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Is the multi-room DVR ready for primetime?

DCAS update • OCAP in cable's sights • ET wrapup

INSIDE: Digital Simulcast wallchart



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Here we go again

DBS does video very well. In the U.S., it has attracted more than 27 million subs. What DBS has been unable to do (so far) is come to market with a high-speed bundle that doesn't rely on partnering with telephony companies in some sort of a quasi, revenue-sharing bundle that offers video from DBS and data and voice from the telco—but puts everything on one bill. There's lots of revenue sharing going on, and you can bet that someone is losing something somewhere in the translation.

Some large and mid-sized telcos have also latched on to DBS in recent years so that they could add video to the bundle. But many of them have since gotten religion and embarked on delivering video over their own networks, although they might still rely on DBS to gain traction outside their traditional regions.



*The belief is that
DirecTV will move
ahead with
WiMAX*

JEFF BAUMGARTNER,
EDITOR-IN-CHIEF

But just last month, DirecTV made a veiled stab at telling the world that it is once again getting serious about adding its own high-speed service bundle. News Corp. Chairman Rupert Murdoch told investors that, "you'll be hearing from us within two months on a very clear plan [of] what will happen, and it's not as

expensive as you might think." In this case, "not as expensive" means less than \$1 billion.

The belief is that DirecTV will move ahead with a plan that involves WiMAX, which recently saw its first group of vendors win certification. But that was for the fixed version of WiMAX. For mobile wireless, they'll have to wait for the 802.16e standard to come of age. The IEEE just approved a draft proposal on the super-charged 802.11n protocol, but there's been no indication that DirecTV plans to leverage it.

Whatever happens, it will be DirecTV's latest attempt to get it right. Direcway is still going, but it leaves much to be desired in terms of both speed and mobility. Remember the original plans for Spaceway? In the late 1990s, DirecTV said it would build three satellites with a total capacity of about 30 Gbps. Turning to today, the DBS giant will utilize the capacity of two Spaceway satellites to fuel a big high-definition television expansion.

As for EchoStar, it has been less vocal about creating its own two-way broadband service. It wrote off investments in Starband Communications and WildBlue Communications years ago, but presently is looking at ways to offer such a service, if it could be done "affordably and economically," according to a company spokesman.

As it has with HD-VOD, cable finds itself in an advantageous position—ahead of the technology curve on this particular issue. For many operators, the plant is already equipped for data and voice services. It will take some work and money to extend that plant wirelessly, but such plans appear to be on the agenda, based on what was said in Tampa at last month's SCTE Conference on Emerging Technologies. Wireless mesh and mobility was a key topic at the confab, but I find it hard to believe that adding this important component is part of some far-reaching, five-year outlook. It will happen much sooner than that.

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The SCTE's annual Conference on Emerging Technologies delivered the message that "more is more"—MSOs can never be too flexible, can never have enough bandwidth and storage, and can never do enough to provide convenience and choice to consumers.

By Jeff Baumgartner and Leslie Ellis

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As far as subscribers are concerned, it's all about the 'n-Play'—or give them whatever personalized services they want, in any combination they want, whenever they want.

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Bandwidth for the Triple Play

Operators need to offer more bandwidth-intensive services and lower CAPEX with:

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upfront

LATEST NEWS AND INSIGHT

Motorola acquisition beefs up M-CMTS plans

Motorola Inc. has sealed a deal to buy the cable network technology assets of Broadband Innovations Inc. (BI), a closely-held RF and digital technology developer based in San Diego.

Motorola, maker of the BSR family of CMTSs and a BI investor, said the acquisition will bolster its efforts for channel bonding and the modular cable modem termination system (M-CMTS), two important elements of the emerging DOCSIS 3.0 specification. A key goal of the M-CMTS is to enable the cable network to share edge QAM resources for video-on-demand and IP-based DOCSIS services and applications.

Via the deal, Motorola said it will obtain technology and patents that forge greater RF channel density and channel throughput, more effective channel management, and a fault-tolerant RF matrix switch.

In terms of channel efficiency, BI's technology will help the Motorola CMTS locate better performing spectrum quickly when moving to multiple channels, noted Jeff Walker, senior director of marketing for Motorola's Connected Home Solutions division.

Broadband Innovations' wares include a dual channel QAM modulator module that combines the functions of QAM modulation and RF upconversion for two channels via a single module. The company also markets a dual channel upconverter that accepts two adjacent and combined QAM IF input signals and converts them to the appropriate contiguous channels in the cable operator's RF spectrum.

Motorola has yet to apply BI's technology to its line of CMTSs. Early iterations of the BSR platform used an up-



conversion modulator from Wavecom, and second-generation boxes used

Motorola-built technology. But, when looking at the stringent requirements of DOCSIS 3.0, Motorola determined that implementing BI's upconversion technology would take much less time than it would if Motorola decided to build it in-house, explained Mike Cookish, director of product management for Motorola's Connected Home unit.

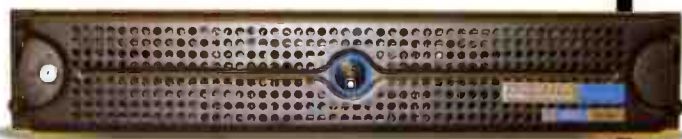
The deal marks the latest effort by Motorola to shore up its DOCSIS 3.0 technology. In November, Motorola teamed with routing and IPv6 expert Juniper Networks to jointly develop M-CMTS technology.

Concurrent gets RAM tough

Targeting bigger storage and higher ingest rates, Concurrent Computer Corp. has unveiled the MediaHawk 4500, a RAM-based video-on-demand system.

Concurrent execs said the system can hook into its existing disk-based VOD systems, or be used to support "greenfield" deployments. Concurrent expects the new platform to become available commercially in Q3 2006.

Concurrent said the 2-RU (rack unit) platform will store more than 20,000 hours of on-demand content and handle ingest rates greater than 2,500 hours per day.



Concurrent's RAM-centric MediaHawk 4500

The company said several factors are driving the need for operators to add more RAM to VOD systems, including the emergence of HD-VOD, rapidly growing on-demand content libraries, and network-based DVR systems.

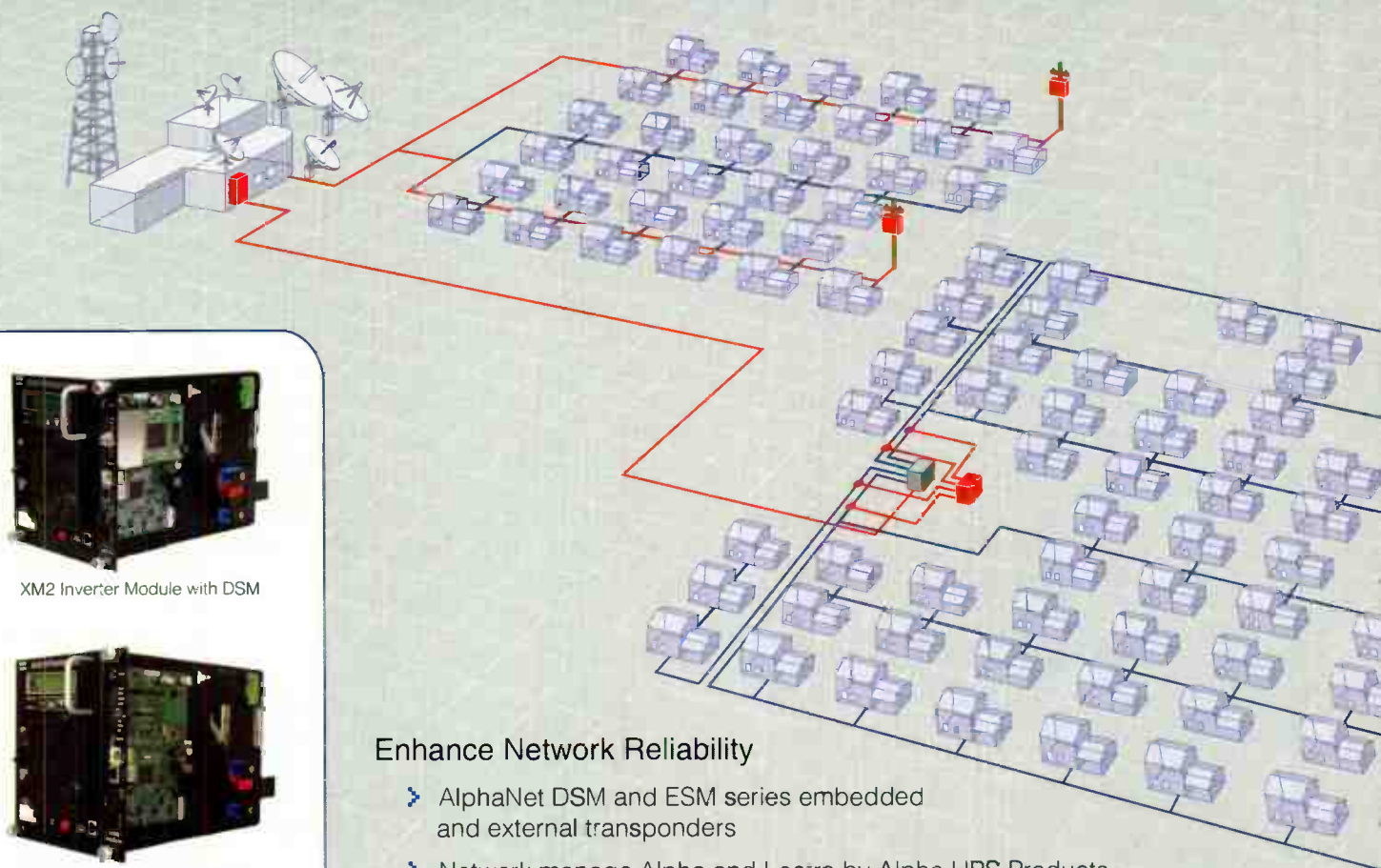
The new server is also designed for more uptime. While a 97 percent reliability rate has been "okay" in recent years, new expectations for VOD have raised the bar to the region of 99.9 percent, said Concurrent President & CEO Gary Trimm.

Although more expensive RAM is part of the VOD equation now, Concurrent said its approach differs from that of Broadbus Technologies. Instead of using RAM exclusively, Concurrent envisions that operators will place the MediaHawk 4500 next to disk-based systems, and that a title's popularity will determine which medium is used.

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upfront

LATEST NEWS AND INSIGHT

ARRIS sets DOCSIS 3.0 'migration path'

Taking a step toward the promise of DOCSIS 3.0, ARRIS has integrated its downstream-heavy Keystone D5 DMTS platform with a handful of video server vendors.

The D5, a product that supports 48 QAM channels, has been integrated with servers from Broadbus Technologies, C-COR Inc., Concurrent Computer Corp., and Kasenna Inc. Still notably absent from this list is market leader SeaChange International.

ARRIS notes that the integration underscores the D5's ability to support MPEG-2-TS digital video delivery, and that it serves as a migratory path to the modular-cable modem termination system (M-CMTS), a key component to the forthcoming DOCSIS 3.0 specification, which will use channel bonding techniques to produce speeds in excess of 100 Mbps.

A key benefit of the M-CMTS will be its ability to share edge QAM resources for video-on-demand and DOCSIS-based services and applications.

Today, operators deliver VOD via edge QAM devices that translate video-over-IP or ASI (in the case of older systems) to RF. The traditional CMTS, meanwhile, translates digital data into RF. M-CMTS tech-



ARRIS' D5 DMTS

nology in the works today aims to give operators one device that can flexibly mix the two together in a much more efficient manner. ARRIS' DMTS is designed to handle traditional MPEG and emerging IP transport technologies.

ARRIS introduced plans for the D5 last year. "We really saw the beginnings of the downstream heavy revolution before [the concept] went to CableLabs" as the M-CMTS, noted ARRIS Senior Director of Product Management Mike Caldwell. "We merged our roadmap with theirs." As of this deadline, CableLabs had yet to issue the DOCSIS 3.0 spec, but ARRIS expects to begin shipping an "M-CMTS-compliant" version of the D5 in Q1 2006.

Two important components of the box—the DOCSIS Timing Interface and DOCSIS RFI spec (used for channel bonding)—are stable enough now for ARRIS to move ahead, Caldwell said. The D5 also supports Field Programmable Gate Arrays (FPGAs), so any required changes should be able to be made in software, he added.

