

Communications **TECHNOLOGY**

PROFITABLE ENGINEERING FOR VOICE, VIDEO AND DATA VOL 24 NO 03 MARCH 2007

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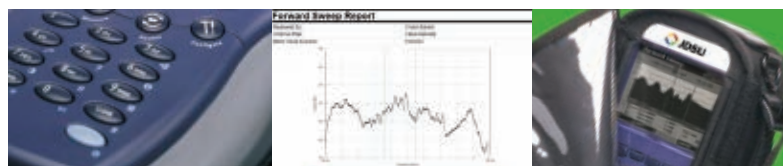
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Occam's Razor

Here's a multi-million dollar question: Will the cost of CMTS core functionality drop anywhere nearly as fast as demand for throughput is expected to rise?

Not likely. Thus the elegant—and nonproprietary—proposal from **Motorola** Data Networking Architect Michael Patrick to sidestep the expensive “hair-pin” turn that burgeoning volumes of IP traffic would otherwise need to take around the modular cable modem termination system (M-CMTS).

Patrick—and others—have been circulating this idea for months, but he formalized it in a paper prepared for this year's **SCTE** Conference on Emerging Technologies. At the same event, **Time Warner Cable** Senior Director of Video Systems Glen Hardin offered another clean-cut solution, namely: letting customers use their PCs as a way around the on-demand user-interface bottleneck.

There could be a trend at work here. Call it a move away from complexity and toward Occam's razor, the principle that all things being equal, the simplest solution is usually the best one.

Hardin and Patrick aren't alone in bracing for a lot more video. It's the premise of Bob Scheffler's timely discussion of King Content. (See page 26.)

And yet another connection in this issue with Patrick: His five-to-seven year projections presume a 750 homes-passed node. Nothing smaller. Is node segmentation reaching a point of diminishing returns? Maybe so. (See page 22.)

Finally, a reminder from Ken Eckenroth that minding the basics, in this case, measuring CLI, doesn't mean neglecting new technologies, such as global positioning systems. (See page 32.)

As for Eckenroth's question of rifle or shotgun, one more inside note: whereas I point my 50-year-old Remington Sportsman 58 toward moving targets, our Managing Editor Ron Hendrickson, formerly a U.S. Marine infantryman, aims his even older M1 at stationary six-inch X-rings 600 yards away.

Keep in mind, if you ever consider contributing to us, that our managing editor takes the notion of deadlines rather literally.

Jonathan Tombes

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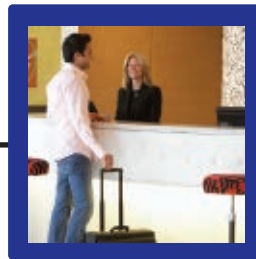
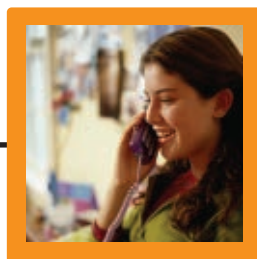
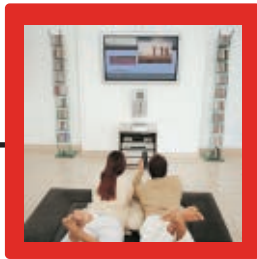
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Viva Cox's Vegas Hospitality Network

While every customer is an important customer, it's hard to imagine a more platinum-level customer than a guest at the **Wynn** or **Bellagio** hotels in Las Vegas. Customers in these lap-of-luxury environs expect the best, and the last thing hotel owners want is any sort of glitch to interrupt the stay of freewheeling guests.

All of which leads us, in a roundabout way, to a look behind the scenes of one of the primary service providers to these hotel and gaming establishments. **Cox's Hospitality Network** (HN) has been around since 1985, but Cox took control of it when it purchased **Prime Cable** in 1998. Over the past two years, the Hospitality Network and other commercial services have been rolled into **Cox Business Services** (CBS), with the Hospitality Network becoming a brand under CBS. "We have 16 of the 25 largest hotels in the world, and we're pretty proud of that," said John Fountain, vice president, technology, of CBS in Las Vegas. "We provide several video systems and data systems to the hotels."

Video, data services

CBS/HN serves up video and data services based on what a hotel wants to provide its guests and on its infrastructure. While newer hotels such as the Wynn can take advantage of IP infrastructure with Ethernet feeds to the rooms, others are provisioned in more traditional ways.

"We do analog over coax, digital over coax, which is QAM-based, and we do IP over Ethernet," Fountain said of the video services. "It depends on the infrastructure that a hotel has, but the majority of them don't have Ethernet running to all of the rooms.

"We basically run each hotel as a separate headend, so out of the 125,000-

plus rooms, there's a headend in each hotel that is custom built for that hotel. So we might have analog storage/analog delivery, or digital storage/digital delivery, depending on what the customer is asking for. There are a large variety of video networks that we put in each one."

Depending on the hotels' needs, vendors for video include **nStream**, **SeaChange, On Command** and **KoolConnect**. In the hotels where HN



Visit www.cable360.net for an interview with Cox CBS VP John Fountain.

is using IP, it's able to deliver 100 Mbps to each TV set in MPEG-2. The HD and digital streams are QAM-based.

"We only have a handful of hotels in IP," Fountain said. "Most of them are delivered either analog NTSC over coax, or they're delivered by QAMs."

On the data side, HN can deliver high-speed Internet over coax on DOCSIS 1.0, 1.1 and 2.0 modems. In some cases, it uses copper twisted-pair DSL as well as Ethernet with CAT-5 and CAT-6.

While HN uses some **Atrica** gear for its Ethernet services, Fountain said the hotels and headends primarily use **Cisco** SONET gear with point-to-point links between the hotels and the networks.

"One of the advantages we have in Las Vegas, because we're the local provider, is that we can bring a 100 Mbps pipe to a hotel," Fountain said. "At

the very edge of these hotels, there's a very large amount of transport available for the rooms. For example, if you're in one of our hotels with Ethernet, like the Bellagio or Wynn, you'll find that you get 10 to 20 Mbps out of your room. You just can't find that in most hotels."

Integrated billing

In most hotels and casinos where HN provides high-speed data, it also offers wireless overlays with Wi-Fi, making the Vegas Strip area one of the largest, if not the largest, areas in the world in Wi-Fi density because of the hotel deployments. Fountain estimated that HN provides wireless overlays for 50,000 to 60,000 rooms.

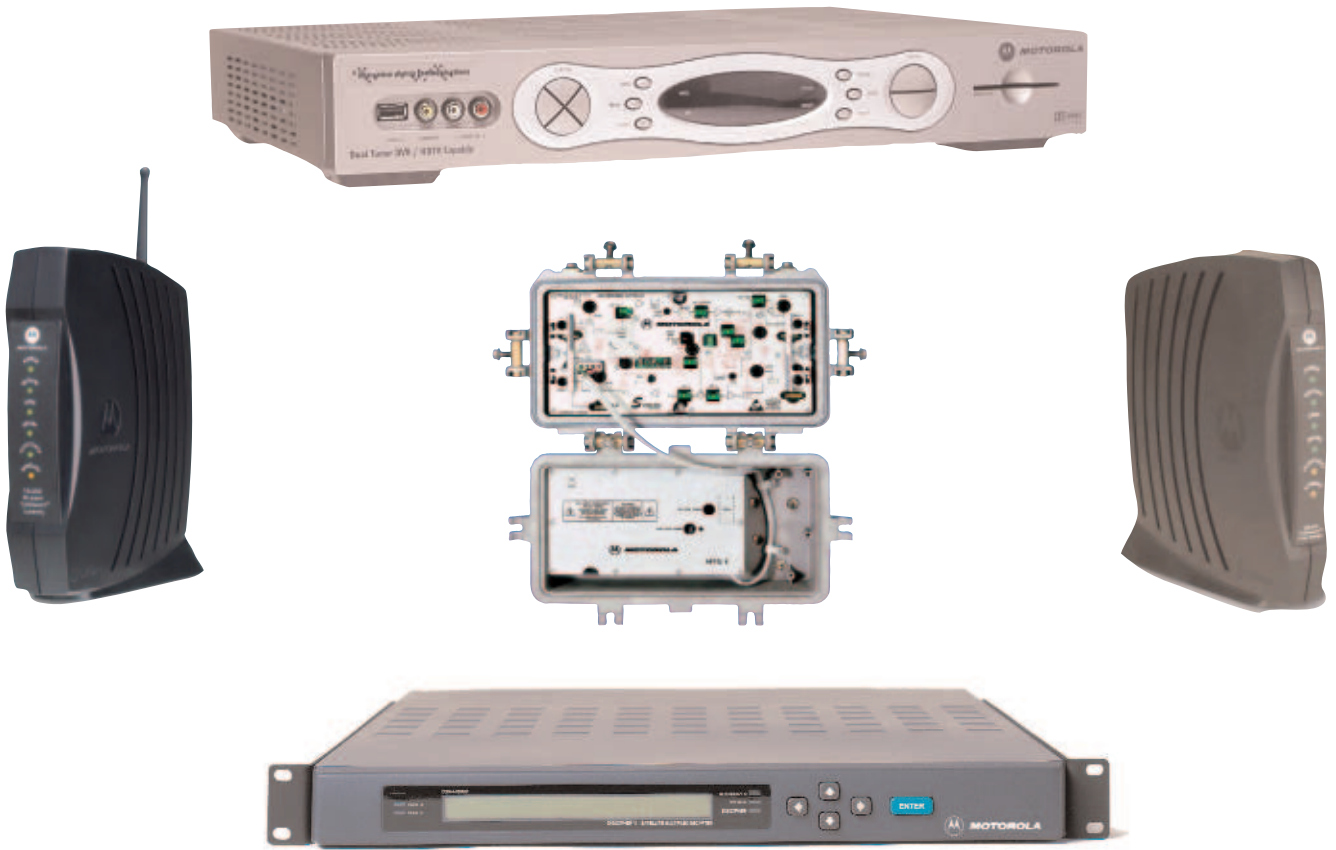
"We can integrate that (Wi-Fi) into the billing systems for the hardware," Fountain said. "In fact, one of the things we did that was kind of novel is when we first put wireless in, you could literally go to your TV to purchase a code and then use it to connect your laptop without having to use your credit card and then have it get billed to your room. It was a pretty novel solution because you hadn't seen that in wireless before. You used to have to use a credit card or get a code from the front desk."

