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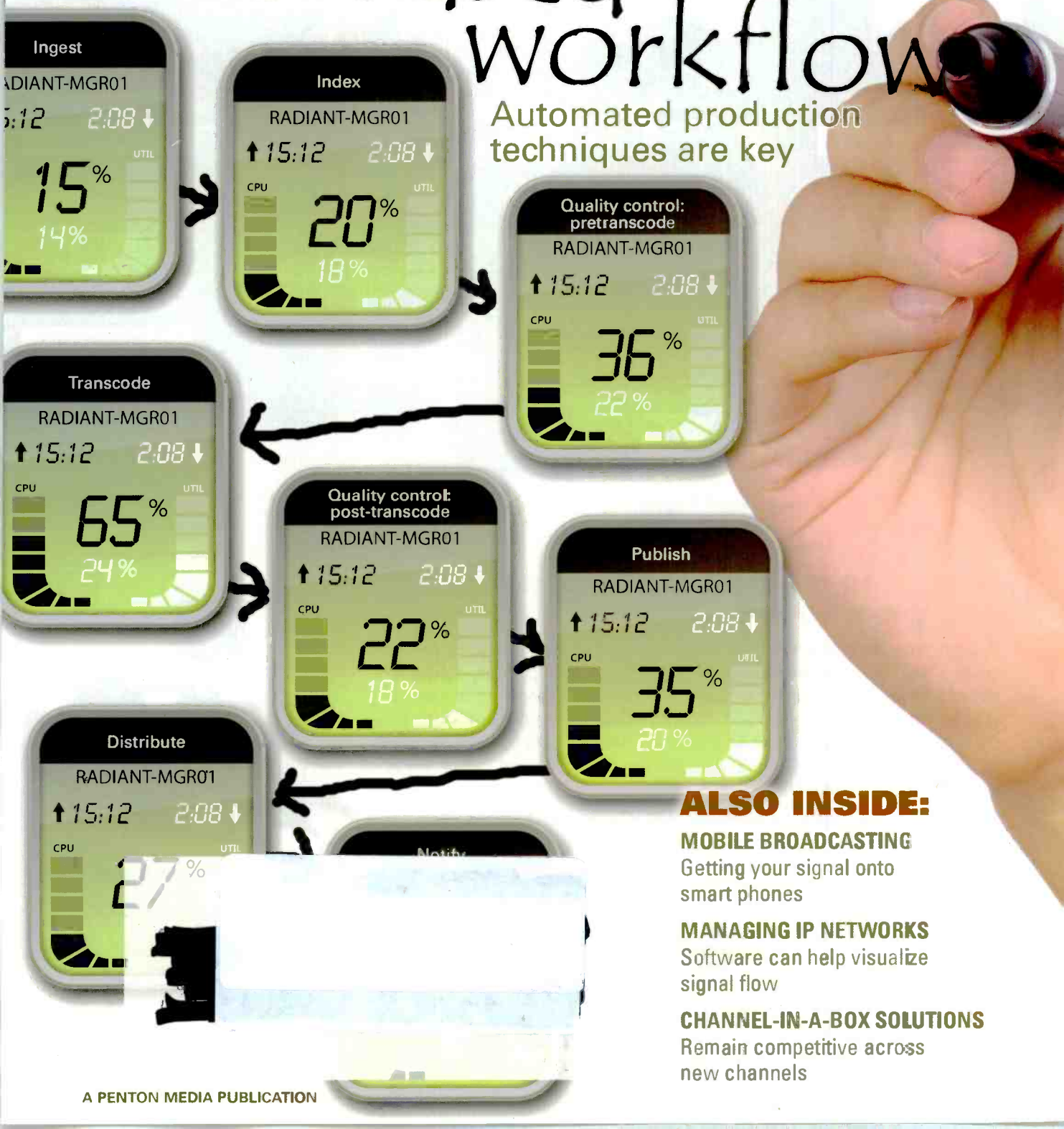

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TABLE OF CONTENTS

VOLUME 52 | NUMBER 5 | MAY 2010

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FEATURES

BEYOND THE HEADLINES

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FCC UPDATE

DIGITAL HANDBOOK

TRANSITION TO DIGITAL

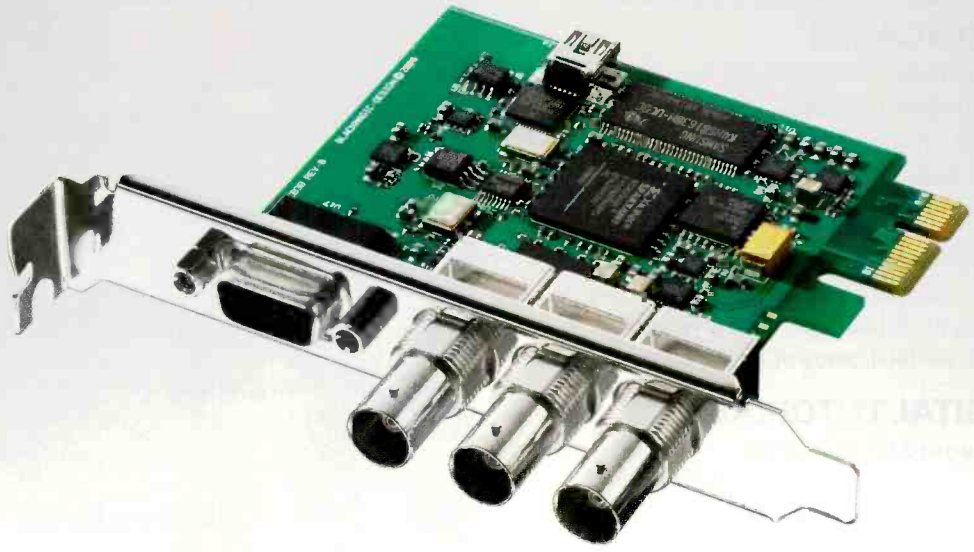
COMPUTERS & NETWORKS

PRODUCTION CLIPS

continued on page 6

ON THE COVER:
Building a file-based workflow can help better prepare content for distribution formats like online, video on demand and cable.

Blackmagicdesign



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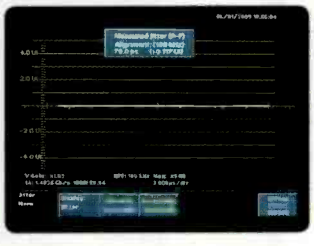
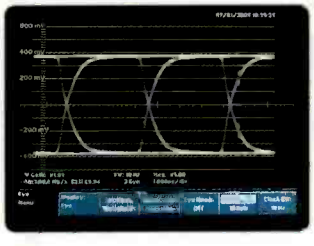


SDI Eye Pattern in SD



SDI Jitter Performance in SD

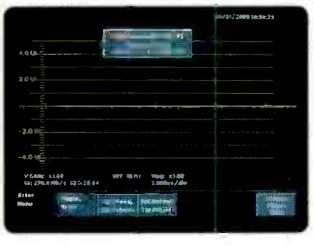


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TABLE OF CONTENTS (CONTINUED)

VOLUME 52 | NUMBER 5 | MAY 2010

SYSTEMS INTEGRATION

SHOWCASES

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NEW PRODUCTS & REVIEWS

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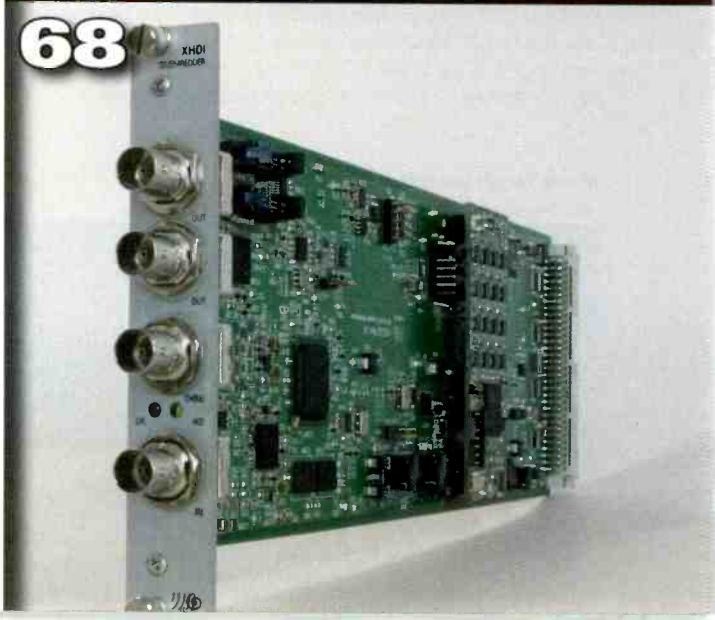

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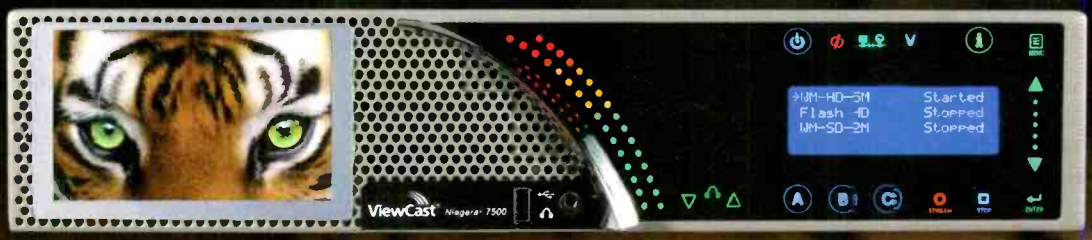

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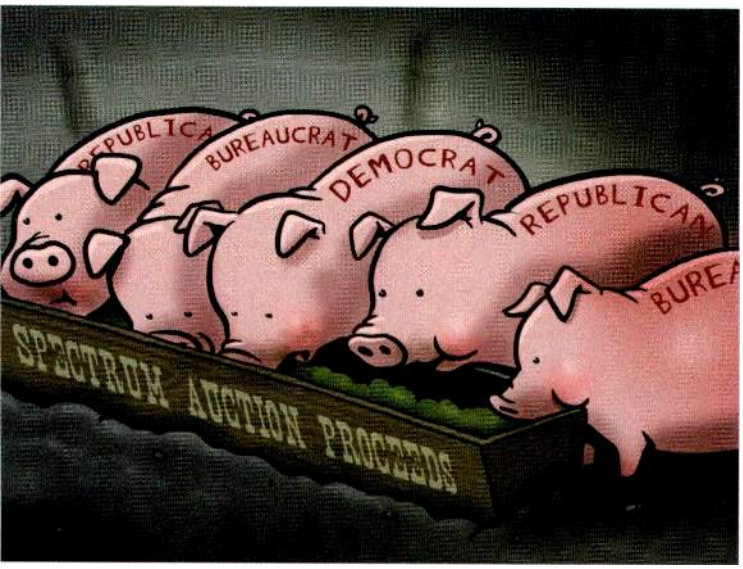
The money trough

The stage is set for a seismic battle between the over-the-air (OTA) broadcast industry and the most powerful political animals in the world: a Congress hungry for both money and control. FCC Chairman Julius Genachowski has just given these ambitious animals the scent of both.

Broadcasters are open-minded about technological changes. After spending billions, these professionals have completed the move to digital, most have implemented HD, and some are even now broadcasting mobile video. These business people are not stubborn about implementing new technology and solutions when it benefits their audiences — and bottom line. However, the latest round of government proposals has even the most optimistic TV station owner feeling a bit nervous about the future.



A month ago, the FCC released its long-awaited National Broadband Plan (NBP). This plan promises a financial nirvana while simultaneously predicting data catastrophe if it is not implemented. In the 25 years I've been following FCC activities, the commission has never executed such a carefully orchestrated public relations campaign for anything. In fact, the NBP was being assembled long before Genachowski was approved as FCC chairman. Only later did we discover that the FCC's 300-page tome cost U.S. taxpayers $20 million. That works out to $50,000 per page, or $50,000 per day, however you choose to calculate it. Even so, if the NBP were to be implemented as written, the document's $20-million cost would represent but a tiny part of a trillion-dollar government expansion program and forever change the broadcast industry and how Americans receive TV.

The justification for change isn't so much in question as how it's going to happen. If offered money, some broadcasters are going to take it. From a capitalistic viewpoint, that could be seen as just one less competitor. If broadcasters operated in a free marketplace, fewer competitors might be good. The problem is that OTA broadcasting is no longer a free-market business. Congress and the FCC increasingly have seen it fit to micromanage broadcasters and their business, often while giving some competitors a free ride.

A spectrum auction represents a threefold dilemma for broadcasters. First, many will argue that broadcasters should not be paid a penny because it is the "public's spectrum." That alone will make it difficult for politicians to justify using auction money to compensate a local OTA broadcaster for its loss.

Second, the NBP promises trillions of dollars in benefits. What politician will argue against receiving billions of dollars in auction fees and the claimed trillions of dollars in benefits? After all, this has been called a crisis, and Congress' solution to any crisis is more money — spending, taxing or both.

Finally, if the "incentive auction," called the *carrot approach* by some, doesn't work, there is the *stick approach*. That ultimate FCC tool was insinuated by Democrat Commissioner Michael Copps. When it was suggested broadcasters might not agree to an incentive auction, he responded, "I've always been a believer in use it or lose it, [and] licenses all expire." Let me interpret what he said. Either you cooperate and do what the commission wants, or the FCC may take your license. The battle lines are drawn.

Unfortunately, our industry's representative organization, the NAB, has lost the last several rounds with the FCC. Let's hope its new guy is better trained in political guerilla warfare than the last one. Our future depends on it. BE

Brad Dick
EDITORIAL DIRECTOR
Send comments to: editor@broadcastengineering.com

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Universal cameras

Dear John Luff:

In the March 2010 edition, you claim that universal cameras can be constructed for different resolutions. You are overlooking the fact that the optical low-pass filter (OLPF) can be optimized for one resolution only.

This is the main problem of all current HDSLRs. It leads to false detail and massive aliasing, like moiré on repetitive structures in focus.

Uli Plank
Institut für Medienforschung
Hochschule für Bildende Künste Braunschweig
Braunschweig, Germany

John Luff responds:

First, I concur entirely. The physics of imaging do not allow all things without compromises. The question becomes: At what cost can we avoid compromise today in cameras varying in price by about two orders of magnitude, and with optics that vary by the same amount? The design of a complete system must take into account the effects of sampling, and low-pass optical filters have been in cameras for a generation. DSLRs, the subject of your letter, were not the only topic of my article, but they are of increasing importance in the marketplace.

One would hope that any professional shooting with a camera and lens costing less than $5000 would not expect the performance of digital cinema cameras, but of course you are exactly correct. Not understanding the limitations of the tool could well lead to the assumption that the tool is defective when it is simply not optimized for that use. The truth is that no one is willing to say much about the secret sauce, how the live video in DSLRs is produced from a Bayer sensor with many times more pixels, whether they take into account any optical filtering or how they convert from "Bayer space" to 1080p. As one expert told me, "It appears they do make final choices on pictures and not test charts," though lots of threads about aliasing in DSLR video can be found in even a cursory search.

Survey says

The "Nielsen: Broadcast-only TV households to slip below 10 percent" article in the May 4 "HD Technology Update" newsletter certainly caught readers' attention. Here are two comments about the article.

Dear editor:

Sacrilege alert: I really think that Nielsen may be wrong.

As someone who has seen cable subscriptions drop because of the recession in an area utterly underserved and overpriced by cable, satellite and broadband providers, I honestly think Nielsen's methodology is flawed, its results are skewed and the whole survey is, in a word, unbelievable. Isn't this the same organization that swore up and down that America was ready for the DTV transition?

Do any of these research organizations, or the government for that matter, gather information beyond America's city limits? My guess: no. That's why the whole notion of the broadband spectrum crisis is a farce as well. This "crisis" was caused by the FCC and the consumer electronics industry, not broadcasters. I have a feeling that a large part of mainstream America couldn't care less if someone's iPhone runs slowly and they can't update their Facebook page from a local bistro.

America ought to worry more about the promise of giving spectrum to emergency services, which still has not happened, and ask why it has not instead of whining about their cell phones not being able to access the Internet. When the next Hurricane Katrina happens and the grid goes down, our 3G and 4G networks die with it. Who's left to inform the public about how to save themselves? Broadcasters and emergency services.

Mark

Dear editor:

Here we go again with flawed Nielsen data. Does anyone remember the DTV mess? Nielsen claimed 10 percent of households weren't ready. The actual number was closer to 40 percent.

For OTA in Los Angeles, 10 percent is simply wrong! In this six-county DMA, the number using antennas is still well over 25 percent. Cable companies have been losing subscriptions because of the recession, and it's the same at DIRECTV and DISH.

It is time for Congress to act and require one seat on the FCC to be held by a practicing engineer (certified by SBE), not D.C. lawyers or their academic buddies. This flawed data will be used by the FCC chairman for his 20-channel wireless spectrum grab. The data is flawed, and so is the FCC's approach.

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Channel in a box

The openness of a digital channel in a box allows you to stay competitive with viewers' changing needs.

BY PETER LEVY

The FCC mandate for the digital conversion was a costly and challenging endeavor for the broadcast industry. The conversion did, however, create valuable additional bandwidth and opportunities for local broadcasters. The productive use of the additional digital bandwidth has been slow to evolve partly because of the economic downturn and the lack of available, efficient revenue-generating products. Considerations such as brand extension to local and increasingly hyperlocal audiences, competition from other forms of media, budget and manpower constraints, and the upcoming mobile TV arena have caused a considerable amount of consternation for stations as they attempt to make decisions about how to attract an ever more distracted viewing public.

A channel-in-a-box system should be able to process and share information from multiple platforms, such as the Web, mobile TV, streaming, digital tier or traditional broadcast television.

The convergence of the Web, digital television and mobile TV, as well as the severity of the economic downturn, is more than ample cause for stations to rethink their digital tier strategy. Station management teams are being challenged to employ systems and processes that are capable of delivering their content and programming on a variety of platforms in a single efficient system that minimizes the strain on the stations' resources.

The concept of the digital channel-in-a-box system is an appealing, albeit elusive, objective for broadcasters. The solution must have the flexibility to meet a variety of viewer and advertiser demands, ease of programming and the dexterity to handle a variety of content types and formats. The single-system, channel-in-a-box approach is a cost-effective and flexible solution that addresses many of the configuration and station needs for a digital tier programming system.

Programming

Selection of programming for the digital tier is difficult because of the rapid evolution of competing industry media. If broadcasters select a digital tier product or system that is locked into a single type of content — such as weather, news, movies or sports — and the market demands change, broadcasters will be left with equipment and systems with greatly reduced viewership and revenue generation.

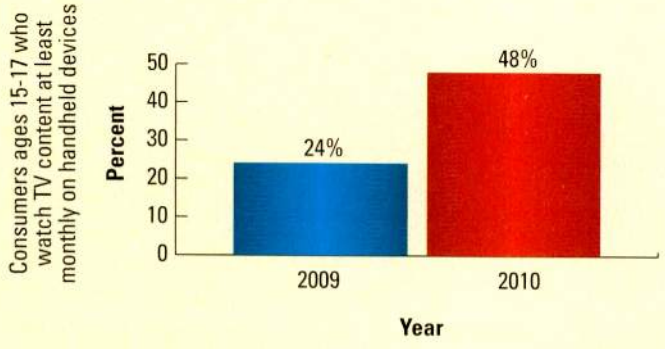
Over the past six years, there have been many options available to broadcasters for airing on their digital tier (NBC WxPlus, MGM, RetroTV, The Tube, MyTV, etc.), but few options have actually generated a consistent revenue stream and a profit for the station. Many of the companies providing digital tier content over proprietary platforms are no longer in business, leaving stations with useless equipment and looking for a viable solution.

Networks are scrambling to find programming that appeals to the masses, creating an opportunity for local television stations to target their local viewers on the digital tier. Television stations have spent many years establishing local content and brands in their markets. Critical to the survival of local broadcasters is the ability to expand their brand in the market and easily move their content to multiple platforms.

FRAME GRAB *A look at the issues driving today's technology*

Young people consuming TV on handheld devices increasing

48 percent of 15-17 year olds consume TV on mobile devices monthly.



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System considerations

An automated workflow is the single most important factor at the station level when selecting a digital tier channel-in-a-box solution. Engineering and IT resources are being cut, and monetary resources are limited. Some of the systems being aired today require full-time staffs to operate; this will dramatically cut into the station's return and viability of succeeding as the digital tier evolves. Systems that are fully automated and aggressively supported by their vendors are required to ensure the highest probability of success in the local market.

Integrating a new digital programming channel with other station equipment is a critical factor in determining the automation and flexibility of the systems the broadcasters consider. If the new system can interface with the station's existing equipment and is transparent with other station platforms, it expands the capability and flexibility of what broadcasters air and how robust the presentation will be.

The workflow for the digital channel system should incorporate full integration with all of the content the station generates. Once content is generated at the station, the digital system should be able to ingest the content without further configuration. The more flexible the content capabilities of the digital system, the greater the opportunity for a higher return on investment (ROI) at the station. The digital system should also be able to process information and share additional information between a variety of platforms including Web, digital tier, mobile TV, streaming and traditional television broadcasts.

Ideally, the digital channel system should be content agnostic. The concept of content agnosticism allows content and video to be ingested from a wide variety of sources and formats, automatically, without further configuration by the television station. Types of content should include websites, XML/RSS, AP/ENPS feeds, wire feeds, school closing, National Weather Service, videos, live video feeds, simulcast video, digital media, etc. To ensure the flexibility of the system, it will most likely require nonproprietary formats for data acceptance.

The digital system should also include an integrated digital video server for content and commercial playback and be capable of integration with existing servers. It should also provide an integrated traffic and automation interface designed specifically for the playback and billing of commercial and other revenue content on digital tier channels or at least integrate with existing traffic systems. The cost of a second license on the current traffic system is often a prohibitively expensive method of trafficking the digital channel, so an integrated system by your digital channel supplier may be the best option.

Traditional 30- or 60-second spots are giving way to logo placements, sponsorships, product placement and paid programming.

Generating revenue

Advertising flexibility should be another consideration when looking at digital channel systems. The days of 30- or 60-second spots are giving way to logo placements, sponsorships tied to specific content, product placement and paid programming. Many nontraditional types of revenue-generating sources that have been successful on the Web and have been key revenue sources for the newspaper industry — classified ads, real estate, obituaries, employment ads — are starting to find their way to the digital tier. Many stations are also finding opportunities with new, nontraditional advertisers because of the substantially lower cost to air ads on the digital tier. As sponsors and sales departments demand more options to generate revenue, the digital tier system will have to be flexible enough to handle the requirements.

The ability to ingest and display local information on the station's digital tier system with virtually no station involvement creates a high ROI. Several systems available today allow a fully automated workflow solution, allowing the broadcaster to start the workflow with a third party inputting the information, which is then pushed to the station's Web page and then directly to the on-air display system. This type of automation workflow provides a turnkey website and digital tier presentation, which doesn't need to be managed by the station.

FCC compliance is an area that is still under review on the digital tier. If you select a system today for the digital tier that includes the three primary FCC mandates — EAS notifications, closed captioning and children's programming — the future costs associated with these items on the system will be controlled, and broadcasters will not have to worry about integration issues in the future.