WildBlue gets down to business

WildBlue Communications said it will leverage its Ka-band satellite broadband platform to enter the enterprise Very Small Aperture Terminal (VSAT) market.

Although WildBlue's service got off the ground last June by targeting residential customers in rural areas, it will now complement that strategy by going after small- and medium-sized businesses, telecommuters, and "specialized industries" such as retail, financial, telemedicine and government markets.

WildBlue, which will compete in the sector with companies such as Hughes Network Systems and Gilat Satellite Networks, expects to launch the offering in the first quarter of 2006 under the WildBlue Enterprise Solutions brand.

If you think the new Vongo offering from Starz Entertainment Group (SEG) is an "over-the-top" service designed to redirect revenues traditionally tagged for broadband network operators, think again, says company SVP, Advanced Services Bob Greene.

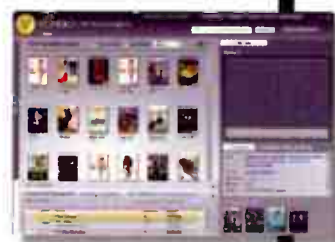
Vongo, launched in January, can offer "great opportunities" for SEG's cable and telco affiliates, he said.

Greene: Vongo offers cable 'great opportunities'

"We're prepared to work with the telco and cable industries. We believe they should

be offering content and access as a bundle and not leave money on the table," Greene said, noting that operators could partner up to handle the customer billing and authorization for the service. "At the same time... We're going to be aggressive in our marketing," he added.

Expanding beyond Starz Ticket service (the SEG-RealNetworks Inc. partnership), Vongo will allow users to download films and other videos for playback on Microsoft-



Vongo offers more than 1,000 titles.

powered PCs, laptops and "select" portable media devices. For \$9.99 per month, a subscription will authorize the service for up to three devices. Vongo also supplies a live streaming feed of the linear Starz premium channel. Starz Ticket, which also supports a stream of the Starz channel, sells for \$12.95 per month and offers fewer titles.

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As cable operators navigate to deliver high-bandwidth services, there's an obvious need to improve network performance to reach higher plateaus. On-demand services, high-speed data and advanced IP services require new levels of uninterruptible service to ensure revenue flow. And a continuous, profitable and expanding revenue stream is what everyone's looking for.

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ADB buys OCAP specialist Vidiom

ADB Group all but cemented a top position in the OpenCable Application Platform (OCAP) arena after signing a deal to acquire Broomfield, Colo.-based Vidiom Systems.

ADB Group is not new to the sector. Its Osmosys division develops OCAP implementations and applications, and is also heavily involved in DVB-MHP, the spec upon which OCAP is largely based. Although several TV manufacturers are creating their own OCAP stacks, Vidiom and Osmosys are among the few to create

licensable versions.

Vidiom, however, is directly linked to OCAP Development LLC, a joint venture of Comcast Cable and Time Warner Cable.

Last May, Vidiom formally announced a licensing deal with the J.V., gaining the right to license its OCAP implementation to other operators, silicon vendors and consumer electronics companies.

Geneva, Switzerland-based ADB called the deal a "strategic acquisition," noting that Vidiom would strengthen its presence in the U.S. market and build opportunities for other ADB products. ADB also markets a wide range of digital set-top boxes.



It's expected that ADB will retain the Vidiom brand, and its existing operations, and that Vidiom will continue to be headed up by President & CEO Timothy Wahlers.

"We believe that Vidiom's vast experience and excellent reputation in the OCAP-based prod-

ucts and markets create perfect synergy with our existing MHP-related business," said ADB Group Chairman & CEO Andrew Rybicki.

Once the deal is closed, it's expected that ADB will retain Vidiom's 100-plus employees.

C-COR Inc. has inked a deal in principal to sell its DV6000 product line to Newfound Technology Inc., a hardware supplier based in Massachusetts.

C-COR sheds DV6000 product line

Although a final purchase agreement is still in the making, the companies

expect to close the deal in C-COR's fiscal third quarter.

The DV6000 is a family of digital video transport gear that C-COR introduced in 1993. The platform includes a digital transport platform, and single channel transport and tributary access systems. The system also supports C-COR's IMI-9000 information and monitoring system.

Newfound Technology said it will place the DV6000 line under its Artel Video Systems division umbrella and combine it with its DigiLink and MegaWav video transport products. Newfound Technology acquired those two lines from Artel in 2004.

Whaleback tees up IP-PBX

Whaleback Systems has formally introduced a business phone system built from the start to support IP connections.

The company's SMB1500 is a PBX platform designed for broadband. In comparison, other circuit-based PBX (private branch network) systems have to be hacked or altered in some way to support IP-based business services.

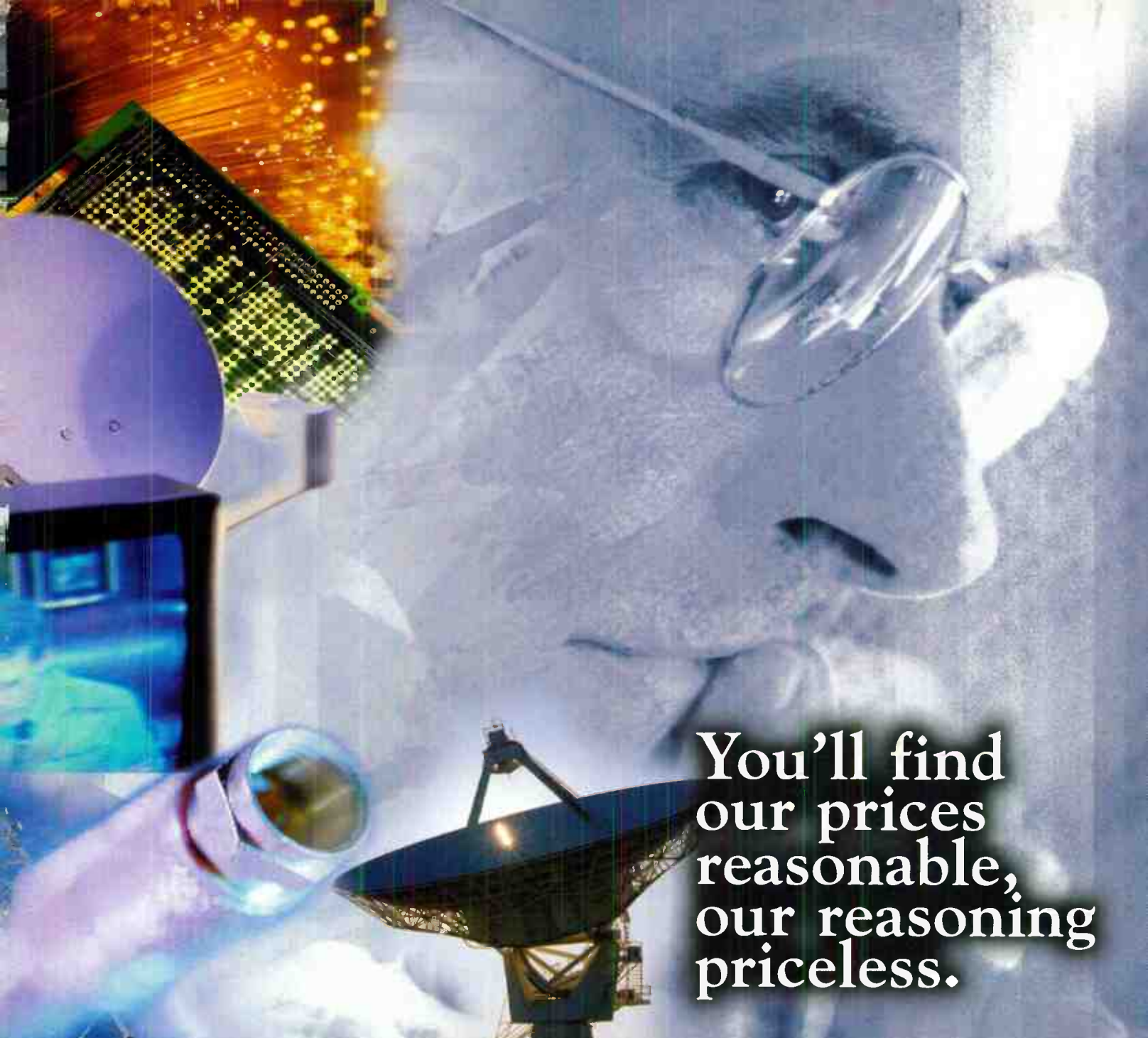
Whaleback is coming to market with a flat rate per station service package that includes unlimited calling throughout North America, an IP multi-line handset, and applications such as voice mail, video calling, desktop messaging, remote access, caller ID and call forwarding. The service also supports E911 and up to 1,500 phone extensions, the company said.

The SMB1500 "allows companies to pull the plug on outdated phone systems and put advanced technology and all-inclusive service to work for their business," said Whaleback co-founder & CEO Mark Galvin, who also founded VoIP gear specialist Cedar Point Communications.

Whaleback Systems also has tapped a certified installation partner for the SMB1500. DecisionOne will provide Whaleback and its customers with infrastructure assessments, installation services and technical support. The move should reduce or eliminate truck rolls for cable operators, which are among Whaleback's primary customer targets.



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Network neutrality? Hush!

Is yesterday's Hush-A-Phone today's Slingbox?

It's hard to imagine today, when mobile phone users think little of broadcasting their most sensitive conversations within easy earshot of strangers, that people once jealously guarded their telephone privacy. But there was enough concern about telephone propriety in the 1920s that an inventive corporation built a business around a product whose singular purpose was to muffle telephone conversations.

The device was a simple cup-shaped appendage that snapped on to the mouthpiece of hand-held or pedestal-style telephone sets. Its originator was based near the intersection of 16th St. and 5th Ave. in New York City. Both product and developer went by the same name: Hush-A-Phone. In print advertisements, the Hush-A-Phone Corp. promoted its invention as a way to solve

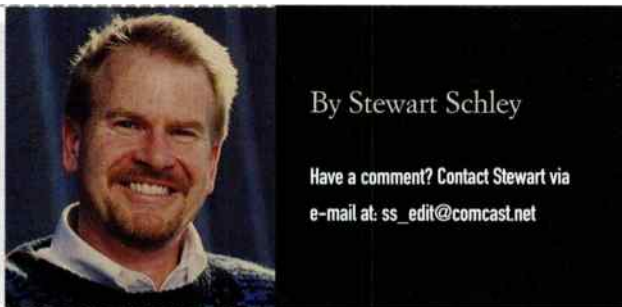
Phone. By then, in 1955, business was sagging, and some retailers had stopped selling Hush-A-Phones altogether.

The FCC's attempts to justify squelching an unobtrusive device bordered on hilarity. According to a summary of the FCC's arguments authored in 1956 by the U.S. Circuit Court of Appeals for the District of Columbia, the commission's attorneys did not challenge the right of telephone subscribers to hold private conversations. It was the incorporation of an alien enabling device they didn't like. Thus, the FCC argued that while it was inappropriate to use a Hush-A-Phone to quiet phone conversations, it was perfectly acceptable for an AT&T subscriber "to achieve (privacy) by cupping his hand between the transmitter and his mouth and speaking in a low voice." The circuit court disagreed. It ordered the original FCC action set aside and instructed the commission to come up with a better set of rules.

The saga of Hush-A-Phone stands alongside the more notorious Carterfone FCC decision of 1968 as one of the key body blows that weakened AT&T's attempt to preserve a wide berth for its telephone monopoly. In both cases, AT&T sought to suppress inventive efforts to dangle new devices onto the phone network or its terminals. In both cases, the big phone company failed, and the legal precedents won by two small companies paved the way for gigantic leaps of entrepreneurial innovation that ranged from fax machines to today's Internet.

