

Broadcast Engineering

APRIL 2012

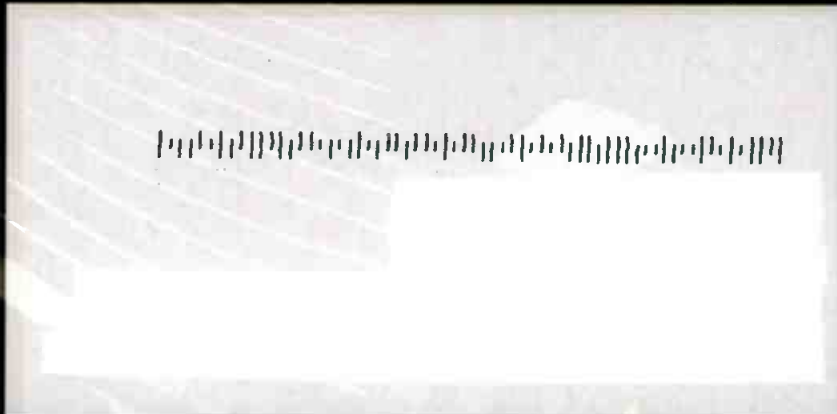
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Learn more at blog.broadcastengineering.com/nab/

JUST THE FACTS!

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Blaming towers is for the birds

I was jogging late one evening in a large park near my home. The nature trails are normally tranquil and solitary. This time, however, I found myself having to share the path with a large flock of Canada geese.

The Canada goose is classified as a “protected migratory species,” and you can’t kill or injure them. The problem is these pests no longer migrate. Instead, millions of them have set up homes near golf courses, lakes and ponds. In addition to killing lawns by eating the grass, they make their foul presence known by leaving large amounts of waste on



walkways, grass, lakes and even boats. A single Canada goose can deposit more than two pounds of fecal matter on your lawn, deck or pathways every day. While eating, a goose will relieve itself every six to eight minutes.

As the most common waterfowl species in North America, the Canada goose is a prime suspect for causing increased levels in high fecal coli from concentrations at beaches. The result can be disease-causing bacteria that result in typhoid, dysentery, hepatitis A and cholera.

Deciding the park pathway was mine and that these migratory interlopers had better move out of my way, I reached for my sound horn. But, before I could grab it, I was challenged by two of the larger geese. Startled, I then stumbled over one of the geese, falling onto the pavement and, you guessed it, right into several piles of goose poop.

At this point, the flock figured it had made its point because as I struggled to regain my dignity and clean myself off, it withdrew to a nearby pond. Geese-1, Brad-0.

The humiliating experience reminded me of a statement I had read about the FCC’s open comment period on communications towers. The report quoted research claiming large-scale killing of birds by communications towers.

“Current estimates of the numbers of birds killed annually by communication towers range between 4 and 10 million,” it said.

I addressed the broader issue of migratory birds versus towers in 2000. The FCC eventually issued new regulations, walking a tight rope between permitting avian murder and destroying America’s communications infrastructure.

Now, it seems there is additional data in a report, created for the U.S. Fish and Wildlife Service, which contradicts the previous claims of large-scale, bird-tower kill. From the report, “... the numbers of birds under the towers he [Arthur Clark] searches has dropped precipitously,” the new reports states. “There is speculation among several other researchers that tower kills are in general decline a few years after a new tower is erected.”

One might ask: Could it be the winged bombers actually learn where towers are located and fly around them?

Avian lovers should be reminded that a bird’s biggest worry is not dying from a head bump to a broadcast tower. No, the Piping Plover, Tufted Titmouse, Canada goose or any other bird for that matter is far more likely to be killed by the common house cat than a tower!

According to research from the University of Wisconsin-Madison, rural, free-ranging, domestic cats in Wisconsin alone may kill between 8 and 217 million birds each year. That means Wisconsin cats kill more than 21 times more birds than all of the communications towers in the U.S. combined.

If bird lovers would focus as much effort on preventing cat-caused bird deaths as they do trying to force more government restrictions on tower construction, tens of millions of their feathery friends might be saved. The problem with that approach is it pits the feather huggers against the fur huggers. And, it’s so much easier to blame your contrived calamity on big, evil corporations. **BE**

Brad Dick

EDITORIAL DIRECTOR

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LET'S GO THERE.

Compression for digital cinema cameras, part 1

New digital cinema tools enable more options for high-end shooting.

BY STEVE MULLEN

From the introduction of the DV format, most camcorders have used DVC, MPEG-2 or MPEG-4 (H.264/AVC) compression. These codecs can be placed into one of two categories: intraframe and interframe. Color sampling is 4:1:1, 4:2:0 or 4:2:2. Data depth is 8 bits or 10 bits. This orderly world of compression is being replaced by one with far greater variety as high-end shooters adopt digital cinema tools.

In this new world, video is treated as “motion pictures.” There are two fundamentally different ways photo cameras record pictures: JPEG and RAW. (See Figure 1.) JPEG compression we know as the basis of motion-JPEG. It is a DCT-based, lossy, intra-frame compression technique. RGB data from a sensor are de-Bayered and then spatially compressed. RAW, simply put, is RGB data from the sensor without de-Bayering. With no

compression applied, the file for each image will be large. Therefore, visually lossless compression may be applied to reduce file size.

The advantage of RAW is twofold. First, a photo editor works directly with sensor RGB data, which enables a wider range of image adjustments. Second, there are no JPEG compression artifacts. The disadvantage of RAW is that image manipulation is performed more slowly. Slow manipulation is not only the result of working with a large frame of data; each image must be software de-Bayered before processing.

We will look at recording motion pictures in four ways. (See Figure 2.) While the categories remain the same as Figure 1, more detail is introduced. Current digital motion picture cameras employ all four of the possible variations presented in Figure 2. In this article, part 1, we will examine the processed category. Both compressed and uncompressed recording will be covered.

	Processed (de-Bayered)	Unprocessed (RAW)
Compressed	JPEG	
Uncompressed		RAW

Figure 1: Storage options for still photos

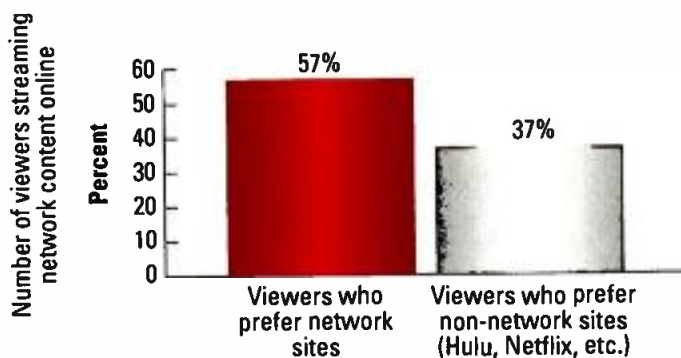
	Processed	Unprocessed (RAW)
Compressed	Processed/compressed	Unprocessed/compressed
Uncompressed	Processed/uncompressed	Unprocessed/uncompressed

Figure 2: Storage options for motion pictures

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

Online streamers prefer network sites

Among viewers streaming network content online, TV network websites are the preferred source.



Source: "TV's Web Connections 2012" by Knowledge Networks

www.knowledgenetworks.com

Processed/compressed

Consider a simplified three-chip camcorder. (See Figure 3 on page 12.) Three sensors output either analog or digital information. In the former case, A/D converters are part of a camera's first image processing stage. In the latter case, digital data from each sensor are ready to be processed. Either way, a sample has a bit depth of 10 bits to 16 bits.

The first processing stage converts RGB data streams to YCrCb (luminance, red chroma component, blue chroma component) data. Processing is typically performed using 14- to 16-bit DSP. First, the luminance (Y)

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signal is computed. Second, two color “difference” components ($C_r = Y - R$ and $C_b = Y - B$) are computed. The luminance signal is obtained by adding each pixel’s red, green and blue samples together. Each sample is multiplied by a coefficient that represents the amount the color signal contributes to the Rec.709 luminance signal ($Y' = 0.213R + 0.715G + 0.072B$).

Color sampling from three-chip camcorders is 4:4:4. These YCrCb data may be filtered to 4:2:2 prior to second-stage processing that provides image adjustments: black level, black compress, black stretch, white level, gamma, saturation, hue and sharpness/detail.

The sharpness/detail adjustment controls how much the video signal is boosted in the mid-range to prevent the loss of fine detail. (See Figure 4.) Boosted mid-frequencies emphasize edges.

Unfortunately, hard edges define objects that, when moving, increase our perception of judder. The red and blue curves represent, respectively, a minimum and maximum sharpness/detail adjustment.

Even at a normal (black) setting, mid-frequencies have a moderately large peak. Negative detail correction, as offered by some camcorders, attenuates mid-frequencies. This

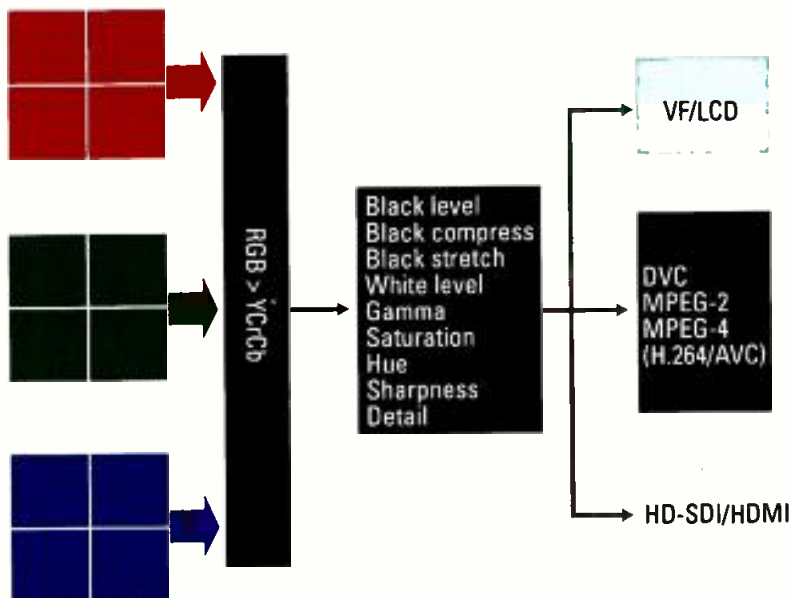


Figure 3: A simplified three-chip camcorder

correction reduces the perception of judder while not diminishing high-frequency fine detail.

An alternate way to prevent images from suffering from a lack of fine detail is to capture and process very high-definition images. This is accomplished by 4K2K cameras. This makes them ideal for both digital cinema and high-quality broadcast production.

When a codec supports only 4:2:0 sampling, YCrCb data are further filtered. And, depending on the compression scheme, 10-bit to 16-bit data are converted to 8-bit or 10-bit data. The specifications for eight

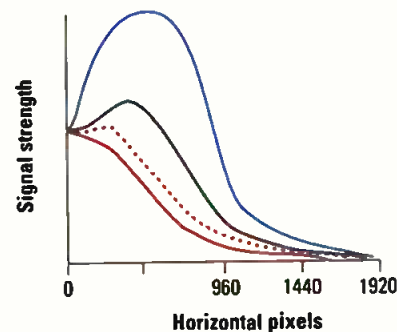


Figure 4: Sharpness control effect on HD video frequency response

Format	Bit depth	Resolution	Chroma sampling	Bit rate	Compression
HDV	8 bits	1280 × 720, 1440 × 1080	4:2:0	18Mb/s-25Mb/s	Interframe
H.264/AVC	8 bits	1280 × 720, 1440 × 1080, 1920 × 1080	4:2:0	18Mb/s-36Mb/s	Interframe
AVCHD	8 bits	1280 × 720, 1440 × 1080, 1920 × 1080	4:2:0	18Mb/s-28Mb/s	Interframe
XDCAM EX	8 bits	1280 × 720, 1440 × 1080, 1920 × 1080	4:2:0	25Mb/s-35Mb/s	Interframe
MPEG-2 XDCAM 422	8 bits	1280 × 720, 1920 × 1080	4:2:2	50Mb/s	Interframe
DVCPRO HD	8 bits	960 × 720, 1280 × 1080, 1440 × 1080	4:2:2	100Mb/s	Intraframe
HDCAM	8 bits	1440 × 1080	3:1:1	144Mb/s	Intraframe
AVC-Intra	10 bits	1280 × 720, 1440 × 1080, 1920 × 1080	4:2:2	50Mb/s or 100Mb/s	Intraframe
HDCAM SR	10 bits	1920 × 1080	4:2:2 or 4:4:4	440Mb/s or 880Mb/s	Intraframe

Figure 5: Common compression schemes



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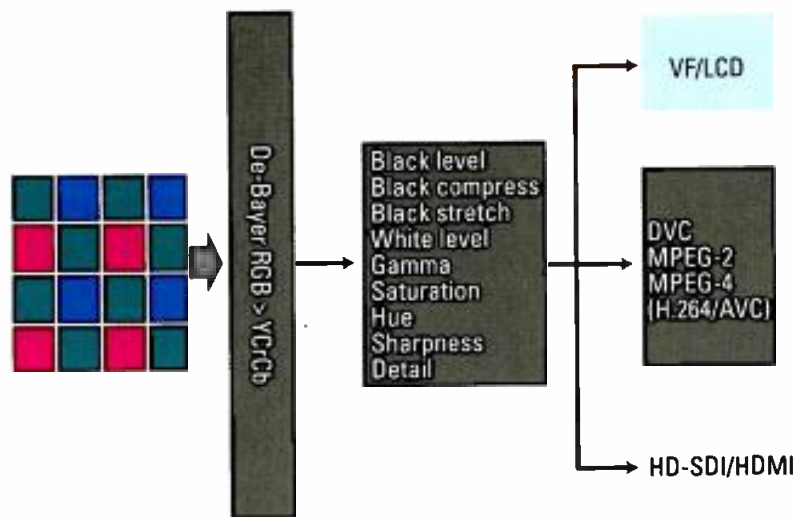


Figure 6: Single-chip camcorder

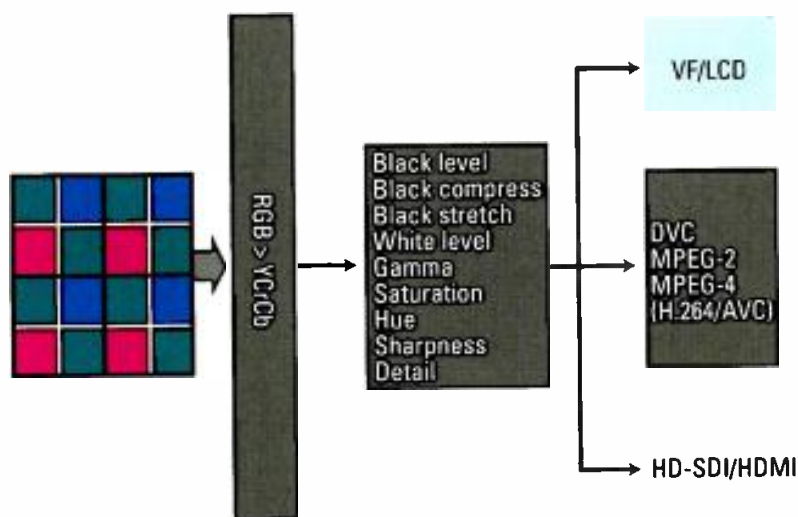


Figure 7: Single-chip super-pixel camcorder

common video codecs and one very-high-data-rate codec, HDCAM SR (SRMASTER), vary. (See Figure 5.)

HD camcorders use a DVC, MPEG-2 or AVC-based compression. Compressed data are recorded to tape, disc or solid-state memory. Though most camcorders employ 4:2:2 processing with 10-bit data, the majority of their codecs employ only 8 bits and many provide only 4:2:0 color sampling. The solution, as shown in Figure 3, is an uncompressed digital output. YCrCb data are output via an HDMI or HD-SDI port. Typically, output is 10 bits with 4:2:2 color sampling. Data can be sent to an external recorder that has an Apple ProRes or Avid DNxHD hardware codec.

Consider a single-chip camcorder.

(See Figure 6.) Sequential RGB data from the sensor are de-Bayered prior to YCrCb processing. For a single-sensor camcorder to provide luminance resolution equivalent to a three-chip camcorder, the image to be de-Bayered must be equal to, or larger than, 3.4MP (full HD) or 13.6MP (4K2K). The de-Bayer interpolation process can be nearest neighbor, linear, cubic, cubic spline, etc.

De-Bayering generates an equal size 4:4:4 color-sampled RGB frame. When the sensor is larger than the frame-size to be recorded, downscaling is performed. This can be done before or after conversion to 4:2:2 YCrCb. Image adjustments are YCrCb processed.

Long-GOP MPEG-2 or H.264/AVC encoding is typically used to record

YCrCb data. When a codec supports only 4:2:0 sampling, YCrCb data are chroma filtered. Likewise, 10-bit to 16-bit data are converted to 8-bit or 10-bit data. YCrCb data can be output via an HDMI or HD-SDI port. (See Figure 6.) Typically, output is 10 bits with 4:2:2 color sampling. Data can be sent to an external digital recorder that has an Apple ProRes or Avid DNxHD hardware codec.

Next we'll look at a single-chip camcorder that employs "super-pixels." (See Figure 7.) Sensor resolution is four times larger than the recorded image. Data from every four photosites are combined to create a super-pixel that has two green samples. This ratio nicely matches the requirements for the luminance signal: $Y = 0.213R + 0.715G + 0.072B$. No de-Bayering is required to obtain an RGB frame. Therefore, resolution matches the RGB frame size, and color sampling is 4:4:4. Data, however, are filtered to 4:2:2 prior to image adjustments. The YCrCb data are encoded using 8-bit 4:2:2 long-GOP MPEG-2.

YCrCb data can be output via an HD-SDI port. Output is 8 bits with 4:2:2 color sampling. Data can be sent to an external digital recorder that has an Apple ProRes or Avid DNxHD hardware codec.

Processed/uncompressed

To provide higher quality recordings, a camcorder can provide an uncompressed output. Shown in Figures 3, 6 and 7, an uncompressed YCrCb digital signal is output via an HDMI or HD-SDI port. The port is fed a digital signal after image adjustments have been made. Depending on a camcorder's processing circuitry, the 4:2:2 output may be 8 bits (125Mb/s) or 10 bits (166Mb/s). To record uncompressed data, the recorder must be able to store data at these rates.

The second part of this article will focus on the compression technologies involved in the recording of RAW motion pictures. **BE**

Steve Mullen is the owner of DVC. He can be reached via his website at <http://home.mindspring.com/~d-v-c>.



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Incentive auction OK'd

The amount of money television broadcasters may receive for returning spectrum remains unclear.

BY HARRY C. MARTIN

Congress has passed the long-awaited spectrum auction legislation, and the President has signed it into law.

Television broadcasters got most, but not all, of what they were hoping for. The act (1) requires the FCC to make "all reasonable efforts" to preserve existing television station coverage; (2) prohibits the involuntary moving of broadcasters from UHF

to VHF or from high-band VHF to low-band VHF; (3) provides for a one-time auction; (4) establishes a relocation fund of \$1.75 billion; and (5) requires coordination with Canada and Mexico on border concerns.

However, the definition of "broadcast television licensee" for the purposes of incentive auctions is limited to full-power television stations and "Class A" television stations. LPTV licensees got only a single provision stating that nothing alters their current spectrum-usage rights.

Other important features of the auction legislation are:

- Stations that agree to forego reimbursement for relocation costs may make flexible use of their spectrum, including non-broadcast uses, as long as they continue one free television program stream. The act says nothing about such ancillary uses by stations that do not relocate.

- Stations that agree to share a channel will retain their current cable carriage rights.

- No stations may be permitted to move from VHF to UHF unless they file a request by May 31, 2012, so most VHF stations will remain in VHF.

- Rights to protest license modifications, otherwise available under Section 316 of the Communications Act, are suspended.

- Nothing in the act is intended to prevent the FCC from implementing its "white-space" rules.

- Public-safety operators using TV channels 14 to 20 in the top-10 markets will have to give those frequencies back after 11 years.

A major question left unanswered by Congress is precisely how much money is likely to be paid to any particular TV licensee opting to make its spectrum available for repurposing.

Through repurposing, a TV licensee could either (1) turn in its spectrum, (2) move to a different channel or (3) share a channel with another station. To determine what the payout will be, the commission will have to conduct a "reverse auction" in which any licensee interested in repurposing may submit bids stating the amount it would accept for voluntarily relinquishing some or all its spectrum.

Meanwhile, the commission also will conduct a "forward auction" to sell off the spectrum made available by the repurposing. The proceeds from that auction will provide the pot from which payments will be made; later, the amount to be paid to individual participants will be based on the results of the reverse auction, but with no details now as to how much of any participant's reverse auction bid would actually be paid.

Congress decided the FCC may not exclude big wireless entities such as AT&T and Verizon from the forward auction. However, the FCC may implement policies to promote competition, by authorizing limits on spectrum holdings (either nationally or on an individual market basis) by any one entity.

The FCC now must tie up the many loose ends left by Congress through issuing rules for the auction. How many broadcasters will agree to repurpose, how much the wireless entities will bid and how long the process will take are open questions. Some estimate it will be four to six years before any television spectrum becomes available for wireless broadband use. **BE**

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

? Send questions and comments to: harry.martin@penton.com

Dateline

- On or before June 1, 2012, non-commercial television and Class A television stations in Arizona, the District of Columbia, Idaho, Maryland, Nevada, New Mexico, Utah, Virginia, West Virginia and Wyoming must file their biennial ownership reports.
- On June 1, 2012, television stations, Class A television, LPTV stations and television translators in Maryland; Virginia; West Virginia; and Washington, D.C., must file their license renewal applications. Television and Class A television stations in those locations must begin their renewal post-filing announcements on June 1.
- On June 1, 2012, television and Class A television stations in North Carolina and South Carolina must begin their pre-filing renewal announcements in anticipation of an Aug. 1, 2012, renewal application filing date.
- On June 1, 2012, television and Class A television stations must place their 2012 EEO reports in their public files and post them on their websites: Arizona, the District of Columbia, Idaho, Maryland, Michigan, Ohio, Nevada, New Mexico, Utah, Virginia, West Virginia and Wyoming.

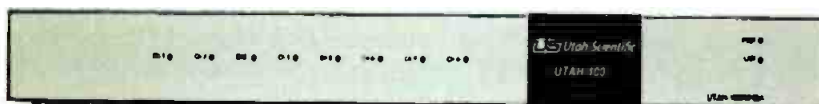
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Elements of DRM

The secrets of secret-keeping are revealed.

BY ALDO CUGNINI

Digital rights management (DRM) has come to mean the combination of content protection (by means of encryption) with entitlement rules (conditional access, or CA) to protect consumable content. In the analog world, content providers often achieved both objectives by means of video signal scrambling. With digital technology, the two elements can be integrated into a system or managed separately. Although different solutions exist to implement DRM, systems deployed around the world incorporate a number of similar elements.

Content and message security

For ATSC broadcast, encryption initially was specified as the FIPS 46-2 DES Digital Encryption Standard of the National Institute of Standards and Technology (NIST). The limited key size of DES, however,

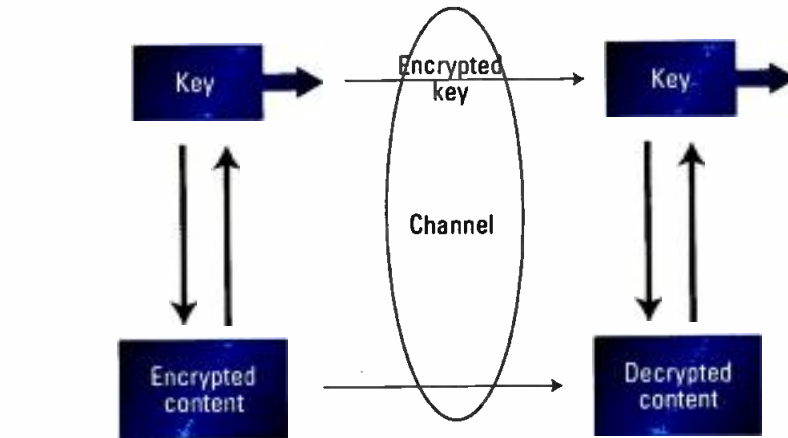


Figure 1. Encrypted keys, changed frequently, form the basis for protecting encrypted content.

was viewed as a vulnerability for other national security implementations, resulting in the withdrawal of DES as a standard by NIST. ATSC allows for a replaceable conditional-access module, so other encryption algorithms such as AES are possible, although encryption rarely has been used in the broadcast multiplex. In

a practical sense, the strength of the encryption itself is perhaps not as important as the protection of the encryption keys themselves.