One additional consideration may be the capability of the system to stream your channel to your Web page and to mobile TV spectrum in the future. The efficiency of the system configuration and output should be carefully analyzed. If the broadcaster can use the same system for creating its digital tier and mobile TV applications, many efficiencies in

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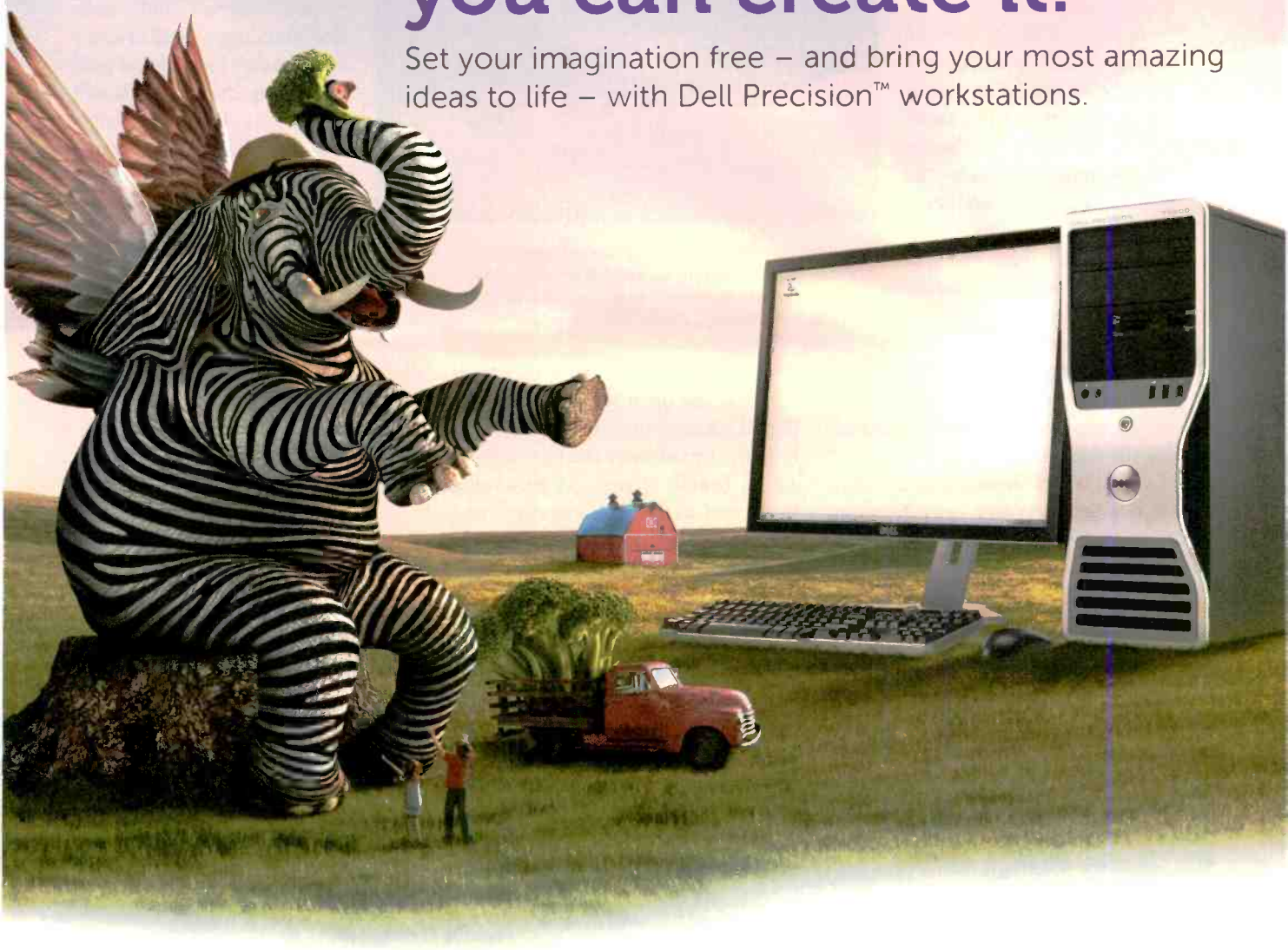

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both personnel and financial resources will be realized.

Summary

To be successful on the digital tier, broadcasters must be as flexible as possible in content and platform, having the ability to change programming quickly to match local viewers' and advertisers' changing needs and viewing habits. The system must also be transparent with the other equipment and content at the station, allowing the station personnel to create content once and push it out to a variety of platforms including the digital tier.

Broadcasters should consider digital tier products that operate on an open platform with nonproprietary software and equipment that is flexible enough to adapt to a variety of content. The open platform of a true digital channel-in-a-box system allows the broadcaster the flexibility to air its brand, change programming easily and as often as required, and to stay competitive with the rapidly changing needs of its viewers.

Revenue sources from the Web and newspapers, such as obituaries, are starting to appear on digital tiers. New or nontraditional advertisers are also interested in the lower costs to air ads on digital tiers.

Investment in an automated digital channel system — which capitalizes on the station's current look, staff, and branding — will create a high-quality local digital programming channel. This will satisfy the FCC's demands for local digital programming while generating additional revenue at a low cost of production.

If stations use the right combination of products and services by virtue of an open-platform, content-agnostic digital channel in a box, they will be able to optimize their return on investment and generate a profitable "new" revenue source with their digital channel programming. BE

Peter Levy is the president of Weather Metrics.

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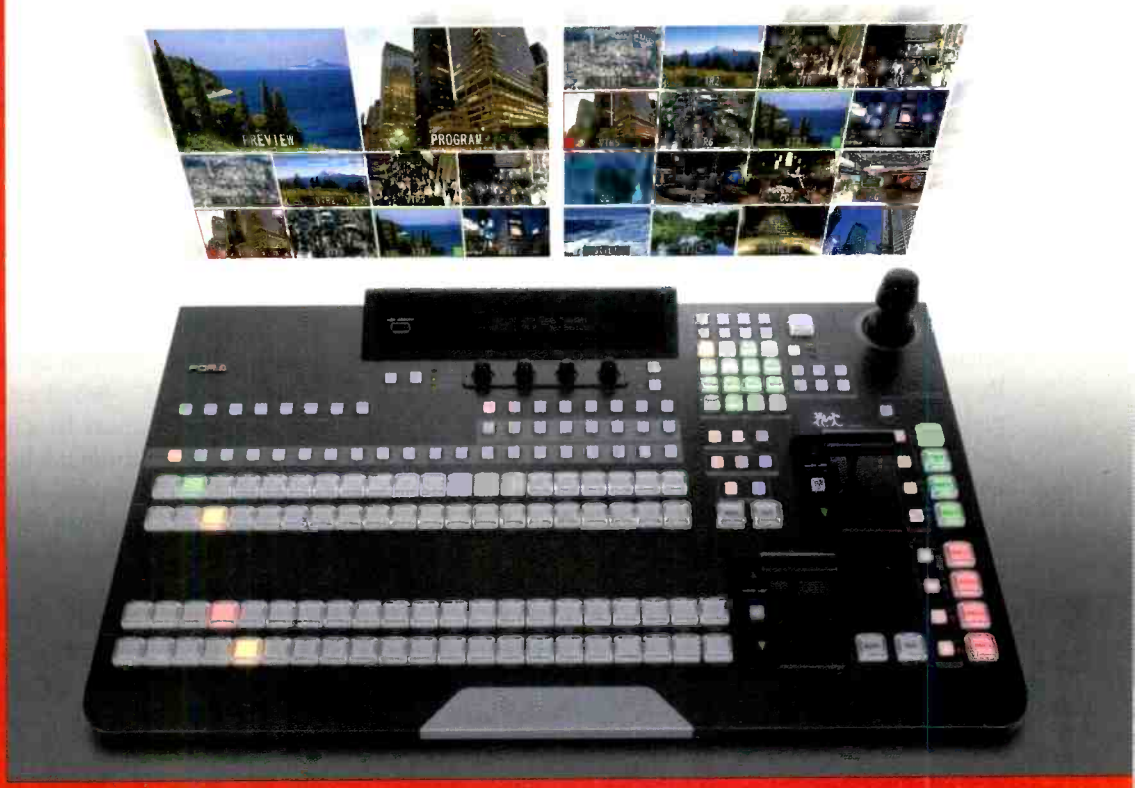

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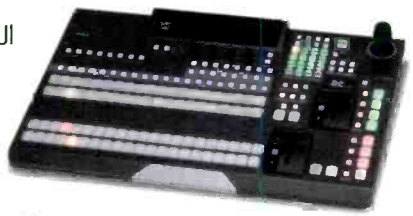
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Retransmission consent

The FCC proposes to overhaul retransmission consent.

BY HARRY C. MARTIN

In the wake of the recent well-publicized disputes between cable companies in the New York area and the Fox and ABC TV stations there, the major cable and satellite program providers (MVPDs) have asked the FCC to establish a new regulatory framework to govern negotiations for retransmission consent. During the New York disputes, the local Fox and ABC affiliates threatened to pull their programming, including New Year's Day football and the Oscars, off the affected cable systems.

Arbitration of disputes

The MVPDs are urging the FCC to impose a mandatory arbitration process and to require that MVPDs continue to carry stations when parties cannot reach a deal providing for retransmission consent. This system would come into play at any time a cable or satellite operator claims that the parties cannot reach an agreement. Once the dispute resolution process is invoked, the appropriate compensation level would be established by arbitrators rather than through direct negotiation between the parties. Because such a process could last for a year or more, during which the broadcaster could not pull its programs from their systems, the MVPDs would gain an advantage through the proposed regulatory scheme.

Ancillary carriage

The proposal, if adopted, also would prohibit a broadcaster from demanding carriage of other programming services in return for the right to carry a broadcast signal. Such a demand would be considered a per se violation of the "good faith" negotiation requirement that will apply to preliminary negotiations. The MVPDs suggest that the FCC should allow such ancillary carriage arrangements, but only if the MVPD consents to them.

Changed environment

During the 18 years since passage of the Cable Act of 1992, which permitted TV stations to elect between negotiating retransmission consent agreements with MVPDs or invoking must-carry rights, the competitive environment has changed. In 1992 local cable systems had monopolies in terms of retransmission of local broadcast signals, making it difficult for the stations to achieve much more than basic carriage of their signals. In today's marketplace, however, local cable systems face competition from satellite providers such as DIRECTV and Dish Network, as well as from telephone companies such as Verizon with its heavily-marketed FiOS system. While more than 200 channels of nonbroadcast programming may sound tempting, the viewing public continues to demonstrate an affection for broadcast TV programming.

Broadcasters have substantially more bargaining power in this environment than they did in 1992 and can risk losing carriage by one MVPD because their programs will continue to be carried by the others in the market. Moreover, MVPDs cannot afford to lose carriage rights to their subscribers' most popular TV shows.

To add appeal to their plan, the MVPDs argue that their proposal is consumer friendly because it will eliminate the loss of popular TV shows due to ongoing private disputes. This may resonate with the commission given the public outcry that occurred over the threatened disruption of sports programming and the Oscars earlier this year.

Advocacy on all fronts

There is a big political push behind the MVPD proposals. A letter was already sent to Congress raising the points to the House and Senate Commerce Committees. The NAB has fired back with its own letter to those committees. In Congressional testimony in March, Chairman Genachowski said the retransmission consent process "is a subject that should be looked at seriously . . . for a framework that works for consumers." Ten days after the MVPD petition was filed, the FCC issued a public notice inviting comments on it. The extended deadline for comments was May 18. BE

Harry C. Martin is a member of Fletcher, Heald and Hildreth, PLC.

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Dateline

- Noncommercial TV stations in Arizona; Idaho; Maryland; New Mexico; Nevada; Utah; Virginia; Washington, D.C.; West Virginia; and Wyoming must file their biennial ownership reports by June 1. The biennial ownership reporting date for commercial TV, Class A TV and LPTV stations has been suspended pending a further redesign of FCC Form 323.
- June 1 is the deadline for TV stations in Arizona, Idaho, New Mexico, Nevada, Utah and Wyoming to electronically file their broadcast EEO midterm reports (Form 397) with the FCC.
- June 1 is the deadline for TV stations licensed in the following states to place their annual EEO reports in their public files: Arizona; Idaho; Maryland; Michigan; New Mexico; Nevada; Ohio; Utah; Virginia; Washington, D.C.; West Virginia; and Wyoming.

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Mobile video technology

What does the ATSC-M/H standard mean for you?

BY ALDO CUGNINI

With the ATSC standard for mobile DTV released last year, and the potential for a half-billion worldwide mobile TV subscribers by 2013 (according to ABI Research), this is the year that mobile video services and devices will make it into the U.S. marketplace. The ATSC Mobile/Handheld standard A/153 (also called ATSC-M/H or simply ATSC Mobile) is a backward-compatible enhancement to the existing ATSC A/53 standard for digital television transmission. (See Figure 1.) New devices can decode either the mobile or the main stream, and existing devices can continue to operate by decoding the main stream alone. This month, we'll describe the high-level features of the standard.

ATSC-M/H is organized into eight parts: system description, RF and transmission system, service multiplex and transport subsystem, announcement method, application framework, service protection, video coding, and audio coding.

RF and transmission

To improve reception reliability for moving receivers over that of ATSC A/53, ATSC-M/H uses additional training sequences and FEC. Because power consumption is a critical factor for handheld receivers, the standard also provides time slicing, which allows the receiver demodulator (a high consumer of power) to cycle on and off, resulting in power savings. This is possible because the M/H data is organized into groups called *parades*, wherein each parade can carry different kinds of services. It is rarely necessary that a receiver simultaneously decodes all of the services present in a stream.

Because the total bit rate for an ATSC transmission is fixed at 19.4Mb/s, the M/H data stream must borrow bandwidth from the main channel. This main data rate loss (MDRL) can be set between 0.9Mb/s and 7.3Mb/s. The efficiency of this loss will vary, however, as the M/H stream requires overhead for additional error protection. This overhead can be set, upon transmission, and presents a trade-off between the payload data rate (PDR) and error resiliency.

ATSC-M/H uses additional training sequences and FEC to improve reception for moving receivers.

The heart of the M/H error protection scheme uses what is called a serial concatenated convolutional code (SCCC). The standard defines two SCCC rates, namely 1/4 and 1/2, and these can be applied separately to different arrangements of RS frames, which are selectable groupings of services providing the same QoS. Fundamentally, the SCCC rates imply data efficiency (data-to-overhead) ratios of 25 percent and 50 percent, respectively. However, the actual throughput efficiency is a more complicated function of these rates plus other overhead data. In addition, different services can be grouped together into the different RS frames. To give an idea of the boundary conditions, the total PDR can vary from 152kb/s (at

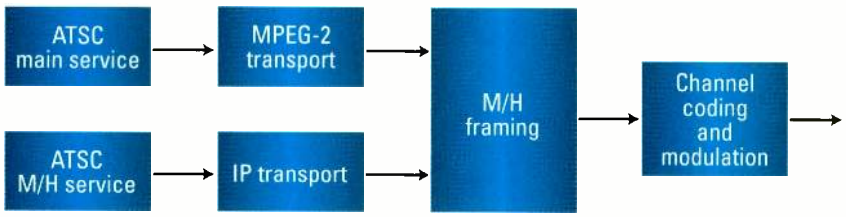
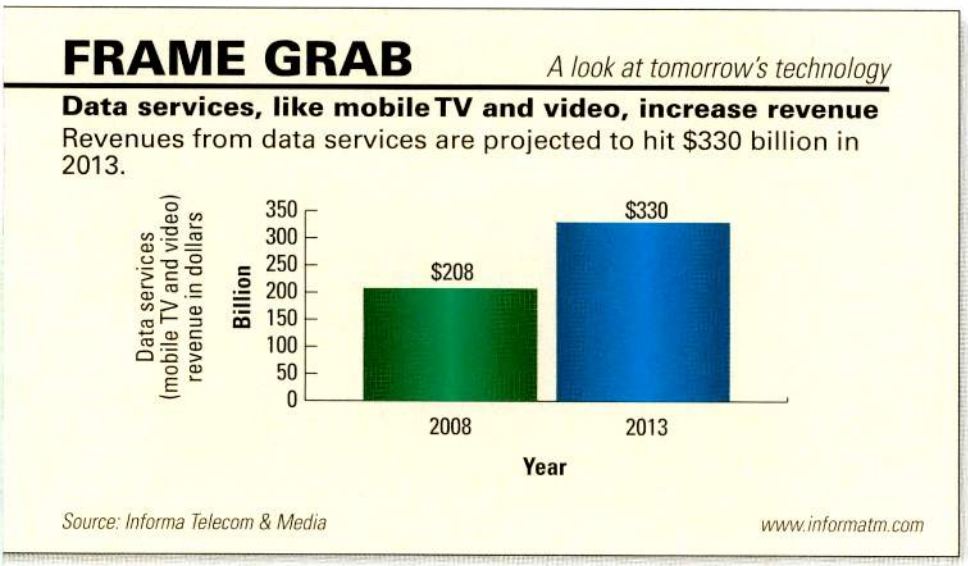


Figure 1. ATSC-M/H adds a new mobile service to the existing main service.



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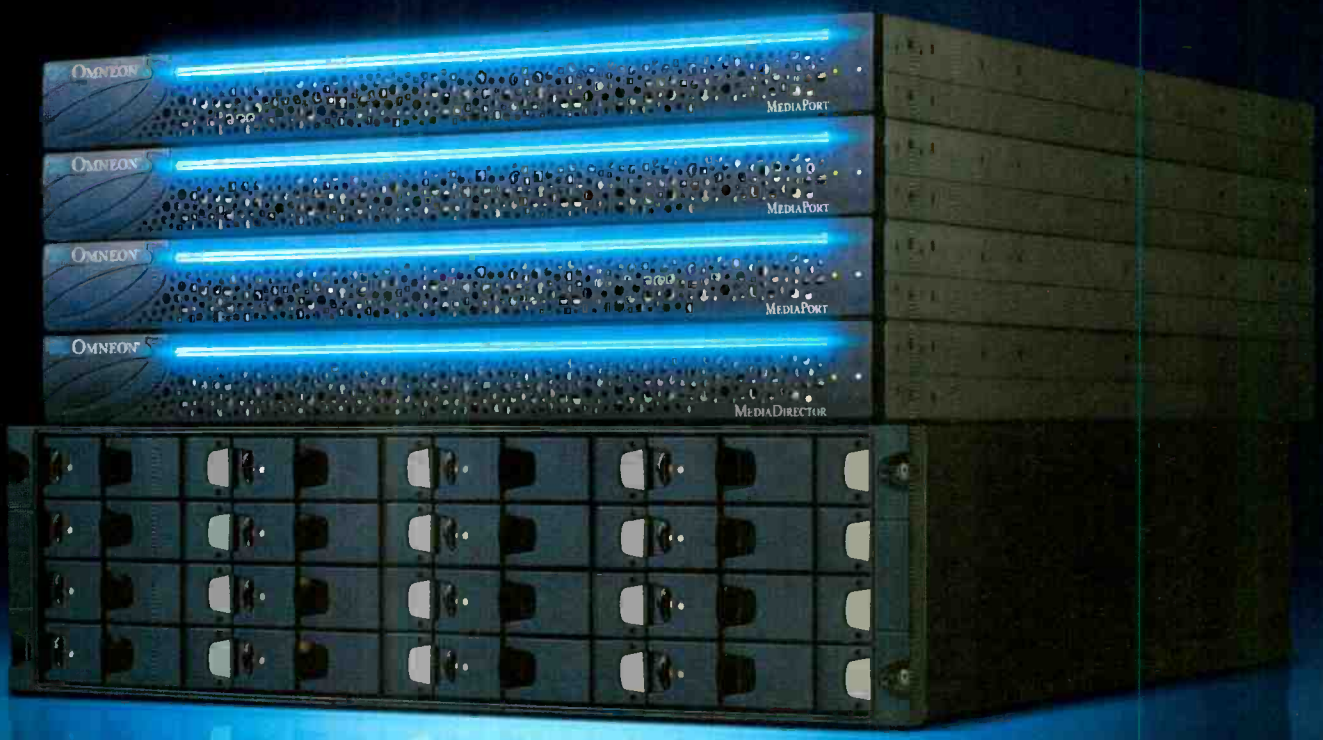

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Payload data rate (kb/s)	Main data rate loss (kb/s)	Efficiency	QoS
152	917	16.5 percent	highest
312	917	34.0 percent	
1258	7334	17.2 percent	
2529	7334	34.5 percent	lowest

Table 1. Sample ATSC-M/H data rates and efficiencies

the highest QoS) to 2.5Mb/s (at the lowest QoS), while the MDRL can vary between 0.9Mb/s and 7.3Mb/s. Numerous combinations of PDR and MDRL are possible; a few are shown in Table 1.

Transport and services

The ATSC mobile service multiplex and transport subsystem supports various mechanisms for delivering multimedia to portable devices. Whereas the main channel service was designed to carry A/V transport streams, ATSC-M/H was designed to carry IP datagrams. (See Figure 2.) These are network layer packets that contain data together with source and destination information, intended for transmission over a network where a reception acknowledgment is not relayed back to the source. In other words, IP datagrams map the concept of an IP network onto a lossy medium such as broadcast transmission. IP-based delivery allows for the implementation of an interactive application software stack that is compatible with existing mobile delivery standards.

IP-based networking forms the backbone over which the Internet operates, by means of Transmission Control Protocol/Internet Protocol (TCP/IP). TCP/IP, however, requires a two-way communications path to allow the retransmission of lost packets—something that broadcasting does not provide. For this reason, User Datagram Protocol (UDP) is used on top of IP, which is a connectionless protocol that does not set up a dedicated end-to-end connection. UDP requires only a small transport layer and provides packets with definite boundaries, which aids in synchronization. UDP does not have a method for time stamping, however, so Real-time Transport Protocol/RTP Control Protocol (RTP/RTCP) over UDP (over IP) is used.

Designed for real-time, end-to-end transfer of multimedia data, RTP/RTCP provides methods to achieve jitter compensation and to detect and compensate for out-of-sequence packet arrival, conditions that are common in an IP network. One of these methods is time stamping, which specifies the sampling instant upon transmission of the first byte of the RTP packet. RTP does not guarantee arrival of packets, but the use of sequence numbers can provide an indication of packet loss. The payload type in RTP defines various codecs and allows for future codecs, but this is currently constrained for ATSC-M/H.

ATSC-M/H supports the delivery of many types of content. In IP parlance, TV broadcast would now be called streaming delivery of audio and video using a unidirectional link route (UDLR). File delivery over UDLR is also possible, providing a versatile mechanism for the transfer of data (e.g., HTML, XML and similar files) and applications, as well as nonreal-time caching of content for later consumption.

ATSC-M/H also defines an interaction channel, an out-of-band

bidirectional link route (BDLR), which can be used for carrying out interactive transactions. The form of BDLR channel is not specified but would be implemented by means of a two-way communications channel, such as that provided by a cellular phone. The standard supports the delivery of a service guide over the in-band UDLR channel, or by means of the BDLR channel, as defined in the ATSC A/96 standard for ATSC Interaction Channel Protocols.

ATSC-M/H also supports A/65 captions and parental controls, and provides for graphical overlay support through a standardized application (also called presentation) framework.

Announcement and service protection

A special announcement protocol is used in ATSC-M/H to announce the content and services being delivered or scheduled for delivery. This protocol includes, but is not limited to, a service guide (or EPG) that is sent as its own service. Because this guide could be extensive, a much smaller service signaling channel (SSC) is also sent, which indicates what services are currently available. This allows receivers to quickly display information to the user regarding the immediately available content. Service protection and content protection are also available. The first is used to protect content during its delivery, and the second is used subsequent to delivery.

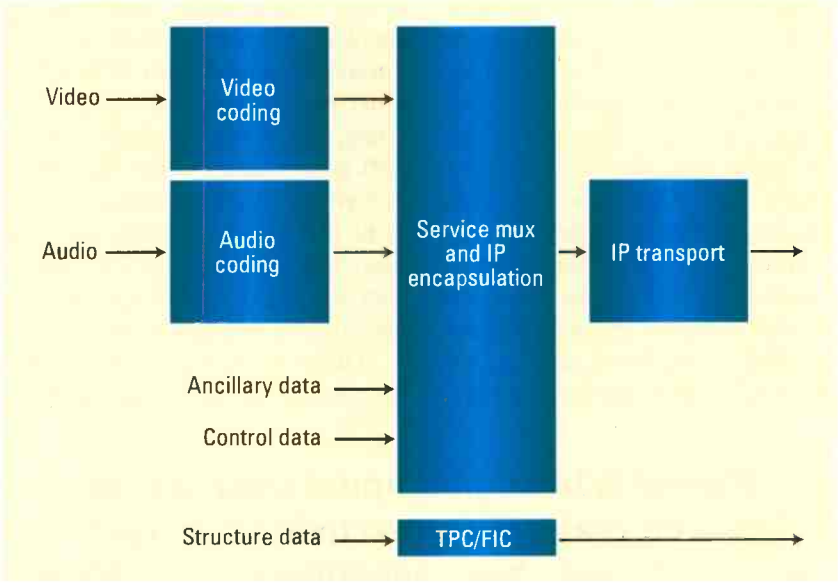

Figure 2. ATSC-M/H uses the IP transport mechanism.

Video and audio

ATSC-M/H specifies MPEG-4 Part 10 AVC and SVC video coding, and MPEG-4 Part 3 HE AAC v2 audio coding. While the standard does not specify the bit rates for video and audio, we can consider an example case: Using 500kb/s for video would provide five program channels using the most efficient mode of transmission. With so many options available, there will no doubt be much experimentation and customization of broadcast configurations. Watch for more details about video and audio coding and interactivity in later installments of this column. BE

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Network QoS

Moving video on Ethernet can be like trying to cut wire with a screwdriver.

BY BRAD GILMER

Increasingly, users have a requirement to interconnect professional video equipment via Internet Protocol (IP) over Ethernet. Many times it's because this is the most readily available technology. But Ethernet connectivity is also generally low cost, and it is ubiquitous, not just between facilities but within facilities as well. Equipment manufacturers have responded by adding Ethernet connections on almost all professional video devices. At first, these connections were not used to transfer video of any kind. Then manufacturers added the capability to move video files on and off of devices via Ethernet. Now it is becoming more common to stream real-time video using Ethernet. However, users have encountered problems transferring video over Ethernet.

What is the problem?

In short, the problem is reliability. As the professional user comes to rely more on IP-based technology, limitations of this technology raise reliability issues that must be addressed. In a way, we are victims of our own success. Someone tries moving video files or real-time video over a network and succeeds. Others then do the same thing, and quickly, the network is overwhelmed by the amount and type of traffic video represents.

The root of the problem is that moving video on Ethernet was never foreseen. We are trying to cut wire with a screwdriver; while you can successfully do it, a screwdriver may not be the best tool for the job. To be fair, it is likely that IP will be the predominant method of video transport going forward, and network engineers have addressed the fundamental issues. That said, it is difficult to achieve reliable professional video transport on generic Ethernet networks.