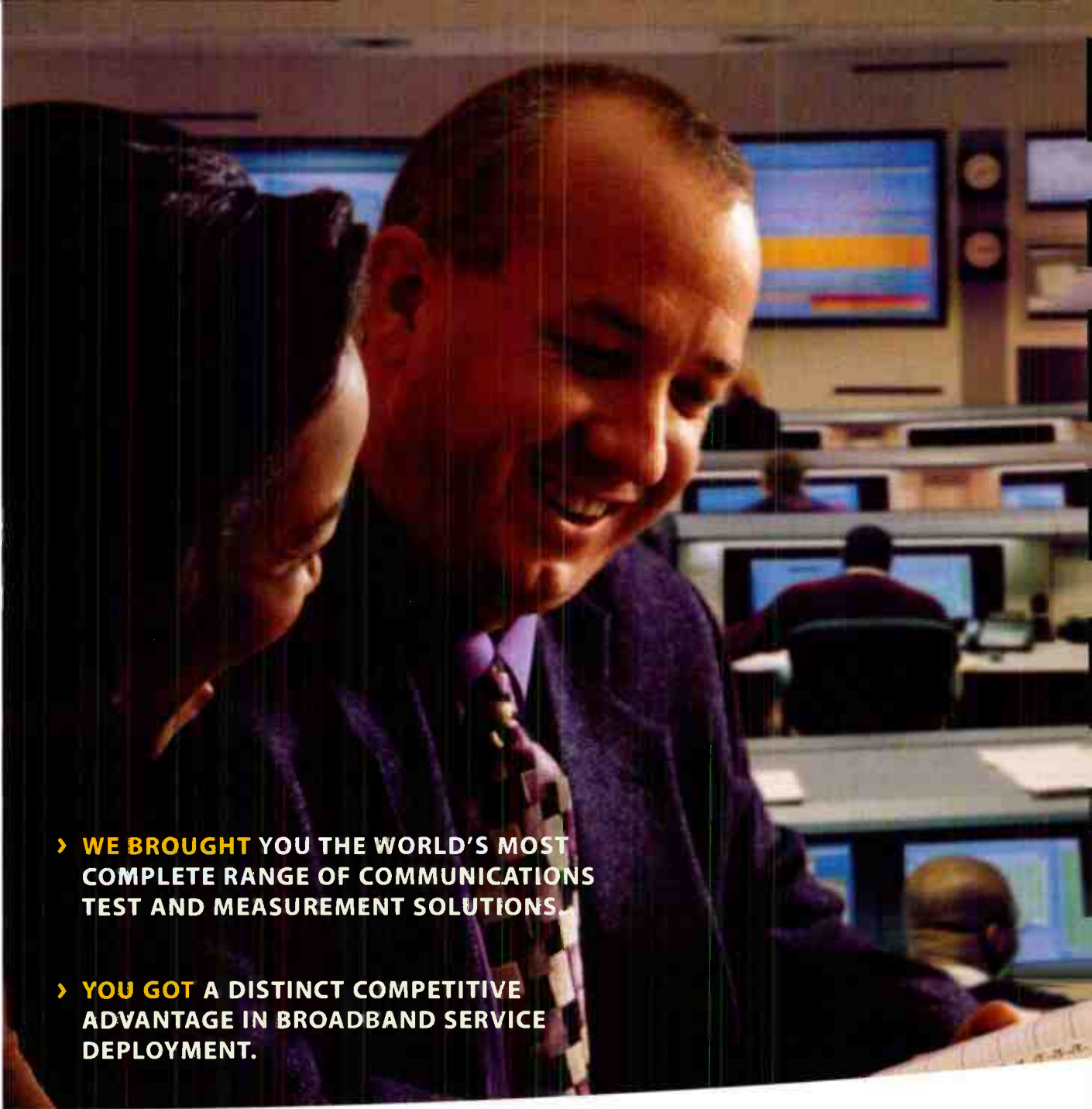
Don't be surprised if Hush-A-Phone and Carterfone rise up again as part of a public conversation about "network neutrality" and the future of the Internet. Advocates of a neutrality model will seize on the innovation flurry that Hush-A-Phone unleashed as proof that the right policy model for the Internet age is to ensure that all Internet applications are treated alike by IP networks, and that end users have freedom to tinker with new devices that feed from the unfettered data flow. Yesterday's Hush-A-Phone, they'll contend, is today's Slingbox. It's a good point, but it doesn't mean a utility model for broadband access has to emerge. Instead, as broadband network providers grapple with the right approach to serve their customers, earn a return on investment and wrestle with difficult policy issues, it may be helpful to think about how history could have been revised. Things might have turned out differently for AT&T if, instead of running for regulatory protection, it had tried to prevail over the Hush-A-Phone threat in a more admirable way: by making its own voice-muffling gizmo, advertising the devil out of the thing, and battling it out in the open market. That would have been something worth talking about. ■

Stewart Schley writes about media and technology from Englewood, Colo.



three problems. It would safeguard privacy, so confidential conversations stayed that way; it would eliminate "phone talk annoyance," thus controlling the noise level within places of business; and it would "improve hearing in noisy places" by preventing environmental noise from entering the phone transmitter.

Things went well enough for Hush-A-Phone Corp. that it survived the Great Depression and sold roughly 125,000 of its noise-reducing inventions over a 20-year run. But trouble developed in the late 1940s when, according to written accounts, a lawyer who worked for American Telephone & Telegraph Co. happened upon a Hush-A-Phone displayed in a store window during a lunchtime stroll in Manhattan. He bought one and hustled it back to AT&T's headquarters. Quicker than you can say "monopoly with an attitude," AT&T's attorneys filed a complaint with the Federal Communications Commission charging that the Hush-A-Phone violated tariffs forbidding people from attaching to their telephones any device "not furnished by the telephone company." Further, AT&T said it had the right to suspend or terminate phone service to anybody caught using one of the things. Not surprisingly, an FCC that often acted as a nurturing matriarch to AT&T upheld the complaint upon challenge from Hush-A-

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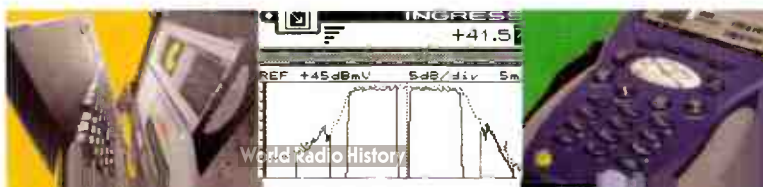
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BRAIN

Multi

By Craig Kuhl, Contributing Editor

The technology that will enable the sharing of content and applications from a central point in the home to multiple devices, most notably the multi-room digital video recorder (DVR), is on the verge of greatness. But before that happens, there are dues to pay.

Content protection, evolving business models, technology hurdles and an ill-informed customer base are impeding the progress of the multi-room DVR and the technologies that will connect a host of devices in the home.

Those impediments may be short-lived, however. Inspired by an on-demand market expected to top

\$6 billion in customer orders, and with 31 percent of current digital customers expressing "strong willingness" to pay for DVRs as a monthly service, along with 15 million to 37 million homes predicted to have DVRs by next year, a Forrester Research report reveals, multi-room technology is getting the attention of service providers and their supporting cast of vendors.

On-demand viewing is also expected to expand from 3.5 percent of all viewing today to 28 percent in 2007, with viewers also increasingly watching TV shows recorded on their hard drives. Although multi-room connectivity isn't a new concept, an explosion of new devices and the advanced technologies they carry are lifting the multi-room concept higher on service providers' radar screens.

"People are used to getting content on more than one TV. But now, they want HD, DVRs and other types of content with every TV, in every room. And for service providers, more homes with more boxes creates more revenue," says Bruce Leichtman, principal analyst for Leichtman Research Group (LRG).

Yet more boxes also create more costs, an element that the multi-room model is attempting to reduce. "Getting the right equipment and making it profitable is a challenge. As multi-HD homes multiply, they need HD boxes. You don't want expensive boxes on every set, so a server client makes more cost sense," Leichtman says.

What made sense for Charter Communications, which is deploying such gear from Scientific-Atlanta Inc. (S-A) and Digeo Inc., is to position multi-room DVRs and connectivity as value-added fea-

Multi-room DVRs still face business and technology

POWER

lied

hurdles





ONWARD, DCAS

FCC filing highlights momentum for downloadable conditional access

BY JEFF BAUMGARTNER, EDITOR-IN-CHIEF

The cable industry's downloadable conditional access (DCAS) effort appeared to take a big leap forward late last year following an important filing to the Federal Communications Commission (FCC).

The DCAS project has been in the making for some time, but the filing from the National Cable & Telecommunications Association (NCTA) on Nov. 30, 2005, shed much more light on the progress being made. The U.S. cable industry hopes the report, coupled with some recent demonstrations, will gain favor with the FCC in terms of determining a long-term replacement for the existing CableCARD.

In addition to replacing the CableCARD long-term, there are other potential benefits to DCAS. For starters, DCAS should also all but eliminate the conditional access duopoly that exists today, since most cable systems base their digital systems on either Motorola's Digicipher platform or Scientific Atlanta Inc.'s PowerKEY scheme. To a lesser extent, cable operators, most notably Cablevision Systems Corp., are employing

NDS Group's VideoGuard.

In the filing, the cable industry made it clear that its earlier work with DCAS has shown much promise. On top of that, the industry also notified the world that it is more than willing to move away from the CableCARD, a removable access platform that is deemed much more expensive and less elegant than the downloadable version that the industry is proposing.

"We are pleased to report that downloadable security is a feasible Conditional Access ("CA") approach, that it is preferable to the existing separate security configuration, and that the cable industry will commit to its implementation for its own devices and those purchased at retail," the report notes.

The DCAS timeline

But how quickly can the industry pull DCAS together? According to the filing, the industry said it expects to rollout DCAS nationwide by July 1, 2008.

At last month's Consumer Electronics Show in Las Vegas, Time Warner Cable Senior Vice President of Advanced Engineering & Technology Mike Hayashi

elaborated even further. He said expectations, at least from Time Warner Cable's standpoint, are to start field implementations of DCAS toward the end of 2006, position plant for a larger rollout in 2007, and extend DCAS nationwide by 2008.

But there's plenty of work ahead in terms of getting from here to there.

For starters, the system under the proposal will employ a secure microprocessor. Those microprocessors, to be installed in digital televisions and set-tops, will also support a secure bootloader that will receive the "keys" and other important components of the CA system.

Keyed up

Here are some important dates and milestones referenced in NCTA's Nov. 30, 2005 filing with the FCC:

- A national rollout of DCAS by July 1, 2008.
- Q2 2006: Construction to begin on DCAS keying facility; facility to be online by Q3 2006.
- Phase II ASIC chip completion by Q3 2007.
- Completion of DCAS network architecture components by Q4 2007; testing of retail and leased devices by Q1 2008.

The industry is also moving ahead on a keying facility. According to the report, the cable industry has already selected a

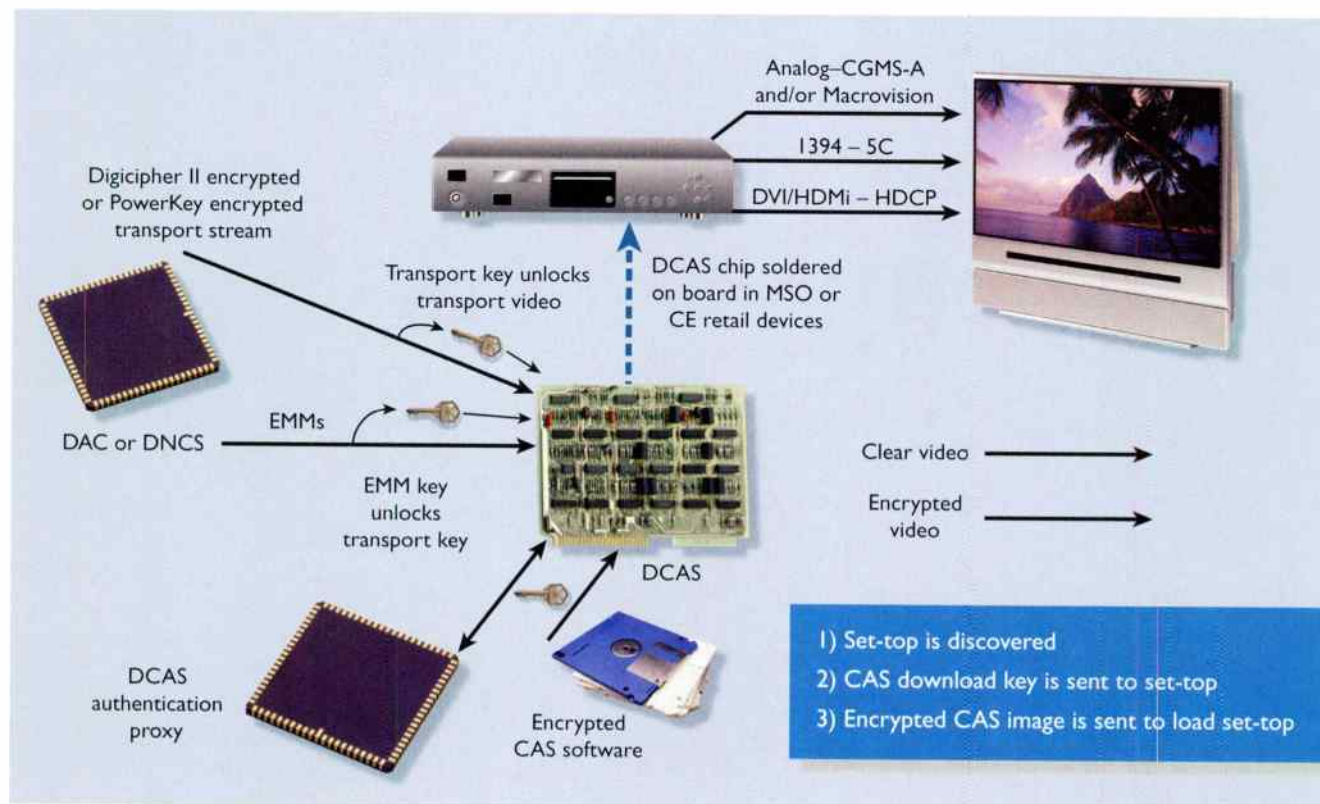


Figure 1: The proposed DCAS architecture.