HN has also integrated the billing for the video and data systems.

"If you're hardwired, we can tell where you are and put it (the billing) on your portfolio pretty easily," Fountain said.

Hotel minibars can also sit on HN's coaxial plant. Guest room minibars are outfitted with sensors that have the ability to detect when items are removed. If an item is removed for more than 30 seconds, a signal travels across network via the PMS (property management system) and registers on the guest folio as a purchased item. In other words, when a guest purchases an item, the hotel can track it using the connectivity that CBS provides to the hotel. [▶](#)

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Cable Keeps Winning the Battle of the Bundle

Expect cable operators to open up the gap this year when it comes to customers, bundled services and telco competitors.

According to a report by market research provider **Pike & Fisher**, cable companies are outperforming telephone carriers by a widening margin in the battle for household wallet-share, and that is likely to continue as both industries add advanced mobile features to their service bundles.

The fact that cable operators have already spent \$100 billion over the past decade on network upgrades to HFC architectures has allowed them to enjoy a competitive advantage over RBOCs during cable's deployments of VoIP vs. the video deployments of telcos.

The report also said marketing alliances between telephone carriers and satellite

video providers have failed to blunt cable's competitive edge, particularly as cable operators have rolled out digital phone service and begun wider discounting of triple



That's a bundle, all right

bundles of voice, video and high-speed Internet services. Both industries are now adding mobile services to those bundles, and cable may win that battle even though

the telephone carriers already have their own mobile networks, the Silver Spring, MD-based company said.

Cable companies are adding mobile services to their bundles through a joint venture with **Sprint Nextel**. In late November, **Time Warner Cable** launched in Raleigh, N.C., and Austin, Texas; and **Comcast** in Boston and Portland, Ore. In early February, **Cox** launched in San Diego and Phoenix.

"We're not yet ready to talk about our experiences," a Time Warner spokesman said. MSOs are also fairly tight-lipped about the technology involved.

The Pike & Fischer report finds that cable companies will leverage their massive capital investments of the past decade and programming expertise derived from their core TV business to develop new "converged" services that include premium video content for cell phones and remote DVR programming.

"The (Sprint/MSO) alliance...raises the specter of cable not only catching up (with phone companies) in the integration of mobility, but even jumping ahead," said report author, Mitchell Shapiro, in a statement.

Market-by-market upgrades by phone companies to enable multi-channel video delivery will "take time," Shapiro continued. "And there's no guarantee they will succeed financially, especially given the wild card of Web-based services."

Verizon, AT&T seek separation

To date, while telcos such as **Verizon** and **AT&T** have played catchup on the triple-play bundles, their strategies are changing from defense to offense as they roll out their respective services, according to the report.

A key goal of both companies' network upgrades is to become more formidable competitors in the bundled-service space, by delivering traditional and new on-net video services, introducing new "converged" and "personalized" services, and, at least in Verizon's case, having the bandwidth to out-deliver cable when it comes to data. 

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Banner Year for SCTE Standards

The **SCTE** standards program broke records last year. Thirty-one revisions and 19 brand-new standards made it through their respective committees and were approved by the engineering committee (EC). This compares to only 20 making it to final approval in 2005.

"In 2001, when we made [standards] a formal program with membership dues, we had a fair amount of work going on. A lot of that work came to culmination in 2002. That was our previous best year," said Steve Oksala, vice president, standards. The most recent Standards Annual Report available online (http://www.scte.org/documents/pdf/standards_annual_report_2006.pdf) shows that approximately 45 were approved by the EC that year.

The highlights for 2006 include EC approval of the three-part standard, SCTE 118, for program-specific ad insertion, which was under the guidance of the Digital Video Subcommittee (DVS). "The whole area is a really hot topic for the standards program," Oksala said. SCTE 118-1 covers data field definitions and provides a functional overview and application guidelines; SCTE 118-2 offers a content provider to traffic communication applications data model; and SCTE 118-3 is a traffic system to ad insertion system file format specification.

The Data Standards Subcommittee (DSS) worked on facets of IP Cablecom in 2006, including SCTE 24-4, Dynamic Quality of Service for the Provision of Real-Time Services over Cable Television




One for the record books

Networks Using Cable Modems; SCTE 24-7, Media Terminal Adapter Management Information Base Requirements, and SCTE 24-8, Signaling Management Information Base Requirements.

Oksala also mentioned the Hybrid Management Sub-layer Subcommittee work in 2006 on the four-part SCTE 25, which deals with Hybrid/Fiber Coax Outside Plant Status Monitoring. He expects 2007 to be another busy year with several standards originally approved in 2002 coming up for a five-year review, including additional parts of IP Cablecom (SCTE 24).

Oksala said that while the Cable Applications Platform Subcommittee didn't have any releases in 2006, there should be a new SCTE 90-1, SCTE Application Platform Standard OCAP 1.0 Profile, in 2007. DSS will tackle DOCSIS 3.0, and DVS will continue revising the Emergency Alert Standard and digital insertion standards (SCTE 30-35).

As always, the SCTE Web site offers free downloads of all its standards (<http://www.scte.org/content/index.cfm?plD=59>). Also available is a project register, detailing standards activity for 2006. It can be accessed from the Standards home page. (<http://www.scte.org/content/index.cfm?plD=102>)

The site also shows what your colleagues are the most interested in. There is a "top 10" list of standards, that includes, incidentally, SCTE 22-1 and SCTE 79-1, the parts of DOCSIS 1.0 and DOCSIS 2.0 that deal with Radio Frequency Interface. 



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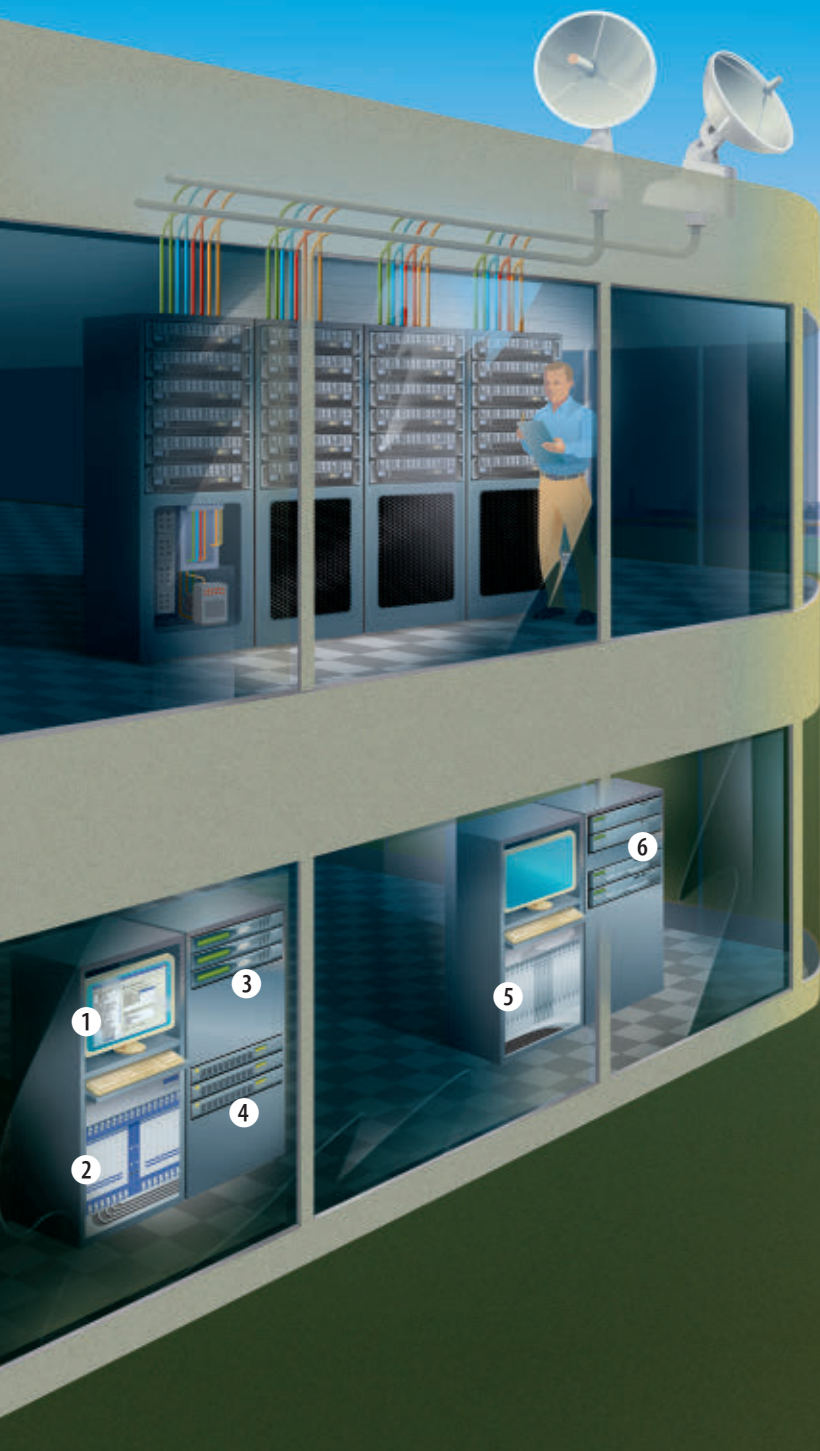
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SCTE: Active Status

It's been quite awhile since I used this forum to get on my **SCTE** soapbox. Regular readers know that I've long been a supporter of SCTE and its programs and have even served on the Society's national board and various committees and subcommittees.