A brief review of traditional IT QoS

I wrote about this topic in the March column, but let's have a refresher. Using traditional IT QoS, you can guarantee the level of performance across a network. But you should know that QoS is not a thing; you cannot buy QoS. You also cannot set the "QoS switch" on your router and get guaranteed delivery.

Instead, QoS is a framework of policies and technologies that can be used to control the quality of service that your network delivers. At a high level, QoS works by controlling traffic admitted to the network, marking traffic by type (voice, video, data, etc.), and establishing priorities for traffic types so that lower priority traffic gets dropped first when the network gets busy. QoS can also establish guaranteed routes for particular flows so that all packets in a stream flow from source to destination via the same path or reserve bandwidth during a specific time. Other QoS tools exist as well.

The IT world has spent a lot of time and effort to address QoS on IP over Ethernet. It is possible to provide reliable professional video transport across Ethernet networks. But in order to do this, you will need to implement a QoS framework on the networks. For a more detailed discussion of QoS, read the book "Video Systems in an IT Environment" by Al Kovalick.

Other QoS options

When addressing the QoS issue, it may help to stand back from the problem and think outside the box. Do you really need to use IP over Ethernet in this application? If you are trying to cut wire, perhaps you can find a wire cutter rather than use a screwdriver. Here are some other options that can move video from one place to another without the QoS issues associated with creating a managed IP over Ethernet network:

- *SDI/SDTI.* There is not much to say here that has not already been said. SDI and SDTI are well known to the professional video community. SDI routers are recognized quantities. They are nonblocking switches, meaning that if you use every input and every output on a video switch, things continue to function; this cannot be said of almost all Ethernet switches when they are running at the maximum bandwidth on all ports. Furthermore, SDTI can be used to transmit all sorts of data, not just video. And at 1.5Gb/s, SDTI provides high data transfer rates. SDI/SDTI can be a great choice for video transport inside a facility.
- *Fibre Channel.* This technology was developed for high-density, high-speed data transfer. It provides nonblocking transport without the

Now it is becoming more common to stream real-time video using Ethernet. However, users have encountered problems transferring video over Ethernet.

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need to deploy QoS technologies. It is known within the professional video and IT communities. Unfortunately, Fibre Channel is nowhere near as ubiquitous as Ethernet or SDI. It also has technical and financial limitations that make it unrealistic to deploy across an entire facility.

• *ATM.* Several years ago, asynchronous transfer mode (ATM) looked like it was going to be the preferred choice for professional video applications. ATM provided guaranteed high-bandwidth connectivity between devices, was widely used in other industries, supported large file sizes and high speeds, and large switches were available to interconnect the number of devices typically found in a television plant. However, high costs initially limited ATM installations. ATM never really hit its stride in the professional video environment. The issue was not entirely cost-related. In point-to-

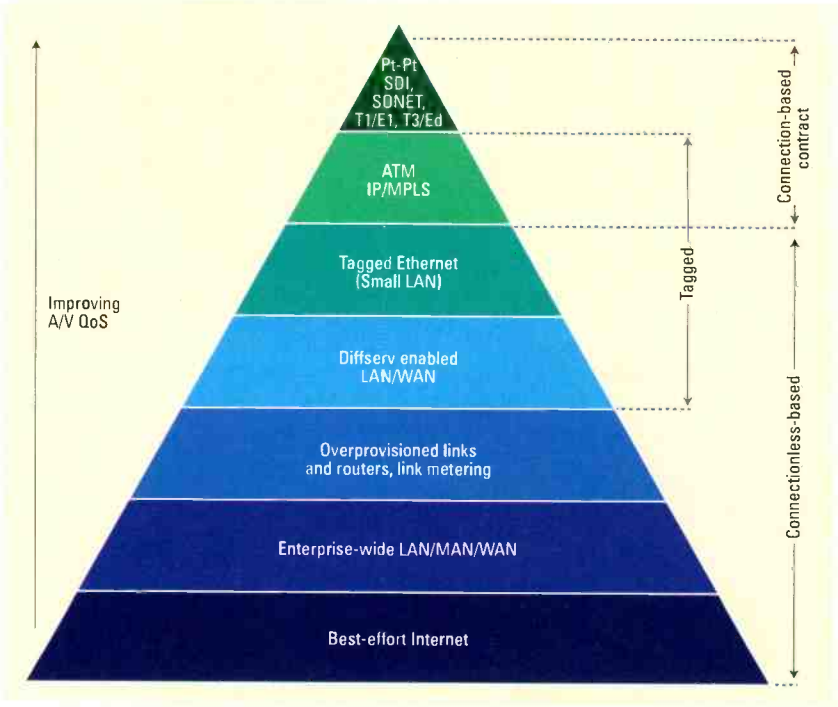

Figure 1. The QoS triangle shows varying levels of QoS based upon the technology employed. QoS is a trade-off between reliability and complexity. Figure courtesy the book "Video Systems in an IT Environment" (*www.theAVITbook.com*).

point applications, SDI was firmly entrenched. In networking applications, Ethernet quickly dominated, eclipsing ATM in all but a limited number of applications.

• *Ethernet without QoS.* Ethernet may be used in professional video applications without a QoS framework. In this case, the lowest cost and easiest implementation in a professional video environment is to simply overprovision your network. Overprovisioning means to provide much more bandwidth than you would ever expect to be used. While overprovisioning would seem to logically take care of any issues you might have with moving video over a computer network, there are times when, even with a vastly underutilized network, video transfers will fail. For example, FTP transfers using generic FTP clients are guaranteed to fail if the delay on the network is high enough, regardless of the amount of available bandwidth.

Determining the optimum QoS solution

Implementing QoS is a trade-off. Whether you choose to use SDI or ATM, which have high QoS built-in, or whether you decide to use Ethernet networks and deploy a QoS framework that delivers guaranteed performance, the final choice will depend upon a number of factors.

As Figure 1 illustrates, you can think of QoS as a pyramid. At the bottom of the pyramid is the best effort Internet. At the top of the pyramid are technologies such as SDI. QoS improves as you go from the bottom of the pyramid to the top. Varying levels of complexity are used to address QoS in the levels of the pyramid. However, it is interesting to note that in the pyramid there is no specific QoS framework at either the bottom or the top of the pyramid. In both cases, the QoS is implied. At the bottom, you get best effort. (If the packet makes it, great. If not, oh well.) At the top using SDI, the video is guaranteed to make it by virtue of the technology employed.

It is up to the facility engineering team to determine the appropriate level of QoS required and to balance the trade-offs between ubiquity and the near universal connectivity of Ethernet, and the implicit extremely high QoS of SDI. As a final thought, it is likely that both technologies will co-exist in major professional video facilities. BE

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SAN connectivity

Proactive management can decrease system costs.

BY STEVE O'DONNELL

A SAN is now a key component of most reasonably sized IT infrastructures, including those handling video production. Today's SAN technology has evolved from its humble beginnings into a mission-critical enterprise IT component. The first SANs were introduced to handle small numbers of enterprise-scale systems being connected to storage arrays a few cabinets away.

The basics

Before we get too far in our discussion, it is important to understand some basic SAN concepts. SANs support block-level access to data. Support for file systems and metadata is contained at a higher level in the operating system code or, sometimes, within a database or Java appliance. There are other types of shared storage that are file-oriented (as opposed to block-level); these are known as network attached storage (NAS) or object stores (ObS).

NAS storage often supports Common Internet File System (CIFS) and Network File System (NFS). CIFS is a Windows-centric file system, while NFS is usually reserved for UNIX-based platforms.

Both NAS and ObS use TCP/IP for communication between the host computers and the shared storage controllers. This IP traffic is usually carried over the LAN rather than a dedicated SAN.

SAN traffic between an application and the storage array is significantly more sensitive to delayed or lost data than is other LAN traffic. To prevent disruptions, the SAN is typically designed to avoid overloading. One common solution is to construct the SAN so that every one of its ports can send and receive at full speed. Unfortunately, SAN connections are expensive, and SANs are cost-constrained. SAN architects must balance cost and risk while recognizing that a mistake can result in outages.

The protocols of the SAN are:

- Fibre Channel (FC)
- Fibre Connectivity (FICON)
- Fibre Channel over Ethernet (FCoE)
- Fibre Channel over IP (FCIP)
- Internet small computer systems interface (iSCSI)

These represent enterprise-scale derivatives of the peer-to-peer small computer systems interface (SCSI) of the 1980s. The latter two, FCIP and iSCSI, are IP-encapsulated protocols and are carried over a LAN.

The first SANs were introduced to handle small numbers of enterprise-scale systems being connected to storage arrays a few cabinets away.

Storage interface and its requirements

Neither SCSI nor its derivatives (FC, FCoE) include a transport layer protocol to perform error correction and retransmission functions. Therefore, they object strongly to data loss. Additionally, SCSI and its derivatives assume a direct peer-to-peer connection between the initiator and the target, so end devices, and the applications that use them, do not tolerate latency and delays well.

FC is implemented at the same protocol level as Ethernet, but unlike Ethernet, it is designed as a lossless protocol with quite predictable latency characteristics. FC was designed to support the sensitive application-to-storage interface by maximizing throughput and reliability.

Also, FCIP and iSCSI have no mechanism to handle LAN overloading. As a result, they are prone to delays and frame loss. These solutions are not suitable in larger environments where engineered levels of performance and resilience are required. Their main benefit is that they can be implemented at low cost on an existing LAN.

FCoE was created to enable network convergence. The result allows delay- and loss-sensitive data flows to share the same physical network as normal LAN traffic. As a result, FCoE is implemented at the same protocol level as FC and Ethernet and uses smart switches to ensure that the FCoE traffic is shaped to provide good application and storage performance.

Enterprise-scale SAN design

SANs are carefully designed to avoid frame loss, latency and delay by integrating nonblocking switch fabrics and a judicious fan-out ratio between the hierarchies of the connected host, edge-switch ports, the interswitch links (ISL) to the core switches and the connections to the storage array. SAN designs typically assume that all hosts may be communicating at full line rate at the same time, implying significantly over-provisioned SAN capacity

Physical layer over-provisioning is compounded when implementing complex, multitier, edge-core-edge

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switch designs for large-scale environments. While intended to provide physical reconfiguration flexibility to accommodate growth, these designs actually introduce substantial additional cost, complexity and resultant risk.

SANs are typically designed around a fan-out ratio between host connections and storage array ports of 6:1 to 12:1, depending on the estimated intensity of the storage activity. Low-utilization hosts can be theoretically supported at the upper fan-out ratios, while highly utilized hosts require much lower fan-out ratios. (See Figure 1.)

SANs are typically designed around a fan-out ratio between host connections and storage array ports of 6:1 to 12:1, depending on the estimated intensity of the storage activity.

SAN design in the cloud

Good SAN design involves balancing high-intensity hosts and low-intensity hosts on the same edge switch to maximize switch use. Choosing the correct fan-out ratio is a difficult enough decision at the initial implementation stage, but it becomes difficult to maintain in a mature and growing SAN. It becomes time-consuming to manage with a virtualized workload that will be automatically and transparently moving between physical hosts and their associated SAN connections in real time.

In a virtualized world, applications are untethered from the underlying physical hardware, the same hardware that has physical network

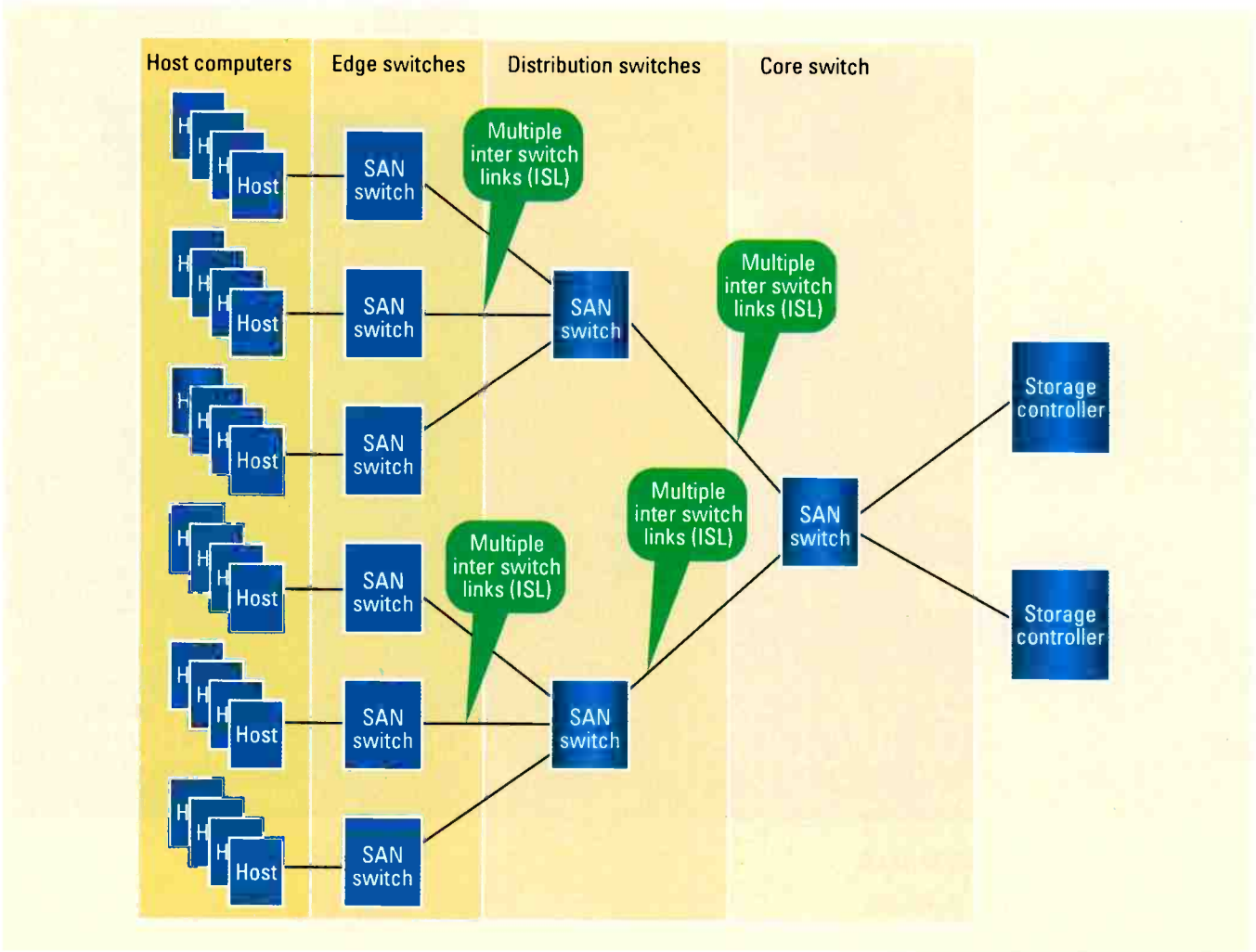

Figure 1. SANs are typically designed with a fan-out ratio between 6:1 and 12:1, depending upon estimated level of the storage activity.

connections to the SAN. For example, a system could enable the migration of an entire running virtual machine, application and all, from one physical host and physical storage system to another seamlessly and without user interruption.

Cloud computing offers many benefits to the enterprise, obscuring the physical complexity of servers, storage and networks from applications. It enables rapid deployment and enhanced availability through outages. Cloud does not, however, offer a free lunch. An inadequate underlying SAN infrastructure will quickly be exposed as more and more workload is virtualized and automated tools move critical business applications between nodes on increasingly larger clusters of servers and storage.

The cloud not only insulates and obscures the physical complexity of the underlying hardware from applications, it has the potential to obscure the cause of an outage. This

Cloud computing offers many benefits to the enterprise, obscuring the physical complexity of servers, storage and networks from applications.

may increase the time it takes for engineers to resolve, and it may reduce the success of initial diagnostics. When using cloud-based storage, it is not unusual for a fairly simple fault that can be repaired in a few minutes to take many hours to diagnose and only after much technical hand-off between multiple support teams.

The choice is stark: Overengineer, pay the price and hope for the best, or adopt a more scientific approach and manage the SAN proactively. BE

Steve O'Donnell is managing director EMEA and a senior analyst at Enterprise Strategy Group.

Editor's note: This feature is based on a September 2009 article, "Storage connectivity and why it is important," on The Hot Aisle, the official blog of Data Centre Solutions.

Managing IP networks

Route analytics software can help you keep your networks in check.

BY RUSSELL BROWN

IP network management focuses on keeping the network up and running smoothly and comprises a number of aspects, including the initial design and layout of the network; selecting the equipment to install; setting up and configuring routers, firewalls and managed switches; selecting and installing security software; managing users; setting policies; and so on. On large networks, these tasks are handled by a whole department, but even small networks require some network management to work efficiently and effectively. As more audio, video and transport streams begin to migrate over to the IP world for transport, it becomes even more important for broadcast engineers to understand and control these IP networks.

Getting started

If you are new to networking or are the kind person who would rather copy files onto a CD or USB drive to move files from one computer to another instead of using the network, it would be best to take a class or pick up a book on network fundamentals before getting started. There are many resources available on the Web to help you get started, including *Broadcast Engineering*'s own "IT Fundamentals" webinar series.

Route analytics

Monitoring a network's operation is imperative, and several software packages, known as route analytics, are available to do this. Using this type of software allows the network manager to observe how the network is working as a whole in real time. Routers send each other instructions of how to route a particular IP packet to its destination. To find the shortest path for an IP packet, the router must know if any of the routers near it will get the packet closer to its destination. By exchanging information between them, routers are able to construct a map of how to get data from point "A" to point "B" via the shortest path.

Route analytics software listens to the inter-router messages and creates a visual map of the entire network, which enables the network manager to actually see what is happening on the network. Routers work at Layer 3, the network layer, of the OSI network model, which is the same layer that the Internet operates on. Routers over the years have become highly sophisticated and can reach out to other routers to understand the entire network to make better routing decisions.

Figure 1. Five areas are identified in the ISO's framework for network management.

Route analytics software also records network traffic, so the network manager can look back and observe what was happening on the network when a fault occurs. Because it is continuously monitoring the health of the network, it can alert the network manager to spikes in network traffic or even loss of any part of the network. These software packages also allow for simulations of the network, allowing managers to experiment with what-if scenarios and better plan for the future.

FCAPS

FCAPS is the ISO Telecommunications Management Network model and framework for network management. It breaks down the management of an IP network into five areas — fault, configuration, accounting, performance and security — which are the five network management functions, or elements, as defined by ITU-T and the ISO. (See Figure 1.)

- *Fault management.* This is where faults are detected, isolated and repaired before any users are affected. Faults in the network can lead to downtime, so fault management is the most widely implemented of network management elements.

Route analytics software allows the network manager to observe how the network is working as a whole.

- *Configuration management.* Keeping track of all the versions of software and the configuration of the software and hardware is the goal of this part of network management.
- *Accounting management.* Measuring the use of and the traffic on the network down to the level of individual users is the responsibility of this part.
- *Performance management.* This is a measurement of the overall performance of the network, including latency, packet loss, retransmission and

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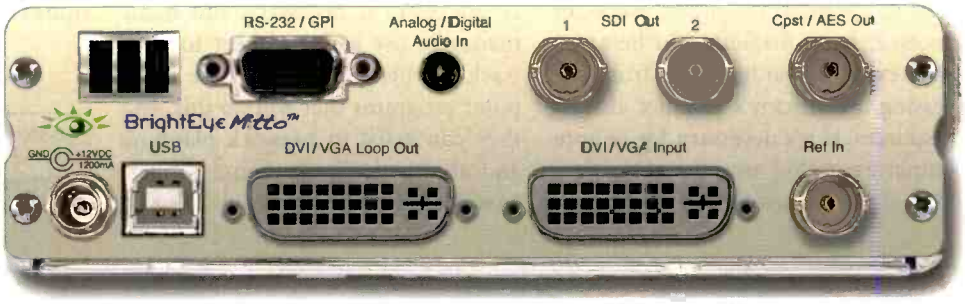

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throughput. This monitors the general health of the network and how well it is serving its users.

- *Security management.* This element controls access to network resources to protect them from attack or theft. Only those users who are authorized should be able to access the network.

Route analytics software can cover several areas of FCAPS, including fault, accounting and performance management.

Network security

Network security also falls under network management and is comprised of both hardware and software. Firewalls are used to keep unwanted data and users off the network. Most companies have intranets that connect to the Internet so their users can access it, but a firewall is the best way to prevent unwanted users from accessing a company's intranet and its resources. If it's necessary for remote employees to log onto the network, a virtual private network (VPN) should be used. Firewalls can also keep employees from connecting to places on the Internet such as FTP sites or music/movie download sites and can also record the activity passing through them, so expansion can be planned for as needed. In addition, dedicated computers can be set up as hardwire firewalls, which can handle more data traffic at higher speeds than software-only firewalls located on a server, and many routers can act as firewalls, but they must be configured to do so.

A firewall is the best way to prevent unwanted users from accessing a company's intranet and its resources.

Every computer on the network should also have its own software firewall, in addition to updated antivirus software, to keep an infected computer from spreading a virus or malware over an intranet. All of these tasks fall under the IP network manager's domain.

IP address design

Don't forget about IP addressing within the network. Keeping the IP addresses under control is very important in any network, and this all starts with planning the network and assigning the static address, as well as the ranges for the dynamic addresses. Keeping a record of all assigned IP addresses is necessary, and many managers use a spreadsheet to keep track of them. There also are computer programs that will do this, and they can assist in network planning and automatically configure subnets as well as subnet masks.

Network configuration

Configuring the network equipment and keeping a record or copy of it falls under this category. Other than the physical layout of the network, this is where the network is told how to perform the required functions. It is probably one of the least understood parts of the network, but one of the most important.

As a network grows, keeping accurate records of the equipment and their configuration becomes increasingly important. If a router fails and must be replaced, would you know how to set it? What if the last person to configure it left the company, and there are no records? Having a copy of the setup file would be the best solution to this problem, because it could be loaded in the replacement equipment, but a written record should always be kept as well.

Conclusion

This is only a rudimentary introduction to an increasingly complex issue. As IP network management becomes more important, network managers need to do all they can to keep up on the issue, even if this requires some extra training. BE

Russell Brown is chief engineer at KMTP-TV in San Francisco and writer of Broadcast Engineering*'s "Transition to Digital" e-newsletter.*

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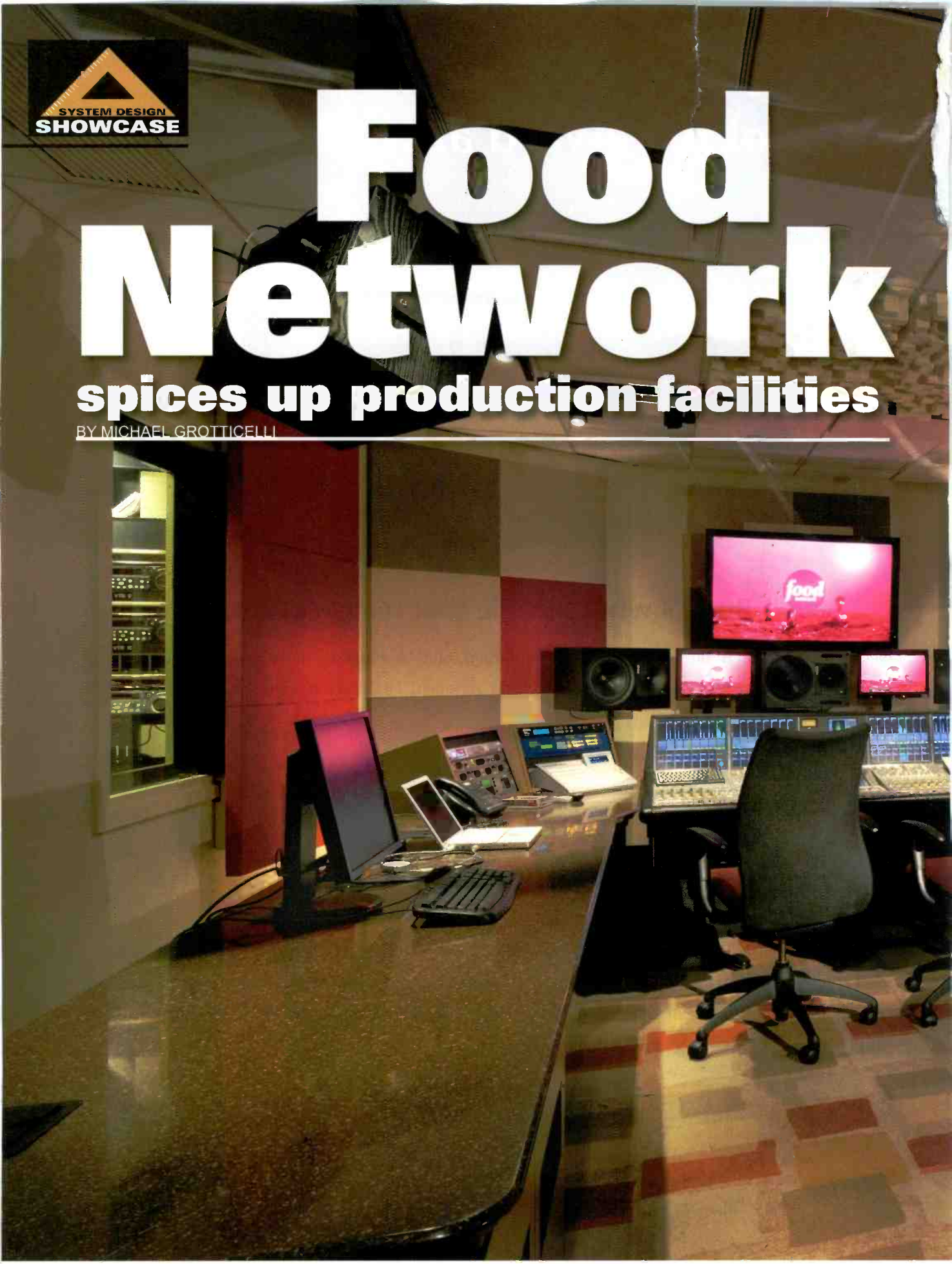
SYSTEM DESIGN SHOWCASE

Food Network

spices up production facilities

BY MICHAEL GROTTICELLI



Like any good recipe that needs adjustements over the years to keep it fresh, the production and post facilities at Food Network in New York City have upgraded from standard-definition digital to high definition with a sprinkling of new cameras, a pinch of an HD production switcher, and a heaping of newly fabricated audio production and post rooms that are fully surround-sound capable. The new facility can now accommodate more production, and the staff feels more at home.

