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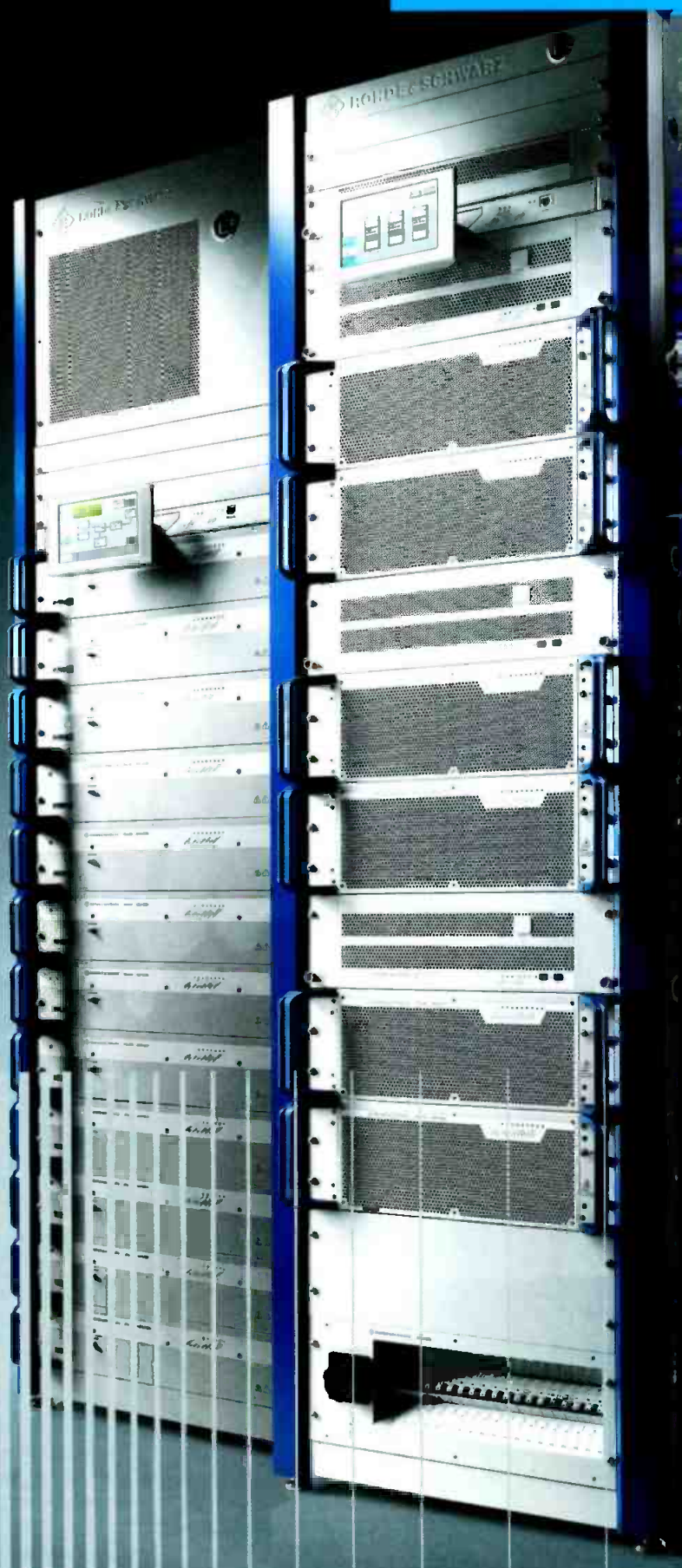

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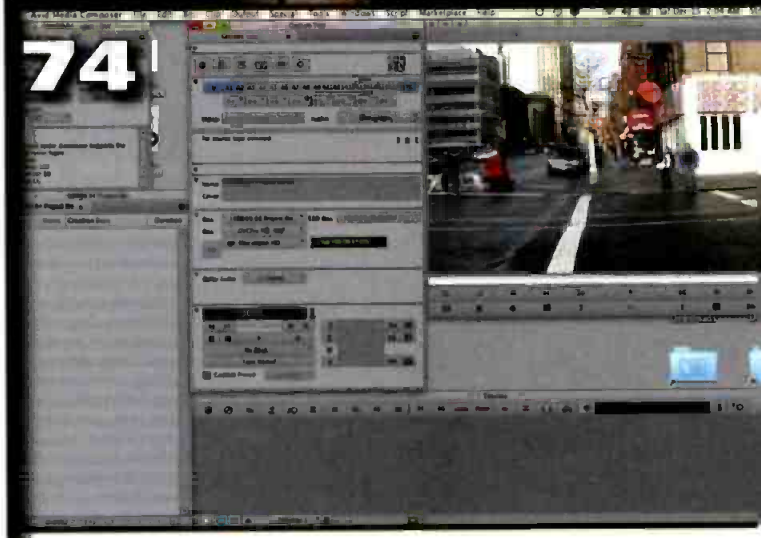

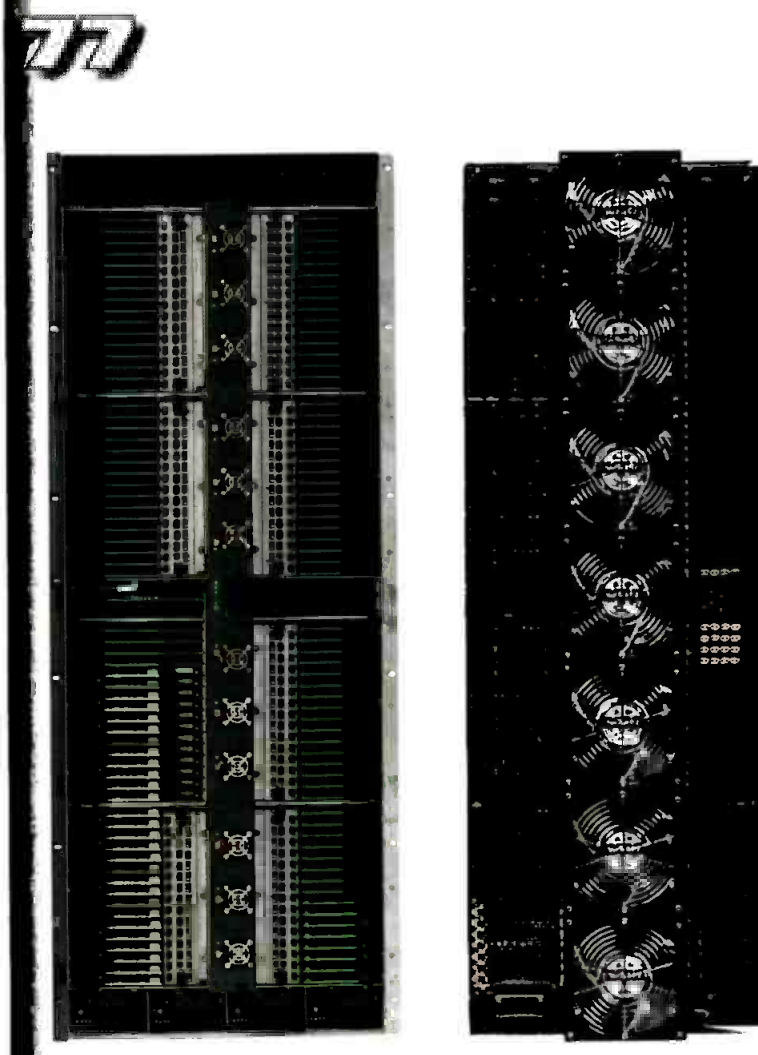

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3-D is dead. Long live 4K!

There is a striking similarity between how 4K is suddenly being pushed by the consumer electronics industry, and how those same vendors pushed the now dormant 3-D technology just three years ago.

I'm not making a comparison between the technologies themselves. I just simply see parallels as TV set makers continue to try to drive sales by hawking the next must-have technology regardless of minute benefits. So, why should broadcasters care?

They should care because broadcasters eventually have to deliver matching imagery.

The 2010 CES show was filled with 3-D TV sets and demonstrations. The media went overboard on the benefits and the "wow" factor, and predicted its huge success. The NAB convention followed only three months later, and practically every video booth had some type of 3-D technology demonstration. Were the demonstrated products real? Of course not. Companies had only 90 days to whip up something to show attendees they were supporting the new 3-D bonanza.

This year, you'll need a magnifying glass to find 3-D at the NAB Show — not because it isn't being developed, but because no one is buying the technology. Sure, Hollywood and CES want to develop new products; I get that. But, after recently seeing the just-released 3-D version of "Top Gun," all I can say is, "Wow, film grain looks even better in 3-D."

So, back to 4K. There's a building community of support for 4K imagery. And, it seems it may be the next legitimate step in increased image quality. But, let's be sure we understand where 4K may be applied.

First, 4K and the CES term Ultra HD are not the same. You'll also see 4K called Quad HD, but Ultra HD is the official CES technology icon for 4K-like imagery. Ultra HD provides 3840 x 2160 pixel images. True 4K imagery relies on 4096 x 2160 pixels. The new CES-labeled Ultra HD TV sets do not accurately display a true 4K size image. But, who's going to see the difference?

Second, although TV set makers may be moving full-speed ahead, broadcasters aren't exactly sitting on their hands.

Just last month, CBS used six FOR-A FT-ONE 4K cameras at Super Bowl XLVII. Also last month, Japan announced it will broadcast the World Cup in 2014 in 4K. Even the 2012 Summer Olympics in London were available in 4K at selected public venues, but no DTH broadcasts.

Despite the CES push, and for many practical reasons, 4K may not quickly become the next must-have. The Korean trade publication *Chosun Biz* says that LG has sold only 300 of its 84in Ultra HD TV sets since its August introduction. Currently, the TV set costs $20,000. We all know prices will drop, but will viewers "see" enough image improvement to part with hard-earned dollars?

An Internet search will provide plenty of stories about the drawbacks of 4K screens in the home. Issues include the requirement for 80in or larger screens and optimum viewing distances that can't be accommodated in most average living rooms.

Given these unknowns, should engineering managers today even consider supporting the technical requirements of 4K technology when upgrading a facility?

One expert I trust, Stan Moote, VP business technology at Harris Broadcast, says, "There is no reason to be frightened over 4K. Without putting a single 4K feed out to air, broadcasters can embrace 4K technology to improve their build-outs and productions."

OK, that I'll buy.

Tell me what you think. Is 4K technology in your future? Is it on your 2013 buying list? BE

Brad Dick
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Cloud video processing

The cloud offers an easy way to increase processing capability on the fly.

BY DUSTIN ENCELEWSKI

Video processing requirements are becoming more complex as media consumption habits change and the number of consumer devices capable of displaying video increases, requiring support for an expanding number of file formats. Multiscreen viewing of both live and on-demand content increasingly challenges media companies to assess how much on-site infrastructure to procure to satisfy spikes in demand without overinvesting.

Ensuring a high-quality, reliable consumer viewing experience across multiple screens requires the processing of massive amounts of video — as seen in the Olympics last summer when data delivery peaked at 2.8PB of content, featuring a peak rate of 700Gb/s, when Bradley Wiggins won the gold medal in men's cycling.

The chart below shows an example of predicted demand for video processing capacity compared to actual demand, where the red steps represent capacity purchases over time. (See Figure 1.) An obvious concern is where demand exceeds what fixed infrastructure can support. However, the opposite situation can prove even more costly over time, where demand runs lower than capacity, resulting in investments that go unused.

A hybrid workflow is achieved by maintaining just enough on-premise infrastructure to fulfill day-to-day transcoding requirements, while leveraging cloud services for the elasticity to keep pace with demand.

Media companies that don't have enough video processing infrastructure to meet variable demand may find it difficult to keep up with customer expectations for top-quality service. Production houses that buy more infrastructure than they need will incur the unnecessary costs of maintaining resources that sit idle. Either way, they lose money.

The cloud offers a rational and cost-effective solution to the problem of variable demand by offering the ability to instantly scale up video processing capacity to accommodate high-traffic events, and then back down again as traffic wanes, while avoiding additional hardware investments that aren't consistently utilized. Just like paying for a utility such as water or electricity, media companies can replace additional capital investments with more predictable operating costs that rise and fall depending upon the amount of cloud resources they actually use. Cloud computing can help organizations handle variable video processing demand with great flexibility and agility, enabling them to improve customer service while at the same time reducing capital costs.

Cloud computing also presents exciting opportunities for media and entertainment companies that want to minimize the risk of launching new initiatives. For example, a broadcaster can quickly introduce a new program or channel using cloud transcoding and evaluate its success without investing in additional infrastructure. Once the new inititave is proven successful, investments in on-premise infrastructure can be made confidently to balance long-term economics.

Likewise, the cloud offers the opportunity to take one-time projects

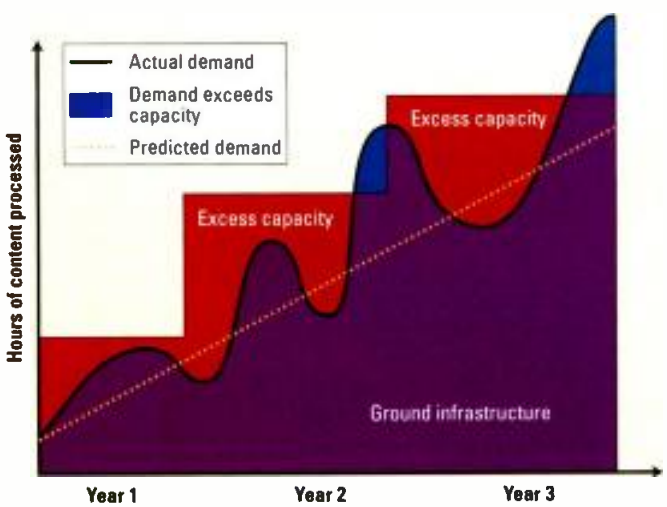

Figure 1. Video processing demand

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without long-term investment. For example, many media companies have an extensive catalog of content, but supporting the infrastructure required to convert a video library into new distribution formats can be costly and inefficient. Using cloud resources, broadcasters can enhance offerings and extract unrealized revenue to make archived video footage available to customers on demand.

Overcoming challenges

While the cloud has been a hot topic, until recently, several obstacles have put cloud transcoding out of reach for many companies, particularly those that process high volumes of professional-quality video. The good news is that these hurdles are quickly disappearing.

First, until recently, the cost of processing video in the cloud has been prohibitive, especially for high-volume production houses. Yet as more providers such as Google, HP, Rackspace and Amazon Web Services (AWS) enter the market, competition and increasing supply are driving down the price of cloud resources. As these providers continue to grow, users will benefit from economies of scale, which will make large-scale video processing even more affordable in the cloud.

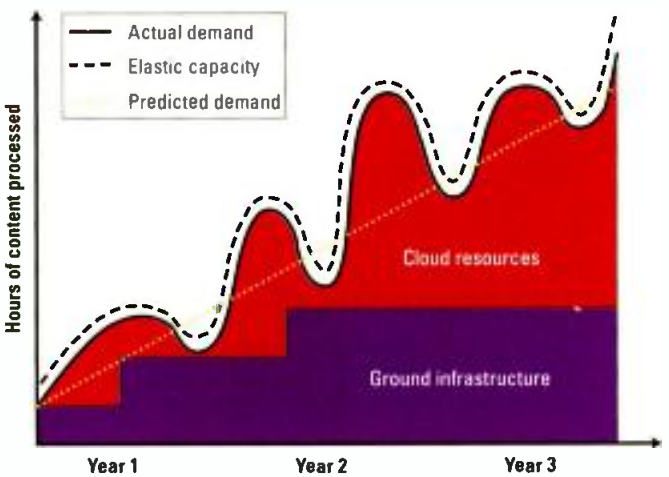

Figure 2. General trend lines of an economically optimized video processing system at the high end of the broadcast industry, over time

Second, the transfer of data is a tremendous challenge for organizations moving large, mezzanine-quality video files. Yet this issue is being addressed by accelerated data delivery systems. For example, Aspera and Signiant have designed highly efficient transport technologies that move data at maximum speed, regardless of file size, transfer distance or network conditions. In addition, Amazon recently introduced the Direct Connect service, which makes it nearly as fast to move data between an on-premise facility and AWS as it is to move data across a high-speed local network. Innovations such as these help mitigate data transfer bottlenecks.

Third, concerns about data center outages and system failures have prevented many media companies from moving assets off-site. However, this issue is ameliorated as the cloud matures and vendors build more enterprise-grade reliability. For example, most established cloud vendors have built redundancy measures into their services, and replicate data and resources across multiple geographic zones for enhanced durability in case of outages.

Fourth, media executives are understandably concerned about security. In many cases, their video assets fuel a multibillion-dollar business, so they're leery about letting them be processed off-site. However, as the cloud becomes more widely adopted, media companies are becoming

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increasingly comfortable with the concept of cloud-based video processing.

Large-scale data centers are capable of providing greater security than many individual media companies could afford on their own. Most established data centers support high levels of encryption and undergo industry-standard security audits. Amazon's cloud, in particular, has received the highest possible maturity rating from the Motion Picture Association of America (MPAA) for securely storing, processing and delivering protected media and content.

Foundational elements

There are key considerations that must be prioritized to ensure an economical, effective balance of ground and cloud transcoding resources:

- *Feature parity:* Select a platform that can exactly replicate the profiles, capabilities, and formats used on premise so that video outputs are identical regardless of where they are processed.
- *Unified management:* Make sure cloud-based and on-premise video platforms can be administered from a single interface and API so both sets of resources are managed seamlessly.
- *Secure environment:* Avoid multi-tenant environments and publically exposed networks.
- *Reliable implementation:* Ensure the cloud system spans multiple regions and availability zones for redundancy.
- *Data transfer:* Select cloud-based data centers that are located near on-premise data centers and leverage accelerated data transfer services.
- *Experience:* Make sure the vendor is equipped to meet FCC regulations and other standards, and quickly supports new ones.

Recommendation: A hybrid approach

How can media, entertainment and broadcast companies best leverage video processing in the cloud? Low-volume broadcast companies may want to move all transcoding functionality to the cloud so they can scale resources up and down as necessary. For companies that consistently process vast amounts of video, the economics of a cloud-only system are still challenging. For those companies, a hybrid workflow makes the most economic sense.

A hybrid workflow is achieved by maintaining just enough on-premise infrastructure to fulfill day-to-day transcoding requirements, while leveraging cloud services for the elasticity to keep pace with demand. (See Figure 2 on page 12.) This ground-to-cloud approach has the potential to save organizations significant capital expenditures. Augmenting in-house transcoding capacity with cloud resources can reduce video processing costs by at least 50 percent, and by as much as 80 percent, according to a report by the multinational technology consulting firm Accenture.

Being flexible about leveraging both on-premise and cloud resources allows companies to cost-effectively balance transcoding resources, while optimizing capital investments already made.

As cloud computing vendors continue to tackle the issues of cost, data transfer and security, interest in cloud-based transcoding is sure to grow among media and entertainment companies in the near future. By taking a hybrid approach, media companies can fully reap the benefits the cloud can offer. BE

Dustin Encelewski is director of product marketing, Elemental Technologies.

+ ADDITIONAL RESOURCES +

The following are available on the *Broadcast Engineering* website:

- Goodbye spinning disks
- Amazon's cloud outages causing concern
- Is the cloud really as green or cost-friendly as widely thought?

Mobile video technology

Expectations are set for mobile service.

BY ALDO CUGNINI

Last year, the Open Mobile Video Coalition (OMVC) released a specification, the ATSC Mobile DTV Receiver Profile Guidelines. The spec, issued by the OMVC Technical Advisory Group (OTAG), recommends two profiles for mobile receivers: a required Base Profile and an optional Enhanced Profile. (Let's call it an "E-Profile"). So consumers can sort it all out, it's conceivable that support for the Enhanced Profile could lead to a class of devices with a user-recognizable label. Although the OTAG spec concerns implementation of the ATSC A/153 standard, many of the embodied concepts apply to other systems throughout the world, such as DVB-MHP (Multimedia Home Platform).

