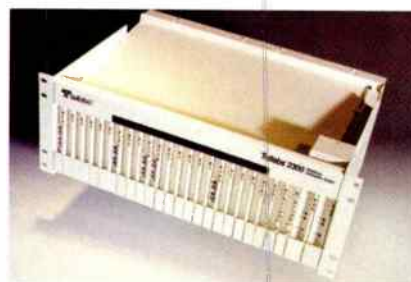
As of the end of November, ARRIS Cornerstone HDTs and voice ports drove 4.7 million lines of the approximately 6.7 million total circuit-switched cable telephony lines worldwide.

For circuit-switched equipment sales, "in aggregate, yes, the volumes are starting to decline," says Stan Brovont, ARRIS' vice president of marketing, who adds that the decline is a combination of fewer new cable clients buying Cornerstone gear and existing Cornerstone customers slowing their equipment orders as they opt for hybrid VoIP strategies going forward.

"I still want to point out, however, that we are still seeing strong demand for the constant-bitrate product, but it is coming from those customers who have already invested extensively in the constant-bitrate technology and want to maximize the return on the existing assets that they have invested in," he notes.

Indeed, ARRIS did see a few new constant-bitrate customers in 2004, including a couple of municipalities and at least one independent telco that had switches and had acquired some cable networks. A few existing customers also expanded their circuit-switched voice networks through either acquisition or new market rollouts.

Cornerstone also gained a boost last month, when Cox Communications Inc. signed a deal with ARRIS to extend its exclusive supply deal for switched telephony customer devices. Under the deal, Cox will buy "a substantial amount" of Cornerstone voice ports in



The Tellabs 2300 Telephone Distribution System

2005 for its switched telephony markets. Cox does plan to eventually transition those markets to VoIP, and under the deal, it gives ARRIS an 18-month exclusive contract to supply Touchstone VoIP ports for that transition.

Migration hassles

Even if circuit-switched telephony has seen its zenith, it isn't time to send condolence cards just yet. Given the obstacles, cable operators offering circuit-switched telephony don't appear to be in a hurry to move existing systems over to VoIP.

Making such a transition not only strands equipment capital, but also requires reprovisioning lines, altering billing systems and retraining customer service and support. "That means you've got to migrate slowly," Barber says. "So that means that your provisioning systems are going to have to deal with two different technologies in the same node."

The backoffice conversion is one of

the thornier issues that dissuades cable operators from letting go of circuit-switched service. Tellabs' O'Malley notes that while most of its cable customers see an eventual VoIP destination, the migration will be a long trip.

He points out that many cable operators are getting established backoffice systems via their agreements with telco switch owners, "but none of that exists for voice-over-IP today."

Services are equal, for now

Another strong argument for circuit-switched technology is that it is far from broken and is able to supply the same lineup of services, when compared to VoIP.

"Right now, there is no service that I can do in VoIP that I can't do with constant-bitrate," Charter's Barber notes. "Even when I look at some of the SIP-based services that are coming down the line that maybe give you video calling capability, remote access or presence awareness, caller ID

on a set-top box and those kinds of things—bottom line is I can overlay that SIP architecture on a constant-bitrate architecture and achieve the exact same thing."

But others suggest the new services are coming fast. For CedarPoint Communications Executive VP of Strategy and Market Development Dave Spear, "The legacy gear is not going to be able to make those changes for new applications as fast as they need to" for looming applications that can tie in mobile and video phone functions. CedarPoint has developed a multimedia switch that can be configured for constant-bitrate or IP traffic, and the trend among its clients favors the latter.

"As more consumers adopt these new applications and these new applications come to the marketplace, then I think there will be a time when somebody will say, 'OK, is this the time to cut over those Class 5 switches?', " Spear adds.

Indeed, during the next 24 to 36

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GRAVEdanger?

months, Sunflower will start rolling out a VoIP service to field applications that tie the phone to cell phones, video phones and set-top boxes. But that doesn't mean it's abandoning circuit-switched offerings, notes general manager Patrick Knorr.

Instead, the new IP services will have more of a residential focus, while enterprise services continue to be powered by circuit-switched systems for some time.

Except for big businesses that will be provisioned with more encompassing IP applications, "for just your regular two-, four- or even eight-line business, I think the reliability of circuit switched and the simplicity is far more important to a business than gadgets," Knorr says.

CBR gear pricier

On the downside, the laws of market economics are starting to weigh against circuit-switched technology. Already, VoIP subscriber devices and network gear are undercutting older constant-bitrate gear. Charter's Barber says that depending on volume, new constant-bitrate equipment costs between \$250 and \$300, plus \$90 to \$100 per switch port per line. In contrast, VoIP media terminal adapters cost \$90 to \$125, with switch port costs coming in at \$40 to \$50.

There is still a large base of switched gear available, but Barber sees that dwindling over time. With the resulting price difference already evident, "as a result, we continue to see that price compression, and there is a point where it becomes almost illogical to not go and convert to IP," he says.

The higher circuit-switched equipment cost is one reason that ARRIS doesn't see the market developing for smaller operators the way rival Tellabs does.

"The startup cost for voice-over-IP is actually lower than constant-bitrate, so the smaller accounts are actually almost more likely to look at voice-over-IP initially," Brovont says. "Customers that have existing switch assets that have not yet deployed constant-bitrate telephony over HFC are using gateways where they can deploy voice-over-IP in the access network, and still absorb capacity on their circuit switch."

With more cable operators opting for VoIP in their first foray into voice service, does that mean manufacturers will scale back production of circuit-switched gear? Perhaps eventually, but Tellabs doesn't see an immediate volume decline.

"At least in the case of most of the major Tier 1 suppliers, they've got relatively large, multi-year contracts that lock a lot of the pricing in place," O'Malley says. "So given that, I would say that is certainly not a short-term issue, and only possibly a long-term issue."

Still, the reality is that circuit-switched gear will be harder to come by in the future, Sunflower's Woodard notes. So far, Sunflower has been able to acquire gear from resellers—in one case picking up a brand-new HDT from a cable operator that went under. But Woodard expects that will get harder over time.

"IP is the sexy thing in the game and that is what everyone wants to be doing and that is what they want to install," he says. "And we may just run into a point where product availability means we have to make a transition."

Eventually IP

While he notes that in the distant future everything may end up on an IP platform, Woodard isn't as eager to put the last nail in the constant-bitrate coffin.

"I don't know if circuit switched should be dead," he notes. "I think there are a lot of reliability issues. There are a lot of technical management issues, and there also seem to be some capacity issues on how many calls you can actually get over a voice-over-IP network before you start running out of room for your data and you need more CMTs, or you are going to eat up more return path with voice-over-IP and things like that."

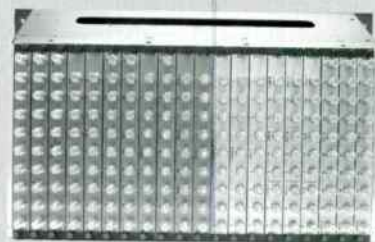
For now, suppliers including Tellabs and ARRIS continue to support their circuit-switched lines. Although most see this eventual transition to IP-based voice, they also argue that it won't happen any time soon.

"It will be a long tailoff—several years," Brovont says. "Nobody is going to do a hard stop on the constant bitrate and then move to voice-over-IP overnight." ■

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IPTV: The quiet rise of an underrated technology

Telcos choose IPTV to defend markets against competitors



By Stephen Reeder,
Executive Director, Sales and
Marketing, ANT Ltd.

As recently as just 12 months ago, Internet Protocol television (IPTV) was discounted as a niche technology with little chance of competing with the cable and satellite companies which were already well-established as preferred providers of multiple television channels to consumers across the U.S. and the rest of the world.

In the case of cable companies especially, telcos had begun to see their traditional voice customer base progressively eroded as ambitious cable service providers offered at-

tractive telephony packages bundled with TV and broadband Internet access. Faced with the possibility of losing customers to the cable giants, telcos had to find an aggressive and innovative way to defend their market share. IPTV was the obvious choice as it allowed telcos to go head-to-head with the cable providers by offering the same kinds of service. However, television programs delivered over broadband networks also provide telcos with a unique advantage over the cable providers—that of true triple play interactivity.

Triple play is a term which has already been used to describe the cable offering of high-speed broadband Internet access,

voice telephony and television channels delivered over the cable network. However, telcos rightly argue that the cable triple play offering is less than capable of true interactivity because of the broadcast nature of the network and the restricted bandwidth in the return path to the headend.

With IPTV, customers can order programs and films through the television interface, pay for them, and watch them immediately with full trick mode (stop, rewind, fast-forward, pause, etc.). This truly interactive form of video-on-demand (VOD) is unique to IPTV because of the point-to-point nature of the virtual connection between the customer and the headend. Additionally, IPTV is an excellent medium for the delivery of gaming-on-demand, which is a relatively new service available to telcos whereby customers can order and play games from any platform on their television screens, just as they would with films.

Currently, the U.S. faces a challenge to extend the telephone infrastructure to allow more customers the option of broadband Internet access and then IPTV in their homes. Dwellings located in more remote areas of the country—or even as little as 30 miles from a major city such as Boston—are unable to receive broadband services due to the distance from the telephone exchanges. However, this situation may change following the recent decision by the Federal Communications Commission to allow telcos to build high-speed fiber-optic networks to within 500 feet of residential buildings without the legal requirement to share the new lines with rival companies.

With this new incentive in place, many more homes across the country can expect fiber-based broadband access in the coming years. According to the *Boston*

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Globe, SBC Communications has already publicly stated that it will invest \$6 billion over the next three years in such a network. No similar provider will risk being shut out of this potential market through lack of early investment, so we can expect many more companies announcing similar schemes in the coming months.

The large geographical area of the U.S. and its division into states has created a very different telecommunications market in comparison to countries like the U.K., France or India. The dominance of a few major Bell

The boom in IPTV delivery has been such that cable companies are now considering ways of using IP over their own cable networks to deliver interactive TV services

corporations and the plethora of small independent operating companies (IOCs), in addition to the aggressive cable and satellite companies, create a fiercely competitive environment in which, theoretically, customers have access to varying services from different sources.

Unsurprisingly, the independent telcos have been the first to adopt IPTV as their key weapon of choice in defending their markets against encroaching cable companies or the larger Bells. Their small size has enabled them to consider the benefits of IPTV and weigh the investment implications much more quickly than their larger contemporaries, and therefore set up the video headend and conclude agreements with content providers before larger, more widespread companies have had time to evaluate the options available to them.