I sometimes hear questions along the lines of "What's in it for me?" or "Why should I be involved in SCTE?" The simple answer is that the more you give—in terms of being an active member—the more you receive. The key phrase here is active member. Let's take a look at a few ways that one can be active in the Society.

Recognizing our technical workforce

A little over a year ago, SCTE declared the month of March "Broadband Engineering & Technology Awareness Month." Last year's inaugural campaign of BETA Month was to highlight the engineering and technology profession across our industry—basically a formal tip of the hat to all of our technical workforce for a job well done.

The 2006 Broadband Engineering & Technology Awareness Month initiative included a national ad campaign, articles, pre-written press releases, and public relations kits that could be used by cable operators, SCTE chapters, and just about anyone else wishing to promote BETA Month and salute the folks who are on the technical side of our industry. The timing of 2006's campaign coincided nicely with the **National Cable and Telecommunications Association's** "Cable: A Great American Success Story." NCTA made available a DVD copy of a short film of the same title, which highlighted "... the achievements and enterprising spirits of cable's engineers and technicians."

Here it is a year later, and the second annual Broadband Engineering & Technology Awareness

Month is upon us. If you're an SCTE Chapter officer or board member, a system-level supervisor, manager or director of some sort, perhaps even a regional or corporate honcho, why not take advantage of BETA Month to recognize your fellow SCTE chapter members or those with whom you work?

How? Sponsor an ice cream social, a luncheon, pizza after work, a buffet breakfast or lunch, or maybe something as elaborate as a dinner or evening event. Be creative!

The May 2006 issue of SCTE's Interval highlighted a cooperative effort on the part of the Society's Lighthouse Chapter and Time Warner's New England Division employees based in Portland, ME. Vendor-sponsored box lunches for all of the system's technical staff, hourly drawings for Wal-Mart gift cards, and a showing of the NCTA video were part of what was a two-day celebration.

By the way, if you're involved with a chapter, conducting a BETA event and submitting a report about it to SCTE headquarters is good for points in the 2007 compliance and awards matrix.

"I sometimes hear questions along the lines of 'What's in it for me?' or 'Why should I be involved in SCTE?'"

Elections

SCTE mailed ballots for this year's national board of directors election back in January. If you haven't voted yet, dig down through your in-basket and open that big envelope. Read the candidate biographies, and either mail your paper ballot in or vote on-line. The voting deadline is March 30, and results will be announced no later than April 15. This year's ballot once again features a strong slate of candidates, thanks to the hard work of the Nominations Subcommittee. Remember, the Society's board members are your voice in the goings-on at SCTE, and your vote really does count. There have been several instances over the years where a given candidate won by just one or a handful of votes. I recall one director position that had to be decided by a coin toss,

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because of a tie vote. Had just one more person in that region voted

Staying in touch

Speaking of SCTE's directors, when was the last time you spoke or corresponded with a regional or at-large director? I phoned my regional director the morning I started writing this month's column (he's running for reelection) and chatted about issues that are important to me. I

pending or existing legislation. Those we elect to represent us in a government role or an SCTE director role really do listen to constituents. While they may not always agree with us, or us with them, staying in touch is important.

Chapter meetings

The reality is that **Cable-Tec Expo**—SCTE's flagship annual confab—is simply out of reach of a lot of folks, especially at

lot by attending a chapter seminar, one can learn even more by volunteering to be a speaker! Pick a favorite topic—it doesn't have to be a theoretical deep-dive on electromagnetic wave propagation. Are you handy with a quadrature amplitude modulation (QAM) analyzer? Consider conducting a hands-on session in which you demonstrate how you use a QAM analyzer to troubleshoot digitally modulated signals.

Bring a live drop into the meeting room, and hook it up to a half-dozen or so instruments. (Maybe you can convince a favorite vendor to lend you the analyzers for the meeting.) Come up with ways to create some simple impairments and show seminar attendees what a good digitally modulated signal looks like and what a not-so-good one looks like.

If you have time—yes, I know time is a valuable commodity these days—consider getting involved with your local chapter as a friend of the board or maybe even running for a board position. And don't be bashful about sharing new ideas, even if you're not part of the local board. That's what keeps any organization on its toes.

"Most of the chapters conduct local or regional technical seminars on a regular basis."

asked my director's thoughts on various topics and shared some of my opinions.

Maintaining a dialogue with our elected directors—or candidates running for a position—is not a whole lot different than letting our elected government officials know what we think about new,

the system level. The good news is that most of the Society's roughly 70 chapters conduct local or regional technical seminars on a regular basis, often every other month. These seminars provide excellent low-cost or free training to attendees. While one can certainly learn a

Certification

SCTE has had a variety of technical certification programs available since the 1980s. Many cable operators have their own internal training and certification programs in place, but why not pursue getting certified above and beyond what your company may offer? Studying for and successfully passing a certification exam is a great way to demonstrate to yourself and your peers your competency in one or more subjects. That certificate says you know your stuff. It gets you a little peer recognition. And it just plain feels good when you find out you passed the test.

This month's column touched on just a few ways you can be active in SCTE. For more information about Society programs, visit www.scte.org. ↩

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T-1, PBX and Centrex

When I started this column more than 10 years ago, finding a match between what our industry needed to hear and what I had to say was about as easy as filling a glass of water from Lake Michigan. There was so much “new stuff,” and cable technical people were thirsty for knowledge. Now that we’ve been doing so well in adding residential telephony customers, I began wondering if the lake had been emptied—until I talked to some folks at **Comcast**. “2007 and 2008 are the years of commercial services,” said Jim Venne, director of Regional Sales Operations for the Chicago Region. The reason is the same as the one the Sundance Kid gave when asked why he robbed banks. “That’s where the money is!”

Classic telephony

Commercial services includes data access and video, as well as business telephony. Even for data, however, much of the technology is classic telephony. T-1 and T-3 links are connectivity mainstays, and even when we are talking about Gigabit Ethernet (GigE), it often means T-1 over an Ethernet link. In addition to being used for ties between corporate locations, T-1 links are the pipe that connects cell towers to the necessary land-based mobile switching centers. Similarly, although most new business telephony systems are sold as multimedia communications, the main application is still voice services.

The market for commercial services is huge, by some estimates more than \$7 billion annually in regional markets alone. So why didn’t we get into this business from the start? In conversations I had with cable executives about 10 years ago, they would often say that it was better not to fight too many battles at once. They didn’t have any doubts about competing for residential phone service, but felt that if they offered business telephony (or any other commercial service), it would be the straw that pushed the telcos into residential video. Some arguments die naturally.

T-1, two ways

T-1 services can be offered by a cable company in two forms over an HFC plant: as a DOCSIS-based service using a T-1 modem or as an Ethernet-based service. Vendors offering implementations include **Vyyo**, **Narad** and **Scientific Atlanta**. Vyyo provides a system with modems using DOCSIS chipsets, while both Narad and Scientific Atlanta have Ethernet solutions.

Vyyo’s solution consists of DOCSIS compatible T-1 modems at a customers’ premises, connected over an HFC network to their headend-based XMTS T1 Access Concentrator. Both the modems and the access concentrator use **Broadcom** DOCSIS chipsets, but also incorporate proprietary technology to maintain T-1 timeslots and clocking. The XMTS interacts with the modems and a backbone transport network similarly to the way a cable modem termination system (CMTS) functions in a standard DOCSIS network.

Narad’s offering is an Ethernet switched solution that consists of Optical Network Distribution Switches (ONDSs), Narad Diplex Filters (NDFs), Narad Access Switches (NASs), and Broadband Interface Units (BIUs). The BIUs are customer premises located 100BaseT Ethernet modems that contain a pseudowire interface that converts

“2007 and 2008 are the years of commercial services.”

Jim Venne, Comcast

T-1 to Internet protocol (IP) for transmission over an Ethernet network. NASs are Ethernet switches that bridge existing amplifiers and regenerate the Ethernet data. The ONDS is a switch located at a fiber node and is where the T-1 is switched to a fiber distribution network. Narad uses an upstream carrier in the 908 to 971 MHz band and a downstream carrier in the 1.02 to 1.08 GHz band to provide symmetrical data service and depends upon the NDF to separate Ethernet from the standard cable spectrum at the ONDS.

Like the Narad product, Scientific Atlanta’s Broad-LAN Transport System is Ethernet-based and requires a T-1 to Ethernet interface from a partner company. Unlike Narad, it operates within standard upstream and downstream allocations. The hardware consists of a headend-based T-1200 or T-2400 Transport



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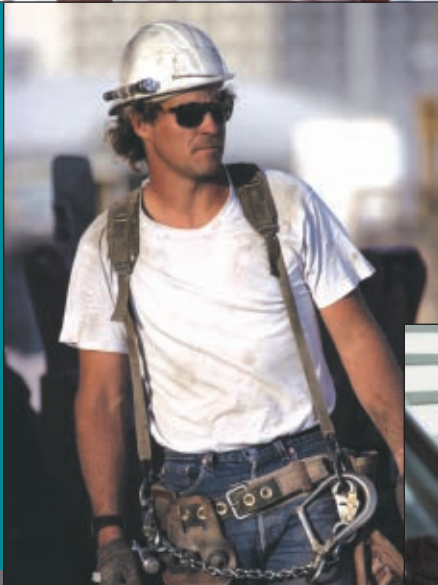
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Modem Termination System and the customer premises C-1100 or C-1200 Client Transport Modem. It uses a 6 MHz channel in the 88-864 MHz downstream spectrum and another 6 MHz channel in the 5-42 MHz upstream. In the reverse path, subscriber information is multiplexed on up to 14 narrowband tones. The multiple tones provide immunity from "jammer" frequencies within the 6 MHz band.