Source: NCTA

vendor for the DCAS keying facility, and has hired project specialists to develop the secure bootloader layer for a prototype DCAS chip and the test application and tools for conditional access integration. Relationships for this part of the business are under development by CableLabs and the MSO-led NGNA (Next Generation Network Architecture) LLC organization.

According to the filing, construction on the keying facility will begin in Q1 2006, and go online in Q3 2006.

"They've just identified a need," said one CA vendor in reference to the keying facility. "It will have to be a secure building, a record-keeping facility. It's something that no one in U.S. cable has done." In fact, until the DCAS project came about, the CA vendors took care of this element, and provided the necessary indemnification in case anyone was smart enough to defeat the conditional access system.

The report also outlined some details related to chip development. The Phase I chip, already developed, is being used for testing and development of network components. Although not disclosed in the fil-

ing, it's known that Infineon Technologies is one if not the only supplier of the Phase I chip.

A Phase II ASIC chip will be required for the final version of DCAS. Development on that chipset is underway, with completion expected in Q3 2007. It's also expected that the cable industry will seek multiple sources for the Phase II chips, so that they don't fall into a locked position as they did with S-A and Motorola.

From there, completion of the network components for the DCAS architecture are expected by Q4, 2007, with testing of retail and leased devices by Q1 2008.

The filing acknowledged that "considerable work" lay ahead before a commercially viable DCAS solution is ready. However, the filing stressed that operators serving 85 percent of the cable subs in the U.S. are committed to implementing DCAS for their own devices as well as those sold via retail.

In addition to the filing, the cable industry also followed up with its latest demonstration of the technology. The demo showed an S-A set-top using DCAS to op-

erate on a Motorola Digicipher network. A Motorola box was then shown to use DCAS on a PowerKEY-based network. Samsung also showed off a set-top tagged for retail that loaded up a CA system from NDS. This followed a separate demo in July 2005, which teamed S-A, Motorola and NagraVision, another CA vendor.

Another element of DCAS that is important but does not get mentioned as much is the DOCSIS Set-top Gateway (DSG) platform. DSG, a CableLabs specification, enlists in-band DOCSIS (rather than proprietary out-of-band signaling) to deliver information to the set-top box. This information can include electronic program guide data, streaming media, or in the case of DCAS, the keys required to authorize service.

Open up

Although Comcast and Motorola have formed a joint venture that will result in "next-generation" CA technologies based on Mediagipher, one goal of the DCAS project is to open up the network to other CA vendors. According to sources, the



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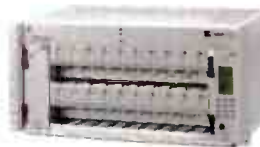
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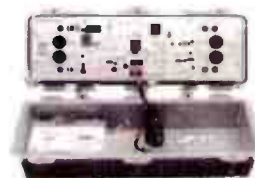
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ONWARD, DCAS

Comcast-Motorola J.V. is presently seeking a CEO and is in the process of interviewing prospects.

"No specific CA is initially included in the Host device," the report notes. The "host" refers to the digital set-top or television. "When the set-top or retail Host connects to a network with DCAS, that network's CA client is securely downloaded to the customer device."

Because it's "removable" in the sense that it can be swapped out like the existing

CableCARD approach, the downloadable version is also designed to support a retail model, and ensure that the devices will operate on all manner of digital cable networks in the United States. "When the device is moved to a different network, the special chip downloads the new CA," notes the report. DCAS "is likely to facilitate the development of a competitive navigation device market," it adds.

Unlike today's deployed CableCARD platform (the module and hosts), which

supports only unidirectional services, DCAS should support two-way digital cable services right off the bat, meaning the television or set-top will be able to handle premium services, video-on-demand, and interactive program guides.

"From the perspective of the manufacturers of host devices that can be sold at retail, DCAS eliminates the need for a CableCARD interface and the logistics of obtaining and installing a CableCARD," the report explains.

The cable industry is expected to file follow up DCAS comments on February 6, 2006.

Too much?

Despite the results DCAS is shooting for, the project isn't without its critics. Some on the CA field wonder whether the cable industry is biting off more than it can chew.

"The document made it sound more mature than what I expect it is," notes one industry observer close to DCAS developments. "There's still a lot of grunt work that needs to be done," including business work, setting up companies, hiring staff, setting up processes, and, of course, the building of the keying facility itself. "Conditional access can be a management nightmare. [The cable industry] is exchanging highly confidential information that [CA] companies usually take inside."

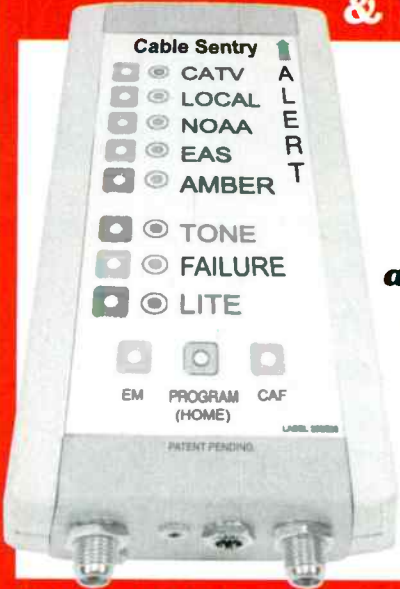
But that hasn't stopped some key companies in the consumer electronics field from stepping up in support of the DCAS project.

On the date of the filing, CableLabs announced Samsung Electronics as the first to sign on the dotted line for a DCAS license. In early January, LG Electronics followed up as the second.

In concert with that, LG paired up with Comcast and NagraVision at the Consumer Electronics Show to conduct what they called the "first public demonstration" of DCAS.

In an earlier interview, Jud Cary, the deputy general counsel at CableLabs, noted that the DCAS agreement is similar to the CableCARD Host Interface Licensing Agreement (CHILA), but that it also accounted for the newer downloadable technology. ■

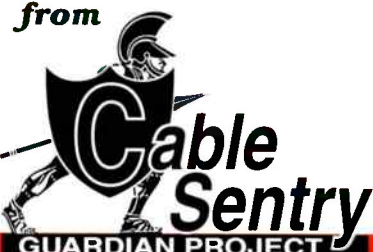
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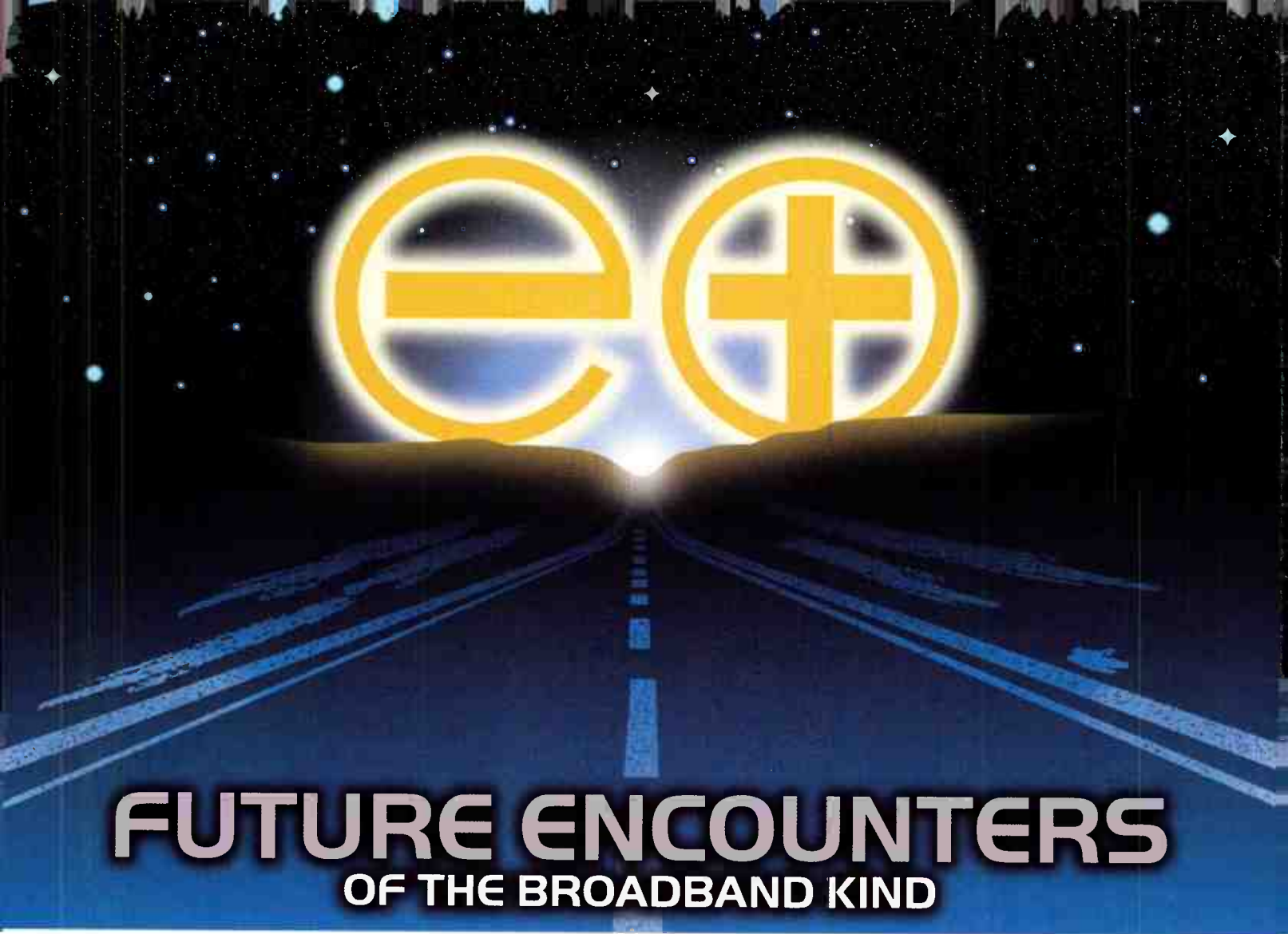
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FUTURE ENCOUNTERS OF THE BROADBAND KIND

*More storage, bandwidth and (lots more) wireless
convergence is on cable's horizon*

By Jeff Baumgartner, Editor-in-Chief; and Leslie Ellis, Contributing Editor

More than 1,000 engineers descended on Tampa, Fla. last month to witness the Society of Cable Telecommunications Engineers' annual five-year look at the technical horizon.

The sold-out 2006 Conference on Emerging Technologies covered the technologies that cable might consider friend or foe (wireless and IPTV), as well as those that will help operators free up precious bandwidth.

Futurist Carroll: Be more agile

But who better to kick off a show about

the future than a futurist?