In order to offer the best possible services to their subscribers and increase their potential revenue streams, many IOCs are now considering additional interactive services like gaming-on-demand and set-top boxes with built-in personal video recorders (PVRs) to allow pause and play-back of live TV broadcasts and simultaneous recording of multiple streamed channels onto the box's internal hard drive.

The larger Bell corporations have been

slower on the uptake, first due to naturally more complicated internal processes slowing the flow of evaluation and information necessary for the adoption of new technology. They are also obliged to consider a far greater number of subscribers who may want different things from their IPTV service. Therefore, the Bells face greater potential to increase their revenues through triple play services, but also face the possibility of failure if the balance of on-demand services and broadcast content does not satisfy their subscribers.

They have also been concentrating more on the development of better infrastructure which would allow very high-speed broadband (VDSL) and high-definition TV (HDTV) streaming over fiber-optic networks (the "fiber-to-the-premises" or FTTP strategy). Fiber-optic networks offer telcos more options with regard to the level of service they can offer their customers without increasing their costs, thanks to the hugely increased bandwidth afforded by fiber-optics in comparison to the limited-bandwidth copper wire networks, which are currently the norm.

In many areas, the availability of IPTV services and broadband Internet is limited by the bandwidth offered by the copper wire infrastructure, which decreases the greater the distance of the home from the telephone exchange. Traditionally, cable companies have been able to exploit this area of weakness and obtain a stronger hold over the local market. However, new ADSL and video compression technologies may soon spell the end to these traditional barriers to service, allowing telcos to reclaim subscribers.

Current IPTV video services are compressed using the MPEG-2 technology format which requires an average of 4 Megabits per second bandwidth. Using new MPEG-4 and Windows Media V9 compression formats, the bandwidth required is dramatically reduced, allowing more customers access to streaming services and also allowing current customers with broadband connections to receive more channels or HDTV programming over the existing copper network.

TV services over DSL networks have proved to be a successful way for indepen-

dent telcos to differentiate themselves from the competition. Indeed, the boom in IPTV delivery has been such that cable companies are now considering ways of using IP over their own cable networks to deliver interactive TV services, VOD and gaming-on-demand to secure their own subscribers who have been targeted by the more dynamic and aggressive telcos. Therefore, in the near future we can expect to see a greater number of set-top boxes combining cable with IP to make the most efficient use of the network bandwidth while offering an increased level of service.

The Federal Communications Commission has also added a new twist which promises to open the broadband market to even greater competition and potentially connect every home across the U.S. to broadband services. Power utility companies are now permitted to carry data over their electrical wires using electrical frequencies hitherto unused. Therefore, in theory, any home connected to the electrical grid could receive broadband services in the future without the need for either cable or copper telephone connectivity. The technology, christened "broadband over power lines" (BPL), could turn into an even greater threat to telcos and cable companies who are already fighting over subscribers as the electricity companies have ready access to a larger subscriber base. They could also offer more incentives to bundle cheap IPTV and voice-over-IP services with electricity services.

Such technological developments are still considered to be mostly at concept-stage and will not be available for years to come. However, IPTV was also considered to be a futuristic concept less than two years ago and yet is now being taken seriously as a mainstream technology by key industry figures like FCC Chairman Michael Powell.

IPTV will occupy a prime position in the future of the U.S. television broadcast industry, be it over copper, HFC cable or fiber networks, or even piggybacking on a household's electricity supply. The most important aspect for the consumer will be that the television programming delivered is what they want to watch, and the interface for choosing their VOD films, games or broadcast programs is simple to use and well-presented. ■



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VOD: An affordable infrastructure

The technology of RAIDed SATA can tap into rich new revenue streams

By Patrick Kevill, Senior Manager,
Vertical Markets, AMCC 3ware

At one time, video stores had a virtual lock on distributing recent movies directly to consumers, but the advent of digital formats changed the market and changed the picture dramatically. Home distribution is shifting rapidly to digital formats in all modes, from DVDs to personal video recorders (PVRs), and that change puts local cable systems in an enviable position. No distribution method approaches the capability of an in-place MSO to move content directly to consumers, without ever making them leave their comfortable recliners.

The marketplace is hardly free of competition, however. The scene is evolving with stunning rapidity, and cable companies must constantly seek new ways to create value for their customers. But if constant change is wearing, it also encourages creation of new revenue streams.

Competition for distributing digital movies comes from satellite feeds as well as "old technology" players such as Netflix, with its new angle in the business model. Streaming Internet providers want to break into the market by sending one-time-view movies to PCs. Even the local phone company is trying to stake out a content delivery niche in many markets.

Local video stores will never go away completely. But with the new digital delivery modalities, cable's main problem will be to take full advantage of existing and newly developing digital systems. The industry needs to create a new set of competitive services and revenue flows while the ambitious new players are still finding their feet.

In this fluctuating marketplace, cable companies need a model that will stay highly competitive in the future. They need to take full advantage of digital efficiencies and infrastructure strengths to give their customers

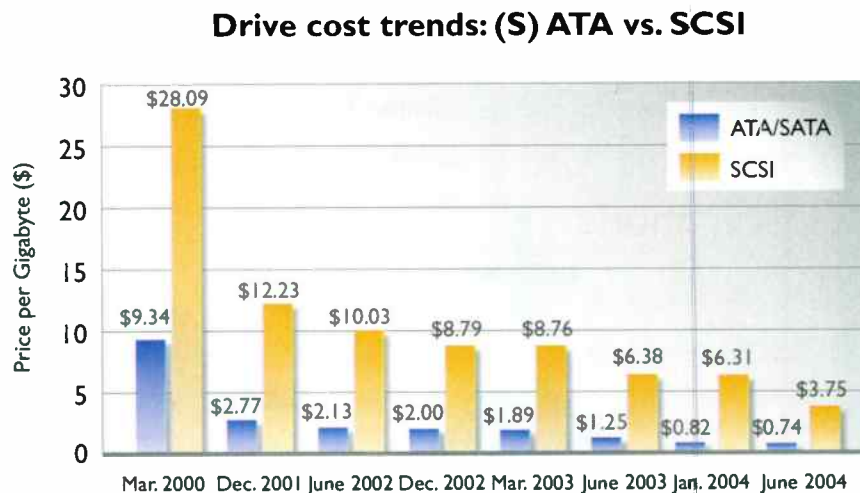


Figure 1. Cost trends of distributed SATA storage arrays.

access to entirely new sets of services and revenue. Fortunately, affordable technology is available now to meet these requirements.

New digital modalities

Movies are a staple of cable content, but they are hardly the only way for an MSO to generate revenue. Demand-driven content could range from archived popular series to interactive games, from shopping catalogs to cable-based phone services. Many of these approaches are already being tested or even actively marketed. But in any demand-driven field, the successful vendor must find a proverbial "edge"—a method that confers a clear advantage in cost, performance and reliability.

One short-term possibility has been a traditional Holy Grail for the industry—delivery of movies-on-demand, at prices that won't drive away consumers, and with a level of efficiency that won't bankrupt the distributor. Becoming a convenient, digital alternative to a trip to the video store would produce huge, stable revenue streams with which to open other opportunities.

Video-on-demand was reserved to select

providers until recently, because of the huge, expensive storage requirements of a digital video library. On-demand services simply are not practical in videotape, which requires physical storage on shelves. Nor is on-demand a practical option for direct delivery from DVDs or other optical media; their access is linear and slow. Yet an adequate digital library for on-demand service takes staggering amounts of storage—many terabytes. Because high availability is everything to a cable system, storage would have to consist of high-end media such as SCSI drives feeding fiber optic lines. It is simply too expensive.

Or it was, until recently.

The ISP model

Implementing an intermediate store-and-forward system would mitigate the need for huge, high-end storage facilities in an on-demand video library. The intermediate stage would need only support fast delivery from long-term back-end storage, and feed

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into a broadband infrastructure capable of carrying the data traffic. It is an approach basic to the business model of the largest high-

availability Internet service providers (ISPs), such as Google and Yahoo, so it is well established and thoroughly debugged.

Intermediate store-and-forward can be the key to video-on-demand services by cable companies as well.

For the intermediate stage, RAIDed SATA arrays provide the best approach today. Though well proven, these arrays of high-bandwidth, high-capacity Serial ATA drives in a RAID architecture used in an intermediate store-and-forward layer are relatively new for cable operators. In a cable environment, using them means abandoning older storage models where content moves straight from long-term media like tape to front-end delivery at precisely scheduled times. Fast magnetic drives fully capitalize on the newer storage and transmission efficiencies, making the older approach very expensive by contrast.

Affordable RAIDed SATA storage makes true video-on-demand practical and cost-efficient for the first time. It can put huge libraries of content, across every genre, into play and turn on-demand content into a new revenue stream. The RAIDed arrays solve the reliability problem that has kept existing local content libraries small and expensive.

That's the secret the ISPs figured out—with a large set of servers, each handling terabytes of data, and more servers backing them up in real time, you can use more affordable components. If one of the servers goes down, who cares? Another takes over, the flow isn't even interrupted, and the failed one is taken off-line and fixed or replaced without ever causing a blip in the data stream.

Bandwidth and cost issues

More than any single factor, bandwidth requirements long made true video-on-demand impractical. But now a single controller card can manage up to two full terabytes of data. This can be used to generate some basic conservative metrics.

A DVD-quality movie requires about 2 GB of storage per hour. The compressed broadcast (MPEG-2) of that movie measures roughly at a sustained 1.5 Mbps. Translating that into megabytes per second, the operator can supply just under five continuous movie streams for each MBps.

These simple metrics give a good idea of the cost and scalability of a VOD server farm. A 2 TB (Terabyte) VOD server sells

Architecture of a SATA-based VOD service

A store-and-forward delivery system based on SATA RAID arrays is reliable enough for cable and flexible enough to provide precise load-balancing across the system. If a new movie proves extremely popular, simply copy it to a third, fourth or fifth server. As demand wanes, other content can replace it on an as-needed basis.

A tried and proven approach to delivering content is derived from the Web server farms deployed by today's

Internet content and search engines like Yahoo and Google. It is called a load-balancing cluster. In such a cluster, two or more computers run the same set of services (e.g., a Web server) and incoming traffic is divided among them, to distribute the load. This setup is highly scalable and reliable, since you can easily add systems when load increases, and services are not interrupted when a computer goes down. It is a setup ideal for services accessed by a large user base.