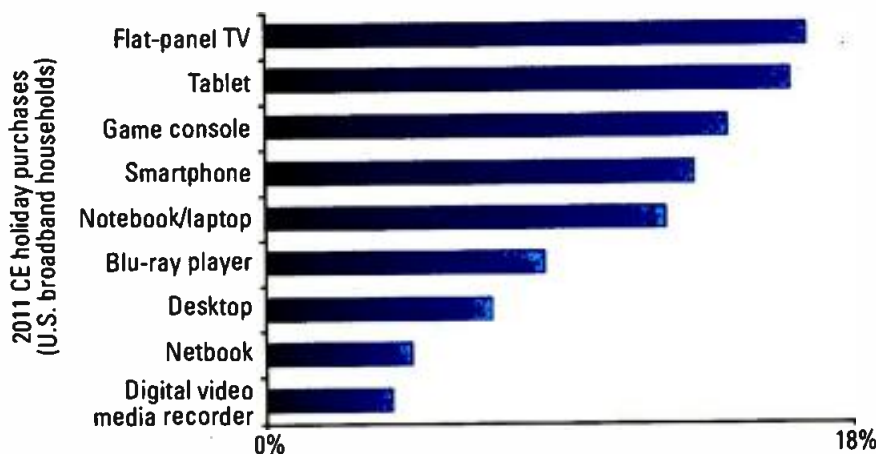
The ATSC broadcast standard also was updated last year to provide

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The strength of the encryption itself is perhaps not as important as the protection of the encryption keys.

support for conditional access using Simulcrypt for IP-delivered services. Although the standard does not mandate any specific multiplexer or scrambler interface, it does recommend compliance with the Head-end Implementation of DVB Simulcrypt. (More on that later.)

OMA BCAST is part of a suite of specifications developed by the Open Mobile Alliance, an international

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consortium formed to drive global user adoption of mobile data services. ATSC Mobile DTV (MDTV) service protection, although built on the OMA BCAST DRM Profile, is not really DRM per se, as it only addresses the protection of content during its delivery to an MDTV receiver. Service protection (also called conditional access) is only responsible for protecting the service, i.e., the transmission “pipe,” and not for the content in the pipe.

Service protection imposes no controls on content after delivery to a receiver. DRM, on the other hand, refers to the process of protecting the content itself. In the ATSC A/153 mobile standard, content protection means protection of content subsequent to delivery through the service protection system and defines post-delivery usage rights.

ATSC A/153 service protection consists of the following components: key provisioning; registration; long-term key messages (LTKM), including the use of broadcast rights objects to deliver LTKMs; short-term key messages (STKM); and traffic encryption. The service protection system uses a form of the AES, as defined in the IP security encapsulating security protocol (IPsec ESP), and traffic encryption keys (TEK). TEK is based on public-key cryptography, a system for providing access to encrypted files by a protected method of secret key exchange. (See Figure 1 on page 18.)

In the OMA BCAST DRM Profile for service protection, post-delivery usage rights can be communicated in rights objects (ROs) to a receiver. ROs may be delivered over an interaction channel (interactive mode) or the broadcast channel (broadcast-only mode). Note that broadcast mode implies a high bandwidth cost, as all receivers will need individual updates of their ROs, possibly on a frequent basis. Interactive mode, on the other hand, relies on an ongoing (but likely intermittent) out-of-band connection to the receivers. In this age of constant

connectivity, this is not an unlikely scenario, especially when a user’s home is the mobile device base.

Encryption of content over A/153 is conducted on the traffic encryption layer according to AES-128, which uses 128-bit symmetric TEKs. The broadcast messages carrying TEKs are called short-term key messages (STKMs). The TEKs are protected with a service encryption key (SEK) (used e.g., for subscriptions) or program encryption key (PEK) on the

The actual content encryption method used by any content owner can be unique, and different DRM systems can even be used within a media container.

STKM layer, above the traffic encryption layer. The SEKs or PEKs are delivered to receivers within ROs.

Mobile DTV Trust Authority

Last year marked the Open Mobile Video Coalition’s (OMVC) announcement that it had defined a Mobile DTV Trust Authority, specifying a secure infrastructure for delivering live DTV content to mobile video-enabled devices. (A trust authority is an independent entity that safely manages keys and associated transactions for protecting content.) One potential component of this solution is the UltraViolet digital rights locker that the Digital Entertainment Content Ecosystem (DECE) consortium developed.

DECE specifies various security protocols for use within the DECE (which extends to other media), including mechanisms for

authentication, integrity and confidentiality protection, as well as means for sharing information necessary for carrying out content authorization. It is important to note that the actual content encryption method used by any content owner can be unique, and different DRM systems can even be used within a media container (a file or stream). DECE also provides a method for protection of out-of-band content, including keys sent in an interaction channel.

The mechanisms a trust authority uses are based on existing global Internet security technologies, including Security Assertion Markup Language (SAML), HTTP Authentication and TLS/SSL. The last two protocols, the Transport Layer Security (TLS) and the Secure Sockets Layer (SSL) protocols, provide a number of security features for Internet transactions, including protection against unauthorized connections to services and protection against malicious code execution.

The SSL protocol provides mutual authentication between a client and server, as well as the establishment of an authenticated and encrypted connection. Originally invented by Netscape, SSL runs above TCP/IP and below HTTP and other high-level network protocols; the protocol has become essentially a de facto Internet standard.

In the authentication process, a TLS/SSL client (e.g., a content display device connected to the Internet) sends a message to a TLS/SSL server, and the server responds with the information needed to authenticate itself. The client and server exchange session keys, and the authentication dialog is concluded. An SSL-secured communication then can begin between the server and the client, using the encryption keys that were established during the authentication process. For servers to authenticate to clients, TLS/SSL does not require keys to be stored on client domain controllers or in a database; clients confirm the validity of a server’s credentials with a

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DVB conditional access

DVB conditional access defines elements used in many DRM systems. Conditional access in the DVB system consists of three main functions: scrambling and descrambling, entitlement checking, and entitlement management. Scrambling can be applied to service components, either

A better approach would be to treat the terms *DRM* and *conditional access* as two aspects of the more general notion of *content protection*.

using a common secret control word (CW) or using separate CWs for each component. Descrambling in a receiver requires the possession of an appropriate CW. Entitlement checking includes encrypted CWs, sent inside DVB tables called entitlement control messages (ECMs). Entitlement management provides options for different end-user subscription arrangements. This information is carried inside entitlement management messages (EMMs), which can be broadcast or sent over an interaction channel.

DVB Simulcrypt allows the use of different conditional access systems at the same time. In this way, keys, ECMs and EMMs can be protected using cryptographic algorithms such as DES, while simpler scrambling algorithms can be used to encode the actual content essence. ECMs and EMMs are carried as IP packets within broadcast streams for both DVB and ATSC.

Definition of concept

There is confusion in the industry as to the correct meaning of Digital Rights Management. Some say the term *DRM Profile* has (unfortunately) been incorrectly applied to the OMA BCAST specifications, which essentially define a conditional access system modeled on prior DRM work. Others confuse *conditional access* with *encryption*. It has been suggested that a better approach would be to treat the terms *DRM* and *conditional access* as two aspects of the more general notion of *content protection*.

BE

Aldo Cugnini is a consultant in the digital television industry and a partner in a mobile services company.



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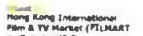
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Monitoring IP networks

Today's IP environments enable a wide range of automated testing.

BY BRAD GILMER

IP networks have become a mission-critical part of just about every broadcaster's facility. Broadcasters need to monitor these networks with the same critical eye they use to monitor the rest of their video facility. This month, I will provide a high-level introduction into the topic of IP network monitoring.

Why monitor

Before jumping in, it might be good to look at some reasons a broadcaster might choose to monitor its IP networks. Those reasons include: establishing a baseline performance; detecting, isolating and addressing problems; identifying issues before failures occur; identifying failures that have already occurred; and, checking new IT components through acceptance testing and system commissioning. Let's look at each of these in turn:

- *Establish baseline performance:* One reason to monitor your IP networks is to establish baseline performance. Establishing a baseline lets you look back later to see how things behaved when the network was operating normally.
- *Detect, isolate and address problems:* When a network fails, you will be under pressure to get the network up and running as fast as possible. If you have already established a network monitoring strategy, you will be in a great position to quickly and efficiently identify the problem source and get things back up and running quickly.
- *Identify issues before failures occur:* You might think IP networks are an all-or-nothing infrastructure. Either the network works properly, or it fails dramatically. This is because users typically experience the network in this way. But, if you are monitoring the correct parameters, you can

identify some problems before the network goes down. In my opinion, it is much more valuable to your company to be proactive rather than reactive and only fix problems after they have occurred.

- *Identify that failures have already occurred:* Interestingly, depending upon your network topology, it is possible to have a network failure and not know it. In fact, IP networking technology was developed by the U.S. Department of Defense to deal with the "smoking hole" scenario. It wanted

When we purchase a new piece of video gear, we check it out before we put it on-air. Why wouldn't we do that with new IT infrastructure components?

a network that would keep operating, even in the face of a nuclear attack. Since IP traffic can re-route automatically in the case of a failure, how will you know that a component has failed in the core network? This can happen only by being aggressive about monitoring system alarms and looking at system logs.

- *Acceptance testing and system commissioning* — When we purchase a new piece of video gear, we usually check it out before we put it on-air. We may monitor the new equipment's behavior for awhile to ensure it is operating as advertised. Why would we not do the same thing with new IT infrastructure components?

How to monitor

Once you have decided that monitoring your IP network is important, and you have determined why monitoring is critical, the next obvious step is determining how to monitor your network. The easiest way to get started is to use monitoring capabilities you already have in your facility. Here are a few things to consider: router statistics, switch statistics, server statistics and workstation performance graphs. Again, let's take a look at each of these individually:

- *Router statistics:* Just about any router will provide you with overall bandwidth usage statistics. Many will also give you information on specific traffic types. Routers that connect your facility to the Internet will give you valuable information about the amount of traffic crossing your corporate boundary. Look for unusual activity or high-usage statistics. Some routing systems will allow you to view statistics over time. Do you see spikes of activity at unusual times of the day or heavy usage on weekends that cannot be readily explained? Since routers direct traffic between networks, do you see an unusual pattern of traffic from one network to the other that cannot be explained?
- *Switch statistics:* Routers provide important information at network boundaries, but they may not give you the information you need when it comes down to a specific device that may be causing trouble. Consumer-grade switches typically do not provide a lot of information. However, commercial-grade switches can provide excellent information that exists at the port level. They can provide detailed information on just how much and what sort of traffic is going to a particular computer. This can be very helpful

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when you are trying to isolate a particular problem. Note that you should look at managed switches, and you should check to see what sort of statistics are available; features vary depending upon manufacturer and model. (A note about switch statistics — in many cases, statistics are only available in real time.)

- **Server statistics:** Almost all servers can provide detailed logging information. In their raw form, these logs can be useful for pinpointing specific problems. Many log analysis programs are available, some of which are free, especially for *NIX servers.

- **Workstation performance graphs:** Servers and workstations alike typically provide network monitoring graphs in real time. On Windows and *NIX servers, the graphs can be quite detailed, providing information on incoming and outgoing traffic, filtered by type. These monitors can also show graphical representations of processor usage, which, when considered with network usage, may help isolate a specific process or program that is causing a problem and needs to be addressed.

Network probes

Another class of monitoring device is the network probe. While many commercial tools are available, I suggest you start with an excellent free resource — Wireshark. Wireshark is a free network sniffer or probe, which can record a series of packets and display them at a later time. It has an excellent manual, and there are many tutorials and other online resources available also.

As your familiarity with IP network monitoring grows, however, you may decide that you need to employ a full, commercial solution. There may be several reasons for this. For example, you may decide you need professional support. Or, you may require a feature

or performance that is not available in free monitoring solutions. You may also decide that you need some professional video functionality that is only available in commercial solutions.

If you are moving video around in MPEG-2 on IT networks, then this may be a case where a professional monitoring tool would be useful. As you probably know, MPEG-2 can be



Figure 1. Products such as Fredrick Engineering's feStream provide monitoring and analysis of not only IP network data, but packetized video and audio data as well.

encapsulated in UDP packets and sent over IP networks. Troubleshooting errors on IP networks that appear as glitches in MPEG-2 streams can be notoriously difficult to isolate. This is because errors can be introduced at many different levels. Is the problem present in the source video? Was the MPEG-2 stream properly configured? Is there a problem with the MPEG-2 encoder? Is there an issue with the IP transport? There are a number of places where errors could be introduced.

One tool is the FE Stream Analyzer from FE Engineering. This analyzer is specifically designed to inspect IPTV packets. The main screen gives a quick summary of critical, video-oriented measurements such as PCR jitter and video packet loss, while also displaying a number of parameters related to the compression system as well. (See Figure 1.) It will look into a multiplexed MPEG Transport Stream and allow you to pick out a particular service for analysis.

Broadcasters should be aware of another category of commercial solutions — network emulators. These devices allow you to create a clean-room network, and then degrade the network in a carefully controlled manner to determine how equipment performs under these degraded conditions.

Network emulation products allow you to select different types of network impairments and then adjust the severity of the impairments. This can be extremely useful when troubleshooting professional video equipment. Because MPEG-2 compression assigns different importance to different packets in the stream, the effect of a hit on an "I" frame will be much more pronounced than on a "B" or "P" frame. Thus, end-users may see differing effects of a particular network error depending upon where the error occurs. A network emulator will allow you to carefully control the

behavior of the network, something you cannot do in the real world.

I encourage you to experiment with some of the free tools you already have in order to get familiar with the concept of network monitoring. I also encourage you to take advantage of the free trials offered by many network monitoring vendors. This can be a good way to become familiar with some of the advanced features and monitoring options that are available.

Finally, I cannot stress the importance of education enough. It is critical that professional video engineers maintain a level of expertise that allows them to understand and act upon the information made available through IP monitoring. **BE**

Brad Gilmer is president of Gilmer & Associates, executive director of the Video Services Forum and executive director of the Advanced Media Workflow Association.

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5.1 bass management

Good management in the studio will maximize the surround experience at home.

BY RICH TOZZOLI

Mixing 5.1 Surround Sound. Sure, it's a sexy term that invokes sonic visions of spaceship flyovers, car chases or front-row concert seats at Madison Square Garden. But, with the excitement and extra speakers comes certain challenges, such as bass management.

Home-theater-in-a-box

Let's first put ourselves in the comfortable seat of the end consumer. Whether it is a multichannel TV broadcast, concert DVD or Blu-ray disc, our audio will most likely travel through one of the many home-theater-in-a-box (HTIB) systems available at local electronics giants. That

connected to the receiver, which will probably receive its input via digital output from a cable box, video game console or consumer player (such as DVD or Blu-ray). Unless it's full-range audio from a Blu-ray player, most consumers' receivers will take a Dolby (Digital) AC-3 stream, such as those sent by major TV broadcasts or movie channels.

That single stream is decoded (if encoded in 5.1) by the receiver, "broken out," and sent to the appropriate speakers (L, C, R, LS, RS, LFE). But, the fact remains that these small home theater speakers often can't reproduce any bass information below 120Hz or so. That means bass management in the receiver will typically direct that information from each of the speakers down into the subwoofer. Combine that bass information with any of the LFE content from your mix, and you might have a big mess of low-end on your hands.

So, when mixing surround, I will "bass manage" my mix, either with hardware or software. This lets me approximate what the consumer will hear at home in a bass-managed home theater. While hardware systems are fine, I happen to rely on software — the Waves 360 Surround Tools package, specifically. I prefer software because of the recall ability, simplicity of setup and lack of additional cabling.

While the 360 bundle features surround reverbs, compressors and limiters, etc., the most important tool, in my book, is the M360 Surround Manager. This lets me calibrate the speakers and subwoofer in my room, adjust for various speaker angles and LFE settings and, in general, simulate the bass management of a home theater setup.

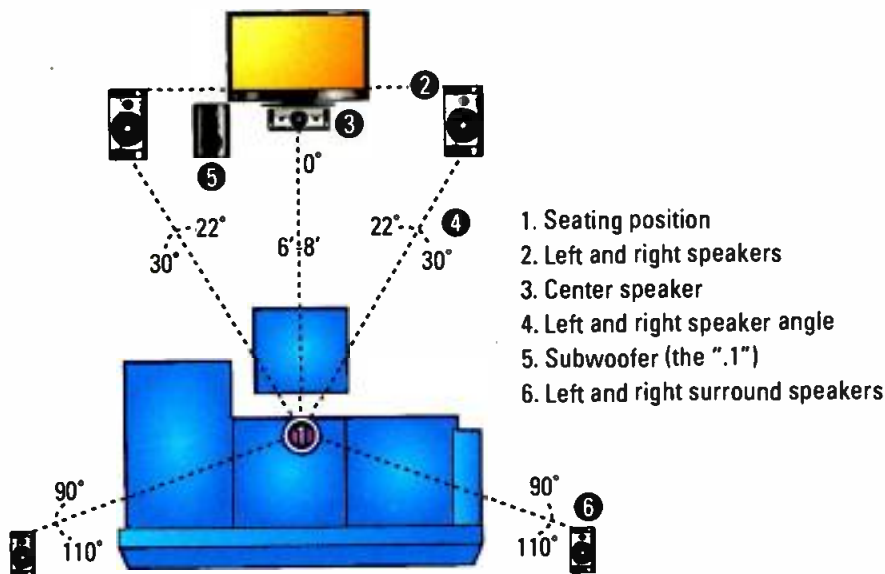


Figure 1. The typical home-theater-in-a-box arrangement is usually a 5.1 setup, with speakers in front and just behind the seat, and a subwoofer that carries the LFE channel.

The fact remains that these small home theater speakers often can't reproduce any bass information below 120Hz or so.

We mixers must face the reality that much of our work will be heard on home theater speakers smaller than the palm of our hands, with the subwoofer doing most of the heavy lifting. With that in mind, let's explore how understanding bass management can help you produce and deliver a better mix.

means the setup will probably involve a 5.1 (or more) layout with Left Front (LF), Center (C), Right Front (RF), Left Surround (LS) and Right Surround (RS) speakers. Then, of course, there will be a subwoofer that carries the LFE channel, or the ".1" in the "5.1" term. (See Figure 1.)

These consumer speakers will be



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In the course of mixing, I will bypass the M360, which will then send full-range signals to the speakers. When activating the M360 (along with the LFE 360 plug-in), it will selectively filter the low end of each

Taking it a step further, any mix information you send using an LFE fader will play back discretely in the subwoofer, both for you in the studio and the consumer at home. But, in a consumer's bass-managed playback

released, consumers complained that the mixes were a bit too "muddy." What happened was the above scenario had come true — where the entire low-end from the five speakers cut off in the consumer bass manager was sent to the subwoofer *along with* all of my LFE information from the mix. It was simply too much bass. If I had used a bass manager, I would have heard the problem before it went out to the public. Needless to say, that never happened again. Now, when I mix, I use the LFE very sparingly, instead popping the bass manager in and out to simulate that consumer experience.



The Avid Pro Tools 10 panner provides a separate LFE fader, which allows for more control. If not managed correctly, however, it may result in too much LFE information being sent to a home system's subwoofer, which can cause the audio to sound "muddy."

In a consumer's bass-managed system, the subwoofer will play back any sub information cut off from the small satellite speakers in the receiver, along with LFE information.

speaker (L, C, R, LS, RS) and send it into the subwoofer, along with my LFE signal.

Mixing the LFE channel

Let's talk further about mixing in LFE information. As the panner shows, there is a separate LFE fader. So, if this panner was assigned to the kick drum in a live-concert mix, raising that LFE fader would send some of the kick to the .1 channel, which would then be reproduced by the subwoofer. That applies to any channel with an LFE send — bass guitars, explosion effects, or even dialog or vocals from the center channel.

system, the subwoofer will also playback any of the sub information cut off from the small satellite speakers in the receiver, along with your LFE information. In other words, be very careful when mixing the LFE channel. While it sounds good in studio to feel that sub rocking, all of that bass may overwhelm the consumer at home.

Before I understood how to use bass management, I made a mistake on a certain concert DVD. In the studio, I sent a lot of information from the bass guitar and kick drum to the LFE channel in the mix (which was not sent to mastering — hence, no "lifeguard"). So, when the DVD was

A good metering tool

Another important surround tool from the Waves 360 bundle that I rely on is the Durrough meter. (You can, of course, use any good metering tool.) Note that these meters are also available in hardware versions, which I've used quite a bit as well. What I do is watch channel 6 light up (where it's assigned in my 5.1 mix) when raising the LFE fader. Aside from hearing it through the subwoofer, I can see it go up accordingly on the meter as the LFE send is raised. Note that in a non-bass managed mix, the LFE channel will only light up when information is sent to it via the LFE fader. When checking with bass management "on," channel 6 will light up on the meters even if no LFE information is sent. That proves that the bass manager is actually working — doing its job of sending audio that small speakers cannot reproduce (again, around 120Hz) to the subwoofer.

The use of bass management can help in many ways — the most important being the full understanding of what happens to the bass frequencies in a mix. By taking the time and effort to set up a bass management system, it can ensure that what you hear in your studio will be heard correctly at home.

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Rich Tozzoli is a music producer, composer and mixer.

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Closed captioning

The simple text is often a result of complex execution.

BY RENAUD DESPORTES

Data insertion and extraction — and closed captioning in particular — represent a significant component of broadcasting. The insertion of captioning into the broadcast signal may be considered as just one small part of the transmission chain, but it is an important and often complex undertaking that can be represented as four main challenges.

The first challenge is determining how to organize closed-captioning production, especially considering prepared (or even prerecorded) and live-captioning services are structurally completely different and require entirely different core competencies.

Another challenge is figuring out how to store captions in broadcast facilities alongside media assets, and

In addition, the encoding process for media streaming can introduce delays that prove to be difficult to harness in order to keep captioning in sync.

Although the term “closed-captioning” is used in this article, the scope is not limited to “North American-style” closed-caption systems, but also addresses all other equivalent captions transport methods, such as European/Australian teletext/OP-47 or the Japanese/South American “B37” specification.

Captioning services

Mandates from ruling authorities, such as the FCC, state that distributors of programming must provide a minimum number of hours of closed-captioned programming per day, week or calendar quarter, giving

Because this process still cannot be completely automated with tools such as voice recognition systems, it essentially requires creation of an internal captioning department.

In a second approach, one more typical of smaller broadcast companies, the broadcaster will hire the services of a captioning production company that performs the service and delivers data into the facility’s broadcast workflow. Lacking the human resources, space or bandwidth to train their staff to set up and maintain an in-house captioning service, such operations focus their efforts on implementing actual data insertion, as well as setting up and supporting workflows for externally generated prepared and live captions. Rather than build out internal captioning capability, these facilities must then address the IT and security issues related to opening the facility to an external service provider.

The question, then, is this: How do we keep, store and archive closed-captioning data and make it available for later (re)broadcast? In addition, broadcasters face the question of how to cope with the multiple formats in which closed-captioning data can be provided, even within a single facility, whether it is pre-encoded in video media, as an independent time coded closed-caption “script” file, or as a data stream as received from live captioning services.

The question, then, is this: How do we keep, store and archive closed-captioning data, and make it available for later (re)broadcast?

at which stage to encode captions, taking into account distribution, contribution, recording of live events for later re-playout and direct broadcast.

A third challenge is future-proofing and optimizing investments in closed-captioning management equipment, considering current migration to HD and DTV, along with the addition of new media vectors such as the web.

And, finally, it must be determined how to prepare integration with web services, should they be streaming, VOD, etc. Engineers have to handle different formats, different video and audio encoding processes, different asset management systems and, obviously, different ways of making captions available with these new media.

terrestrial and satellite broadcasters, as well as cable operators, no choice but to deliver captioning data with their broadcasts. In addressing these requirements regarding the delivery of closed-captioning within digital television services, broadcasters basically have two choices.

In an approach often adopted by larger broadcast networks, internal services are developed to take on complete captioning services. At dedicated workstations, staff members perform both offline captioning, as well as live captioning, for news, sports and other live events. In-house services require trained staff and specific software and workstations designed to support live-captions creation.

Captioning workflow

On page 34, Figure 1a illustrates a detailed view of a basic captioning workflow including both captioning encoding and management tools. In this example, a video and captions processing system connects with a caption management system.

The captions and video processing system — called an inserter —

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encodes actual closed captions and associated control data into the video signal, ensuring both compliance to required closed-captioning standards and integrity with the video signal. The captions management system ensures interconnection and interaction with the captioning data sources, handles the different ways of getting caption data (either as files or streams) and also interfaces with the playout automation system, the media assets management (MAM) and the playlist management system so that the required captions file is loaded and played or live-captioning source is connected in time. Also, it ensures accurate synchronization of file-based captions playout against currently-played video media timecode.

This captioning management system ensures on-the-fly encoding of closed-captioning data, should the source of this data be a file or a live stream. It relies on integration with a broadcaster's MAM system in order to retrieve caption files automatically. It also needs the automation system to trigger and synchronize playout of those files, which will appear as secondary events in the playlist. One benefit unique to this model is that because closed-captioning data is not encoded within the video file; the captions file can be delivered to the broadcaster or altered/corrected at any moment prior to the actual playout. (See Figure 1b.)