Video and audio, while customizable, will likely converge to common formats. H.264 (Base Profile Level 1.3 and Main Profile up to Level 3.1) is recommended by OTAG for both mobile profiles, at supported resolutions. Although Scalable Video Coding (SVC) is a broadcast option, OTAG has not entered it into a mobile profile, citing a lack of marketplace maturity for SVC-compatible consumer products. However, DVR-pause is required, and impulse recording and scheduled DVR are "desirable" in the E-Profile. These step-ups will require additional storage memory. As an example, a combined data rate of 600kb/s for audio and video (reasonable for 416 x 240 resolution) would require 4.5MB for each minute of stored content — not too demanding given today's flash memory prices.

The Scalable Full-channel Mobile Mode (SFCMM) is an optional transmission mode that scales mobile payload capacity up to the total available from the channel; such a device, of course, would not support legacy mobile broadcasts. SFCMM is deemed "desirable" in the E-Profile, as is a second tuner. HE-AACv2 (w/SBR) (High-efficiency Advanced Audio Coding with Spectral Band Replication) is required for all devices, as constrained in A/153 Part 8, with the average loudness of the audio at -14dB LKFS.

Interaction (return) channel

In both profiles, an interaction (or return) channel by one or more out-of-band sources (Internet, Wi-Fi, cellular, USB, Bluetooth) is required from all devices at least once per week. Interactivity, both active and passive, is a key differentiator that can set mobile apart from fixed-device broadcasting; users naturally want to interact with an audio/video device they hold in their hand, and this factor should pave the way for applications that leverage social and informational enhancements to linear TV viewing.

Many of these interaction-channel media have persistence and connectivity challenges, which have led to various service-provider solutions. Under the DVB-MHP banner, interactivity and other enhancements have been defined using an Interactive-broadcast profile or an Internet-access profile, both being over and above the Enhanced-broadcast profile.

Electronic service guides (ESG) can be delivered in-band (i.e., through the OTA terrestrial channel) and out-of-band, over a separate interaction channel, as shown in Figure 1. An in-band basic ESG is required in both OTAG profiles, while an enhanced ESG over an interaction channel is required in the E-Profile. Aggregation of multiple-ESG information collected from multiple providers is required by OTAG on all devices. File-based delivery is required on E-Profile devices to support the mobile aspects of the non-real-time (NRT) standard that allows in-band pre-caching and downloading of content.

The rich media environment (RME) is required for supporting interactive components in the E-Profile. Defined by the Open Mobile Alliance (OMA), RME provides a rich graphical and media experience by integrating Scalable Vector Graphics (SVG), for graphical object creation, and ECMAScript, for script support, into a media stream.

Conditional access and service/audience measurement require an interaction channel. The A/153 Mobile DTV standard incorporates a conditional-access system (CAS) that

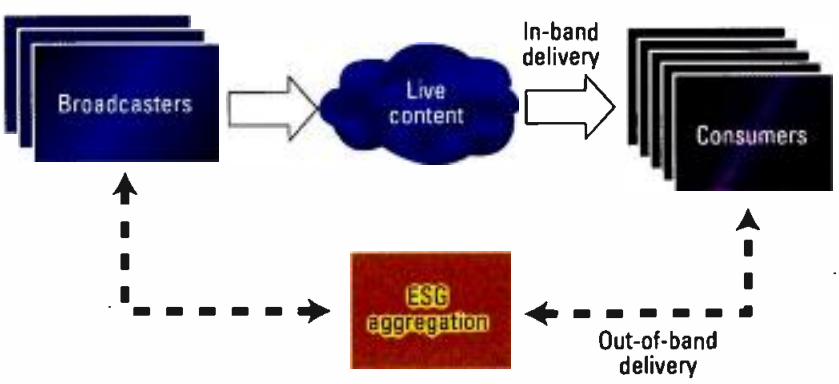

Figure 1. As part of the requirement to provide their mobile viewers with connectivity, broadcasters can deliver electronic service guides in band through the OTA terrestrial channel, or over a separate interaction channel.

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is based on the OMA-DRM standard. Conditional access and service protection require that encryption key exchange take place over an interaction channel, due to the capacity limits of OTA content delivery. Content security, while not explicitly specified, is envisioned using an exchange of short-term keys over the broadcast channel, and long-term keys over the out-of-band return channel.

Simple devices without an interaction channel will, therefore, risk missing out on some services in the broadcast stream. Of course, services and content can always be sent in the clear, with no encryption.

There are several items in the E-Profile that were not completely set in the standardization process when the OTAG document was finalized. Hence, we might expect additional elements to be defined, in the area of conditional access, in the coming months. For the time being, the OTAG recommends that service providers (i.e., broadcasters) supply an optional conditional-access application to be downloaded and installed in receivers that support the E-Profile.

All devices are expected to provide a facility for collecting and reporting on content consumption. In order to support audience data gathering and reporting, user data collected on all devices should be uploaded to a service agency at least once per week, or the same time as a long-term key is delivered.

Geo-location is required on all devices if GPS or other positioning data is available from the device. Wake-up functions are required in the E-Profile, such as to provide emergency alerts. The Cell Information Table is required on all devices, providing carrier frequency information on selected available transmitters, so that cell-like handoffs would allow near-seamless roaming from one transmitter footprint to another.

As defined in ATSC A/153, mobile content data is organized into groups called Parades, each of which can carry different kinds of services: Data groups within a Parade all have the same Forward Error Correction (FEC) parameters, and a Parade can carry simultaneously up to two Ensembles, which are logical pipes for IP datagrams. Although it is usually unnecessary for a receiver to simultaneously decode all of the services present in a stream, decoding parallel Parades is required on E-Profile devices. Expected uses for this functionality include PIP, or transmitting CAS Entitlement Management Messages in Parades separate from the A/V content.

Starting point

Receiver profiles, although demonstrating a path to viable business models, do not constitute a "standard." Readers must keep in mind that the Mobile DTV Receiver Profiles specification was published for illustrative purposes only, and does not carry the weight of a regulation or standard. Nonetheless, the spec was developed cooperatively by broadcasters and consumer-electronics manufacturers, and thus represents a snapshot of their combined expectations for services and products. BE

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

Send questions and comments to: aldo.cugnini@penton.com

ADDITIONAL RESOURCES

The following are available on the *Broadcast Engineering* website:

- ITU approves H.265 video codec
- Is streaming TV worth the wait?
- Mobile DTV usage to be measured using census-level data

JPEG 2000 over IP

The format can be configured to provide lossless video compression, while MPEG-2 transports audio.

BY BRAD GILMER

Last month, we talked about Ethernet and IP and the advantages of a layered network stack. Let's look at an application that uses these layers — the streaming of JPEG 2000 over IP.

JPEG 2000

JPEG 2000 (J2K) is one of a number of compression formats that are used by professional media companies every day all over the world. The purpose of this article is not to go into detail about how J2K works — there are many excellent tutorials and books on this subject — but, there still are a few things you should know.

First, J2K is generally used when high quality is required, such as for backhaul of national sporting events or for transfer of content between production facilities. Second, it can be configured to provide lossless compression, meaning that it is possible to prove that the video, after a compression/de-compression cycle, is mathematically identical in every way to the video prior to compression (lossless compression). Finally, the J2K specification does not cover audio; it only tells you how to compress video images.

In the 1950s, AT&T (note the capital letters — we are talking about the old telephone company) built a nation-wide, terrestrial, video network for the big three networks. This was an RF-based analog system that remained in place for many years. In the 1960s, AT&T launched communications satellites, and AT&T and other satellite operators added video capability to these platforms over time. As a result, in the 1980s, satellite became the dominant long-haul technology. During the dot-com boom, tens of thousands of miles of fiber optic cable were installed all over the country. The boom was followed by a bust, but the fiber was already in the ground. Thanks to this, megabit and now gigabit networking has become available on long-haul networks — at surprisingly reasonable prices in some cases.

If you remember from last month's article, we said that one of the keys to networking is layering and encapsulation. Packetized networks use packets composed of a header and a payload section. The header contains information that is used to perform functions associated with that layer of the network functionality, and the payload section contains the information we want to transport across the network. Each layer performs a specific function. Let's look at a specific example — the transport of J2K with audio over IP — to see how a layered approach is applied in a working scenario.

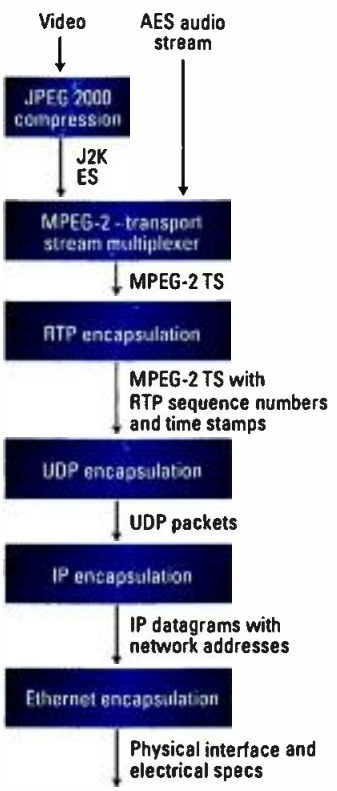

Figure 1. This shows the transport of J2K with audio over IP, illustrating how a layered approach is applied in a working scenario.

Figure 1 shows the protocol stack used in this case. We start with live professional video and audio — perhaps the output of a sports production truck. The video out of the truck is compressed using J2K, resulting in something called a JPEG 2000 Elementary Stream (ES). The audio at the side of the truck is already an AES stream.

Using MPEG-2

As mentioned earlier, the JPEG standard says nothing about audio. Fortunately, we can use a portion of the MPEG-2 specification to multiplex JPEG-2000 ES and AES audio into a single MPEG-2 Transport Stream (TS) in a standardized way. This is an important point: The MPEG-2 specification covers all sorts of things besides compression. So, even though we feed this J2K video through equipment that is following the MPEG-2 specification, it is important to realize we are using J2K compression that is then fed into an MPEG-2 multiplexer, where it is combined with the AES audio. The result is a single MPEG-2 TS.

The MPEG-2 TS contains information that helps receivers reconstruct timing between video and audio streams. While this is vital to reproducing video and audio, these timestamps do not provide everything we need in order to deal with what happens in the real world on long-haul IP networks. Let's look at some of these networks' characteristics.

As IP packets travel over a network, they can take different paths from a sender to a receiver. Obviously, the inter-packet arrival time is going to change. In some cases, packets can arrive out of order or even be duplicated within the network. Having information about what has happened to packets as they transit the network allows smart receiver manufacturers to do all sorts of things in order to ensure that video and audio at the receive end are presented in a smooth stream. What we need is a way to embed information in the packets when they are transmitted, so that we can adjust for network behavior at the receiver.

RTP

Real-time Transport Protocol (RTP) allows manufacturers to insert precision time stamps and sequence numbers into packets at the transmitter. If we use these time stamps to indicate the precise time when the packets were launched, then at the receiver we can see trends across the network. Is network delay increasing? What are the implications on buffer management at the receiver? This information allows receivers to adjust in order to produce the continuous stream at the output. RTP sequence numbers are simply numbers that are inserted in the RTP header. The numbers increase sequentially. At a receiver, if you receive a packet stream in the order [1], [2], [4], [3], you know immediately that you need to reorder packets 3 and 4 in order to present the information to the MPEG-2 TS de-multiplexer in the order in which it was transmitted.

The next layer is User Datagram Protocol encapsulation. MPEG-2 packets are 188 bytes. This data needs to be mapped into packets for transmission. The newly created SMPTE 2022-6 standard describes how to do this. UDP is designed to provide a simple scheme for building packets for network transmission. Transmission Control Protocol (TCP) is another alternative at this layer, but TCP is a much heavier implementation that, for a variety of reasons, is not well suited to professional live video transmission.

Real-time Transport Protocol (RTP) allows manufacturers to insert precision time stamps and sequence numbers into packets at the transmitter. This allows network trends to be seen.

UDP packets are then encapsulated in IP datagrams, and at the IP layer, network source and destination addresses are then added. What this does is allow the network to route data from one location to another without the use of external routing control logic.

Finally, the IP datagrams are encapsulated in Ethernet packets. The Ethernet layer adds the specification of electrical and physical interfaces, in addition to Ethernet addressing that ties a specific physical device to an address, something IP addressing does not do.

Hopefully, this real-world example helps you to understand that layered systems are critical to the success of modern networked professional video, and that each layer adds something unique to the system. BE

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

? Send questions and comments to: brad.gilmer@penton.com

ADDITIONAL RESOURCES

The following are available on the *Broadcast Engineering* website:

- Comparing JPEG 2000 and MPEG
- AVC-I
- IP contribution networks for live broadcast

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Wireless microphones

When preparing for television and event production, planning is the key.

BY JASON ESKEW

Today, productions large and small use wireless microphones, in-ear monitors (IEMs) and intercom systems. While smaller events utilizing this equipment are relatively easy to plan and produce, larger ones can become quite challenging.

The professionals who install and operate wireless systems for these scenarios have learned how to manage the flow of information and apply proven techniques to the hardware in order to get several wireless systems to work together successfully in the same venue. This task involves many of the same engineering principles one would apply to designing the main PA system or the broadcast signal path.

These principles can be boiled down into a fairly simple recipe: Gather requirements and baseline information about the event, and then design the wireless microphone setup to match.

Setting the scene

One of the most challenging aspects of planning a successful event is determining what you have to work with and what needs to be accomplished. As an example, let's take a look at planning for a medium to large music awards show.

Several weeks out from the event, the tech manager will ask for a bid. To provide this, the first things you'll need to determine are the location, dates and requirements for the event. In this case, let's assume that you'll be working in a large sports arena in downtown Miami.

The host television network owns a fairly large collection of wireless microphones, IEMs and wireless intercoms. To make the budget stretch further, the host would like to use its equipment for the production, with supplemental equipment to round out the requirements. In addition, there are associated productions, such as a red carpet event, that will also need equipment and coordination. Finally, there will be media crews using wireless systems for both the production and for press coverage.

The main production element has several live-live musical performances and many more live-to-track performances. Meanwhile, some of the artists are endorsed by Brand X, and request specific transmitter models or wish to use their own custom-decorated transmitters.

It's important to identify roaming wireless systems in some manner. One approach is to put a flag or tag on the receiver antenna showing that a camera crew's wireless mics have been cleared for use.

At this point, you now know what needs to be done, where it needs to be done and when. But you don't know what you have available or what is required.

The first step is to get a list of equipment and frequency ranges that the television network wants to use. While that list is being compiled, you'll need to determine the baseline coordination for Miami. This requires figuring out which TV channels are available and which are blocked by broadcast transmissions at that particular venue in Miami. There are several ways of going about this task, such as using a frequency coordination software package, tvfool.com, fccinfo.com or FCC.gov, but all of these methods are based on the same FCC data.

If that information is out of date or contains inaccuracies, you might find that channels you expected to be available are actually in use. That's why nothing beats an actual site survey for determining the baseline coordination. It's best if you conduct the survey well in advance of the event, but if that isn't possible, make it the first task you perform once you arrive on site.

For planning purposes, however, you next need to determine what equipment the performances require. As it's common for some of the acts not to send their riders until much closer to the production itself, it's important to look for frequency ranges that overlap across multiple different wireless vendors and equipment models. This way, you can reserve additional frequencies for those making last-minute additions.

It's also important to work with the intercom department, as its goals and restrictions often differ from those of

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the audio department. For instance, the tech manager may be asking for additional wireless channels for riggers flying set pieces into the stage, while the A1 or producers want more mics and IEMs for a performance element that was just added.

Deployment

Once you have the list of required equipment and have determined the baseline coordination, it's time to start fitting the puzzle pieces together.

First, integrate the "must-use" equipment from the network and baseline coordination. Once you complete this task, you can fill in the middle of the puzzle with equipment from your inventory. Sometimes, there is simply too many of one particular model and frequency range, and you have to look at subrenting equipment in alternate frequency ranges. Only after the frequency coordination has been roughed in can you start designing an antenna system and accessories to outfit the required coverage areas with all of the various wireless systems needed for this production.

While you are planning, maintain your awareness of the other productions going on in the area, such as the red carpet event or the daily network news show. These other events need to be mixed into the overall frequency plan. It's pretty much guaranteed that the talent and production staff will be in rehearsals or on-air at the same time that the main event is rehearsing.

An added twist comes in the form of roving camera crews documenting the event setup or shooting B-roll packages for use during the broadcast. As these crews routinely shoot both inside the main event and at each of the associated productions, their wireless mics need to be coordinated for use both inside and outside the venue. Don't rely on those crews remembering to change frequencies when they move from one area to another.

Once on site, program all of the wireless systems to the frequency plan you developed, and "war game" all of the systems. War gaming refers to turning all transmitters on at once, and then turning one off at a time and checking the associated receiver for any issues.

When all of the fixed systems are working to your expectations, it's important to identify the roaming wireless systems in some manner. We often put a flag or tag on the receiver antenna showing that a camera crew's wireless mics have been cleared for use. This allows anyone in the audio or intercom department to quickly determine if a new system has been brought into the venue or a previously cleared system is in use. If anyone on the crew spots wireless systems without flags, they are trained to contact the lead frequency coordinator. This way, the new wireless system can either be cleared for use or requested to be turned off.

Show time

On the day of the event, many more media crews will show up to cover it, and many of these crews will bring wireless systems. It's important to constantly watch for these new arrivals and intercept them before they start using their wireless systems. If possible, try to clear the frequencies for use and be sure to flag the systems for quick identification. If the systems cannot be cleared for use, ask the camera operator to remove the antennas completely to show that they aren't using the wireless systems at all.

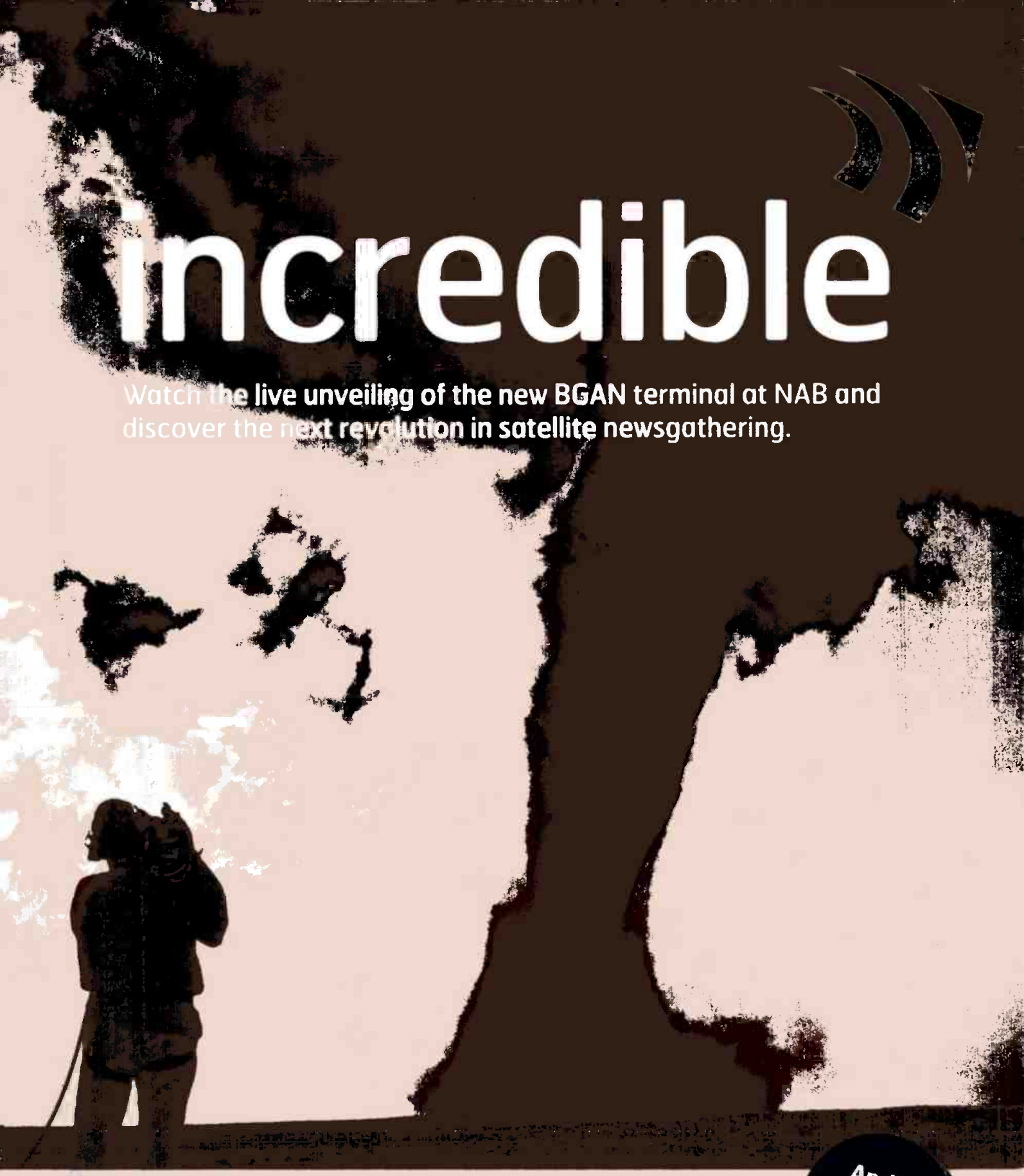
Prior planning is key in the wireless microphone game. Learning the recipe for success and being able to apply it before and during the event will help you produce every event with zero wireless problems. BE

Jason Eskew is a wireless specialist with Professional Wireless Systems and the author of the Intermodulation Analysis System frequency coordination software.