Owned and operated by Scripps Networks Interactive and located above New York City's Chelsea Market, the facility now accommodates many more shows and expanded international agreements to carry Food Network programming in other countries. Over the past three years, it has grown to roughly 99 million subscribers across the United States alone. The facility operations now reflect the network's changing lineup and expanded nature of the shows. To support this increased activity, the engineering staff has grown by three people (for a total of five), and the production staff has nearly doubled in size.

The facility continues to evolve under the supervision of Bill Jarett, vice president of engineering for Scripps Productions in New York, who said the network has taken a meticulous approach to implementing new technology when it makes sense while maintaining existing workflows to keep productivity high. The broadcaster has completely rebuilt the audio, flex and production control rooms and has become HD-compliant

The new surround-sound control room features a Solid State Logic digital audio console, extensive patch bays and networked connectivity to two production studios in the facility.

in its studio operations. System integrator Azzurro helped with the upgrade — working a frenetic schedule to get it done in approximately four weeks, while Jarett's engineering team did most of the design work internally.

The traditional tape-based workflow in New York is different from other Scripps Networks sites located in Knoxville, TN, and Nashville, TN. Great American Country (GAC) in Nashville, for example, is completely file-based (standard definition only). Jarett said that at this juncture it doesn't make sense for Food Network to completely replace its VTRs because the crew iso records all of its camera sources, which can sometimes amount to six or seven angles for one show. But it will happen in the longer term. Currently, HDCAM tapes are sent via overnight delivery to Knoxville — sometimes two weeks ahead of their airdate.

Adding a new ingredient

As if maintaining a heavy workload wasn't enough, the network has added more to Jarett's plate by rebranding the Fine Living Network as the Cooking Channel, which is scheduled to launch on May 31 with instructional and entertainment programming produced in the revamped NYC studios. The network reformatted more than 400 hours of existing Food Network programming for the new channel, and about 75 hours of new material will be shot and posted by the end of the year.

Producers often suggest new ways of producing their shows, which sometimes means new technology being added or taken away as needed. The Internet and social media are now routinely embraced. Food Network started incorporating the Internet into some of its shows in 2002. The building also includes a large workstation area for the company's Internet group.

The new sound and music recording room (with adjacent voice-over booth at top center) includes a Digidesign Pro Tools setup, where original music and sound effects are composed and mixed.

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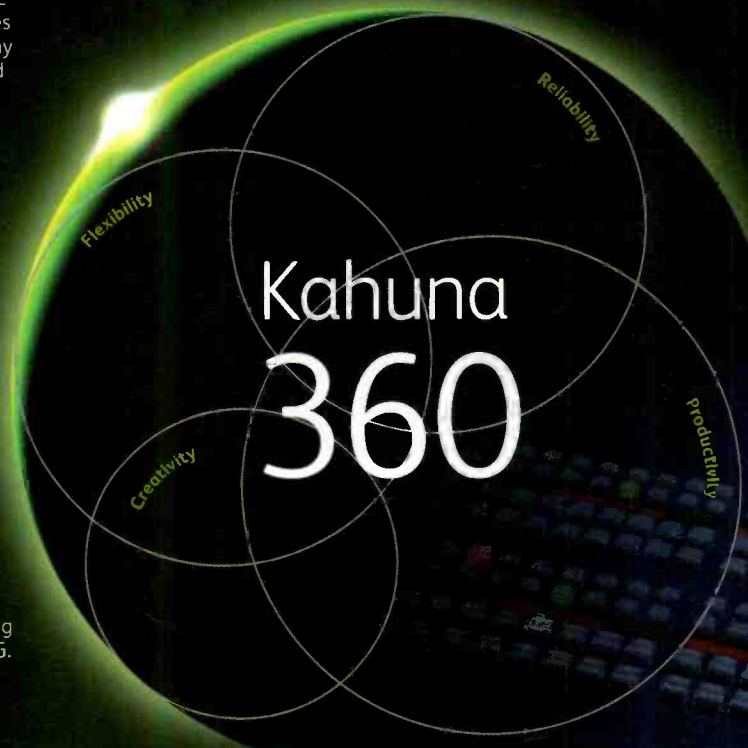

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Building on the foundation

The continuing HD upgrade culminated in 2008. That's when the network completed the future-looking installation of HD-SDI cabling and a flexible signal routing infrastructure that was HD-ready. A Grass Valley Concerto router was swapped out with a Concerto Plus, which can now handle SD and HD signals.

All show production is live to tape and then posted for several months before it goes to air from master control facilities at the Scripps Networks Media Logistics Center in Knoxville. Food Network's website is managed from the operations facility in Knoxville, although the NYC facilities house a large team of Internet support.

In Knoxville, the shows are also duplicated and stored in a vast tape library on Digital Betacam and HDCAM cassettes at two separate tape storage facilities in Knoxville and New Jersey, and also on a digital nearline StorageTek system in Knoxville. Uplink transmission and master control facilities for all of the broadcaster's networks are also housed at the Knoxville facility. Master control functions are performed in Knoxville, but are backed up by Crawford Communications in Atlanta, GA, so that the network never goes off the air.

The refurbished HD control room features an innovative use of NEC LCD monitors at the front wall (six screens hung vertically) and two at the back row to allow producers a better view on what's happening in the studio during show tapings.

The New York facility currently only utilizes one outbound circuit, tied to HD at Azzurro's video switching center in New York City, which can be connected to the Scripps Networks Media Logistics Center via satellite or used for satellite media tours. DS3 and T1 used for broadcast media files and data also interconnect multiple NYC and Knoxville-based operations.

HD post is the main ingredient

At Food Network, virtually every show is completed in post. Once shows are recorded (live to HDCAM videotape) in one of the two in-house production studios (as well as in a state-of-the-art kitchen wired for cameras and special lighting), they

are edited in one of several edit suites with Avid Symphony Nitris and Media Composer DX Nitris workstations in post-production, connected to a 64TB Avid ISIS storage array (soon to be expanded to 128TB to accommodate 12 edit rooms).

The network added an Apple Xsan (64TB) and will be adding a Final Cut Server system for graphic and promo production. In the near future, the ISIS and Xsan will be merged, but today they operate almost completely independently of one another. File sharing between the two is not through a direct connection.

Most of the graphics are inserted into the shows while they are edited, and the audio is mixed afterward in a Digidesign digital audio mixing room. Graphics are created using multiple software packages, including: Adobe After Effects, Photoshop and Illustrator software, as well as the Cinema 4D and Maya packages. For on-screen bugs and IDs, Avid Deko is used for SD and Miranda Vertigo templates for HD.

New HD production and control

The decision to complete the migration to HD in the production studios came to fruition in 2008. That's when the last of the facility's existing Grass Valley 5000 SD cameras (with Fujinon HD lenses) were upgraded to 6000 Worldcam HD cameras with a simple board swap. In addition to the upgraded cameras, the main production studio "A" also now features four broadcast service panels with new fiber-optics connections. A smaller studio "B" has undergone some refinements as well.

The main control room (which can be used for either studio or both simultaneously) now boasts a new Sony 8000G HD production switcher. The most impressive upgrade, however, is the virtual monitor wall, designed by Jarett. The front wall of the room was completely redone to go from 35 various-sized CRT monitors to a mere six NEC 46in HD LCD displays hung side by side in portrait style. Hung on special brackets that facilitate easy maintenance, each flat panel can be tilted for better viewing from all sides of the room. This unique arrangement of the panels allows the room's Evertz VIP-X/VIP-A multiviewer software to display a wide variety of configurations that closely replicate the sources displayed with the old wall, in a relatively small space. (Mobile truck builders should take notice of the space-saving design).

Five separate video feeds — also generated by the multiviewer system and transferred via fiber — are used on some shows (like "Iron Chef

America") to drive different sized monitors on-set. Two additional 40in displays have been installed at the back row, replacing smaller screens where the producers sit, to give them a better view of the camera feeds and what's going on in the studio. Forecast Consoles designed new desks to accommodate the extra monitors. The producers still have line of sight to the front monitor wall if required. An Evertz X-Link HD router has been installed as well.

Technology at work

Adobe After Effects, Photoshop and Illustrator software
Apple Xsan storage
Autodesk Maya 3D animation software
Avid
- Deko 3000 HD CG
- Digidesign mixer
- ISIS storage
- Media Composer DX Nitris editor
- Symphony Nitris finishing system
- Thunder HD still store

Evertz
- MVP-VIP mutliviewer system
- X-Link router

Genelec speakers
Grass Valley
- 6000 Worldcam HD cameras
- Concerto HD routers

Harris modular A/D, D/A converters
Maxon Cinema 4D modeling, animation and rendering package
Miranda Vertigo graphics processor
NEC LCD monitors
Panasonic Varicam and HDX900 cameras
Solid State Logic C100 digital audio console
Sony MVS 8000G production switcher

Expanding waistline

To accommodate the increased workload of the Food Network and the new Cooking Channel — and having outgrown its current environments — the facility added more audio and video post rooms. Some shows are shot in an outside studio in either New York City (Horvath Studios) or in Los Angeles. Outside shows are shot handheld with Panasonic Varicam and HDX900 cameras, as well as in a studio on pedestals and jibs.

Improved audio surroundings

Most shows are currently recorded and posted in stereo, but the plan is to move to 5.1 in the future. To support this move to multichannel sound, the facility's existing audio control room, built in 2004 and tied to the main production studio, was upgraded to a surround-sound audio control room. The Walters Storyk Design Group (WSDG) in New York helped retrofit the room with specialized acoustic ceiling tiles, and hung speakers that surround the console operator and acoustic wall treatments to accommodate surround-sound production.

An existing audio post-production room on the second floor, designed and built by WSDG, features a Digidesign

digital audio workstation. Here original music is composed and mixed. The music is then blended with voice and effects to produce a finished promo or long-form production. A temporary audio post-production room also utilizing a Digidesign digital audio workstation is housed on the third floor and will eventually move to a new production area yet to be completed.

Ongoing upgrade

Going forward, the facility's overall system architecture must remain flexible because the shows themselves are always being changed and updated. The facility has to grow with the times, but must avoid technology that will soon become obsolete. That's why refinements will continue. In the future, an integrated, multiple system, file-based repository will be deployed to support unlimited file sharing between systems. At some point, the facility's production workflows will also become entirely file-based.

The network plans to convert to all file-based, and Tom Killoy, senior vice president of operations in New York, has spearheaded the most recent collaboration between the Knoxville- (HGTV, DIY Network, Fine Living Network), Nashville- (Great American Country), and NYC- (Food Network) based technology teams, in order to develop a consistent integrated file-based technology strategy that supports all the brands.

"Predicting technological trends years in the future is difficult at best," Jarett said. "What you try to accomplish is matching your workflow with the appropriate technology, keeping in mind the flexibility and upgradability of the systems and the longevity of the manufacturers. The end result should support both the productivity and creativity of the users and the technological and corporate goals of the company, while also maintaining cost effectiveness." BE

Michael Grotticelli regularly reports on the professional video and broadcast technology industries.

Design team

Scripps Productions NYC
Thomas Killoy, senior vice president of operations
Bill Jarett, vice president of engineering
Joe Bruno, director of engineering

Azzurro Systems Integration
Marc Bressack, executive vice president
William McKnight, vice president/general manager
Scott Buckholtz, director of engineering
Steve Regina, design engineer

Walter Storyk Design Group
John Storyk, principle
Nancy Flannery, CFO
Joshua Morris, designer

SYSTEM DESIGN SHOWCASE

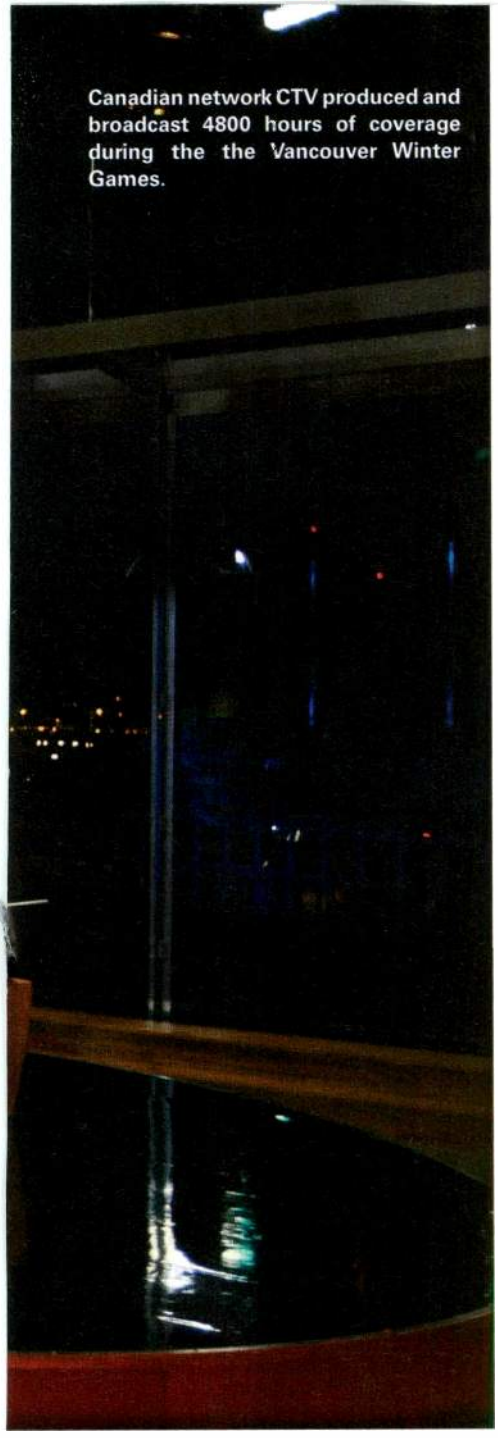
CTV at the WINTER OLYMPICS

The broadcaster produces a miracle on ice (and snow).

BY MICHAEL GROTTICELLI

To call the technical feat that CTV accomplished in covering, mostly live, this year's Winter Games impressive is an understatement. In building a 40,000sq-ft temporary HD-SDI facility at the International Broadcast Center (IBC) in Vancouver to support 11 television, radio and online networks, what the network did was downright Olympian.

This was the first major Olympics production for CTV, Canada's largest privately owned network, since the 1988 Winter Games in Calgary. (The network had a limited role at the Winter Games in Lillehammer in 1994 and the Barcelona Summer Games in 1992.) The previous Canadian rights holder was the Canadian Broadcasting Corporation. This year, the network produced and broadcast 4800 hours of coverage, including the opening and closing ceremonies



Canadian network CTV produced and broadcast 4800 hours of coverage during the the Vancouver Winter Games.

as well as men's hockey. (In previous Olympics, the host broadcaster and NBC usually handled the production, and the other broadcasters used that same feed.)

This year, the network was a founding member of the Olympic Broadcast Media Consortium (OBMC), the official host broadcaster, in partnership with multimedia provider Rogers Media. Together, they provided coverage in English, French and other languages on multiple platforms from Vancouver to accommodate Canadian viewers. The OBMC was formed to support 11 television channels and one radio network, with CTV's temporary facility sustaining all of them. Literally every second of Olympic competition was available live on radio, TV or online during the Games. The network was responsible for more coverage than NBC or any other broadcaster.

Allan Morris, senior vice president of engineering, operations and IT at the network, said that although planning had occurred 18 months before, most of the technical facilities were designed, configured and tested months before the start of the games in a 13,000sq-ft warehouse in Toronto across the street from the network's main broadcast and production facility. The various systems were laid out and connected to replicate what they would be doing in Vancouver for the Winter Olympics. In October 2009, once it had been tested and the staff trained, the equipment was packed into 16 tractor-trailers and shipped off to Vancouver, where it took six weeks to reassemble in the IBC. Crews and talent began showing up in late January.

Temporary broadcast-quality facilities, permanent results

Six studios and seven control rooms were built at the IBC. There were five main control rooms for the five main OBMC members — CTV; V, a French network; The Sports Network (TSN); RDS, the French version of TSN; and SportsNet, Rogers Cable's sports channel — and two studio and two control rooms at the Whistler Resort, which was home to many of the downhill events. These remote operations were fully accessible from any control room at the IBC facility and could be closely monitored for internal use via a 180-channel IPTV system.

Production personnel sitting at any desktop in the IBC could see any network, any channel and any venue with the click of a mouse. This included talking with venue production personnel via intercom or VoIP phone while watching the images from the camera as they came into the IBC. People could also look at the incoming IPTV signals on larger monitors using Amino boxes attached to televisions. This saved lots of time and greatly increased efficiency.

Some consortium members also had control rooms off-site at their respective home facilities, so signals were sent from Vancouver to the network's main production facility in Toronto and then on to the distribution platform of choice.

Tapeless production control

The control rooms featured Ross Video Synergy production switchers, Lawo signal audio consoles, Harris Inscriber G7 graphics (created with various applications on Macintosh workstations located adjacent to the control rooms), an Inscriber Connectus centralized graphics management system, an EVS (4 x 2) XT[2]+ replay system, Evertz MVP and VIP multiviewer software displayed on Panasonic flat-panel plasma HD displays and TVLogic monitors in critical viewing areas. Evertz supplied nearly all signal-processing equipment. The control rooms also used a large RTS digital intercom system (576 x 576), as well as Harris Videotek and Tektronix test and measurement gear.

Forty-two Hitachi SK-HD1000 HD cameras with Canon lenses, on tripods and handheld, were used in the studio and at many venues. In the field, operators used 15 Sony XDCAM HD camcorders with Canon lenses.

The primary workflow for broadcasting in HD was a tapeless environment — there was one Sony HDCAM and one Betacam SX machine just in case — so that everything that came in never touched videotape. Sources coming in from fiber and satellite feeds, on-site production trucks (supplied by Game Creek Video based in the United States and Dome Productions in Canada) and other sources were routed through the various control rooms. For complete redundancy, all events took two separate paths using dual Evertz routers (one

Six studios and seven control rooms were built in Vancouver at the IBC, including five main control rooms, like the one pictured here, to support the five main OBMC members' live coverage.

with a large 576 x 576 matrix and 6000 x 6000 audio matrix), video servers and production switchers to protect against system failure and ensure that the network never went off the air.

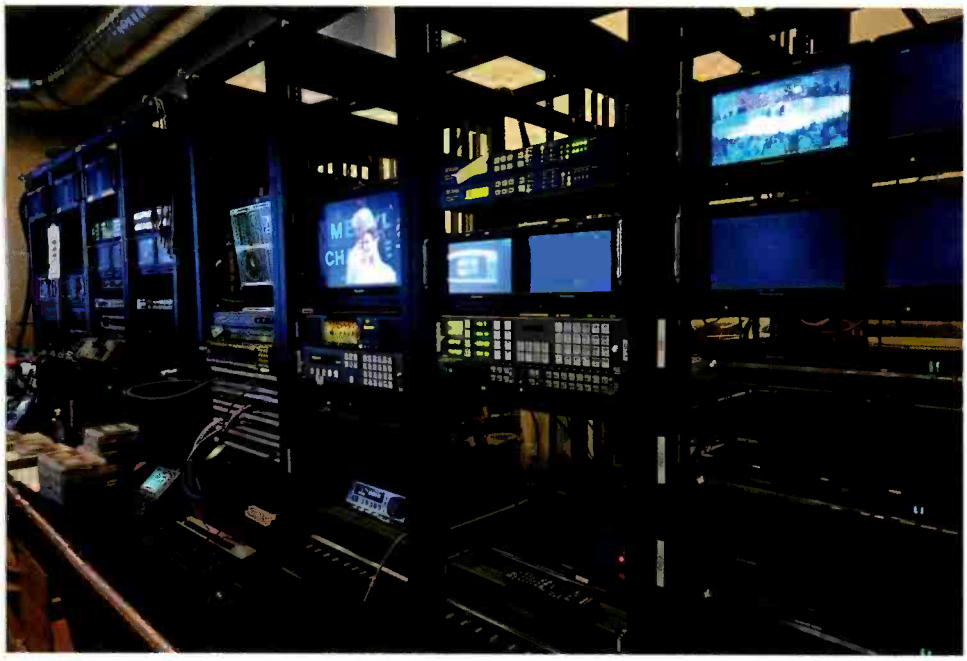
Comprehensive centralized storage

Harris was a major supplier to the OBMC, providing integrated broadcast and production systems that allowed the network's team to centrally receive, manage and create program elements and distribute them to multiple stations across Canada. The equipment package included NEXIO AMP advanced media platforms with Velocity HD editors, which were used to build video clips for all program platforms in both English and French. Harris NetVX transmission systems using MPEG-2 4:2:2 at 50Mb/s delivered all content back to home base master controls across the country.

The company's equipment also supported the consortium's online coverage on *CTVOlympics.ca* and *RDSolympiques.ca* with a backup control system for FTP file transfer. The system consisted of NEXIO Remote software, which monitors and controls channels on servers over a local area network, and the NEXIO PlayList event-sequencing application, which enables clips to be selected from the database and arranged in any order for frame-accurate transmission.

All broadcast material was recorded to a large NEXIO AMP server (with dual 15TB arrays and 32 ingest ports), and editors picked from it as necessary. Two or more editors could access the same clip simultaneously, which happened often during the games. Each port had a logging station associated with it, and low-resolution (proxy) files were instantly created so that editors could begin working as soon as the material came in from a venue. A Dixon Sports system helped organize media clips based on the sporting event and provided premade graphics templates that helped maintain a consistent look for each sport. These clips were then made available to desktops throughout the the network's portion of the IBC via a massive network that supported 13 Velocity HD edit workstations. Each edit room was dedicated to a particular sport, in both English and French. There was also a Digidesign Pro Tools room for mixing 5.1 surround-sound elements.

To streamline the workflow and make things happen faster, the network's engineers wrote custom code



The equipment racks used during the Winter Olympics were configured and tested inside a 13,000sq-ft warehouse in Toronto (across the street from CTV's main broadcast and production facility) months before, then packed up and sent to Vancouver.

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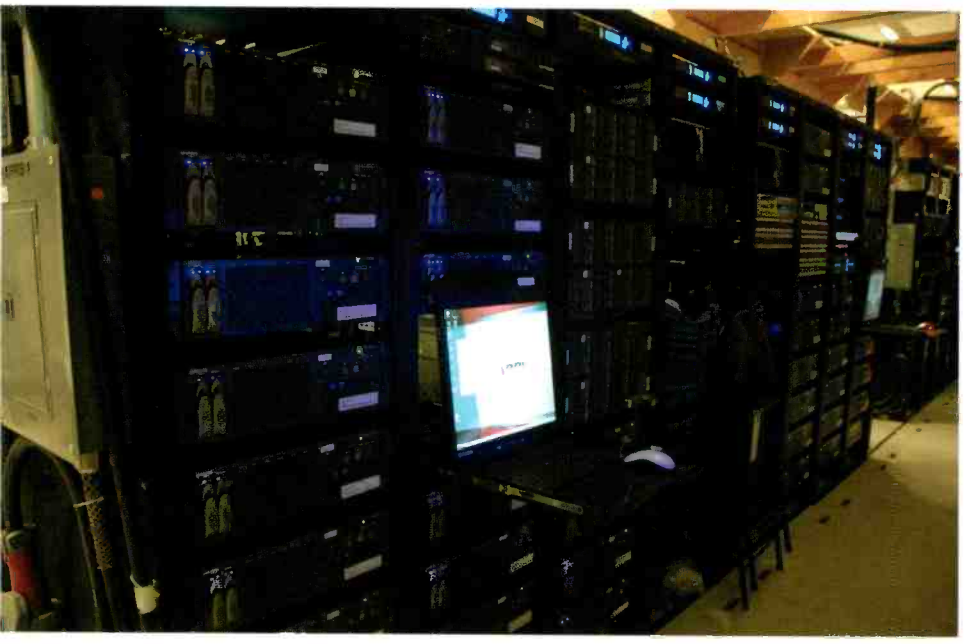
VIDEO SYSTEMS

Panasonic flat-panel plasma HD displays and TVLogic monitors displaying Evertz MVP and VIP multiviewer software were strategically located throughout the CTV complex to help monitor the hundreds of feeds coming into the IBC in Vancouver.

and their own applications to facilitate seamless file transfers between the server, the Avid Nitris DX edit systems and a multinode Isilon IQ X-Series server.