Another option illustrates the conventional broadcast transmission chain with captioning processing implemented on the front end, at the ingest stage. (See Figure 2.) In this case, captioning is embedded into ingested files that, maintaining captioning data with content itself, eventually will be transformed into a broadcast. One benefit of this model is that the MAM system handles audio, video and related closed-captioning data as a single asset, in turn simplifying management and movement throughout the rest of the workflow. Obviously, care should be taken to ensure that the chosen in-house video file

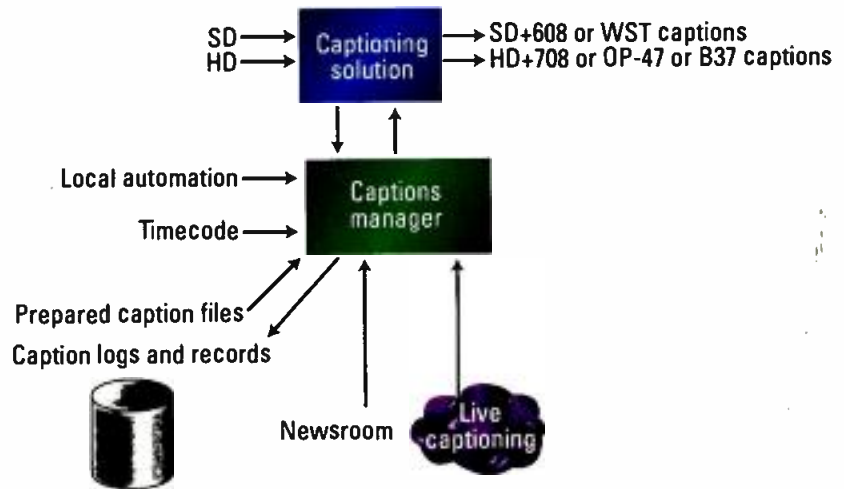


Figure 1a. In this illustration, a video and captions processing system connects with a caption management system within a basic workflow.

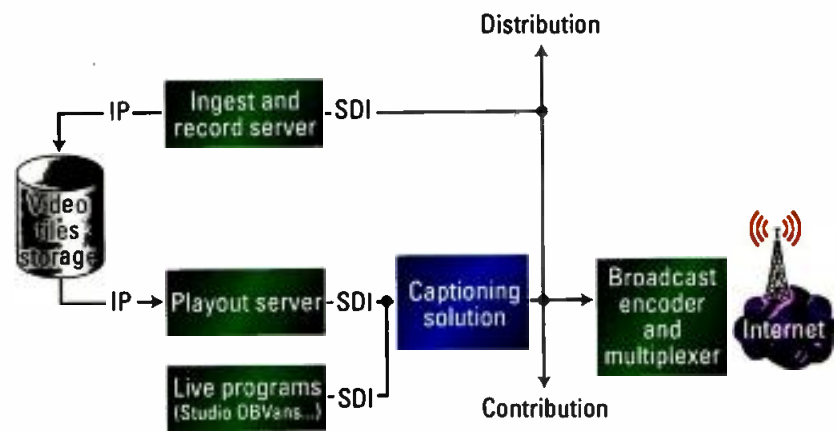


Figure 1b. This example highlights the system's unique benefit that a captions file can be delivered or altered at any moment prior to actual playout.

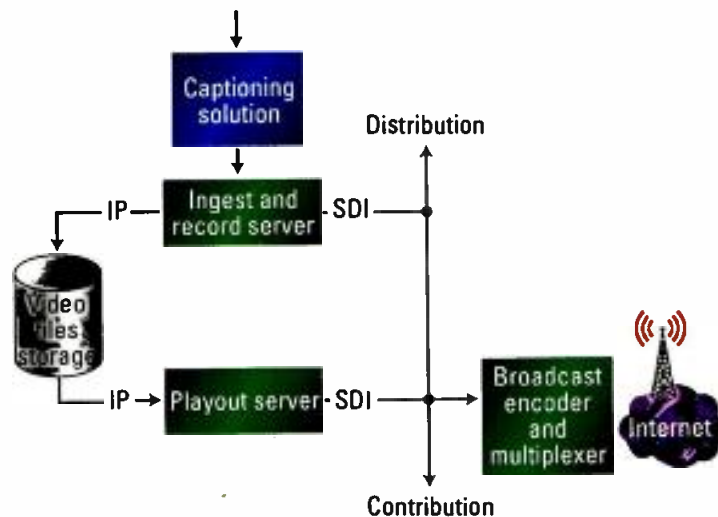


Figure 2. The conventional broadcast transmission chain, shown here, implements the captioning process on the front end at the ingest stage.

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format/wrapper is able to carry ancillary and closed-captioning data.

This latter approach does not address the requirements of setting up a structure for live captioning, for which at least a good part of the first model (described by Figure 1) is necessary. Further, regardless of the option primarily chosen to handle prepared captioning data, it also is necessary to record live programs along with synced captions for later rebroadcast. An ideal mix of both options presented in Figure 1 and Figure 2 is required in order to build the more complete and flexible solution. Obviously, the inserter should be able to behave nicely with video signals that already contain closed captions

Also, it is important to keep the workflow as simple and coherent as possible. Thus, an auto-sensing inserter is a good choice. A captions inserter should be able not only to sense the incoming video format, but also pick the proper output captions standard.

Broadcasts today are typically delivered in both SD and HD. Therefore, the inserter should be dual-channel so that it can handle captions encoding both channels at once. Most certainly, the broadcaster will use a single format — SD or HD — video storage and playout server architecture with an up- or downconverter situated before the captions inserter to feed the inserter's second channel. Pre-encoded caption data that comes

common process. Through offline batch processing, captions files are "merged" into VOD media files. Difficulties arise when it comes to streaming captioned media — especially if several concurrent streams following different standards are required.

In addition to selecting which caption transport standard to use, the broadcaster must decide how to get caption data to be encoded in web media streams and how to maintain read synchronicity between captions and video streams. Timed-Text is becoming widely adopted and pushed by the FCC, among others. Microsoft's Synchronized Accessible Media Interchange (SAMI), another popular format, is used for streaming content in Windows Media format.

As for generating Timed-Text captions from a coherent and common source according to the workflow examples above — whether the production origin is live, pre-encoded or provided as a caption file — there is no common solution for now. One solution is to get caption data directly from the distributed program SDI video signal. In this case, the same kind of captions and video processing system as is detailed above (the "inserter") should be used, just before the streamed-video encoders.

The inserter would be capable of reading and analyzing on-the-fly closed-caption data streams from the SDI signal. The extracted caption data stream then could be transcoded to Timed-Text, for example, and then be sent to the IP multiplexer for web broadcast, with a delay corresponding to the one implied by the encoder.

Using the increasingly sophisticated captioning solutions available today, broadcasters can build captioning workflow with a high degree of flexibility, streamline multiformat operations and minimize the costs associated with meeting increasingly stringent captioning requirements. **BE**

When it comes to choosing the type of closed-caption inserter needed, broadcasters should future-proof their equipment whenever possible.

and other related information (such as XDS in North America, teletext pages or packet31 data in Europe/Australia, etc.) and be able to insert live captions data seamlessly and when necessary.

Closed-caption encoding in the baseband video signal allows captions data to be kept perfectly in sync and is also ideal not only for distribution in broadcasters' facilities, but also for contribution and recording of live events for later rebroadcast. There are, however, some existing workflows in which on-the-fly caption encoding is done at the latest stage, right before broadcast, at the encoder/multiplexer level. This approach is limited in that it lacks record capability and is incapable of distributing video with embedded captioning, especially for new vectors such as web streaming.

Streamlining operations

When it comes to choosing the type of closed-caption inserter needed, broadcasters should future-proof their equipment whenever possible.

from within the "native" video SDI stream is then copied and transcoded on-the-fly by the captions inserter to the up- or downconverted SDI stream that goes through its second channel. This type of solution permits the inserter to encode and insert live or external file-based captions in both SD and HD streams simultaneously.

In addition to offering a seamless integration in the playout automation system, a dual-channel, auto-sensing closed-caption inserter can result in a hassle-free and future-proof solution for those broadcasters who aim at migrating smoothly toward a full HD workflow, and beyond.

To the web

Creating closed captions for VOD and web-based program delivery is another challenge that demands flexibility in handling data and workflows. As long as proper and interoperable file formats both for media and captioning files are chosen and used, encoding captions from prepared captions files for VOD is a relatively

Renaud Desportes is the director of Wohler's ancillary data product line.

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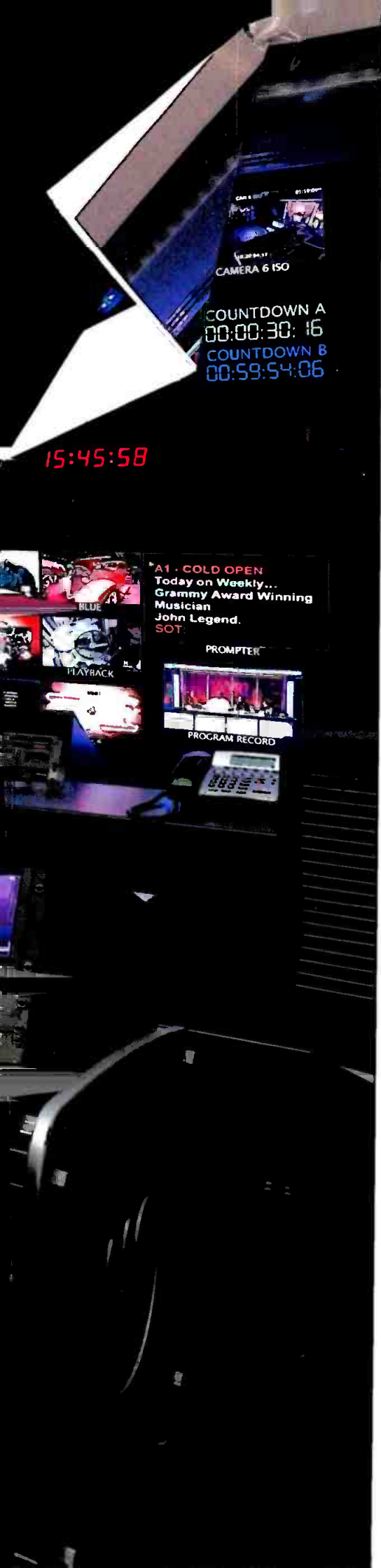
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The newly installed, state-of-the-art production control room features a Grass Valley Kayenne 3.5 M/E HD switcher, Chyron graphics and a monitor display wall composed of 10 HD LCD monitors with a Miranda Kaleido-X multiviewer.



Manhattan Center rises to the occasion

BY MARVIN WILLIAMS

Manhattan Center, centrally located at 34th Street and 8th Avenue, is home to the world-famous Hammerstein and Grand Ballrooms, as well as two television studios, two audio recording studios and several video post suites.

Here at Manhattan Center, we recently completed the total rebuild of our TV1 studio. Under the direction of Marvin Williams, director of engineering and operations, we have built a new, fully HD, state-of-the-art television studio. With the rest of the industry moving toward HD and 3-D platforms, we made the decision to start from scratch and build a brand new television studio.

TV1 had been in operation since 1995 as an analog studio, and then it was converted to a digital studio in 2003. In 2007, the studio began HD production on a small scale, so it seemed there was no time like the present to make the transition to full HD.

The facility was gutted down to slab and brick, and the team began its design. We wanted to build a studio and control room that would be an icon as well as a premier working space in the TV industry. We had to consider all factors, ranging from the overall flow and organization to the various systems that make the facility operational. The new facility layout was established based on a design by architect Tom Lekometros of The Lawrence Group/ New York.

Once the plan was in development, a totally new mechanical, electrical and plumbing infrastructure was done, based on a design from AMA Consulting Engineers of New York. Most importantly, the broadcast technical infrastructure, which is based on HD- and 3G-compliant equipment and systems, had to be carefully selected and integrated into a strong architecture in order to provide maximum flexibility, scalability and future expansion capability. The majority of the technical design was completed by Manhattan Center staff engineers, with consultation and additional design help from Bill Marshall of Harvey Marshall Berling Associates.

Design team

Manhattan Center:

Marvin Williams, dir. eng. & ops.

Travis Butler, chief eng.

Stan Gregory, lead tech.

OBie O'Brien, dir. of production

Eva Clark, controller

Robert Katz, K2 pictures consultant

Phil Hack, K2 pictures consultant

Lawrence Group New York:

Thomas C. Lekometros, architect

Harvey Marshall Berling Associates:

Bill Marshall

Travis Butler, the chief engineer, and Williams had to come up with a practical solution for freelancers to work in, while retaining the traditional production workflow environment and maintaining a highly flexible platform to accommodate new technologies. We had already experienced working in a partially SD tapeless environment when our client ESPN occupied the space from 2003 to 2007. Now with the new technologies, we would do it again with an HD file-based system. Clients increasingly wanted to walk away with files instead of tape so that they could edit on Final Cut Pro or Avid systems. We still maintained a 16-bay HD tape infrastructure for clients who would still want tape assets.

Production studio

The new production studio features Ikegami HD cameras and is wired for 16 cameras. Manhattan Center houses four studio pedestal cameras and seven hand-held cameras with studio build-up kits as well. The studio is a SMPTE-based fiber backbone facility and can connect to any of the other venue spaces throughout the facility by cross-patching in its technical core. There are 10 broadcast service panels in TV1 — seven in the studio, one on 34th Street and the other two in the support spaces.

The studio uses an SSL C10 HD audio console with 128 DSP and

Dialogue Automix with Genelec 5.1 monitoring system. It employs 18 wireless microphone channels with room for expansion, IFB and Riedel Acrobat wireless intercom throughout the studio. There is a wireless antenna system in place in the studio, green room areas and on 34th Street for outside shooting, as well as connectivity for monitor mix position and front of house.

The studio lighting is controlled by an ETC Ion board controlling three ETC SR48+ 96-channel racks over Ethernet. There is Ethernet to 16 DMX breakout modules in the grid and along the studio walls. There are also two company switches installed in the studio (100A and 200A), allowing for easy tie-in. An iWeiss 360-degree curtain and track is in place with a black curtain.

Production control room

The newly installed, state-of-the-art production control room features a Grass Valley Kayenne 3.5 M/E HD switcher, Chyron graphics and a monitor display wall composed of 10 HD LCD monitors with a Miranda Kaleido-X multiviewer for easy assigning of sources, aspect ratio sizing and tally. In order to optimize the space for the production and technical staff, a three-console configuration features the necessary ergonomics while providing suitable sight lines to the front monitor wall.



The new production studio employs Ikegami HD cameras and is wired for 16 cameras.

Adjacent to the control room is the audio mixing suite, which was acoustically designed to accommodate a conventional surround-sound monitoring environment and the lighting control booth with the ETC Ion control console with fader wing 2 x 20.

Audio communications

The overall communications system is based on a Riedel 136 x 136 matrix with a combination of analog, MADI, and AES and GPI interface cards. The matrix, key panels, telephone interface units and other gear are all seamlessly interfaced to provide a vast amount of point-to-point, IFB, four-wire (e.g. cameras, etc.) and party-line communications requirements.

Although the majority of the IFB and party lines are interfaced to the talent and operations via wireless provisions, there is also an outboard hard-wired Clear-Com two-wire system as well for the ballrooms, which are connected to control room. Riedel Acrobat wireless intercom systems are in the studios as well as in the ballrooms.

Post production/playback

Graphics and video files are shared over an extensive IP-based file-sharing network in order to support production and post capabilities. The MC team also implemented Grass Valley K2 servers for multi-camera

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Genelec: Speakers
Gepco: Fiber systems and SMPTE fiber patching
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Ikegami: HDK cameras, LCD HD monitors, security cameras
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NEC: LCD5220-AVT monitors
Riedel Communications: Digital intercom systems
Sachtler: Studio pedestals
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Scharff Weisberg: Wireless antenna system
Solid State Logic: C10 HD audio console
Sennheiser: Wireless microphones
TBC Consoles: Broadcast consoles
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Vinten: Studio pedestals
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Adjacent to the control room is the audio mixing suite. The overall communications system is based on a Riedel 136 x 136 matrix with a combination of analog, MADI, and AES and GPI interface cards.

recording and playout production support. Studio and post-production share resources, linking the studio K2 system to the post-production Avid Media Composer editing workstations and Final Cut Pro workstations.

EditShare Energy supplies storage and backs up media files. This provides for tapeless studio recordings, and seamless transferring to the post-production suites. The facility has heavily transitioned to a tapeless workflow environment, but also maintains an infrastructure for HD tape decks to supplement additional production requirements and legacy tape playback and record functions.

Video control and transmission

The video control room is set up to control two shows at once either in TV1 and TV2 or either of the venue spaces. The video control room has all the OCPs mounted between the two video shading positions, and each shader has his or her own master control panel for any detail adjustment that might be needed. There are two 46in HD LCD flat panels that are control by Miranda multiviewers, so configuration of each monitor can be controlled for each show's needs.

The technical core contains the entire respective 11 camera CCUs, although the system is currently wired to accommodate a total of 16 camera chains. There are also controls and monitoring for color correctors for each engineer to paint monitors on set.

Transmission is set up with a 50in HD LED monitor that is controlled by a Miranda multiviewer, so configuration of inbound and outbound signals can be programmed according to each show's requirement and be monitored. Transmission is set up for two engineers to operate on two separate shows. Each engineer has control of AJA frame-syncs via web-based software on our TechLan. **BE**

Marvin Williams is director of video engineering & operations for Manhattan Center Studios.



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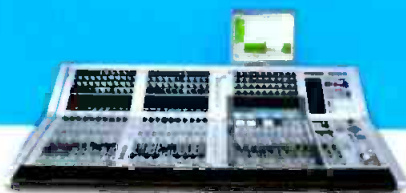
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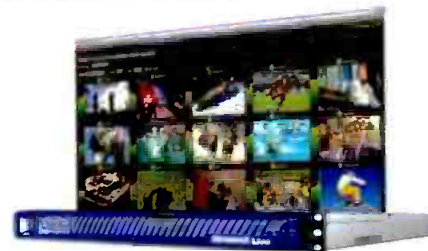


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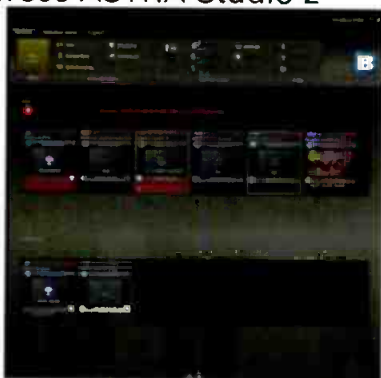
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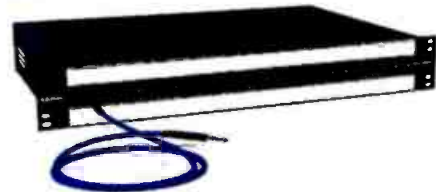
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Booth: N4920

CONTROL SOFTWARE

Evertz MAGNUM VUE

Part of Evertz Live Production control system; new features include integrated tally, advanced event scripting, timer control, unified naming and new widgets for the customizable user interface.

www.evertz.com

Booth: N1502

LENS

FUJIFILM HA19x7.4BERM/ BERD

Offers minimal focus breathing and short multi-order diffractive optics; newly developed coatings improve blue transmittance and response; compatible with all Premier Series ENG accessories; employs 16-bit encoders, as well as a 2.2X extender, as standard.

www.fujinon.com

Booth: C7525



Multiviewers with integrated mouse and keyboard control.



A one of a kind system to enhance your multi-imaging experience.



April 16-19, 2012 . Las Vegas, Nevada | Booth# SL8915 . <http://avitechvideo.com>

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DIAGNOSTIC IP PROBE
Bridge Technologies VB12-RF



Portable monitoring/measurement appliance designed for use on the road; features a ruggedized chassis with a form factor smaller than a laptop computer; includes the full complement of broadcast and IP interfaces, along with a wide range of built-in interfaces for RF, ASI and IP; also provides full TR 101 290 alarming and analysis, as well as support for all media transportation codecs.

www.bridgetech.tv
Booth: SU9819

VIDEO DELAY
Axon SLD100

Low-maintenance video delay can store and delay up to one hour of uncompressed SD material (including all blanking) as RAW data; uses SSD disks for reliability.

www.axon.tv
Booth: N4624

LIGHTS
BriteShot Luminator series

Comes in two flavors: the Luminator RGBAW light and the Luminator White; the Luminator RGBAW can produce temperatures ranging from 3100K to 6800K in a wide range of color schemes; also features built-in color correction and built-in lighting effects such as fire, police lights, fire truck lights and lightning; both flavors operate on 3.8A; this power allows up to five RGBAW lights to be plugged into a single 20A wall outlet simultaneously, and powers the Luminator White at nearly 1500ft-candles brightness at 10ft.

www.briteshotinc.com
Booth: C8228

MANAGEMENT SERVICES
Broadcast International
Managed Media Services
(MMS)

Powered by its own CodecSys software; turnkey management system for digital signage and background audio; consists of software, equipment, screens, network, management, installation and field services for a complete interactive multichannel approach; delivers real-time analytics to maximize the effectiveness of corporate marketing and communications.

www.brin.com
Booth: SU8523

FIELD LENS
Canon XJ95x8.6B

Focal range of 8.6mm-820mm (95X zoom); improved optical shift-type stabilizer incorporates a sensor inside the lens that detects vibration; Constant Angle Focusing System uses 32-bit CPU to counteract lens breathing when focusing; weighs 51.1lbs.

pro.usa.canon.com
Booth: C4325

PLAYOUT SYSTEM
Primestream FORK Playout

Features unlimited, extendable metadata fields, extensive CG and graphics integration, and sophisticated redundancy options; scales to support multiple stations; facility management controls for managing shared and independent resources across installations; lightweight client gives full playlist control to remote sites via VPN and 3G, allowing broadcasters to control their stations and stations groups from anywhere; integrates with Omneon MediaDeck and Omneon MediaCenter.

www.primestream.com
Booth: SL6605



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Booth N3478

www.octopus-news.com



Loudness Simplified



TouchMonitor TM3

TouchMonitor TM3 provides professional Loudness, True Peak and PPM metering at an affordable price with easy and flexible preset control.

- Display unit with 4.3" touch screen and flexible display layout
- Separate interface box with audio I/O, USB, GPIO
- Audio: analog bal. and unbal., S/PDIF, AES3
- ATSC A/85 Loudness and True Peak measurement
- 2-ch. stereo and 6-ch. (5.1) versions available

TouchMonitor TM9

TouchMonitor TM9 sets a new standard of professional audio metering in terms of precision, performance, efficiency and flexibility.

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- Highly flexible screen layout with scalable instruments
- Software licenses for flexible configuration
- ATSC A/85 Loudness and True Peak measurement
- 16-ch. audio interface options: analog, AES3, AES3id
- 3G/HD-SDI interface option available
- Ethernet/LAN, USB, VGA, GPIO ports

About RTW

Based in Cologne, Germany, RTW has more than 40 years of experience in designing and manufacturing high-quality instruments and technologies for visualizing audio signals with the most up-to-date technology.