Potential gold mine

For cable, business telephony is an unopened goldmine. In the beginning, the only place to get business phone service was the telco, and two flavors evolved. Private branch exchanges (PBXs) are telephony systems where the telephone switch is located at the customer premises. Their cousin is Centrex Service, where a group of lines in the same telco central office switch that serves residential customers is reserved for a business customer. Originally, the telco owned either type of system, and the size of

the business was the leading parameter that determined the type of system. With deregulation, businesses could own their premises-based telephony switches, and cost and control became just as important. Today, PBXs are mostly sourced from private vendors or obtained from a service provider acting as a distributor for a private vendor. Centrex-type service comes from a service provider. In both cases, the service provider can be a cable company as well as a telco. A third flavor of business telephony, hosted PBX, is also possible. Similar to Centrex service, a hosted PBX is located in a network apart from the business being served. A hosted service, however, is usually based upon a network that only serves businesses.

Like T-1 implementations, business telephony can be provided by a cable company in two ways. A cable company can partner with an IP PBX vendor or with a hosted service, either as a distributor or in a marketing relationship where the cable company provides access lines and/

or network connectivity. Alternatively, it can provide Centrex-type business services from a PacketCable network if business features are part of the feature set of its network. **Whaleback** is one company that offers the first type of solution, while **CedarPoint** offers the second.

The Whaleback CrystalBlue offering is a sort of hybrid between a customer premises PBX and a hosted PBX service that exists in a third-party network. An on-premises processor handles call switching and feature provisioning, but call completion is via a Whaleback gateway accessed over a broadband link from the business. In late January, Whaleback announced a "bandwidth resiliency" feature that provides hot swaps between two broadband links to guarantee uninterrupted service and/or route diversity. The business customer pays Whaleback a flat monthly fee per phone line and a per-line activation fee, which includes unlimited U.S. usage and maintenance for the processor and its feature software. The cable company receives revenue for each broadband line between the on-premises processor and the customer's Internet service provider (ISP).

The CedarPoint Centrex offering is completely based upon the cable company's PacketCable-compliant switch. In 2006, CedarPoint added a set of business features to its Safari product, to complement existing residential features. As such, Safari provides much the same functionality as traditional Class 5 switches with a Centrex offering. Safari also offers trunk connectivity to IP PBX offerings.

Lots of lakes

Going back to my glass of water analogy from the beginning of the column, it appears there are still a lot of commercial services lakes to fill this column's waterglass, from both technology and marketing perspectives. Add cellular to the mix, and there's no drought in sight for a number of years. ↩

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node splits

How, When and Whether

Everyone likes to split wood and sit by the fire. But burned as fuel in a open masonry fireplace, wood averages only 15 percent efficiency. Now let's talk about fiber optic nodes...

By Jonathan Tmbes, Editor

Splitting wood, splitting nodes. It's a rough analogy, but helps get across several points.

First, both are established practices, and even popular, given cold temperatures or bandwidth constraints. Second, both cover a range of materials and techniques. Finally, as far as generating heat and bandwidth relief, both are limited in what they can achieve.

That last point makes this topic controversial. You can't get too far into a discussion of node splits before hearing about alternatives.

Big nodes, costly splits

The idea of segmenting or splitting the fiber-optic node appeared soon after that device became the linchpin of cable's HFC architecture in the mid-1990s. In cable years, that's a long time ago.

The practice has accelerated in the past few years, and the near-term trend looks strong. "A lot of node segmentation is going to be performed in 2007," says **C-COR** Vice President, Access Technology, Bill Dawson. Why is that?

One reason is that there remain some obvious targets. "We have customers who have currently 2,500-home node sizes now," says **Motorola's** Director of Systems Marketing, Connected Home Solutions, Fred Slowick. "That's a very large serving area."

Just how big? Slowick says most of the major MSOs are in the less-than-a-thousand homes-passed category. A commonly

heard estimate is that most nodes serve between 500 and 750 homes passed.

Operators have commended this technique publicly. It is one of several reported "tools," for instance, in **Cox Communications'** extendable optical network (EON) initiative's "tool kit." Yet there's a downside. Cox Senior DOCSIS Engineer Ben Bekele said in a recent CT-hosted Webcast on DOCSIS 3.0 that reducing node splits would be a good thing. Why? "They cost a lot of money."

Initial steps

Through metrics such as **Time Warner Cable's** Node Quality Index and **Comcast's** 100-Worst and Most-Penetrated Nodes, operators pay close attention to the status and health of these devices. As for mapping them against available bandwidth, **Charter Communications** Vice President, Network Operations and Engineering Services, Keith Hayes underscores the importance of methodically gathering and acting upon the right kind of data.

"The first step is you need to know where you're running out of bandwidth: whether it's VOD (video on demand) or HSI (high-speed Internet) or telephony. No. 2, you need early warning."

Before touching the outside plant, however, Hayes recommends optimizing signal transmission. That would include upgrading from lower modulation orders to 256-QAM (quadrature amplitude



modulation) on the downstream and from quadrature phase shift keying (QPSK) to 16-QAM on the upstream.

Another technique is to rationalize narrowcast so that there is a 1:1 combining architecture between nodes and headend or hub optics. Given a three-way splitter servicing three nodes, for instance, the idea is to remove the splitter, add two transmitters and make those optical connections point-to-point.

Yet this practice faces its own alternatives. In the aforementioned Webcast, Comcast Senior Manager, Advanced Engineering, Saifur Rahman said that instead of “decombining,” operators should consider using DOCSIS 2.0 techniques to add more downstream DOCSIS RF channels per node. In either case, you’ve moved beyond modulation upgrades but not yet reached a node split.

“You want to take the easier steps, which are typically your denser modulations, before you take the physical steps of having to recombine or extend fiber and cut a node in half,” Hayes says.

Knotty nodes

Much as wood varies by species, fiber nodes come in all shapes and sizes, makes and models.

Segmentable nodes have been widely—though not universally—deployed. Yet even nodes designed to be split can end up serving an unbalanced, or asymmetrical, number of homes off each output port in the field, making them resistant—much like a piece of knotty wood—to clean strikes down the middle.

“I would say—just a guess—that 50 percent are segmentable,” says Motorola’s Slowick. “But 75 percent of all nodes out there are not balanced, so it doesn’t do you a lot of good.”

In those cases, the practice is not so much splitting a node as chopping away at a nodal service area. The idea is to pull fiber further down the line and install a smaller, satellite or mini-node in a subset of the original area. Of course, that adds costs.

In the best case, the coaxial plant is balanced and the node is either segmentable or can be replaced with one that supports the desired split. “It could be as simple as a one-hour, pull-out-old-node, activate-new-node,” says Charter’s Hayes. “You have somebody at the hub reconfigure the electronics and someone down in the field who removes the old node and splices in the new one.”

The “knotty” cases are more complicated. “You have to strive to accomplish some sort of a balance in the ultimate topology,” says Dawson. The need to realign the plant makes this a bigger project. “That might have to take place over a night or two previous to the actual node split,” says Hayes. “Instead of one technician, you bring in three or four to go do the reconfiguration.”

Lashing up express coax and installing mini-nodes farther down the line consumes additional labor and materials, including fiber.

What fiber?

Pulling a half-mile of fiber to a new node is not out of the question. But increasing the number of fibers feeding optical nodes is a non-starter. Standard counts, ranging from eight to six to four (which becomes two within-a-ring in ring architecture) are fixed quantities.

Even operators who budgeted spare fibers in rebuilds a decade ago find themselves short today, having redeployed that glass to homes or perhaps businesses that popped up in the interim. “The point is, they are not there as spares anymore,” says Dawson.

That relative fiber scarcity has accelerated the number of wavelength division multiplexing (WDM) products in the access space. This trend has been building. Five years, **Scientific-Atlanta** announced it had mounted coarse WDM (CWDM) return path modules into optical nodes and deployed with a European operator. Three years ago, at the **SCTE** Conference on Emerging Technologies, Time Warner Cable's Tom Staniec spoke enthusiastically about collaborating with a vendor about handling a "lambda on a pole."

The category has matured, with operators apparently eager for more efficient

Senior Director of HFC Product Marketing, now with Comcast) tested the assumption that reducing the number of amplifiers has positive network operating results.

"The conventional wisdom turned out to be correct," Schweitzer says. "The deeper you bring fiber into the network, the more reliable the network is."

A live topic that Schweitzer also explored is what number of amplifier cascades will enable operators to support the **CableLabs'** definition of required availability for VoIP networks (namely, 0.9994.) His answer? Node-plus-two with redundant power supply, node-plus-one without.

"The first step is you need to know where you're running out of bandwidth." Keith Hayes, Charter

use of their fiber assets. "We're getting a tremendous response for our forward path CWDM technology," Dawson says.

The point is that plain segmentation itself only gets you so far. Adding optical muxing and de-muxing or mounting erbium doped fiber amplifiers (EDFAs) in the field gets you further, but of course adds costs.

WDM and more

A recent development in this space is the adoption by **Aurora Networks** of dense WDM (DWDM)-related technologies associated with C band of the **ITU** grid (1,530 nm-1,565 nm) back into the O band (1,271 nm - 1,360 nm).

"We've been able to get to a point where we offer six wavelengths within that O-band window," Aurora Vice President of Marketing John Dahlquist says.

Dubbed "LcWDM," Aurora's approach promises to facilitate node segmentation (with or without network reconfiguration) by delivering twice as many wavelengths over a single fiber and going two times the distance, from 15 km to 30 km, as CWDM. It also dovetails with Aurora's established position on eliminating RF amplifiers, even down to a node-plus-zero architecture.

This architectural point is yet another way in which a discussion of nodes often segues into more strategic questions.

In a paper presented at last year's Cable-Tec Expo, Eric Schweitzer (then **Harmonic**



Motorola's SG400 Scalable Node. Other examples are **Scientific-Atlanta's GS7000**, **C-COR's Opti-Max 4100**, **Harmonic's PWRBlazer3100/3800 class**, and **Aurora's NC4000**.

Expansions, SDV

How the industry eliminates enough actives to hit that target is a loaded question. (Schweitzer said the industry status quo was greater than node-plus-four.) More commonly, node-plus-n is discussed in terms of new build rather than existing plant.