The Nitris systems were tied to a centralized 24TB Avid ISIS storage system. All content going into the NEXIO was transferred to a 200TB Isilon digital file storage system for longer-term storage and to serve as backup files. Leveraging the networked, file-based system in Vancouver, highlight reels for live events could be turned around in a matter of seconds if required. (During the closing ceremonies, one sponsor wanted a clip from the Canada-U.S. hockey game included in a 30-second spot. The game had just ended that afternoon, but the crew was able to do it with time to spare.)



All broadcast material was recorded to a large Harris Nexio AMP server (with dual 15TB arrays and 32 ingest ports), and editors working on Harris Velocity HD edit workstations built video clips in English and French for the various program distribution platforms.

Fast HD turnaround times

The NEXIO servers provided 20 playout ports to send content to the various control rooms for inclusion into the various consortium partners' main broadcast feeds as well as to a number of off-site facilities operated by consortium members.

All audio and video clips (and associated metadata) were eventually archived to the IQ X-Series system in Vancouver. They were then moved via file transfer to the network's Storagetek systems back in Toronto on a daily basis.

Redundant OC-48s at 2.45Gb/s were used to deliver all real-time and recorded content, VoIP telephony, corporate business system applications, IPTV, and various low-bit-rate/low-latency monitoring feeds. This ensured that content was never lost and was available to anyone who needed it. As a further backup, the network used one C-band transponder to deliver the outputs of the five main control rooms using MPEG-4 at 10Mb/s. It was continually downlinked in Calgary, Toronto (two different sites), Montreal and Halifax to be used if required.

Unprecedented technical complexity

Perhaps the most impressive part of the CTV's coverage was that the IBC facility provided 24/7 content to all of the various channels simultaneously, in a file-based environment, in two different languages, for three weeks. When the network compared its operations to other broadcasters in the IBC, there was little in common. Its operations were so critical that it required two Leibert UPS units to feed dual AC power cords to every piece of

equipment at the IBC. Smaller UPS units were used in all venues.

The complexity of feeding five clients in two languages was enormous, but somehow the crew pulled it off without a hitch. The system never hiccupped, and not a single clip was lost. Many in Canada thought this year's Winter Games were the best they had ever seen. It was certainly the country's most watched Winter Olympics.

Morris said the key was that video was everywhere it needed to be. From any desktop, producers could look at single or multiple feeds simultaneously. In addition, the systems deployed were of such a large scale that new twists (and custom software applications) on file-based architectures became critically important. Along the way, they learned a few things that will serve them well going forward, both for future Olympics coverage in London in 2012 and for the network's production facilities in Toronto.

A project of this magnitude was only possible because of the expertise and dedication of the engineering team members and support staff. BE

Michael Grotticelli regularly reports on the professional video and broadcast technology industries.

Design team

Allan Morris, senior vice president of engineering, operations and IT
Albert Faust, senior director, media technology systems
Curtis Skinner, director of engineering, CTV Olympics
David Dickson, director, media technology systems
Robert Miles, manager of audio engineering, CTV Olympics
Mark Weeres, manager of video engineering, CTV Olympics
Brian Learoyd, director of mobile engineering, logistics and installation

Technology at work

Avid
- Nitris editors
- ISIS storage

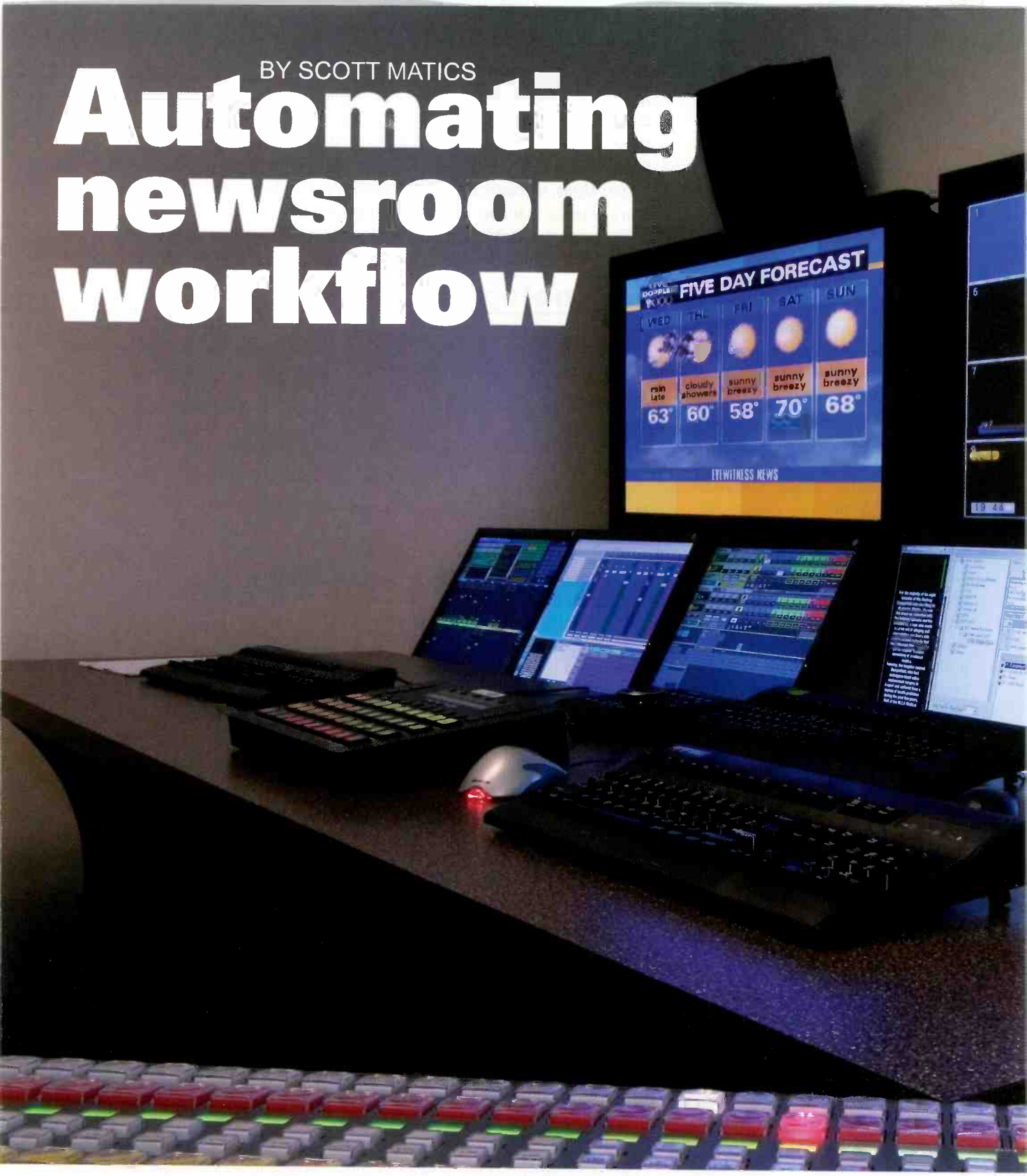
Canon lenses
Evertz
- MVP and VIP multiviewer software
- Modular gear
- Routing switchers

EVS XT[2]+ HD replay servers
Harris
- Inscriber G7 graphics
- Inscriber Connectus graphics management system
- NEXIO AMP server
- NetVX video networking systems
- Velocity HD editing platforms
- Videotek test and measurement gear

Hitachi SK-HD1000 HD cameras
Isilon IQ X-Series storage systems
Lawo MC56 and Zirkon audio consoles
Panasonic flat-panel plasma HD displays
Ross Video Synergy production switchers
RTS digital intercom system
Sony XDCAM HD camcorders
Tektronix test and measurement gear
TVLogic monitors

BY SCOTT MATICS

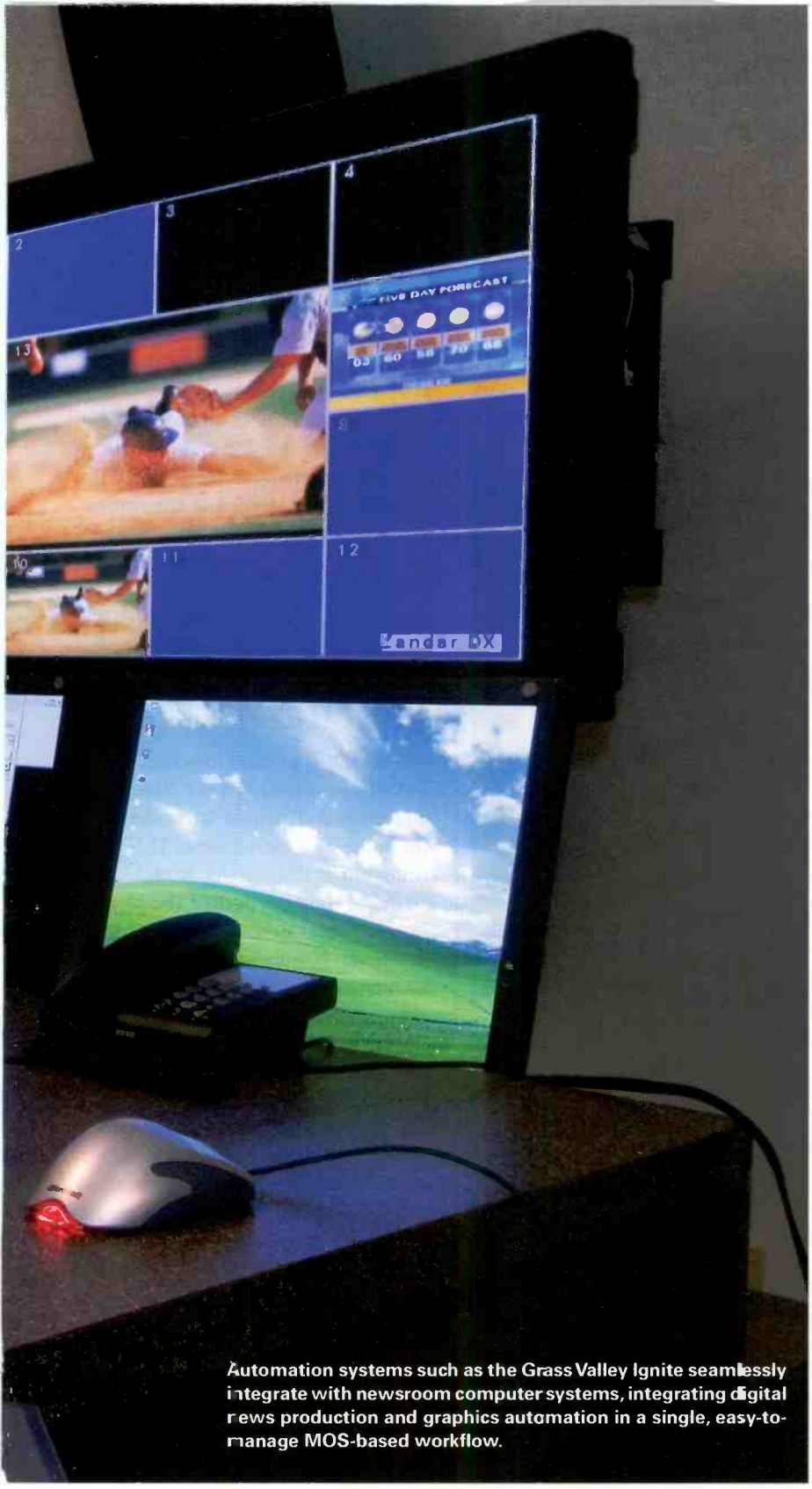
Automating newsroom workflow



New technology, added delivery channels and the increasingly unpredictable viewing habits of consumers are forcing today's news staffs to make significant changes. Today, station news teams need to be vigilant 24/7. In addition, they must not be dependent upon a linear storytelling model, and they must be able to distribute content across multiple platforms. Likewise, the production technology they deploy has to do more than simply present the daily television newscast.

Play to your strengths

As newsroom staffs become less technical and more creative in storytelling, stations are automating many of the technical aspects of the creative process — file format conversion, clip logging and management,



Automation systems such as the Grass Valley Ignite seamlessly integrate with newsroom computer systems, integrating digital news production and graphics automation in a single, easy-to-manage MOS-based workflow.

and editing — so that focus for the journalists remains on the story itself.

Production systems that make news departments more productive should include a common user interface that provides access to all the most commonly-used features. This eliminates the need to continually change screens in order to carry out different tasks. This saves precious time in getting the news to all three screens — living room television, computer screen and mobile device — nearly simultaneously.

Re-examine the process

To efficiently accomplish this, it is important to employ a tightly integrated production system. Such systems allow a single operator to handle the production of an entire multicamera newscast. This approach requires careful preplanning. During the planning, you need to involve every department (management, journalists and production) of the station. This planning should be completed well before installation.

It is important to also allow time for extensive training — not only in what personnel will do, but also about the way a production staff thinks about producing a newscast.

Do not look at the use of integrated production systems just as a potential means of reducing headcount. Rather, look for opportunities to assign staff into areas where their skills can be maximized for both the individual and station. In addition, those trained in using the technology gain a new and important skill, one that adds to their professional value.

One key in the re-examination process is to help the production staff understand that today's consumers expect content to be available on multiple devices, across multiple channels and on their personal schedules. This means stations have to implement a 24/7 news cycle — one that's not dependent on the linear cycle of time- and manpower-availability that traditionally has driven news departments. Production automation can help achieve these goals.

The news staff also has to understand that content has to be optimized for the various platforms in order for the story to be understood clearly. For instance, framing for Web and mobile devices must be different from that for television audiences. Any selected solution must be able to handle such production issues in an intuitive and transparent way. Journalists should not be encumbered with complex technical processes.

Deployed correctly, integrated production systems empower news teams to be able to create more content with the same amount of people and to reach more viewers across more delivery platforms. Such solutions lessen the need for supportive technical staff and energize those involved in content creation. The result should be enabling content creators to find new ways to tell stories and to do so more efficiently.

One result of properly using automated production tools is that they allow stations to stay relevant in today's highly competitive news environment. They also improve the on-air look, reduce technical errors and sometimes enable a station to launch new newscasts where none were previously available. Such results benefit viewers with more in-depth stories and station owners with additional revenue.

Set the agenda

The most important step of any integrated production system deployment should happen long before the technology is installed at the station. Get as many departments involved in the process as early as possible, and work out the technical details up front. Make it clear that although the *means* of producing and distributing content will change, the basic core values of producing quality content will not.

This is not a technology that can be forced upon a staff. They have to be educated and helped to understand the value of such a system. This takes time, but if done right, it makes the staff feel they are part of the process in selecting a new way of producing the news. It builds camaraderie and facilitates more collaboration among the employees.

Keep the technical processes invisible

To be valuable to the news creation process, such technology should include familiar features that allow journalists to apply their skills quickly. The platform should permit journalists to work independently while performing highly technical tasks. In most cases, they don't even need to understand how some processes happen. The technology should do all of the heavy lifting, based on presets that have been set by the station engineers.

There can be a series of presets developed by the station's interactive or engineering staff that allows journalists to create and then upload the completed content to a particular software template that automatically publishes it to any desired format. That might be a Web or smart phone stream. The feature would

properly scale video frame grabs or resize video to fit a cell phone screen. Such technical mechanizations should be completely hidden from journalists.

Once journalists approve a story for distribution, additional software can be employed to package all of the elements related to a particular story and send the video assets and the associated metadata (as an XML file) to a predefined location, where content is then automatically repurposed.

Tighten NRCS integration

To be successful, the new production system has to be tightly integrated to the station's NRCS, often via MOS protocol. Journalists and producers work on a single screen and still have access to all of the needed image processing and publishing tools.

Likewise, the new production system should provide a tight link between the NRCS and the station's control room. Again, it's about keeping control of the story in the hands of the people who care about that story most.

Any technology chosen should be expandable and provide an easy path for stations to migrate slowly to fully automated production — protecting their original investment — while being able to pick and choose which shows will continue to be run manually. The production system should seamlessly interface with other third-party video production systems — such as graphics equipment and video servers.

Improve the bottom line

At the end of the day, automated production systems are nothing more than efficiency tools. It's up to the individual station to figure out how they want to improve their productivity to meet the increasing demand for content in all of its forms. Traditionally run stations need to make the transition from TV broadcasters to becoming media content producers and distributors, with all that that implies.

To remain successful networks, broadcast groups and individual stations need to reduce their costs while efficiently reaching all three screens (TV, Web and mobile). Without automating the required content creation processes in some way, these businesses will never be able to afford the staff and technology necessary to get the job done in a timely fashion.

That's the reality of today's broadcast news department. It involves making the best of a difficult situation and employing survival tactics to make the business model work. BE

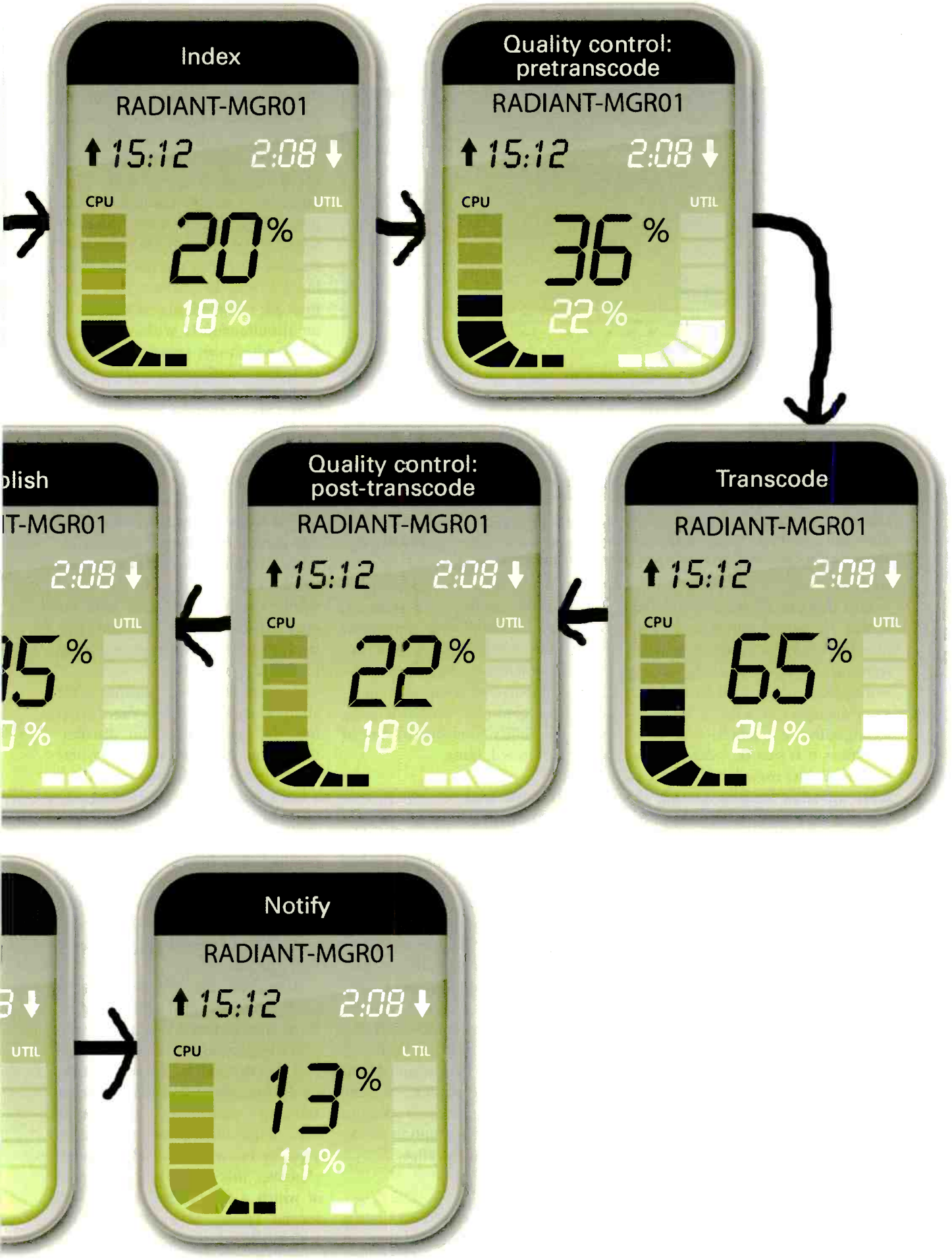
Scott Matics is a product manager at Grass Valley.

Building a file-based workflow

BY KIRK MARPLE

The following steps, when done correctly, help prepare content for distribution formats.

While the process for building a file-based workflow is typically thought of as nonlinear, a series of steps should be followed in a linear manner to ensure successful results. The steps — ingestion, indexing, quality control (pretranscode), transcoding, quality control (post-transcode), publishing, distribution and notification — when done in the proper order, help to better prepare content for the various distribution formats, including online, video on demand and cable. Depending on the different transcoding processes that are being performed, this workflow can be a combination of both hardware-based and software-based technologies. Also, several other considerations to keep in mind when selecting elements for your workflow are the turnaround time, the amount of files being managed and the amount of staff available to help with the process. Let's take a look at each of the steps involved so you can better understand their benefits.


Index
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15:12
2:08
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UTIL
20%
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Quality control: pretranscode
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CPU
UTIL
36%
22%
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RADIANT-MGR01
15:12
2:08
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Quality control: post-transcode
RADIANT-MGR01
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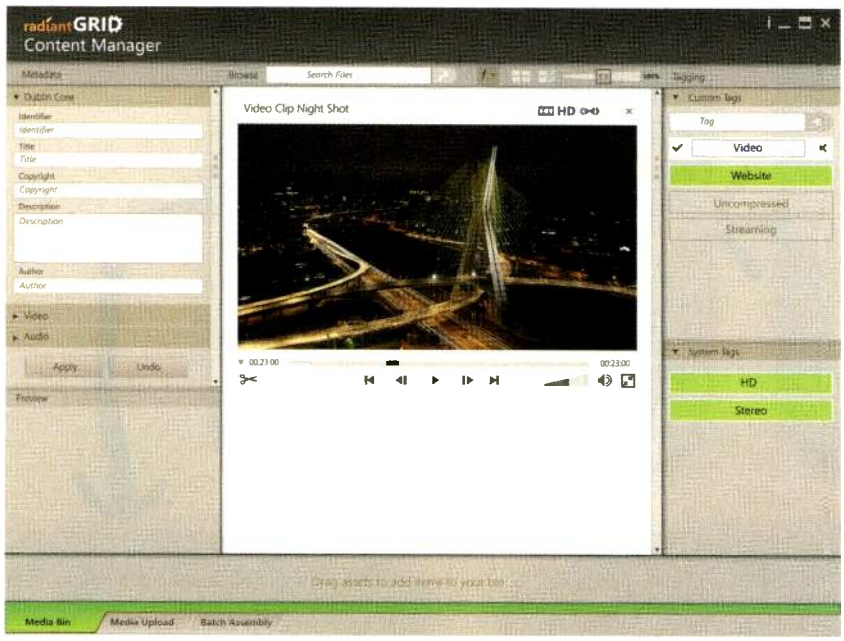


Metadata and asset management are essential organizational elements of a file-based workflow. RadiantGrid's catalog management feature (pictured here) supports the searching, browsing and filtering of ingested assets.

Ingestion

One thing to always keep in mind is that all content must be brought into the workflow either via satellite transmission, a file from an editing workstation, or physical media such as a videotape, CD or DVD. When selecting software to handle a file-based workflow, it is best to select one that can handle the majority, if not all, of these ingestion formats. During the ingestion, files are preprocessed into a form that is optimal for the transcoding stage. This can mean breaking down or demuxing files into essence formats. From this, mezzanine streams can be made from the source media; these are optimal for transcoding.

Indexing

While ingestion creates the assets in the repository, indexing — the next step — creates the metadata that is attached to those assets. Via indexing, all media-specific metadata (i.e. file length, frame rate, codec, etc.) is pulled out. With metadata being a big portion of the file-based communication process, the best software solutions are those that offer a means to easily manage the data and allow for changes to be easily made. Many software platforms offer catalog management, which allows for all items associated with a file (a thumbnail view, a preview version, the master) to be packaged and delivered along with metadata throughout the workflow along with the ability to search by any of these connected items.