Ask GROUP ONE Limited, our U. S. distributor about RTW's simplified Loudness measurement products. | Phone 516-249-1399 | www.g1limited.com



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Win a TM3 at **NABSHOW** on booth C1844!
Where Content Comes to Life



GLUE SOFTWARE

Chyron MediaMaker

Integrates Chyron graphics with file-based workflows; extends Chyron graphics capabilities to a wide range of editing and third-party applications; gives video editors and graphic designers access to the same graphics and animations that are being used live on the air; takes producer-created graphics from a wide range of newsroom systems for painless repackaging into the edit suite; integrates applications such as Apple Final Cut Pro, Adobe Premiere Pro and Adobe After Effects with the Chyron graphics workflow suite.

www.chyron.com

Booth: SL1510

VIDEO FRAME SYNCHRONIZER

Crystal Vision SYN 3G



Synchronizer works with 3G, HD and SD sources; designed for applications without embedded audio; synchronizes sources timed to a different reference; corrects any processing delays; ability to cross-lock allows it to use any existing timing signals with any source reference to either HD tri-level syncs or SD Black and Burst; manual freeze allows SYN 3G to be used as a simple still store, while automatic freeze is available when input fails through loss of signal; measures 4in by 10.5in, which fits Crystal Vision's standard frames.

www.crystalvision.tv

Booth: N1815

SERVER

Dalet Brio

Designed to ingest and playout broadcast-quality video in SD and HD formats; each unit features built-in redundancy; works with either its own local storage, directly attached to a SAN or in a hybrid configuration; plays any supported files, including mix of SD and HD, on the same timeline; allows for on-the-fly cross-, up- and downconversion of video signal.

www.dalet.com

Booth: SL4615

REMOTE CONTROL APPLICATION

Cinedeck Controller

Free TCP/IP-based application enables multiple Cinedeck RX systems to be managed from any PC, or via a browser, with no additional hardware requirements; drives up to 24 channels (across 12 Cinedeck RX systems) from a single interface; file management is either by local touch-screen operation or via a remote administrator station; can remotely record, playback, fast forward and rewind multiple Cinedeck RX units in sync.

www.cinedeck.com

Booth: SL13417

MONITORING AND LOGGING TOOL

Cobalt Digital SPOTCHECK

Monitors an IP or ASI MPEG stream at the transit encode point to measure and log all material emanating from facilities in larger operations using multi-program MPEG streams; operates at emission MPEG level and leverages automation as-run data to maintain a complete log of all program segments; compliance records can be graphically queried or queried by using as-run search entries, ranging over several minutes to several months.

www.CobaltDigital.com

Booth: N1929

POST-PRODUCTION SOFTWARE

DFT Digital Film Technology FLEXXITY v1.5



Provides Mac and/or Linux support; provides the post software tools for dailies, playout and archive applications for facilities with existing Apple infrastructure; aggregates a number of key functions in one software interface; helps facilities maximize their value and delivery of their content by streamlining audio ingest, image ingest, audio/video synchronization, metadata logging, grading and playout/file generation; its scale-up flexibility allows users to implement a software system that is fine-tuned to their specific needs, from single-user seats to multi-user workgroups.

www.dft-film.com

Booth: C11145

EMERGENCY MESSAGING PLATFORM

Digital Alert

Systems DASDEC

Designed to provide a flexible platform for emergency alert and CAP management in a fully integrated package; includes support for automatic FCC-compliance logging with the system's nonvolatile memory; browser-based interface facilitates simultaneous access by multiple users while making it easy for broadcasters to deploy content to multiple channels and manage all EAS/CAP functions remotely.

www.digitalalertsystems.com

Booth: C3346

QUALITY MONITOR

Video Clarity RTM

Measures audio and video quality and delay, as well as VANC data lines integrity; alarms and records the AV sequences if any of these levels have fallen below a degradation threshold that can be pre-configured by the engineering team; detects fine detail issues such as blur and blockiness; includes reference test patterns.

www.videoclarity.com

Booth: SU11302

BROADCAST MONITORING SYSTEM

Digital Nirvana MonitorIQ

Latest version provides compliance logging, aircheck, signal analysis and diagnostics, and content repurposing; records at full SD and HD broadcast quality; based upon an open API platform; provides access to the entire transport stream for analysis and diagnostics, as well as IP multicast to enable IPTV inside the facility.

www.digital-nirvana.com

Booth: N3438

CONTROL FOR LIVE TELEVISION PRODUCTIONS

DNF Controls Production Control Application

Designed to provide fast, simple and reliable control over video and graphic playout devices for live and live-to-tape programming; the semi-automated solution works with existing control room equipment to simplify production control, expand production capabilities, enhance production look and branding, and minimize production errors.

www.dnfcontrols.com

Booth: N2115

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TRANSCODER/STREAMER
DVEO MultiStreamer
DIG/IP (mini)



Supports both HD and SD H.264/MPEG-4 AVC transcoding, with auto detection; has optional HDMI input instead of SDI/HD-SDI input; outputs include multiple, simultaneous IP streams through GigE port (RJ45), SDI or HD-SDI video loop-through; can upconvert incoming SD streams to HD and serve streams in RTMP protocol for direct playback using Flash players or for publishing to CDNs.

www.dveo.com
Booth: SU2114

MEDIA ASSET
MANAGEMENT SYSTEM
EditShare Geevs/Flow



Records Avid DNxHD or ProRes directly to the system's shared central storage; produces proxy files in real time for the MAM, with user-level security, mirror copy and automatic archive; allows users to log shots, and create subclips, as well as sequences that cut between inputs; integrated MAM allows users to view proxy files on their desktops, as well as ingest media from file-based sources such as P2 and XDCAM.

www.editshare.com
Booth: SL9020

STORAGE SYSTEM
EMC Isilon X200

Unified scale-out storage system capable of scaling from a few terabytes to multiple petabytes and over 30GB/s of throughput within a single file system; features 60-second on-the-fly scaling of capacity and/or performance; namespace operation acceleration via SSD; up to N+4 data protection, set at cluster, directory or file level; intelligent use of SSDs for metadata and file-based storage workflows; ideal for high-concurrency, high-throughput applications and workflows.

www.isilon.com
Booth: SL6315

FILE-BASED AUDIO
PROCESSING SOFTWARE
Emotion Systems Emotion
File Finish

Audio normalization and loudness compliance tool for media files; delivers measurements against predetermined parameters; generates a detailed file error report and repairs files to meet established criteria; supports AIFF, WAV, MOV, MPG and MXF files, and can work with 16-bit and 24-bit audio; can test to multiple loudness targets in a single pass, as well as check and report on true peak values and LRA.

www.emotion-systems.com
Booth: N3719

NEWS PRODUCTION SYSTEMS
EVS E/E News



Combine IT and live broadcast architectures; feature advanced media ingest, including multiple file import, as well as integrated content management and media sharing based on SOA and advanced third-party systems integration; also feature scalable storage with extended client-browsing and editing, (including Web services).

www.evs.tv
Booth: SL3815

SHARED STORAGE SYSTEM
Facilis TerraBlock 5.5

Multiplatform, high-capacity, shared storage system supports 4Gb/s and 8Gb/s Fibre Channel, and GigE and 10GigE through the Facilis Shared File System; v5.5 features include Linux shared file system support, integrated server spanning and mirroring, and Adobe Premiere Pro project sharing; shares both Apple Final Cut Pro 7 and Adobe Premiere Pro projects on multiuser write volumes through the Facilis Project Manager Application and avoids costly overwrites; supports Avid Media Composer 6.0 and Symphony 6.0 on Windows 7 and OS X Lion.

www.facilis.com
Booth: SL9019

RACKMOUNTED DIGITAL
VIDEO RECORDER
Fast Forward Video sidekick
HD Studio

New, rackmountable version of sideKick camera-mounted DVR occupies only a half RU in width and 2RU in height; directly compatible with sideKick HD, which allows direct transfer of field footage stored on the unit's 2.5in SSD; easy integration with NLE systems and other content sources allows for fast and seamless editing playback to air; industry-standard RS422 control; includes standard analog and AES I/O, as well as GigE port for uploading and downloading of content.

www.ffv.com
Booth: C6313

CONTENT STORAGE
MANAGEMENT SYSTEM
Front Porch Digital
DIVArchive v7.0



Supports complex DPX packages; enables video-like operations on film-carried content, making it ideal for film production and post-production applications; implements the company's Archive eXchange Format (AXF) technology to protect, preserve and facilitate the exchange of content among storage systems; interconnects every element of operations from archive to production to transmission.

www.fpdigital.com
Booth: N5806

STREAMING WEB-TV SERVICE
GlobeCast Multiscreen

Allows broadcast clients around the world to stream their content to any Internet-connected device.

www.globecast.com
Booth: SU812



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www.americanradiohistory.com

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AUDIO MODULE

LYNX Technik PDM 5289

Allows almost unlimited shuffling of embedded audio channels and metadata; provides 16 channels of audio embedding/de-embedding for SDI video; can be used to manage multichannel audio, metadata and audio/video delays; also offers flexible metadata extraction, shuffling and embedding; the module functions as a 32-channel audio processor and a Dolby-E synchronizer.

www.lynx-technik.com

Booth: N4433

SET DESIGN

FX Design Group



Award-winning set design, fabrication and installation services, including hard sets, 3D digital backgrounds, and facilities and workflow planning; specializing in HD for news, sports and entertainment shows appearing on broadcast, cable, Web and mobile; also offers photorealistic 3D virtual sets; offers lighting gear packages and lighting design.

www.fxgroup.tv

Booth: C7243

BUSINESS PROCESS MANAGEMENT SOFTWARE

Florical SMART Central

Provides a portal to access the many automation applications and services that create an operational workflow, which improves both management and staff access to information and control; based upon unique user rights, allows users to perform many functions from any networked workstation with secure access; gives immediate access to critical information to decision makers; uses an SOA environment to handle changes, new requirements and demands placed on the broadcaster.

www.florical.com

Booth: N5823

GRAPHICS PACKAGES

Giant Octopus election graphic packages



Release from FX Design's new motion graphics company; packages offers each television station client its own custom look and original music score for election coverage, along with a standard list of deliverables to accompany the client station's logo; modern (white package) or traditional (blue package — shown) looks offered.

www.fxgrouponline.com

Booth: C7243 (FX Design Group)

CONSULTING SERVICES

Global Reach Group consulting services

Provides distribution, channel network establishment and management, business development, media relations, marketing, and advertising services across the country, or across the globe; comprised of industry professionals from the United States, Latin America and Europe; offers a modular approach to accommodate each client's specific needs; clients can choose between an all-inclusive international package or go one project, one region at a time.

www.globalreachgroup.tv

Booth: N4920 (BHV Broadcast)

ARCHITECTURE

Globecomm Media Processing Center

Developed facility ingests content in native IP format and configures it for delivery in multiple formats through multiple media, from DTH to IPTV to mobile video; simplifies design; reduces operating and maintenance costs; replaces frequent transcoding with end-to-end native IP.

www.globecommsystems.com

Booth: SU6129

ENCODER

Haivision Makito 2.0

Compact H.264 encoding appliance supports low-latency 1080p60; now also supports direct live RTMP streaming to the Internet and CDNs; can encode multiple bit-rate streams, which then can be simultaneously directed to LAN targets leveraging transport stream multicast and WAN infrastructure with RTMP.

www.haivision.com

Booth: SL9911

TRANSMITTER AND HEADEND

Harris UAX Compact Class and Selenio system

Transmitter allows ATSC broadcasters to fill in coverage areas underserved by ATSC Mobile DTV signal penetration; offers a single-box solution to improve coverage compared to a combination of signal processing, network adaption and/or other components; headend solution features networking system with adaption for connection to large transmission networks; uses latest generation of compression and multiplexing technology to retain image quality for main HD/SD channels and support ATSC Mobile DTV channels.

www.broadcast.harris.com

Booth: N2502, N3400

SLOW-MOTION CAMERA

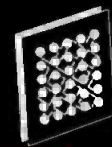
I-MOVIX SprintCam Vvs HD

Based on Emmy award-winning technology from Vision Research; operates at up to 5800fps in 720p (up to 2700fps in 1080p); provides instant replay at native HD resolution and image quality with a dual output for a live and replay feed; dual output allows operators to shoot and record at the same time; memory is segmented; live and replay views are integrated on the viewfinder; has support for synchronization of two cameras in 3-D ultra-slow-motion capture; features joystick-equipped control panel.

www.i-movix.com

Booth: C4644

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CONTROLLER

**HiTech Systems
HT800 series**

Offers direct control of four or eight VTRs for jog, shuttle, cue and play operations; has 2 M/E capability, assemble and insert (including track selection and adjustable frame delay), record inhibit and crash record; features mark in and mark out keys to store a total of 99 in and 99 out cue location points; jog, shuttle and variable sensitivity of the wheel allow for operator preference and VTR type.

www.hitechsys.com
Booth: N5020

**ULTRA- AND SLOW-MOTION
CAMERA SOFTWARE**

**I-MOVIX SprintCam
Vvs HD 1.2**

Updated version features refined, operational enhancements for all four system components that allow operators to use all capabilities of the ultra-motion technology in a simpler, more efficient way; provides higher-quality ultra-slow motion images than previous version.

www.i-movix.com
Booth: C4644

MICROWAVE RECEIVER

**IMT Nucomm
Newscaster DR2**



Split-box HD/SD COFDM diversity microwave receiver for outside broadcast and other mobile video applications; rugged machined housing provides durability and excellent thermal characteristics for operation in the harshest of conditions; receiver has four RF inputs that communicate directly with the system's external intelligent receivers in the 1.99GHz to 2.7GHz and 6.40GHz to 7.75GHz bands, with other bands also available; use of external intelligent receivers allows receive antennas to be remotely mounted.

www.imt-broadcast.com
Booth: C6423

SNG NETWORK

Inmarsat BGAN

Provides data connection speeds up to 512kb/s, suitable for standard office-type applications such as e-mail, Internet and intranet access, and VPN access to corporate networks; streaming rates of 32kb/s, 64kb/s, 128kb/s, 176kb/s, 256kb/s, as well as ISDN at 64kb/s; rates are guaranteed and on-demand; allows phone call at the same time as having an open standard IP session.

www.inmarsat.com
Booth: SU10009

IPTV DISTRIBUTION

Intelsat

A wholesale MPEG-4 content aggregation and delivery service for distributors and integrators operating in the United States; supports delivery of a prepackaged TV programming line-up in a highly-efficient MPEG-4 IP format to cable and telecom service providers.

www.intelsat.com
Booth: SU4919

ANTENNA

Jampro Antennas JUHD



UHF panel antenna can be configured to provide various azimuth and elevation patterns; by using optional beam tilt and null fill, the elevation patterns can be shaped to maximize coverage; designed as either a side-mount or a top-mount horizontally polarized antenna, it can be configured to include varying levels of vertical polarization, with results ranging from small amounts of elliptical polarization to full circular polarization; radomes enclose and protect the panels from rain and ice.

www.jampro.com
Booth: C2307

ENCODER

Intopix IP-Cores

The JPEG 2000 HD Family allows users to retain image quality throughout complete production process; features a decoded bit rate range from 250Mb/s up to 1Gb/s; can process up to 120 progressive fps in HD resolution (1920 x 1080); also features support for 4:2:2 and 4:4:4 sampling, as well as constant-bit-rate and variable-bit-rate encoding.

www.intopix.com
Booth: C5145

DIGITAL AUDIO PROCESSOR

Jünger Audio D*AP LM2



Two-channel digital audio processor; handles both analog and digital (AES/EBU) audio and features an automatic input switchover with parallel output formats; rack-mountable; controllable through a newly designed front panel or via a Web-based interface; incorporates version 2 of the company's LEVEL MAGIC adaptive loudness algorithm, which is compliant with all current broadcast audio loudness recommendations, including ITU 1770 (versions 1 and 2), ATSC A/85, ARIB TR-B32 and EBU R128.

www.junger-audio.com
Booth: SU3604

CAMERA CONTROL SYSTEM

Telemetrics Coax/Fiber Link

Cost-efficient, high-performance camera control system for transmitting HD/SDI video over inexpensive cabling; ideal for both permanently installed and mobile applications; employs frequency division multiplexing to transmit multiple signals between the camera and base station for distances up to 3000ft; eliminates the need for video equalizers, frame synchronizers, intercom adapters, microphone phantom power and remote power supplies.

www.telemetricsinc.com
Booth: C9529

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in a world of change, those who stand still will fall behind. but those who innovate, who go the extra mile, reach that little bit further... they define what is to come.

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defining the future*

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CLOUD-BASED ENG SYSTEM

TVU Networks
TVUPack Cloud

Enables production crews to broadcast live in SD or HD to any size Web audience without the need of traditional receiving infrastructure; is a cost-effective cloud-based alternative to traditional satellite or microwave broadcasting hardware that enables broadcaster to bring live broadcast content to TV stations or Web audience with minimum infrastructure investment.

www.tvupack.com

Booth: SU8519

TS ANALYZER SOFTWARE UPDATE

Triveni Digital StreamScope MT-40

Software update extends the MT-40's audio monitoring capabilities by allowing users to monitor and analyze audio loudness according to ITU-R Recommendation BS.1770; provides the ability to export accurate LKFS/LUFS loudness measurements of broadcasts in real time; provides forensic evidence of compliance that is critical for approaching this issue.

www.trivenidigital.com

Booth: SU5202

HANDHELD CELLULAR VIDEO UPLINK

LiveU LU40i



Weighs less than 1.5lb; features SDI, analog and HDMI outputs; bonds up to six network connections using 4G LTE/3G, WiMAX, Wi-Fi and LAN; includes encoding capabilities for transmitting high-quality HD/SD video from diverse locations, adapting to dynamic network conditions; inputs HD/SD-SDI, HDMI and analog (composite, Y/C, component and stereo audio).

www.liveu.tv

Booth: SU9119

MIXING CONSOLES

Lawo mc2 series

Features the addition of loudness monitoring for each channel following EBU R128 and ATSC A/85 specifications, and based on ITU 1770; metering is shown in the channel display and the GUI main display; a permanent display of the integrated measurements is provided within the GUI.

www.lawo.de

Booth: C2046

HANDHELD 4K CAMCORDER

JVC GY-HMQ10



Captures, records and plays video images at four times the resolution of HD television; powered by the company's Falconbrid large-scale integration chip for high-speed signal processing and a 1/2in CMOS imager with 8.3 million active pixels; delivers real-time 3840 x 2160 footage at 24p, 50p or 60p; uses MPEG-4 technology and a variable bit rate H.264 codec operating at up to 144Mb/s to record up to two hours of 4K video to economical SDHC or SDXC memory cards; also captures and records 1080i or 1080/60p full HD.

pro.jvc.com

Booth: C4314

MEDIA WORKFLOW SYSTEM

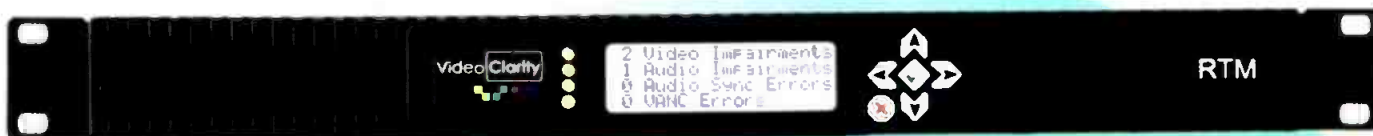
Quantel QTube

Links remote studios to headquarters to support frame-accurate editing over the Internet — all with low latency and full security; supports SD and HD; local and remote media can be mixed on the same timeline.

www.quantel.com

Booth: SL2415

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New IP Monitoring for OTT Quality Testing



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This architecture delivers on the cloud promise, like lower costs and flexible deployment, so you can finally stop wasting money on IT infrastructure you don't need. Plus, LYNX isn't just storage. It's a cloud-based implementation of the world-leading DIVASolutions, which already manages content for most of the largest media companies.

At Front Porch Digital, we lead the industry in creating innovative ways to help you make the most out of your media assets. Visit fpdigital.com and talk to our team about how we can connect you to your cloud – a long-term solution that's even smarter and less expensive. It really does seem like heaven.

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LOUDNESS QUALITY MONITOR

Linear Acoustic AERO.mobile

Employs newly developed psychoacoustic processing that enables content to remain audible in noisy environments on small mobile devices; features two separate multiband processing cores that accept mono, stereo or Dolby 5.1 station audio with full downmix support; loudness management is accomplished by the user's choice of fully automatic, metadata or GPI control modes; AES and HD/SD-SDI I/O are standard.

www.linearacoustic.com

Booth: N3737

MULTIVIEWER

Grass Valley Trinix NXT

Latest enhancements include on-screen mouse and cursor functionality to expand individual tiles to full screen, powerful signal monitoring, status, alarming functions and the ability to import and export configurations for predetermined screen layouts; each multiviewer board includes 32 scalars with all inputs and outputs on each board supporting all video standards from 480i to 1080p.

www.grassvalley.com

Booth: SL106

EDITING CARD

Matrox Mojito MAX



Provides broadcast-quality input and output for a range of editing apps; facilitates H.264 encoding for deliveries to the Web, mobile devices and Blu-ray, all in a single 3/4-length PCIe card.

www.matrox.com

Booth: SL5115

**AUTOMATED PAYOUT SERVER
Media 5 Video 5 Server HD**



Simultaneously broadcasts, records and reproduces multiformat payout; includes SQL data base, statistic information system, access control, HTML control, local or remote control; compatible with formats including with DV, MPEG-2, MPEG-2 I-FRAME, DVCPRO, DVCPRO-50, MJPEG, DVCAM, MPEG-2 (ISO/IEC 13818-2) (VBR, CBR) up to 80 Mb/s, MPEG-2 HD-DVD and others; supports SD, HD and 2K video.

www.video5.tv

Booth: C10445

AUTOMATION MODULE

Myers Information Systems ProTrack On-Demand

Module enables media facilities to build, schedule, track and publish program and sales packages; provides transcode requests for station-defined distribution platforms and needs, such as mobile, In-ternet, cable, DVD and more.

www.myersinfosys.com

Booth: N4616

LOUDNESS MONITOR

Miranda Technologies Axino

Loudness monitoring and correction processor for high program count, IP transport streams; provides continuous monitoring and selective loudness correction across hundreds of programs carried within an MPEG IP transport stream; loudness monitoring and logging is performed using BT.1770 and EBU standards; loudness control can address excessive segment-to-segment and program-to-program loudness.

www.miranda.com

Booth: N2512

NEWSCAST AUTOMATION

Mosart Multi-Studio Solutions



System designed for multistudio broadcasters by providing streamlined sharing of resources and coordination across several control rooms; scarce resources such as video server ports and graphics engines can be shared; workflow is optimized through template sharing and an automated template database, making it possible to re-use templates in multiple control rooms.

www.mosart.no

Booth: N1820

MEDIA SWITCH ROUTER

Net Insight Nimbra 310

Provides service-centric network management, QoS Enhanced Links and loss-less routing; compact one-box access for multi-service transport of media and data services, targeting the increasing demands for transport of real-time sensitive media and data applications; applications range from high-end video services such as studio production and contribution to broadcast distribution in IPTV/cable TV or DTT/mobile networks.

www.netinsight.net

Booth: SU3919

CONTENT LOGGING SYSTEM

NETIA Media Logging

Meets increasing demand for a mixed A/V digital monitoring system; modular design allows setup of advanced infra-structures; gives ability to record, centralize and view content from multiple sites; lowers operating and storage costs due to automatic purging and use of MPEG-4 compression.

www.netia.com

Booth: SU812

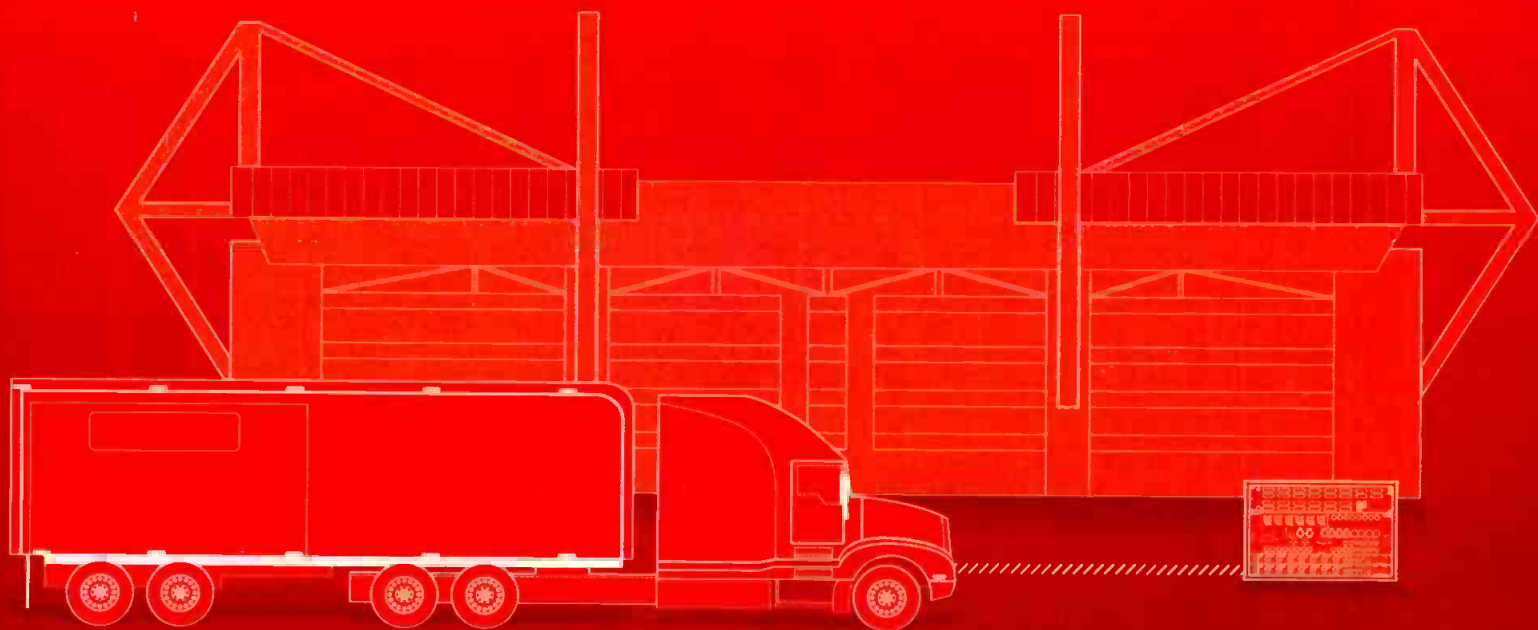
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Companion App Framework



A key component to the flagship Interactivity Suite (IS); framework helps develop branded applications that push/pull relevant information or media to a second screen such as a tablet, smartphone or PC; support for most major broadcast protocols allows framework to be an active return channel to the broadcaster, meaning mobile devices and PCs become peripherals for enabling participation TV, interactive content and remote control.