This model on a video server farm has identical characteristics. It supports a large number of users, ensures no server-farm service interruption, and can scale directly as the number of customers grows.

Today's SATA technology makes "video farm" deployments both practical and cost-effective. The architecture's many boxes mean failures have zero impact on the business. The system supports well balanced, discretionary use of technical resources, unlike a SAN, where everything typically is connected by Fibre Channel us-

Digital video cluster model

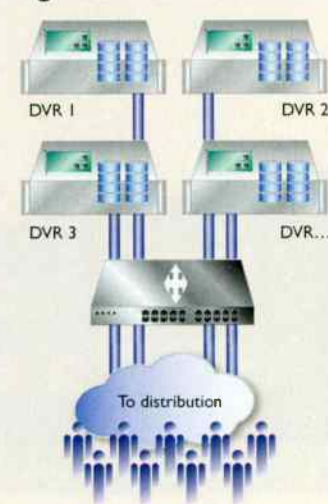


Figure 2. A simplified diagram of a four-node, demand-driven cable delivery system.

ing high-cost drives. SATA RAID arrays can be added as needed, making scaling the system very simple when demand increases.

The SATA drive arrays in the figure are fed content by network-attached storage (NAS) boxes acting as back-end storage for movies or other digital content. The cable system already has a broadband digital delivery infrastructure to serve as the front end.

The intermediate SATA stage feeds the front end through Gigabit

Ethernet network cards, completing the connection from library to consumer. The Ethernet feeds streams as if they were files, forwarding compressed, broadcast-quality signals to the front end at a fraction of the cost of expensive, fiber optic channels.

The SATA nodes are "paired," that is, loaded with identical content, to provide a high-availability fail-over mode. The cable operator loads a movie into one node, then copies it to the other, repeating the operation as needed to balance the demand load. Copying to multiple nodes not only balances the load but ensures reliable delivery to every customer.

Consumers are accustomed to seeing previews and ads in the period before main shows, both on TV and at the movies. Operators can use this fact to create an independent revenue stream when loading content from longer-term storage, by delivering local ads before the ordered content is delivered. Short animations or other filler content also can be used to give customers a more theater-like experience.

for about \$5,000. Such a system would have 12 x 250 GByte SATA disk drives, one redundant drive in RAID 5 and a spare disk. This capacity is practical because many of today's 32-bit operating systems use file systems for which this capacity hits an upper limit. The result, using a 2 TByte controller, provides storage to approximately 500 DVD-quality titles. A reasonable performance expectation for this system would be more than 50 MBytes per second, or at least 250 independent streams per \$5,000 server—a service level completely inaccessible only five years ago.

Other design factors

The benefits of a SATA-based video-on-demand system are compelling. With no single point of failure, a distributed system is as reliable as any technology can be. Cost is low, only about a fifth of an equivalent SAN unit, making multiple points of redundancy affordable and practical (see Figure 1).

SATA arrays are currently available in

7 GB or 8 GB capacity for around \$7,000. A medium-size SAN with video capacity can easily cost several hundred thousand dollars for top brands like Network Appliance or HP, or as little as \$50,000 for lower-end brands. Even at the low end, a

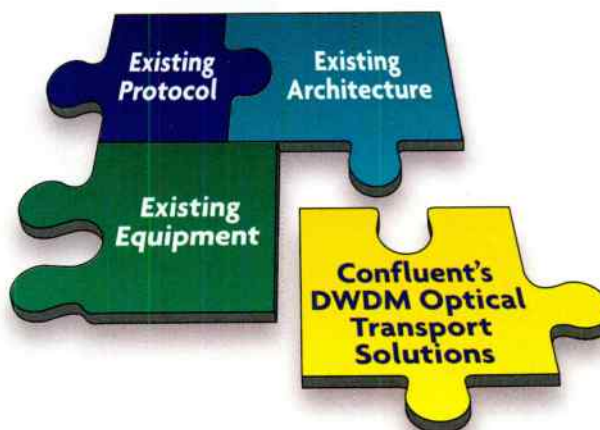
SAN costs five times as much per Gigabyte. The SATA RAID system's distributed approach gives the operator better bandwidth, better load balancing, more failover capacity, and better ability to adjust storage on the fly. ■

Pertinent service metrics

- A VOD movie today would cost the consumer about \$4 per viewing.
- At 50 percent utilization over 24 hours, a VOD movie would generate \$6,000 of gross revenue; at 25 percent utilization, it would generate \$3,000 a day.
- With 12, two-hour movies a day per available stream, or 3,000 movies at the 250-stream upper limit, such a server could feed out 1,500 movies each day at \$4 per movie.

Typical hotel VOD capacities can be taken as a comparison. A hotel with on-demand viewing in 50 to 200 rooms typically needs a couple of terabytes of storage. This can be handled by a single 2-TB SATA box. A cable operator can use that figure to configure for peak loads plus some reasonably safe unit failure margin to derive an accurate linear scale of what they need to provide the ultimate cable system service locally.

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Viva Las Gizmos

Cable plays up two-way TVs, DBS touts portability, iTV and 'VOD'

By Jeff Baumgartner, Editor

Las Vegas—From a drool-worthy 102-inch television to a batch of ultra-sharp 1080p HDTV sets, showgoers had plenty to feast their eyes on here at the 2005 Consumer Electronics Show.

Although the size, scope and sounds of CES could crush the senses, it did not take very long to detect and distill technological themes that intend to work with or against the aims of the cable industry.

The 2005 iteration of the show will certainly go down as the year that made video-to-go a trend that operators (and copy-right protectors) will soon have to deal with or somehow embrace, as EchoStar Communications surely has (more later).

The show also witnessed the arrival of the broadband box, with several flavors from the likes of DAVETV and Akimbo, that use existing broadband connections to bypass cable and DBS providers for video services.

Another trend, if you knew where to look, was cable's slowly growing presence at the show, which pretty much started and ended with digital televisions outfitted to deliver interactive cable services without a separate set-top box.

Pushing the two-way needle

Although a two-way Plug & Play agreement appears to be far from completion, that little detail did not stop some MSOs and television makers from moving ahead on their own.

Time Warner Cable, Bright House Networks, Charter Communications and Samsung Electronics all found common ground on agreements to develop digital televisions capable of supporting interactive



In a landmark deal, Time Warner Cable, Bright House and Samsung agreed to move ahead on digital televisions capable of delivering interactive cable services. Pictured at the signing ceremony (from left) are Bob Miron, CEO of Bright House; Glenn Britt, president & CEO of Time Warner Cable; GS Choi, president & CEO of Samsung Electronics, Digital Media Division; and DJ Oh, president & CEO, Samsung Electronics, America.

cable services such as video-on-demand.

A non-exclusive memorandum of understanding (MOU) to support the OpenCable Application Platform (OCAP) in digital TVs—signed by top execs at Time Warner, Bright House and Samsung at the Four Seasons—comes well before a formal two-way “Plug & Play” agreement for set-top-free digital televisions is finalized.

Under the deal with Time Warner and Bright House, Samsung will jointly write specifications for OCAP-compliant TVs and how they operate on a cable network. Those TVs will also support re-

move downloads of the MSO's OCAP-based Digital Navigator (ODN), a product spawned by Time Warner's MystroTV division.

Under a second MOU, Charter and Samsung expect to deploy low-cost network interface units and Samsung bi-

directional HD sets that incorporate XHT (eXpandable Home Theater), a home networking technology that supports the IEEE1394 “Firewire” cable.

Of the deal with Time Warner and Bright House, Samsung executives said the agreements represent a “major part” of its entry into the cable industry. “We knew this was something we had to do,” said company spokesman Steve Goldstein.

Commercially-available models could take a year to 18 months to reach the marketplace, Goldstein said. He added that Samsung is committing to deliver OCAP-capable TVs “in a mass-market way.”

Time Warner Cable hopes to complete the necessary headend and other engineering work to make it possible to conduct a trial by the end of 2005, said Mike Hayashi, the MSO's senior vice president for subscriber technology and advanced engineering.

Because OCAP and OpenCable pre-date Plug & Play activities, the parties said they were confident they could handle any changes that might come with a formal



The innovative Slingbox can “sling” live and recorded video to a wide range of Internet-connected devices, including laptops, wireless phones and even game consoles.

two-way Plug & Play agreement. But no one was ready to say how the MOU might impact current two-way discussions, which have proceeded slowly.

Time Warner Cable CEO Glenn Britt noted, however, that cable's involvement with consumer electronics remains vital.

"We're in a very competitive environment and we want to keep innovating," Britt said. "It's important for us to work together with CE companies."

Hayashi said Time Warner Cable's decision to move ahead with two-way products now will fuel technological advancements, noting that specifications "tend to lag innovation in the marketplace."

Samsung wasn't the only TV maker to step up its two-way Plug & Play efforts. At the show, LG Electronics announced it had signed a deal with CableLabs to integrate OCAP into its line of interactive digital televisions and set-top boxes.

LG marks the second TV maker to sign such a license, which pertains to both OCAP and CHILA, an acronym for the CableCARD Host Interface License Agreement.



On the floor, Samsung demo'd digital televisions running OCAP applications, including this TV-based messaging app.

Eyeballing the competition

Per usual, cable's competitors were out in force, led by the DBS industry.

EchoStar Communications took the wraps off several new initiatives, including a slick line of portable digital video recorders and its own spin on video-on-demand.

On the portable end, EchoStar is set to rollout a range of handheld models that sport three different screen sizes (7 inches, 4 inches and 2.2 inches) and hard drives capable of storing between 20 gigabytes and 40 gigabytes. Support for USB 2.0 will en-

Ciciora's corner

Have a comment? Contact Walt by e-mail at: Walt@Ciciora.com



Analog broadcast shut-down?

BY WALTER S. CICIORA, PH.D., RECOGNIZED INDUSTRY EXPERT ON CABLE AND CONSUMER ELECTRONICS ISSUES

I was in an office supply store picking up printer paper when I saw a 19-inch color TV with a built-in VCR and a built-in DVD player. The price was \$149! That's about what it costs for two couples to go to a modest restaurant in Connecticut and maybe have one "house" wine each with dinner. A recent newspaper story reported on 20-inch TVs on sale in grocery stores for \$79. This is crazy!