If part of figuring out the technology future is interpreting consumer shifts, then we should be watching for the "change averse" baby boomers, who just want technology to *work*.

That's according to keynoter Jim Carroll, the Canadian technology futurist.

"Emerging into purchasing power, and into your customer base, is this generation who thinks differently—is wired differently," Carroll told attendees. And that generation is far more demanding. "They'll expect far more of you, will be constantly pushing you, and will have far less loyalty to you as a brand," he cautioned.

When planning for the future, cable's biggest challenge is "re-skilling," Carroll said. "You know plant—you've been doing it for 20, 30 years. All of a sudden, you're hit with VoIP, codec issues, issues of packet latency—which means it's critical to re-skill the folks who are instrumental in your architectures."

As for the juicy stuff—predictions—Carroll was ready. For starters, with Americans taking 80 billion digital photographs a year, and user-generated video a natural next step, the big numbers will require even more weird prefixes. "We'll be talking about zetabits and yottabits" in 2010, he said.

Plus, consumers will have massive levels of bandwidth, and content choice. That means cable must distinguish itself in customer care, and in QoS. A self-described early adopter when it comes to technology—Carroll's massively networked home contains a 4.5 terabyte server attached to broadband and digital video spigots from Rogers Cable—he urged cable to befriend power users, not penalize them. “The music industry went to war with its customers. Do you really want to go there?”

Bottom line for cable: Agility is the end game. “You must have a plan for short-term longevity—innovate with fluidity, be flexible in design,” Carroll said. “Because who knows what can come next?”

More storage, more bandwidth

On the age-old question of finding the right balance between storage capacity and bandwidth, one thing came through loud and clear (again) this year: The answer is just “more.”

Joe Matarese, CTO of C-COR's Global Strategies division, reported steep price declines in both solid state and disk drive storage—DRAM alone went from \$100 per megabyte, in 1991, to less than a dime per megabyte in 2003. Flash memory will follow a similar path; hard disk drive storage is on the steepest slope.

How much storage is ahead? By 2010, watch for the high-end computer to come stocked with 60 empty terabytes of hard disk storage.

It's probably good that all that storage is coming. It looks like we're going to need it. On a worldwide basis, we humans stored more than 5 exabytes of information on print, film, magnetic and optical storage in 2002 alone, according to the University of California/Berkeley's “How Much Information? 2003” study, which Matarese cited.

(Big number refresher: An exabyte is 1,024 petabytes; a petabyte is 1,024 terabytes; and a terabyte is 1,000 Gigabytes.)

And we're going to need big bandwidth even more: According to the same study, 18 exabytes of information moved over electronic channels in 2002—more than three times that which was stored. Keyword: More.

The 2010 network

Getting more bandwidth-hungry services into a narrowcast environment is high on the list of Time Warner Cable's interests, and that means moving more deeply into switched digital, noted John Carlucci, the MSO's chief network architect.

“One of the best examples (of increasing available spectrum) is switched digital, which takes advantage of the IP switching fabric, and our QAMs, to only deliver services to nodes in which those services are being used,” Carlucci said. “It means we can use our pipes more efficiently.”

Carlucci's list of attributes for the cable network in 2010: Diverse, vast, and converged. Capacity improvements, like switched digital, advanced statmuxing, and using H.264 encoding and transcoding, will pave the way for content expansion, and new delivery endpoints, he said.

Adam Tom, president and CEO of RGB Networks, said his view of the cable network in 2010 is one that is fully switched, and outfitted for everything on-demand. Advanced statmuxing and compression will be the norm for high-bandwidth services, as will channel bonding. Just applying advanced statmuxing to on-demand content encoded at a constant bit rate (CBR), Tom said, could yield a 40 percent bandwidth savings.

Getting video over the DOCSIS channel remains a big focus at Cisco Systems, which used ET to create another new acronym on the matter: V-DOC, for “Video DOCSIS.”

Harsh Parandekar, a Cisco software development manager, defined “V-DOC” as “video delivery over DOCSIS in the HFC plant—a converged end-to-end IP solution.”

Getting there isn't without its challenges, Parandekar and others at ET noted. The cost of DOCSIS ports on existing CMTS gear is high, because operators currently “get” four upstream ports when they want only to add one downstream port. “It isn't as commoditized as QAMs.”

Another key problem: Multicast techniques aren't yet supported in gear based on DOCSIS 1.1 and 2.0.

Moving to a modular CMTS (M-CMTS) environment will ease the cost burdens, Parandekar said, in the neighborhood of

“10 times the bandwidth at one tenth the cost.” Similarly, DOCSIS 3.0 contains hooks to resolve the multicast dearth.

Ultimately, Parandekar said, the decision to shift to video-over-DOCSIS depends on your level of belief in IP network proliferation. “If you accept that IP is the emerging protocol of choice for communications, including video, then V-DOC is a practical solution,” he concluded.

Sizing up telco TV

Finally: Some useable, articulate information about how telco video stacks up, relative to cable video. The goods came from Nimrod Ben-Natan, a VP at Harmonic (which was providing video gear to Verizon, through a relationship with Tellabs—so we're thinking they should know).

So here it is: Three things, unique to telco-delivered video-over-IP.

One: The much-vaunted fast channel change, which, when demonstrated during Ben-Natan's presentation, looked as fast as it used to be, back when the F-connector plugged into the back of the TV set. How fast is fast? Less than 200 milliseconds per channel change.

Two: Aggressive use of tunerless picture-in-picture, where three or more smaller, lower-resolution (200 kbps) video windows appear alongside the main TV channel, to display, say, additional camera angles on a sporting event, or a mosaic of simultaneously airing games.

Three: Targeted advertising. Because the telco network is inherently point-to-point, ads could be spliced into a unicast stream for specific homes, or groups of homes, he said.

Telco video isn't without challenges, though, Ben-Natan said—notably bandwidth. Supporting a home with two HD sets, each eating up 6 Mbps, removes more than half of the available bandwidth on a 20 Mbps connection—the current deployable max for advanced DSL gear.

Getting to know the ‘residential node’

Back in the RFI days of the NGNA project (circa 2004), there was much discussion of the VNIU, or Video Network Interface Unit. The VNIU, as it was described then, would be affixed to the side

Congratulations to Comcast's John Leddy.

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Building a network is a lot like building a bridge. It is an end-to-end proposition, but it begins with innovation. John Leddy, Vice President of Network and Transport Engineering at Comcast, is an innovator. This award honors his leadership in developing new and innovative ways to offer IP-based video and data services to Comcast subscribers, as well as for the transformation of his engineering organization into a nationally-focused team able to offer any service seamlessly across Comcast's Cisco Powered converged infrastructure.

Great work, John.





Congratulations to Mike Coral of Time Warner Cable

C-COR sponsors the annual Star of Integrity Award to honor the achievements of an SCTE member in advancing next-generation On Demand networks. This year's winner, Mike Coral, Director of Network Operations, South Carolina Division, is being recognized for his leadership in placing Time Warner Cable in the forefront of deploying advanced services using new technologies and operational solutions. The result is a high quality subscriber experience with convenience, value and choice.

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World Radio History

of a customer's home to handle the digital-to-analog conversion for every outlet in the home. Among other things, this would eliminate the need for individual set-tops at every coax outlet.

Fast-forward to today, and we're starting to hear more about a similar device, but under a different name: the residential node.

Describing this concept further was WeiMin Zhang, the chief technology officer of BroadLogic Network Technologies. The residential node, he explained, is in essence a gateway device that can be centrally located inside or outside the house. Wherever it ends up, it will create a "trans-

lation point" between the coax plant and the in-home coax network. Even if the content being sent down the plant is all or mostly digital, TVs (especially those without digital set-tops) in homes with a residential node will still see those signals as analog. Zhang said such a device will greatly help operators push the transition to digital without leaving analog customers in the dust. And that's not a small group to ignore, as 60 percent to 70 percent of cable homes are still using analog-only services.

Waxing wireless

Another hot topic at ET was wireless—as

in leveraging wireless to extend the cable plant and to usher in a range of mobile data, voice and video services.

Although WiMAX tends to grab most of the headlines when it comes to high-speed wireless technologies, another, 802.11n, should also be given heavy consideration as operators decide how wireless technology will hook into their traditional HFC networks, said Mike Rude, director of technical marketing at Metalink.

MIMO (multiple input/multiple output) technology is the "cornerstone" of 802.11n, Rude explained. MIMO sends multiple independent signals on the same

ET recognizes '06 award winners

Brown, Coral, Leddy and Johnson take home the hardware

Top engineers from Time Warner Cable and Comcast Cable, and an individual who was an influential voice for the cable industry for the better part of two decades, were honored during the annual ET Awards Luncheon.

The Polaris Award, the grandfather of the ET Awards, was given posthumously to Roger Brown, the former publisher and editorial director of CED magazine, who passed away in October after a courageous battle against cancer. Brown was key in helping to get the Polaris off the ground when it was first awarded to Tom Staniec in 1993.

Roger Brown is the 13th person to be honored with the Polaris, an award that recognizes those who have helped to "light the way" toward a deeper industry understanding of the strategic benefits of optical fiber. Roger's wife, Birdy, accepted the award on his behalf. "Roger would be very humbled to receive this award," she said.

CommScope, the sponsor of the Polaris, donated \$5,000 to the Roger Brown Family Fund. "The importance and significance of fiber's role and the subsequent creation of one of cable's greatest tools—HFC—were never lost on Roger," said Jim Hughes, CommScope's executive VP, global broadband sales & marketing.

Mike Coral, the director of network operations for Time Warner Cable-South Carolina, won the Star of Integrity Award, which recognizes an individual who was key to the introduction of advanced broadband services. C-COR



Brown



Coral



Leddy



Johnson

Inc. sponsors the award.

Coral, who joined TWC in the early 1990s and now runs headend and network operations, has spearheaded a centralized network for the operator's S.C. division, streamlining and paving the way for everything from digital cable, to VOD, high-definition and even caller ID. He also directed the launch of "Compass," a TV-based interactive services portal that supports applications such as Start Over, a new service that allows viewers to restart programs in progress.

Taking home the IP Innovator Award (sponsored by Cisco Systems) was John Leddy, VP of network and transport engineering for Comcast Cable. Leddy was recognized for his important role with the MSO's Regional Area Network (RAN), a cost-cutting platform that gives Comcast the ability to carry voice, video and data services over a common IP infrastructure. The work included the development of integrated optics for IP routers populating the network.

At the show, SCTE also formally recognized D. Quincy Johnson as its "Young Engineer of the Year," an award sponsored by SCTE, Multichannel News and Scientific Atlanta. Johnson, the director of technical operations for Turner Broadcasting System Inc.'s Network Operations Division, was, among his other accomplishments, recognized for leading the design of a facility in South America for an initial 12-channel network origination and distribution system for Turner's networks for the region.

frequency via different antennas. Similar in approach to DOCSIS 3.0, 802.11n also enlists channel bonding techniques when applied to the 5 GHz spectrum.

802.11n, a wireless platform whose performance roadmap could hit 600 Mbps, is still in the standards process, thanks to squabbling and other delays.

Still, he called on cable operators to consider integrating 802.11n into their own modems, set-tops and multimedia terminal adapters to facilitate the networking of bandwidth-intensive applications such as HDTV. By the same token, the technology will also enable others to bypass the operator and take services directly to the customer. 802.11n "will show up in cable homes with or without an invitation," Rude said. "Make sure your devices have this interface on them."

802.11n is also a technology that will support the development of wireless mesh networks, a subject covered by Bob Scott, director of wireless networking for

Scientific-Atlanta, which is approaching the wireless market in partnership with Tropos Networks. Although adding wireless capabilities to the cable plant is the logical next step in the network's evolution, adding wireless for the sake of adding wireless is not how it should be viewed, he said.

"It finally hit us that we were looking at it the wrong way. Consumers don't care about wireless; they care about mobility," Scott said.

Although WiFi, 3G and WiMAX are hot topics, none of these solutions solve all the problems. "There's no one size fits all," Scott explained. "But [wireless mesh] is a great technology for cable," he noted.

Traver: Compete for entertainment dollars

As portable devices, podcasts and "over-the-top" services proliferate, the cable industry must do all in its power to maintain and grow its share of the consumer entertainment dollar, said Comcast

Media Center SVP and COO Gary Traver, the keynoter for the final day of ET.