Beyond the fiber-deep question, two other issues impact current discussion of node segmentation, namely expansion to 1 GHz and switched digital video.

As for expansion, it's worth noting that today's latest nodes already are supporting 1 GHz. The reason being, the optics cost the same. They're also capable of mid-splits.

Whether, when and how widely any of that spectrum gets used is another matter. Some engineers on the operator side are beginning to use words such as "isolated

single node, spot spectrum improvements," carefully chosen to sidestep the trip wires that Wall Street has set to detect any potential movement toward network upgrades.

In the end, any analysis of node segmentation must answer that first question that Hayes raised: Where are you short? VOD? HSI? Telephony? And what about SDV?

Usually cast as a bandwidth savings technique, SDV also looks like a service, consumes bandwidth early on and reacts in its own way to a node split.


Whereas a split can double HSI capacity, "in the SDV case, there will not be a doubling," says one MSO engineer, "because many program streams will be duplicated on each side of the split."

"On the other hand, doubling the size of the narrowcast Edge (E)QAM allocation will provide SDV with far more than double capacity, because the additional EQAM resources will see mostly long-tail content."

In other words, a split can work against SDV. "The efficiency gains you get in a 500- or 1,000-home node are much higher than you would get in a 250- or 125-home node," says Jeff Fryling, vice president of business development at **Vyyo**, a firm that advocates operators' cutting to the chase with bandwidth expansion, rather than getting hit with a "double spend."

Many weapons

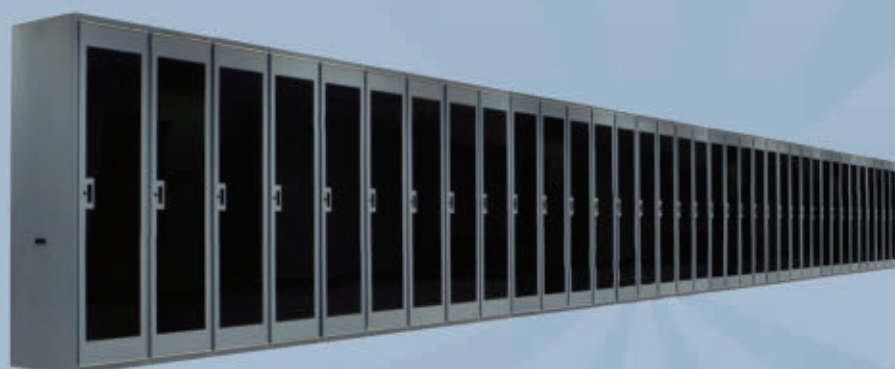
But in certain cases, segmentation may be compatible with SDV. That was one of the points that Dawson and C-COR colleague Jeff Sauter made in the July 2006 issue of *CT*. Although their article did not account for Edge QAMs, it did contain a busy table mapping existing against desired serving group sizes, indicating the kind of close calculations required to determine which techniques to use at which sized nodes.

The bottom line is that while large nodes with balanced distribution legs present easy targets, node splitting is no silver bullet in the battle for bandwidth. It's one weapon in an arsenal that contains higher modulation orders, decombining, advanced DOCSIS and the latest environmentally hardened optics. Add to those the notion of spot spectrum improvement, boosts to Edge QAM resources and, needless to say, robust spreadsheeting capability. 

Jonathan Tombes edits *Communications Technology*. Reach him at jtombes@accessintel.com.



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THE CONTENT KING

Royalty Awaits New Propagation and Distribution

Content is still king. Honoring that king—or rather the many claimants to that throne—calls for a propagation and distribution network that preserves the integrity of the content/customer relationship.

By Bob Scheffler, Motorola

Seamless content on demand, mobile TV, seamless content mobility, portable content players: All these popular concepts have in one thing in common—content. With all eyes on content, now is the right time for the cable industry to look upstream, beyond the headend, and toward the growing numbers of content providers that are eager to make these concepts a reality.

In brief, it's time to sketch the framework of a content propagation and distribution network that preserves the integrity of the content/customer relationship and provides a mechanism to enable future content types and delivery models.

Content and consumer

Before doing so, however, it's worth reiterating some basic points. First, there is a special relationship between content providers and content consumers. Having one without the other doesn't make much sense. Historically, most video content was created and supplied by TV networks and cable networks. In modern times, user-generated content has emerged as a plausible source for content. But in all cases, it's a two-way relationship between the provider and consumer.

Second, it's a transactional relationship. The consumer seeks out content. The content provider must have some motivation for going through the trouble of creating the content. It could be money (from advertising or subscriptions), marketing value (building a brand), or maybe even just fame or popularity (as often seen on **YouTube**). The lines blur as these personal video objects create brand or advertising revenue for someone in the distribution chain. In general, though, the truism holds: Content is king—a king who provides valuable services, but one who must be honored with money, brand appreciation or popularity.

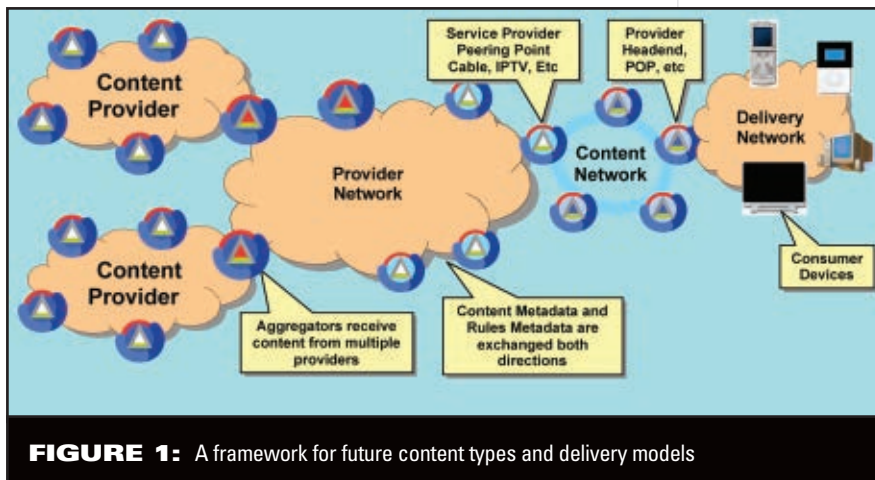


FIGURE 1: A framework for future content types and delivery models

How has content been delivered until now? For the cable industry so far, the two primary types of content are broadcast and on-demand. Broadcast content is sent in real time from programmers. This content may be live, such as news or sports, or it could be a syndicated show.

In the case of broadcast, the operator is usually simply receiving the content, maybe re-encoding it, and placing directly on the plant without any recording, buffering or time shifting. In this case, it's a simple pass-through of the content and the associated electronic program guide (EPG) data.

On-demand content is a bit trickier because there is not only the video content itself, but also the rules concerning how much to charge, ratings, etc. Today, this content is usually destined for video on demand (VOD) libraries. **CableLabs** created the Asset Distribution Interface (ADI) specification to help standardize the VOD library distribution functions. A fundamental premise is that the VOD titles are "pitched" by a provider and "caught" by multiple headends. A typical VOD asset will have many hundreds or thousands of copies sprinkled throughout the country and world.

Each copy is a full and complete copy of the content plus meta-data—and ideally the same as every other copy.

Beyond the status quo

What happens as we move to multiple viewing devices such as PCs, cell phones and mobile players? Our industry currently services set-top boxes and PCs, but some operators, such as **Rogers** in Canada, also own the local cellular network.

How can we abstract the viewing device away from the supporting infrastructure to enable viewing on disparate consumer devices? Certainly the ADI specification can be adapted and used for these new devices because they are really just adaptations of the existing VOD experience (codec, screen size, bit rate, guide, etc.). It becomes even more intriguing as new forms of content emerge. How do we control the movement of all that content to all these devices? Equally as important, how do we reconcile the views/usage back to the content providers?

As a point of departure, consider time shifting. **Time Warner Cable's** Start Over service gives consumers the ability to tune to a broadcast program in progress and restart the program from the beginning. In going

beyond a movies-only model, operators will encounter special cases, such as syndication exclusivity, or syndex. That term refers to how a content provider may make a show available exclusively on one network Thursday, a second network on Friday and yet another on Sunday.

When a popular show like "Friends" is sold for syndication (reruns), these syndex rules become very important, not only to the content provider but also to the network that buys the rights to play the episodes. It would be unfair (and probably unwise) if three different broadcast networks played the same show on the same night.

This exclusive availability can be different in any given area of the country or within different markets.

The localization of the cable plant, as compared to the direct broadcast satellite (DBS) footprint, brings a new capability to the term "exclusive." It could be exclusive in my region, my state, my town or maybe even my HFC node. Yet, in the current on-demand tier, there is little if any provision for such windows of availability.

A new framework

That example points to the need for a content propagation and distribution framework that preserves the integrity of the content/consumer relationship, as well as providing usage data to the content provider to maintain balance in the relationship. This new framework should also provide a mechanism to enable future content types and delivery models. (See Figure 1.)

This framework should provide a granular control over what content is available in the smallest of areas and even by population demographic. The usage data needs to be propa-

The Royal Network

BOTTOM LINE

Content is still king, but the king now resides in more than just one palace: networks, cable companies, Web sites, and individual consumers are all content providers these days. The challenge is to provide the desired content to the desired device without annoying the many kings who provide said content.

The framework of a content propagation and distribution network must preserve the integrity of the content/customer relationship and provide a mechanism to enable future content types and delivery models.

gated back to the content provider to facilitate adherence to licensing models and enable appropriate royalty payment. This could be similar to a pay-per-view (PPV) model in some cases. In any case, building the value of the content provider will help us to better serve our customers and provide a superior experience.