A January 5, 2005 article in the Wall Street Journal, "Why HDTV Hasn't Arrived In Many Homes," had statistics on U.S. sales of analog color TV receivers compared with digital television receivers. A bar graph based on data from the Consumer Electronics Association gave the numbers. The bar graph indicated that roughly 35 million television sets were sold in the U.S. in 2004. Of these, roughly 7 million were digital. The annual sales rate of analog television receivers is four times as large as for digital TV sales.

We can play with these numbers a bit. If we project that the total number of TV sets sold in the U.S. will remain at 35 million units a year, and that the unit sale of digital TV sets will increase by 50 percent each year, it won't be until some time in 2007 that more digital sets will be sold in a year than analog sets. Increases of 50 percent are easy in the early years when the base number is small, but become much more difficult when the numbers are large. So 2007 is optimistic. Using these optimistic figures, essentially all the sets sold in 2008 will be digital. But between 2005 and the end of 2008, 85 million more analog sets will have been sold against only 55

million more digital sets. Because an analog color TV functions for at least a dozen years, these receivers are filling several rooms in the average household. I've seen statistics indicating a current population of over 300 million color TV receivers in the U.S. (plus a huge number of VCRs). It will be a very long time before most TV sets in homes are digital.

A lot of digital set-top box adapters will be needed. But they will likely cost more than a new analog television receiver for a long time. I recall the consumer electronics industry making a huge fuss over the evil cable set-top boxes and how they would cripple the features of the consumer's television set. As this transition to digital broadcasting continues, the number of non-cable set-top boxes will have to explode.

We hear a clamor from the government to shut down analog TV broadcasts. If indeed the analog broadcasts are going to be shut down, isn't there a responsibility to advise buyers of these analog receivers of the imminent obsolescence of their purchases? While the price of these products is not a major dent in the income of most of the readers of this column, those price points impact many less advantaged folks. And any large-scale scrapping of analog TV receivers represents an environmental issue. An interesting public policy question, to say nothing of the moral issue, concerns who is responsible for ensuring consumers are making informed choices when purchasing these analog products. Should the responsibility lie on the should-

continued on page 34

able the transfer of an entire movie from the primary EchoStar receiver/DVR to the portable device in about five minutes, said EchoStar President Mark Jackson.

He declined to say how much the devices will cost consumers or whether customers will be charged a separate, recurring monthly fee.

EchoStar also put the pressure on cable when it came to VOD and how it should be defined to consumers.

EchoStar's notion of VOD will be delivered next month via the company's new DISH Player-DVR 625 receiver. EchoStar will reserve about 100 hours of hard drive space to record movies and other titles.

The customer may use the drive's remaining 100 hours of space to record programs on their own as they would with any traditional digital video recorder.

EchoStar chief Charlie Ergen, speaking at a press conference, said the box supplies "the best of what's on satellite and what [customers] want." He expects future versions of EchoStar DVRs to store "hundreds" of hours of programming.

DirecTV, meanwhile, put the spotlight on how some of its interactive television activities are coming together.

DirecTV, in a shot against DVR software partner TiVo Inc., also showcased its first set-tops running middleware from

corporate cousin NDS Group. In addition to NDS-powered digital video recording, the software also enables "DirecTV Active," a portal of interactive applications such as weather updates and financial market summaries, and "Mix Channels," an expanded mosaic capability that gives customers the ability to view up to six live channels on the same screen.

DirecTV also put its hat in the multi-room DVR ring after signing a licensing deal with Ucentric Systems (now part of Motorola Inc.). Under that deal, DirecTV will use Ucentric's software to run applications on a primary set-top that is networked to smaller units connected to additional TVs. The system is being designed to support both high-definition and standard-definition signals.

The telcos also made some noise, led by SBC Communications, which unveiled "U-verse" as the brand name of its IP-based services. Set to launch this year, U-verse will bundle together video, data and VoIP. U-verse stems from Project Lightspeed, SBC's plan to spend \$4 billion to deploy fiber to 18 million homes by the end of 2007.

Video: Don't leave home without it

The 2005 CES brimmed with broadband bypass boxes—including several models that piggyback on high-speed connections to deliver video services—but it also saw a breakthrough of devices and services that enable consumers to enjoy a wide range of live and recorded video when they're away from home.

A company that stood out from the others in more ways than one was Sling Media Inc. Its \$249 Slingbox uses high-speed connections to "sling" live TV programming from the viewer's home to a laptop or just about any other Internet-connected device, including PDAs, cell phones, and even gaming consoles. The Slingbox is designed to send content directly from the consumer's home-based cable set-top, satellite receiver or digital video recorder.

Instead of time-shifting, Sling Media likes to call what it does "placeshifting."

"It's like accessing your television with a very, very long wire," observed a showgoer on hand to see the Sling Media demo.

The company expects the Slingbox to

Ciciora's corner

Have a comment? Contact Walt by e-mail at: Walt@Ciciora.com

continued from page 33

ders of those selling the products? In that scenario, selling an analog TV receiver without a warning on the day before the shut-down of analog transmission could be considered a dishonest and exploitive act. Is it still fraud a month before? How about a year before? When does it become a moral responsibility that a product offered for sale is actually usable? One might argue that because the government is the entity shutting down the analog broadcasts and making those new receivers useless, maybe the government should be informing the general public of the hazards in buying analog TV receivers.

Another aspect of this issue involves the ideals of democracy. Consumers are clearly voting with their dollars. They are choosing analog TV receivers because they feel they are getting the best value for the price. It is hard to believe that the majority of buyers don't know about digital consumer products in general, and digital television in particular. But do they know or believe an analog shut-down is coming? They certainly know about digital music and would likely be biased in favor of anything digital if given the choice compared to an analog implementation. In spite of this, they continue to choose analog television receivers by a wide margin.

The government is telling these citizens that it knows better than they, and it is willing to force a course of action rejected by the majority. Just ask your elderly aunt what she thinks of this. Mine has told me!

This is another misapplication of the principle of eminent domain. There has been a lot in the press lately about local government confiscating the property of citizens by condemnation so that it could be used for a "higher purpose." Originally, this was done only rarely to build roads, schools, or other public works having few or no other possible locations. The practice became abusive when local governments condemned property to sell it to developers who would construct facilities generating greater tax revenue. A similar action is taking place here. The usefulness of color TV receivers will be taken so that the spectrum used can be auctioned to generate revenue for the government. Yes, there will be some allocation of spectrum for public safety. But the majority of spectrum will simply bring in more money in a lump sum for the politicians to spend as they like.

Maybe consumers themselves should decide—via their purchases and retirement of analog receivers—when analog broadcasts are no longer needed. Maybe it shouldn't be a cram-down.

hit shelves in the first half of 2005. Sling Media does not anticipate charging monthly service fees.

Depending on the available bandwidth, the Slingbox automatically downgrades and upgrades video bit rate quality as to avoid buffering or interrupting the video signal in any way, explained Jeremy Toeman, Sling Media's vice president of product management. The box can deliver bit rates as low as 80 kbps to a PDA, or between 150 kbps to 170 kbps to a PC, he noted.

But Sling Media's approach also opens the door to big questions about copyright infringement. Toeman insisted his company does not bypass existing conditional access and security systems, but does tap into existing (and insecure) analog outputs.

"We're not a pirate broadcast device, but a private broadcast device," he said.

Although Sling Media can take cable programming and deliver it virtually anywhere, the company views itself as a potential cable partner. Operators, for example, could offer the box as a complimentary service that enables customers to



DISH-to-go: EchoStar introduced a new range of handheld devices that store and play back video transferred from the customer's primary receiver/DVR.

watch the channels they're already paying the cable company for, but to watch them while they're on the go, Toeman said.

In a very similar vein, Orb Networks also introduced a platform that provides access to live television, music, photos and other digital content from wireless devices ranging from cell phones, to PDAs and computer notebooks. But unlike Sling Media, Orb will charge a service fee of \$9.99 per month or \$79.99 per year for the first user.

Comcast Corp., meanwhile, shed some light on a project it's working on that will

enable customers to take their video on the road—literally. Comcast, through a partnership with Delphi Corp., will build a system that enables customers to transfer "select" video content to an in-vehicle entertainment system. Under that deal,

Delphi will develop a consumer device that leverages its 802.11x-based rear-seat video system, and Comcast will hammer out the content rights. The companies expect evaluation and development to run between 6 months and 18 months. ■

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ET '05 peered into the future of competition and tech



SCTE's ET '05 drew 935 attendees to Huntington Beach, Calif.

By Karen Brown, Senior Editor; and
Jeff Baumgartner, Editor

The Society of Cable Telecommunications Engineers' Conference on Emerging Technologies saw a flood on many levels this year—not only from the weather, but also from attendee numbers and the array of technical information presented during the three-day event.

The conference in Huntington Beach, Calif. began even as the region was hit with historic rainfall and flooding. But as the deluge subsided outdoors, a torrent of a different kind began indoors—one of technical information in the form of white papers and panel sessions filled with observations, discussions and even disagreements on the latest in cable technology.

The conference, which attracted 935 attendees (up 20 percent from the '04 gathering in Dallas), covered topics ranging from analysis of competing technology to digital rights management, home networking, wireless systems, bandwidth management and converged network architectures.

Allen: Cable has the keys

The journey to an all-digital world where entertainment and communications will easily flow across many devices won't be an easy one, but computer pioneer Paul Allen, who keynoted the conference, said it is one in which cable is poised to take the wheel and drive.

Allen, co-founder of Microsoft Corp. and owner of Charter Communications Inc. parent company Vulcan Ventures, took the crowd through a wide-ranging roadmap of future services, telling cable's engineers that "we're in the driver's seat; we have the superior platform," to create and field the multimedia and communications services consumers will want. But he also noted the challenge lay in pulling together wired and wireless technologies for data, television, voice and mobility—the latter ranging from Wi-Fi to cellular systems—via a common digital network base.

"We have to have great operations in the field to make all of this work together," Allen said. "We have to figure out ways to make that happen, with seamless integration."

At the same time, cable operators also face challenges from the galloping rate of innovation. "Every year we see the technology side of the products become better," Allen noted, but he also warned that "one of the things we have to internalize is these things will be happening faster, and at a rate we haven't seen in the past."