www.never.no
Booth: SL4730

VIDEO EDITOR
Manzanita TS Editor

Transport stream editor modifies VOD and advertising assets without re-encoding original files; enables content and service providers to frame-accurately edit MPEG-2 TS arbitrarily at any frame; adds and removes SCTE-35 messages from VOD assets; includes optional tools for modifying packets and tables, and editing fields within various structures such as transport, adaptation and PES headers.

www.manzanitasystems.com
Booth: SU3702

ENCODER/DECODER
Nevion Ventura VS904



Provides H.264 4:2:0/8-bit and MPEG-2 4:2:0/4:2:2/8-bit capability with bit rates from 2Mb/s to 80Mb/s; supports multiple audio codecs, including SMPTE302 pass through, MPEG-1 Layer II, HE-AAC, AAC-LC and AC-3; offers a low-latency option of 250ms (end-to-end) while maintaining high visual quality.

www.nevion.com
Booth: SU2019

TRANSMITTERS
Screen Service Broadcasting
SDT ARK-6 series

Can be used as a transmitter, a heterodyne transposer, a regenerative transmitter and single-frequency echo canceller; implements DVB-T/T2, PAL, ATSC/MH, NTSC and ISDB-T modulations; allows selection of transmission modes in various ways: remotely, using a dry contact, via SNMP commands, via TCP/IP using the Web graphic interface, or even via a dedicated command inserted into the transport stream.

www.screen.it
Booth: SU4306

SIGNAL PROTECTION TECHNOLOGY
Snell Signal Senti



Designed for the automated playout environment; watches over the main and back-up signal paths, using the company's Hyperion content monitoring system and an intelligent 2 x 1 changeover switch to play an essential role in signal-path decision-making and switching; serves as a comprehensive video, audio and metadata monitoring and reporting system that can trigger the signal changeover automatically or provide detailed information for an operator-controlled decision; packaged in a 19in, 1RU form factor; offers a variety of interfaces, including RS-422, GPI and Ethernet back-up.

www.snellgroup.com
Booth: N1820

SD/HD SLOW-MOTION VIDEO SERVER

Orad PlayMaker

Designed to meet the growing challenges of live sports productions; provides up to eight I/O channels of high-quality ingest in multiple video formats, including DVCPRO, DNxHD and JPEG2000, with synchronized slow-motion replay and editing tools; with its PlayNet module, the server provides Gigabit network file sharing between servers for preview, copy or instant playout of clips from remote servers; introduces instant import and export capabilities to almost any storage or NLE environment for a fast turnaround workflow.

www.orad.tv
Booth: SL4524

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email: usa@stagetec.com
www.stagetec.com



SCHEDULER

NVerzion KISS



Newest version of Keep it Simple Scheduler features intuitive interface that allows users to operate with or independent of NVerzion automation; can be integrated with a QuickBooks interface, simplifying the process of generating invoices and reports, and virtually eliminating billing errors.

www.NVerzion.com

Booth: N4912

SDHC MEMORY CARD

Panasonic UHS-1



Offers a transfer rate of 90MB/s and off-load speed of six minutes with a singular clip; user must have a computer embedded with USB 3.0 technology and be equipped with a Panasonic UHS-1 USB adapter or an SDHC card slot that supports the memory card's chip to achieve this transfer rate; incorporates a Super Intelligent Controller System (SICS) that extends the archive shelf life of the card and its recordings, provides power failure protection, and controls the data writing to the card so that the entire card is used fully over its lifetime.

www.panasonic.com/professional

Booth: C3607

OTT MONITORING SYSTEM

Sencore VideoBRIDGE

Adaptive stream monitoring enhancements will help operators ensure desired QoS from the point of origination, through the delivery network and onto the customer-premise end viewing devices; users will be able to monitor quality of all popular adaptive bit rate streaming protocols by adding licenses to their existing VideoBRIDGE probes, by including the OTT options with new probe installations and by installing VideoBRIDGE software modules directly onto multi-screen client devices; the new options will monitor protocol breakdown, peak, average, total bandwidth use, advance packet loss and jitter metrics, and more.

www.sencore.com

Booth: SU3612

MOMENT CAPTURED

K2 DYN0

Live video production is exciting, but you don't get many second chances. Your replay solution needs to be fast, reliable, and easy to use. And K2 Dyno™ is just that. It's the result of connecting real-world replay operators with Grass Valley's world-beating expertise in file-based servers.

more info at: www.grassvalley.com/products/k2_dyno

With full support for 2X and 3X slow-motion cameras, multicam operations, key and fill, and standalone or SAN-attached K2 Summit™ or K2 Solo™ clients, the K2 Dyno Replay System is ideally suited for SD, HD – even 3D – sports production trucks and studio facilities.

WHERE CONTENT BEGINS



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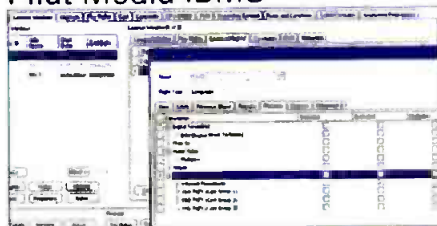
CAPTIONING CREATION SOFTWARE
Softel Swift Create



Subtitling and captioning software and workstation supports all formats of Open, Closed and DVD/Blu-ray subtitles and closed captions; operators can prepare subtitles and captions remotely, using a "browse quality" clip; software can be used with Swift ReSync TiGo to automate the process of timing subtitles to video as they are initially typed or spoken.

www.softelgroup.com
Booth: N1525

MANAGEMENT SYSTEM
Pilat Media IBMS



Integrated Broadcast Management System offers flexible and scalable information backbone capable of adapting to changing requirements; new automated metadata workflow enables automatic import of metadata for large volumes of content; can check for and retrieve missing metadata; drives transcoders to prepare media for distribution; creates and places offers in service navigation menu based on metadata values such as genre, resolution and cost.

www.pilatmedia.com
Booth: N4429

TV TRANSMITTER
Thomson Broadcast FUTHURA Plus

Designed to offer a 50-percent improvement in efficiency over current standard transmitters; uses drain modulation technology for an advance toward meeting lower energy consumption targets in the broadcast industry; the company's fully automatic real-time Digital Adaptive Pre-correction technology corrects linear and non-linear distortions, while low-operating junction transistor temperatures contribute to extended durability.



www.thomson-broadcast.com
Booth: SU3012

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Also available are several HD/SD Pattern Generators and Sync Generators.

ESE, 142 Sierra Street, El Segundo, CA 90245 USA, Tel: (310) 322-2136



www.eseweb.com

ROBOTIC CAMERA SYSTEMS

Ross Video Furio



Available in two versions: FurioRobo and Furio RC (Remote Control); FurioRobo is designed for live television production studio use in which typically a single operator controls multiple cameras with pre-set shot and motion path recalls; consists of a pan-tilt-zoom head, rail-based dolly system with elevator and sophisticated IP-based control system; Furio RC is designed for applications in which an operator controls the camera system remotely using a joystick or local fluid head and foot pedals to move the camera along the rail up and down; ideal for live stage productions; translates the camera operator's every move to the remote camera.

www.rossvideo.com

Booth: N3807

SINGLE/MULTICHANNEL AUTOMATION SYSTEM

Rushworks A-LIST



Provides intuitive, single- or multichannel SD/HD output for broadcast, PEG channels and Internet TV; features include DTMF and GPIO triggers, drag and drop scheduling, Auto-Loop, Auto-Fill, Auto-Bug, File Segmenting, multiformat playback, real-time upconvert from SD to HD, router control, dedicated EAS crawl, traffic import and the ability to record live events; supports streaming directly from the system.

www.rushworks.tv

Booth: C9915

AUDIO MIXING CONSOLE

Solid State Logic C10 HD



Provides a self-contained console with no additional processing racks and passive cooling for smaller spaces; broadcast production automation option provides support for Ross and Sony production automation systems; a 5.1 upmix option generates multichannel surround output from stereo sources; dialog automix option ensures reliable multitrack talk show audio level management.

www.solidstatellogic.com

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ARCHIVING SYSTEM
FOR-A LTR-120HS

LTO-5 tape drive (1.5TB) supports AVC-Intra 100, AVC-Intra 50, DVCPRO HD, DVCPRO 50 and DVCPRO files; designed to enable archive at ingest systems; records video footage as an MXF file in real time by simply pressing record and play on the front panel controls; doubles as a material/program exchange media server; features HD/SD-SDI I/O, GigE interface for file-based I/O, and RS-422 for external VTR control; 3RU half-rack chassis; built-in LCD screen for convenient monitoring.

www.for-a.com

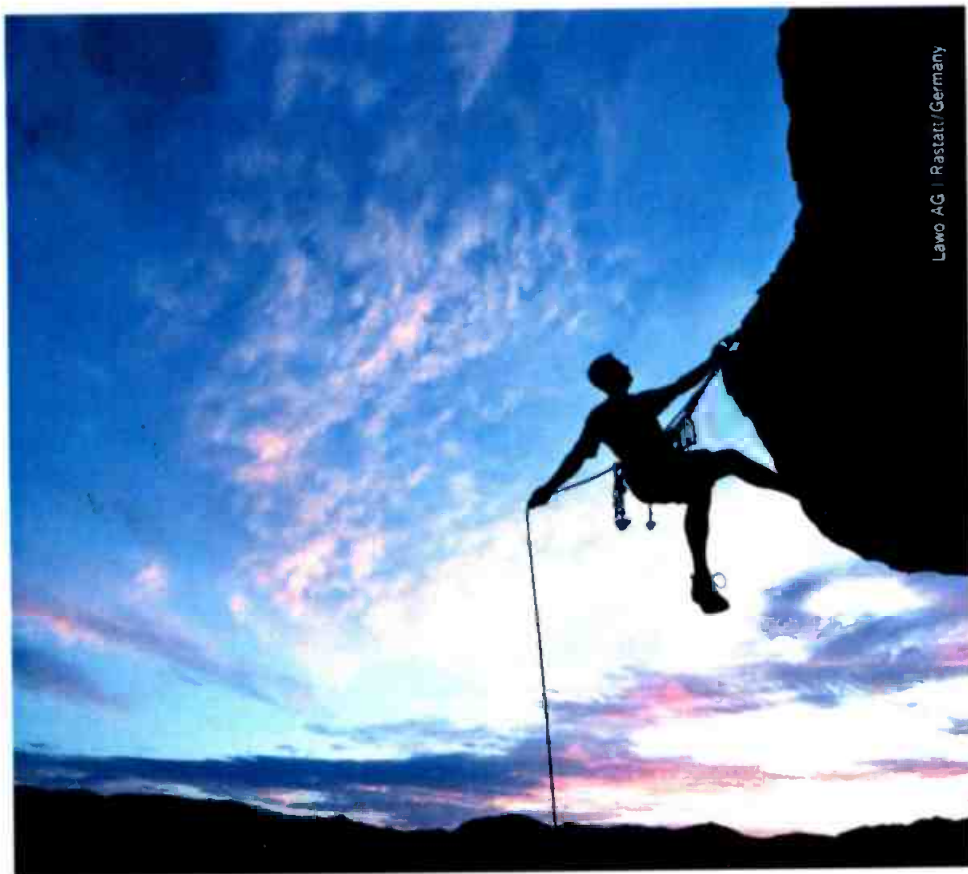
Booth: C5219

GRAPHICS PLATFORM
Avid Motion Graphics

Leverages the latest advancements in real-time 2D/3D graphics creation; designed to enable users to create stunning content that cuts through the visual clutter, quickly integrate graphics into their stories, get to air faster and easier, streamline workflows, and build brand recognition.

www.avid.com

Booth: SU902



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The Lawo mc² series with integrated digital routing. Successfully tackling big challenges requires tools that are easy to use, reliable, and guarantee maximum performance. We suggest the Lawo mc² series with digital routing technology. With digital routing integrated directly into the console, not only have we established a paradigm shift in audio technology, we've also created a quantum leap forward in work efficiency. Additional benefits of the Lawo mc² series include more than 800 DSP channels, intuitive layering capabilities, and our vast experience in designing the most advanced digital consoles on the market — resulting in the perfect mix of innovation and functionality only Lawo can offer. To learn more, visit us at www.lawo.ca



Networking Audio Systems



Visit Lawo at NAB 2012 in Las Vegas
April 16 – 19, Hall C2, Booth C2046

CLOUD STORAGE
Signiant Media Exchange (MX)

Private cloud solution with fast, secure file transfer designed for the business needs of media content providers from major studios and global broadcasters to regional, post-production houses; users receive unattended, real-time updates without having to check for new content or wait for downloads; uploads can be done without an agent, reducing the steps required to send or obtain content for increased operational efficiency and scale.

www.signiant.com

Booth: SL4228

AUDIO ROUTER
PESA Expanded Data Exchange Engine

Provides essential signal processing to distribute AES3, AES3id, time code, analog audio and MADI in one frame without external converters; converts any input type to a packet stream and can be switched as stereo pairs or as two independent mono analog channels; each unit supports up to 24 ports in 1RU and can interconnect I/O frames to build a system up to 1536 x 1536 mono; five units can be connected together to 7680 x 7680 mono.

www.pesa.com

Booth: SL9615

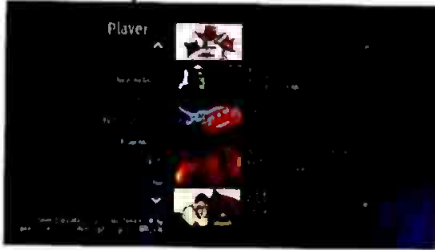
WIRELESS INTERCOM
Clear-Com HME DX210

Wired intercom interface now compatible with Clear-Com's or RTS' 2-wire systems; provides two separate 2-wire and 4-wire interconnections; 1RU base station supports up to 16 full-duplex and 44 half-duplex beltpacks and/or wireless headsets by linking four base stations.

www.clearcom.com

Booth: C8008

MHEG APPLICATION
S&T Player



MHEG application for VOD services including catch-up TV, with flexible back-office integration using the new Mediator product; offers a configurable and customizable application for browsing and navigation of content as well as playback control for hybrid broadcast broadband platforms.

www.s-and-t.com
Booth: SU8502

ROUTER
Thinklogical MX48



3RU, protocol-agnostic, modular, non-blocking router of video and peripheral signals over multi-mode or single-mode fiber-optic cable; suited for environments such as small broadcast facilities and small post-production houses; has 48 duplex fiber ports in and out; redundant, hot swappable, current-sharing power supply modules; features 6.22Gb/s of bandwidth; offers 16 x 16, 32 x 32 or 48x 48 non-blocking matrix; has coaxial SFP modules for SDI/HD and SDI/3G video.

www.thinklogical.com
Booth: SL10424

CAMERA INTERFACE
Studio Technologies Live-Link Jr.

Provides everything needed for a single-camera live event; provides data link between a camera operator in the field and a production vehicle or fixed installation; interface supports SD-, HD- and 3G-SDI data signals, as well as IFB and intercom audio; transports audio as embedded SDI data.

www.studio-tech.com
Booth: C3747

TECHNICAL FURNITURE
TBC Consoles TracWall

Displays from 15in to 65in can be bolted directly to the grid with fixed, tilt/swivel and articulating mounts; cables are channeled directly into base cabinets, which also provide storage space for additional rack equipment and power supplies.

www.tbconsoles.com
Booth: C6516

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FIBER TRANSPORT

The Switch network upgrade



Phase one of expansion brings 21 new cities onto upgraded network for a total of 27 locations, with plans to connect 23 additional cities across the United States and Canada in the coming year; long-haul transmission system is capable of transmitting in any format, including uncompressed 3G, uncompressed HD-SDI, compressed HD (JPEG 2000) and 270Mb/s SDI.

www.theswitch.tv
Booth: SU9905

TRANSMITTER

**Rohde & Schwarz
R&S THU9**

Liquid-cooled transmitters delivers output power of up to 36kW for ATSC and ATSC Mobile DTV; attains efficiency values of up to 30 percent for ATSC, including the cooling system; features built-in pump unit and bandpass filter; 7in display unit has a touchscreen and LEDs that indicate the system status.

www.rohde-schwarz.com
Booth: SU3407

BPM CLIENT

Tedial Ficus Web client

Enables implementation, monitoring and execution of production workflows in a full Web-based environment; delivers features such as proxy editing followed by the automatic creation of a high-resolution version.

www.tedial.com
Booth: N6506

MONITOR

TV Logic LVM-212W

Features 21.5in standard screen with native full-HD resolution and 3G-SDI; also features 16.7M colors (True 8-bit) with automatic color calibration; can be controlled remotely via Ethernet or wirelessly.

www.tvlogicusa.com
Booth: SL5005

ENCODING SOFTWARE

Telestream Episode 6.2

V6.2 adds improved and expanded API with a new XML-RPC interface for Episode Engine, as well as a faster, more robust command line interface; adds new formats such as AVC-Intra, ProRes 4:4:4 and expanded MPEG-2 VOD support; features 24-channel audio support; now supports Mac OS X Lion.

www.telestream.net
Booth: SL1405

1.888.console  tbconsoles.com

SMARTTRAC

Now TBC's successful modular edit console becomes the building block for complete Master Control and Production Control Console systems. The **MADE IN USA** quality, aesthetics and functionality of TBC Consoles for up to

50% of the cost of conventional control room consoles.



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Master Control



Production Control

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Booth # C65126

technical furniture systems for video production and broadcast

CONNECTION POINT IDENTIFICATION TECHNOLOGY

TE Connectivity Quareo Technology

Designed for the physical layer or layer 1 of the OSI model; based on unique identifiers for every connection point in the network, where a connection point can be defined as one end of an Ethernet cable or a port on a network device; is a Connection Point Identification technology, which provides unprecedented knowledge about the network, including accurate documentation and report changes, as well as enhanced security; enables higher network availability while lowering the network operating costs.

www.te.com

Booth: C11128

NEWSROOM SYSTEM

OCTOPUS Newsroom OCTOPUS6

Runs natively on Mac OS X, Linux and Windows; installation-free client and centralized updates; features seamless load-balancing and automatic fail-over; includes editorial tools such as spell check, word blacklist, rundown buddy, rundown stopwatch and rundown time markers; includes plug-in for Final Cut Pro integration.

www.octopus-news.com

Booth: N3418

INSTANT REPLAY SYSTEM

NewTek 3Play 425

Four-input, two-output slow-motion system supports the simultaneous display, recording and instant replay of all channels; designed to give users an affordable option to deliver instant replay and slow motion for broadcast, webcast, arena scoreboard displays and more, without sacrificing quality; existing customers of the NewTek TriCaster can incorporate 3Play 425 into their programming over Ethernet, freeing up the live video inputs for cameras.

www.newtek.com

Booth: SL5111

DIGITAL AUDIO ROUTER

Salzbrenner Stagetec Mediagroup NEXUS

Functions as an audio network, a router and an I/O matrix; offers audio format conversion, A/D and D/A converter systems, audio processing, data forwarding, routing interfaces, multichannel metering, power amplifier control and intercom; optical interconnections carry all audio and control data in a digital format; graphical control software application allows any input to be routed to the desired outputs.

www.stagetec.com

Booth: C3332

LIGHT

Litepanels Sola 4

DMX-controllable LED Fresnel fixture features a 4in Fresnel lens; uses a small fraction of the power consumed by conventional fixtures; employs Litepanels' proprietary LEDs to produce a soft light quality in 5600°K daylight color balance; based on the same Fresnel technology as the company's Sola 6, but in a smaller, more lightweight form factor; focuses from 70 degrees to 10 degrees; can be dimmed from 100 percent to zero with no noticeable shift in color temperature.

www.litepanels.com

Booth: C6025

LENS

Thales Angenieux Optimo 45-120

PL-mount 45mm to 120mm T2.8 zoom lens has been designed for 35mm film cameras and new generations of digital cameras; available in meters or feet, its focus ring has a 320° focus rotation with more than 50 precise focus witness marks and minimal breathing; small and light enough for handheld cameras, steadicam or crane; long enough for close-ups.

www.angenieux.com

Booth: C6019

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DIGITAL WIRELESS AUDIO SYSTEM
Shure ULX-D



Features 24-bit, 48kHz digital audio; wide frequency range with flat response for low range and transient response; greater than 120dB dynamic; encryption-enabled (AES-256) for any application for which secure transmission is needed; up to 64MHz overall tuning range (region dependent); up to 14 active transmitters in one 6MHz TV channel (17 on an 8MHz TV channel); more than 60 compatible channels on one frequency band; up to 328ft working range dependant on signal absorption, reflection and interference.

www.shure.com
Booth: C1610

HYBRID ROUTER
Snell Sirius 830

15RU router features high-performance modules for flexible routing of SD, HD, ASI and 3Gb/s signals; advanced hybrid processing (AHP) technology is built-in; new embedded audio and AES/MADI processing modules with AHP provide embedded audio routing, audio track swapping and processing on all inputs and outputs; this allows users to route any combination of embedded, discrete and MADI sources and destinations; without compromising inputs or outputs, AHP allows additional processing to be added by simple firmware updates in the future.

www.snellgroup.com
Booth: N1820

ANTENNA CONTROLLER
Viking Satcom RC1500A

Features include automatic positioning capability for use with polar-mount antennas; also features optional control for 24V feeds such as the FEED-4CKUMOTO and a high-resolution pulse sensor interface; tracking option is available.

www.vikingsatcom.com
Booth: OE3013

SHARED STORAGE
Sonnet Technologies
Fusion RX1600Fibre

Four-port, 8GB Fiber Channel (FC) interface supports up to four users without needing an FC switch; integrates into larger SANs; supports Final Cut Pro environments; provides for AVID volume locking; delivers aggregate bandwidth up to 1000MB/s; tunable rebuild priority enables ability to work on projects with full-read performance during a RAID group rebuild; does not degrade like general-purpose shared storage systems; can have 16TB, 32TB or 48TB capacity.

www.sonnettech.com
Booth: SL8713

MULTICHANNEL HD ENCODER
Thomson Video Networks
ViBE EM4000



Incorporates MUSTANG 2.0 — a more powerful evolution of the company's compression engine — within a multichannel frame; designed to deliver significant operational cost savings through better use of satellite or terrestrial bandwidth; with its integrated architecture and multichannel HD capabilities, the encoder delivers valuable energy savings and reduces the complexity of headend infrastructure.

www.thomson-networks.com
Booth: SU3012

DIGITAL FILTER SUITE
Tiffen Dfx 3.0.5

Adds compatibility with Avid 64-bit systems, including Media Composer, Symphony v6.0 and NewsCutter v10.0; offers enhanced filter control; adds support for 16 Sony camera models; adds Dfx Paint Mask tool with new blur controls providing more control over blending and transitioning in effects and filters; adjustable brush slider covers large areas; brush coverage can scale up to 50 percent of the screen.

www.tiffen.com
Booth: C8818

COFDM HD TRANSMITTER
Broadcast Microwave
Services NT5723SDHD



Features include low power consumption, one-frame latency (end to end) and a frequency range of 5.725GHz to 5.850GHz; 1920 x 1080i (HD); Part 15 license free (U.S.); measures 3.35in x 1.19in by 5.6in (without brackets); weighs 1lb (0.45kg).

www.bms-inc.com
Booth: C9545

DISTRIBUTION AMPLIFIER
ESE ES-210

Quad 1 x 6 1MHz/5MHz/10MHz distribution amplifier provides four independent 1 x 6 frequency DAs in a single rack-mount enclosure; each DA has loop-through inputs and six isolated outputs, which are all accessible via BNC connectors; uses screwdriver-adjustable gain controls that are located on the front panel; the gain controls provide an overall signal level adjustment of -1.5db to +3.4db.

www.esweb.com
Booth: C6437

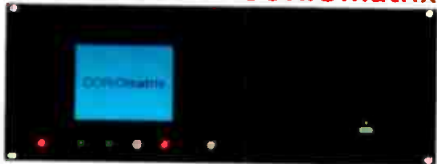
INTEGRATED CHANNEL
PLAYOUT DEVICE
Harmonic ChannelPort

Speeds the cost-effective deployment of new television channels by integrating flexible branding and master control switching with clip playback; fully compatible with all Harmonic Spectrum media server components; fits seamlessly into existing infrastructures to simplify the launch of new services; rich multilayer graphics and dynamic text can be easily keyed over programming, while support for a broad range of automation systems offers users the freedom to choose what's best for their workflows.

www.harmonicinc.com
Booth: SU1802

ROUTING SWITCHER

TV One C3-340 CORIOmatrix



Features 16 AV universal module slots; automatically recognizes the modules inserted as an input or output module; this flexibility allows end-user configurations to be based on their own needs instead of the router forcing a certain setup and limited configuration; offers up/down/cross-conversion on the outputs; offers DVI-U input/output modules that accept HDMI, DVI-I, YUV, YPbPr, RGBHV, RBBS, RGsB, Y/C and composite video; 3G/HD/SDI-SDI and HD/SDI-SDI hot swappable modules are also available.

www.tvone.com

Booth: C5647

LIGHT BANK

Videssence ExceLED 225



225W unit has adjustable beam spread; provides long throw and high light levels required for film and video in large production studios and similar applications; "Nine Light" in spot mode with daylight LEDs provides more than 200 footcandles at 50ft; has a 30,000-hour life achieved through precision heat sink design; all units are provided with power cord and choice of c-clamp or stand adapter; may be ordered in dim and non-dim configurations.

www.videssence.tv

Booth: C6537

EQUIPMENT RACKS

Stantron Broadcast E-Racks

Available in 25in, 30in, 34in, 36in, 40in, and 42in depths; choice of 40U, 45U or 52U heights; welded racks; powder coat finish in one of four colors; features horizontal lacing bars ever 7in.

www.stantronracks.com

Booth: SU4312

SYSTEMS INTEGRATION

TSL

Provides comprehensive, cost-effective systems integration; addresses and resolves the challenges that today's growing file-based/IP-centric projects command; has expertise in both traditional integration and international class know-how in shared storage (including cloud), high-performance networks, 3G fiber architecture and media asset management.

www.tsl.co.uk

Booth: N1119

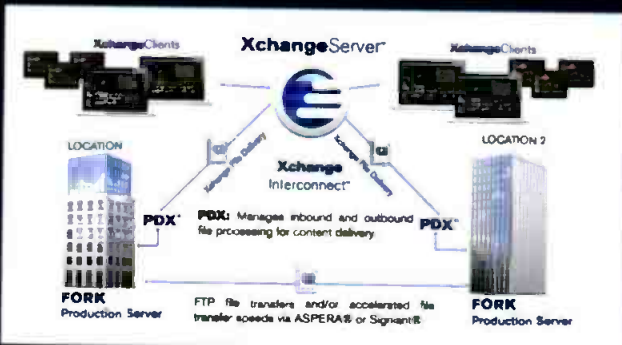
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NEW AT NAB 2012

primestream

FORK XCHANGE Suite™

A professional Web application that empowers broadcasters with an easier and faster way to work together in a collaborative environment. The platform fully integrates with FORK™ Production Server and provides instant access to media when and where it's needed—on any PC or iOS device. Features include the ability to browse, add metadata and markers, trigger FORK action scripts, and transfer media from and to multiple remote production servers.