Quality control pretranscode

Before starting the transcoding process, the file needs to be checked to make sure that all elements of the ingested file are correct, such as the frame size and the bit rate, or there will be issues later on. There are two ways quality control can be performed. One is through an external or Web-based program that can check the policies set for the project. A second option would be to use a software program that can be integrated into the workflow. The amount of time you have for this process is going to help determine which option works best for a particular workflow.

Transcoding

All audio, image, closed-captioning and subtitle processing happens in the transcoding phase. Transcoding can take place all within the software platform or within a combination of software and external hardware. Many transcoding software platforms now include audio and video processing, which were typically solely found in hardware previously. Because the audio and video processing is now in the software, this allows multiple transcoding processes to go on simultaneously within the platform, which can speed up the process, particularly when working with a large number of files.

For those looking to use a combination of hardware and software processors, transwrapping (also called transmuxing) is another option. With transwrapping, the source file is ingested, and the video and audio are demuxed into the essence streams. This allows either the video or the audio to be processed within the platform; then both are muxed back together, and the transwrapped file can be processed using hardware processors.

Another feature to consider is the ability to assemble one or more assets into the final product for distribution. One common scenario where this feature would be used is to stitch a black slug, with a promotional interstitial, with the master asset (movie, TV show, etc.), with a trailing interstitial, and finally with a trailing black slug. Some developers also offer multitrack assembly; this can be used as a basic nonlinear editor so that different takes of the same project can be put together.

Along with the software and what processes are handled within the platform, another factor to consider is the actual transcoding process being used and how the content is being distributed throughout the server. Some software distributes transcoding tasks across the transcoding farm, as capacity becomes available. Though effective, this can limit the speed at which a file can be converted. A second option is grid transcoding, which allows source content to be

transcoded in parallel across all available transcoding resources, and can speed up the transcoding process.

Quality control post-transcode

While the transcode may have already been completed, it doesn't always guarantee a conforming file. Similar to the quality control pretranscode, this stage is where the transcoded file is validated. Like quality control testing pretranscode, this can also be performed either by an external program or one within the software platform.

Publishing

The publishing step is where the transcoded files and metadata are taken into the repository and packaged for delivery. Publishing doesn't touch the actual media file, but it may put the files into some special directory structure or rename them so they are properly noted for output.

Distribution

The second to last step of the process is distribution, which takes the generated files, the transcoded files and possibly the metadata, and pushes them out to a file server somewhere. Then, the files could be posted to a website, sent to an online cable provider, made available to an online music download vehicle such as iTunes for distribution and purchase, or to online video services such as Hulu.

Notification

Even though there is a lot of software involved in a file-based workflow, things never happen in a vacuum. The final stage, which is notification, can either be handled by humans or by an automated process. For example, this could mean simply sending an e-mail, sending a message via a Web service or a notification system within the software platform telling the final user that the files are there. The amount of people utilizing the files and their general proximity will determine the best solution.

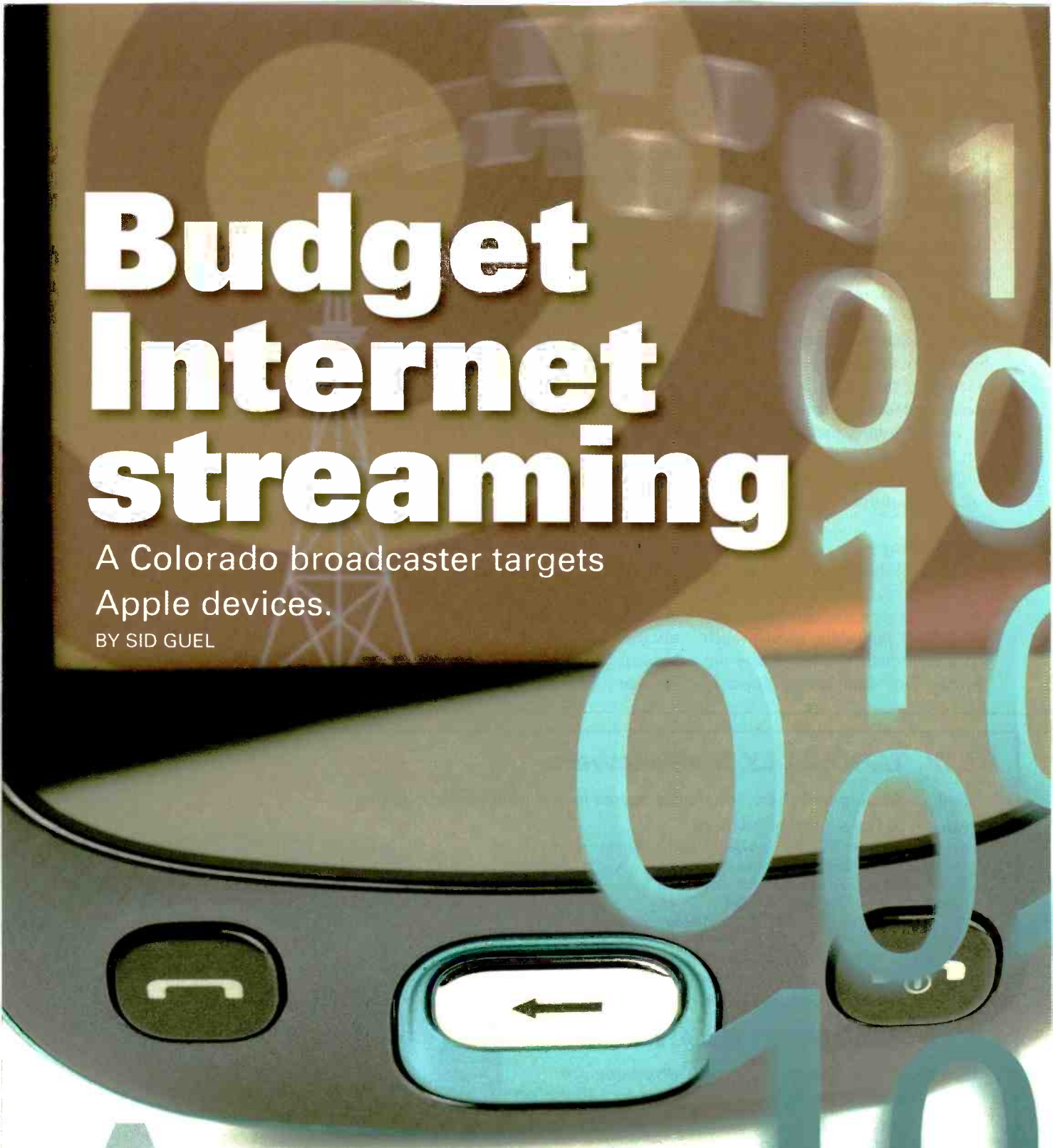
Clearly, a file-based workflow is a combination of old practices and new. Software allows much of the process to now be automated, but there will always be a human element required for the workflow. An example is dropping a file out of one piece of software and loading up another piece of software, transcoding it and putting it in another folder. Having a better understanding of the various elements involved in a file-based workflow will help you create better results for your projects and give you the ability to better manage your content. BE

Kirk Marple is president and chief software architect of RadiantGrid Technologies.

Budget Internet streaming

A Colorado broadcaster targets Apple devices.

BY SID GUEL



As broadcasters look for new ways to increase audience and revenue, sending video to mobile receivers looks attractive. Mobile device data traffic is growing at a compounded annual growth rate of 268 percent. These factors encouraged one Colorado broadcaster to begin broadcasting a live media stream to the Internet and to smart phones. On Dec. 14, 2009, KCXP-LP (TV Aspen Network) became the first local TV station to broadcast 24/7 to the Apple iPhone.

The initial goal was to broadcast the station's OTA signal live, or semi-live, to the Internet and smart phones. Live streaming to the Internet has been around for several years and is an established technology. Broadcasting to a smart phone, however, is newer and more complex.

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The business model

Some broadcasters continue to question the business model of broadcasting live to the Internet or to smart phones, and perhaps for good reason. The revenue and audience gains are unclear. Even so, Marcos Rodriguez, the station's owner and general manager, decided to give the technology a try.

With less than $30,000, Rodriguez acquired the needed hardware and software to create an H.264 IP transport stream for smart phone M3U8 protocols and a variety of VC-1 file formats for live Internet streaming.

The monthly ISP and CDN service fees are currently around $1500. Even if costs increase as more users begin accessing the content, Rodriguez sees his overall investment as remarkably small.

The project team

Rodriguez hired Wayne Brenengen of Waymo Engineering to direct the project. Additional IT consulting support came from Devon Vaughn of the CDN company Liquid Broadcast and Kathy McVey of the ISP Everwave (a TV Aspen Network sister company). Inlet Technologies provided hardware and software. The system's basic block diagram is shown in Figure 1.

The media output format

The network delivers a variety of resolution levels for smart phones and live Internet streaming. The two most common formats are Microsoft's Silverlight Smooth and Adobe's Flash. Each format has advantages, but the choice of which to use is left to the viewer.

TV Aspen Network delivers two types of resolution levels of M3U8 for smart phones. Because the iPhone normally connects using a 3G-GSM cellular network, the signal must be supplied in a compatible transport format. When the smart phone is connected to the Internet via Wi-Fi, a higher-resolution M3U8 stream is available for smart phone viewing.

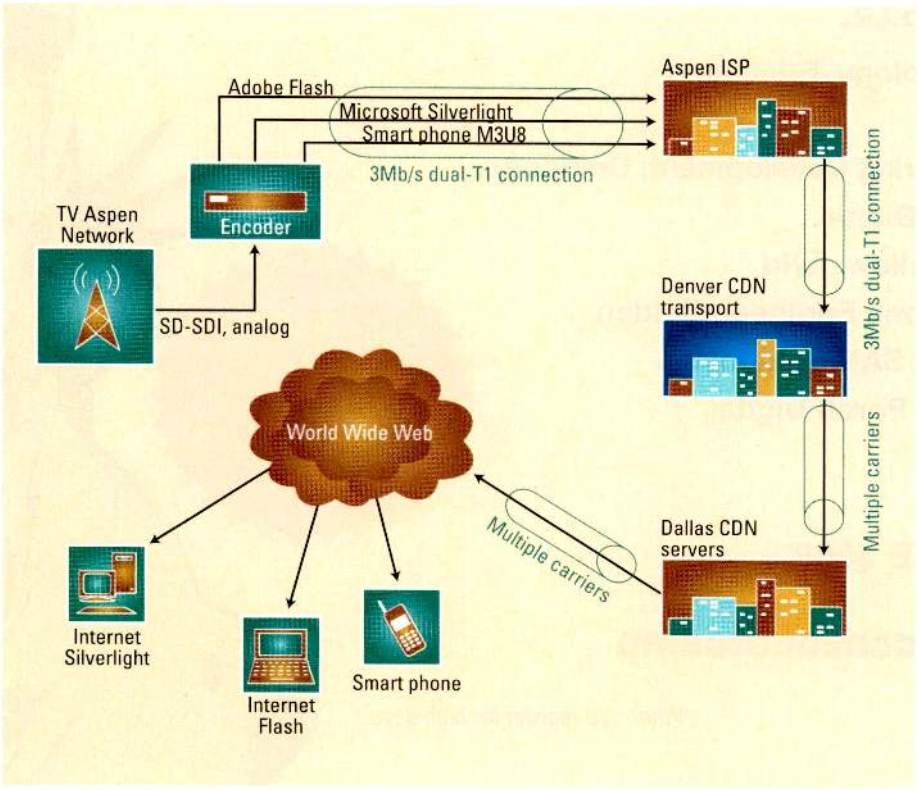


Figure 1. The KCXP-LP off-air signal is first encoded in three formats: Adobe Flash, Microsoft Silverlight and M3U8 for smart phones. It is delivered to a local ISP and then a CDN, which feeds multiple carriers and the Internet.

Why Apple?

The design team researched the marketplace and chose Apple's iPhones and iPads over other smart phones and mobile broadcast technologies for one significant reason: More than 60 percent of all Internet data traffic going to smart phones is going to iPhones, iPod Touches and iPads.

The iPhone's M3U8 file format is unique in the sense that it is actually a playlist of video segments that are about 10 seconds long. The M3U8 format requires video stream packets to be cut up into segments that are played out in sequence on the iPhone. To the viewer, the sequential playlist of video segments appears as a continuous video stream.

The encoder

The IP encoder handles SD–SDI video and analog audio, converting the stream into multiple IP streaming formats. Being able to output several formats simultaneously is a workflow benefit.

The ISP

Specifying and configuring an ISP network for live video streaming is critical. The network relies on a dedicated dual-T1 link, which is separate from the station's business network. The configuration includes two T1 lines and an exclusive T1 router to handle the encode stream going to the CDN provider. This keeps other traffic off the network and avoids congestion. The network's cost is about $1000 per month.

The CDN

The CDN provider is in Fort Collins, CO. While there were several CDN companies available, the team selected a local vendor for more personal attention. The station sends a 3Mb/s stream from Aspen to Denver. From Denver, the CDN contracts with other carriers to transport

the stream to Dallas, where the live stream can be accessed by national and international users.

The biggest challenge

There are a number of issues that must be addressed when broadcasting to any smart phone. They include bandwidth optimization, production workflow, the ISP and the CDN. Other issues that have to be considered include the type of compression to use and any resulting latency. The biggest challenge turned out to be balancing data rate against optimal video imaging.

Other mobile platforms

There are other mobile platforms. The Open Mobile Video Coalition (OMVC) just released a paper supporting the ATSC-M/H standard. Even so, waiting for other mobile broadcast technologies and standards to roll out was not feasible for the TV Aspen Network. Team leaders thought other technologies were still being tested and had an unclear future. In addition, the team thought that the ATSC system was too expensive for its application.

Waiting for other mobile broadcast technologies and standards was not feasible for TV Aspen Network.

The end result

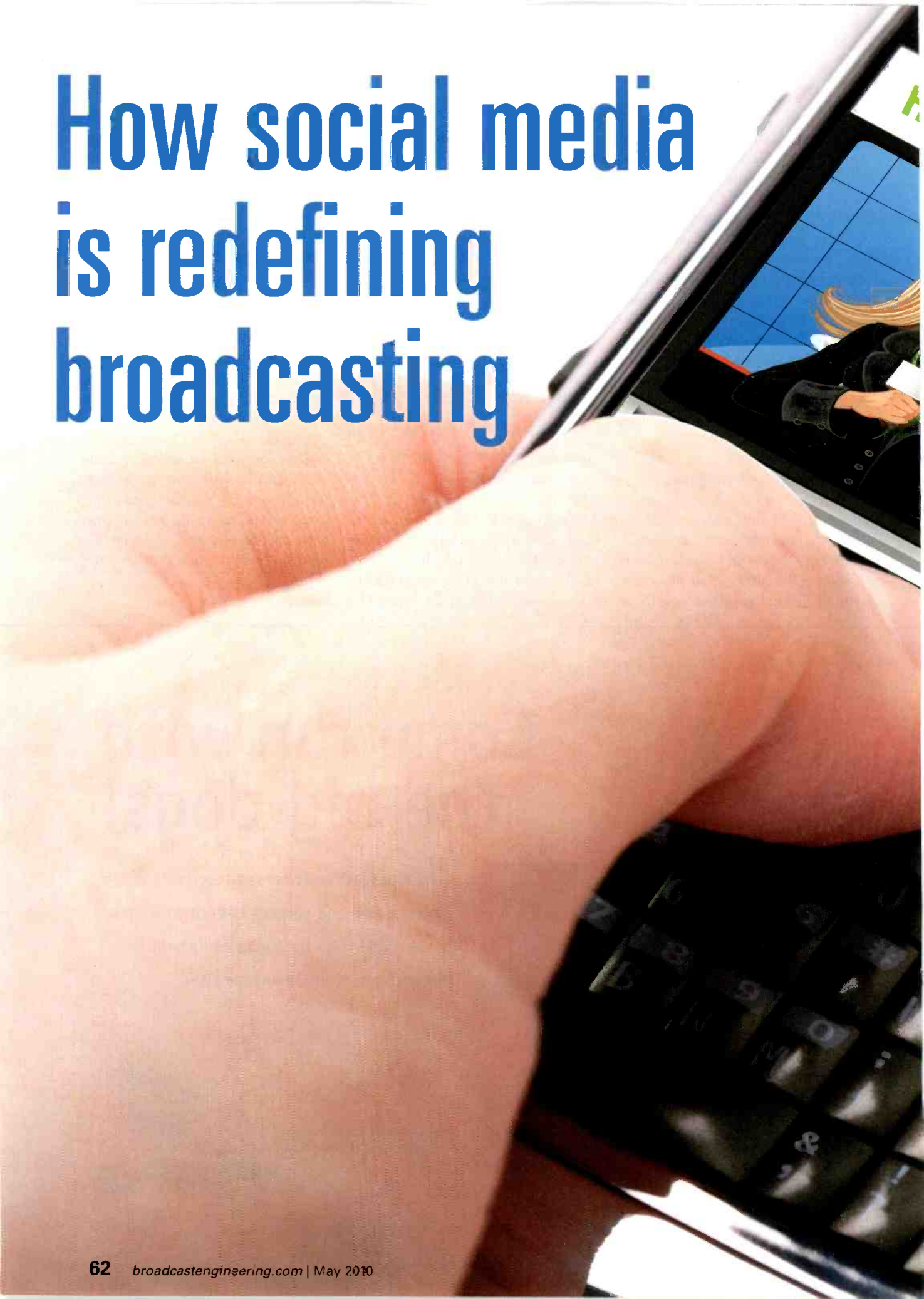
At the end of this project, TV Aspen Network had a spectacular video stream for website and smart phone M3U8 access. The 1.4Mb/s Flash stream can be viewed at *media.tvaspen.mobi/flashhi/index.html*. The Silverlight stream can be found at *media.tvaspen.mobi/smooth/index.html*. For those with Apple devices, the link can be found at *media.tvaspen.mobi/iPhone/stream1.m3u8*.

The bottom line

There are large companies working to develop new technology standards for broadcasting to mobile devices. Public acceptance of this technology, however, is not yet clear. The Apple smart phone and Internet streaming applications are off-the-shelf technologies that exist today. There are numerous CDN and encoding companies that can provide cost-effective solutions for smaller stations. As TV Aspen Network is discovering, new ideas can work with proper planning — even if it requires breaking new ground. BE

Sid Guel is the president and founder of Broadcast Automation Consulting.

How social media is redefining broadcasting



BY ROB VAN DEN DAM

With the convergence of broadband, broadcasting and information technology, different networks now support all forms of communication and media, such as voice, video, computing and games. Connectivity and communication tools and devices are increasingly available and affordable for a large audience; as a result, control of communication media is shifting away from the domain of the media and communication companies and toward the more open Internet communication platform. All this has placed production of media such as images, words, video and audio in the hands of a significant fraction of the world's population. It's a fundamental shift in human communication behavior toward participating and sharing — the great switch from push to pull.

Introduction

Most of the media over the last decade was produced by professionals and transmitted from a tower, distributed over a cable system, or beamed directly from satellite. It was a world in which conversations took place with just one other person, or with a group, by broadcasting the same message to everyone in the group. Those days are over, never to return.

The media landscape as we knew it, where large organizations were controlling channels, is increasingly slipping away. This trend is related to the widespread social media phenomenon.

The media landscape as we knew it, where large organizations were controlling the channels, is increasingly slipping away. This trend is related to the widespread social media phenomenon, which is a reflection in two long-term underlying trends in communication:

- A shift in the control of communication media, from the proprietary domain of the traditional providers to the open Internet; and
- A shift in communication patterns, from one-to-one and one-to-many to many-to-many, collaborative communication. This entails sharing videos, photos and other multimedia contents that substantially enrich the user experience.

Shift in communication media control

The shift in the control of communication media is the result of communication becoming increasingly digital. All media gets digitized, and the Internet increasingly becomes the mode of carriage for all media. Phone calls, magazines, movies and the like are all migrating to the Internet. Media is increasingly becoming ubiquitous and a means of coordinating information, whether it's news, opinions, thoughts, audio, images or video, because everyone can share information via the Internet.

More and more people are becoming connected. The majority of households in developed countries have Internet access, and the number of Internet users in emerging economies is growing rapidly. At the same time, data connectivity speeds have increased significantly, while the costs of connectivity and storage have declined drastically. With better, cheaper technologies and multimedia tools, availability of Web 2.0 software, and greater use of broadband and wireless networks, social media are becoming ever-more viable platforms for communication and media services, and consumers are responding eagerly.

Shift in communication patterns

Traditional broadcasting and interpersonal communication, usually via the telephone, do not provide collaborative group capabilities. The availability and convergence of mobile communication and the Internet are now creating a platform that enables group communication encompassing many participants through shared spaces in virtually any geographic location. The Internet is the first medium in history that has native support for groups and conversation at the same time and gives us the many-to-many pattern.

Media has become a mass of conversations, based on two-way communication, not on traditional one-way information push models. And the viral distribution of information is fast and on a large scale. In addition, the members of the former audience can now also be producers, not only consumers, because the same equipment — computers, phones and the like — enables everyone to both consume and produce. This is a huge change in the media landscape we are used to, and a fundamental shift in the way we communicate and organize media.

The emerging media landscape

The combination of shifts in communications control and patterns is redefining the competitive landscape,

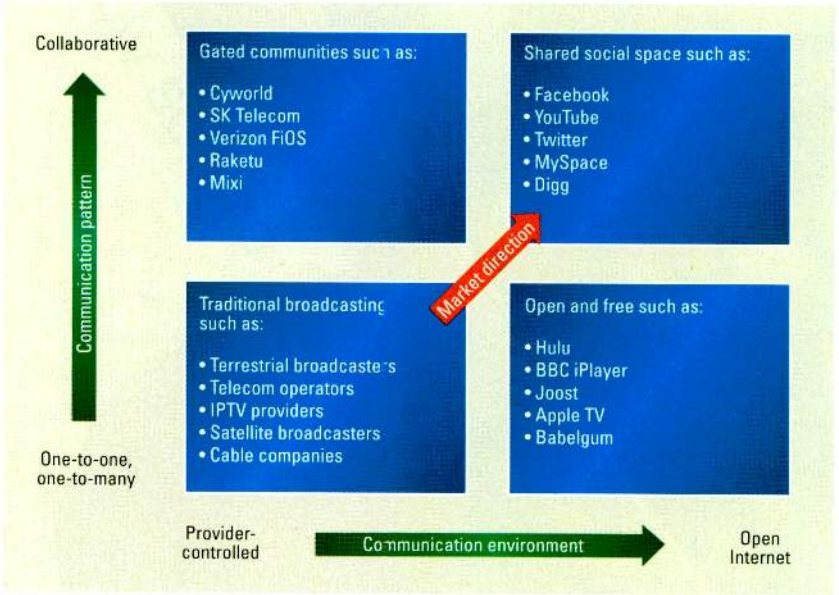


Figure 1. The future media landscape is shaped by shifts in communication control and patterns.

giving rise to new business models. (See Figure 1.) In contrast with traditional models, emerging models are based on open platforms that support many-to-many and collaborative patterns.

Traditional broadcasting

The traditional broadcasting space, characterized by one-way information push models, has been the domain of broadcasters and cable operators. It is the largest segment in terms of revenue and subscribers, but is showing signs of slow growth, or even decline, as other models take hold. While these providers claim the largest number of subscribers, the users of open Internet platforms are growing at significantly faster rates.

Many telecom operators are also focusing on offering TV and video services. Most of them are investing in IPTV, where video content is transmitted using the Internet Protocol (IP) over the closed network of an IPTV provider who has configured it so that viewers can receive only the provider's TV channels. Until now, many operators have focused on offering the same TV channels and the same type of content as their competitors offer. But some telecom companies have taken it further, for example by competing on exclusive content, or offering ease of use by providing features such as an electronic program guide (EPG), which allows individual users in the household to set up a personalized TV guide with favorite programs and settings.

Currently, most IPTV services are based on subscriptions and video-on-demand (VOD) charge, though many telcos realize that advertising might become an increasingly important source of revenue. Still, many operators see offering TV and video services mainly as a necessity to combat the trend of losing subscribers to cable companies, which are increasingly offering VoIP as part of triple-play bundles. In 2009, IBM's Institute for Business Value (IBV) conducted a global Telecom Executives Survey. One of the questions referred to the company's revenue expectations from traditional and nontraditional services and packages, and the revenue expectations from IPTV are relatively low. (See Figure 2.) The prioritized IPTV investments suggest they are in particular critical in the defence of traditional telco services.