That phenomenon extends to good-old telephony, where VoIP is fast developing to include video. The number of things one can do with the technology "are pretty amazing," Allen said. And cable data services are now able to lash together multiple data channels to offer hundreds of megabits per second to customers.

Key to developing all of these services is the migration to an all-digital platform. Pointing out that Charter's Long Beach all-digital deployment was a step in this direction, he advised that once cable operators have moved a majority of their customers to all-digital transmission systems, "you can find ways to subsidize moving the rest to digital."

If cable operators can overcome the inherent hurdles, they should be well positioned to offer the best vehicle for next-generation services in the future, he concluded.

Despite the challenges "this is going to happen in the next five years, and that is very exciting," Allen said.

Eyeing the competition

Banking on the advice that it is best to know one's enemy, cable engineers in another session picked up technology reconnaissance reports on competing technologies ranging from telco-centered fiber-to-the-home systems to emerging wireless schemes such as metro WiMAX and upgrades to satellite platforms.

Chief among those competitors are telcos fielding DSL-based technology. David Reed, chief strategy officer at CableLabs, alluded to the rain deluge in the Los Angeles

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area during the week, saying he had no intention of "raining on cable's parade" with his views on DSL technology.

SBC has discussed ADSL2+, while Verizon has stated it will move directly to fiber-to-the-premise (FTTP) to deliver video service, he noted. ADSL2+ does improve DSL's throughput, but the technology still requires 8,000-foot loop lengths to deliver the necessary bandwidth.

At the same time, new broadband wireless technologies such as WiMAX and metro-area extensions of Wi-Fi are also coming into play. Sandy Teger, co-founder of System Dynamics Inc., noted that for cable operators the two technologies weren't a cause for panic, but it was important for them to understand the implications.

WiMAX is developing in metropolitan

this is what the customer wants," she noted.

Steve Osman of SES Americom updated the group on the latest in satellite technologies, including potential upgrades that could give DBS providers HD capacity that rivals cable's. That includes the evolution of multi-beam satellites combining Ku- with newer Ka-band spot-beams and advanced frequency re-use systems that could boost capacity from two to 20 times.

On top of that, satellite providers can field "tweener" satellite positions 4.5 degrees from existing slots, as well as Ku- and Ka-band "topper" birds riding above the traditional orbital arcs. That could further double capacity, Osman noted.

With those tools, and new compression codecs such as H.264/MPEG-4 that can cut

Dumb pipe, smart pipe

A series of experts looked at the issues that play into turning a simple best-effort data service into a more sophisticated, complex means to deliver premium services while controlling other usage and protecting against predatory application worms and viruses.

Susie Kim Riley, founder and chief technology officer for Camiant Inc., focused on dynamic bandwidth management used in cable networks.

"Things are starting to converge at the network, and applications are also converging as well," Riley said.

Enter PacketCable Multimedia, which will allow operators to apply QoS to target applications. A key there is in the policy server, which allows the operator to control how network assets are tapped by specific application, Riley noted.

But the cable network—at least for now—is essentially a dumb pipe, according to Milind Gadekar, senior manager of service control platforms at Cisco Systems Inc. After first apologizing to the cable engineers for that characterization, Gadekar told them that to change dumb pipes into smart ones requires four key elements: service control, subscriber management, real-time traffic control, and staying up with new applications.

"In today's broadband network it becomes more complex because applications change and morph, and the network has to be able to keep up," Gadekar said.

With all of these changes looming for networks, the cable modem termination system (CMTS) also will have to evolve. Tom Cloonan, chief technology officer for ARRIS' broadband division, told the crowd there are plenty of new features on the horizon to help operators manage bandwidth.

Cloonan said it is getting harder to figure out the bandwidth needs of subscribers because the applications they choose to tap are becoming less predictable. But DOCSIS 2.0 provided an array of tools to change bandwidth usage, which can save as

Peering into the future of IP

Emmendorfer awarded 'IP Innovator' honors

The rest of the cable industry may still be trying to envision an all-IP world, but Mike Emmendorfer, this year's IP Innovator Award winner (sponsored by Cisco Systems), is already there.

Emmendorfer, the vice president of advanced engineering at Charter Communications, has had a hand in just about every aspect of the MSO's drive to merge voice, video and data services onto a unified IP platform—well ahead of many of its MSO peers.

His peers recognized Emmendorfer for a laundry list of IP accomplishments, including the design, test and launch of one of the first fully IP voice networks in the U.S. cable industry. Emmendorfer also helped install Charter's first DOCSIS virtual private network to supply enterprise services, and has led the deployment of a session initiation protocol (SIP) scheme to support integrated voice, video and multimedia services.

For his part, Emmendorfer is quick to point out the award also recognizes the importance of IP and Charter's drive for an all-IP infrastructure.

"Certainly this recognizes not just the efforts of Mike Emmendorfer. It does recognize the efforts in my view of the Charter organization and our vendor partners," he said. —KB



area networks as a more or less fixed service, with products expected this year. But with development of the new 802.16e standard to add call handoffs between base stations, WiMAX will become a mobile access technology, Teger said.

"That's the piece that all of us have to be aware of and figure out what to do, because

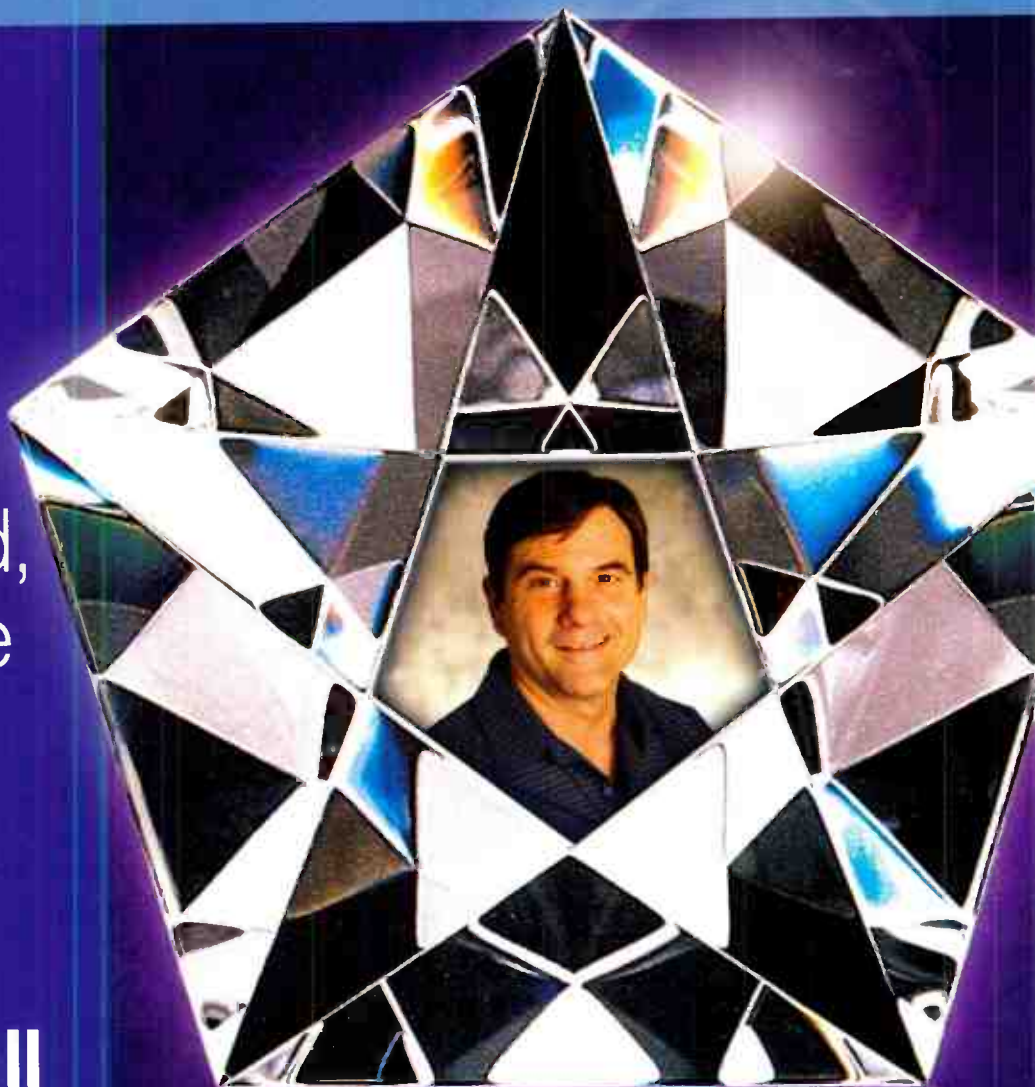
the HD bandwidth load in half, satellite competitors could raise their HD channel capacity to virtually match that of a cable operator's 860 MHz plant, Osman said.

If cable operators continue to support analog channels or don't similarly convert to advanced compression codecs, "they will be at a distinct disadvantage," he surmised.

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much as 30 Mbps in a plant, he added.

Cisco's new wideband protocol scheme, meanwhile, also is aimed at making the next-generation cable network more efficient, according to John Chapman, a Cisco distinguished engineer. By eliminating the DOCSIS service subchannels and creating a single wideband channel, cabling can

But as with everything, there is a downside. For channel bonding and wideband, the penalty comes in recombining data at the endpoint, and, for wideband specifically, that penalty extends to modifying cable modems to recognize the bigger data channel. Because the bonded channels or the single wideband channel are delivering

that an operator stands to realize significant bandwidth savings. However, most of that discussion has been theoretical. Until now, that is.

Ran Oz, the CTO of switched broadcast evangelist BigBand Networks, and Nishith Sinha, iTV systems engineer at Cox Communications, shared the findings of two "proof of concept" trials—one with Cox and another with an undisclosed MSO.

During those trials, BigBand and its partners uncovered several key statistics, including how much bandwidth an operator might expect to save in different scenarios, as well as some valuable insight into the viewing habits of digital cable subscribers.

"Trial A," conducted with Cox, was done on a spectrum-limited 550 MHz system in Tyler, Texas. Trial A, which eventually reached four nodes, switched 60 digital channels already available as a broadcast tier. "Trial B" took a broader view by switching the entire digital lineup, sans high-definition and music channels. Trial B eventually reached four nodes and topped out at 171 switched channels.

In Trial A, it was discovered that channel usage peaked at 50 out of a possible 60 channels—not a huge bandwidth savings, but the results were likely "artificially higher" due to set-top "tune in" and "tune out" messages.