ADDITIONAL RESOURCES

The following are available on the *Broadcast Engineering* website:

- FCC: Where do wireless mics fit in shrinking TV spectrum?
- Avoiding audio problems with wireless microphone systems
- Improving audio quality with digital microphones and digital wireless



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Metadata

Now that you have it, where will you put it?

BRUCE DEVLIN

File-based workflows feed off metadata. Anyone who has put a workflow together knows that making it all work depends on knowing information about the media. Sometimes it's simple: Is the file SD or HD? Sometimes it's more complicated: What is the episode and series title? Sometimes it's dynamic: Should I use English or Spanish on audio channels 3 and 4? Many of these issues can be solved by investing a fortune in a MAM that runs your whole business.

But is there a lighter touch that can solve 80 percent of the problems for 20 percent of the effort? What if you could carry some of that metadata in the file? What if that file could then describe itself to your transcoders and QC tools? What if some of that metadata were standardized?

This article explores some of the possibilities for efficiency gains and cost savings by using embedded metadata specified by application specifications such as the Digital Production Partnership from the UK that is based on AS-11 from Advanced Media Workflow Association (AMWA).

Anyone who tells you that file-based workflows are simple is either clueless or someone who has really got their head around metadata. If you visit enough facilities and look at file-based workflows, you start to notice a few common themes bubbling around:

- Increased efficiency and cost reduction are actually happening.
- The magnitude of efficiency increase is less than desired.
- The things that go wrong are often surprising to everyone.
- The more automated processes become, the more efficient the facility.
- Achieving high levels of automation involves knowing lots of information about the media you have and the media that you need to make.

"Information about media" is just another way of saying metadata, and metadata is the key to getting good file-based automation. In a closed environment, keeping track of metadata can be quite simple: Buy everything from a single vendor with a complete end-to-end management system and then hope that the single vendor is nice to you and doesn't go out of business or focus in a direction that doesn't suit your business.

In reality, most businesses need to spread their risks and choose a variety of best-of-breed vendors and then attempt to get all the software working together. With formats such as MXF and QuickTime, the format in which the media is stored is pretty much vendor-agnostic now. The same is not true for metadata. Not only does metadata storage vary on a company-by-company basis, the actual definition of many of the metadata terms changes on a company-by-company basis.

To a large extent, this problem is rooted deep in the history of the media industry. A couple of decades ago, we were battling against physics to build electronic SD and HD processing equipment. Most countries had one or maybe two dominant broadcasters, and the market for interchanging content between broadcasters was tiny compared to today. The concept of "monetizing an archive" was unheard of because "repeat programming" was what you did to fill the low-revenue slots in the schedule.

Adding an XML sidecar to a media file is perfect in some circumstances. However, an application specification such as AS-11 allows much easier exchange of media and metadata between businesses.

Metadata was written on cards and filed in cabinets or tape boxes, and there was no cost benefit in adopting anyone else's system because there was no need to exchange the data. There was always a human about to re-key or rewrite the card with the "metadata" on it.

Today, moving media between businesses and between business units drives the industry. Anyone who has built a multiplatform transcode farm knows that creating the XML sidecar file for delivery is often more difficult than creating the media itself. Why is this? Why can't the metadata be "just right?" Often, this is because it is not present or has not been validated until late in the media's lifecycle.

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A few years ago, a friend of mine at a conference explained the issue succinctly. He stood up and said to the audience, "Metadata is like an upstream tax. I run a post house, and you want me to get all the metadata right for free, so that you [expletive-deleted]ers can increase your levels of automation downstream." It got the laugh from the audience, but the point was well made: Accurate metadata upstream dramatically increases automation and accuracy downstream. But how do we store and propagate that metadata?

The classic answer is to use a MAM or DAM system, but this only works within a single facility. At the edges of a facility, the metadata needs to be transferred to another business. XML sidecar files are the de facto solution today. They are easy to change and can be validated for integrity against a schema (.xsd file; see the tutorials at w3schools.com if this is new to you), but in practice this feature of XML is underused in our industry.

There are times when an XML sidecar file is the perfect answer; it works well when componentized media formats (like AS02 and QuickTime reference files) are being used. It works well for local interchange between equipment, but sometimes it would be great to put the metadata inside the file in a way that allows interchange between businesses.

A project in AMWA has done just that with the new AS-11 application specification that has been adopted by the UK's Digital Production Partnership (DPP) for the interchange of content within the UK market. The AS-11 specification gives a metadata framework that allows "shims" to be defined that place application-specific metadata within the MXF file. The DPP (*digitalproductionpartnership.co.uk*) has defined a standardized set of metadata that defines the titles, contents and segmentation of the file. In other words, the basic metadata required to bring media into a facility so that higher levels of downstream automation can be achieved.

Will this format solve all of the world's problem? No. But it will solve more than 80 percent of the problems for less than 20 percent of the effort. For this reason, manufacturers, broadcasters and post houses are all looking to AS-11 and the DPP to lead the way in creating commercially effective file-based interchange. **BE**

Bruce Devlin is chief technology officer, AmberFin.

ADDITIONAL RESOURCES

The following are available on the *Broadcast Engineering* website:

- MXF
- Does a file-based workflow make it easy?
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2013 NAB Preview

What's inside?

Each year, the *Broadcast Engineering* staff provides a guide full of comprehensive coverage to help you make the most of your time at the NAB Show.

First up, we announce the winners of our 12th annual Excellence Awards. We'll recognize these facilities at the NAB Show for their achievement in each of eight categories.

Next, browse through more than 30 pages of product descriptions and photos to build your ultimate shopping list.

And finally, our exhibit hall map will help you find your way through the maze of booths. We'll see you at the show!

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The BroadcastEngineering 12th annual Excellence Awards

KCET-TV

Winner of new studio or RF technology – station

Submitted by
Harris Broadcast Communications and The Systems Group

Runner-up
Digital Switch Over
Submitted by Arqiva

Los Angeles-area community television station KCET-TV sold its broadcast home of 40-plus years, providing the opportunity to create a brand-new broadcast and media facility using a predominately file-based workflow. The new space included the fifth and sixth floors of a new high-rise in Burbank, CA, where nothing stood beyond bare concrete floors. Krismar Construction broke ground with the goal of turning over the broadcast area to integration by mid-December, while The Systems Group developed the broadcast design with the KCET team. The KCET team chose XOR Media servers and Avid editors to work natively in their preferred file system, XD-CAM. Marina from Pebble Beach Systems was chosen as the broadcast automation system.

A Harris Platinum router serves the core infrastructure, with integrated frame synchronization and MADI capability for high-density audio routing. Additional Harris equipment includes the Selenio media convergence platform for signal encoding, 6800+ series modular-core processing gear and X85 signal processors. The KCET master control room is the pulse of the new facility, with monitoring capabilities through Harris HView SX Hybrid multiviewer feeds, and signal routing through Magellan and NUCLEUS control panels. All components tie back to the Platinum router, which serves as the core of the infrastructure, and additionally houses the multiviewers and other signal-processing capabilities to minimize rack-space requirements.

The entire infrastructure was wired with Cat 6A plenum-rated 10GB-capable copper, allowing for fast, bidirectional file delivery between the servers and editing systems. Ross Video was the main supplier for two production control rooms. The larger room includes a Ross Vision 3 switcher and a two-channel Expression.

KCET began broadcasting from its new location in the wee morning hours with only a few minor challenges, before moving its entire operation to the new location. ■

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FOX News Channel

Winner of new studio technology – network

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Communications Engineering, Inc. (CEI)

Runner-up

Crown Media
Submitted by Volicon

When it was time to make major upgrades to its vital D.C. bureau, FOX News Channel (FNC) chose the systems integration services of Communications Engineering, Inc. (CEI)

The upgrade to the bureau's technical infrastructure included major changes to improve the facility's HD monitoring capabilities. New systems were added for network channel origination, and preparations were made to convert to a totally tapeless operation. All modifications had to occur without impeding daily production or the ability to cover breaking news 24/7. CEI presented design alternates to enable an efficient transition through both the construction and operational upgrade phases.

FNC, along with other FOX cable channels, originates from master-control facilities in New York City. This project also included enabling the D.C. bureau to be the primary FOX News master-control disaster recovery site. Five new HD air chains were built to replicate the NY services for FOX News Channel, as well as provide a (N+1) spare.

To support the additional air chains, a new Evertz MVP multiviewer was installed to serve acquisition, transmission, camera shading and master control. A unique "sticky notes" feature conceived by CEI and developed by Evertz allows an operator to create a customizable text field to be laid over the monitor path of any incoming video source. That note travels with the source and can be displayed or turned off at each monitoring port. This feature is extremely useful during hectic breaking-news events with multiple, remote feeds.

The project also required the design and installation of a new broadcast LAN system with enterprise-level redundant switches, redundant firewalls and connectivity to New York via WAN access. Redundant paths were established to all devices to minimize network outages. ■

Turner Studios

Winner of new studio technology – HD

Submitted by

EVS

Runner-up

CNN-Washington, D.C.
Submitted by Lawson & Associates, Architects and CNN/Turner Broadcasting

Turner Studios seamlessly broadcasts live sports for the National Collegiate Athletic Association (NCAA), National Basketball Association (NBA), Major League Baseball (MLB), National Association for Stock Car Auto Racing (NASCAR) and the Professional Golfers Association of America (PGA), providing content that is used to feed live broadcasts, websites, mobile, multimedia platforms and on-demand services in support of these partner organizations.

Turner Studios, the full-service broadcast production division of the Turner Entertainment Group, had over many years maintained four incompatible, decentralized systems, which were insufficient for the rapidly increasing scale of its sports production needs.

With a new multi-year, multi-screen NCAA coverage agreement, it designed a centralized production system for live feeds and highlight work that could supply quick-turnaround media to Turner Sports' many partners and provide a historical record for search and retrieval of all archived content. The new Sports Central system needed to be ready in time for the start of the 2011-2012 NBA season and the 2012 NCAA March Madness basketball tournament.

Turner Studios selected EVS as the ingest/playout backbone of the new system, deploying XS ingest servers, XT3 playout servers and IP Director suites. The dedicated ingest/playout network records content locally. At the same time, HD content is streamed through EVS XTAccess servers to create duplicate high-resolution growing feeds on redundant Quantum StorNext SAN systems.

The EVS system is tightly integrated with Dalet, which initiates the feed recording and gathers all metadata and log entries for search and retrieval by production staff via the Dalet WebSpace browser-based interface. After editing in Final Cut Pro 7, the Dalet Xtend plug-in publishes the edited content to the SAN and directly to EVS servers for playout. Staff can also edit highlights in their browser and publish directly to sites and apps for consumer viewing. ■

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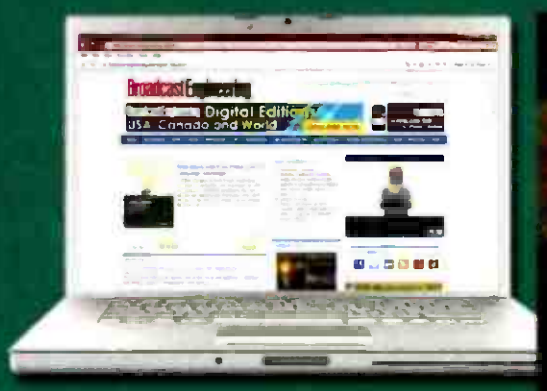

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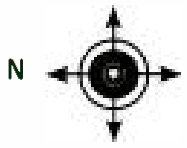

EXHIBIT HALL HOURS

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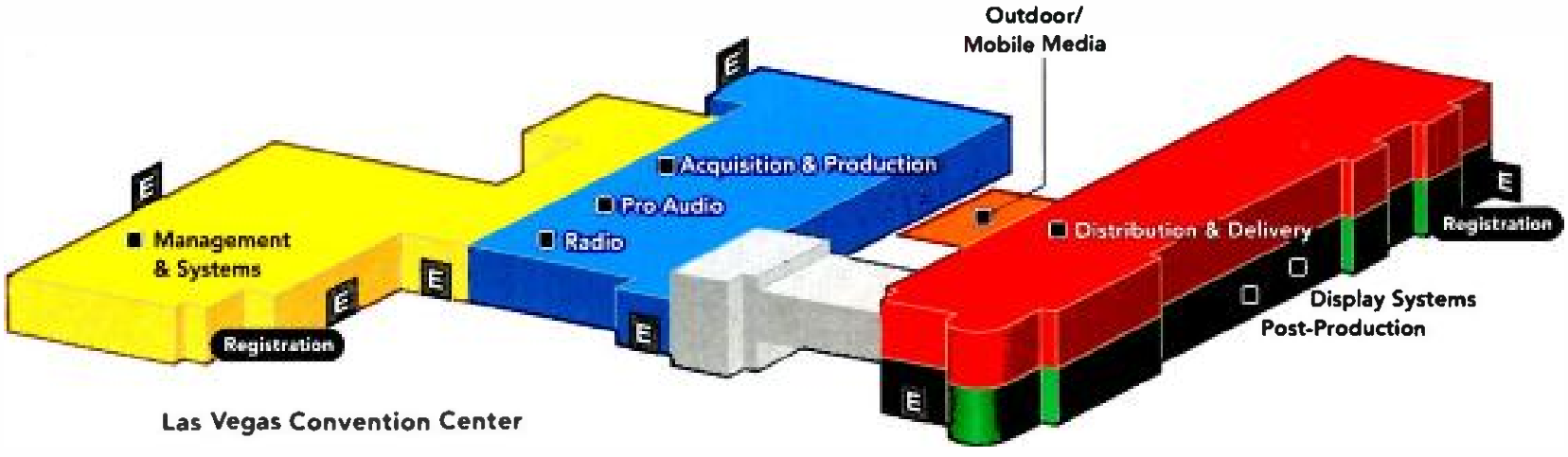
Thursday, April 11	9 a.m.-2 p.m.



Las Vegas Convention Center

Map information current as of Feb. 22, 2013

MAP INFORMATION

The following is a brief description of what you will find in this year's NAB map from *Broadcast Engineering*.

To the right, you will see a listing of the NAB categories and what products can be found in each. Next to each listing, you will find a color square that indicates the convention hall each category is located in. On the overview map (above), you will see each hall with its product categories.

Our table of contents below lists each hall and the pages they are found on. On each of these pages, you will notice some booths are highlighted with different colors. The ☐ highlighted booths are our magazine advertisers, while the ☐ highlighted booths are our map advertisers.

We thank all of our advertisers for their support of our NAB coverage and exhibit hall map.

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PRODUCT CATEGORIES

☐ **Management & Systems** — Includes DAM, storage, 3G B/S, cloud computing, routers, master control, newsroom automation, servers, multicasting and workflow solutions.

■ **Acquisition & Production** — Includes cameras, lenses, motion capture, 4K and virtual production.

■ **Pro Audio** — Includes 5.1, editing, mastering, mixers, effects, encoding, recording and compression technologies.

■ **Radio** — Includes analog, digital and streaming technologies, antennas, transmitters, towers, automation, master control, news and weather services, encoding, scheduling software, signal management, IT/network infrastructure, microwave/RF accessories and web, mobile, and video applications.

■ **Outdoor/Mobile Media** — Includes ENG, SNG, DSNG vehicles, mobile production studios, outdoor signage, power generation and satellite uplink.

■ **Distribution & Delivery** — Includes HDTV, 4G, IPTV, cable equipment, test and measurement, fiber to the home, streaming, interactive television, OTT, content delivery networks, encoding, streaming, advertising platforms, VOD and Wi-Fi/Wi-MAX.

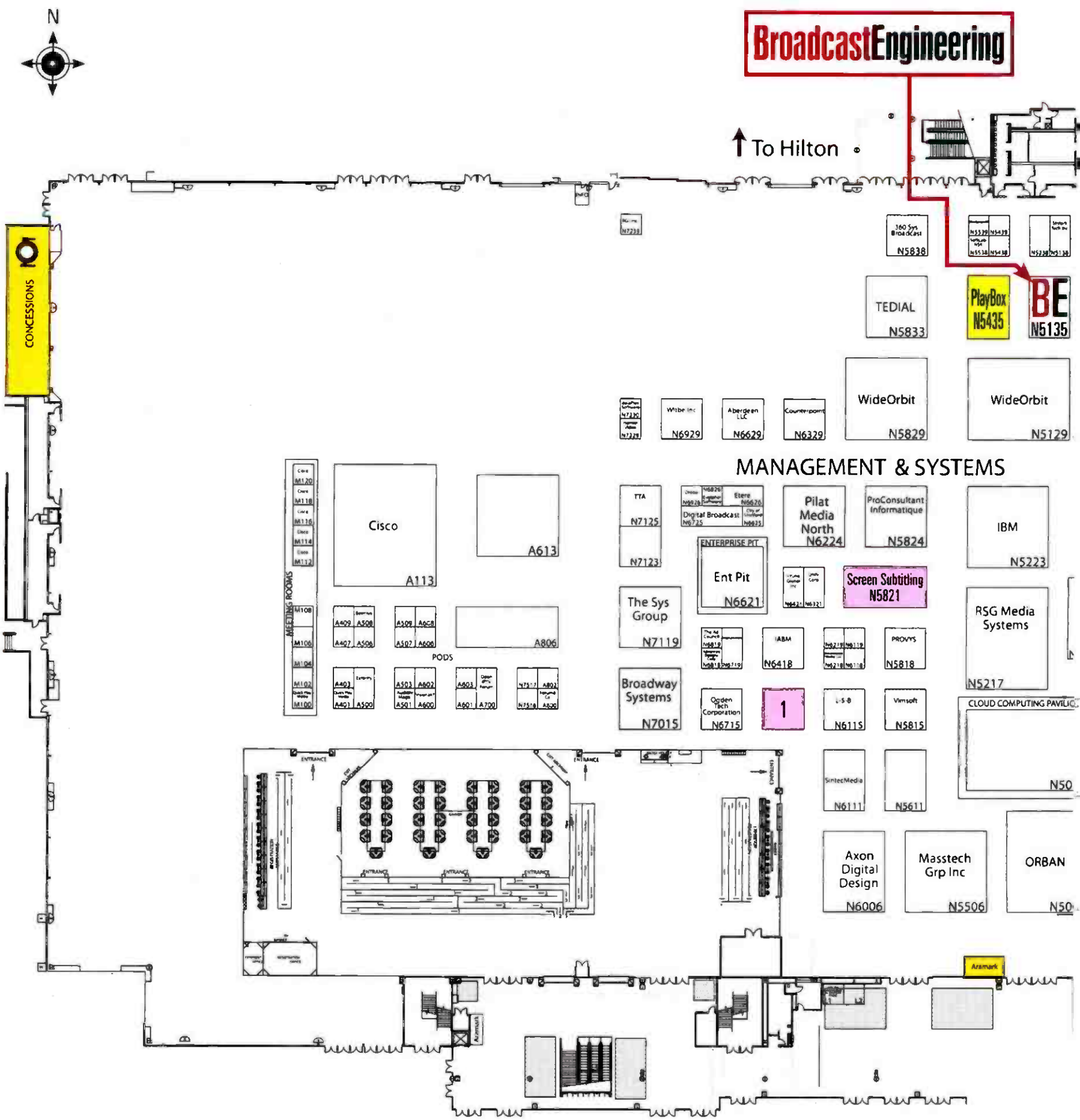
■ **Display Systems** — Includes 4K, digital signage, TV sets, monitors, projectors, projection screens, video displays and Ultra HD.