Another critical but not-so-obvious requirement involves separating metadata dealing with content from metadata dealing with rules or scheduling. Take the case of a localized program that has one set of rules in Phoenix and another set of rules in Philadelphia. Providing a mechanism for localized rules allows different content, different schedules and different ads depending upon where the content is made available. Or the case of specific ethnic centers, such as Toronto, Canada. This is quite a diverse population, but completely different from San Antonio. If a content provider had to schedule on a nationwide basis, it could not give a different piece of content in these two different locations. Today, this problem is primarily solved with varying channel lineups within each market.

The increasing popularity of on-demand content affords a simple means to control different "avails" in different regions and so encourage a larger group of content providers. That in turn helps expand service offerings and satisfy customers. A single content object can be sent to all headends, or appropriate regional or local storage, but separate and

distinct rules or schedules can be sent to each individual headend. These rules impose only a light tax on transport. While each complete movie object in MPEG-2 standard definition (SD) may be 3 GB or higher, the actual rules metadata is under 1 MB, or more than 1,000 times smaller. This keeps the majority of the propagation traffic the same for all destinations, and only a small rules set needs to be sent to individual headends. (See Figure 2.)

The rules are used to decide how the EPG should be populated. In one geographic location, such as Phoenix, the rules may specify that a specific content object should be listed in the on-demand guide from noon until 4 p.m. In Philadelphia, the same content might be listed from 4 p.m. until midnight.

they schedule live broadcast content, can motivate them to provide more content. As always, balance is in order, and certainly having the flexibility in the framework to allow for such things is of great benefit.

One mechanism needed in the rules framework is the ability to control advertising on a per-content basis. One of the underutilized features of a modern VOD server is the ability to insert advertising on the fly. If each content object is marked with **SCTE-35** messages flagging valid splicing points, a good VOD server can place or replace the ads in the content object. This ad placement must be made based on the content rules provided by the framework.

Consider these examples. An advertiser may want a different ad spliced

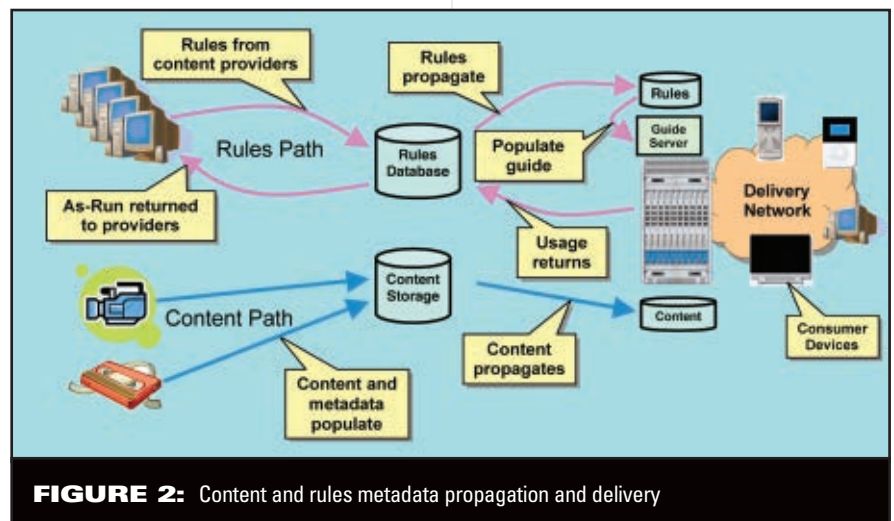


FIGURE 2: Content and rules metadata propagation and delivery

Why? Let's assume that the content in question is a "Friends" episode. In Phoenix, **Cox** might be carrying a channel with "Friends" reruns starting at 5 p.m., while **Warner Brothers** (the studio or **WB** network) may decide they want to offer "Friends" on demand, but not to compete with the Cox local channel in Phoenix. These rules allow the content provider, in this case Warner Brothers, to have the flexibility to schedule its on-demand offerings.

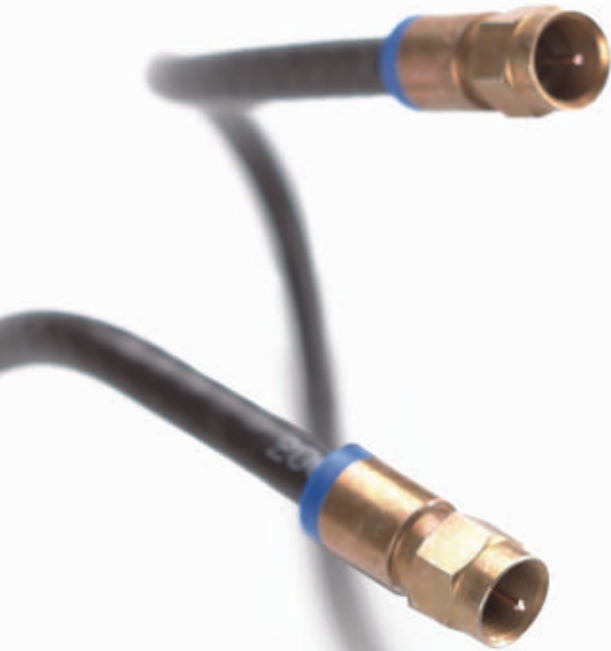
The content provider receives certain benefits from such scheduling. Dynamically adjusting the VOD schedule helps "steer" the consumer to the most interesting or most valuable content. Allowing content providers to schedule on-demand content, just as

in if the content is viewed on a cell phone instead of a living room TV set. The ad rules can also specify lock-outs or noncompliant ads. Or take our "Friends" example: **Coke** has product placements in the content and might be a little upset if the operator spliced in a **Pepsi** ad. However, Coke may want a "fresher" Coke ad than what was included in the original content. The rules should specify which ads can stay, which can be replaced, and what they can be replaced with. In a similar manner, some ads may be allowed for "trick mode" or fast-forward, but some may not. These rules will greatly add value to the content provider, helping to maintain and build their branding.

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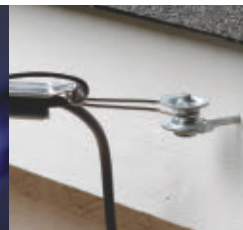
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Usage stats

After a given object is played, the usage statistics are returned to the source of the rules. This in turn will propagate back to the content provider for "as-run" documentation. In the broadcast industry, "as-run" data is combined with the Nielsen ratings shares for the actual airing. This is how the advertising rates are applied and billed.

With all that content and metadata passing back and forth between the content provider and the cable headend, we need ways to propagate both content and metadata. The content payload itself can be propagated using conventional VOD schemes, such as a pitcher-catcher network, when the content is not "live." The content itself, plus the content-related metadata, can be bundled together using mechanisms such as the CableLabs ADI specification.

The rules metadata is a bit more complicated. This data requires a two-way communication mechanism to carry both the rules to the edge, but also to reconcile the as-run data back to the content provider. With the Internet and nationwide backbones, moving small rules files around does not pose too much of a challenge.

What about live content? This is where separating our rules metadata from the content metadata helps tremendously. The rules metadata would be pre-pitched using the rules propagation framework. As the live content is aired, it is captured and correlated with the rules metadata for adherence and control. Keeping the metadata partitioned like this allows one satellite feed to service the whole country, but many different rules to

be sent to specific markets for localization.

Interestingly enough, this model approaches a broadcast trafficking and automation flow with as-run reconciliation and advertising make-goods. Because of the similarities to broadcast, much of the work of the **Society of Motion Picture and Television Engineers** can be leveraged for this application.

One place this could help is in the propagation delay and pain of distributing VOD content. When the VOD library was strictly movies, the library stayed relatively static with infrequent changes. Today we have many nonmovie titles in the VOD library. Along with providing mechanisms for content providers to make their content available, operators should try to simplify the pitch-catch propagation model. In many cases, loading VOD libraries involves tapes being sent to an external dupe house and then shipped around the country. Enabling more streamlined distribution is yet another way to encourage content providers.


New twists

One new twist involves user-generated content sites such as YouTube. Do we facilitate viewing Internet-based content on our living room TV set, further blurring the lines of content? As an industry, we have the technology to provide a seamless content environment where the source of the content is not a primary restriction. But blending these two worlds can have some interesting side effects. Some content is really designed to be viewed on a PC, such as a Web site. Some content is designed to be viewed on a TV set. We naturally gravitate to our preferred viewing device, so allowing consumers to access any type of content on the preferred device is desirable.


Will YouTube replace broadcast networks? Not likely, but remember the opening premise: Content is still king. Regardless of source, popular content is still popular content. Planes crash, costumes malfunction, starlets get out of cars with short skirts, and not only reporters, but nearly everyone now seems to have a camera. These events can cause an amazing amount of traffic on Web sites, but usually for a very short time. Would they compete with the Super Bowl? Hardly, but the lines between broadcast and the long tail certainly are becoming more interesting.

With the infrastructure to reach the consumer, near-infinite capacity, localized relationships, nationwide backbones and strong content relationships, the cable industry's ability to exploit this new content era is well-established.

Plenty of questions have arisen. Which features do you enable with time-shifted TV? Will broadcasters allow network digital video recorder (nDVR)? What is the best way to control streaming content to a cell phone? But nothing will happen for long without the permission of the respective content owner. The industry can either try to deploy services without permission or build the framework that enables content partners greater participation and control.

The latter approach, of course, holds more promise. Providing such added value to content partners will encourage them to offer more content. That's the competitive edge it will take to win the future of media and content distribution. 

Bob Scheffler is distinguished member, technical staff, Connected Home Solutions, for Motorola. Reach him at BobS@motorola.com.