Trial B, however, found that substantial bandwidth savings could be made when a greater number of less-popular channels are included. There, the maximum number of channels ever used never exceeded 67 of 171 available—a bandwidth savings of 60 percent.

The home hub

Home networks may connect cable operators to new and lucrative services, but they also present potentially vexing problems with device interoperability and digital rights management.

A panel of experts tackled these technical issues, and while there were few clear answers, there was seemingly no shortage of possible avenues cable operators could take.

Doug Jones, chief architect at YAS Broadband Ventures, walked cable engineers through issues surrounding condi-

Fiber—then, now, and later

'Polaris' winner Gall recognized for HFC achievements

Donald Gall, the chief technology officer of Pangrac & Associates, took home the Polaris Award (sponsored by CommScope), which recognizes a member for exceptional achievement in the development and use of optical fiber. Gall's peers bestowed the honor as much for his past achievements as for the contributions he will likely make to the cable industry down the road.

Gall is one of a select group of engineers credited with spearheading cable's revolutionary hybrid fiber/coax (HFC) architecture, a technology borne out of necessity.



In the 1980s as an engineer for Time Warner in Kansas City, Gall and colleague David Pangrac helped operate an 1,800-mile system that teemed with 30-amplifier cascades. The problem? The operator had more than its share of problems keeping the service reliable and delivering a quality picture.

"It was obvious at that point that the [cable] architecture that survived from the '50s and '60s wasn't working in the major metros," Gall recalled.

Gall came across a possible solution to his problems when he saw an ad from Ortel for a 6 GHz analog laser.

Gall and others theorized that such a laser might shorten the cascades. Though the MSO turned down the idea initially, it was later adopted and became a key point on the timeline toward cable's migration to HFC.

These days, Gall and his associates are looking at the next step—fiber-to-the-home—and devising ways for cable operators to move in that direction using existing headends, CPE, billing systems and backoffice software.

—JB

gain significant bandwidth.

"There's nothing simpler than a big, fat pipe," Chapman said. "That's what we are trying to do with DOCSIS—is create one big, fat pipe."

A related strategy calls for bonding data channels so that they share traffic load but retain their channel boundaries. Thomas Quigley, senior director at Broadcom Corp., said there are several strategies available for channel bonding, which essentially bolt together adjacent data channels to boost overall traffic efficiency. Because it retains the channels' integrity, it can be put in place without disrupting legacy network systems.

a much larger load of data, it requires more sophisticated recombining to sort out the flood of data and make adjustments for variation in packet arrival time.

"Certainly, as we define these specifications at CableLabs and in the industry, that is something that we need to be aware of," Quigley noted.

Getting a fix on switched broadcast

The idea behind using switched broadcast technology is simple: by "switching"—instead of broadcasting—all or some of the channels in a given lineup, it follows

CONGRATULATIONS, *Keith Hayes!*

Congratulations to Keith Hayes Winner of the 2005 Star of Integrity Award

C-COR sponsors the annual Star of Integrity Award to honor the achievements of an SCTE member in fostering network integrity for advanced services over cable.

We congratulate Keith Hayes, Vice President, HFC Technical Operations and Engineering for Adelphia Communications, who is being recognized for his leadership, both as a corporate executive and former Chairman of the SCTE, in transitioning cable networks to next-generation services that place the consumer in control of their entertainment, information, and communications.



The winner of the Star of Integrity Award receives the Steuben "Star Stream" crystal sculpture. C-COR also makes a scholarship donation to the SCTE in the winner's name.



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We can rebuild it. We have the technology.

'Star of Integrity' winner Hayes was key cog in Adelphia's major upgrade project

Keith Hayes, the 2005 Star of Integrity winner, was recognized for his instrumental role in the incredibly rapid rebuild and upgrade of Adelphia Communications' networks, and preparing them for the introduction of advanced services such as high-speed data, video-on-demand and high definition television.

Sponsored by C-COR Inc., the Star of Integrity recognizes the accomplishments of an SCTE member for achieving network integrity for advanced cable applications.

Although Adelphia was well behind its peers more than a year ago, the MSO managed to have 97 percent of its plant upgraded by the end of 2004.

"My role was making sure [Adelphia's construction directors] could be successful, ensuring capital and parts...and running interference on contractual issues," Hayes said in an interview. "I tried to do everything that I could do to flatten the bumps on the road."

In addition to the general upgrade, Hayes, a former SCTE chairman, also made key contributions to operational improvements at Adelphia. Among those was an effort that has reduced truck rolls by more than 20,000 per month.

—JB



tional access in the future home multimedia network.

For cable, conditional access is the basis for digital rights management, Jones said. In the past, that has governed content streaming from the headend to the home, but that has changed with DVR technology.

"Now that we are dealing with stored content, we are dealing with playback and recording issues," Jones said. "It adds specific usage rules of the content."

In the future, it may also be possible to move content between cable conditional access keys. That would allow customers who move from one cable system to another to transfer stored content between the systems, even if they didn't use the same conditional access schemes.

Indeed, for RealNetworks, the vision of the future home could allow content to be transferred from a home DVR player to

And that's not all...

Horn named 'Young Engineer,' Pike gets 'Chairman's Award'

SCTE kept up the tradition of marking its next generation of talent last month when it formally introduced Adelphia Communications' Randy Horn as its Young Engineer of the Year.

The award, sponsored by Scientific-Atlanta and CED sister pub Multichannel News, is given to cable engineers younger than age 30 who have contributed significantly to their organization. As part of the award, Horn was awarded \$1,000.

Horn, who started his cable engineering career at Charter Communications, is presently director of data engineering for Adelphia's Colorado Springs, Colo. system.

In accepting the award, Horn noted much of the credit had to go to the industry itself.

"I stand here in front of you today because of an industry, an industry that has pushed itself to compete in one of the toughest markets in the world," he told the crowd.

Horn also said the future of cable promised to introduce many new services in the home, and in the not-so-distant future, he envisioned subscribers being able to buy products they see in TV shows or in advertisements by hitting a button on their remote control.

Such services may not be easy to create, but that was part of the allure of his job.

"One of the things I like is the fact you don't have to go into the office twice and work on the exact same problem," Horn told the crowd.

SCTE Chairman Wayne Hall and Society President and CEO John Clark also bestowed the "Chairman's Award" on GCI Cable and Entertainment CTO Dan Pike, recognized for his seven years of service on the SCTE Engineering Committee.

The contributions of Pike, who served as the SCTE Engineering Committee chair from August 1997 to July 2004, were key in the number of SCTE-approved standards rising from a mere four to 136. During his tenure, the number of American National Standards Institute (ANSI)-approved SCTE standards skyrocketed from just one to 129.

Pike gave what will probably be remembered as the briefest acceptance speech in ET awards history: a quick "thank you," followed by an equally quick exit from the stage.

—KB and JB



Horn (left) is congratulated by Dwight Duke, president of S-A's transmission network systems unit.

PHOTO COURTESY SCTE

a server in a car via Wi-Fi, allowing passengers to continue watching the content during a trip, according to Jeff Ayars, Real's general manager of embedded players and client technologies.

Interoperability of DRM systems to secure that content will be key, and Ayars noted there are at least three groups working toward that goal. The IEEE is developing MPEG-21, while the European Union is working on an overarching DRM overlay dubbed OPERA. But Ayars focused on the Open Mobile Alliance's work on a DRM 2.0 specification aimed at content streaming to mobile phones, now ready for implementation.

The OMA DRM standard—which Real had a hand in developing—was intended primarily for cellular phones, but “the specification itself is significantly robust and it was designed in order to support high-quality, high-value content,” Ayars said.

Turning homes into miniature VOD servers also is part of the future, according to Gary Hughes, director of media engineering at Broadbus Technologies.

By 2008, more than 50 percent of homes will have home networks, and home media services will be a central feature, Hughes said. With the evolution of devices able to access, store, index and distribute content, “it’s all sounding rather like a home mini-headend,” he noted.

New services such as VOD magazines and “hyperchannels” offering specialized content are also on the horizon, but that will bring along thorny content protection issues. In particular, Hughes noted metadata could pose problems, with the need to extend program information beyond just the bullet description in the program guide.

From a consumer electronics perspective, interoperability and consumer behavior patterns are key, according to Paul

Liao, chief technology officer for Panasonic Corporation of North America. While digital media has caught on, people are still moving content around via physical data files such as CDs, Liao noted.

In response, Panasonic is looking seriously at powerline home networking. Not only does it require no new wiring, but there are also plenty of connection points in the power outlets.

“While there are lower-speed products out on the market, what we are really looking for is higher speed, at upwards of 100 megabits,” Liao said.

In the end, Liao said that consumer multimedia devices need to protect content but be easy for consumers to use and hopefully offer a better experience than they do now. On the downside, the danger is in trying to alter consumer habits.

“If you try to change consumer behavior—good luck,” Liao said. ■



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Future fusion

BroadLogic a key cog in emerging 'Wideband' movement

Last April, CableLabs announced plans for DOCSIS 3.0, a next-gen spec that aims to blow by DOCSIS 2.0 as if it were a horse and carriage. Although CableLabs has not yet had much to say about the "guts" of 3.0, last month's SCTE Conference on Emerging Technologies shed some light on that subject as execs from Cisco Systems and Broadcom Corp. discussed the "Wideband" protocol and "channel bonding" techniques. But BroadLogic, a silicon startup that counts Cisco and Time Warner Ventures as investors, has plenty of skin in this game, as well.

premise equipment) only take one slice at a time and process that, whether they tune it, demodulate it, decode it, etc.

The bandwidth capacity that's enabled, the physical infrastructure, is not being mined properly, in our view. One of the key technologies... is to look at the ability of the CPE to process, simultaneously, multiple channels. Hence the term Wideband. It's not a new modulation scheme or RF channel infrastructure. It's the ability to simultaneously process at a much lower cost. When you do that, it delivers cable operators the ability to deliver much more efficient networks and higher speed services.

applications of Wideband? Where does video come into the picture?

Francesca: Even if you look at current DOCSIS, people with cable modems and PCs access a number of services. They're already streaming video over it today. But as the pipe gets larger, it has the ability to carry [more than] just data-centric applications—much richer content, including much higher quality video and telephony services.