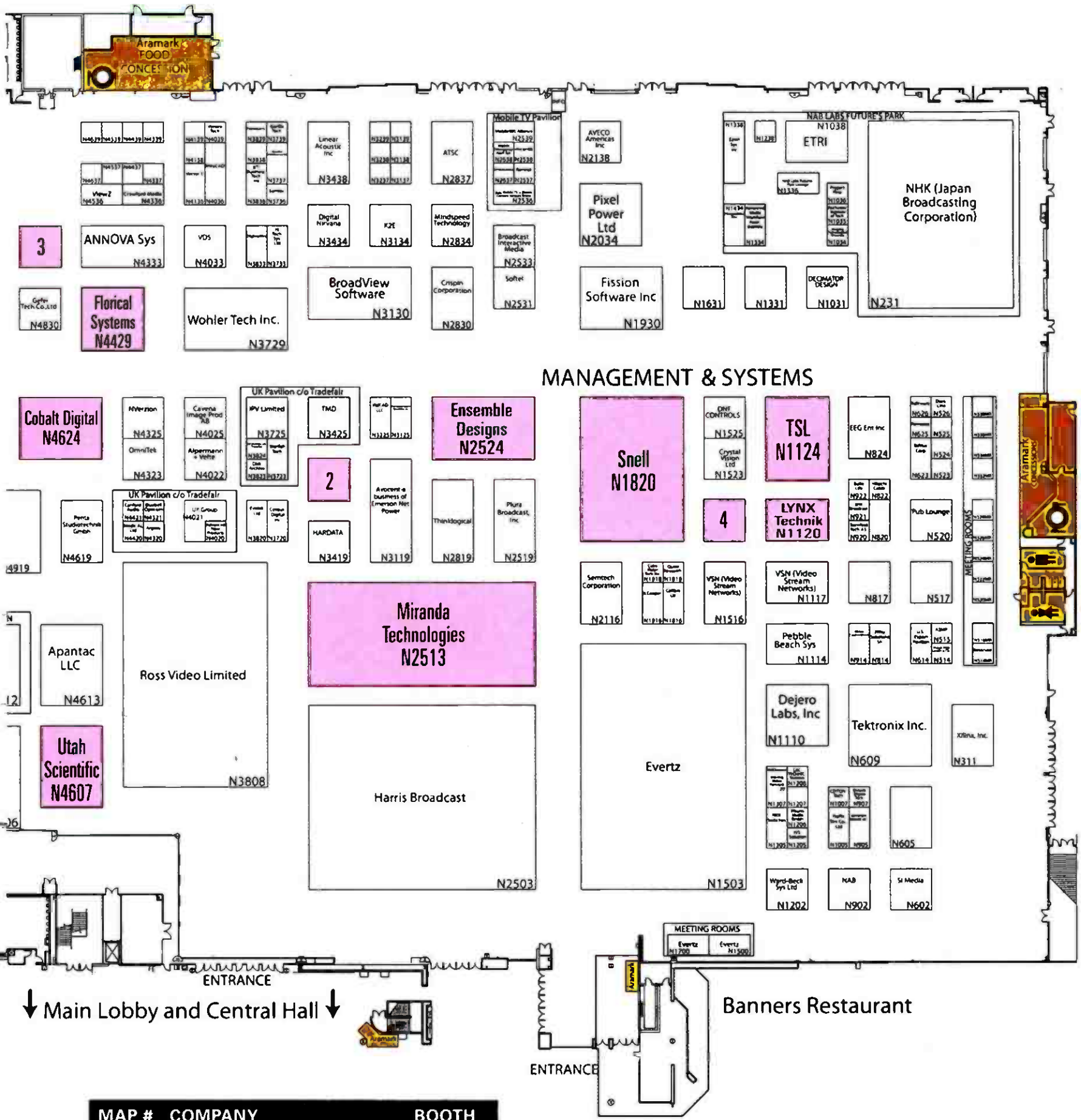
■ **Post-Production** — Includes animation and VFX, digital intermediate, editing software/hardware, 3-D technologies, motion graphics, subtitling and captioning, and encoding.

See Broadcast Engineering at booth #N5135 on page 4

NORTH HALL

Advertisers | Map advertisers | Points of convenience





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2	Opticomm-EMCORE	N3422
3	Phabrix	N4833
4	SGL	N1520

CENTRAL HALL

Advertisers | Map advertisers | Points of convenience

NAB Exhibit Hours, April 8-11, 2013
Mon.-Wed. .....9 a.m.-6 p.m.
Thurs. .....9 a.m.-2 p.m.

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1	Videssence	C3941
2	RUSHWORKS	C5640
3	Eartec	C5646
4	ESE	C6043
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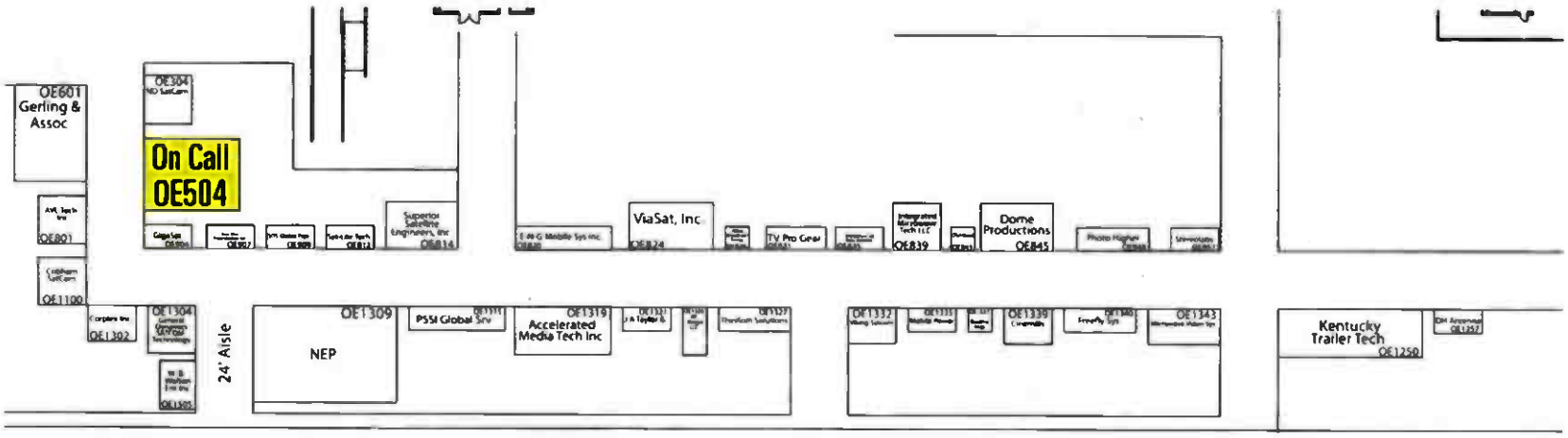
OUTDOOR MEDIA & EQUIPMENT

Advertisers | Map advertisers | Points of convenience



See On Call at booth #OE504 on this page

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NAB Exhibit Hours, April 8-11, 2013
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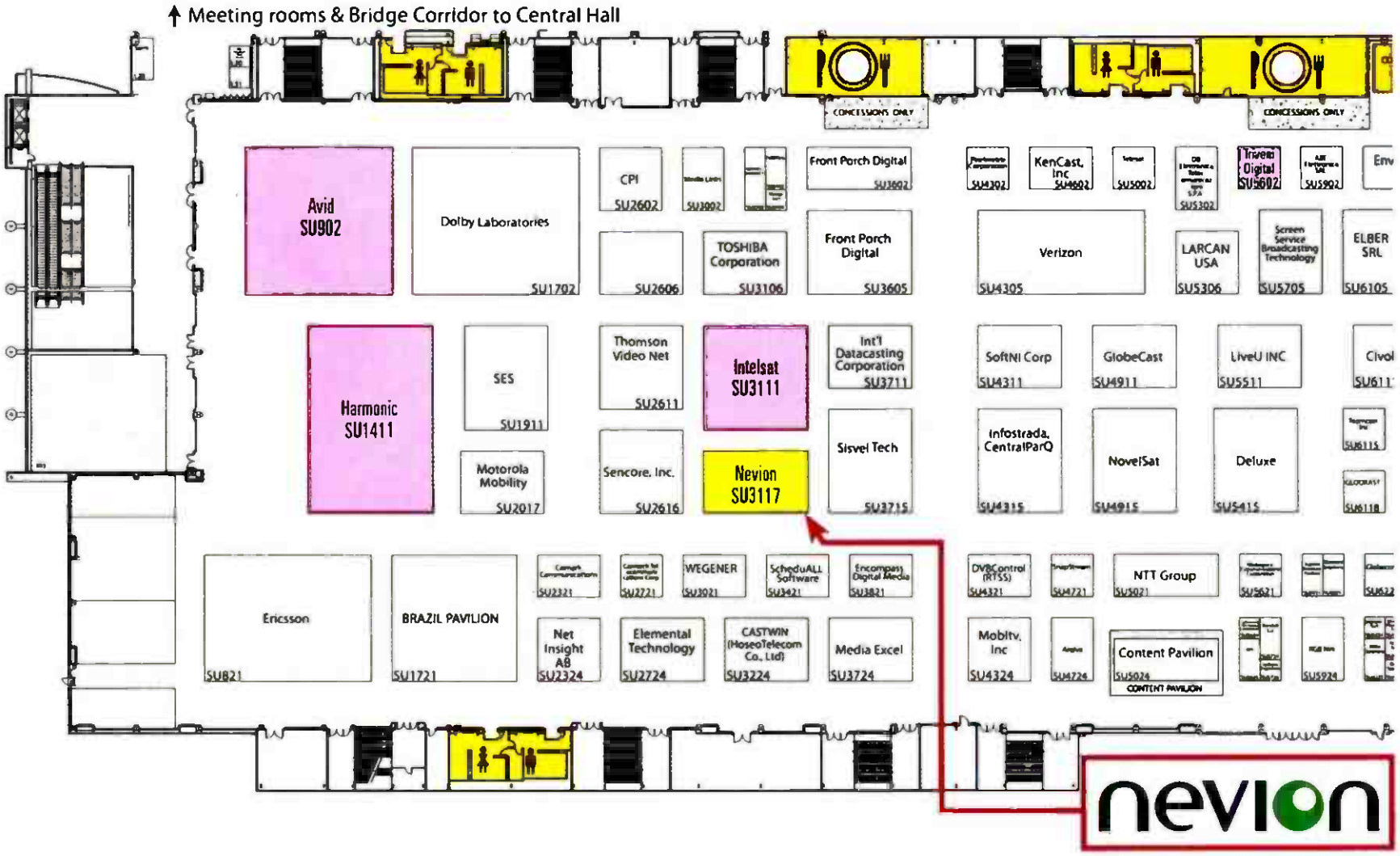
Thurs. ..... 9 a.m.-2 p.m.



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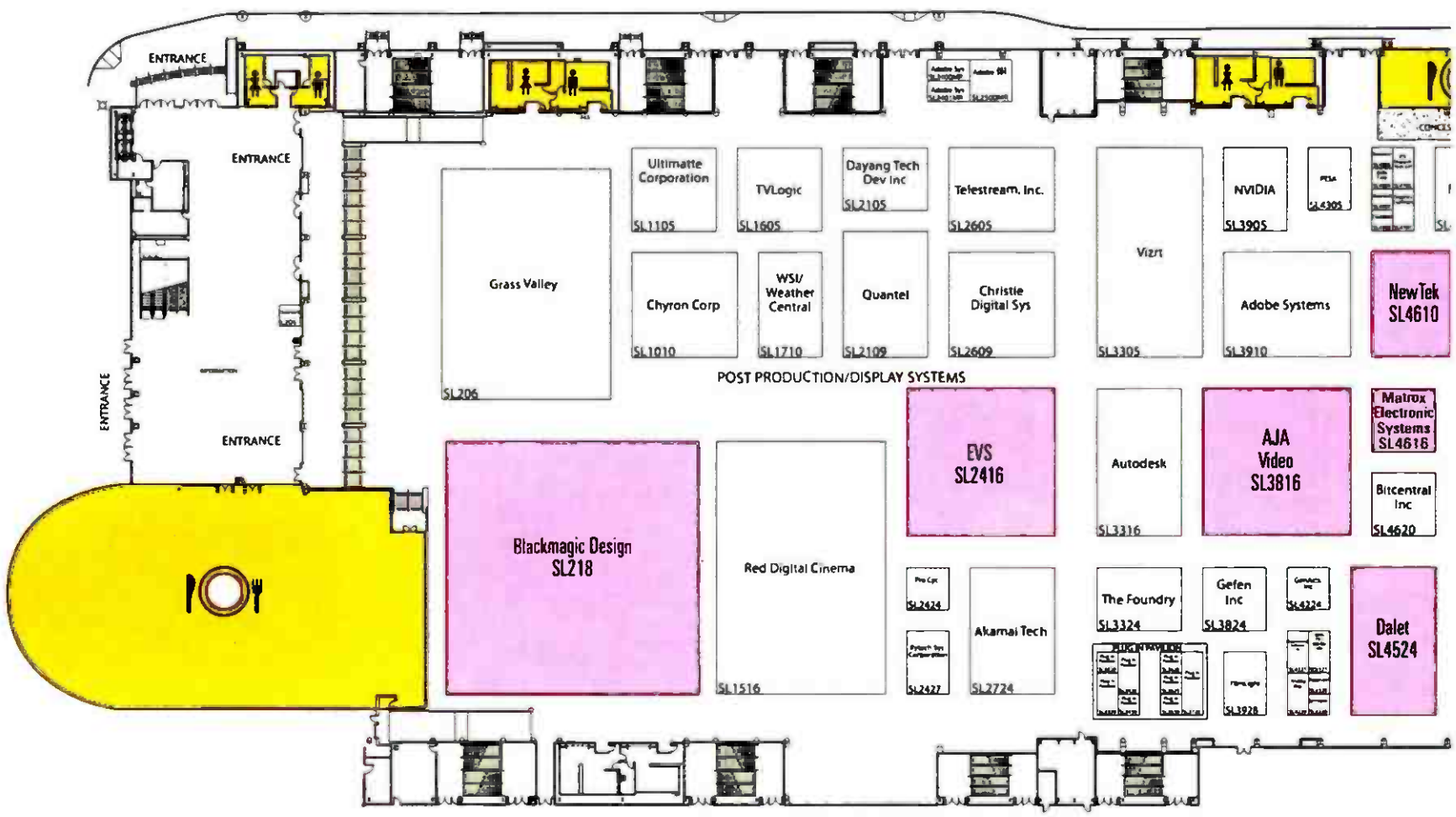

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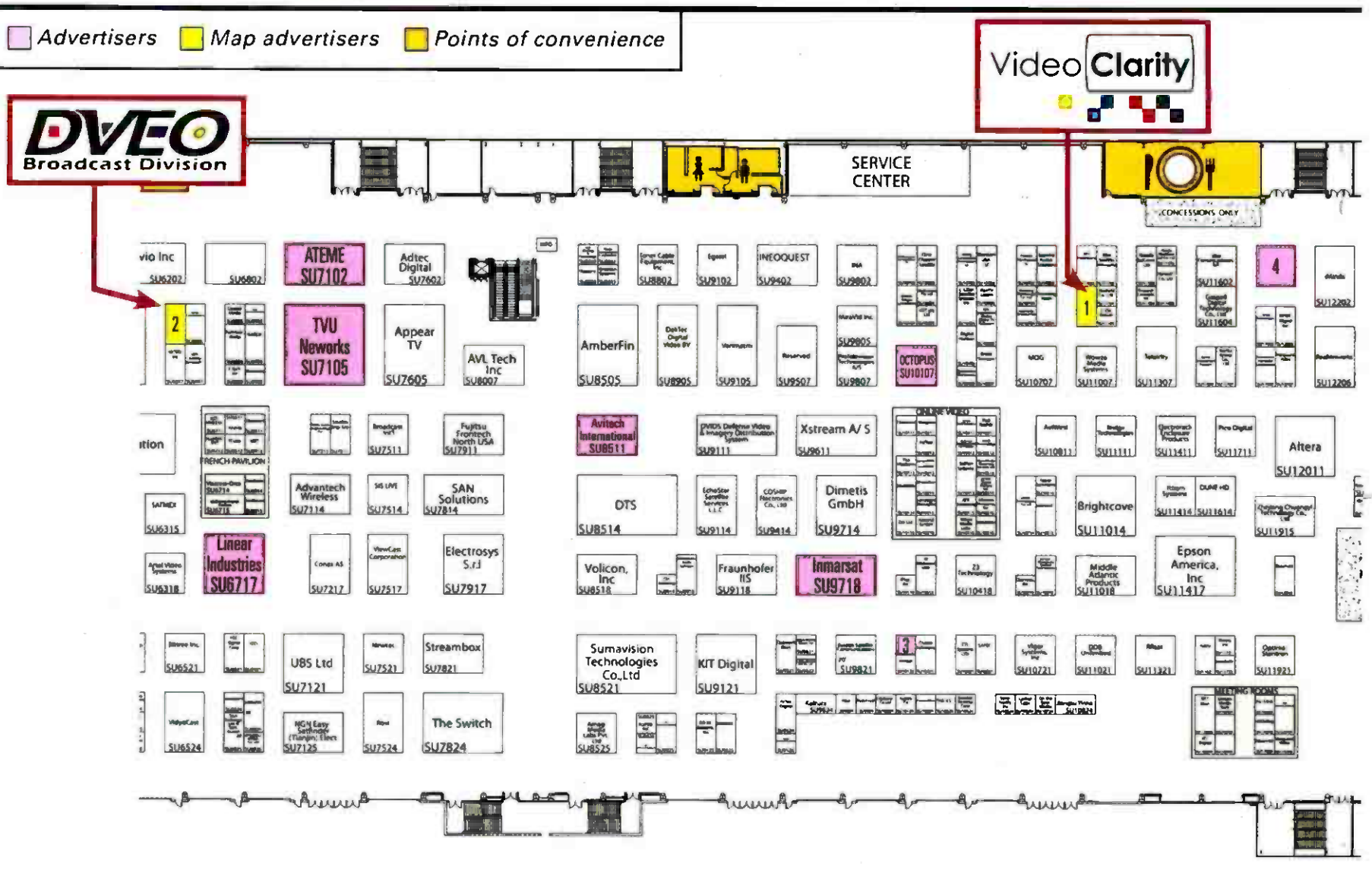