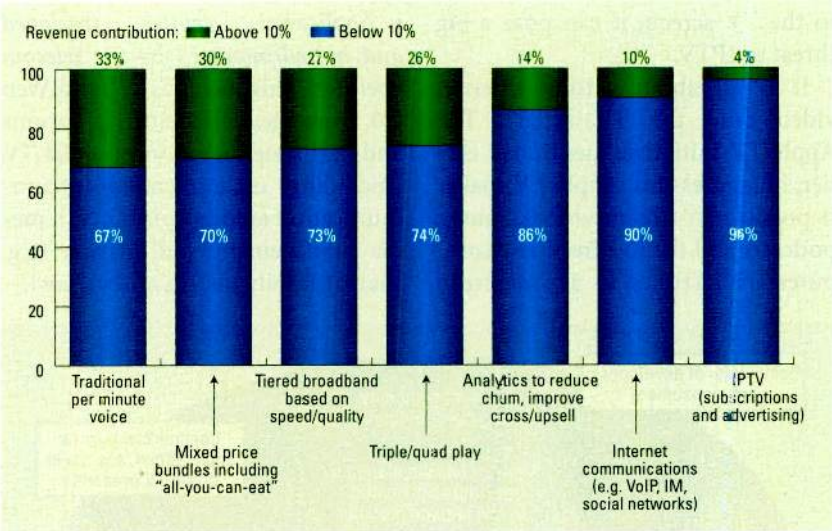


Figure 2. Relative contributions of models/services to revenues over the next five to 10 years. Revenue expectations from IPTV are relatively low.

Open and free

This model offers alternatives to traditional broadcasting platforms such as cable and satellite, but in particular challenges IPTV. Parties in this space include Internet TV providers like Hulu, Babelgum and Joost. Variations of Internet TV include BBC's iPlayer and Apple TV.

Parties in this domain provide these services for free or at low cost and as such threaten the profitable services of traditional providers. Revenue is preliminarily based on advertising. Advertising is becoming increasingly important to fund content, as consumers do not expect to pay for all content. The results of the IBV's 2009 Digital Consumer Survey indicated that in all the countries involved, the majority of those surveyed were willing to view advertising before or after a good-quality, free video broadcast. (See Figure 3.)

Internet TV has the same look and feel as IPTV but is delivered over the public Internet; in fact, it's delivered over the top (OTT) of existing telecom networks, getting a free ride. As

Figure 3. Global users interested in online video ad-supported vs. paid content online

such, Internet TV is not a controlled environment and cannot guarantee quality of services. Obviously, Internet TV is still in the embryonic phase, and many players are attempting to create a market for themselves. In particular, when Internet TV moves to the TV screen, it can pose a big threat to IPTV.

It is all about getting Internet video onto the TV screen. The Apple TV initiative, mentioned earlier, illustrates this. Apple TV makes it possible to stream videos, music, podcasts and the like from any computer with iTunes to a widescreen high-definition TV set. Increasingly, consumer electronics manufacturers are working on developments to enable Internet access in televisions. It is only a question of time until Internet access is a standard feature.

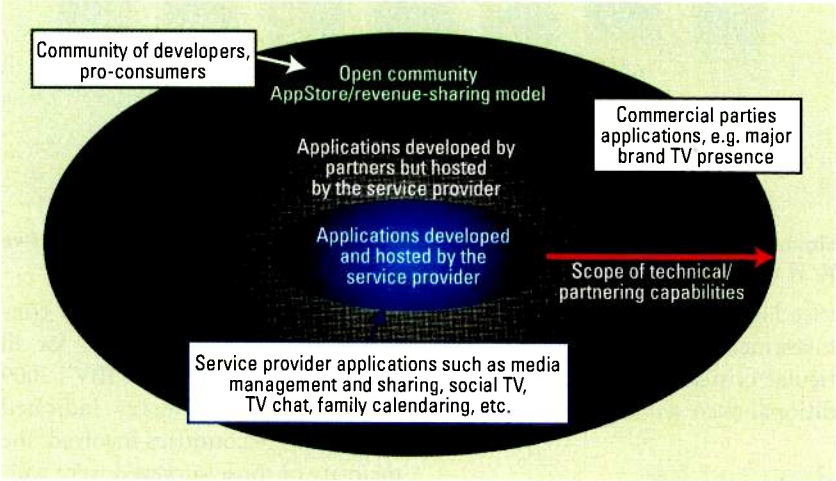


Figure 4. Alternative approaches for application stores

Gated communities

This model is the domain of traditional providers; it is still a "walled garden" approach, but one that facilitates many-to-many communication and collaboration services that will appeal to users with a preference for the more secure and reliable communication environments.

Some telecom operators have started initiatives to move to this space, taking optimum advantage of the possibilities that IPTV offers with regard to interactivity, participation and personalization, usually by developing application stores and based on the business models depicted in Figure 4. The three types of business models refer to the alternative approaches for application stores:

- *Applications defined, developed and hosted/managed by the telecom operator.* This includes TV and Web 2.0 convergence (including forums and real-time messaging), social TV (including recommendations/communication among consumers), media management and sharing (e.g. sharing family photos and videos).
- *Applications defined and developed by a business partner, but hosted/managed by the telecom operator.* This includes commercial partner applications, such as major brand TV presence (direct access to loyalty cards, promotions, how-to videos).
- *Applications developed by the open community, using AppStores à la Apple iPhone and based on a revenue sharing model.* Applications are provided by the community of developers.

This model enables the concept of the pro-consumer.

Verizon is an example of a U.S. service provider moving to this space. It has developed TV-based widgets for Facebook, Twitter and other features in an attempt to make its FiOS IPTV a more fully-integrated TV and online content experience. Verizon has also been testing the ability to stream online videos from YouTube. Moreover, the company has opened its widget platform application programming interface to outside developers, and its "Widget Bazaar," offering downloads of some of the applications that result from the move to the open community development space.

Now the question remains whether telecom operators are seen as the logical providers for consumers to turn to for online video services and other entertainment content. The IBV 2009 Global Telecom Consumer Survey found that the majority of consumers are more likely to turn to Internet information providers like Google for online video services and other entertainment content, with pay TV (cable and satellite) providers as second, and telcos as third. (See Figure 5.) So far, the telcos seem to have been unable to establish themselves in the minds of consumers as key players in content and entertainment service.

Increasingly, consumer electronics manufacturers are working on developments to enable Internet access in televisions. It is only a matter of time until Internet access is a standard feature.

Shared social space

The shared social space is the domain of players such as Facebook, YouTube, Digg and Twitter. Providers in this space encourage participation and contributions from everyone who is interested. They support collaboration and feedback over the

open Internet in the form of blogs, forums, wikis, voting, social networks and other social tools. Widespread availability and connectivity, as well as communication tools/devices, enable people to create and broadcast their own content, including images, words, video and audio.

These platforms put the power of media in the hands of the people, transforming content consumers into content producers. And it continues to expand through bookmarking, crowdsourcing, video sharing, social widgets and the like. Increased involvement from consumers improves information of any kind.

We are increasingly in a landscape where media is global, social, ubiquitous and cheap. The days when most of the media that was available for public assumption was produced by professionals are over. Former consumers are now producers. And the network of relationships within the shared social space guarantees that they can talk directly with each other. They are no longer disconnected from each other.

As there are more amateurs than professionals and the network grows, the power of media is quickly shifting away from the editors, the publishers and even governments, as was clearly illustrated in the tumultuous days after the Iranian presidential election in 2009. The Iranian government was able to boycott the media elite, but not the news coming from social media such as Facebook, Twitter and YouTube. The media was produced locally, by amateurs and at such an incredible abundance that there was no way of stopping it. The news rippled like wildfire.

Broadband and broadcast convergence

Convergence of broadband and broadcast is taking place, not in devices, which appear to be proliferating, but in the network, where Internet protocols and Web technologies are increasingly prevalent. The Internet is becoming the dominant broadcasting platform of our civilization. Already 25 percent of humans are communicating and accessing information on the Web. Everyday more people are connected, both via the fixed and the mobile Internet. The use of video and other data services will grow as Internet data traffic and mobile broadband consumptions soars. The success of sites like YouTube, Facebook and Twitter brings to light the social aspect of video, which serves as a centerpiece for social interaction and as a means of expression.

Today, with the strong presence of the Internet, broadband and social software, the traditional roles of the media elite are being challenged. All the aggregation, filtering, distribution roles and the business models are changing. And social media are becoming part of all media streams. The change is well stated by Rupert Murdoch of News Corp.: "The new generation have a different set of expectations about the kind of content they will get, including when and how they will get it, where they will get it from, and who they will get it from. They want control over their media, instead of being controlled by it."

"The new generation have a different set of expectations about the kind of content they will get, where they will get it from, and who they will get it from. They want to control their media, instead of being controlled by it."

Media and communication companies will be subject to the disruptive force of openness and changing human communication behavior. They must take bold steps to remain an integral part of a changing landscape. The combination of an old media mind-set with the new media consumer will ultimately result in disintermediation; companies have to adapt quickly to survive. The journey will not be without risks, but the option of doing nothing is a luxury few can afford. BE

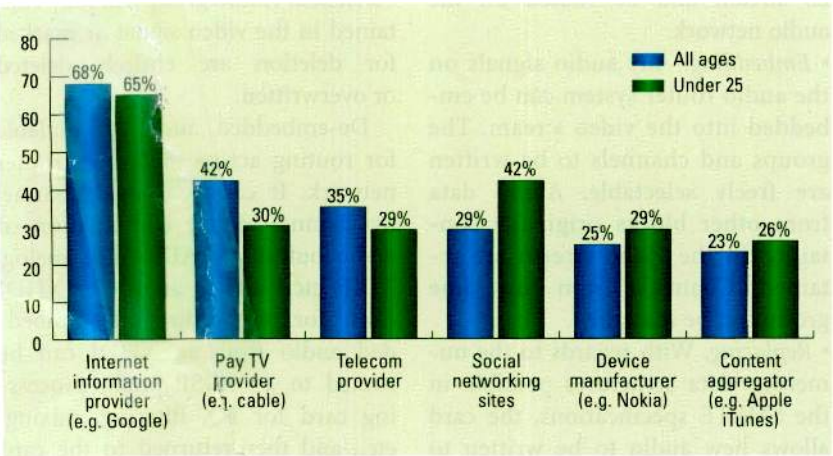


Figure 5. A list of the providers that consumers plan to turn to for online video and other entertainment content over the next five to seven years

Rob van den Dam is a global telecommunications industry leader at the IBM Institute for Business Value.

Stagetec's 3G audio embedder/de-embedder

The new router card supports all SDI standards.

BY RUSTY WAITE

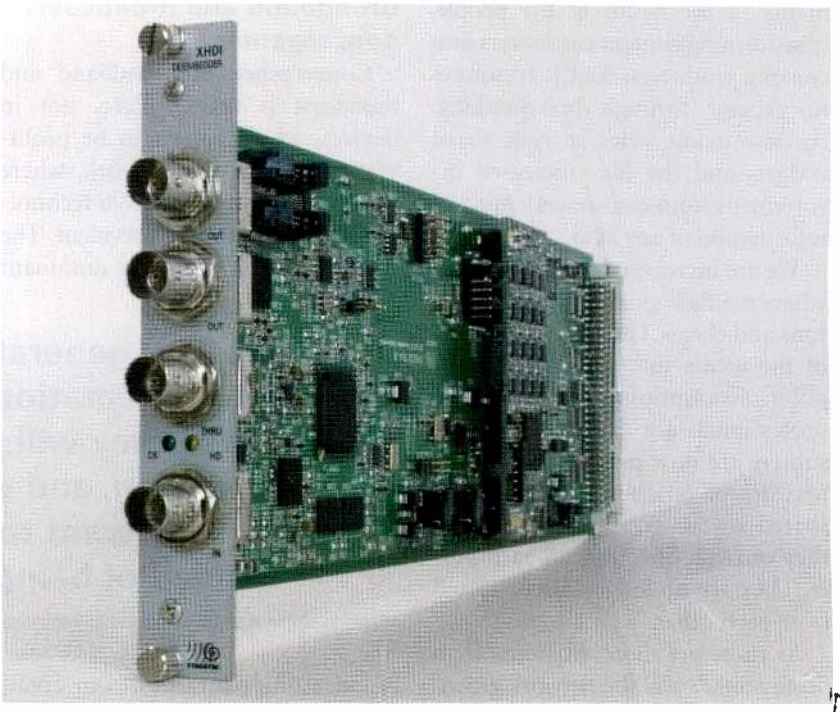
Walk into any TV production or broadcast facility today, and you're guaranteed to run across embedded audio. Whether for transmission, routing or archiving, it's pretty much the norm to embed audio within the video signal. The main reasons for embedding audio, besides a reduction in cabling, are:

- Vastly simplified cabling as the video and up to 16 channels of audio travel on one coax.
- The need for audio and video to always be in sync, especially in the digital domain.
- The fact that separate audio and video routers are not needed when the program is ready for transmission.

But that solves only the transport and storage of completed programming. To work with the audio during the production process, the audio channels need to be separated from the video. Enter the embedding/de-embedding process.

Stagetec's NEXUS digital audio router system has a distributed modular structure, intuitive controls and reliability. It offers a full contingent of audio and communication interfaces and is typically found in master control rooms, broadcast facilities, OB trucks and live performance centers.

The XHDI-02 card is the second-generation HDI interface for the router system. It is an audio embedder/de-embedder card for video signals compliant with SMPTE 259M (SD), SMPTE 292M (HD) and SMPTE 424M/425M (3G). There are a total of 16 I/O audio channels at 24 bits conforming to SMPTE 272M-AC (SD) or SMPTE 299M (HD/3G) standards.



The Stagetec XHDI-02 embedder/de-embedder card supports a number of audio and video standards and interfaces with the company's NEXUS routers.

The primary functions of the card are:

- *De-embedding.* Any audio signal can be extracted from the video stream and be routed on the audio network.
- *Embedding.* Any audio signals on the audio router system can be embedded into the video stream. The groups and channels to be written are freely selectable. Audio data from other blocks originally contained in the video stream are retained. Channels from the same group can be reapplied.
- *Replacing.* With regards to the numerous data structures possible in the SMPTE specifications, the card allows new audio to be written to existing data structures. This will embed only the pure audio data. This mode provides a high degree of compatibility even for non standard streams, for example, if only two audio channels are defined for a group.
- *Deletion.* Audio groups already contained in the video signal or marked for deletion are entirely deleted or overwritten.

De-embedded audio is available for routing across the whole router network. It can be routed channel by channel to any combination of audio outputs (MADI, AES, analog, TDIF, etc.) and to any other XHDI card for embedding. De-embedded audio from an XHDI can be routed to an XDSP audio processing card for EQ, filtering, mixing, etc., and then returned to the card for re-embedding.

The card accepts synchronous and

asynchronous HD/3G video signals. Sample rate converters (SRCs) on the card will match the audio router system's clock if different. The card also has a special function in HD/3G mode in that it time-aligns the audio blocks in embedding/de-embedding modes. For greater flexibility, the card is available in BNC or fiber-optic (LC, single-mode) versions.

The card offers video pass through with a video delay of zero to 15 frames for SD and zero to eight frames for HD/3G if needed. There is onboard DSP that is available for processing (gain, noise-shaping) on all audio channels.

There's a direct link from the card to the Dolby E Encoder (XDEE) and Decoder (XDED) cards within the audio router system to embed and de-embed asynchronous audio and nonaudio signals. The card has been tested by Dolby Labs and has received itscertification.

A two-channel metadata embedder/de-embedder is compliant with SMPTE 2020-1 and 2020-2 standards. The metadata signals are routable through the network. There is an adjustable audio delay of 0ms to 170ms at 48kHz for the transmission channel.

The NEXUS system is extremely reliable and flexible because of its distributed architecture. The XHDI-02 card is a complement to the full array of interfaces available to the digital router system. It has already been installed in multiple facilities around the world, including ESPN headquarters in Bristol, CT. BE

The card accepts synchronous and asynchronous HD/3G video signals and is available with BNC or fiber-optic ports.

Rusty Waite is president of North American operation at Salzbrenner Stagetec Mediagroup.

GraniteSTOR abcSAN

Small Tree's iSCSI-based shared storage technology provides functionality and scalability.

BY STEVE MODICA

In industries working with large files, storage is critical to maximizing workflow and productivity — thus, the growth of storage technology over the past decade. However, with this growth, two issues have arisen. The first is a combination of applications requiring different storage elements to work, preventing a one-size-fits-all solution, and the second issue is scalability limitations.

The lack of a one-size-fits-all storage technology to date has handcuffed organizations that need to use multiple applications to complete projects. While Final Cut Pro will work with any storage technology, Avid requires the use of its own dedicated storage technology, and Pro Tools requires direct attached storage. This forces organizations to consider implementing multiple storage technology equipment throughout their facility in order to successfully meet the requirements of specific projects. Obviously, this can be cost prohibitive for small to midsize production and post-production facilities.

Scalability has also become an issue facilities must consider when examining storage technology. With two to three editors, it's not a serious problem to have a FireWire drive on every desk. If you've got 10 editors or more, however, using FireWire drives on every desk can be problematic, with too many drives to track projects and the likelihood of disk failure causing serious problems.

Under the hood

GraniteSTOR abcSAN, iSCSI-based shared storage technology from Small Tree, was built to provide economical, functional and easy-to-manage shared and direct storage for facilities that require flexibility and scalability. It provides robust (greater than 600MB/s), consistent performance over Ethernet networks while offering optimal cost-efficiency. The full-featured solution offers an intuitive GUI with single-pane class management for users who wish to manage RAID sets, volumes, targets and shares from one screen. Deployable as either a NAS or a SAN, it is available in a 12-drive (12TB or 24TB) configuration.

The shared storage technology can act as both a server or a direct attached device. So, if users set it up with half of their storage exposed as iSCSI targets, it can work as a time machine system, acting as a server so people can back up to it or as a Pro Tools system. At the same time, the other half of the system is serving out bandwidth and storage so that users can run Final Cut Pro. With Mac OS 10.5 and through some of the improvements in the network stack, the technology provides 100MB/s over Ethernet back to the client.

GraniteSTOR abcSAN is deployable as either a NAS or a SAN solution and is available in 6TB, 12TB or 24TB configurations.

As NAS running over Ethernet, the technology is more scalable than Xsan because if the NAS server is full, users simply add more servers and put them on the network so that all of the users can see them. Files can be transferred easily between servers, and each server brings more bandwidth, more CPU and more memory to the storage equation. The only piece of the entire storage infrastructure that needs to scale is the Ethernet switch. This is by far the most inexpensive thing to scale, and large switches are easy to come by. Now with Xsan, you can have only one metadata server. Once users have hit a certain number of nodes hammering away on the metadata server, it's not going to provide optimal speed, and users can't make it any bigger.

Linux leads the way

The technology is based on embedded Linux, which is efficient, especially in the 2.6.27 and above kernels. Small Tree found that Linux will outperform a Mac server because a lot of people are using it and making open source improvements. So, when users combine Linux with inexpensive hardware, fast Intel processors, fast Intel networking cards and a nice GUI to configure it all, they're leveraging efficient and inexpensive technology.

Moving 110MB/s over an Ethernet Gigabit link, Small Tree's iSCSI software was built to be lean and mean. It's easy to use; editors simply click and type in the IP address of their RAID, and off they go. It'll be there automatically when they log in, and it'll mount when they reboot.

The 12-drive configuration offers inexpensive access to RAID 5. While only last year people were buying 10Gb to do uncompressed HD, by saturating the two Gigabit links on the abcSAN 12-drive, 10 to 15 clients can work simultaneously with no difficulties. Additionally, clients can now edit HD over Gigabit Ethernet. BE

Steve Modica is CTO for Small Tree.

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Remote monitoring

Learn solutions for remotely diagnosing problems in your broadcast facility.

BY JOHN LUFF

A cable company says your signal is horrible and that is why it looks like a 1950s station when its customers tune in. What do you do? It is tempting to say, "It looks good leaving here." I remember experienced engineers at one station I worked at long ago saying the problem is "west of Denver," which I was told was a remnant of the time when microwave circuits converged in ATT long line offices in major hubs, making it possible to isolate to a region, but often not a specific location. In the world where mountains of data can be gathered in seconds from seemingly impossible locations (falcon cams come to mind), is it not possible to remotely monitor and diagnose problems? Of course it is, given the right tools, sufficient bandwidth, a clear definition of the data or pictures you want to keep track of and how much it is worth.

Harris' CCS Navigator offers device configuration and various levels of control and monitoring for broadcast networks by using a binary open source protocol that provides real-time parametric adjustment and enhanced alarm management and correlation.

Limitations of monitoring

Remote monitoring comes with limitations, particularly if the public network is used to transport the data. Latency, the delay between when the event/sample happens and when the report of that arrives at the remote monitoring point, is the most serious issue with monitoring over a WAN, particularly the public network. When the Internet is busy, particularly in peak times after school hours, generally latency increases, and throughput on any last-mile link decreases. So long as the latency remains low and throughput remains high enough to allow quality (no pun intended) monitoring, there is no problem using a public circuit. Security is a separate concern, but assuming you use a secure VPN to carry the traffic, you will likely be safe from digital prowlers. However, video monitoring is a bandwidth hog, and a few missed frames here and there can be a major operational headache. For instance, how do you determine that the video being monitored is not dropping frames when the monitoring circuit is failing? Second, in efforts to reduce bandwidth and make service possible on links with packet jitter (variations in latency), we often choose lower-bandwidth codecs, which usually require longer to code the content. This makes monitoring a live feed more difficult, akin to watching a satellite feed of the signal and perhaps much worse latency than a satellite's one-fourth of a second. There are some low latency options that can be strategically important in cases like remotely monitoring master control output in a centralized operations approach.

Where the monitor circuit is only intended to show a representation of the content and quality can be lower, it is easier to get low latency. Using fewer samples (CIF, Q-CIF), reducing audio bit depth below 16 bits per sample and using long-GOP coding reduce bandwidth. Insidiously, using long GOP actually increases latency. As we move inexorably toward all HD content in distribution and delivery to everything except cell phones, picking the right codec and having sufficient bandwidth are becoming more complicated.

Monitoring solutions

There are monitoring options that can utilize features added to otherwise ordinary products, like distribution amplifiers. The features can include the obvious parameters like presence and absence of sound and picture, captions, and levels. These remote monitoring probes often return thumbnails of the video at a low bit rate and simple alarms.

A more powerful strategy is to combine the basic monitoring functions with an extended capability that

takes signals requiring more thorough evaluation, as in the case of an alarm condition, and switch the signal to a streaming media encoder or device with more complete analysis capability. Remote monitoring might thus be attached to a routing switcher giving access to many different points in the system. This requires good knowledge of the system being remotely monitored as well as a remote control capability. This monitoring by exception has been appropriately termed "lean back, lean forward" by one manufacturer. When the alarms go off, the operator looks at a generalized screen showing status on many devices. When a failure occurs, the device of interest is brought forward, and the operator leans in to see the detail and work the solution to the problem. When the monitoring and control are tightly integrated with a sophisticated multi-image display system, this can be particularly effective at providing both the overview and the tools necessary to fully understand a failure.

A clever use of good technology is to connect a modest multi-image system to a streaming encoder to bring back many signals all at once. Quality will be lower than individual signals, but if you have control over the multi-image system, you can switch it into a single channel mode when appropriate. The ability to get an overview of a remote system is particularly valuable in centralized operations.

As we move inexorably toward all HD content in distribution and delivery to everything except cell phones, picking the right codec and having sufficient bandwidth are becoming more complicated.

There are less expensive options with stand-alone modules that peek at signals and report the results over low bandwidth. This is great for looking at your signal at a distant cable headend, or the other end of an STL, and can use dial up or Internet connection when it is available.

Don't forget that today we might have no picture at all when looking at the output of a compressed link or off-air receiver, yet the data may be arriving just fine. MPEG transport stream analysis is another tool that can be crucial to troubleshooting a device you can't get in front of. Syntax and statistics lead to effective understanding of issues with compressed links. When combined with information about the transport medium itself, for instance remote ATSC signal analysis, you can get a complete set of tools that allow a technician with good understanding of the symptoms to properly diagnose problems without leaving home.

Lastly, SNMP offers non-picture related data that fills in a complete picture. Knowing the status of fans, power supplies, disk systems and even the air-conditioning system in the remote facility helps you understand a complex and confusing picture of a system you can't put your hands on. BE

John Luff is a broadcast technology consultant.

Send questions and comments to: john.luff@penton.com

Altera — 28nm FPGA

FPGA features embedded HardCopy Blocks that leverage HardCopy ASIC capabilities to harden standard or logic-intensive functions such as interface protocols, application-specific functions and proprietary custom IP; offers faster time to market for designs while reducing cost and power; integrates 28Gb/s transceivers to enable the implementation of next-generation designs on a single chip without the need for external components; partial configuration allows designers to reconfigure part of the FPGA while other sections remain running.

408-544-7000; www.altera.com

Chrosziel — DSW 500 Adaptor

Direct swing-away system provides a pivoting radius of 100mm for comfortable lens change; can be used with all Chrosziel Sunshades and MatteBoxes, particularly with select 2/3in HD/SD format, 1/3in HD format and compact 35mm/full-format chip MatteBoxes, as well as products using the 15mm standard.