He warned, however, that the industry must stay wary of passing technology fads and "separate the hype and reality" before determining which ones will have a long-lasting impact on the bottom line.

"Sometimes in the early stages, we don't know what will be a fad and what will have the sustainable business models. But one of the things that we do know is that on-demand content consumption is at the core."

Traver also was critical of the "triple-play" and "quad-play" verbiage. With service convergence on the horizon, operators should instead think of it as an "integrated single play" that should simplify the way consumers use technologies and services.

"Winning the battle for the media customers of the year 2010 will come down to who does a better job of serving the customer's need for convenience, choice and relevance," he said. ■



Motorola is proud to honor the following award recipients:

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IP Innovator Award: John Leddy, VP of Network and Transport Engineering, Comcast Cable Communications

Star of Integrity Award: Mike Coral, Director of Network Operations, Time Warner Cable-South Carolina

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NVR: Delivering the goods

Quantifying the technical aspects of implementing NVR

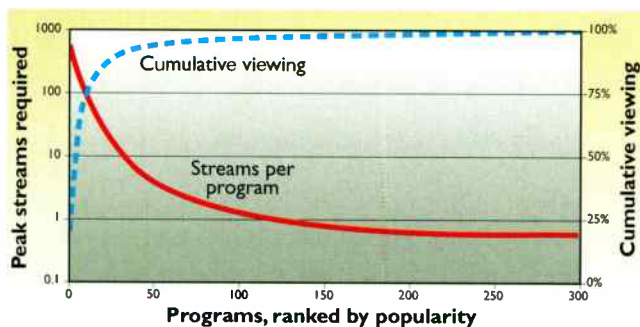


Figure 1: Trick-play-delayed demand curve for NVR example.

By David Large, President,
David Large Consultants

People who use personal video recorders (PVRs) routinely swear never to go back to the “old way” of viewing television on a fixed, uncontrollable schedule. PVRs allow both recording of programs for later viewing and “trick-play” functionality (pause, stop, rewind) when viewing live programming.

Many cable operators now offer PVR-equipped converters to their subscribers, but have no way to upgrade the millions of already-deployed boxes. This has led to consideration of a centralized version of PVR technology known as networked personal video recorders (nPVR) or, more simply, networked video recorders (NVR) for several reasons:

- Storage capacity is less expensive to buy and service in large server complexes than in individual set-top boxes.
- NVR is compatible with existing two-way converters.
- Capacity can be upgraded easily.
- One recording can be accessed by many users.

This article will quantify some of the issues in implementing NVR, with the caveat that there is little industry experience

with shared PVR servers and, thus, the assumptions presented here can only be regarded as preliminary.

Defining the service

While there are variations, there are basically three implementation options:

- **Record all:** Record all linear

programming delivered over the network, and retain for some fixed time period. The advantage for the customer is that no advance action is required to be able to access prior programming. Disadvantages include storage space that is wasted recording material that is never accessed.

- **Hosted personal space:** Allocate private storage space to each subscriber and provide the same user interface as for a set-top-based PVR. It has been suggested that this model may be easiest to defend legally under the Copyright Act¹. This model loses the efficiency of shared storage, however—no matter how many subscribers trigger recording of a hit show, it must be copied to each of their allocated spaces.

- **Shared recording on demand:** Retain one shared-access copy of each program that at least one viewer “triggers” by either selecting “record” or using some trick-play function. This is similar to a new service announced by Time Warner Cable:

Later this year, the South Carolina division also plans to roll out “Start Over”—a new time-shifted video-on-demand service which will allow subscribers with digital set-tops to watch any program from the beginning of the show so long as they access the feature before the scheduled program ends.²

Streams required

Assuming full PVR functionality, the required streams to support the NVR service can be estimated using the methodology in Table 1.

The required number of channels will increase with the shift to high-definition, but can be reduced by reducing the service group size, by utilizing more efficient multiplexing, or by utilizing more efficient encoding (e.g. MPEG-4). Experience will determine whether these estimates are reasonable. Sharing bandwidth and modulators with an existing VOD service will also reduce peak stream usage risk.

Storage required

The amount of required storage depends on the system model:

Record all. Continuously recording 300 linear program streams in MPEG-2 format, at a per-program data rate of 4 Mbps (including overhead, metadata and trick-play files) requires 1.8 gigabytes (GB)/hour/stream, for a total of 390 terabytes (TB), assuming a 30-day average retention is provided.

Hosted personal space. An 800,000-home system, with the assumed penetration numbers, will have 212,800 digital video subscribers. Allocating subscribers, on average, 7.5 hours of recording capacity, plus a 45-minute cushion for live programming trick play functions, requires 14.85 GB/subscriber, or a total of 3,160 TB—over eight times as much as for the record all model.

Shared recording on demand. Required capacity is a function of how many programs get recorded. Assume the relative popularity among 300 choices shown in Figure 1, in which the top three to four share 50 percent of the viewers, the top 28 share 90 percent of viewers, while the least

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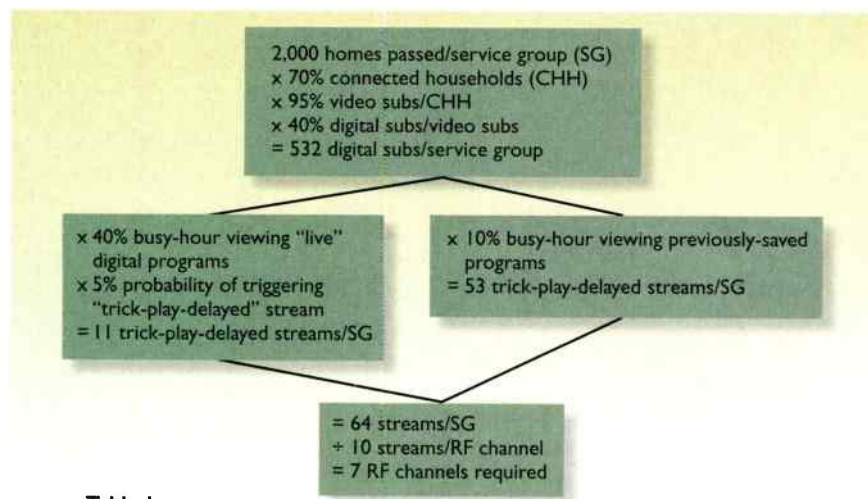


Table 1.

popular has a viewership of about 1/1,000th that of the most popular.

The following calculation illustrates one method of estimating the number of programs which will be stored for later viewing. For each program on each channel, calculate:

- 212,800 digital subs
- x % viewing "live" digital programs during timeslot
- x program's audience share
- = # of live views of program
- x 1% (% of views from previous storage)
- = probable total views from storage
- If > 0.5 (better than 50% chance of delayed view), save.

The percentage of subs who are actively viewing live programming, and the audience share of each program, can be derived from data published by program ratings services. Assuming the relative popularities shown in Figure 1, at peak viewing hours, 68 of the 300 programs would be saved. If we arbitrarily assume that average television viewing activity is one quarter of peak-hour viewing (based on studies showing that the television is viewed about six hours/day in the average household), on average, 33 programs will be recorded. Based on 45-minute average program length (a compromise among half-hour and one-hour network programs and a lesser number of longer features), 1,056 new programs would be stored daily. With an average persistence of 30 days, the total number of stored programs would be 31,680,

requiring 43 TB of storage.

Additionally, all programs will be recorded automatically to support trick-play modes. Programs for which no trick-play-delayed stream is triggered may be deleted upon completion of the live program, while the remainder (if not stored for later viewing) can be deleted as soon as the last customer completes viewing of the delayed streams. Assuming the average retention time is two hours, the total storage capacity required to store these additional programs is 961 GB. Thus, the total required storage to support the shared recording on demand model is approximately 44 TB—11 percent of that required to provide the same functionality as the record all model, and just 1.4 percent of that required for Hosted Personal Space.

Based on its advantages, the remainder of this analysis will be based on the shared recording model.

Optimizing the type of storage

If viewership of all programs previously stored were added to Figure 1, the curve would extend far to the right, with simultaneous use of the oldest programs continuing to drop. No single storage and streaming technology is optimum across this wide range of usage. Current technology choices include:

- RAM, at about \$375/storage hour, but very high stream generation capability.
- 15,000 RPM Fast SCSI drives, at \$9-\$13 per hour, can generate 90 streams.

- 10,000 RPM Slow SCSI drives, at \$5-\$7 per hour, can generate 70 streams.

- 7,200 RPM SATA drives, at \$1-\$3 per hour, can generate 40 streams.

As illustrated in Figure 2, RAM is best to support a high number of simultaneous accesses to a few assets; SATA can store a lot of assets where simultaneous usage is quite low, while SCSI disks are optimum at intermediate usage rates.

Total cost of ownership (TCO) is more useful for comparing storage technologies and includes purchase cost, lifetime, chassis costs, service, and powering. Yearly TCO can be as little as 10 percent of purchase cost (RAM) or over 60 percent (SATA disks).

Server configuration is more complicated, however, than simply choosing an optimum set of storage/streaming devices. In one manufacturer's servers, for instance, disks are arranged in redundant "volumes" of six-to-seven drives whose storage capability is $n-1$ (and streaming capacity is n) times the capacity of a single drive, where "n" is the number of drives.

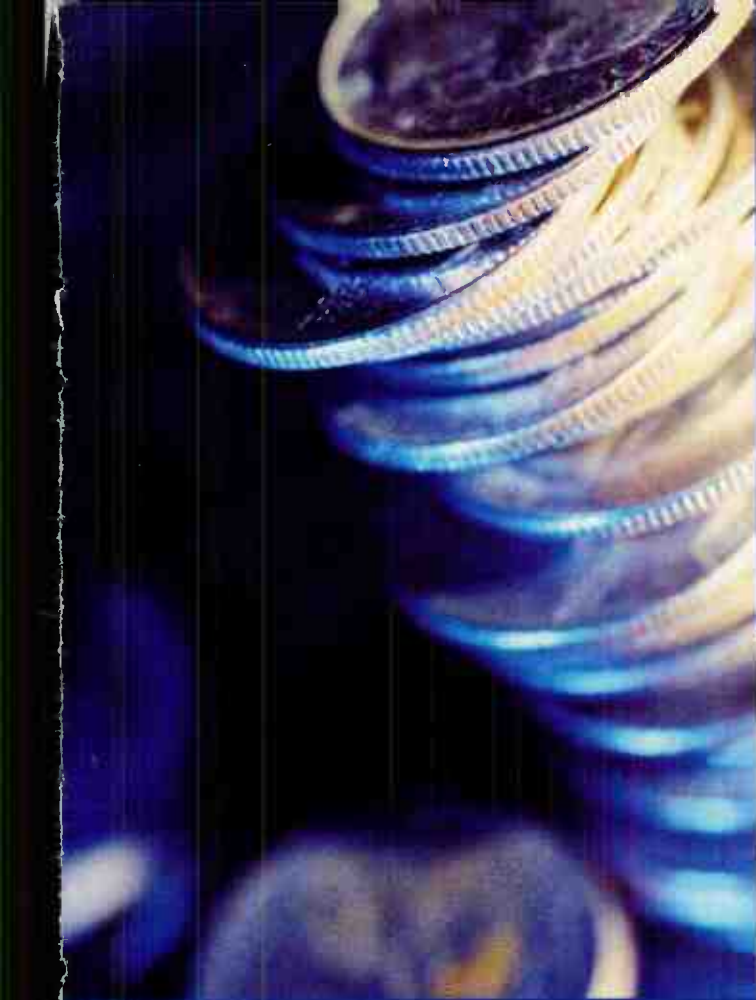
Each server may include any combination of RAM and multiple volumes of disk drives. Each disk volume will contain a set of identical disk drives; however, not all volumes in a server need comprise the same drive type. Each stored asset is spread across all drives of a given type in a server, with the advantage that the total streaming capability of the linked volumes can be allocated among the assets as required.

Finally, each physical server is limited by the capacity of its external interface ports. Each Gigabit Ethernet (GbE) port, for example, can transport up to 252 SDTV 3.75-Mbps streams.

Excess streaming capacity is an essential. While Figure 1 may be perfectly accurate as a generic average, in fact, certain programs will occasionally, and unpredictably, draw more viewers. Thus, the server must be configured to provide reserve streaming capacity.