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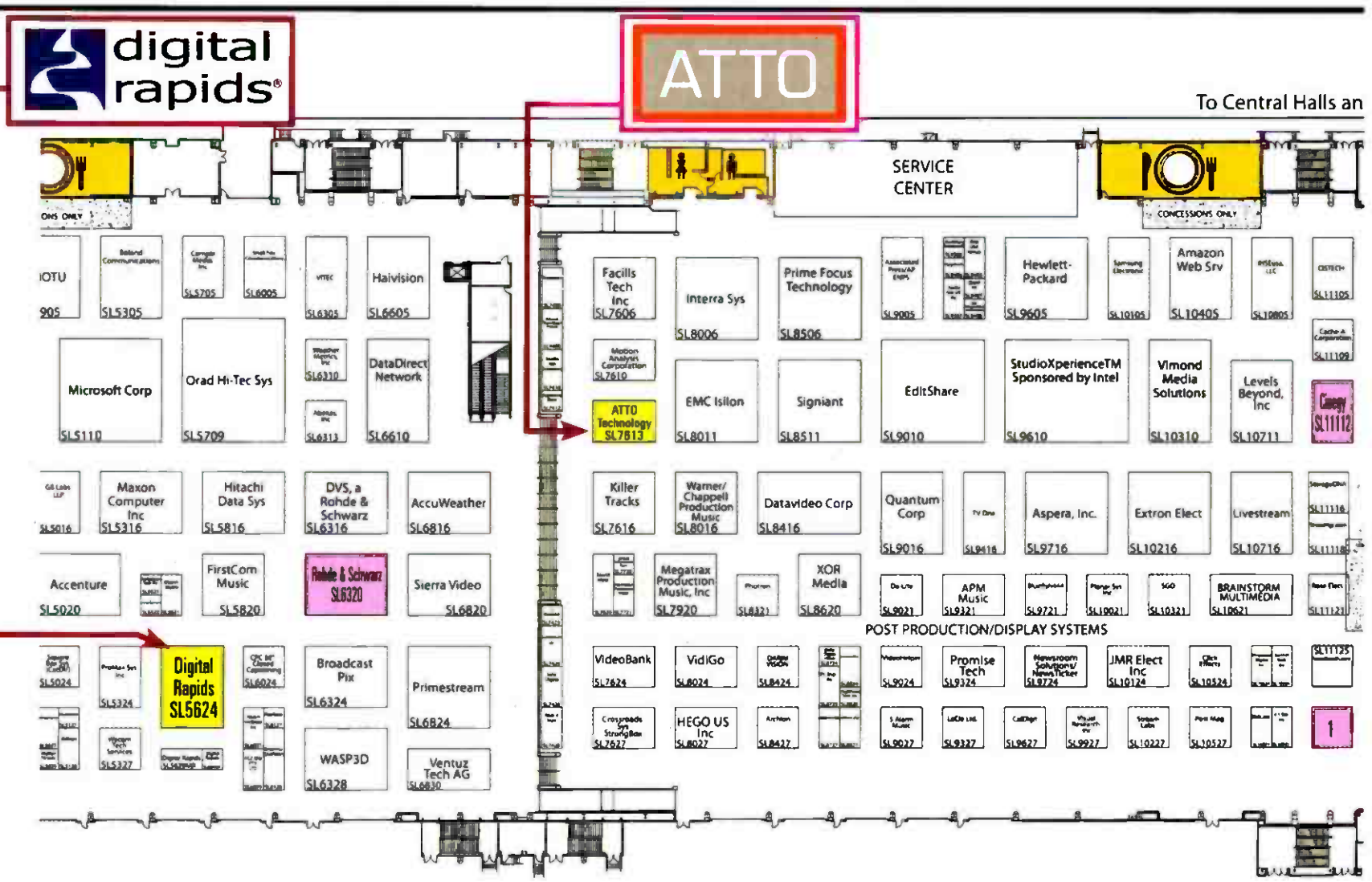

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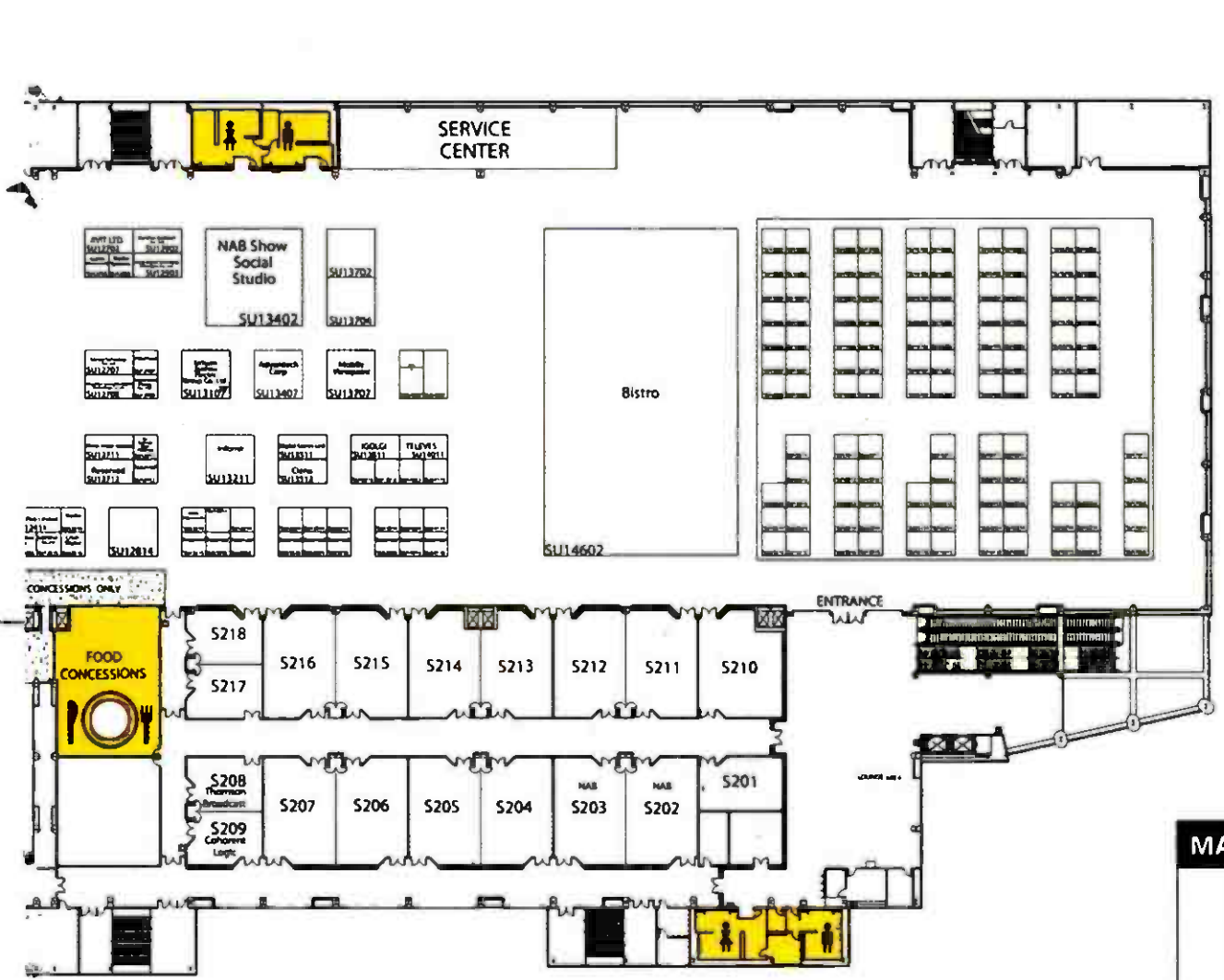

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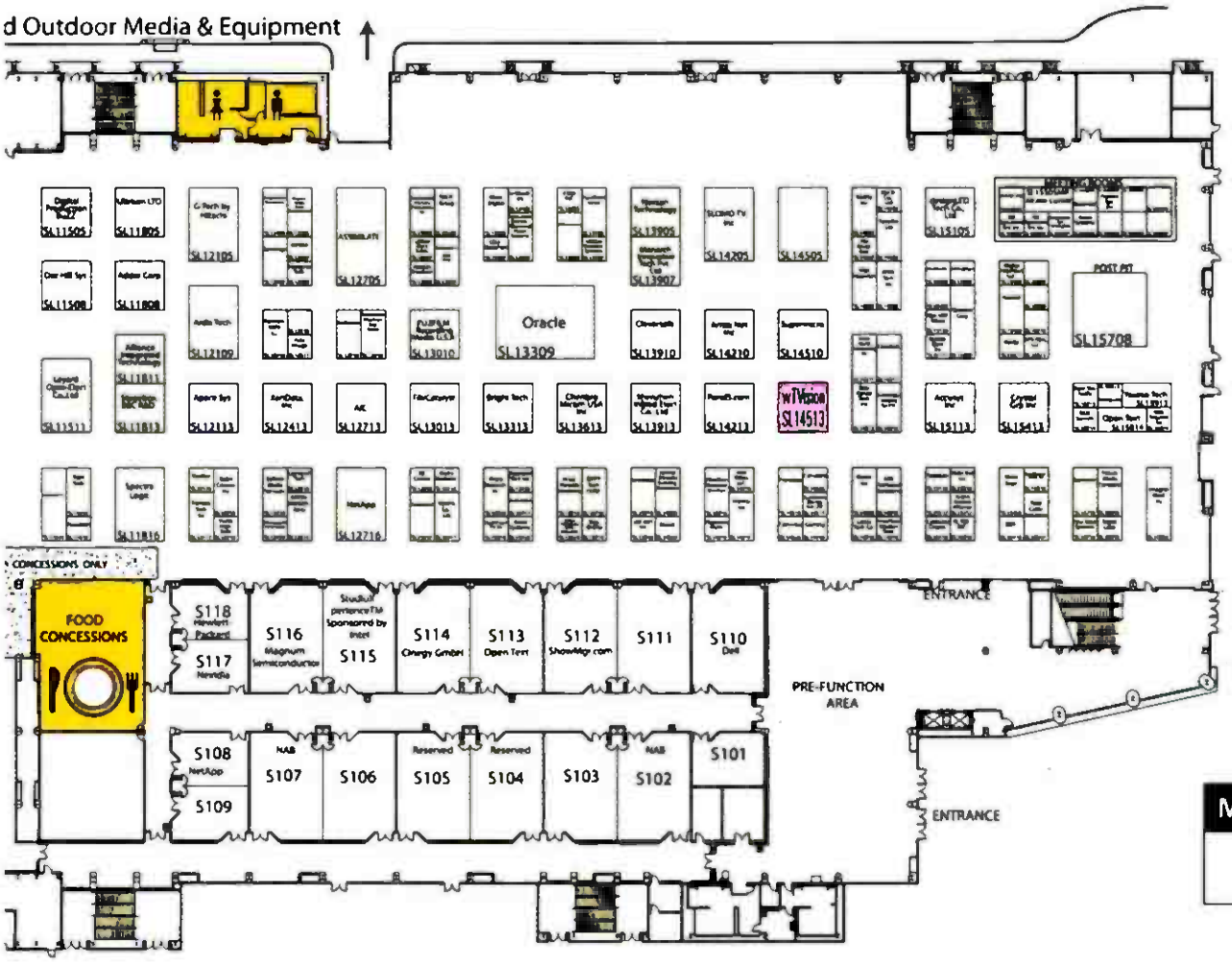
3	Path 1	SU10121
4	Contemporary Research	SU11902



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1	Flanders Scientific	SU11127

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KEY

Here is a key to help you understand the NAB's hall lettering and numbering system.

C = Central Hall
N = North Hall
OE = Outside Exhibits
SL = South Hall, Lower Level
SU = South Hall, Upper Level

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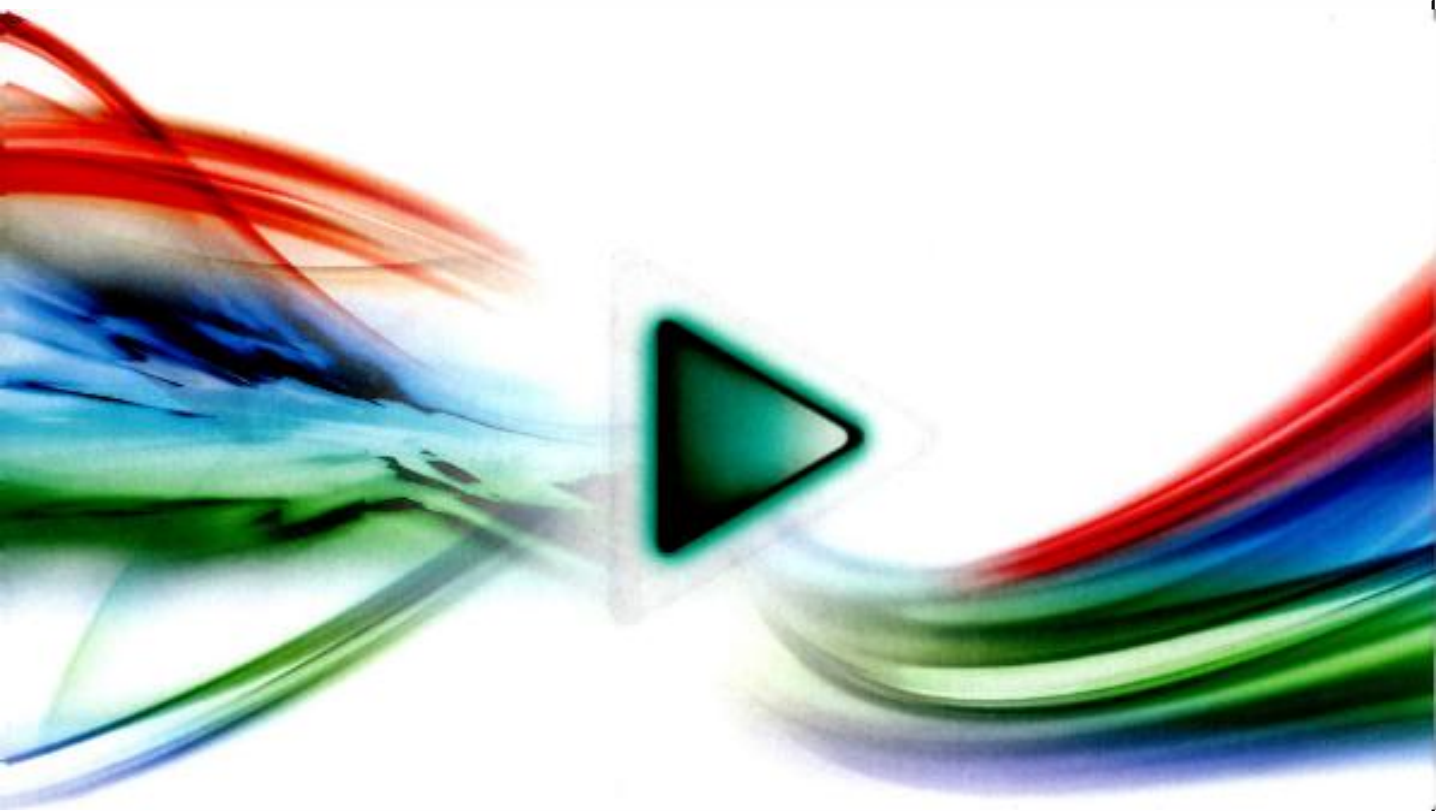

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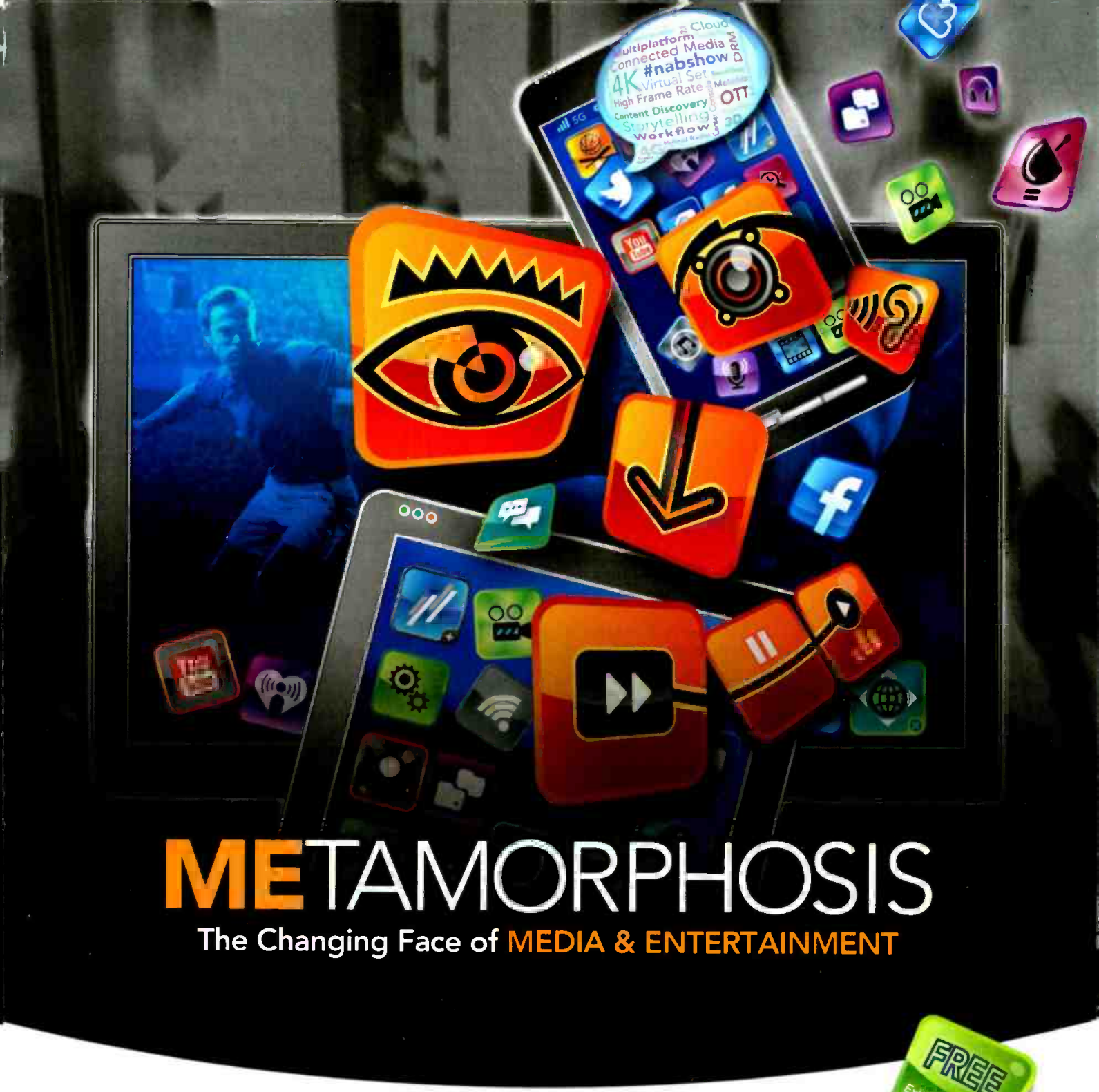

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Miami Marlins Production Facility

Winner of new studio technology — non-broadcast

Submitted by

Avid

The most challenging part of moving the Miami Marlins to Marlins Park was not getting physically into the new facility. It was designing and implementing the kind of innovative all-digital workflow we needed to handle a significant increase in both volume and diversity of content built for, and distributed across, multiple platforms. Today, we serve as a full in-house production agency.

Starting the process in 2004, we adopted a smaller Avid storage solution set. Since then, we've pursued an incremental upgrade path that has ultimately led to the acquisition of a far more robust set of Avid production systems to accommodate the needs of our new on-site production facility.

This has made our production much faster and more efficient. If we need a commercial spot, we have the material we need right at hand. In a given season, we may do more than 400 spots for TV and radio, so we are glad to have the kind of workflow Avid provides to meet a dizzying schedule of turnaround times.

From creating feeds for broadcast and internal scoreboards, to logging clips and putting together highlights packages, we cover basically anything that happens at a game, including ceremonies, first pitches and player presentations.

Our department is a key part of the marketing function, producing media for every application, from TV spots to in-game entertainment. To give the fans a better window into the lives of our players, we do scheduled interviews and put together featured pieces around them. We also do a "Meet the Marlin" segment to help create a more fleshed-out picture of our players' lives.