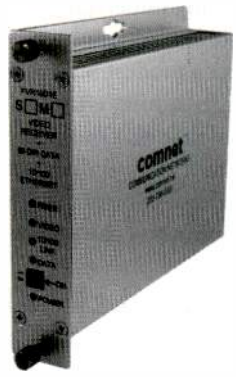
+49 89 90 10 910; www.chrosziel.com

Electrorack — HydroCool-IT

Passive, water-cooled, rear-door heat exchanger is designed to cool up to 30kW per rack; relies on servers to push air through the low-resistance coil; rear-door design allows the unit to retrofit to existing installations and typically doesn't require rearrangement of enclosures, with transition frames attaching directly to the enclosure housing the door that contains the heat exchanger; works in conjunction with a dedicated chiller or a coolant distribution unit (CDU) that connects to the main building chilled water loop; CDU creates an isolated secondary cooling loop minimizing liquid volume and controlling water pressure and flow; provides intelligent monitoring; interfaces with building management systems and Web management tools for high reliability.

800-433-6745; www.electrorack.com

ComNet — FVT/FVR 10D1E series



Fiber-optic transmitters and receivers support 10-bit, digitally encoded, RS-250C, short-haul-quality video, serial data and 10/100 Ethernet on a single optical fiber; offers users a solution for current requirements where high-quality video is needed; provides for future expansion and upgrades that will necessitate the use of Ethernet.

203-796-5300; www.comnet.net

Gekko Technology — kisslite

3200K and 5600K white light source is a lightweight, portable LED ring light system; works with handheld cameras, mounted on a stabilization system or on a crane or dolly; provides high-quality fill without compromising the dominant or ambient light source; dual- or triple-filter staging are available if required; can mount directly on most lenses as well as 15mm and 19mm bars.

+44 8448 005326
www.gekkotechnology.com

Axon Digital Design — SynView

Multiviewers can handle multiple individual selectable UMD and tally overlays, as well as multiple audio metering and metadata overlay; are modular and expandable per four inuts; current product portfolio contains multiviewers up to 32 channels of 3Gb/s-HD-SDI or HD-SDI in 2RU.

301-854-6557; www.axon.tv

ARG ElectroDesign — Media Combiner 1900EX

Broadcast network adapter is designed for the transmission of real-time video-over-IP sources, as well as DVB-ASI and 2Mb/s G.703 signals over carrier Ethernet and private microwave circuits in ring and meshed topologies; 32Gb nonblocking Ethernet switch with fast redundant-ring technology enables users to attain redundancy switching speeds of less than 5ms per link with no risk of generating broadcast storms; features Qos, CoS, factory configuration of dedicated ring and IGMP ports, and enhanced Layer 2 features for easy installation and operation.

203-376-3372; www.arg.co.uk

Bridge Technologies — VideoBRIDGE v4.5

Software update introduces new fault tracking capabilities and increased alarm filtering capabilities in the VBC; increases clarity of data presentation for easy monitoring of large volumes of data in multichannel installations with more graphical representations of events in time; features ultrafast searching using a comprehensive range of criteria, enhanced large thumbnail view for instant visual feedback of service output in monitoring overview displays, graphical alarm view for instant, overview of alarms for up to 120 channels per screen with thumbnails and up to 300 in stream view, and alarm scheduling in the VBC, which provides the ability to "wash" alarm events where channel sharing and content switching provoke alarms.

+47 22 38 51 00; www.bridgetech.tv

Media 100 — Media 100 Suite Version 1.5

Editing system upgrade includes the ability to create, save and export presets; offers improved media management capabilities, AVCHD import using ClipWrap, faster and more powerful multiclip editing feature, Panasonic P2 frame rate support, and support for Apple's ProRes 4444, LT and Proxy codecs, as well as for Intel and PowerPC-based Macs.

800-922-3220; www.media100.com

Gennum — GN2010/GN2012

Clock and data recovery (CDR) family includes three variants; GN2010E includes an EML driver; GN2010D includes a DML driver; both combine a dual 10Gb CDR with a limiting amplifier and laser driver as well as integrate the APC loop, reducing the need for external components; GN2012 is a dual 10G CDR with limiting amplifier; all three provide retime support for 8Gb Fibre Channel, allowing a single device to support Fibre Channel, 10Gb Ethernet and OC-192 SONET; enable a sub-1W, CDR-based, 10GigE SFP+ module and a SONET-compliant SFP+ module; use a 3.3V power supply; do not require a reference clock.

905-632-2996; www.gennum.com

MAXON — CINEBENCH 11.5

Updated advanced hardware testing suite assesses a computer's performance capabilities; based on same technology as CINEMA 4D; includes the ability to more accurately test the industry's latest hardware, including systems with up to 64 processor threads, and a more streamlined interface; testing environment better reflects the expectations on today's production demands; offers a tangible benchmark that incorporates a user's common tasks within CINEMA 4D to measure the performance of a system's processor and graphics card under real-world circumstances; available free via download; can be used on Windows and Mac platforms.

805-376-3333; www.maxon.net

never.no — Interactivity Suite

Array of software applications allows users to influence a broadcast in real time and interact with each other; enables media owners and advertisers to track consumers from medium to medium, communicating individually with them and tailoring and optimizing each individual's content and sponsor environment; includes Interactivity Desk, which is a software tool for on-air and off-air editorial control of interactive and participation formats in all media; reads various forms of viewer contribution data; enables the editor to moderate, edit and sort it before submission to the broadcast systems, blogs, Web, STB or IPTV middleware; suite also features Dynamic Content Scheduler, a Windows-based GUI for configuring, deploying and scheduling interactive, automated TV graphics.

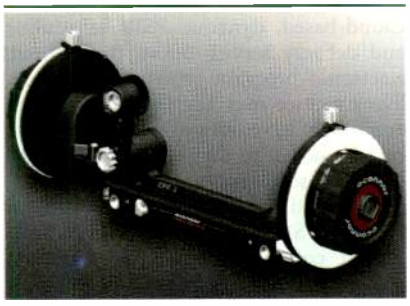
917-680-4881; www.never.no

NextComputing — Radius

Turnkey solution combines the PC content output and real-time Adobe Flash rendering capabilities of VidiGo Graphics with NextComputing's all-in-one portable workstation; features the necessary horsepower to perform live rendering of Flash animations to HD-SDI output and an integrated display.

603-886-3874
www.nextcomputing.com

OConnor — CFF-1



Cine Follow Focus features a multifunctional, modular design that eliminates the hassle of juggling separate bridge plates as well as a single, easy-to-use snap-on bridge that clamps onto 15mm or 19mm studio rod systems; integrates seamlessly with existing accessories; swing arm can be mounted on either side of the bridge; bridge can slide independently of the support bridge dovetail, increasing mounting options for specialty setups; horizontal sliding adjustment mechanism enables the operator to locate the focus driver gear so the line of sight to the lens witness mark is always clear.

818-847-8666; www.ocon.com

Omneon — MediaTools

Utility suite is designed to provide simple, cost-effective, powerful functionality; includes ClipTool Pro, a Windows-based software application that features an easy-to-use GUI to monitor and control playout and record functionality for an Omneon Spectrum media server; provides control for ingest, quality assurance and playout operations with VTR-like control panel.

408-585-5000; www.omneon.com

Boris FX — Boris Job Slate

Apple Final Cut plug-in automatically creates commercial slates based on XML files received from the Ad-ID advertising identification and management system; saves production time and reduces operator error by eliminating the need for manual text entry with a standard text tool; features include customizable text, custom backdrops, global adjustment of size and position of text, and a watch folder to assist in locating XML files.

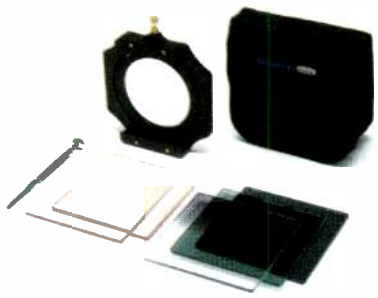
888-772-6747; www.borisfx.com

Radiall — NSX series

Multipin rack and panel connector series includes size 10 contact to complement legacy size eight and size five range; offers greater density; available in standard crimp termination and solder tails for printed circuit card applications; new layout possibilities are coded as 13T13 with 13-contact size 10, 18T18 with 18-contact size 10 and 15T6Q2 with two-contact size eight, seven-contact size 16 and six-contact size 10; size 10 contact can be either concentric twinax or triax type; size eight can be coax, concentric twinax, triax or quadrax; size 16 contact is power.

480-682-9400; www.radiall.com

Schneider Optics Century 5-Filter Kit



Filter kit combines an easy-to-use filter holder and five Century 4in by 4in filters; holder attaches to the lens via an interchangeable adapter ring, which screws onto the threads at the lens front, and clips securely into place using a smooth, quick-release, spring-loaded mechanism; holder can be rotated to any angle, retain two filters and is compatible with DV and film cameras; filters slide into twin slots on the top and bottom of the system.

800-228-1254
www.schneideroptics.com

Sencore — TSM1770

Transport stream monitor enables engineers to monitor compressed audio, video and data services on any satellite network; supports ASI, SMPTE 310M, 8-VSB, QAM and Ethernet physical inputs; reports transport stream status on the physical layer, protocol and AV levels; monitors quality of service parameters; delivers the results in a straightforward way.

800-736-2673; www.sencore.com

Marshall Electronics V-LCD50-HDMI

Lightweight, 5in, 800 x 480, camera-top/portable field monitor with HDMI offers standard features, including a wide variety of formats and markers, four user-configurable, front-panel function buttons, RGB check field/field detect, RGB gain and bias control, false color and peaking filters, image flip, freeze frame, and HDMI auto color space and ratio detect; can be battery powered in the field using four AA batteries or the included power supply; bottom 1/4in-20 mount allows the unit to be mounted to most DSLRs, cranes and jibs.

800-800-6608; www.lcdracks.com

V4x — Social TV Apps

Tools to deliver compelling interactive, video-rich media applications for mobile, Web and connected TV; can be used to create and schedule unique, interactive video sequences that can boost viewing and community engagement while generating revenues; revenue-generating apps include contests, pools, quizzes or sweepstakes through opt-in forms, in-app purchases and e-commerce links; offer the ability to launch video boutiques with video sequences or live streaming including banner and companion ads, as well as social interaction among shoppers; allow viewers to fully participate in programs with various interactive widgets.

646-402-5941; www.v4x.com

Adtec Digital — DTVGuide

Cloud-based, dynamic PSIP scheduling and delivery service offers multiformat, electronic program scheduling and delivery service over the Internet with no equipment to set up and maintain and no cost for access to the programming data; integrates seamlessly with Adtec DTA3050 series multiplexer as well as third-party PSIP and SI generators capable of XML format consumption; enables users to create and upload their own program listings or take advantage of more than 100 North American network programmers that provide data to Adtec's servers on a daily basis.

615-256-6619; www.adtecinc.com

Roland Systems Group — V-Mixer software v2.1/1.1

Software update v2.1 for M-400 and v1.1 for M-380 adds S-4000M functionality, as well as user-requested features; features include enabling distribution of multiple I/O units around a location, venue or stage for flexible V-Mixing system configurations, selecting whether to mute aux sends and/or direct outs when input channels are muted, adjustment of gate and compressor parameters using EQ area control knobs, access to three user fader layers and patchbay assignment icons that have been changed to show signal flow direction; available as a free Web update.

800-360-2580; www.rolandsystemsgroup.com

ProConsultant Informatique — LOUISE 5.0

Business management system provides an intelligent, robust business-oriented architecture for simultaneously managing and scheduling program assets across multiple linear and nonlinear outlets, including VOD, mobile and other services; includes new, updated and customizable GUIs with modules for streamlining nonlinear production; incorporates essential program information in its centralized database, including rights, contracts, scheduling and all associated metadata through its lifecycle; allows secondary event scheduling; serves as a control and information hub for data exchange.

+33 3 87 37 7878; www.proconsultant.net

Videssence — ExceLED 25

25W LED fixture provides a concentrated beam of light with even coverage of consistent 3200K light; additional control and effects can be achieved with the gel frame and barn door accessory options; features 40,000-hour life through precision heat sink design and optimum LED driving; provided standard with power cord and choice of C-clamp or stand adapter; adjustable mounting yoke allows rotation and can be locked in place; units may be ordered in dim and non-dim configurations.

626-579-0943; www.videssence.tv

16x9 — Noga Griffin Arm

Articulating arm can hold 10lbs at full extension; features variable-friction load adjustment and a flip level with safety catch that releases with one turn of the arm's three joints at once; overall length is 22in and is made up of two equal-length arms and three articulating joints; can be mounted on a light stand or anywhere else with a grip clamp; each arm has a 5/8in pin threaded at the ends in 1/4in-20 and 3/8in-16, respectively, for additional mounting options.

661-295-3313; www.16x9inc.com

Front Porch Digital — DIVAsolo v4

Updated content migration system combines a SAMMA Solo encoding appliance with DIVArchive CSM solution and DIVAdirector MAM; features Apple Final Cut and Avid Interplay integration, direct VTR control, automatic shot list generation, key frame extraction, dynamic metadata collection, full desktop Web browser access to all migrated assets and an LTO-based data tape robotic system; incorporates new features of DIVAdirector v4.1, including a simplified browser interface, support for identification and retrieval of clips with noncontiguous time code, partial restore format auto-detection, and enhanced and simplified management of remote proxies.

303-440-7930; www.fpdigital.com

EditShare — XStream v6.0

Update to shared-storage solution includes optimizations for DPX workflows, user groups for simplified administration, managed and unmanaged space capabilities, media space renaming feature, support for the latest versions of Netatalk and Samba, a new GUI, integration of solid-state drives, and support for dual-port 10GigE cards.

617-782-0479; www.editshare.com

ERI — CS300

Broadband, 3-1/8in, four-port, motorized coaxial switch is designed for any VHF or UHF broadcast application from 54MHz to 862MHz; features a coplanar design that simplifies interconnecting transmission-line requirements and allows for more compact equipment configurations with fewer expensive elbows; switch rotation is performed by a precise Geneva Drive mechanism that maintains optimum transmission system performance by ensuring a precise 90-degree rotation during each activation; available with 110VAC or 240VAC drive motor and control voltages of 12VDC or 24VDC.

877-374-5463; www.eriinc.com

AmberFin — iCR Smart Ingest

System combines high-quality SD/HD ingest with automatic assisted QC in a single system; allows tape content to be efficiently and reliably used in workflows based on central storage solutions, including SAN- and NAS-based architectures; performs a wide range of automatic quality tests on video, audio and time code and generates easy-to-read reports that detail the nature and position of an error with a thumbnail of the frame where it occurred.

+44 1256 317500; www.amberfin.com

Digital Nirvana — MonitorIQ 2.0 BMS

Monitors and records broadcast TV programming; can be customized to record based on time block, channel or episode in addition to nonstop recording for compliance logging purposes; combines functionality of content recording, content search, retrieve and repurposing, Web publishing, signal monitoring, aircheck logging, archiving, ad verification and tracking, and competitive analysis in a scalable, networked appliance with a Web-based user interface; features the ability to search any text within a facility's as-run/traffic logs and go directly to the video at that time, ingest overnight ratings and provide a hyperlink into the video for each of the data points; integrates with Statmon Technologies' AXESS management platform; HD-SDI version enables the ingest of four HD-SDI inputs and supports PAL/NTSC, ATSC, QAM, DVB-T, DVB-C, DVB-S and HD-SDI; maintains embedded metadata that is not broadcast with the recording.

510-226-9000
www.digital-nirvana.com

Yamaha Commercial Audio Systems — M7CL v3.01 software

Digital audio console software update includes a channel select/send on-fader option, as well as a conversion button on the system setup dialog box; features include recall safe parameters (input patch, output patch, direct out patch and insert out patch) and VCM effects (Comp 276/276s, Comp 260/260s, Open Deck, EQ601); omni Channels 1-8 can be used for talkback.

714-522-9011; www.yamahaca.com

HaiVision Network Video — Makito AIR

Compact, ruggedized version of commercial, off-the-shelf MAKITO system delivers HD H.264 encoding at up to 1080p60 resolution; supports core feature set of MAKITO, such as HD encoding performance of less than 55ms, as well as real-time metadata; can incorporate key length value and cursor on target metadata into the MPEG streams according to standards set by MISB.

847-362-6800; www.haivision.com

Gefen — CAT5-1600HD/CAT5-5600HD

KVM extension solutions extend high-resolution displays using DVI and USB 2.0 peripherals up to 200ft; CAT5-1600-HD extends one display with up to four peripherals using one dedicated cable (Cat 5/6) for peripherals and one Cat 6a cable for the display; CAT5-5600HD extends two displays with up to four peripherals using one dedicated cable (Cat 5/6) for peripherals and two Cat 6a cables for both displays; computer cables are connected directly to the sender unit, while workspace devices are connected directly to the receiver unit; sender and receiver units are linked by two or three cables with no image degradation or loss.

800-545-6900; www.gefen.com

Aberdeen — AberSAN

High-bandwidth, scalable storage appliance brings the simplification of a NAS server to the SAN environment by combining Fibre Channel and iSCSI block-level connections with multiuser network sharing; removes storage and partition size limitations to deliver ease of use and flexibility while featuring more efficient crossplatform collaborative editing and shard media storage; enables users to designate their virtual volumes as multiuser write (file or block level) for an optimal combination of performance and workflow and removing many of the configuration complexities common in iSCSI and Fibre SANs that do not allow shared drive volumes; incorporates ZFS file system; is scalable from 8TB to 96TB.

800-552-6868
www.aberdeeninc.com

SSL DV — Gravity LiveEdit

Real-time, nonlinear editing system delivers the power to modify a program's content while keeping within pre-existing time schedules for live and near-live broadcasting applications; provides users with fast, simple editing capabilities to manipulate a live stream as it is repurposed and rebroadcast; enables recording streams to be appended, inserted, overlaid and replaced into the timeline at any point, as well as the independent editing of audio and video streams to create split audio "L" cuts; includes a real-time timeline and user-adjustable time delay.

212-315-1111
www.solid-state-logic.com

TV One — LM-404HD

High-performance, HD, multiformat, quad-color LCD monitor provides four 4.3in, 16:9 displays, high brightness, wide viewing angle, excellent contrast ratio and HD color; features inputs for SD/HD-SDI with an active loop through, analog RGB-HV, YPbPr, component video, composite video and YC inputs; supports and automatically detects NTSC and PAL standards; front-panel talleys can be activated externally via DB9 connector; includes adjustable rack mount and on-screen display menu that contains all the necessary controls to adjust contrast, brightness, sharpness, color level (RGB) and other parameters necessary for optimum monitor performance.

800-721-4044; www.tvone.com

Softel — ScheduleSmart

Captioning/subtitling control system uses algorithms to determine the optimum point in the workflow at which to bind captions, subtitles and other ancillary data to content; introduces flexibility in captioning and subtitling workflows by automatically assessing whether there is time to ingest data to media servers or on the DAM system; if the system determines that early or late binding is not possible, live systems are directed to perform the binding at airtime; automates selection of the correct encoding method to add captions and subtitles directly to file-based media assets or to handle live binding.

203-354-4602; www.softelgroup.com

MultiDyne — LiGHTCuBE

Fiber-optic field transport system houses any product in the MultiDyne line in a portable, 14in cube design; can be configured for as many as 80 HD-SDI, SDI or composite video paths, with 225 AES or analog audio channels; supports DVI, RGB and HDMI; can be AC and battery powered; features an HD monitor and signal generator on either end of the products, which enables users to send the test pattern down the line or to send the signal from the studio end directly to the LiGHTCuBE to monitor the camera output and the signals arriving at the shoot.

888-332-6779; www.multidyne.com

Sonnet Technologies — Fusion D800P2

Midlevel, software-configured RAID storage system contains eight hard drives that can be configured in RAID 0, RAID 1 and RAID 10 sets, as well as JBOD; dual-port multipliers offer high-performance data transfers up to 390MB/s write and 475MB/s read; includes two 2m locking eSATA data cables for the controller connections; features built-in handles, small desktop form factor, Vantec Stealth fan and hot-swappable drive trays.

949-587-3500; www.sonnettech.com

Streambox — Avenir

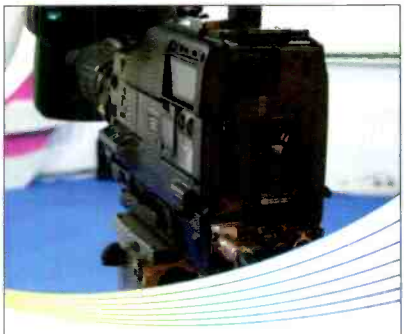
Hardware-based encoder offers 3G/4G wireless network bonding for high-quality HD or SD in a portable form factor to enable live or file-based video acquisition over a variety of low-data-rate networks; uses ACT-L3 codec to capture and encode HD content in 1090i or 720p, at rates up to 20Mb/s, and SD content in NTSC or PAL from 64kb/s to 8Mb/s; features compact, lightweight, rugged chassis with a range of power options including AC and DC connectors, as well as a Li-Poly battery system; users can connect via their choice of network connections ranging from dual Ethernet to WiFi platforms, including bonded 3G/4G mobile broadband devices, browser-capable PDAs and low-bandwidth, portable satellite devices such as BGAN; includes a set of field editing tools.

206-956-0544; www.streambox.com

T-VIPS — TVG415/430/450

JPEG 2000-based video gateways are designed for real-time contribution and distribution of broadcast-quality video over IP networks; feature support for high-quality video, robust transmission, very low latency and error concealment performance; each unit can be configured as a receiver or transmitter.

973-376-8282; www.t-vips.com



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Where's the disconnect?

Mobile DTV has the potential to be stillborn.

BY ANTHONY R. GARGANO

Following a lengthy standardization process and comprehensive testing regimen, the long-awaited A/153, the ATSC's DTV standard for mobile television, was finally adopted on Oct. 15, 2009. Several months later, companies showed various implementations of handheld reception devices, essentially in prototype form, at the Consumer Electronics Show.

More recently at the CTIA show, the wireless and cellular industries' equivalent to CES and NAB, LG showed prototypes of several soon-to-be-available cell phones that include an imbedded mobile DTV reception capability. Simplifying the design of such mobile devices, LG, which was both integral in the development of the mobile DTV transmission standard and influential in its final adoption, also showed single-chip reception technology. LG's complete receiver on a chip incorporates a fully functional tuner/decoder on a 7mm square substrate and is designed for integration into cell phones. Simply add an antenna, power and a display, and you're in business. The LG2161R, incorporating both the radio frequency tuner and the mobile DTV demodulator for reception and display of the mobile DTV signals, is currently in pilot production and will move to mass production this summer.

Consumers will soon have a variety of mobile DTV reception options, and the holiday shopping season should provide a great opportunity for the marketing and promotion of mobile DTV. Some educational activity will be needed so that consumers understand the difference between mobile DTV and the various mobile television subscription services, such as Qualcomm's Flo TV. Another wild card is Apple. The company clearly has focused on TV programming distribution, and its recent launch of the iPad has the potential to completely change the publishing industry's distribution model just as the iTunes store revolutionized music industry distribution. Already numerous magazines and newspapers ranging from the *The Wall Street Journal* to your local daily have announced plans for electronic subscriptions custom delivered for the iPad. Following publishing, it appears the broadcast industry will be moving next into Apple's crosshairs.

Despite the plethora of services being offered by all of this competition, mobile DTV still finds a potentially strong place in the market according to several recent polls and market studies. One study by the market researcher Frank N. Magid Associates reported that local news content is the key driver for mobile DTV. Here's an excerpt from the report:

> CONTENT
>
> When mobile DTV is available, what kinds of programs will consumers want to see?
>
> News is the clear leader for mobile DTV content. Nine in 10 respondents (88 percent) said they would watch at least one of several news categories measured. Most notably, interest in mobile news programming among young adult Millennials (18-29 years old) is quite strong compared to their relatively weak local news viewing on standard television sets.
>
> Among the news categories tested, breaking news (76 percent), emergency reports (75 percent) and weather (74 percent) topped the list, and they tend to be localized in focus. Other types of news programs trailed but still had large support in the 50-59 percent range. Entertainment programs rank lower but still appeal to two-thirds of device owners.

Mobile DTV is represented by an industry trade group, the Open Mobile Video Coalition (OMVC), which characterizes mobile DTV as the "power of local TV on the go." There are several other studies that indicate a high level of consumer interest in mobile DTV driven by desires to watch local news, sports and weather.

A robust proof of technical performance, confirmed consumer interest and numerous soon-to-be-available reception and display devices are converging into potential market success for mobile DTV. On the fiscal side, OMVC touts mobile DTV as representing a significant new revenue stream for the broadcasting industry. And, several industry analysts have gone so far as to trumpet mobile DTV as the fiscal savior for local broadcast.

The disconnect

So, where's the disconnect? How about multiple disconnects! Certainly, there's no need to reiterate to this readership the myriad of announcements concerning the reductions of local news staff, the merging of local news operations and newscasts under news LMAs, and the elimination of some newscasts entirely. Then there's the FCC's spectrum grab — wanting to take (at this writing) an additional 120MHz of spectrum space from broadcasters.

So, we have a nascent market whose potential for growth is tied to the availability of locally generated news content delivered via a slice of RF spectrum. The folks who generate that local content are reducing or eliminating their capability to do so. Simultaneously, the delivery pipe for that content is coming under threat. This all amounts to disconnect, spelled D-I-S-C-O-N-N-E-C-T. BE

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