FEATURES

- Connect from anywhere to work with and manage content that resides in a remote FORK MAM™.
- Organize and filter clips dynamically with Xchange Suite Smart Bins.
- Edit clip metadata in Xchange Suite that instantly syncs back to the FORK MAM.
- Frame-accurate marker creation.
- Use Xchange Suite to remotely trigger workflow automations in FORK.
- The advanced frame-accurate HTML5 media player allows producers to review and approve clips for air.
- Transfer content between multiple FORK MAM locations.

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TRANSMITTER
VidOvation Meridian



Designed for high-quality, zero delay, wireless, RF camera links; offers short-range transmissions as an affordable alternative to traditional COFDM systems; uses license-exempt channels while offering secure encrypted transmissions for applications ranging from large-screen presentations and award ceremonies to live broadcast events.

www.vidovation.com
Booth: SU11012

ONLINE MEDIA PLATFORM
Vimond VCC



Vimond Control Center (VCC) is capable of deploying television services across multiple screens; streamlines OTT production workflow by breaking the various production elements down into manageable workflows, which can be customized depending on the need; uses tagging functionality to simplify the process of and increase speed of content management; integrates with the major encoder and transcoder solutions, enabling automation of live and on-demand video ingestion.

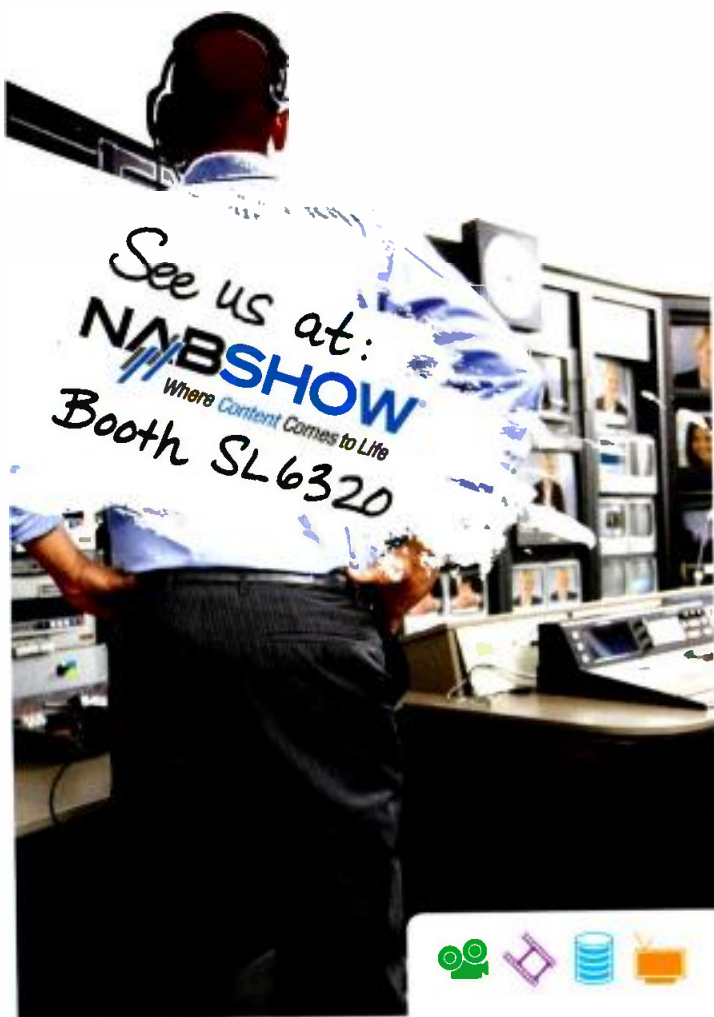
www.vimond.com
Booth: SL10711

LOUDNESS MONITORING MODULE
Volicon Observer



Equipped to measure AC3 dialnorm levels; compliant with ITU BS.1770-1 and BS.1770-2, ATSC A/85 RP 2011, CALM Act, EBU R128 and ARIB-TR-B32; new to the loudness module are graphing, exporting measurements, and integration and reports with as-run logs; intuitive overlay controls within the Observer system's Web-based interface allow users to maintain continuous measurements that identify program loudness and loudness range.

www.volicon.com
Booth: SU5715



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From capture through distribution, ATTO powers high-performance audio & video workflows. Leading industry solutions rely on ATTO's product portfolio to provide reliable, high-performance storage & network connectivity that is trusted by top audio & video professionals. With qualified and certified solutions from ATTO, you can now have the same technology that drives their success.

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www.attotech.com



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DVB SIGNAL MONITOR
T-VIPSTNS547

Two demodulators provide DVB-T/T2 RF monitoring and analysis either through an intuitive Web-based user interface or integration with a network management system; provides an extensive range of RF measurements, T2-MI analysis capabilities (DVB A14-1), IP/Ethernet statistics and EPG/EIT verification, as well as monitoring of six transport streams over ASI or IP; also features easy-to-use user configuration and control.

www.t-vips.com
Booth: SU7907

DIGITAL AUDIO CONSOLE
Studer Vista 9

Features the company's Vistonics TF touch-screen interface that shows 10 channel strips, with rotary encoders and switches mounted directly onto the screen; during a live production, a FaderGlow feature lights up select faders on the console, in one of eight assignable colors, to give operators a quick and easy way to find desired channel groups; channel meters are able to show mono, right through to 7.1-channel signals, in the upper section of the screen, while the lower portion can show bus assignment or, for surround channels, an image of the surround composite.

www.studer.ch
Booth: C2619

PRODUCTION MONITOR
ViewZ VZ-240PM-3G

Features 24in IPS LCD screen with 1920 x 1200 resolution; brightness of 400cd/m2; 1000:1 contrast ratio; 3G-SDI input; HDMI in; component in on BNC connectors; RJ-45 remote control; HDMI-to-SDI active loop through; two built-in 2W speakers.

www.viewzusa.com
Booth: C3940

TRANSCODER
VITEC Optibase
MGW Transcoder



Hardware-based system intercepts live streams from the network and transcodes them to a variety of resolutions, data rates and MPEG formats; allows operators to optimize IPTV content and full-motion video with metadata to meet specific transport requirements or fine-tune data rates and video resolutions for user playback devices.

www.vitecmm.com
Booth: SL5915

FORMAT CONVERTER
Doremi Labs Dimension-3D

Allows the conversion of any standard 3-D format to another, including changing of the frame rate; standard video formats are supported from high definition to 2K; accepts both dual- and single-stream, as well as HDMI inputs and outputs; enables double-stack 3-D projection; by encoding the left- and right-eye streams into a single HD-SDI stream and back again, the unit becomes ideal for recording 3-D content on standard HD tape and server technologies.

www.doremilabs.com
Booth: C9533

SLOW-MOTION CAMERA
Hitachi Kokusai SK-HD1500

Features three 2.3-megapixel 2/3in, progressively scanned IT-CCDs; records at speeds of 150fps and 180fps; its outputs are digital HD/SD video at 1080i, 720p and 480i, all at 59.94Hz or 50Hz field rate; uses 16-bit RGB converters to improve dynamic range, signal-to-noise and color fidelity; capable of 6Gb/s transmission over SMPTE standard optical fiber; compatible with most slow-motion servers capable of 3X SMPTE292M 1.5Gb/s HD-SDI links.

www.hitachikokusai.us
Booth: C4309

Simplicity.

With the new **GuideBuilder Mobile**, managing your DTV metadata is almost as simple as using a program guide.

GuideBuilder makes it easy to configure listing services, change program schedules, and ensure metadata reliability. GuideBuilder lets you centrally manage DTV metadata for terrestrial (PSIP) and mobile broadcasting (ESG) and NRT applications. With its unified workflow, now you can add mobile ATSC services for your customers and keep your peace of mind.

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STORM TRACKING SYSTEM
Weather Central ESP:LIVE



Gives broadcasters hyper-local mapping, advanced storm tracking algorithms, interactive data display capability and a suite of tools to give viewers what they need, when they need it; features include looping X-Vision data, X-Vision 3D velocity, velocity scope for live radar, looping level 2 data and dual pol radar support.

www.wxc.com
Booth: SL3911

MULTIEWER

Apantac TAHOMA LI-16HD

Capable of looping inputs for further distribution or duplication; single frame processing delay; 16 auto-detect HD/SD-SDI with active input loop (no composite); upgrade from SD to HD, HD to 3G via software; 16 channels of embedded audio per SDI input; four channels of discrete audio per input (optional); supports DVI, HDMI, VGA (optional) and SDI (optional) outputs; supports full 10-bit HDMI 1.3 outputs; output resolution up to 2048 x 1080 (including 1080p); built-in Cat X extenders extend 1080p (DVI/HDMI) up to 115ft with optional active receivers.

www.apantac.com
Booth: N4806

CONFERENCING SYSTEM

Clear-Com Concert for Newsrooms

Allows users of newsroom applications to communicate with each other and simultaneously initiate a call and/or chat; allows for conferencing while participants are working in stories; can interface with external audio systems, including partyline systems, paging systems and program feeds; program feeds can be interrupted by important communications from the news director or producer; compatible with Windows 7 and XP.

www.clearcom.com
Booth: C8008

AUDIO CONSOLE
Wheatstone Dimension One



Uses the company's Gibraltar DSP engine; control surface features motorized faders and is layered so that each fader controls two sources, each of which can be mono, stereo or full 5.1; faders can be "paged" together or separately; each fader also has a "spill" function, which allows its individual channels to spill out onto separate faders (two for stereo or six for 5.1 sources); LED displays always indicate a fader's current source to eliminate operator confusion; features automatic mic mixing to optimize the levels of several microphones during dialogue, and Audio-Follow-Video (AFV), which allows the console to automatically control input channels based on the video source currently being taken.

www.wheatstone-tv.com
Booth: C2615

AUDIO CODEC

Dolby Laboratories Digital Plus

Enables delivery of high-quality audio across any device and any distribution workflow, including broadcast, OTT, online and on-demand; platform includes scalable and bandwidth efficient multi-channel coding designed for bandwidth-constrained delivery networks, in addition to pre- and post-processing technologies such as loudness control and device playback sound optimization.

www.dolby.com
Booth: SU1212

WIRELESS INTERCOM

Eartec Simultalk 24G

Full duplex wireless transceiver designed for hands-free short-range communication; operates in 2.4GHz unlicensed spectrum; field-programmable frequency selection via DIP switch; range of up to 450ft; weighs 4.5oz.

www.eartec.com
Booth: C8230

SYSTEM ACCESSORIES

Wowza Media Server 3 AddOns

With three AddOns, Media Server 3 becomes full streaming media infrastructure; Wowza Transcoder AddOn transforms live stream from encoders, IP cameras, IPTV headends and other sources to H.264; Wowza nDVR AddOn stores content in normalized format as single live stream cache that can be delivered on PCs, tablets, smartphones and TVs; WowzaDRM AddOn integrates with digital rights management platforms to deliver on-the-fly encryption for live and VOD content to any screen.

www.wowza.com
Booth: SU9702

MULTIEWER

Wohler Technologies RMV16

Gives control rooms and other mission-critical areas the power and flexibility to drive up to 16 separate monitoring windows to a common flat-panel display; mix-and-match design allows broadcasters to select the number of inputs and outputs they require and to display these sources combined with waveform, vector-scope, de-embedding and metering of up to eight audio channels, UMD, timecode and insertion/display of both clock and still images; accepts inputs including analog composite video, component, SD-SDI, HD-SDI and 3G, and can provide outputs in VGA, DVI and HDMI formats.

www.wohler.com
Booth: N5211

NEW STANDARDS UPDATE

XenData archive systems

New standards support includes ability to write files to and restore from LTO tapes in LTFS, as well as tar formats in a single system; spans folder structures across multiple LTO tapes; has ability to defragment LTO tapes, freeing space from overwritten and deleted files; management of disk, as well as LTO, allows frequently-accessed files to be cached.

www.xendata.com
Booth: SL12513

SOFTWARE UPDATE

AJA Video drivers for Final Cut Pro X 10.0.3

Enables use of Io XT and the latest AJA KONA cards, including KONA 3G, with Final Cut Pro X; 10.2 X Beta drivers enable beta broadcast monitoring feature available in Final Cut Pro X 10.0.3.

www.aja.com

Booth: SL3305

CONTROL PANELS

Utah Scientific UCP-LP

Family of menu-based router control panels feature high-resolution, full-color LCD displays and buttons to provide user-friendly operation for increasingly complex routing systems; panels offer 16 or 32 buttons in a compact 1RU package, as well as an innovative 3RU panel with dual-touch-screen LCD displays; all of the new panels are based on a completely new, user-definable menu system that provides a completely open platform for defining all panel functions on a panel-by-panel basis.

www.utahscientific.com

Booth: N4511

LOUDNESS METERING

RTW TM9

Equipped with a high-grade 7in or 9in touch screen and easy-to-use GUI; features a highly flexible screen layout with scalable instruments, as well as ATSC A/85 loudness and true peak measurement; 16-channel audio interface options are analog, AES3 and AES3id; 3G/HD-SDI interface option is available; offers Ethernet/LAN, USB, VGA and GPIO ports.

www.rtw.de

Booth: C1844

SCAN CONVERTER

Ensemble Designs BrightEye Mitto 3G Fiber

Scan converter has DVI, VGA or HDMI inputs; provides SD, HD or 3Gb/s SDI video outputs, as well as an optical SDI output; complete control of audio levels, channel mixing and audio delay is provided for the analog, AES and embedded audio inputs; can also be used with Apple's iPad and iPhone, enabling video from these devices to be converted to SDI.

www.ensembledesigns.com

Booth: N2524

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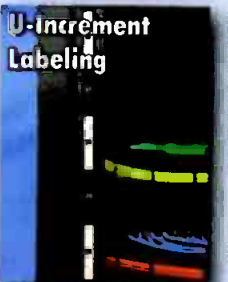
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by visiting

StantronStrong.com/base



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MULTICHANNEL-IN-A-BOX
PlayBox Multi-Channel AirBox

Provides multiple video playout channels on one server; offers a wide choice of features, including Live-in, audio re-mapping, Dolby Digital support and loudness normalization as a part of QCBox; newly supported video file formats include AVC Intra and Apple Pro res.

www.playbox.tv

Booth: N5834

MULTIVIEWER
Avitech International Sequoia 2H2U

Features two HDMI and two autosensing inputs for 3G/HD-SDI/SD-SDI; includes integrated mouse/keyboard control; can be communication cascaded with other Sequoia Solo units; supports up to 1920 x 1200 resolution; 25W maximum power consumption.

www.avitechvideo.com

Booth: SL8915

MULTICHANNEL VIDEO SERVER
DVS VENICE

Enables fast, efficient processing of various compressed, uncompressed formats; designed for content ingest, playout and transcoding; includes built-in secure RAID storage; the system's openness grants users seamless production processes and allows for workflow efficiency.

www.dvs.de

Booth: SL6815

FIBER TO TRIAX CONVERTER
Grass Valley LDK 4427

Allows users producing programs in resolutions up to 1080p50/60 to send their signals across any type of cable infrastructure; performs a 1-to-1 conversion of a 3G fiber camera signal to a 3G triax signal; ancillary data are also converted on a 1-to-1 basis, with full access to all transmission diagnostics at any time; compatible with the LDK 8000 Elite and LDK 4000 Elite HD camera heads.

www.grassvalley.com

Booth: SL106

ATSC ENCODER/MUX COMBOS
Linear Industries LEX2000

Generates an ASI or SMPTE-310 output from multiple audio, video and metadata sources; MPEG-2 encoder uses intelligent scene analysis, adaptive decision logic and nonlinear quantization to achieve excellent quality video, even with multiple video programs and bandwidth constraints; its statistical multiplexer applies multilayer control algorithms to optimize encoding rates of multiple MPEG-2 streams.

www.linear-tv.com

Booth: SU7219

MAM APPLICATIONS
TMD Mediaflex V4

Suite of applications delivers an integrated system incorporating comprehensive business and operational workflow management; manages the lifecycle of media content from concept to archiving; enables users to easily search for, retrieve, browse and catalog media content in multiple formats.

www.tmd.tv

Booth: N3716

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LOUDNESS METER SOFTWARE
Cobalt Digital Loudness
Metering System

Easy to use option ensures thorough audio level and LKFS assessment; integrates with the company's Fusion3G range and most COMPASS cards; works with the OGCP-9000 remote control panel and WINOGCP desktop virtual control panel to provide a flexible, complete system for ingest or on-air loudness measurement, assessment and records; cards forward audio measurement data to the control panel over the plant's Ethernet network.

www.CobaltDigital.com
Booth: N1929

NIELSEN WATERMARKS ENCODER
Ross Video NWE-3G

Modular, future-proofed system with a 16 audio channel, 3Gb/s process core and passive bypass protection on all audio and video I/O; a single openGear frame now can be configured with a complete air path solution for Nielsen encoding, loudness processing for CALM compliance and Dolby encode/decode, with room left over for other complementary solutions such as SCTE trigger detection or fiber transport.

www.rossvideo.com
Booth: N3807

SOFTWARE UPDATE
Blackmagic Design
Videohub v4.9

Routes SD, HD and 3Gb/s SDI video; ranges in size from 16 x 16 SDI up to the 288 x 288 Universal Videohub, which can mix SDI and optical fiber interfaces in a modular rack-based design; update adds new Smart Control configuration software, which lets users define up to 10 macros each with their own source and destination routing commands that can then be activated by one button; adds support for allowing destinations to be locked from a Smart Control panel as well as Videohub software.

www.blackmagic-design.com
Booth: SL220

QUAD SPLIT VIDEO MONITOR
Wohler Technologies
RMQ-230

Allows users to watch video and monitoring data in up to four display windows on a single 23in 1920 x 1080 LED backlight screen; accepts 3G/HD/SD-SDI, analog composite and HDMI inputs in varying configurations tailored for different monitoring applications and price points; allows broadcasters to mix and match video input formats on a single screen; can display waveform and vectorscope while also providing audio de-embedding, audio metering of up to eight channels, UMD, timecode and various markers; users can also configure the system as a single full screen or with one large screen and three smaller windows.

www.wohler.com
Booth: N5211

ROUTING PLATFORM
Snell Vega



Allows users to configure any signal port independently for fiber or coax (copper), easing a mixed connectivity environment and helping broadcasters to migrate simply and cost-effectively; unique design enables any port to be configured as either an input or output, providing a flexible asymmetric routing system available in 2RU with 96 ports or 4RU with 192 ports; uses proprietary algorithms to monitor every sub-assembly continuously; offers a full range of options for maximum redundancy, including dual crosspoints, dual controllers, dual power supplies and dual fans.

www.snellgroup.com
Booth: N1820

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CAPTIONING/SUBTITLING FOR OPENGear

Wohler Technologies HDCC series

Two new versions are available; the first is a full-featured model that provides all the capabilities of the current HDCC series dual-channel captioning/subtitling card within the openGear form factor; the card features a range of capabilities, including independent dual-channel operation for encoding, decoding and monitoring of captions with versions to support every major global standard, as well as encoding and decoding of multiple GPI cues and 3G support; the second version is a cost-effective single-channel encoding solution designed to complement the new Ross Nielsen watermarks encoder (NWE-3G); provides CEA-608/708 captioning functionality.

www.wohler.com

Booth: N5211

MOBILE INTERFACE

Volicon Observer Mobile

Allows access to content anywhere, anytime through an iPad or iPhone; designed to provide greater flexibility, portability and the added convenience of accessing live Observer streaming along with back-navigation of previously recorded content from both local and remote locations; offers the ability to play, pause, search and create logged content on demand using smart devices; provides broadcasters with instant access to the final broadcast product to ensure quality and compliance.

www.volicon.com

Booth: SU5715

MODULAR SIGNAL CONVERSION LINE

Cobalt Digital Blue Box Group

Modular signal conversion line is designed to answer the demand for high-quality, price-competitive signal conversion equipment; initial product offerings include HDMI to SDI and SDI to HDMI converters, and analog to digital, digital to analog converter boxes with audio embedding and de-embedding.

www.CobaltDigital.com

Booth: N1929

ENCODER

Avitech International Seneca-E.264

High-performance, real-time MPEG-4 AVC SD and HD video encoder; supports 3G-SDI HD video, HD/SD-SDI SD video; for audio, supports two embedded SDI, two unbalanced analog or AC3 pass through; encodes dual-channel HD in MPEG-4 AVC high-profile level 4.2 or 4.0; supports CBR and VBR with rates from 2Mb/s to 30Mb/s depending on profile; 15W maximum power consumption.

www.avitechvideo.com

Booth: SL8915

Note: Booth numbers are provided by NAB and are current as of press time. Every effort has been made by Broadcast Engineering to ensure the accuracy of these listings.

"We switched to Ikegami cameras a long time ago.
Their support is by far the best in the industry."

George Orgera, President and CEO, F&F Productions



sophisticated products for demanding professionals.

As broadcast-quality HD camera and monitor technology continues to evolve in performance and price, the high-end leader remains constant. Perhaps that's why



more demanding professionals who don't want to settle for good enough buy Ikegami. Consider Ikegami's line of CMOS multi-format HD cameras like the HDK-79EC, which can operate in 720/60p,

1080/60i or 1080/24p. Or the precision made HDK-79EXIIIa that delivers superb HD imagery, and includes complete studio camera features with an uncompressed full digital connection between camera head and CCU.



For top-of-the-line LCD monitors, consider the HLM-2450, a 24-inch model that features a full 1920x1080 pixel 10-bit resolution panel, light weight, and low power consumption.



HDK-97C



HDK-79EC



HDL-50



HDK-79EXIIIa



HLM-2450WB

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See Us At NAB
Booth #C-5108

The trial of



Mobile EAS

M-EAS is nearing completion of the first phase of technology trial, but the 2012 NAB Show still gives public and commercial broadcasters a chance to see the system in use.

BY PHIL KURZ

It's a quiet day in Seattle, when, without warning, an earthquake somewhere in the Pacific Ocean generates a tsunami aimed squarely at the city's downtown.

Massive injuries and death are averted, however, thanks to the initial early warning and continuous updates that area residents receive via over-the-air TV transmission with their Mobile-Emergency Alert System (M-EAS)-enabled Mobile DTV handsets.

This Seattle tsunami is not the subject of a new disaster movie, but rather one of four emergency scenarios presented at the 2012 International CES in mid-January to demonstrate how an extension of the Emergency Alert System that takes advantage of newly emerging Mobile DTV

transmission system could help warn and direct the public to safety in times of emergency.

Backwards-compatible with the ATSC A/153 Mobile DTV standard, M-EAS is currently in the first phase of a trial involving funding from the Corporation for Public Broadcasting;

Mobile-EAS messages — such as this image from KOMO, which was part of a demonstration at the 2012 CES International convention — include rich media to better direct the public in an emergency.