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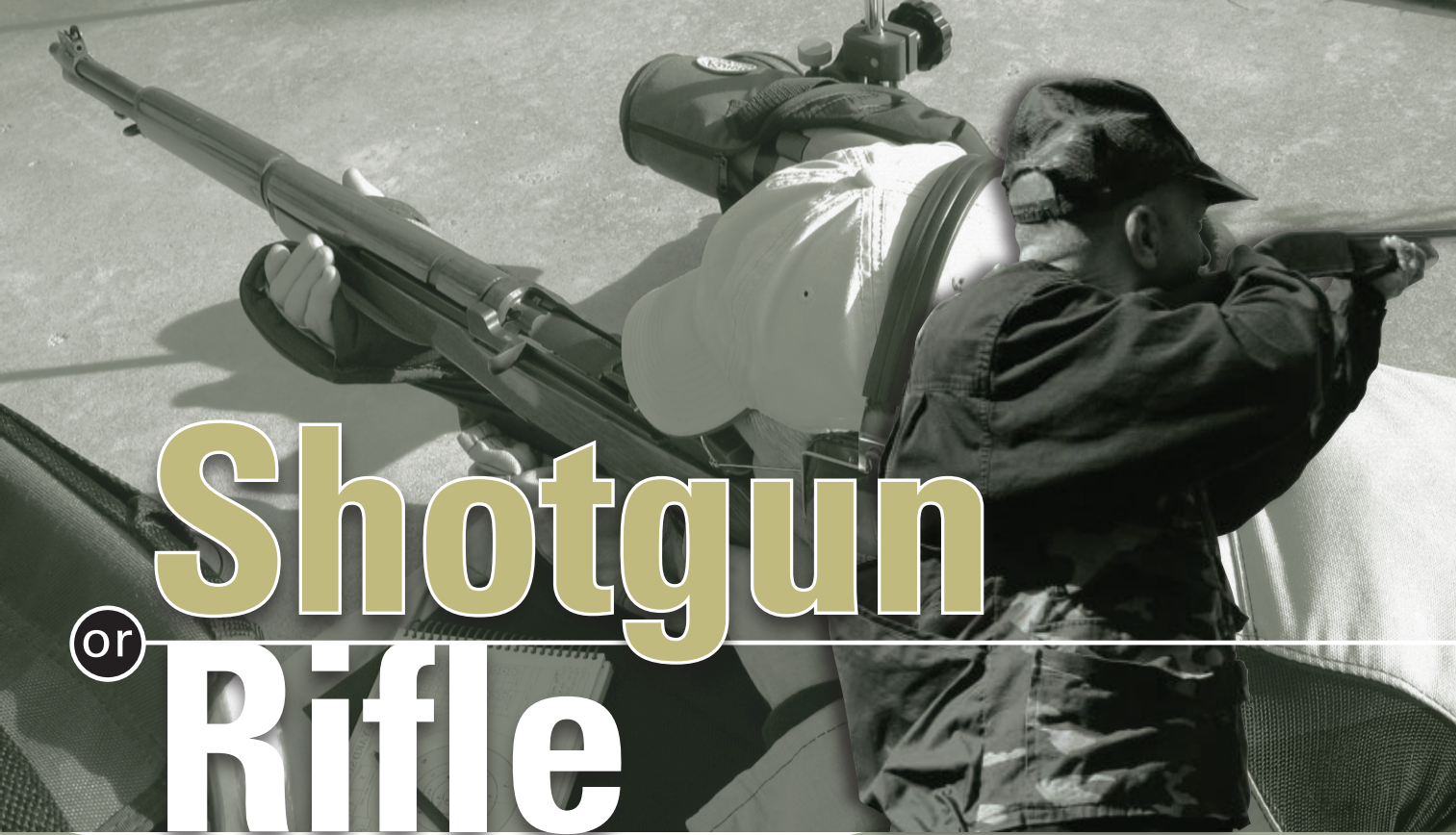


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Shotgun or Rifle

What's in your Leakage Arsenal?

Ken Eckenroth, Cable Leakage Technologies

Each season has its jobs. And whether it's winterizing the house, cleaning out the garage or shed in the spring, packing up for summer vacation, or getting ready for the opening of hunting season in the fall, these tasks all have their own checklists.

A hunting list, for example, might include a cleaned and oiled gun, a case of 12-gauge shells, proper chokes, camouflage, license and bug spray.

For cable operators, one field task comes around every quarter: monitoring essentially the entire plant for leakage exceeding **Federal Communications Commission** limits. Here's a list of leakage equipment that should be familiar to many technicians:

- Yearly calibrated RF leakage meter
- Quarter-wave monopole antenna cut to the correct length for the frequency being monitored
- Half-wave dipole for measuring leak before repair
- Calibrated test leak at office
- FCC Web site for the new electronic filing
- Driving gloves for hours of drive out

It's a routine job, maybe too routine. Every now and then, it's worth asking: "Why are we doing all of this? And is there anything else to say about getting the job done?"

Leakage can be a tricky target to hit, sometimes requiring rifle-like precision, and other times needing the wider pattern of a shotgun approach.

FCC rules

As for the first question, it's the law, FCC law. Since 1985, cable operators must completely drive out their plant four times a year, logging all leaks 20 $\mu\text{V}/\text{m}$ and above. Since 1990, we must conduct a driveout of at least 75 percent of the plant, and file a CLI report to the FCC showing all leaks 50 $\mu\text{V}/\text{m}$ and above, indicating which leaks are repaired and their locations. As an alternative to the annual rideout, a flyover of the plant is permitted.

But even if it were not the law, wise cable operators would vigorously repair their leakage anyway. Ingress can wreak havoc on a system's return path and cause degraded signal quality in the downstream. It can also interfere with an operator's Internet performance, as well as completely disrupt a system's voice over Internet protocol (VoIP) service. With the 99.99 percent availability goal for voice, leakage and ingress mitigation areis? a necessity.

We are very familiar with the FCC rules for leakage. However, there is a lesser known but very important rule in section 76.614 that covers the cable regular monitoring. It states:

"A cable television operator transmitting carriers in the frequency bands of 108-137 and 225-400 MHz shall provide for a program of regular monitoring for signal leakage by substan-

tially covering the plant every three months. The incorporation of this monitoring program into the daily activities of existing service personnel in the discharge of their normal duties will generally cover all portions of the system and will therefore meet this requirement.”

Note the word “substantially.” The FCC recommends that the technician vary his route a little from day to day. And they emphasize section 76.605(a) that states we must find all leaks 20 $\mu\text{V}/\text{m}$ and above. The FCC considers numerous mitigating factors in deciding whether a system will receive a fine and how high they are. It is not a case of whether a technician finds cut cable and a large leak, but whether the system strives for overall diligence to signal leakage monitoring and leakage repair. This includes maintaining quarterly logs and doing yearly CLI.

This portion of the rules that allows service techs to perform leakage during their normal daily duties has profound strategic and economic implications, especially to those operators who are concerned with the bottom line and don't wish to leave

Target: Leakage

BOTTOM LINE

Leakage can be a tricky target to hit. It is wise to incorporate the principles and benefits of both a demand and preventive maintenance program. The rifle is methodical. But the shotgun is valuable because it utilizes existing personnel that are out doing service calls anyway.

Both ways affect the bottom line. The results should lead not only to FCC compliance, but also to better picture quality and more robust VoIP and Internet service, which are the ultimate targets.

anything lying on the table. So with that in mind, let's define the two approaches—shotgun and rifle—and look at how each impacts your quarterly leakage monitoring.

Rifle and shotgun

The “rifle method” is very common and used by several cable operators. It incorporates a street-by-street methodical approach to monitoring. It generally utilizes a dedicated leakage technician who picks a neighborhood to ride out each day, continuing until 100 percent of the plant is driven out. Or if a company wishes to ride out the entire system in a shorter period of time, it might use several technicians to knock it out quickly. The rifle name implies a specific target of methodically patrolling street by street.

The “shotgun method” incorporates most or all of the service and line technicians. Each tech has a leakage meter in his vehicle. He will make note of each leak 20 $\mu\text{V}/\text{m}$ and above during his routine of normal service calls. The shotgun name implies a scattered pattern of coverage.

Each method has its pros and cons. The rifle method ensures complete coverage, but it uses additional and dedicated personnel. The shotgun method uses existing personnel at no additional cost, but the coverage may be incomplete. But that is just the tip of the iceberg in explaining why this method is in the minority.

There are more disadvantages to the shotgun approach. A manual shotgun method can produce duplicate leaks. Several techs may

go down the same street and record the same leak. The shotgun method also is inefficient in locating the source of a leak. The tech has to back up and pull forward to peak out a leak, which also makes this approach somewhat unsafe. The leak may also be on a different street, and finding the leak will take more than a few minutes. This additional time is likely to make the tech late for his next service call, so the particular leak may well be abandoned because leakage detection is a secondary task under the shotgun approach. And finally, a tech doing a secondary task is likely to improperly estimate the correct value of the leak. A common mistake is to ignore leaks lower than 20 $\mu\text{V}/\text{m}$, when in reality the leak is much higher than what the meter reads. A leak from a home or back yard easement is much lower when measured at the street because of the inverse square law of RF propagation.

Global positioning

One solution to the challenges of both the shotgun and rifle manual methods of doing leakage is automated mapping and global positioning system (GPS) tracking software available to cable operators. This utilizes GPS tracking for the automated recording of the vehicle's location and the ambient RF level at each point of the driven path.

This hardware and software has been available since the early '90s for the rifle method. It is incredibly efficient at locating the source of a leak. There is no more driving back and forth to peak out a leak because all the data has been recorded. The peak is determined when the cluster of leaks is analyzed. There is also no more looking for leaks down the wrong street or alley because the software has a leak circle (radius) algorithm that gets larger per the amplitude of the leak and finds the location of the highest RF level. This is essential for large leaks that radiate out over several streets.

The new solutions to the shotgun method are just now being introduced. The reasons why the shotgun method was in the minority are being addressed so that the economic benefits of using existing personnel can be realized. The challenges of the shotgun method are:

- Duplicate leaks
- Inefficient searches
- Underestimated leak values

These three problems can be solved when you use automated GPS tracking for leakage. Each service tech has a leakage detector attached to a GPS system. During a tech's normal service routine, all events are being recorded and then uploaded to the analytical software. An intelligent leak radius is created for each leak location. This radius is then tagged as the area for that leak.