A typical configuration to meet the requirements of our example system is as follows:

- Server 1: 8 GB RAM
- Server 2: 16 GB RAM and two volumes of 73 GB fast-SCSI disks



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RAM streaming from Server 1 handles just the top five trick-play-delayed assets which, per Figure 1, require about 2,300 streams total. The RAM in Server 2 handles the next 11 assets (a little over 1,200 streams total), while the two volumes of SCSI disks store the next 284 assets which require a total of 737 streams. Thus, between them, the first two servers handle all the trick-play-delayed streams, while the remaining servers hold content for later viewing. The total storage is just under 46 TB (plus redundancy), including a moderate expansion provision. Ten GbE interfaces are required to deal with the very high streams and assets among the most popular programs in the first servers, and with total streaming from the large number of assets in the remaining servers. Although the configuration provides excess stream capacity, a slow-SCSI volume could be added to support higher-than-expected simultaneous usage of the most popular of the assets stored for later viewing.

Cost-effectiveness

The yearly cost to provide the required storage and streaming capability is shown in Table 2.

The total yearly cost for server storage to support this application is \$30,498 = \$0.14/year/digital subscriber—far less than the cost of providing and servicing equivalent functionality in each set-top box.

These costs are only for illustration. The price of both RAM and disk drives will continue to fall; disk storage and streaming capacities will rise; faster interfaces will

become available; and server platforms will allow more efficient arrangements. Use of standard off-the-shelf servers allows operators to optimize configurations and take advantage of price declines driven by the total market for these devices.

Although this example envisioned a centralized server system, operators may choose to distribute some servers to smaller hubs in

order to lower traffic volume on interconnecting links. The analysis of a distributed system is similar, with the added complexity of deciding when, and if, to move low-activity assets to a centralized storage bank.

Assets	Total peak streams	Qty.	Technology Type	TCO/year	Yearly capacity cost: per stream	Yearly capacity cost: per asset
16	3,519	24 GB	RAM	\$450	\$0.13	\$28.12
284	737	12	73-GB Fast SCSI	\$1,536	\$2.08	\$5.41
31,680	21,280	216	250-GB SATA	\$28,512	\$1.34	\$0.90

Table 2.

order to lower traffic volume on interconnecting links. The analysis of a distributed system is similar, with the added complexity of deciding when, and if, to move low-activity assets to a centralized storage bank.

Managing the content

Configuring the NVR server system requires only knowing the shape of the demand curve and size and general behavior of the customer base. Much harder to manage is placing individual programs in accordance with their time-varying popularity. In an NVR application, the number of recording “triggers” can be used to determine initial popularity, but with thousands of new programs entering the system daily and tens of thousands in storage, it is virtually impossible to track each one through its lifetime in the server system. What is needed is an automatic content placement system that shifts assets (in both location and storage type) in accordance with the recent history of their usage.

is outlined graphically in Figure 3.

Summary

In summary, NVR is far less expensive than replacing existing, deployed “thin client” digital set-top boxes. Of the possible architectures, making a single, shared copy of only those programs which are specifically requested by customers is the most cost-efficient approach and can provide the same functionality as offered in stand-alone PVR devices.

The most efficient server architectures for this application will use a variety of RAM and disk-based storage and streaming, based on off-the-shelf server platforms. Critically, an automatic, intelligent application for automatically managing the large volumes of content is required. ■

End notes

1. “VOD ‘condos’ rekindle the nPVR,” Jeff Baumgartner, *CED* magazine (editorial), October 2005.

2. “ITV Comes to Carolina,” Steve Donohue, *Multichannel News*, June 13, 2005.

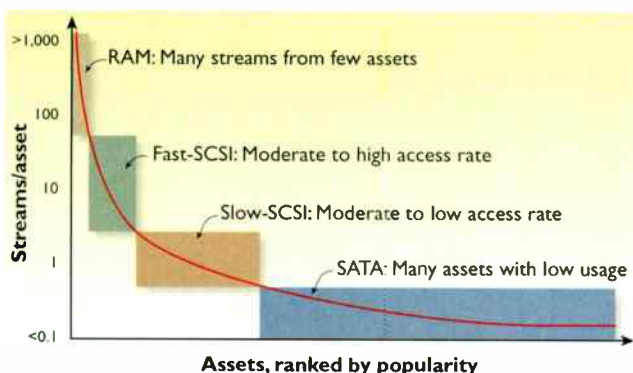


Figure 2: Matching technologies to demand.

The required asset management function will work with a master cluster controller. The controller maintains records of what content is where, how often it is accessed, and information on available storage devices. It also handles new content, placing it according to pre-determined

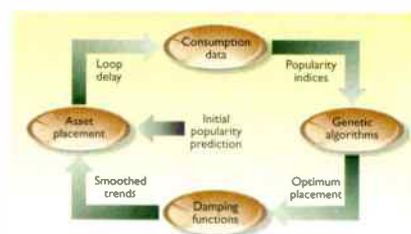


Figure 3: Optimizing content placement.

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Playing up the 'n-Play'

Customer-centric vs. network-centric thinking will help operators win

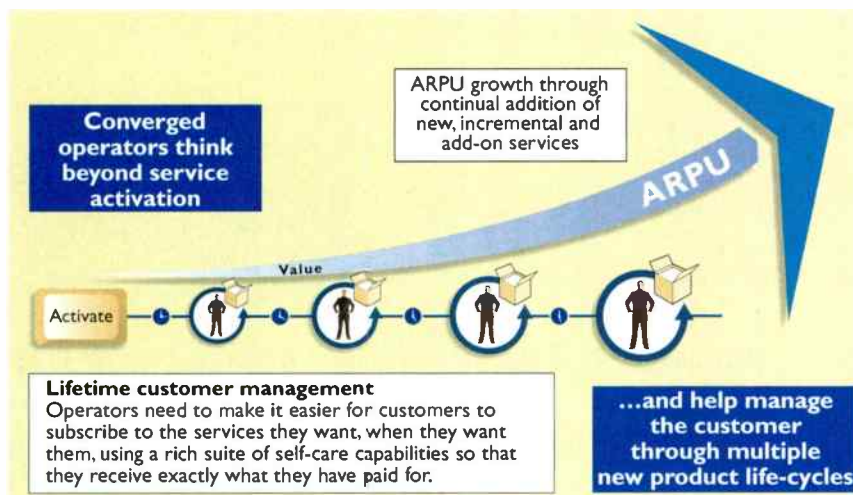


Figure 1: Increasing ARPU—Services need to be designed and created with the customer in mind.

By Christopher K. Huff,
Vice President of Americas Sales,
JacobsRimell Inc.

Cable MSOs and telecom service providers are scrambling to grow revenues and reduce churn by diversifying beyond their core services. However, leading with the conventional “triple play” approach of voice, data and video should be recognized as a purely operator-centric view, because customers view their service provider offerings from a different perspective.

Customers want a tailored portfolio of personalized services, ideally delivered in a mode that matches their current context on-demand. This customer-centric model requires a service provider to offer potentially thousands of unique permutations of their core services, a scenario better described as delivering “n-Play” services. As competition increases and users demand more innovative service bundles, n-Play will be the customer-centric service standard by which all providers will be judged.

The backdrop

Dramatic changes are reshaping the world of communications technology. The much-anticipated convergence of services may finally be nearing reality, enabled by technology and driven by the relentless pressure from new market entrants that bring innovation and differentiation, but do not need to build the access infrastructure.

The most striking area of convergence is between the telecommunications and media industries. We are now seeing media companies expanding their existing customer relationships, moving beyond their traditional boundaries into the service providers’ markets by offering voice and messaging services. Conversely, telecom operators are forging relationships with media companies in order to offer compelling content to their customers, thereby increasing the appeal of the core services. For example, the purchase of Skype by eBay for \$2.6 billion may mark the beginning of the Internet’s super brands, which includes the likes of Google, and the potential tie up between MSN and Yahoo! en-

tering the fray and further challenging cable and telecom traditional revenues.

Increasingly “commoditized” broadband access via cable, DSL, 3G and WiFi, coupled with far more reliable IP connectivity, has brought a wealth of new, cheaper, and compelling services to customers. Examples of this trend include voice and advanced call features, video (including live TV), sports clips, comedy, etc., and high-speed data services supporting games and business applications in and out of the home and for customers who are on the move.

Driven by this heightened accessibility and popularity, significant changes are taking place in the world of media and entertainment, further increasing the type and range of content being made available to consumers. Consumption of this content is taking place on an ever-growing range of fixed and portable devices, from HDTVs to iPods, PDAs to camera and video phones, network-friendly PS2s and Xboxes to interactive TV. For the access provider, this shift represents a major revenue and customer loyalty opportunity assuming the “right” content is available when the customer wants it, and in the format they want.

The trend toward a broader packaged set of services is answering a growing consumer need—that of better interoperability and integration. Consumers want to be able to view their digital pictures on their HDTVs, PCs and cell phones. They want to be able to use their MP3s not only on their iPods, but also on their home surround sound stereo systems. And they want to be able to continue playing their computer games online after they leave the house.

To fully exploit this business opportunity, cable and telecom service providers must be able to cater to every communi-

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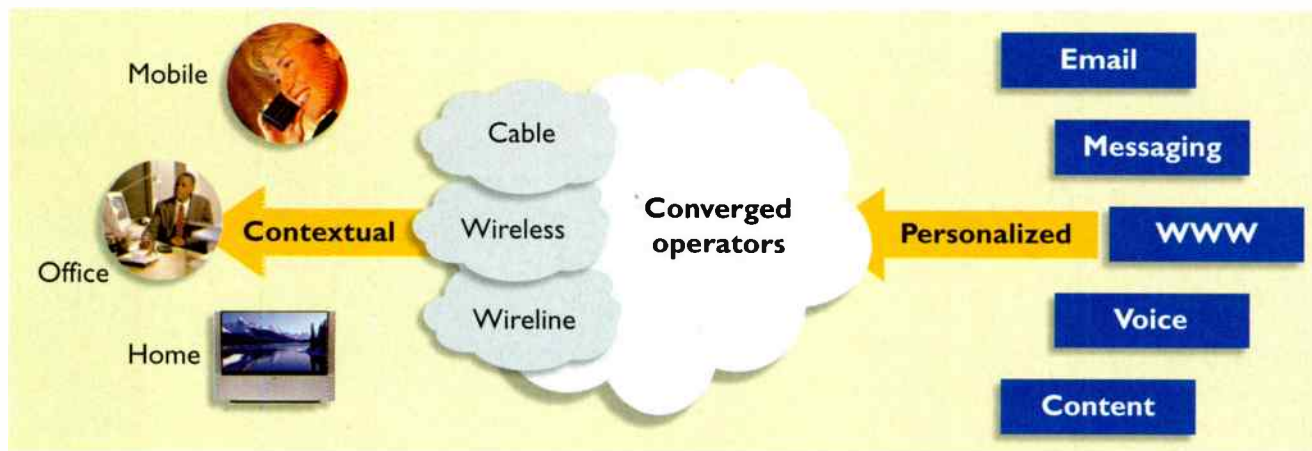


Figure 2: Convergence is increasing competition and commoditizing the transmission layer.

cations need of their individual customers. More importantly, they need to treat customers as individuals, not households, street addresses or telephone numbers. Carriers must strive to develop a strong branded relationship with individual subscribers and commercial customers by reliably delivering tailored services at a competitive price. The wireless operators have always had this advantage—you know when you call a cell phone number who you expect to answer the call, unlike the home or office phone number where any member of the family, or organization could potentially take the call.

In order to approach customers as individuals, cable and telecom MSOs need to rewrite the rulebook when it comes to their business models and dramatically improve both their agility and their responsiveness to ongoing market change.

Triple play

As cable and telecom service providers see their high-speed bandwidth and access connectivity become increasingly commoditized, they are responding by crossing over into new market segments. The first of these was data related services, which was relatively easy for both telecoms and cable MSOs to implement over their high-speed IP networks. Early service offerings here included Internet access, Web hosting, and e-mail services.

The current industry movement is toward the vaunted "triple play" offering—the provision of voice, video and data on a

single broadband connection. This service bundle is attractive to an operator because it provides an opportunity to dramatically increase ARPU, and at the same time, reduce customer churn by making the competitive offerings less attractive.