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PBS; public broadcasters WGBH in Boston, Vegas PBS and Alabama Public Television; Harris; LG Electronics; and Roundbox.

Jim Kutzner, chief engineer of PBS, who spearheaded the CES demonstration and is taking a lead role in the M-EAS trial, says that the success of the new standard will rely upon the acceptance of both the public and commercial broadcasters.

"We have already started trying to be as inclusive of commercial broadcasters and others as we are of public broadcasters," Kutzner says. "This can't just be a public TV thing. It has to be suitable for all TV stations."

At the 2012 NAB Show in Las Vegas, April 16-19, Kutzner plans to expand the awareness of broadcasters about M-EAS by running similar emergency scenarios and transmitting M-EAS warnings for show attendees to see.

For the CES demo, Kutzner enlisted Fisher Broadcasting VP of technology Brian McHale and the company's flagship station KOMO-TV in Seattle for help.

"KOMO, our ABC affiliate, created a scenario about what would occur if a tsunami came ashore in downtown Seattle," McHale says.

The station built warning graphics and text-based alert information as well as put together follow-up revisions to identify the precise areas where the tsunami would come ashore. It created warnings to evacuate to higher ground and other emergency information to assist the public as it evacuated the area, he says.

"We also gave viewers a chance to see maps of the areas impacted, and provided earthquake information and warnings about specific communities most at risk," McHale adds. "We walked through the whole scenario of what would happen."

The tsunami scenario, along with other M-EAS warnings — including a tornado scenario from WGBH, an Amber Alert scenario created by Alabama Public Television and a warning about a suspicious package found at the Las Vegas Convention Center —

were broadcast by Vegas PBS (KLVX) to LG Electronics handsets equipped with Mobile DTV receivers and special software to decode the M-EAS messages.

M-EAS offers several powerful advantages, including the one-to-many architecture of the mobile broadcast; the ability to receive timely, critical warnings while on the move; and access to technologies previously unavailable to broadcasters, such as geo-targeting and delivery of non-real-time (NRT) data that can supplement warnings with other valuable information. To notify Mobile DTV viewers that an emergency situation is developing, M-EAS also provides for display of a message of up to 90 characters in length in an on-screen banner.

For the ongoing trial, Kutzner has identified five goals:

- Determining the feasibility of delivering emergency information to mobile receivers;
- Developing the core technology needed to make M-EAS a reality;
- Identifying the implementation costs to add basic M-EAS capability at TV stations;
- Ensuring the system is simple for broadcasters to deploy and the public to use; and
- Developing acceptance among emergency managers on the federal and local level.

While the M-EAS trial is ongoing and not due to wrap up until the end of May, early indications reveal the project is on track to achieve its goals, Kutzner says. For example, in Las Vegas at the 2012 International CES, the tsunami, tornado, Amber Alert and suspicious device emergency scenarios gave the public the chance to interact with M-EAS-enabled mobile DTV handsets and its GUI.

Similarly, deployment of M-EAS at the three PBS trial participants is helping Kutzner gauge the ease with which the system can be deployed at stations and even helping to raise awareness of the system among emergency managers, he says. To that end, public broadcaster WGBH in Boston demonstrated M-EAS to



In a tornado scenario, Vegas PBS (KLVX) broadcast an M-EAS warning to LG Electronics handsets equipped with Mobile DTV receivers and special software to decode the M-EAS messages.

state and local emergency management officials on March 5.

Between now and the end of May when the first phase of the M-EAS trial ends, Kutzner will be focused on discussing the overall infrastructure necessary to make M-EAS a reality, and the 2012 NAB Show in Las Vegas, April 14-19, will provide a forum for broader input.

"I want to include a lot of broadcasters in the discussion of how this gets put together," he says.

At this point, Kutzner says, he is reluctant to put a dollar amount on deployment of M-EAS at the station level because it is still so early in the process. However, he does say the cost should be "a small fraction" of the estimated \$100,000 to add Mobile DTV service.

Currently, there is no defined second phase for the trial, Kutzner says. However, if the trial goes on beyond May, some of the issues likely to be addressed will include how rich data gets assembled and inserted into M-EAS messaging, ways to ensure a base system can automatically generate emergency messages based on triggers generated by FEMA or state sources, and whether or not emergency messages are pre-generated and triggered for payout when needed. **BE**

Phil Kurz regularly reports on the broadcast industry and is the writer of Broadcast Engineering's "RF Update" e-newsletter.

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The benefits of FPGAs



The devices' inherent flexibility provides a broad toolkit to equipment designers.

BY ROBERT GREEN AND AARON BEHMAN

We are on the cusp of the next exciting age of video compression as High Efficiency Video Coding (HEVC) is expected to be standardized in early 2013. Due to the inherent flexibility of FPGA devices, equipment engineers and designers can get started now on next-generation equipment, and be assured that IP they develop should be

adaptable to any possible, late-stage standards shifts.

The expected move to HEVC (H.265) follows a steady progression of video compression: the introduction of MPEG-1 in 1992 (which laid the foundation for the ensuing revo-

lution in consumer digital video content), the release of MPEG-2 in 1994 (which offered compressed, broadcast-quality digital video) and H.264 in 2003 (which spurred worldwide HD digital video, Blu-ray, Internet streaming and mobile video).

Shown above, the Broadcast Base Board, featuring a CoreEI encoder and decoder IP cores incorporated in a Xilinx Virtex-6 single chip solution, is an example of the HEVC technology expected to be standardized next year.

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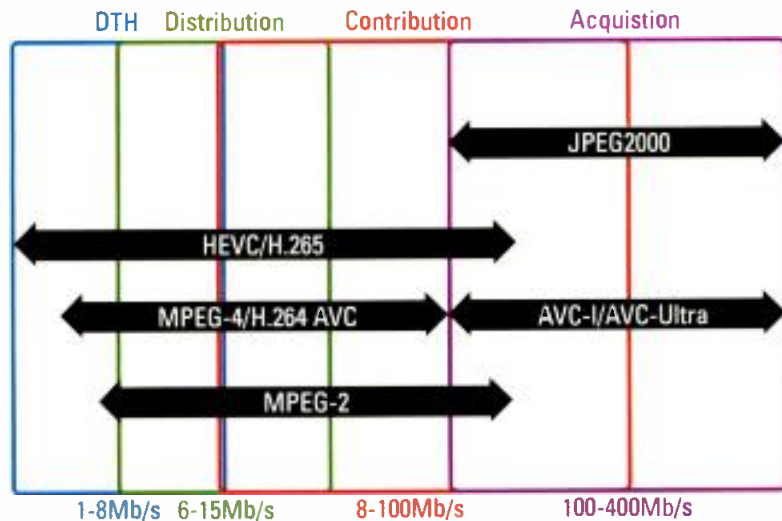


Figure 1. HEVC/H.265 supports a wide range of applications, from DTH transmission to acquisition.

Although the ISO/International Engineering Consortium Moving Picture Experts Group and the ITU have been working on a successor to MPEG-4 since 2004, the latest push toward HEVC came in 2010, when the group reviewed 27 technology proposals looking at how AVC could be advanced to the next level. During the review, it became clear that two paths were possible with the

proposed standard: the same quality as AVC at half the bit rate, or twice the quality at essentially the same bit rate for transmission. Fortunately, HEVC can cover both scenarios and support a wide range of applications, from DTH transmission — where efficient use of low bandwidth (1Mb/s to 8Mb/s) is a priority — to acquisition — where highest video quality is paramount but bandwidth (>50Mb/s)

and storage requirements, particularly, are still a concern. (See Figure 1.)

In parallel, the video-consuming public is expecting ever-higher definition in certain applications (HDTV, 4K2K and beyond), and sharing and watching increasing volumes of video-based content at various levels of quality. Supporting this trend, Cisco's Visual Networking Index predicts that the gigabyte equivalent of all movies ever made will cross global IP networks every five minutes by 2015. Cisco also estimates that Internet video will account for over 50 percent of consumer Internet traffic this year, rising from 40 percent of total traffic in 2010.

Against this backdrop, the move to a new compression standard that can handle higher definition video more efficiently, or double the throughput at current quality levels, is a much-needed evolution. HEVC is particularly well-suited for HDTV displays and content capture with progressive scanned frame rates and resolutions from 1080p up to Super Hi-Vision (16 x 1080p). And yet, video capture and display technology is also moving very rapidly,

AVC High profile	HEVC High efficiency	HEVC Low complexity
16 x 16 macroblock	Coding unit quadtree structure (64 x 64 down to 8 x 8)	
Partitions down to 4 x 4	Prediction units (64 x 64 down to 4 x 4, square intra/inter + non-square inter)	
8 x 8 and 4 x 4 transforms	Transforms unites (32 x 32, 16 x 16, 8 x 8, 4 x 4 intra/inter + non-square inter)	
Intra prediction (9 directions)	Intra prediction (17 directions for 4 x 4, 3 directions for 16 x 16, 34 directions for rest)	
Inter prediction luma 6-tap + 2-tap to 1/4 pel	Inter prediction luma 8-tap to 1/4 pel	
Inter prediction chroma bi-linear interpolation	Inter prediction chroma 4-tap to 1/8 pel	
Motion vector prediction	Advanced motion vector prediction (spatial + temporal)	
CABAC or CAVLC	CABAC (Context Adaptive Binary Arithmetic Coding)	CAVLC (Context Adaptive Variable Length Coding)
8b/sample storage and output	10b/sample storage and output	8b/sample storage and output
Deblocking filter	Deblocking filter	
-	Adaptive Loop Filter (AFL) and Sample Adaptive Offset (SAO) filter	Sample Adaptive Offset (SAO) filter

Table 1. The toolsets provided to implement HEVC encoders can be used and modified to improve bit rate, video quality or both. Information courtesy Matthew Goldman, Ericsson, from the paper "High Efficiency Video Coding (HEVC) - The Next Generation Compression Technology," presented at the SMPTE 2011 Technical Conference and Exhibition, Oct. 25-27, 2011.

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making it tricky to predict where, exactly, all standards will settle. This makes it nearly impossible for broadcast engineers and designers working to get ahead of the competition to rely on application specific standard products (ASSPs) as the backbone of their hardware solutions. For this reason, it is believed that FPGAs offer the only viable platform for the next several years for companies hoping to exploit advantages of HEVC.

Flexible devices

Broadcast engineers and designers are already starting the move to HEVC on flexible FPGAs due to several inherent features of the devices. These features include parallel processing for real-time support of video algorithms and massively parallel processing elements, which can look at multiple portions of an image concurrently. This is in stark contrast to consecutive processing of image sections currently

It is believed that FPGAs offer the only viable platform for the next several years for companies hoping to exploit advantages of HEVC.

done with software/DSP implementations, which result in a struggle to process real-time video at HD and beyond. Also, FPGAs can support the HEVC standard in software with hardware acceleration blocks for motion estimation and CABAC/CAVLC, which enables tradeoffs in device resource and performance while promoting design productivity.

Changes can also be implemented on these flexible devices both during equipment production and after deployment into the field. This allows equipment makers to get ahead of the standards and prevents early adopters from being penalized by late stage shifts in standards.

In the HEVC realm, this is especially important as the Joint Collaborative Team on Video Coding (JCT-VC) which was formed to meld elements from MPEG and the ITU-T Video Coding Experts Group (VCEG), are still evaluating modification to several current coding tools, including adaptive loop filter (ALF), extended macroblock size (EMS), larger transform size (LTS), internal bit depth increasing (IBDI) and adaptive quantization matrix selection (AQMS). New coding tools are also being considered for the new standard, including modified intra prediction, modified de-block filter and decoder-side motion vector deviation (DMVD). The toolsets provided to implement HEVC encoders can be used and modified in various ways to improve bit rate, video quality or both.

Several new features to support HEVC are also being considered. Although not fully baked at this point, they

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include a 2-D non-separable adaptive interpolation filter (AIF), separable AIF, directional AIF, a "supermacroblock" structure offering up to 64 x 64 with additional transforms, adaptive prediction error coding in spatial and

that encoding can be done in any manner using the toolsets in novel ways. From the board-level perspective, it is really only possible to implement this in FPGAs for real-time unless you can afford an 18-month

is not changed from MPEG-4, FPGAs can help them meet the HEVC standard when used as co-processors to ASSPs to add more performance while differentiating the algorithms and tools being used as well as integrating the video/audio interfaces. At the same time, FPGAs allow for further pre- and post-processing to remove noise, de-interlace input video and de-embedding of audio from SDI to perform Dolby compression.

Depending on the application, the ability to trade off computational complexity, compression rate, robustness of errors and processing delay time are all elements that can only be evaluated in real-time with an FPGA-based design. **BE**

At this point in time, only the decoder and the syntax of the MPEG stream are standardized, which means that encoding can be done in any manner.

frequency domain, competition-based scheme for motion vector selection and coding, mode-dependent KLT for intra coding, and IBDI. Table 1, on page 86, highlights the HEVC tool set and compares with H.264/AVC.

At this point in time, only the decoder and the syntax of the MPEG stream are standardized, which means

design production cycle and a huge investment to make application specific integrated circuits (ASICs). Even then, this would never justify device development for the relatively lower-volume encoder market.

For designers who see the potential of using ASSPs for a portion of the encoding and functionality that

Robert Green is senior manager, broadcast marketing at Xilinx. Aaron Behman is senior manager, broadcast & consumer segment marketing at Xilinx.

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Interplay MAM 4

Avid's media management system facilitates workflow collaboration and is easily scalable as necessary.

BY JAMES FRANTZREB

Content creators and media enterprises of every size face diverse challenges in optimizing their businesses to face today's market demands and tomorrow's opportunities. The need to improve efficiency and time-to-market, build audiences and expand business is common to all. Initiatives to achieve these goals vary in type and scope. Where some organizations undertake major business transformation projects, others seek solutions to specific operational challenges that can yield a quick, measurable return on investment.

In either case, a well designed and implemented MAM system is almost always a fundamental element of either approach. In fact, MAM has gone from a "nice to have" database technology a few years ago to an essential element of media business transformation. How is this so?

Interplay MAM

Simply put, MAM technology has evolved. The newest systems employ advanced architectures, powerful user tools and business processes automation capable of linking virtually any media or business system to create capabilities and efficiencies unthinkable just a few years ago.

Avid's Interplay MAM 4 media management system leads this trend. As a configurable and vendor-agnostic system, it is capable of addressing specific needs such as a central media archive that can be accessed by any on-site or remote user. Or, it can be deployed as a transformational solution that coordinates and unifies disparate media operations and business systems across an entire media enterprise.

The key elements of the system are:

- A flexible data model;



Figure 1. A unique feature of Interplay MAM 4 is time-based metadata tracks or strata, which allow annotation of video to any timecode segment.

- Metadata strata;
- Configurable desktop and cataloger tools;
- Service Oriented Architecture (SOA) and Web services APIs; and
- Workflow orchestration using standard Business Process Management Logic (BPML).

Data model and strata

A basic MAM system task is management of media essence and metadata so assets are easy to find, access

well as the ability to create, import and enforce standard terms, ensures that assets can be easily retrieved even by highly specific criteria.

A unique feature of the system is time-based metadata tracks or strata. Stratification allows annotation of video to any timecode segment. Each stratum can be dedicated to a particular category of searchable metadata such as restrictions, source information or content notes, and strata can be added, modified, associated with

MAM has gone from a "nice to have" database technology to an essential element of media business transformation.

and re-use. However, assets can be diverse, and needs are certain to change over time. Interplay MAM 4 offers rich capabilities to define, maintain, modify and extend the fundamental data structure or data model. The ability to define hierarchies attributes, groups, processes and associations, as

objects and deleted without interrupting operations. (See Figure 1.)

User tools

Even with sophisticated technology, a MAM implementation will fall short if its users find it difficult to use or challenging to quickly find



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and reuse media. Interplay Desktop is a Web-based application that enables local or remote PC and Mac users to access media from any location at any time, and is configurable to support different user roles and preferences. Through the application, users can do basic video editing, organize and associate media, save searches, create

in any selected stratum and enter related segment metadata.

SOA and Web services

Interplay MAM 4 is entirely built as a service-oriented architecture (SOA). SOA allows functionality to be presented as a service that is brokered by a provider and can be applied to

integrations to date from more than 35 third-party vendors of video server, storage, editing, newsroom, automation, scheduling, video and audio digitization, archive management, image conversion, video analysis, and quality control systems.

Workflow orchestration

The system enables the automation of workflows and business processes. Through scripted steps and a sophisticated business process engine, automation of ingest, production, multi-platform distribution, and archiving processes and linkage between them can be easily described, implemented, modified and reused. The recent addition of graphical modeling using standard Business Process Modeling Notation (BPMN) enables drag-and-drop workflow building and reuse, and enables quicker, error-free workflow design and modification. (See Figure 3.)



Figure 2. A new frame-accurate player engine provides the feel and response of a professional editing system.

EDLs, edit processes, and more. A new frame-accurate player engine provides the feel and response of a professional editing system. (See Figure 2.)

For archivists, editing assistants and loggers, Interplay Cataloger is an application especially for creating and modifying metadata. Users can frame-accurately set in and out points

fulfill process tasks by any internal or third-party requestor, including other media applications or business ERP systems. Not only does this make it easier to leverage and add to system functionality, but also it simplifies interoperability with third-party systems. The system is inherently vendor-agnostic, with more than 60

Business benefits

Successful MAM implementation requires knowledgeable requirements assessment, planning and implementation. Whether addressing one or more operational needs, Interplay MAM has enabled a large variety of media businesses to:

- Reduce media operations cost by lowering overhead and maximizing creative output;
- Improve business agility by enabling quicker response to opportunity;
- Optimize multi-platform distribution by automating delivery of targeted content;
- Create more compelling content through fast media access and better repurposing; and
- Become more future-proof with the ability to expand or modify the system as needs change.

Media asset management is a transformational technology for a new business environment, and its importance will only continue to grow. **BE**

James Frantzreb is the senior market segment manager, media enterprises at Avid.

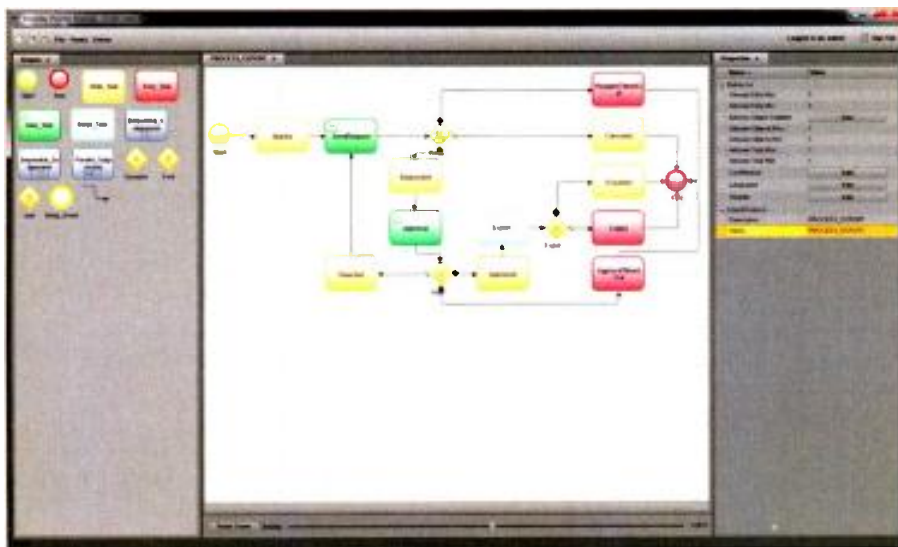


Figure 3. The recent addition of graphical modeling using standard Business Process Modeling Notation enables drag-and-drop workflow building and reuse.



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Neutrik's fiber-optic technology is the solution of choice at Swiss Television.

BY CHRISTIAN GANAHL

An investment in expensive HD and 3D equipment can be optimized with a well-conceived, flexible system architecture, paired with a fiber-optic camera switch solution.

Swiss Television carefully considered how best to deploy its existing HD equipment within an expansion of its studio infrastructure and started the "BigSwitch" project. The basic idea of the project was to plan a step-by-step increase of HD control rooms to be freely switchable to the five major production studios. tpc (technology and production center, Switzerland ag) — an independent subsidiary of SRG SSR, Switzerland's radio and TV broadcaster — considered various new ideas and opted for a future-proof concept. Neutrik's opticamSWITCH flexibly connects the technology and production center's existing cameras and control rooms to one another. Further-



The media's reporting of the Swiss National Council elections on Swiss television was realized by tpc using the opticamSWITCH.

more, as they come online, two planned new control rooms and studios will be easily integrated into the system. (See Figure 1.)

Because the opticamSWITCH is a fiber-optic camera switching system, mechanical wear, costly maintenance and possible mechanical failure are eliminated, resulting in a robust, reliable solution. Integration into existing control systems, with control via software, enables automation and allows for real-time control over complex wiring structures. This increase in efficiency — with significant reduction of potential errors — led tpc to employ the system.

System installation and test phase

Because the facility still had productions ongoing and the time frame was small, the planning was complex. The center needed to win more time for the installation and needed to have a plan B in case of upcoming problems.

During installation, the fiber-optic cables to the studios had to be assembled on-site. Neutrik brought the entire assembly infrastructure, including assembly specialists, to the studio.

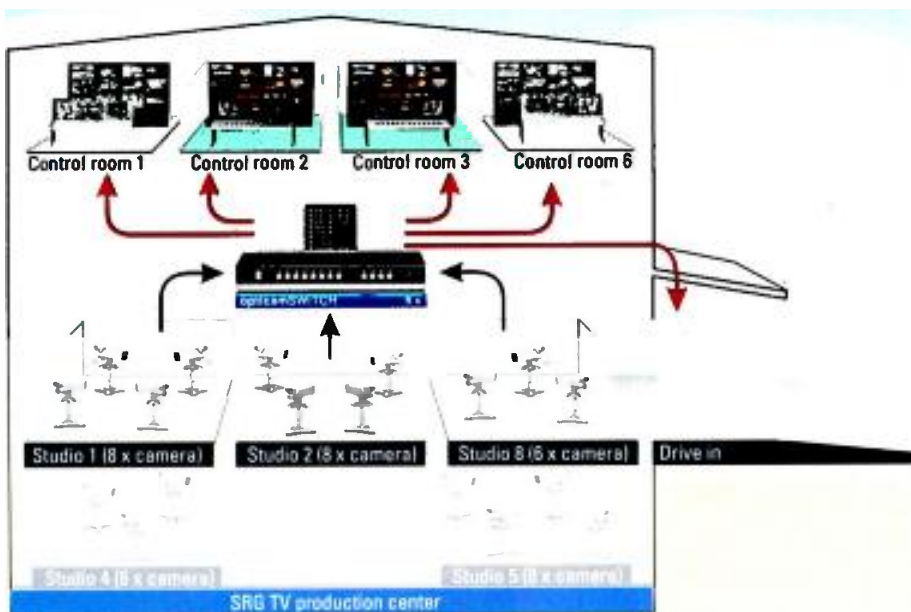


Figure 1. Neutrik's opticamSWITCH connects tpc's existing cameras and control rooms to one another. When two new control rooms and studios come online, they will be easily integrated into the system.

The team, along with Martin Sturzenegger, cabling to the camera routing system. After that, all studio connections

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four years, the Swiss people elect the parliament. On October 23, 2011, it happened again. The media's reporting on Swiss television was realized by tpc using the opticaSWITCH.

The live coverage at the Swiss National Council elections 2011 was 12 hours. From tpc alone there were 120 technicians working in the studio in Zurich. Then there was the Swiss Radio and Television (SRF) program. In total, there were about 870 radio and TV people in Switzerland working for the elections.

Studio 1, with an area of 1000sq-m, was converted into the election studio. Ten tons of material were used for that. In the smaller Studio 2, all of the radio stations were quartered.

Several other rooms were available for the print media. Twenty-six remote outposts were coordinated for control room 2. The election was produced from the main control room 2,

with support from control room 3.

There were eight Sony HDC 1400R cameras for SRF in use, which all ran over the new opticaSWITCH.

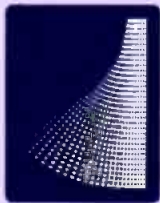
Result

Gerard Koch, project director video technology for tpc, says the decision to use the system for the first time in the elections wasn't a risky one. The facility performed several tests in real environments with associated cameras. In addition, it carried out various smaller productions with the system.

In a worst-case scenario situation, Koch says they would have been prepared with a manual patch solution using opticalCON couplers. Thus, tpc was able to calmly look forward to the elections, which went off without a hitch.

BE

Christian Ganahl is product manager, Neutrik.



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PATENT PENDING

Nevion's Videopath

The platform offers the control required for optical network efficiency.