Beyond serving the needs of the Miami Marlins, we do concerts and quick-turn packages for Comcast On-Demand. This allows us to provide a whole host of information on more than just the games. If viewers miss a previous night's concert, for instance, they can catch performance clips on our site or access it on-demand to view it at their leisure. ■

KSL-TV

Winner of station automation

Submitted by

NVerzion

Runner-up

Maharaja TV (MTV)
Submitted by Maharaja TV (MTV)

KSL-TV, the NBC affiliate in Salt Lake City, operates two independent network channels under the same roof. On a daily basis, its engineering department handles content for the main station, a separate Comcast feed, local independent station KJZZ and the Live Well Network, which KSL broadcasts as a digital subchannel. Until recently, all programming and commercial content was manually acquired from eight different content-delivery systems. Master-control operators would perform about 80 to 100 dubs per day, and each dub would take approximately five minutes.

To increase operational efficiency and reduce costs, KSL employed an end-to-end NVerzion automation system that provides a more streamlined, file-based operation and guaranteed redundancy of the station's main, backup and archive devices, thereby ensuring continuity for its broadcast operations. The system includes an NBase SQL media database manager, NView database viewer, NControlMC Master Control transmission playlists, NConvert manual traffic interface, NCompass ingest manager, NGest professional dubbing and recording software application, NTime event scheduling application, NPoint video-preparation software for segmenting and trimming, NVero on-air verification and video logger, EMC-Router Ethernet machine control, and TeraStore nearline storage archive.

Using the automation platform, KSL seamlessly manages a broad range of equipment, including Omneon Spectrum media servers, as well as Utah Scientific 400SD/HD routers and MC-2020 SD/HD master control switchers.

Master-control operators use NVerzion's NCompass ingest manager to automatically acquire content from a variety of different edge servers and transfer it to the Omneon servers as needed. Operators can set preferences for file naming and program segmenting, as well as manually drag-and-drop file transfers, to streamline operations. ■

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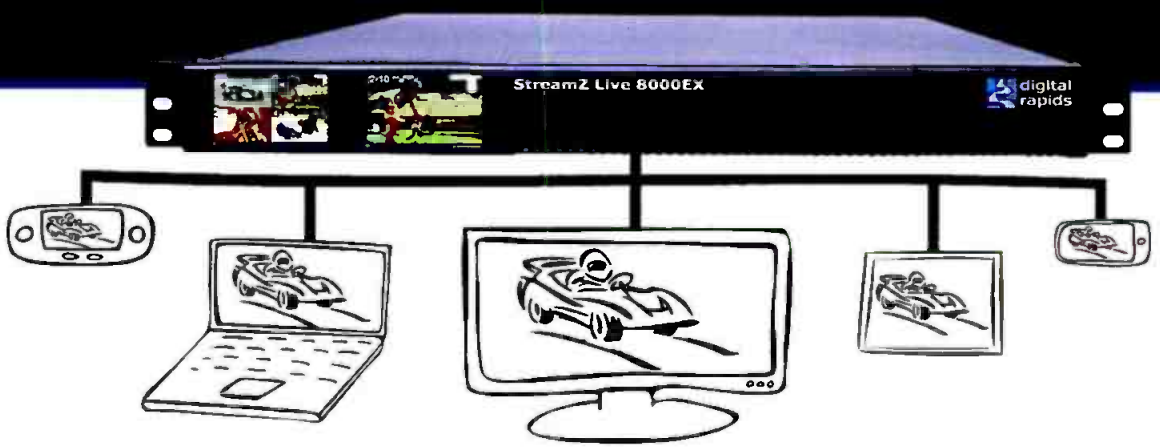

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PAC-12 Distribution Center

Winner of network automation

Submitted by

Comcast Media Center

Runner-up

Centralcast
Submitted by Myers Information Systems and Evertz Microsystems

Comcast Media Center (CMC) successfully launched seven new HD sports networks for PAC-12 Enterprises (PAC-12) from a new origination environment in CMC's Centennial, CO-based facility. Known as the PAC-12 Distribution Center (DC), this environment complements the PAC-12 Network Center (NC) in San Francisco. CMC also provides PAC-12 with occasional satellite and terrestrial fiber acquisition, feed record, media prep, content storage, compression/encryption and uplink services.

Given the dynamic nature of live sports networks, CMC determined that interoperability between the DC and the NC was paramount to the PAC-12 team. Therefore, CMC designed the systems to allow the San Francisco staff to produce and contribute file-based content, remotely schedule and segment feed records, and drive programmatic changes as necessary.

The operations staffing model for the DC needed to be flexible and able to expand/contract as schedules dictated. To support these requirements, CMC designed the origination environment to include one command-and-control master-control station to manage scheduled playback of PAC-12 Conference programming; seven individual network live-event "pods" (one national and six regional), located immediately adjacent to command and control for live game switching, graphics and commercial insertion; and a supervisor and engineering desk to centrally manage all programmatic and/or technical exception handling.

The DC acquires content from multiple sources — either file-based from the NC and commercial advertising systems, or scheduled feeds/live events delivered via dedicated fiber circuits set up between the NC, conference campuses and the DC. This fiber connectivity allows the DC to perform disaster recovery for PAC-12 should the NC be unable to perform its regular functions. ■

CBS News

Winner of newsroom technology

Submitted by

Fujitsu Network Media Solutions

Runner-up

Associated Press DSNG vehicles
Submitted by Ericsson

Recently, CBS News began exploring the benefits of IP-based newsgathering via corporate LAN/WAN. By delivering video from bureaus located around the world over its IP corporate network to headquarters back in New York City, CBS News could save on fiber and satellite bandwidth costs, as well as more easily cover certain breaking-news events.

A key challenge was convincing the company's corporate IT department that CBS News transmissions could use existing corporate bandwidth without causing any QoS issues to the network. CBS News chose Fujitsu IP-9500 H.264 AVC encoders for its new IP-based newsgathering workflow. When the network began implementing IP-based newsgathering, it discovered that the encoders could be used to simultaneously transmit high-quality HD audio and video over fiber, IP and satellite.

When used as part of the new IP newsgathering workflow, the Fujitsu encoders are located onboard an OB truck in the field or at a local news bureau. After compressing video and audio signals from Sony XDCAM video cameras and decks, the encoders send the signals to Sencore 3187B modular receiver decoders located in the CBS Broadcast Center in New York City. The decoders then convert the signals into an HD video feed for recording and broadcast use.

With satellite bandwidth costing several dollars per minute, CBS News' new IP newsgathering approach is extremely cost-effective because it relies on the company's low-cost internal LAN/WAN. The network anticipates that it will increasingly rely on IP video and audio transmission in breaking news situations where Internet connectivity is available. For example, during news coverage of Hurricane Sandy, environmental conditions made it impossible for the network to rely on satellite; however, leveraging a good IP connection, CBS News was able to deliver life-saving information to its East Coast viewers. ■

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NBA Digital Broadcast Operations Center

Winner of post & network production facilities

Submitted by

The Systems Group

The National Basketball Association (NBA) consolidated two existing facilities into one more modern space to enhance productivity through the use of file-based capture and storage processes.

The new facility in Secaucus, NJ, built with the help of The Systems Group (TSG), in Hoboken, NJ, is responsible for ingest and archiving, as well as redistribution of games around the world.

The project — which included a major renovation of a single large floor — now features operations including 16 edit rooms, four game rooms, a broadcast operations center, a technical operations center and digital media management.

The 24-position logging area works in tandem with a custom SGI ingest and archive system. Currently, two game rooms (that rebrand live games for international feeds) are fully operational, with access to a third when required. The fourth room handles all master-control activities (server playout and channel branding), as well as live-game operations for the NBA International Channel.

The new floor houses all of the NBA's ingest and archiving activities, whereby every game (historical and new) is logged, and appropriate metadata is attached. Thousands of hours of game footage dating back to the late 1940s will continue to be archived — the NBA digitizing it from a variety of tape formats, while also incorporating newer audio and video clips.

Additionally, TSG worked with the NBA on its implementation of the NBA High-Speed Arena Network (HSAN), which includes Harris NetVX encoders and decoders. Storage of all the games is accomplished with dual StorageTek SL8500 libraries that provide 300PB of offline storage.

In each NBA arena, Harris video servers directly tied (via HSAN) to Secaucus record every camera view.

The games are encoded as ASI signals to conserve transmission capacity, and then decoded in Secaucus to turn them back to baseband video for editing. ■

West Works Studios

Winner of post & network production facilities

Submitted by

Comcast Media Center

Runner-up

Pac-12 networks
Submitted by Diversified Systems

In mid-2012, the Comcast Media Center (CMC) refreshed its West Works Studios post-production operations by upgrading its enterprise-level edit system and relocating operations. This upgrade was required for a number of reasons, including: the need to meet the increased volume of services offered to West Works Studios clients; to create a more client-friendly "boutique" environment; to become more competitive in the national marketplace; and to optimize the West Works Studios operational footprint.

West Works Studios, the rebranded CMC Production Service Group, runs five production studios and 12 nonlinear edit rooms to support retail and commercial clientele, as well as Comcast. With this operation evolution, West Works Studios was suffering from operational inefficiency due to a fragmented physical footprint and an enterprise edit system that was missing key features needed for more advanced projects. To resolve this condition, a multifaceted upgrade and relocation project was undertaken. Though the environment was more comfortable, the heart of the system — an Avid Isis 7000 system (running Interplay 2.5, Symphony 6.0 and four multichannel Airspeeds) — delivered the biggest impact to the space's upgrade.

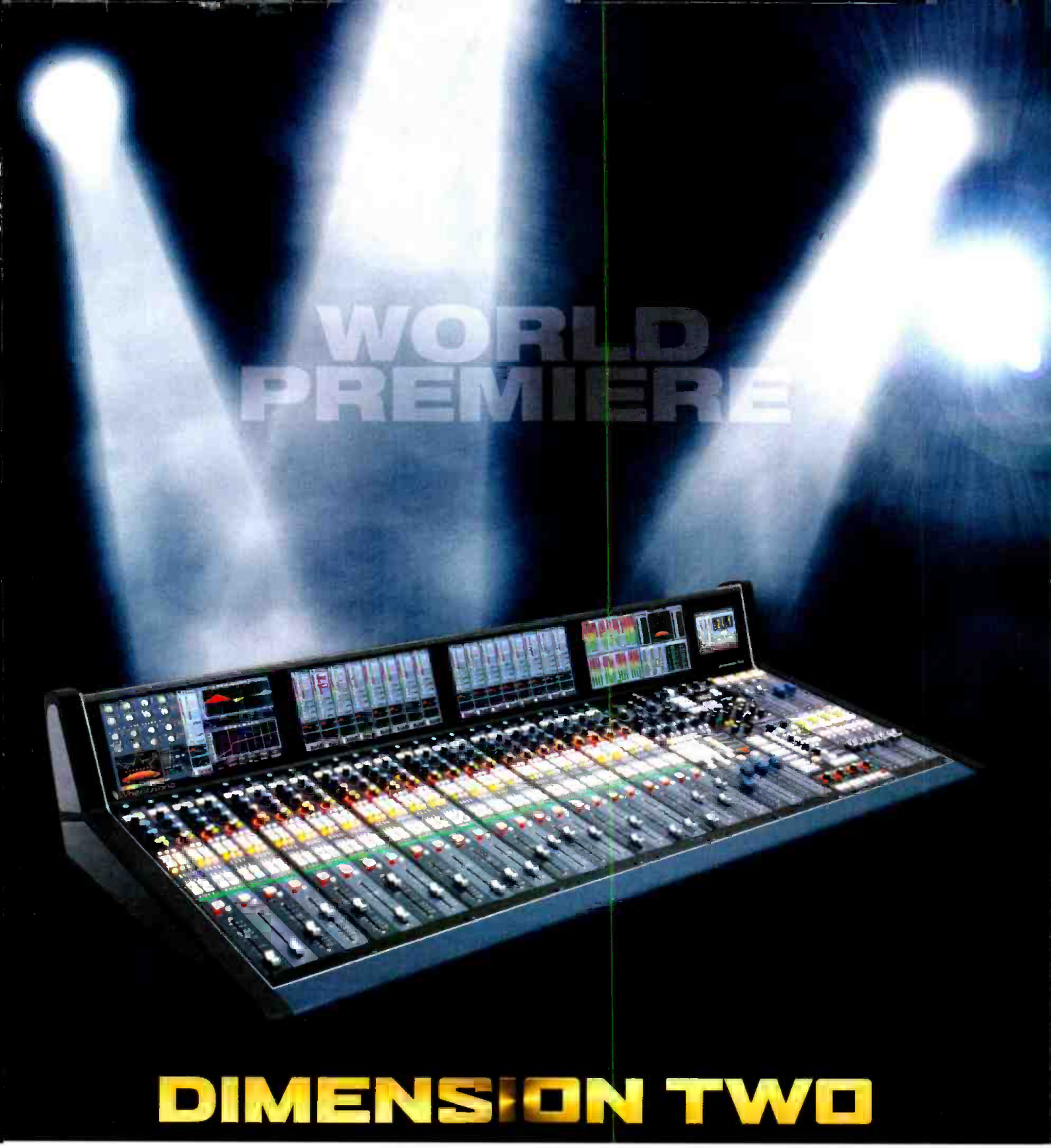
Because West Works Studios provides a large quantity of B2B services to outside organizations, resource availability and scheduling can be the largest challenge. With the integration provided in this installation, editors, producers, content capture staff and management all have permission-based access and viewing into the total system. Resource and content sharing allows an editor to complete an end-to-end capture-and-edit without having to physically travel to another side of the operation — or "wait in line" to use a pooled resource.

Within two weeks, the installation began performing the weekend capture and edit of every football game for the CSS regional sports network. ■

2013 DTV Marketplace

Look at what's inside!

For more information on these products, visit our website at *www.broadcastengineering.com.*



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Booth: SU8918

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DIGITAL MIXING CONSOLE
Lawo mc²56

Now available in five frame sizes in order to meet needs ranging from mobile to studio; latest features include permanent metering of the 16 central faders and nine individually assignable user buttons.

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AUDIO MIXING CONSOLE
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Consists of a main console and separate audio processor, NEXUS STAR; NEXUS STAR rack accommodates all processing components, the RMC main-controller board and up to seven RMD signal processor boards.

www.stagetec.com
Booth: C2050

AUDIO MONITOR
TSL SAM1-3GM

Brings concise monitoring capabilities to facility-wide multichannel audio operations; 1U system provides instant visual feedback from 16 channel sources of embedded SDI.

www.tsl.co.uk
Booth: N1124

Audio recording, storage, playback

TWO-CHANNEL VOICE PROCESSOR
Jünger Audio V*AP

Designed to offer perfect control of microphone recordings; includes processing such as HP/LP filtering, dynamic section, full parametric EQ and de-essing.

www.junger-audio.com
Booth: C2333

AUDIO FILE DATABASE
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Provides instant access to all audio material anywhere on the user's network, hard disk or USB drive; organized database of audio makes it easy to find the right audio cut.

www.enco.com
Booth: C1321

Audio routing, distribution

SOUNDCRAFT INTEGRATION
Riedel Communications
RockNet RN.344.SI

Card provides RockNet integration for any Soundcraft SI Compact console via the console's expansion slot; supports 32 inputs and 32 outputs to the RockNet system.

www.riedel.net
Booth: C4937

AUDIO CONSOLE
Calrec Artemis

Uses Bluefin2 and Hydra2 technologies; Bluefin2 gives Artemis Shine 680 channel processing paths, 340 on an Artemis Beam and 240 on an Artemis Light.

www.calrec.com
Booth: C1746

AUDIO EMBEDDER
Gefen 3GSDI

Selects up to four independent AES/EBU digital audio streams and embeds them into the 3G-SDI output signal; features audio delay adjustment.

www.gefen.com
Booth: 3824

SSL INTEGRATION
Riedel Communications
RockNet RN.334.MD

MADI interface allows intelligent interfacing between RockNet digital audio networks and SSL mixing consoles; this makes the SSL console an integrated part of the RockNet system.

www.riedel.net
Booth: C4937

AUDIO CONTROL SURFACE
Wheatstone Dimension Two

Built on Bridge Router platform; accepts analog, AES, MADI and HD/SDI input signals; provides the ability to send any source or console bus to any audio network destination.

www.wheatstone.com
Booth: 3112

Automation, including news and master control

GRAPHICS SUITE
Florical Acuitas

Includes full-motion graphics, snipes and time/temperature functionality; powered by AirBoss, which adds SCTE-104 capabilities for seamless ad insertion.

www.florical.com
Booth: N4429

SCHEDULING SYSTEM
MediaGeniX WHATS'On

Manages and optimizes cross-media broadcasting, scheduling and content lifecycle processes; designed to streamline current processes as well as grow along with users' future plans.

www.mediagenix.tv
Booth: N5539

CHANNEL IN-A-BOX
Snell ICE Channel-in-a-Box

New features allow up to four channels of HD per unit depending on the channel configuration; now includes powerful, integrated 3D and 2D graphics, and CG functionality with timeline control.

www.snellgroup.com
Booth: N1820

VIDEO SERVER
Playbox AirBox

Provides universal SD/HD content playout and streaming while operating unattended; ideally suited for time-critical live operations.

www.playbox.tv
Booth: N5435

MASTER CONTROL SYSTEM
Ross Video MC1

A dedicated card-based solution provides complete program path protection using input bypass relays, protecting channel output.

www.rossvideo.com
Booth: N3808

BROADCAST WORKFLOW MANAGEMENT
Primestream FORK 4.0

Offers new features, technological improvements and integration with third-party broadcast workflows; new modules include the customizable FORK Logger metadata-tagging tool.

www.primestream.com
Booth: SL6824

TSL

See TSL Professional Products Ltd at NAB 2013, Booth N1124

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Universal Equipment-Control for Frontline Operators

TallyMan

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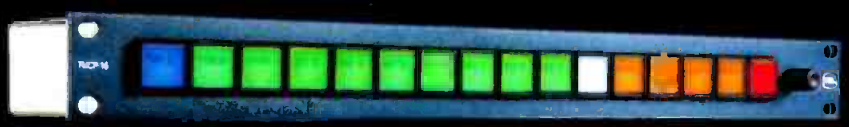
TMCP Control Panels

- A common workflow for engineering operators

The TallyMan Control Panel provides a common workflow to address virtually limitless numbers of routers and control units through a tactile, easy to install push button panel.



- 1U 16 and 2U 32 or 48 button versions
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- Interfaces with ANY third party router via the TallyMan controller
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- New rotary encoder control to allow for quick and accurate recall

www.tsl.co.uk/download/tallyman-tmcp-datasheet.pdf

NEW TallyMan Virtual Panel

- Universal Equipment Control for Frontline Operators

TallyMan Virtual Panel with touchscreen is designed to simplify control of multiple router I/Os. The intuitive user interface is engineered to be more in-tune with the needs of creative operators such as Directors, Producers, EVS Operators and Graphics positions.