We think that 1 gigabit (per second service) can deliver very efficient and cost-effective solutions. The ability is to really leverage the physical infrastructure and make the pipe as wide as possible. Then the operators can decide the use of that.

CED: What's driving the need for this technology?

Francesca: An urgent need in the short-term definitely outside the U.S. is DSL technologies, whether it's VDSL, UDSL, ADSL2... They're all delivering a 30 Mbps to 50 Mbps service today. They know how to get to 100 Mbps in the next 12 months per subscriber. Anything that is DOCSIS 2.0 or earlier—even on a per user basis—[uses] one QAM [which] can't support more than 37 Mbps. And that has to be shared with hundreds of subscribers. This high-profit business that cable operators have loved and enjoyed is getting drained away. Customers are moving to the same price for a lot more usable higher speed. There's an urgent need for that.

In the U.S., cable operators are seeing the same thing. If you look at the telcos putting fiber into the ground or Ethernet to the home... it's all about the delivery of higher-speed services. When they do that, not only can they turn up the dial on how fast you can get on the Internet, but also what to deliver over it, including video. We see that coming here in the next couple of years. That's why CableLabs is working toward [a new specification]. That's the urgency.

CED: What will cable operators have to rip out, or at least change, to add Wideband?

If cable operators were able to do that, they [could] unify a number of physical networks. They have a number of channels dedicated to VOD. They have one or two QAMs dedicated to DOCSIS. A number of channels dedicated to broadcast. Those are all different networks they deliver. When they put them into specific physical buckets like that, they don't get efficiencies, either.

Wideband, for us, is to help operators recover that 400 MHz of bandwidth.

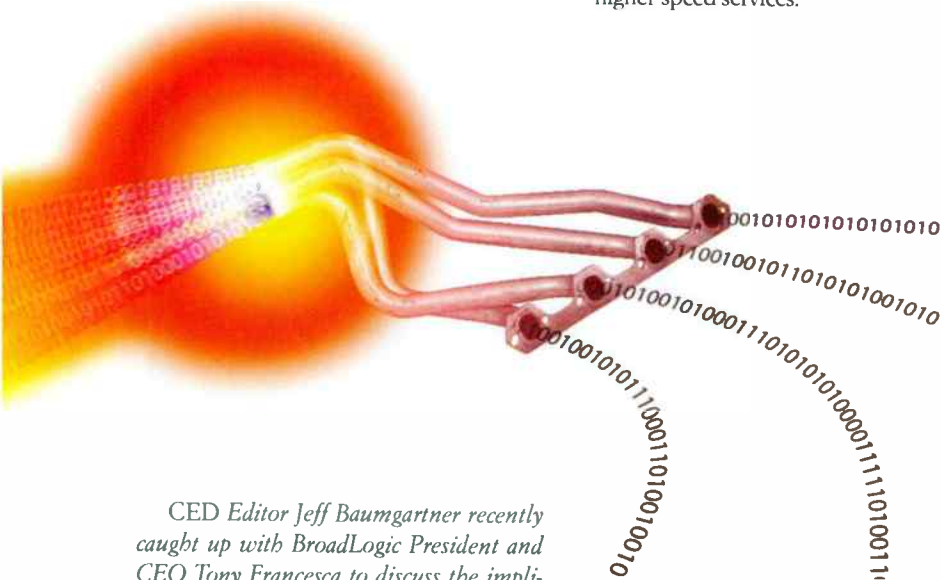
CED: What do you see as the practical

CED Editor Jeff Baumgartner recently caught up with BroadLogic President and CEO Tony Francesca to discuss the implications of Wideband. An edited transcript follows.

CED: Give us the CliffsNotes on what the Wideband protocol is.

Francesca: We look at the HFC network today and we have... technologies that we refer to as Wideband, which solves a number of problems that can unlock, in our view, the true potential of HFC.

If you look at the RF plant, and in the United States in particular, it is sliced into 6 MHz channels. All of the technologies that are developed for CPE (customer



Francesca: The goals are that whatever goes forward has to be backward-compatible. They don't want to tell all of their current subscribers who have DOCSIS 1.0, 1.1 and 2.0 cable modems that they have to replace them. The objective there is to continue to support legacy products...and legacy services, but have a super-set [of] next-gen products that are able to process more than one RF channel.

Then, at least for the CPE, subscribers can pick and choose which products they want to buy. They can go to Best Buy or the cable operator and say they want the faster cable modem or the slower cable modem. They will have all of those choices available to them.

From the headend, the goal is also the same, but it's going to depend on the installed base of the headend equipment and how evolvable that is—whether it's a software upgrade, or it's a blade insert or a new chassis.

CED: Will this technology work on systems that use 8 MHz channels?

Francesca: Absolutely. Our technology has been designed from day one to support 6 MHz channels, 7 MHz channels, and 8 MHz channels, because all of those exist on a worldwide basis. But the key objective is how to make those look like one, unified, aggregate bucket at the higher layers of products and services.

Today, on a single QAM, you can multiplex 10, maybe 15 MPEG SD (standard definition) streams, or two HD (high definition) streams and maybe two more SD streams in that same bucket. But if you look at a wider channel basis...you can statistically multiplex not only lots of video channels...but you [gain] the ability to mine more bandwidth to start with. You can also deliver services that are higher speed and unicast. You get all of those benefits, but the channel has to be wide.

CED: Does Wideband compete with or complement channel bonding?

Francesca: First of all, Wideband, for us, is just a nomenclature. CableLabs uses a term called "channel bonding"—that's a generic term. Our goal is to get standards adopted, and when that happens, the market is broader, and we believe we have technologies to be able to solve those

problems and continue to go forward and be successful, for cable operators as well as the supply base.

The concepts are the same. What people may be arguing is a specific implementation of that—the command structure for supporting all those channels and how you would use those channels simultaneously. But at the end of the day, [Wideband] and bonding allow you to get all of those benefits.

From that perspective, we have technology that is fully compatible for the goal that's being talked about for DOCSIS 3.0. That goal is also to be backward-compatible with anything that currently exists—2.0, 1.1, 1.0. Our technology is fully compatible with anything that is in service today or products that ship today.

CableLabs has a number of suppliers proposing specific implementations of using multiple channels and to simultaneously process those.

CED: Is there any fear that the concepts behind Wideband and channel bonding could become the S-CDMA of DOCSIS 3.0, meaning it's a technology required by the spec, but not necessarily one that many North American MSOs would actually deploy?

Francesca: We haven't seen that at the protocol level. You bring up S-CDMA. Although that was a big battle in 2.0 and then you look at what people have actually deployed, they aren't using S-CDMA. So I think this time around they are trying to be more practical. Let's make sure we ask for things that, at the end of the day, we know that we can practically use, and that we don't burden our suppliers with a longer time to market or incremental cost for [something] that might not see the light of day.

CED: So when it comes to DOCSIS 3.0, we can safely assume that politics won't factor in as much?

Francesca: You can't ever simplify it to that level. There will always be politics.

Hopefully the committee is smart enough to understand what is really effective versus what are jockeying positions. Our goal is that this gets implemented very quickly and that the wider the channel, the more efficiency you get. People shouldn't be thinking that double or quadruple is good enough, because once you put these things in, they last a long time in the infrastructure—five to 10 years—and you don't want to be

ripping them out...and find out that you could've done more than what you thought.

CED: Although Cisco was out in front recently to discuss some of the implications of DOCSIS Wideband, what's BroadLogic's technical role in all of this? Is your silicon going to grace a new class of

CMTSs, cable modems, or both?

Francesca: At the end of the day, we're a chip company. We will not deliver end products to cable operators. We refer to our products generically as "broadband engines," the components that go into the CPE.

CED: So you're not in the CMTS at all?

Francesca: Today, no. That's going to be driven by standards, and the volume is not large [enough] for us to focus on that today. CPEs are in the tens of millions of units. Our goal is that devices in the home should be at consumer price points.

Related to us focusing on CPE, we will be talking about...the ability to take technology that is today regarded as infrastructure—headend or fiber node venue type of equipment—and, with our Wideband technology, take that end of the network into the home. You'll be seeing technologies that traditionally go into the network—at the fiber node and up—at consumer price points. That's the breakthrough we're talking about.

CED: How far along are you on the product timeline?

Francesca: We expect products and services to be shipping and deployed this calendar year. This is not a daydream that is multiple years away. ■



new products

PRODUCT REVIEWS

Optical Fiber Mapping (OFM) software

GERMANTOWN, Md.—Acterna has announced that its Optical Fiber Mapping (OFM) software can now help determine the best fiber optic route to connect two points, as well as manage inner duct connections and usage. Acterna's OFM software is already able to hone in on the exact location of faults, outages, affected nodes, and customer sites, as well as shed light on the entire fiber optic network. With OFM software, users from different divisions within an organization can also generate customized reports or displays and get the specific information they need.

The OFM-500's new features are solutions for both telecommunications and cable operators. By identifying the best fiber optic route according to criteria specified by the user such as the lowest attenuation, the shortest length, or the minimum number of connections, the software saves work for both sales as well as provisioning personnel by eliminating hours finding spare fibers in each cable and virtually splicing the fibers, according to the company.

Additionally, in the case of a fiber fault, OFM-500 software finds, in a matter of minutes, other optical fiber routes that can be used as a backup.

The software also manages ducts and inner ducts, which is significant for operators who want to limit their up-front investment for access networks by installing inner ducts that will be filled with cables at a later date when demand increases. For each section of the access network, Acterna's OFM-500 software indicates information regarding the usage of ducts and inner ducts, the cables inside the ducts and inner ducts, and the customers served by those cables. When it is necessary to modify the network for maintenance tasks, the user will know which customers or services are likely to be affected.

The OFM software can be used as a standalone software package installed on any desktop PC or deployed as a multi-user architecture accessing a centralized database on a server. OFM can also be integrated with Acterna's Remote Fiber Test System (RFTS) to form a complete Optical Network Management System (ONMS).

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Fiber optic transceiver

HUNTINGTON BEACH, Calif.—Radiant Communications has launched a universal fiber optic transceiver, the DL-227. This single unit enables auto negotiation of various transmission speeds including 10, 100 and 1,000 Mbps.

Radiant's copper-to-fiber media converter transmits up



Radiant's universal fiber optic transceiver

to 1 gigabit of data per second. The DL-227 is also space economical and plug-and-play ready for easy installation, according to the company. The fiber port of Radiant's newest transceiver operates in full duplex mode, so the transmission distance is only limited by the power of the optics.