BY JAN HELGESEN

Increasingly, infrastructures designed for SD cannot meet requirements of HD/3G broadcasting. At the same time, however, SD to HD/3G migration presents new business and revenue opportunities. New video transport infrastructures — optical fiber networks and IP networks — promise major advances in flexibility and scalability, but significant challenges are involved in actually achieving those ends. Managed video services can supply the intelligence and control required to make optical and IP networking work efficiently, while helping solve challenges of increased multiformat content transport and networking complexity. The use of ring, mesh or star architecture variations with add/drop/pass capability can provide guaranteed redundancy with full control, monitoring and management capability, while letting broadcasters move beyond point-to-point video transport.

Videopath managed video services for optical networks integrate sophisticated management software with Nevion's Flashlink and Sublime optical video transport components for a fully-managed video services system. The result is cost-efficient, signal distribution that encompasses video and audio signal transport, synch distribution and fully-synchronized switching, along with integrated monitoring, configuration and control. The solution acts as a distributed routing system, controlling connectivity between video and audio end-points.

This ensures complete redundancy while providing the ability to add, drop or pass signals at each end-point. The system lowers CAPEX and OPEX through reduced resource requirements and reductions in



Figure 1. One of Videopath's features includes the system's ability to hide complexities within the lower levels of the managed video stack. This allows operators to focus on elements within the Services layer.

human expertise needed to perform network configuration, maintenance, troubleshooting and problem resolution, all from an intuitive console.

The platform is an integrated hardware and software system that automates key functions in the delivery of contribution video transport services. Its software components benefit from a highly-distributed architecture that enhances reliability and accessibility for third-party developers. By following the best data organization and processing practices of leading companies that provide data-intensive "cloud-based" services, Videopath achieves high availability and cost efficiency.

Hiding complexities

Viewed from an intuitive, browser-based interface, the system coordinates and automates capabilities in the lower layers of the managed video services stack, while hiding the complexities of many of these elements

from the user. This enables operators to focus on the key elements at the Services layer. (See Figure 1.) The following components are critical to achieve this:

- A self-service interface is needed to provision new services and modify existing ones, with access to reports regarding performance and quality of delivered services.
- Integrated provisioning and scheduling of devices are used to deliver media edge and network core services. This includes connection management capabilities to find the optimal transport path from source to destination across the fiber optical network infrastructure.
- Protection mechanisms — where the same traffic must flow across independent paths — also require control of both edge and core devices. Protection at the edge offers little value if the traffic is transported across the same path through the core network infrastructure.

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Users can specify source and destination points, while the system identifies the optimal transport path from source to destination. It uses a shortest-path-first algorithm to provision the least-costly route from source to one or more destinations, and can perform secondary path routing to support redundancy and signal protection. The path is computed and established when video service is needed, based on current network and resources' status. Network resource availability or outages are detected

through real-time notifications. In addition to protected path-switching, Nevion developed a new technology for signal protection in an IP environment as part of VideoIPath: Streaming Intelligent Protection Switching (SIPS). SIPS monitors incoming packets from redundant sources. When a packet in the currently active stream is corrupted or missing, SIPS retrieves the corresponding packet from the secondary stream. A look-ahead buffer enables SIPS to maintain a continuous high-quality stream despite dropped packets or a lost signal.

The mechanisms for path calculations are generic, and the same principles apply for IP, SDH/SONET and fiber optical transport networks. This enables the system to support hybrid network architectures where video and audio signals can be switched at the baseband, IP or Ethernet layer. This introduces a great deal of flexibility in migrating from existing fiber/coax infrastructures to video-over-IP.

The system is based completely on open source software. SQL databases and proprietary platforms are replaced by open Web technologies, providing highly reliable, stable and flexible solutions. Unlike traditional

systems, this one's data-centric API can be used for limitless creative and custom applications, and is well-suited to mobile computing and integration with any third-party management or enterprise system.

As video services become more complex and increase the requirements for processing, transporting and managing more content with higher quality networks must be increasingly flexible, scalable and able to grow with changing needs. Through the integration of reliable, power-efficient transport components and highly-efficient use of network and human resources derived from sophisticated management software, VideoIPath enables broadcasters to deploy fully-redundant networks easily and cost effectively.

Comprehensive management capabilities coupled with technological innovation (including implementation of architecture with flexible add, drop or pass signal capability) and streamlined networking allows broadcasters to realize more value from their networks, reduce OPEX and CAPEX, and create future-proof infrastructures for tomorrow. **BE**

Jan Helgesen is director of product management, Nevion.

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SAN storage

Availability and compatibility should be considered when moving to virtual volumes.

BY JAMES MCKENNA

Virtualization of data storage has changed the way editors and technical engineers access shared data. The method of spanning multiple physical components to present a single pool of space is affecting the way broadcast facilities allocate storage resources. This article will explain virtual volumes as they relate to SANs in broadcast environments.

Before investing in a storage network, you'll have to evaluate many aspects, including: connectivity, file-system support, device management and usability. The reason behind there being so many storage products on the market is because there are so many different types of facilities. When comparing all of the available offerings for your environment, your specific workflow should be the determining factor.

Why virtual volume?

When choosing a SAN, a couple of key factors to consider are: 1) the availability of the storage pool and 2) compatibility of the file system. As the workload or equipment changes in your facility (as it always will), making a poor decision about a SAN feature set will come back to haunt you. Having a dynamically scalable and widely compatible environment will keep your facility working into the future when new applications, operating systems and rapid expansion add additional load to your network. Virtualized storage offers this through the ability to add and delete volumes, expand volumes, and change access permissions to any portion of the network, even during peak production hours.

Virtual volumes can span a large number of drives regardless of the

volume size, so very small portions of the SAN can be allocated for smaller projects without sacrificing performance. At any time, more storage can be allocated to a particular workstation or user, and data existing on this allocation may be shared among several workstations. Users can take advantage of project-based volumes that are managed individually, as



Systems like the TerraBlock 24D 48TB don't need a per-seat license, which can save thousands in incremental costs.

opposed to large chunks of storage with a single file system that holds multiple projects. This can complicate the media management of the facility and cost valuable time when the deadline looms. Virtual volumes can also ease maintenance requirements, eliminating the need for defragmentation (optimizing) and allowing the users to completely fill the SAN to 100 percent without any loss of performance. Up to 25 percent of a traditional drive array will underperform based on linear (non-virtualized) write patterns.

Standard RAID storage is limited to pre-determined partitioning according to stripe sets with respect to the number of drives. The stripe size will be determined by the number of heads needed to achieve adequate performance. The partitioning of the disk (device logical unit number) may be static, leaving little ability to re-allocate or expand the partition available for a certain project down the road. These systems will often have to be destructively reconfigured in order to make changes to stripe sets, or when expanding capacity.

When configuring file systems on virtual volumes, administrators can take advantage of native OS formatting of NTFS, HFS+ (Mac OS Extended), XFS or EXT3, or choose a custom file system that allows for write access from multiple workstations simultaneously, on multiple operating systems. These shared file systems are used to enhance collaboration for facilities working with shared projects. Some shared file systems can be customized to provide emulation modes for workstations that benefit from increased functionality on proprietary storage systems. Certain products, like TerraBlock from Facilis Technology, offer both native OS formatting and shared file system operation concurrently, to deliver the highest performance and total collaboration.

So, why doesn't everyone do this? Virtualization of individual hard drives into a pool of storage is a difficult task. The qualification of bandwidth, data protection and data integrity are all vitally important. However, the result of this technology is simple administration and maintenance with greater flexibility when compared to more traditional server-based or direct-attached SAN systems.

Also, a lot of old technology is out there. It's easier for a storage company to re-brand older software packages as new for the purpose of creating a "turnkey" solution. While these older SAN software packages are field-tested, they lack features and functionality needed by today's creative facilities. Dated SAN technology will struggle to keep up with changes in operating systems and platforms. Client-based (direct-attached) software solutions keep end users from adding upgrades to workstations that could change the supported configuration, since clients are in essence "running" the SAN. Also, more networking infrastructure is required to satisfy metadata paths.

Workflow features

Moving past how virtual volumes can ease administrative workload by allowing for dynamic allocation, what other benefits are there? For one, as much or as little of the SAN is available to any client without involving complex network permissions. The workgroup stays manageable through per-user login to access unique permissions. This allows the administrative control over the amount of active data available to the end user, while always having additional volumes available if needed.

Financial features

Centralizing storage assets will reduce costs, eliminating the need for local storage. Virtual volume storage may also decrease overall storage deployment due to more efficient allocation. Some SAN solutions require individual workstation licensing, which can bump up total cost of ownership. (Not only can there be hidden initial costs, there are per-seat/year-

A robust SAN can be repurposed into other workflows.

on-year expenses as well.) Virtual volume systems like TerraBlock require no per-seat license, so there is no software package to purchase when adding fiber-channel or Ethernet seats to the environment. In addition, since this virtual volume SAN can be used across multiple OS versions concurrently, upgrading client workstations does not have to be an all-or-nothing proposition, saving thousands in incremental costs.

In addition to the cost of physical resources, a virtual volume SAN provides savings in hourly labor and increases satisfaction among your

employees. Since a central, shared storage system allows for migration of projects between and among similarly engineered workstations, scheduling becomes easier to manage. Downtime in a particular room, due to required upgrades or a workstation hardware failure, won't derail a project. The features of project-based storage for media management make backup of critical data off the SAN easy, with the full availability of the storage volumes across the network.

Deployment

Many facilities worldwide have found uses for virtual volume storage that go well beyond the original specification. A robust SAN can be repurposed into other workflows, new and better editorial and content creation workstations, and even the central storage for an entire end-to-end production workflow. The chief engineer faced with the task of creating a custom storage network will always turn to a virtual-volume SAN, due to the ability to create a sustainable network that will future-proof his or her facility in an ever-changing environment.

BE

James McKenna is vice president of Facilis Technology.



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Qualis Audio's Sentinel

The surround-sound monitor measures virtually every parameter necessary to ensure optimum audio.

BY RICHARD CABOT

With the CALM Act, U.S. broadcasters now must monitor and log the loudness of commercials, both in absolute terms and relative to the program. While managing loudness is important, it's only part of what's required to deliver quality audio to today's viewers. The shift to surround sound from stereo brings additional complexity to the tasks of audio monitoring and quality assurance.

Unfortunately, this comes at a time of tightening budgets and shrinking pools of skilled personnel. These changes are forcing many people unfamiliar with the subtleties of audio into roles where they are responsible for ensuring its quality.

The Qualis Audio Sentinel is best described as an electronic listener that reports QoE judgments over a network connection. It measures loudness, downmix compatibility, intelligibility, levels, balance, hum, metadata and other relevant parameters.

Although it can display results graphically in a standard browser window, it doesn't need to, as all measurements create numeric results that are tested and generate alarms if outside user-selected boundaries. This allows the system to function equally well as an unattended monitor, reducing personnel requirements, or as an assist to a skilled operator, allowing attention to be put on other tasks besides policing common audio issues.

Loudness

Loudness and other audio parameters are defined and measured from beginning to end of a programming segment. Practical broadcast streams interrupt programs with commercial advertisements, which themselves

must be independently measured. Real-time monitoring and logging requires independent assessment of program material and of the commercials that separate or interrupt it. This normally requires multiple



This portion of the Sentinel GUI displays loudness, intelligibility, channel balance, downmix compatibility and spectrum.

measurement meters or convoluted and error-prone manipulation of the data provided by a single meter. The Sentinel surround-sound audio monitor solves this problem by maintaining two independent meters for each of the two audio streams it measures.

A little known fact about the internationally standardized method of measuring loudness is that for some material, the loudness results vary with the reproduction format. Although a piece of content might match the -24 (+/-2) LU target specified by the FCC when measured in surround, the loudness can fail these limits when reproduced in stereo. The instrument addresses this by measuring

all surround content in both its original format and after downmixing to stereo. If a particular program or commercial differs significantly after downmixing, a warning is issued so corrective action can be taken.

Automated operation

Signals from a playout server (via GPI lines or Ethernet) let the audio monitor know when the stream is a program versus a commercial, and when a new program or commercial begins. The instrument handles everything else, creating a time-stamped list of programs and commercials with their loudness and other measured audio-quality parameters.

Sometimes it is impractical to issue this information in real time from the playout server. In such cases, the monitor offers a solution that merges the measurement log data with as-run logs, automatically creating a clear and itemized report of measured loudness (and other measures if desired) for each item broadcast. Content that falls outside legal or user-defined limits is flagged in the report. The results can be automatically e-mailed to a specified distribution list, eliminating the need for labor-intensive manual tracking systems.

Downmix compatibility

Although DTV brought surround sound to the picture, more than half of viewers still listen in stereo or mono, making compatibility of the surround signal with stereo and mono reproduction crucial. Previous commercial attempts to detect downmix compatibility problems, however, required subjective interpretation of complex visual displays. Essentially a multidimensional version of the scope display long used to

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measurements on content after a ques- tion arises about its suitability. Its ex- tensive analysis ability allows rapid as- sessment of problems, and the storage of all measurement data eliminates the need to re-measure content. Un- like other instruments that log mea- surements, the user does not have to

review confusing text files of measure- ment data. Log data is viewed through the same intuitive GUI that displays real-time measurements.

What's next

With CALM Act requirements becoming effective at the end of the year, much attention has been given to loudness. Although fully compliant with all international loudness stan- dards, the Sentinel goes much further. Besides characterizing loudness more thoroughly than anything else avail- able, it assesses a wide range of other parameters necessary to deliver qual- ity audio to viewers. By applying psy- cho-acoustically-based measurement algorithms and intelligent alarm gen- eration, it delivers improved audio quality while decreasing costs. **BE**

By applying psycho- acoustically-based measurement algorithms and intelligent alarm generation, the Sentinel delivers improved audio quality while decreasing costs.

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Richard Cabot is CTO of Qualis Audio.

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Multiviewers

Displays these days wear many hats

BY JOHN LUFF

The time is approaching when all displays will process images, with many displaying more than one input at a time. In fact, like it or not, essentially all displays now have image processing, including frame rate, aspect ratio and pixel map changes. This arises not from a crying need in the professional marketplace, but rather from consumer applications requiring home displays to support a random variety of input standards.

Beginning with the first flat-screen televisions almost 15 years ago, display processors became a necessary evil. Many of the early processors did only the minimum necessary to display SD and HD images on the same 16:9 display. Quality was, well, only so-so. But, as flat-screen technology has matured, so too has the technology of scaling engines that are employed in displays, as well as in other devices.

Out of that simple, or seemingly simple, addition to displays has sprung the entire class of display processors for multi-image and, I might add, a host of changes coming for monitors themselves. The basic idea that is embodied in a display processor is to map an incoming pixel map (and sequence of time samples, or frame rate) into a different pixel map on the output. The simplest is to take a smaller frame size, say 720 x 486 interlace, and map it onto a larger pixel map for display, perhaps a 1920 x 1080 interlace screen. The display processor interpolates the missing samples between every two output samples, effectively creating new data for the interpolated points. Going the other way (HD to SD with the same frame rate and sampling structure, progressive or interlace) is the reverse, with pixels discarded to decimate the picture to the smaller pixel map. Simple enough! But throw in more



Shown here is multichannel playout monitoring using Miranda's Kaleido multiviewer system at Slovenia-based Satellite Telecommunications Network (STN), a provider of playout and transmission services in Eastern Europe.

complicated problems — for instance, mixing interlace and progressive — and the display processor must be reprogrammable to do more jobs.

In a multi-image processor, the downconversion decimation is done on multiple inputs, which are then added into a single output. The trick, and where the secret sauce is found, is

a frame displaced in direction and center from the dead-center head-on processing that happens in most display processors. We all have direct visceral experience with display processors that can be reprogrammed on the fly in our pockets — in the form of smartphones. Think critically about what the display processor in your phone is doing when

Beginning with the first flat-screen televisions almost 15 years ago, display processors became a necessary evil.

in preserving the image quality. Part of the display remapping is dealing with overlapping spectra from the input and output samples. When filters are not done well, the aliasing can be quite objectionable indeed.

This technology is not new. The first digital effects units had to have multiple tap filters to allow image transforms that were variable. They also included the geometric effects of viewing

you rotate the display and the picture resizes and scales automatically, and then think about the Ampex ADO of 20 years ago.

So, processors are now taking multiple images and using discrete individual processors to output multiple images, or potentially varied sizes, to a combiner that delivers a single composite image to the output device. Fair enough, but is that all? Not today. We

expect to have the ability to pick the background images onto which we place the video windows. We also expect to be able to place names on each window, and tally information that must be decoded from data streams derived from production and routing switchers. But in recent years, display processors have had to handle lots of other information as well.

Multitasking

Multi-image systems now are expected to decode closed captions (and/or subtitles) and to display bar graphs for embedded and discrete audio channels. They also are expected to decode other metadata such as VChip; standards for frame size and

It would not be surprising to see further integration of scaling technology inside professional monitors.

frame rate; and perhaps emergency alerts, PSIP data and AFD codes.

Some manufacturers have chosen to add support for waveform displays, which grays the line between a "waveform rasterizer" and a multi-image processor. A rasterizer may well provide more than one image at a time, and it is likely in the future that a combination of waveform generation and multi-image processing will allow a video operator to have camera repeat monitors and the waveforms associated with them all in one display processor output. That saves real estate in a monitor wall and reduces the amount of wiring needed, which is a double win in my book.

Multi-image processing systems can support many outputs as well. By combining a routing switcher

internally, the user can have the flexibility to reprogram a monitor wall at will — when a new SNG truck signal is received, for instance — even during a show. The size of the router is arbitrary, of course, as is the number of outputs that can be supported. Some systems support literally dozens of outputs and many more than a hundred inputs.

For some applications, this has resulted in tight integration between multi-image processors and external routing switchers. By taking outputs directly from the crosspoint matrix in a router, it is possible in some cases to feed a display system from the router without increasing the physical size of the routing matrix. Doing this saves money and allows interconnection with multiple digital streams. The display processor appears to the router like another control panel making requests to switch outputs. This tight integration in some cases is between products from a single manufacturer, though two manufacturers can easily weave their products together seamlessly if customers strongly encourage them.

Finally, some display manufacturers have begun tiptoeing into the multi-image world directly. One manufacturer showed a monitor at the Hollywood Post Alliance Technology Retreat in February that had both rasterizer and direct inputs tightly integrated into cards resident inside the monitor. It would not be surprising to see further integration of scaling technology inside professional monitors, and perhaps consumer sets as well. **BE**

John Luff is a television technology consultant.

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

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Back to the Desert

Talk and treats were again lively at the annual HPA Tech Retreat.

BY ANTHONY R. GARGANO

Incredible! Another year is quickly slipping by. We're already a few weeks removed from yet another annual sojourn to the southern California desert. If you study the Bible, you might be thinking Lent and its symbology of 40 days of repentance in the desert. But, if you are a technologist in our industry, a February trip to the desert meant only one thing: It was time for the Hollywood Post Alliance's annual Technology Retreat.

Far from fasting in the desert for 40 days, this event is a four-day feast in the desert, sating both mind and stomach with technical presentations and demonstrations and wonderful camaraderie at pleasant group lunches and dinners. And, in the case of the morning meal, both brain and belly are satisfied simultaneously at breakfast roundtables, where you pile your plate with biddles and bits and then join the technology table that interests you for a lively, over-breakfast discussion. With several dozens of topics of discussion to choose from, if you can't find one of interest, you must have wandered into the wrong conference.

This year's event

This year's annual HPA Tech Retreat was held Feb. 14-17 at Indian Wells, near Palm Springs, CA. For the uninitiated, the Hollywood Post Alliance is the trade association of the southern California content creation and finishing community who are involved in the end-to-end process of generating everything from motion pictures to television programming and commercials. That the HPA knows how to put on a technical conference can be attested to by the continued year-after-year success of this

event that attracts both presenters and attendees representing production, post-production and broadcast from all around the world. This year was no exception. Attendance was a sellout, and there were more than 60 companies with technology demonstrations maxing out the allotted demo rooms. Indeed, there were additional companies waiting to step in had space become available.

This year's presentations had a good mix of subject matter for both broadcasters and content provid-

It is all but official that 3-D TV is dead, dead, dead. I expect the CEA will be the last to get that message.

ers. Resolution was back in the fore, with good discussion of higher-than-HDTV resolution, moving on to 4K and 8K. With just the briefest of mentions of 3-D, it is all but official that 3-D TV is dead, dead, dead. I expect the CEA will be the last to get that message. But, with the CEA reporting HDTV penetration at 87 percent of all television households, it is easy to understand the need to try and find or create that next "must have" product.

Broadcasters have created yet another mobile DTV consortium, this one called the Mobile Content Venture. Mobile DTV has created more consortiums, organizations and associations than any other technology that I am aware.

Upon hearing about this latest group, it occurred to me that I could probably do an entire column on the history and creation of mobile DTV bodies. Following that, a business case history on how not to roll out a new technology might be in order.

The three days of breakfast roundtables, technical presentations and technology demonstrations were preceded by the HPA Supersession day, which included a half-day ATSC seminar on ATSC 2.0, and other sessions on everything from D-Cinema to television production workflows.

Same time next year

This event is at the top of my "must attend" conference list each year. Next year's Lenten time event is scheduled for the week of Feb. 18-22, once again at the Hyatt Grand Champions Resort at Indian Wells. For fasting, solitude and repentance, I suggest a different venue. But, if you want knowledge, camaraderie and sustenance, mark your calendar for the event and for when registration opens in November. **BE**

Anthony R. Gargano is a consultant and former industry executive.

? Send questions and comments to:
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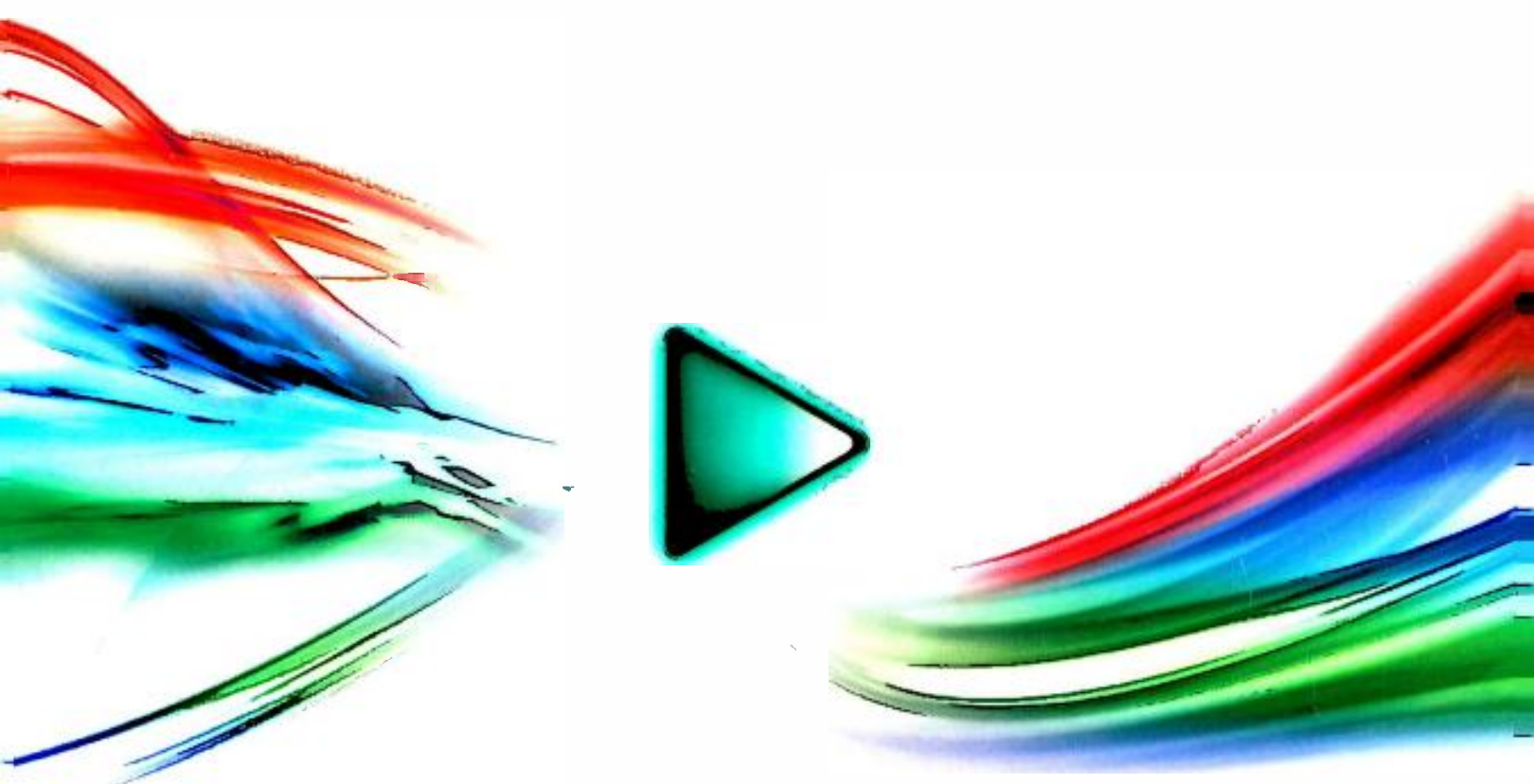
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