- Removes the need to install individual hardware panels each time a router is added or upgraded
- Interfaces with ANY third-party router, vision mixer or multiviewer
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Audio Workflows, Tally Systems and Power Management solutions

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Email: products@tsl.co.uk Web: www.tsl.co.uk/products.aspx

Dolby E PARTNER

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Playbox ScheduleBox
User-friendly GUI handles template-based TV broadcast planning, offering management of single or multiple channels; access control is based on multiple levels of user rights.
www.playbox.tv
Booth: N5435

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Offers solution for transcoding, standards conversion and audio processing in applications including loudness correction, quality control and distribution of media.
www.wohler.com
Booth: N3729

AUTOMATION PLATFORM
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Uses software systems and controls to integrate a broadcaster's legacy hardware and software systems into a unified platform.
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Booth: N4325

NEWSROOM COMPUTER SYSTEM
OCTOPUS Newsroom OCTOPUS6
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INTEGRATED PLAYOUT SYSTEM
Harris Versio
Combines baseband video, channel branding and automated workflow capabilities in an easy-to-deploy, software-based, 1RU channel-in-a-box system.
www.broadcast.harris.com
Booth: N2502

GRAPHICS CONTROL
Molden Media M2Control
Modular, template-based, scalable control and playout application geared for real-time graphics systems; interfaces to data feeds and databases.
www.moldenmedia.com
Booth: SL6830

CHANNEL-IN-A-BOX
SkyLark SL NEO 3000 Series
"Hybrid" channel-in-a-box automation solution is a complete broadcast-quality record-, ingest- and playout-capable system with built-in video server.
www.skylark.tv
Booth: N5138

PLAYOUT SERVER
ToolsOnAir just:play
Version 1.7 includes an enhanced user interface to manage multiple playout channels without the need for increased control unit hardware.
www.toolsonair.com
Booth: SL12810

Cable TV equipment

CABLE LOAD GENERATOR
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Multichannel signal generator for cable TV signals; can simulate cable TV networks with full channel loading; generates both digital and analog TV signals.
www.rohde-schwarz.com
Booth: SL6320

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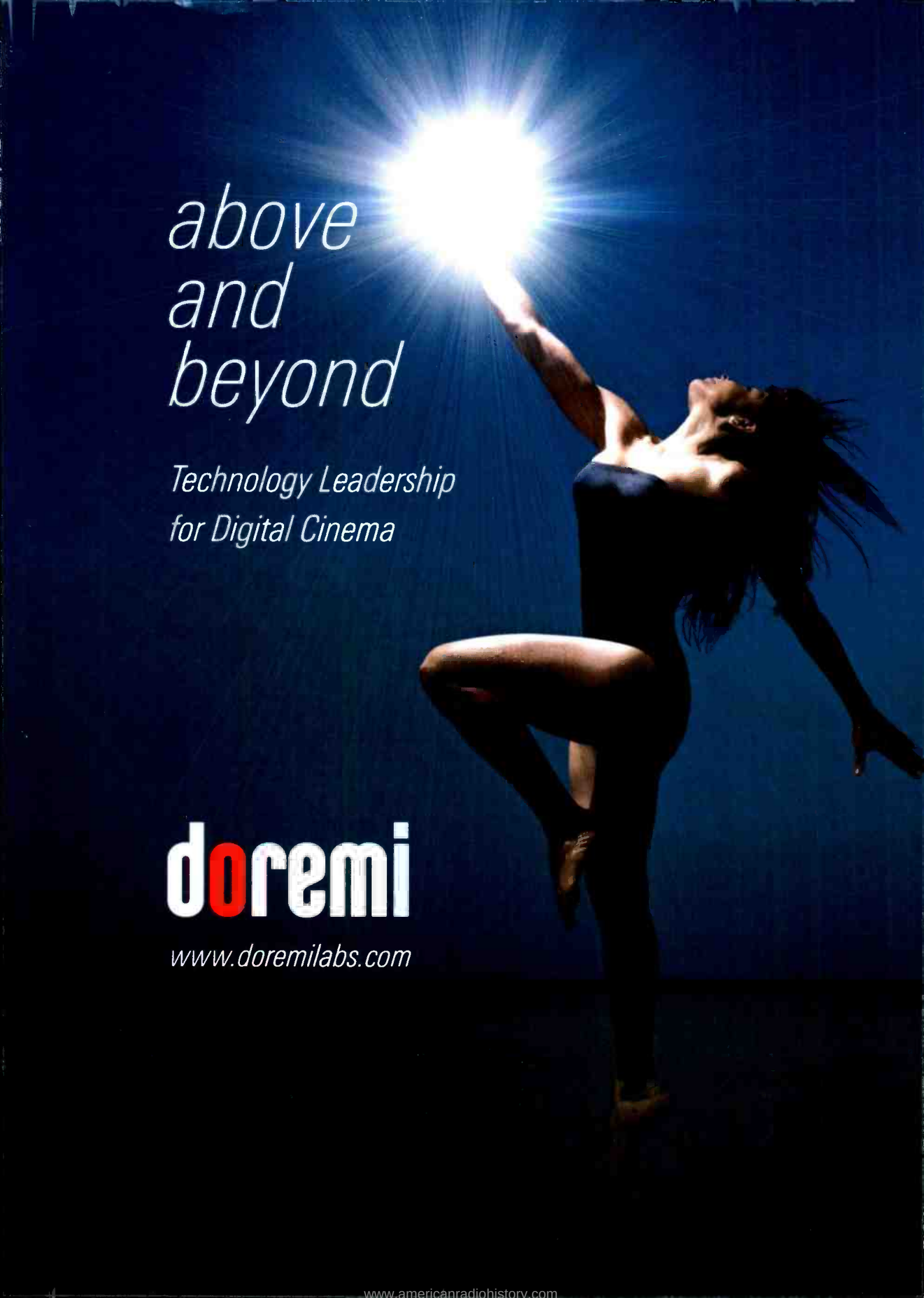
Tektronix Sentry/Sentry Edge II
Sentry family offers QoS and QoE monitoring of a 10G digital video network and video quality monitoring insight, with 3Gb/s throughput; Sentry Edge II family extends insight to QAM access points.
www.tek.com
Booth: N609

MEDIA PROCESSING SOFTWARE
Digital Rapids
Transcode Manager 2.0
Automated, high-volume, file-based processing software seamlessly blends media transformation and workflow processes, while offering efficiency and agility for applications from production and archive to multiscreen distribution.
www.digitalrapids.com
Booth: SL5624

BROADCAST SERVER
TelVue AdCaster A1000
Manages ad insertion for up to 64 channels per server; integrates seamlessly with standard traffic and billing systems; features redundant power supplies and 100-percent solid-state RAID storage.
www.telvue.com
Booth: N623

Camera support, robotics, virtual sets, batteries

COMPACT REMOTE CAMERA LINK
Camera Corps SIMPLY SMPTE
Allows any remotely controlled camera system in the company's product range to be operated over long distance via SMPTE 3K-standard electrical/optical cable.
www.cameracorps.co.uk
Booth: C6032



CAMERA AUTOMATION

Egripment Full Camera Studio Automation

Can be controlled from joystick control, touch-screen system or complex automation system; can be used in the automation environment of any studio.

www.egripment.com

Booth: C8612

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Offers vibration-free speed in an ergonomically designed sturdy package; ideal for OB and studio production with teleprompters or box-type lenses.

www.shotoku.tv

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Telemetrics RCCP-1

Supports RS-232 and Ethernet transmission; camera control and functionality, and control of auxiliary devices, is provided through the panel's touch-screen GUI.

www.telemetricsinc.com

Booth: C9532

Cameras, lenses, accessories

CAMERA SYSTEM

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www.hitachikokusai.us

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Blackmagic Cinema Camera

Features a 2.5K image sensor with a wide 13 stops of dynamic range, as well as a built-in SSD recorder, and popular open standard uncompressed RAW and compressed file formats.

www.blackmagicdesign.com

Booth: SL218

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Designed for super-slow-motion acquisition at 4K resolution up to 900fps; incorporates FT1-CMOS, a global shutter CMOS color sensor.

www.for-a.com

Booth: C5116

FIELD CAMERA

Ikegami HDK-97A

Supports 1080i/720p and 3G signals such as 1080/59.94p 4:2:2 and 1080/59.94i 4:4:4; employs new progressive AIT CCD imagers.

www.ikegami.com

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Great Things. Small Packages.

The UTAH-100 family of routing and distribution products from Utah Scientific has a well-earned reputation for value, performance, and reliability. Two new members of the family are adding ***flexibility*** to the list.

The **UTAH-100/XFD** Fiber Distribution Frame packs up to 16 channels of coax-to-fiber and fiber-to-coax conversion into a compact 1RU frame.

Fiber-per-channel, WDM, and CWDM solutions, including Gigabit Ethernet over fiber, make this unit the logical choice for all of your fiber applications.

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This unmatched flexibility makes it perfect for mobile systems, allowing a single unit to replace racks of DAs.

The UTAH-100 family offers a wide selection of routers in all signal formats in sizes from 8x8 to 32x32 with standard built-in web control and options for built-in or remote control panels, third-party control interfaces, redundant power supplies.

The family also includes Distribution Amplifier packages and modular DA solutions for all applications.

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www.utahscientific.com

WIRELESS HD CAMERA TRANSMITTER
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Provides transmission stability for high-quality HD images using low-latency H.264 compression in conjunction with ultra mobile video link modulation; latency as low as 15ms.
www.cobham.com
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HANDHELD PROHD CAMERA
JVC Professional Products Company GY-HM600
Upgrade improves the camera's autofocus and signal-to-noise ratio, as well as its flash band compensation, which minimizes or eliminates banding during recording when an external flash is in use.
http://pro.jvc.com
Booth: C4314

VIDEO CAMERA
Grass Valley LDX Flex
Provides wide range of gamma and knee adjustments; offers choice of fiber or triax camera transmission using different versions of 3G base stations; can be upgraded through the entire LDX range.
www.grassvalley.com
Booth: SL206

P2 HD HANDHELD CAMCORDER
Panasonic AG-HPX250
Offers master-quality 10-bit, 4:2:2 independent frame, 1920 x 1080 resolution AVC-Intra 100 recording; incorporates high-sensitivity 1/3in full-HD 2.2 megapixel 3-MOS imagers.
www.panasonic.com/broadcast
Booth: C3607

4K CAMERAS
Sony PMW-F55, PMW-F5
Feature newly developed PL lenses, RAW recorder, a new choice of viewfinders and a new recording media with expanded capacity.
www.sony.com/professional
Booth: C11001

CGs, prompters, captioning

DIGITAL CLOSED CAPTIONING
EEG HD490
Instant iCap and ComCC support arebuilt-in; supports new modules for web streaming using live CC data captured into Timed Text files, or real-time data delivery through HTTP POST or Flash/RTMP.
www.eegent.com
Booth: N824

AUTOMATED CLOSED-CAPTIONING SYSTEM
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www.screensystems.tv
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www.softelgroup.com
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Graphics, animation products

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Automates and manages rendering of Adobe After Effects projects into fully finished graphics, ready for playout from an iTX integrated playout platform on Miranda's Vertigo graphics processors.

www.miranda.com
Booth: N2513

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Built on Lyric technology; allows users to access data including RSS feeds, traffic, financial, weather, elections, tickers, promos and snipes, and publish it on-air anywhere, anytime.

www.chyron.com
Booth: SL1010

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wTVision Slides CG V4
Is responsible for the rapid project development environment of real-time TV broadcast graphics solutions for different market segments; features a new multi-screen and multi-layout tabbed user interface.

www.wtvision.com
Booth: SL14513

Intercom, IFB products

PARTY-LINE INTERCOM SYSTEM
Clear-Com HelixNet

Combines an analog party-line intercom with the advanced network management capabilities of a matrix intercom; provides quick setup and distribution of multiple intercom channels.

www.clearcom.com
Booth: C8008

FIELD MIXER
JK Audio RemoteMix 2
Two-channel field mixer and headphone amplifier provides communications interface for remote broadcast, IFB or a backup audio path; features a phone line hybrid with keypad.

www.jkaudio.com
Booth: C3249

WIRELESS INTERCOM
Eartec COMSTAR

Full duplex system allows crews to converse simultaneously just like on a regular telephone; to operate, simply turn the system on and talk; is not voice-activated, and there are no transmit buttons.

www.eartec.com
Booth: C11229

Lighting equipment

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Videssence ExceLED 225
225W unit features adjustable beam spread; provides long throw and high light levels required for film and video in large production studios and similar applications; has a 30,000-hour life.

www.videssence.tv
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Central Hall, C5116

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*According to internal research as of May 2012.

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Cost-effective lighting panel includes eight 5/8in-diameter fluorescent tubes that deliver illumination using Osram daylight or tungsten-balanced phosphors.

www.photonbeard.com
Booth: C11432

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Compact, travel-friendly, all-weather studio-quality portable LED light for news, field production and studios; powered by AC mains or standard broadcast snap-on or V-mount camera batteries.

www.frezzi.com
Booth: C7936

Microphones, accessories

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Offers high separation and extreme SPL handling, which results in extraordinary natural sound; state-of-the-art adapter system allows for seamless integration with many professional wireless systems.

www.dpamicrophones.com
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HEADSETS

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BRH31M single-sided headset has an adjustable headband; BRH440M dual-sided headset is closed-back, circumaural piece built for long-wearing comfort; both the 440M and 441M include a flip-up mute function that deactivates the boom mic when raised vertically away from the mouth.

www.shure.com
Booth: C2627

WIRELESS MIC

Sennheiser DIGITAL 9000

Easy to set up and operate; mic heads and lavalier mics available for the transmitters let users tailor the system to their application; incorporates handheld and bodypack transmitters.

www.sennheiserusa.com
Booth: C3217

Media storage, archive systems, asset management

FILE-TRANSFER SOFTWARE

Aspera Drive

Features integrated desktop and mobile browsing of remote files, drag-and-drop high-speed upload and download from cloud storage, and background synchronization.

http://asperasoft.com
Booth: SL10315

16GB/S RAID CONTROLLER
ATTO Technology
FastStream series

Designed to provide an affordable way to create real-time, shared storage with managed latency for high-performance workflows; features technologies that ensure optimal performance.

www.attotech.com
Booth: SL7613

CLOUD-BASED PRODUCTION SYSTEM
Aframe 2.0

Newest feature, Edit Flow, allows users to export metadata out of Aframe and into the three major NLE platforms — Avid Media Composer, Apple Final Cut Pro and Adobe Premiere.

www.aframe.com
Booth: N.CP 13-15 (Cloud Pavilion)

TAPELESS VIDEO RECORDER
AJA Video Systems Ki Pro

Records high-quality files onto computer-friendly media; SD/HD-SDI, HDMI and analog inputs interface with virtually any type of camera or connect seamlessly with user's post-production hardware.

www.aja.com
Booth: SL3816

INGEST, TRANSCODING AND QC SYSTEM
AmberFin iCR closed captioning

Enhancements help simplify captioning workflows to meet new FCC regulation mandating that all video content broadcast on television in the U.S. with captions should now include captions when it is distributed over IP.

www.amberfin.com
Booth: SU8505

CONTENT MANAGEMENT SYSTEM
Aveco ASTRA suite

ASTRA CMS is the core and can offer a common interface for archive, production, news and master control; other tools in the suite include ASTRA MCR, ASTRA News and ASTRA Studio.

www.aveco.com
Booth: N2138

MAM SYSTEM
Front Porch Digital DIVAdirector

Permission-based Web application enables complete access to file-based content stored by DIVArchive content storage management systems.

www.fpdigital.com
Booths: SU3602, SU3605

RIGHTS MANAGEMENT MODULE
Pilat Media IBMS Rights

For linear and on-demand multi-platform content; delivers centralized rights management across all broadcasting operations.

www.pilatmedia.com
Booth: N6224

MAM SYSTEM
Dalet Galaxy

Features new ergonomic interface, the new Dalet One Cut multi-track video editor and an industry-standard BPM workflow engine; automates many tasks.

www.dalet.com
Booth: SL4524

ARCHIVE SYSTEM
SGL IP2 Archive

Is now fully integrated with IPDirector, EVS' suite of video production management applications; provides high availability for any combination of disk and tape storage.

www.sglbroadcast.com
Booth: N1520

SHARED STORAGE SYSTEM
Small Tree GraniteSTOR TITANIUM4

All-in-one Ethernet-based storage solution for video editors requiring shared access to media files; four-drive system supports 2TB, 3TB or 4TB disk drives.

www.Small-Tree.com
Booth: SL6005

MEDIA ASSET MANAGEMENT SYSTEM

Cinegy Archive

Database manages archives or productions of any size as an affordable alternative to digitizing tape-based archives and production workflows; offers scalable and open architecture.

www.cinegy.com
Booth: SL11112

PLAYOUT AND DISTRIBUTION

GlobeCast

Scalable playout and origination systems allow broadcasters to adapt content to local markets anywhere in the world and simplify the overall content distribution process.

www.globecast.com
Booth: SU4911

STORAGE SYSTEM

DVS DVS-SAN

Configurable and scalable high-end storage solution for broadcast workflows; handles hundreds of connected clients effortlessly; data manager helps organize and move large volumes of data with ease.

www.dvs.de
Booth: SL6316

ASSET MANAGEMENT WORKFLOW

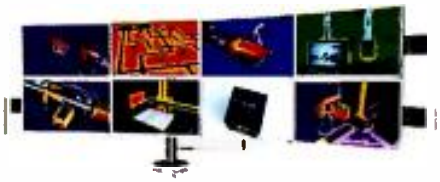
Crispin MediaNav

Prepared workflows detect, inspect, move, copy, quality-check, transcode, store and delete material according to a series of steps that users can create and modify.

www.crispincorp.com
Booth: N2830

MEDIA ASSET MANAGEMENT PLANNING

Snell Momentum



Features a highly intuitive GUI that enables users to edit and control their workflows on demand; delivers maximum control and flexibility to media and broadcast operators.

www.snellgroup.com
Booth: N1820

MEDIA STORAGE SYSTEM

EditShare Flow Version 2.3

Include enhanced frame rate, codec and wrapper support, and an asset groups tab to give administrators an additional way to grant users permission to browse and search for clips in FlowBrowse.

www.editshare.com
Booth: SL9010

CHANNEL-IN-A-BOX
Pebble Beach Systems Stingray
Scalable up to more than 100 channels; enables fast deployment of a wide range of channel types; fully Unicode-compliant; features multiformat playback capability;designed for playout or ingest.
www.pebble.tv
Booth: N1112

ACCELERATED FILE TRANSFER SYSTEM
Signiant MediaShuttle
New additions include secure file sharing for professional media and cloud-based delivery specifications; enforces asset compliance on the front end of a file transfer process.
www.signiant.com
Booth: SL8511

ASSET MANAGER
Solid State Logic Gravity
Tool allows users to capture, playout, move, monitor and manage media assets; extent of user control can be controlled by privilege level; on-screen preferences are customizable.
www.solidstatelogic.com
Booth: C2617

ARCHIVING SYSTEM
SGL FlashNet
Is now integrated with EVS' IPDirector; provides high availability for any combination of disk and tape storage.
www.sglbroadcast.com
Booth: N1520

MEDIA ASSET MANAGEMENT
MYERS Media Asset Management Module (MAM)
Module in ProTrack TV is designed to offer an effective, affordable solution for the management of media assets; automates the migration of media assets to/from playback and archive, based on the data in the ProTrack TV schedule environment.
www.myersinfosys.com
Booth: N6415

CLOUD-BASED HD PLAYOUT PLATFORM
Deluxe MediaCloud
HD playout platform and associated service suite delivers rich functionality required to launch and operate TV channels, including versioning for new media platforms.
www.bydeluxe.com
Booth: SU5415

SHARED STORAGE SYSTEM
Harmonic Spectrum MediaStore 5000
Disk-based shared storage system brings the latest SAS disk technology to the storage component of the Spectrum media server system; accommodates up to 24 hot-swappable drives in a 2RU chassis.
www.harmonicinc.com
Booth: SU1411

New media, streaming products, multimedia/Internet

BONDED LAPTOP SYSTEM
LiveU LU-Lite
Designed to offer a fast, reliable and high-quality mobile bonded transmission via the laptop, using up to four simultaneous Wi-Fi, LAN, cellular and satellite connections; features a user-friendly interface.
www.liveu.tv
Booth: SU5511

REAL-TIME HD ENCODER
Screen Service Broadcast SDT ENC 333A
Provides real-time audio/video encoding for broadcast applications; uses H.264 and MPEG-2 for low output bit rate with a flexible range that goes from 2Mb/s to 25Mb/s.
www.screen.it
Booth: SU4306

VIDEO PLATFORM
Dejero LIVE+
Uses mobile wireless networks to transmit high-quality video for ENG; includes the 20/20 transmitter, a portable and rugged bonded cellular transmitter for a wide variety of ENG applications.
www.dejero.com
Booths: N1110 and N314MR

LIVE FIELD ENCODING DEVICE

Livestream Broadcaster LTE

Features built-in Verizon 4G modem and data plan; built-in batteries instead of AA batteries and support for 5.4Ghz Wi-Fi; lets users go live instantly without a PC.