The DL-227 transceiver meets IEEE standard 802.3z/ab requirements. In addition, it has the ability to automatically configure MDI crossover and can detect and self-correct common wiring problems.

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TEST EQUIPMENT

Handheld test gear

QUEBEC CITY, Canada—EXFO Electro-Optical Engineering Inc. has expanded its line of handheld test instruments designed for installation and maintenance applications in optical networks. The 600 handheld series consists of the FOT-600 optical loss test set (OLTS), FPM-600 power meter and FLS-600 light source. This suite of instruments can be used for a number of tasks, including fiber-to-the-premises (FTTP) deployments, coarse wavelength division multiplexing (CWDM) and dense wavelength division multiplexing (DWDM) applications.

The FOT-600 OLTS features pass-fail indicators, providing on-site analysis to speed up and simplify testing. With extensive memory capacity and a software converter, the FOT-600 OLTS facilitates data management and enables data transfer to a personal computer via a universal serial bus (USB) connection. Variable user configurations are available, including three singlemode wavelengths (1310 nm, 1550 nm, and 1490 nm or 1625 nm) or two multimode wavelengths (850 nm and 1300 nm).

The FPM-600 power meter delivers a wide dynamic range, high-power measurement and a min./max. power function, allowing measurements of rapid system-power fluctuations. The FPM-600 has applications such as high-speed DWDM or CWDM network qualification.

The FLS-600 light source is available in laser, LED and vertical cavity surface emitting laser (VCSEL) models with several wavelength options. EXFO's 600 handheld series is suited for FTTP applications. It can test passive optical networks (PONs) at 1310 nm, 1490 nm and 1550 nm.

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EXFO's handheld test instruments



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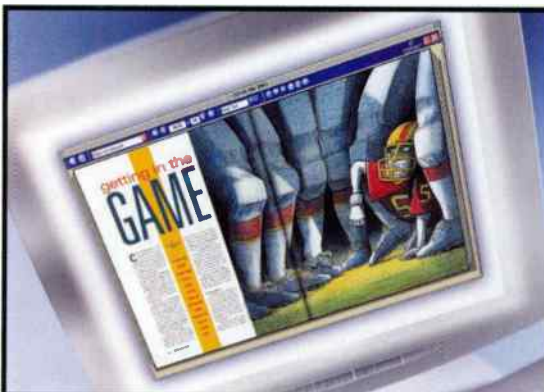
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ARTICLES

In the March issue of CED, you'll find features exploring bandwidth needs, mid-size and larger commercial opportunities, and mobile video.

Fattening up the pipe— Is 1 GHz in your future?

As operators move forward with digital simulcast deployments and beef up high-definition fare, the natural question is, Do operators have enough bandwidth today to do the job? If not, is migration to 1 GHz the answer? Will Wall Street go along, even if the shift is less capital-intensive than the recently completed rebuilds? How about other bandwidth-saving or expanding ideas like DOCSIS Wideband, channel bonding and switched broadcast? CED examines the options in this special feature.

Going after the bigger prey—What does it take to land mid-size and larger enterprises?

Cable relied on DOCSIS to win small- and home-office business users, but what about medium-sized enterprises or even Fortune 1000s? What technologies must cable bring into play to succeed with this elusive, but highly lucrative, end of the business spectrum?

Portable video— Friend or foe?

The ability to digitally record television is becoming a fact of life for consumers as DVR transitions to mass-market status. But now, DVR providers and other consumer electronics firms are upping the ante with special software and devices that allow subscribers to take their favorite shows on the road. But what business and copyright issues come into play, and how can cable operators and other video service providers capitalize on this trend?

CED

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California jams up the digital transition

California has just given a big boost to broadcasters' efforts to delay the return of the analog TV broadcast spectrum. In mid-December, the California Energy Commission adopted regulations that would prohibit the sale in California of the currently-available digital-to-analog off-air converter boxes. They did it by adopting a power consumption limit that is far below the power specifications of current products.

Never mind that Congress wants the broadcasters to give up their analog spectrum by the end of 2006. In the closing days of the 2004 session, our elected representatives adopted a "sense of the Congress" resolution to that effect. While this doesn't make the giveback mandatory as a matter of law, it puts pressure on the FCC to adopt regulations that have that effect. The NAB was supporting an alternative resolution that would apply only to channels 63 to 69, and set the date a year later, but the NAB lost.

In order for a mandatory giveback to be politically accept-

SIR-T151, but doesn't reveal their power consumption.)

So based on the data I have before me, I conclude that the 8-watt limit cannot be achieved by products on the market today. As of the effective date of the new regulation, January 1, 2007, these products cannot be sold in California.

In the same proceeding, California adopted 3-watt power consumption limits for TV sets and DVD players. But those limits only apply to the "standby-passive" mode, while the 8-watt limit for the digital converter box applies to the active mode. The standby mode applies to the lowest power consumption level, where the user thinks the device is off. There are no limits for TVs and DVD players in the active mode.

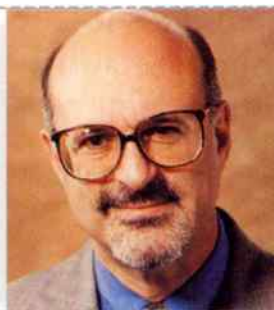
Originally, California also planned to adopt power consumption limits for "integrated receiver decoders," which are cable and satellite set-top boxes. But in that case, sanity prevailed. The consumer electronics industry educated the California commission, and convinced it that there are too many varieties of set-top boxes, with too many options that consume differing amounts of power. So that proposal was dropped from the final regulations.

Now, you might think that it may be possible to build converter boxes that achieve the 8-watt limit by 2007. Evidently that's what California thought, although I could find no evidence in the record supporting that view. All I found was an opinion from a Natural Resources Defense Council representative that it was feasible. (He referred to a European converter made by Pace that meets the 8-watt spec, but that box supports only SD video, not HD, so he was comparing apples and oranges.)

The FCC encountered a similar circumstance back in the 1970s, when it tried to set a 12 dB noise figure standard for analog UHF tuners. At that time, UHF TV stations were at a competitive disadvantage to VHF stations, partly because VHF tuners had a noise figure in the 6 to 8 dB range, while UHF tuners were in the 14 to 18 dB range. In 1978, the Commission ordered a 12 dB UHF noise figure limit for all new TV models after 1982, but recognized that the technology to achieve that level was not yet available.

The consumer electronics industry appealed to the DC Circuit Court of Appeals, on the grounds that the FCC went beyond its authority. The court agreed and overturned the FCC's decision, saying that the FCC "may set standards for UHF tuner noise that reflect current electronic capability. It may not, however, establish standards for the future that are not currently attainable with existing technology." It also said that "the Commission may not prescribe noise regulations that go beyond the present state of the art." (EIA v. FCC, 204 USApp.DC 417)

Does the California Energy Commission have the authority to impose limits without any assurance they can be achieved? We may never know, because probably no one will appeal this regulation. Certainly the broadcasters won't. But the FCC needs to watch out when this sleeping dog decides to start biting. ■



By Jeffrey Krauss,
President of
Telecommunications
and Technology Policy
Have a comment? Contact Jeff via
e-mail at: jkrauss@cpcug.org

able, there must be converters on the market that allow viewers to continue to use their existing analog TV sets. Congress would not be able to weather the political firestorm if those millions of sets were to become boat anchors.

What the California Energy Commission did was to require these converter boxes to consume less than 8 watts of power in active mode, and 1 watt in standby mode. This requirement was contained in an amendment to Section 1605 of Title 20 of the California Code of Regulations. You can find it at www.energy.ca.gov/appliances/. It applies to a "digital television adapter," which is defined as "a commercially-available electronic product which converts digital video broadcast signals for use by an analog video device such as a TV or VCR."

Is 8 watts a practical limit? The only way I know to answer that question is to look at currently available off-air digital broadcast converters. There are only a few on the market right now. There is the Motorola HDT101. It has a power consumption specification of 30 watts. Its older sister, the HDT100, also consumes 30 watts. Zenith makes the HDV420, which consumes 18 watts. The DEXUS Digital Stream HD1150 has a power consumption of 25 watts. (Samsung has two products also, the SIR-T165 and the



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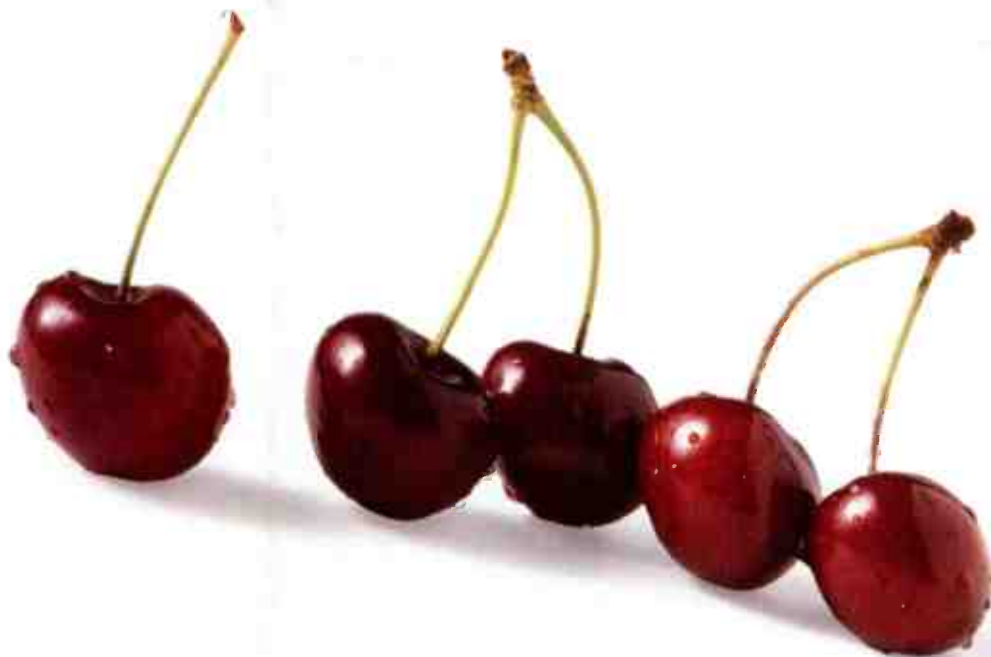
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