An exact address cannot be used for the leak because the RF event is recorded automatically by several techs with different times, speeds, antennas, directions and sometimes even different streets. These multiple recordings are all at different physical locations. A geographic leak radius is by far the most efficient way to keep tabs on an automated GPS leakage environment. Now that we have a geographic area, duplicate leaks can be ignored. And this continues until the leak is repaired and closed out. The inefficient searches are eliminated because

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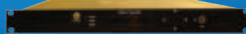
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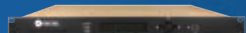


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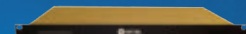
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the software can easily find the peak of the leak in a cluster of leaks.

That takes care of duplication and inefficiency. As for underestimating leak value, the user can input the correct range values. You do not want to accept a leak with its value based on a 10-foot reading. You need to have a multiplier to apply to the leak so it is the correct distance from the vehicle on the street to the house or the pole line.

Combinations

There will be situations where the rifle and shotgun method will be combined. This combination has precedent in leakage, specifically in the several cable operators that combine a yearly CLI flyover with along with their ground-based quarterly monitoring.

Most operators use one of their four quarters to achieve their FCC requirements with a ground-based CLI. The ones that combine them prefer to have a snapshot of the actual interference that only a flyover can provide. But the ground-based CLI data can more effectively be used to find the actual leak source. A flyover is flown in a grid pattern at an average of 450 meters above the system and shows hot spots, but the data may be hard to use to pinpoint the source of the leak. There are pros and cons to both ways.

There are also pros and cons to combining the rifle and shotgun methods. A rifle program is dedicated and generally incorporated into a preventive maintenance program, whereas a shotgun program blankets an entire system more quickly and is more of a demand maintenance program.

It is a prudent and wise decision to incorporate the principles and benefits of both a demand and preventive maintenance program. The rifle is methodical. But the shotgun is valuable because it utilizes existing personnel that are out doing service calls anyway.

Both ways affect the bottom line. And the results should lead not only to FCC compliance, but also to better signal quality and more robust VoIP and Internet service, which are the ultimate targets. ↩

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Spectrum Analyzer

Product name: Decimator

Company: SED Systems

Features/what it does: L-band spectrum analyzer; 1/2 size PCI card; fits in any computer or enclosure with a 1/2 size PCI slot; uses digital technology and Fast Fourier Transformations; accepts all L-band signals from 950 to 2,150 MHz and input power levels ranging from -75 to -5 dBm; data communication occurs via built-in Ethernet port; uses PCI connection to draw power; can be accessed from any location connected to the network; can be operated locally or remotely using any Web browser or network management applicat.

For more information:

www.sedsystems.ca

Remote Optical Test Unit

Product name: OTU-8000

Company: JDSU

Features/what it does: Rack-mounted remote test unit for the company's optical network management system (ONMS); integrates OTDR and optical switch technologies; can test hundreds of fiber links within a 40,000-square-km area and report any faults relative to the nearest physical landmark; monitors long-term performance of installed fibers and detects and locates fiber tapping; can house two field-interchangeable OTDR modules; monitors active fibers using a 1625 nm module designed to take into account factors such as the Raman effect of the optical amplifier; has dual-power feeds; configurations are saved on solid state disk; when the server is not available alarms can still be sent directly to the user via e-mail or SMS.

For more information:

www.jdsu.com

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Product name: Residential Cabling Distribution Center

Company: CommScope

Features/what it does: Data, voice and video signals converge and are then distributed to individual room outlets; supports basic and enhanced systems; allows networking up to seven computers; includes automation capabilities and central control of multiple integrated home communication and video entertainment applications, including telephone, video, data, CATV, Satellite, audio distribution, HDTV, cable modem and even security systems; supports CAT-5e, CAT-6 and fiber connectivity; meets EIA/TIA 60 CEBus and the TIA/EIA 570-B Residential Wiring Standard.

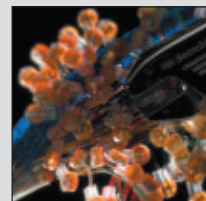
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Keeping Expo Practical and Valuable

SCTE Cable-Tec Expo will be one of the most worthwhile professional opportunities that any cable engineer can experience in 2007. I am doubly honored—as this year’s Expo Program Subcommittee chair and as a member of the **Bright House Networks** team that serves the Expo ’07 host city of Orlando—to have worked with a great group of SCTE staff and industry volunteers in helping to shape the program to be valuable, practical, educational, and immediately applicable for you and your customers. This is going to be a great Expo, and I am excited for everyone to attend!

Following in the footsteps of last year’s Expo chair, Chris Bowick, whom I personally admire, has been a daunting task. Besides the goal of continuing the trajectory of excellence for SCTE Cable-Tec Expo, there are the challenges we have been facing in our industry, and making our Expo relevant for you and the other 10,000-plus expected attendees meant incorporating, not avoiding, those challenges in the body of our program.

For example, we are seeing the growing influence and intersection of regulatory policies upon the strategic and tactical engineering decisions we are all making. This Expo, set for Tuesday through Friday, June 19-22, will occur one month before the July 2007 **FCC** mandate for separable security in all our new leased set-top boxes, a policy issue that has occupied a lot of engineering resources. We also are facing the issue of network neutrality—the resolution of that debate will have tremendous implications for our high-speed data platforms, services and architecture.

How do we tackle such challenges in the Expo 2007 program? By focusing on what we are doing that is most valuable for our customers. By looking at the technologies and products that have helped evolve our service set to take best advantage of our HFC capabilities: First in our digital video platforms, through new compression techniques and other advances that exploit best our robust

bandwidth; then in high-speed data, with equally innovative new technologies to control, shape, monitor and expand our platforms and enhance the advantages of our return path; and then by examining the other critical technical improvements and challenges that face our key growth areas of video on demand (VOD), voice over Internet protocol (VoIP), and other IP-based services that rely upon our carrier-class architectures.

And we want to bring these key understandings and new developments to you in a way that not just educates but also provides relevance and immediacy. We’re doing this by making SCTE Cable-Tec Expo 2007 practical, focusing on best practices that you can apply immediately, brought to you by the most effective speakers in our industry. Above all, we want to infuse the Expo 2007 program with an enthusiasm that motivates you in the best professional ways.

We have shaped this Expo program based on a lesson that

“We have shaped this Expo program based on a lesson that many of us have learned well: ‘Make things easy for our customers!’”

many of us, including our host Bright House Networks Orlando team and their neighboring Tampa Bay colleagues, have learned well: “Make things easy for our customers!” In our increasingly competitive markets, that objective has become a valuable field practice and an effective technical design principle. It begins with the basics, including carefully completing integration tests to anticipate how our customers will experience our products, and from there requires a fervent desire to constantly learn and improve. This approach grows our business and strengthens our platforms.

It is a goal we all share—to continuously learn so we can provide the best services to our customers. In that spirit, I look forward to welcoming you to SCTE Cable-Tec Expo 2007! [↩](#)

Nomi M. Bergman is EVP, Strategy & Development, for Advance/Newhouse Communications. Reach her at NMB@advancenewhouse.com.



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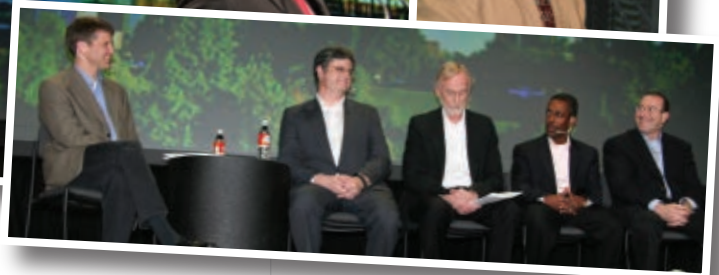
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Got news, quotes or photos of people in the broadband cable engineering community? Send it to mrbuck@accessintel.com for possible inclusion on this page in future issues.



CommTech Jeopardy All-Stars (l-r, top): Jason Farmer, Matthew Maddock, Michael Gates, Eric Somerset and Dennis Berris. **SCTE Cactus Chapter strategy meeting attendees: (standing l-r):** Terry Dockery, Rosa Rosas, Joey Patrick, Bull Lutz, Ron Stoneburner, Manny Moreno, Suzanne Holzer, Dana Gilstrap, Craig McCoach, Jay Blount, Ernie Spicer, Scott Owens; **(seating l-r):** Brenda Hunt, Jim Mess, Bob Riddle.



SCTE Conference on Emerging Technologies keynote Dr. Robert Metcalfe (top right), general partner, Polaris Venture Partners.

ET 2007 Program Chairman Ray Sokola (top left) CTO, Motorola Connected Home Solutions.

Cox VP Technology Jay Rolls (far left, on panel) moderator of the first of two sessions on "Service Velocity & Next Generation Architectures." Joining him (l-r): Michael Patrick, Motorola; Russ Coffin, Nortel; Ben Bekele, Cox; and Alon Bernstein, Cisco Systems.

PEOPLE

O'Leary to Comcast

Comcast named Mark O'Leary regional VP of Business Services. He will be responsible for Comcast's strategy for the business services market in Central California. Among other positions, O'Leary has served as EVP of Broadband Services at Excite@Home and VP Managed Network Services for AT&T in Northern California.



Buchanan Joins CMC

The **Comcast Media Center (CMC)** appointed Richard Buchanan VP of Operations. A 30-year veteran in video production, management and distribution for the entertainment and enterprise markets, Buchanan will oversee the CMC's services for traditional and new media, including its linear and live event TV origination business and emerging services, such as VOD, eTV, iTV, and store and forward operations, and the CMC's advertising services.

Skarica to Lindsay Lindsay Broadband

named Christopher Skarica VP of Engineering. He had served as VP of global technical sales for **Broadbus Technologies**. Prior to that, he had served as chief technology advisor for **Nortel's** global cable/MSO team. He has also held engineering management positions with **Rogers, Maclean-Hunter** and **Cogeco Cable**.



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