However, to continue to maintain competitiveness in the longer term, operators are ultimately going to have to offer ever-growing numbers of personalized services that are also subscriber context aware—that is, allow a customer access to and control of their services regardless of location or medium.

A new order for VoIP service often triggers up to 30 separate procedures across multiple systems...

Meeting this challenge will require operators to transform their existing service and operational support infrastructures, which are currently not flexible enough to meet the demands of true convergence.

Evolving architectures

At the core of this issue is the way that the networks of cable and telecom service providers have evolved over time. The progressive addition of new services has resulted in a stove-pipe organizational structure consisting of a stack of effectively disparate services delivered by disparate

groups within the operators' organizations. This phenomenon is at the root of many customer service and service management challenges, and limits operators' ability to adapt because the cost of adding and managing a new service can exceed new revenues and erode profits.

In the triple-play model, despite offering three distinct services under a single brand and ideally with a single bill, the management of these services on the provider side is often far from seamless. Each service is typically supported by a different operational support system (OSS) infrastructure which makes the service delivery process arduous, expensive and ripe for human error, delays and frustration.

When a customer wants to add a new service, or modify an existing one, it sets off a chain reaction of internal fulfillment steps that are typically far from efficient or customer-centric. A relevant example in today's market is a new order for VoIP service, which often triggers up to 30 separate procedures across multiple systems and, in most cases, cannot be completed in real time. The real goal here is to completely automate this process, allowing the customer to correctly self-provision the package they require the first time in real time. If achieved, this model delivers the "win-win" benefits of higher customer satisfaction and lower operator costs.

Another typical significant issue for operators using this traditional approach to operations is that as more services are added,

and more customers adopt them, it becomes increasingly difficult for the operator to maintain the service levels in terms of service fulfillment and customer satisfaction. This is primarily due to the complex "stove-piped" operational view, and not having all the data related to the customers in a common format in the same place.

Customer-oriented architecture

Leading operators have recently recognized that to solve this organizational challenge, both now and in the future, they must adopt a customer-oriented approach to the processes and structure of their business, and move away from the more common technology-oriented operational structure. Putting the customer and their needs at the core of all decision making will give operators the ability to respond far more quickly to trends and new demands, giving a dramatic increase in the appeal, reach and flexibility of their service offerings while at the same time lowering the ongoing capital expenditure and operational costs of their business.

This journey to customer-centricity can only succeed if operators' service fulfillment infrastructure can support this vision. If legacy platforms cannot deliver results, operators must consider newer, more flexible alternatives. With a customer-centric service fulfillment infrastructure, operators will have a cost-effective and practical way to create, price, implement and then manage massive volumes of value-added services on an effectively individual basis. They will be able to deliver new tailored services and bundles more efficiently, and will be able to simplify the provisioning and activation process.

n-Play

n-Play, as defined by the customers' view, is that the services offered need to be personalized and packaged according to the customers' own needs, and gives them the ability via self care to reconfigure and manage their own services to suit their changing needs.

Based on the "triple play," an n-Play service portfolio could include ring-tones and personalized VOD and/or music channels unique to each family member. Another

n-Play example is a teenager's desire to keep up with the latest music and TV series, as well as having their own play lists available and automatically updated based on their listening and viewing behavior.

If operators can implement a customer-centric vs. network-centric service delivery architecture, they will be in a much stronger position to take full advantage of converged IP services and be able to react far more efficiently to competitive opportunities and challenges. They can offer targeted premium service offerings such as shorter-life style services for major TV or music events or on-demand high bandwidth for gaming. By offering a compelling range of services that are branded, bundled, personalized, contextual, always-on, reliable, technology agnostic, device independent and attractively priced, cable and telecom service providers can fully capitalize on the revenue opportunity and cost

savings offered by converged IP services.

Conclusion

There is no doubt that seismic changes are reshaping the communications sector. Competition and technological innovation are forcing operators to retool their business processes and infrastructure to be more customer-centric.

In order to thrive in this new environment, cable and telecom service providers must deploy customer-centric service fulfillment platforms that can not only deliver triple-play services, but enable customers to design and self-procure personalized n-Play service portfolios. Operators that quickly recognize the limitations of their legacy delivery systems and move proactively to next-generation customer-centric service fulfillment platforms will establish a significant and sustainable competitive advantage in the emerging n-Play services market. ■

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EchoStar is coming to market this month with four new HD packages, starting with a 25 HD channel tier that sells for \$54.99/month.

EchoStar will also push ahead with more local HD fare in 2006, Ergen said.

Once consumers get a taste of HD, they want more and more, said Rainbow President & CEO Josh Sapan. Customer satisfaction of HD networks "ranks up there with breathing," he quipped.

WebTV 2.0

Thanks to faster speeds and broadband

service penetrations, the Internet is quickly attracting so-called "over-the-top" video services from all corners of the globe and from companies of all shapes and sizes. But when companies like Google and Yahoo! give it massive attention, it's definitely appearing like it's ready for primetime.

Google and Yahoo! shared the stage at the massive show at different times, but their message was similar: We're ready to enter the video age in a big way.

Google set plans in motion to open up a Web-based video service that will allow visitors to buy and rent a range of titles from studios and networks, including CBS. The Google Video Store will feature commercial-free primetime and library fare from CBS, including *CSI: Crime Scene*

Investigation, *Survivor*, and *The Amazing Race*, as well as *I Love Lucy*, *The Brady Bunch*, *My Three Sons*, and the *Star Trek Deep Space Nine* and *Voyager* series.

CBS hopes the move will attract eyeballs that are drawn more to PCs than to television screens.

Giving a nod to sports fans, Google Video will also serve up NBA games from the 2006 season (for a fee) as well as some archival footage from the league. Google said it will offer entire games for this season, including playoff games.

The service will also supply music videos from Sony BMG, independent flicks from Greencine.com, footage from ITN, Charlie Rose interviews, cartoons from Classic Media (*Felix the Cat* and *Rocky and Bullwinkle*, among them), and children's programming from Clearvue.

True to its "Store" name, the service will also sell titles from networks such as Here! TV, HDNet, SOFA Entertainment, Trinity Broadcasting Network, Wheels TV and Wilderness Film India Ltd.

The service will also tap the power of Google's search technologies, allowing users to sift through listings by category and title and other key words.

Because it is introducing yet another digital rights management platform to the table, Google said users will be able to download and watch "non-copy-protected" Google Video fare via the Apple iPod and Sony Playstation Portable.

In addition to network fare, the service will also support user-supplied content, a prime element of the beta version of the service that has been available for several months.

Yahoo!, meanwhile, said it is ready to bring video from the PC screen to the TV screen. Similar to a service already offered by TiVo Inc., Yahoo!'s entry, dubbed Go TV, will enable users to take content, including video and digital photos, from their PC or the Web and pipe it to a connected television. The service will also bring a range of consumer Internet applications such as integrated search to the television.

Yahoo! said it plans to launch the service "in the coming months" and will offer it as a "lightweight" client download. ■

Ciciora's corner

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

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be down, too, even if the telephone worked. That's not a fair assumption. I'm primed to test the cable television and cable modem next time the power goes. This will also help me judge cable-based VoIP versus plain old telephone service.

While the power was out, I also thought about the issue of emergency communications. There have been statements from Congress that the switch off of analog television is necessary to improve emergency communications. The experiences after 9/11 and the Hurricane Katrina disaster are cited. A little thought reveals that spectrum availability was not the issue, especially in the case of Katrina. The problem is a lack of coordination between emergency agencies. In both cases, they used different frequencies and different kinds of equipment. Vacating analog TV spectrum will not solve that problem.

I believe that vacating all of the analog TV broadcast spectrum destroys an opportunity for emergency communication to the public. Portable, inexpensive analog television receivers can be an effective way of communicating to the general public. Several problems arise when analog television broadcast is eliminated.

Most importantly, the digital signal is much less robust. In my recent experience, I was able to receive noisy analog signals with lots of multipath. While the signals weren't beautiful, they were completely intelligible. If these channels were providing emergency instructions, they would have communicated the messages to my handheld TV receiver. I'm afraid that digital signals would fail for at least two reasons. The technical reason is that the signal environment would not support ATSC signals to my portable. The economic reason is two-fold. It will be a very long time before I can buy a handheld digital TV with a four-inch LCD screen. The electronics are too expensive. The second reason is that the electronics are too power-hungry. Three or four AA cells won't last very long in a digital receiver, while an analog NTSC receiver will go a long time on its alkaline cells. And these small NTSC receivers are very cheap.

It would seem to me that it would be wise to have the PBS television stations retain their analog signals as they add their digital signals with the understanding that, in times of emergency, the analog signal would be used for emergency purposes.

new products

PRODUCT REVIEWS

Noise canceller

EAST SYRACUSE, N.Y.—Communications & Energy Corp. has announced a device [Model 3903 (Channel#)] which suppresses co-channel and other types of

off-air interference at cable TV head-

ends. The Model 3903 suppresses interference by phase cancellation. It is

placed in the downlead of a second antenna,

which acquires a sample of the inter-

ference. Phase and attenuation tuning dials allow the operator to change the phase and amplitude of the acquired interference sample, so that it cancels the original interference when tapped into the downlead of the cable TV headend antenna.

Any interference which occurs within the TV channel can be cancelled, including co-channel, wideband noise from faulty power lines and harmonics from RF transmitters. An FM band model is available for cancelling interference to an FM channel

from a stop adjacent FM channel.

The 3903 is available for channels 2-6 (54-108 MHz) and 7-13 (174-216 MHz). Connectors are type F (female) 75 ohm.

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Modulator/demodulator

BOXBOROUGH, Mass.—Artel Video Systems has released the DigiLink 1242 dual channel diplexer, a modulator/demodulator which simplifies audio connections to an analog video switch.

Housed in a 1 RU chassis, the DigiLink 1242 is a two-channel audio diplexer. Each channel modulates four baseband audio inputs and sums them into a video input, producing one video plus diplexed output. Completely compatible with the DigiLink 1240, it enables users of analog video switches to switch both audio and video simultaneously.

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Reference designs for DTVs, set-tops

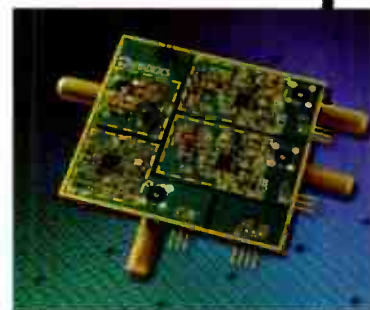
WARREN, N.J.—Anadigics Inc. has unveiled RF front-end reference designs for multi-tuner applications such as televi-

sions, set-top boxes, and digital video recorders (DVRs)/personal video recorders (PVRs).

The reference designs use the company's integrated tuners and active splitters on the same printed circuit board (PCB) to provide RF front-end solutions that enable manufacturers to develop products that maximize use of available bandwidth to provide clear video and high data throughput, according to the company.

The reference designs are optimized to provide maximum signal integrity, with low noise figures as well as low composite triple beat (CTB) and composite second order (CSO) distortion products. Reference design boards use Anadigics' integrated tuners such as the AIT1010 and AIT1021, the company's active splitters such as the APS3604, IF filters, and a reverse path diplexer.

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Anadigics' reference design



Communications & Energy Corp.'s phase canceller



Extreme Broadband's model IPA1001FIC amplifier

Retrofit amp

ENGLISHTOWN, N.J.—Extreme Broadband has introduced its new Infinity Premise Retrofit Amplifier Module (model IPA1001FIC) with cable-less F-Port Interface Connector (FIC) technology. This direct-connect module is designed to eliminate the use of the jumper cable when using traditional splitters, thus saving installation time and labor costs while improving system reliability, according to the company.

An estimated 30 to 60 percent of in-home service calls are related to the drop, caused by intermittent connections. By eliminating the jumper interface, fewer connections are necessary, thereby reducing in-home service calls and reducing the chances of common path distortion (CPD), according to Extreme Broadband.

The Infinity Premise System is a new line of broadband premise amplifiers and external splitter modules. All Infinity Premise modules feature the new FIC port, which allows a direct connection to the amplifier without the use of a jumper.

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With digital network installations in progress, video service providers are taking aim at new services. But what will set them apart, best the competition and create a great return on network investment?

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