new.livestream.com
Booth: SL10716

ENCODER

Digital Rapids StreamZ Live

Designed to provide superior output quality, reliability and flexible, multi-screen output format support for live streaming applications; features ABR support.

www.digitalrapids.com
Booth: SL5624

STREAMING MEDIA MODULE

Miranda SME-1901

Suitable for a wide range of IP monitoring, combining high density with high quality to perform H.264 video and AAC audio encoding for up to 20 streams per frame.

www.miranda.com
Booth: N2513

REAL-TIME HD VOIP ENCODER/DECODER

Screen Service Broadcast SDT ENC 335

HD video over IP system receives SD/HD video signal, compresses it and transmits it via an IP network; decoder captures data from an IP network, decompresses it and plays it back in original form as SD/HD video.

www.screen.it
Booth: SU4306

SOCIAL MEDIA INTEGRATION

never.no Interactivity Suite Hybrid TV integration

Integrates with Hybrid TV's virtual set and augmented reality technology to allow an audience to participate with a program in real time via second-screen devices.

www.never.no
Booth: SL8827

REAL-TIME STREAMING TRANSCODER

Vela Research UltraStreamHD IP2IP transcoder

Designed for continuous low-latency operation; format support includes real-time MPEG-2 to MPEG-2, VC-1, H.264 and MPEG-4SP/SP transcoding, transrating and frame-rate conversion.

www.vela.com
Booth: C2330

CONTENT-REPLACEMENT INTERFACE

Yospace SmoothStreaming support

Provides support for seamless replacement of content, including tailored advertising and content blocking; interfaces directly with the playout automation system to ensure a completely seamless output.

www.yospace.com
Booth: SU8503

Production switchers, video effects, keyers

WORKFLOW FRAMEWORK
Grass Valley GV STRATUS

New release includes tools to increase workflow efficiency through automated, rules-based file operations; features introduction of EDIUS XS nonlinear low-resolution proxy editor.

www.grassvalley.com
Booth: SL206

MULTIFORMAT SWITCHER
Snell Kahuna 360

Features FormatFusion3 technology, which supports a mix of SD, HD, 1080p and now 4K; accepts incoming 4K UHDTV feeds, mixes them with 1080p, and outputs as either 4K UHDTV or 1080p.

www.snellgroup.com
Booth: N1820

LIVE SLOW-MOTION REPLAY
Evertz Dreamcatcher

Features a highly scalable and flexible system architecture; supports 3G, HD and SD baseband I/O; an eight-channel system packaged in 2RU can provide more than 70 hours of high-performance, fault-resilient HD storage.

www.evertz.com
Booth: N1503

VIDEO PLAYBACK SYSTEM
Blackmagic Design UltraStudio 4K

Includes video technology such as 4:4:4 and dual-channel 3-D stereoscopic capture and playback, plus full-resolution 4K monitoring; can be used on the desktop and easily installs into equipment racks.

www.blackmagicdesign.com
Booth: SL218

TIME CODE READER, GENERATOR AND INSERTER
ESE HD-488/SD

Reads and generates HD or SD/SDI video, Linear Time Code (LTC), Digital Vertical Interval Time Code (D-VITC) and RP-188 Time Code; in SD mode, the unit will accept 4:2:2 (525 and 625 line) digital video signals.

www.ese-web.com
Booth: C6043

PRODUCTION SYSTEM
NewTek TriCaster 855

Fully loaded, 24-channel switcher, with eight-source ISO recording and powerful integrated effects system is a complete, integrated solution for delivering big, live productions in native, full-resolution HD.

www.newtek.com
Booth: SL4610

INTEGRATED PTZ PRODUCTION SYSTEM
RUSHWORKS VDESK LTD, VDESK PRO, VDESK PRO+

Designed for single-operator, multicamera production using a touchscreen and PTZ cameras, so no camera operators are required; supports four, eight or 12 HD/SD-SDI ins; controllable via tablet.

www.rushworks.tv
Booth: C5640

2 MLE CONTROL PANEL
Ross Video Carbonite 2

Based on the Carbonite 2M and 2X, offering 16 source select buttons instead of 24 or 32; is available with 16 or 24 multi-definition SDI inputs and nine internally generated sources.

www.rossvideo.com
Booth: N3808

NONLINEAR SWITCHER
Grass Valley GV Director

Suitable for all production environments; features simple 26-button panel with OLED lables, T-bar and 8in portrait touchscreen; includes simple audio mixing capabilities.

www.grassvalley.com
Booth: SL206

PRODUCTION SYSTEM
NewTek TriCaster 455
Affordable, integrated solution to produce a four-camera, 14-channel, HD live show; features explosive 3-D visual effects, video playback, graphics, transitions and virtual sets.
www.newtek.com
Booth: SL4610

VIDEO SWITCHERS
Sony MVS-3000, MVS-6520, MVS-6530
Feature multiformat support, multiviewer output and standardized menu panel control; MVS-3000 and MVS-6520 are 2 M/E switchers, while the MVS-6530 is a 3 M/E model.
www.sony.com/professional
Booth: C11001

Recording media

VIDER SERVER
DVEO Xaris
Available with single or dual-channel SDI/HD-SDI I/O; records and plays in a scheduled or sequential mode; supports H.264/MEPG-2 video formats and embedded audio pass-through.
www.dveo.com
Booth: SU6505

DIGITAL PRODUCTION WORKFLOW SYSTEM
EVS Enriched Live Production
Enables broadcasters to embrace new connected operations and deliver "live everywhere" offerings to consumers; simultaneously connects live venues to broadcasters, remote users or multimedia consumers.
www.evs.tv
Booth: SL2416

HD FIELD RECORDER
Panasonic AJ-HMP200
Features new editing and recording functions, expanded AV/IT connectivity and optional AVCHD support; 10-bit, independent frame, 4:2:2 recorder can be used with virtually any camera.
www.panasonic.com/broadcast
Booth: C3607

Satellite equipment, services

BONDED CELLULAR SATELLITE BACK-UP SYSTEM
On Call Communications
QuickSPOT
Satellite back-up system for 3G/LTE bonded cellular ENG; provides simple operation for live news gathering by combining bonded cellular backpack encoders with on-demand satellite network.
www.occsat.com
Booth: OE504

SATELLITE

Inmarsat-4 (I-4)

Three satellites in the series are able to generate hundreds of high-power spot beams; each I-4 can generate 19 wide beams and more than 200 narrow spot-beams.

www.inmarsat.com
Booth: SU9718

BROADCAST MONITORS

Plura Broadcast SFP-3G series

Consists of the 17in SFP-217-3G, 21in SFP-221-3G, 24in SFP-224-3G and 32in SFP-232-3G monitors; supports up to 3Gb/s 1080-60p along with all other digital and analog inputs and formats.

www.plurabroadcast.com
Booth: N2519

LIVE MEDIA NETWORKING

Nevion Flashlink

IProvides 10Gb/s uncompressed video transport, Ethernet, data and communications over IP, asynchronous transport of multiplexed audio, and digital sync distribution, with zero latency.

www.nevion.com
Booth: SU3117

Studio and support products, multi-image displays

VIDEO WALL

Evertz EFX Video Wall

For studio back-drop applications; at its core is the 3000DVT-18x18, a large-scale video wall processor with transition effects and the ability to scale any video across any size video wall.

www.evertz.com
Booth: N1503

PLAYOUT SOFTWARE CONTROLLER

EVS NanoAir

Can be used for playing out studio and stage backdrops, such as animations and fill and key; fast-turnaround TV solution for live and near-live production reduces production times.

www.evs.tv
Booth: SL2416

MULTIVIEWER

Avitech International

Rainier 3G Plus

Allows monitoring four SDI (3G/HD/SD)/CVBS (NTSC/PAL) sources in a single card via a full HD 1080p output; up to four cards can be installed in a 1RU chassis.

www.avitechvideo.com
Booth: SU8511

MULTIVIEWER
Harris HView SX Pro

Delivers a compact signal processing and monitoring option for control room environments; high-density design accommodates more sources and outputs in fewer rack units to reduce costs.

www.broadcast.harris.com
Booth: N2502

SDI-TO-HDMI MULTIVIEWER
Matrox MicroQuad

Four-channel multiviewer for 3G/HD/SD; lets broadcasters and A/V professionals use an affordable HDMI display to view up to four SDI video signals and show or hide labels and VU meters.

www.matrox.com
Booth: SL4616

MULTIFORMAT BROADCAST MONITOR
Flanders Scientific CM-170W

17in monitor features 3G/HD/SD-SDI, component, composite and DVI-I inputs; unit also features full 12-bit video processing and a 10-bit panel capable of reproducing more than 1.073 billion colors on screen.

www.ShopFSI.com
Booth: SL11127

PRODUCTION CONSOLES
TBC Consoles CCW

Designed for systems such as Grass Valley's IGNITE or Broadcast Pix's GRANITE; features a complete wrap-around for one-person operation, with multiple keyboards and monitors automating other functions.

www.tbcconsoles.com
Booth: C8614

TBCs, frame syncs, conversion equipment

MULTIFORMAT/MULTI-PURPOSE CONVERTER
BHV Broadcast Proteus

Available in rack-mount and portable versions; features 10-bit SDI, analog video and audio I/O, advanced standards conversion algorithm, comprehensive audio facilities and ARC.

www.bhvbroadcast.com
Booth: N921

UP/DOWN/CROSSCONVERTER
Crystal Vision Up-Down 3G

Allows flexible up-, down- and cross-conversion between 3Gb/s, HD and SD sources; can perform two different conversions simultaneously and give out co-timed dual outputs.

www.crystalvision.tv
Booth: N1523

SCAN CONVERTERS
Ensemble Designs BrightEye Mitto

New high-resolution support for line of BrightEye Mitto high-performance scan converters; new software supports 1920 x 1920 pixel images; provide conversion from computer video to SDI video.

www.ensembledesigns.com
Booth: N2524

MPEG-2 TO MPEG-4 CONVERSION
Globecomm

Provides tools for encoding, delivering improved coding efficiency, the ability to encode mixed media, high error resilience for robust transmission and interaction with various animated objects.

www.globecommsystems.com
Booth: SU6221

ULTRA HD JPEG 2000 CODEC
intoPix Ultra HD family

New range of visually lossless JPEG 2000 encoder and decoder cores support 4K 60fps or 8K 60fps in a single 28nm FPGA from Xilinx or Altera; low delay (2+1 frames).

www.intopix.com
Booth: C4742

SCAN CONVERTER
Matrox Convert DVI Plus

Ideal for creating broadcast-quality video from computer applications such as Skype, YouTube, Google Earth, FaceTime, ProPresenter, PowerPoint and web browsers.

www.matrox.com
Booth: SL4616

HEVC ENCODER
Ittiam Systems HEVC Encoder

Targets 30 percent to 50 percent bit-rate reduction over H.264 at similar visual quality; supports a wide range of standard resolutions up to Ultra HD; encodes interlaced and progressive content.

www.ittiam.com
Booth: SU11414

MPEG-4 AVC
Path 1 PiXiE

HD encoder/decoder features a video interface with a single HD-SDI/SDI port that supports 1080i 29.97/25, 720p 59.94/50 formats; the embedded HD-SDI audio interface supports PCM formats.

www.path1.com
Booth: SU10121

UNIVERSAL INPUT SEAMLESS SWITCHER
TV One C2-8000 series
Provides high-quality video switching with two-channel bi-directional conversion between a variety of analog and digital video formats.

www.tvone.com
Booth: SL9416

EXTENSION CARD
Opticomm-EMCORE Optiva OTC-1HDP
Provides uncompressed transmission of one channel of 3G HD-SDI video with embedded digital audio; allows for format conversion of HD-SDI to DVI and DVI to HD-SDI, over the copper.

www.opticomm.com
Booth: N3422

Telco, IPTV and mobile video equipment

IPTV SERVICE
Intelsat IPTV Service
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: SU3111

MOBILE CELLULAR UPLINK SYSTEM
TVU Networks TVUPack Mini
Weighing less than 2lb, enables broadcasters to transmit live video over multiple 3G/4G/LTE/WiFi connections; available in both camera-mount and belt-mount configurations.

www.tvupack.com
Booth: SU7105

PORTABLE CWDM REMAPPER/MULTIPLEXER
MultiDyne FS-18000 Fiber-Saver
Transports up to 18 digital optical or SDI signals over a single fiber, simplifying the transport of additional signals in remote locations where there are an insufficient amount of available fibers.

www.multidyne.com
Booth: C10339

ENCODING/TRANSCODING PLATFORM
Thomson Video Networks ViBE VS7000
Combines next-generation compression platform for outstanding picture quality in an all-IP environment with live broadcast-quality encoding, innovative video preprocessing and faster-than-real-time file transcoding.

www.thomson-networks.com
Booth: SU2611

MOBILE CELLULAR UPLINK SOLUTION
TVU Networks TVUPack TM8200

Uses multiple 3G/4G/WiFi/BGAN connections, a proprietary H.264 encoder and Inverse StatMux+ transmission algorithm to deliver live professional HD video while using fewer data connections.

www.tvupack.com
Booth: SU7105

CELLULAR INTERNET NEWSGATHERING (ING) TRANSMITTER
VISLINK LiveGear AirStream
Provides high-quality live HD/SD video and audio transmission from anywhere there is cellular broadband service.

www.vislink.com
Booth: C6508

Test & measurement equipment

LOUDNESS MONITOR
Cobalt Digital SpotCheck-2016
Monitors, meters and logs loudness compliance over extended time-periods; now supports codecs H.264, MPEG-2, MP1L2, DD and AAC.

www.cobaltdigital.com
Booth: N4624

LOUDNESS COMPLIANCE SYSTEM
Emotion Systems eFF 3.0
Latest version features Dolby E, True Peak, Short Term and Momentary Coorection using innovative DNA and loudness range control.
www.emotion-systems.com
Booth: SU8603

VIDEO/AUDIO LEGALIZER
Eyeheight LE-2M-K
Keeps a timed log of every non-compliant video or audio event requiring correction in the course of a 24-hour transmission schedule.
www.eyeheight.com
Booth: C6516

TEST GENERATOR
Phabrix SxA AES
Handheld instrument supports 3G-SDI, HD-SDI and SD-SDI; analysis includes waveform, vectorscope and data toolsets..
www.phabrix.com
Booth: N4833

BITSTREAM ANALYZER
Linear Acoustic DM-2000
Portable handheld diagnostic tool to monitor and generate Dolby Digital/ Plus/E, HE-AAC, MPEG I L II and PCM bitstreams; 3GHz SDI, AES and Toslink I/O; built-in speaker and headphone jack.
www.linearacoustic.com
Booth: N3438

10G-CORE MONITORING BLADE
Sencore VB330
Monitors 10GB media ports and quickly identifies issues throughout the network; supports up to two 10GB Ethernet inputs; can monitor hundreds of streams for ETR 101 290 compliance.
www.sencore.com
Booth: SU2616

MONITOR
Video Clarity RTM 3G

For audio and video performance testing of a contribution level, long-haul TV transmission chain; provides a long form test for encode/decode processing products targeted for 3G HD-SDI transmission.
www.videoclarity.com
Booth: SU11004

DTV MONITORING SYSTEM
Triveni Digital StreamScope MT-40
Provides end-to-end MPEG-2/MPEG-4 transport stream analysis and monitoring for DTV services carried by broadcast, cable, satellite, IPTV or mobile networks.
www.TriveniDigital.com
Booth: SU5602

LOUDNESS MONITOR
TC Electronic TouchMonitor
Features a touch screen with highly flexible layout options, consistent loudness readout and compatibility with all major broadcast standards, including ITU-R BS.1770, EBU R128 and ATSC A/85.
www.tcelectronic.com
Booth: C204

TV transmitters, feedline, antennas, towers, services

BROADBAND UHF SLOT ANTENNA
Jampro Antennas
Prostar JA/MS-BB
A single, compact solution; conserves tower space; minimizes wind loading; designed for multichannel or combined-channel operations in analog-analog, analog digital or digital-digital TV applications.
www.jampro.com
Booth: C2607

ATSC ENCODER/MUX
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 high-quality video.
www.linear-tv.com
Booth: SU6717

TRANSMITTER

Rohde & Schwarz R&S THU9

Transmits efficiently due to innovative transmitter design and Doherty technology; scalable and flexible system configuration with a unique MultiTX system with multiple transmitters in a single rack.

www.rohde-schwarz.com
Booth: SL6320

Video editing systems

DIGITAL VIDEO TRANSCODER

Actus Clip Factory

Efficient workflow designed for repurposing broadcasted content; supports all formats and resolutions; users can edit media, transcode clips and distribute packaged content.

www.actusdigital.com
Booth: SU9524

MPEG-2 TS EDITOR

Manzanita Systems MPEG-2 Transport Stream Editor

Suite of tools for editing and modifying VOD and advertising assets without the requirement of re-encoding original files; in addition, includes Stream Editor and Packet Editor tools.

www.manzanitasystems.com
Booth: SU6908

UNINTERRUPTABLE POWER SUPPLY

Staco Energy Products FirstLine P

Three-phase uninterruptible power supply product line adds an offering for 160kVA-to-250kVA applications; online, double-conversion units boast efficiencies of up to 98 percent.

www.stacoenergy.com
Booth: C3205

MEDIA PRODUCTION HUB

DVS VENICE

Enables fast, efficient processing of various compressed, uncompressed formats; designed for content ingest, playout and transcoding; includes built-in secure RAID storage.

www.dvs.de
Booth: SL6316

VIDEO PROCESSOR

Lawo V_pro8

Features high-quality cross-format conversion, color correction, and embedding and de-embedding; offers variable audio delay of up to 320ms for each mono channel.

www.lawo.ca
Booth: C1311

NONLINEAR EDITOR
Avid Media Composer 6.5
Provides 64-bit performance, easy-to-use editing tools, and streamlined HD, file-based and stereo 3-D workflows; open platform enables users to work with the gear they have or want and integrate into any workflow.

www.avid.com
Booth: SU902

Video routing

INTEGRATED RECEIVER-DECODER
ATEME Kyrion DR5000

Supports MPEG-2 and MPEG-4 up to 4:2:2 10-bit with low latency; offers software upgrades from SD to HD and also from 4:2:0 to 4:2:2 chrominance.

www.ateme.com
Booth: SU7102

SWITCH CENTER
Guntermann & Drunck Control Center Digital
Features a modular design consisting of interchangeable input and output cards (I/O cards); has 288 ports available; cabling system is done via CAT cable and fiber optics (also in mixed mode).

www.gdsys.de
Booth: TBA

FIBER-OPTIC NETWORK
Intelsat Video Fiber Network
Built for broadcasters to provide full flexibility and options for both SD and HD transmission; ideal for unidirectional, long-haul intercity transport of sports, entertainment and news events.

www.intelsat.com
Booth: SU3111

HDTV TUNER
Contemporary Research ATSC+SDI

Features an onboard HD-SDI port; is controllable via RS-232, IP and IR commands; an onboard web page enables remote web control; a new menu-driven display simplifies set-up.

www.contemporaryresearch.com
Booth: SU11902

ROUTER
Harris Platinum IP3
Accommodates separate video, audio and data paths within the same frame; delivers high-quality, multiformat signal routing up to 576 x 1024 in a single 28RU frame.

www.broadcast.harris.com
Booth: N2502

VIDEO TRANSPORT PLATFORM
Ciena 565
Multiplexes video signals (SD/HD/3G-SDI,DVB-ASI) alongside Ethernet services from remote studios, stadiums, etc. over a reliable WDM system into a centralized studio or video production location.

www.ciena.com
Booth: SU13512

FIBER PATCH PANELS
Bittree Fiber Patch Panels
Available for LC/LC, ST/ST and SC/SC; provide optional designation strips; developed in response to the rapid growth of fiber-optic cable.

www.bittree.com
Booth: SU6521

FRAME SYNC INPUT CARD
Miranda NVISION 8500 series

Contains eight input ports; allows easy synchronization of incoming wild feeds or signals moving between facilities; offers eight frame synchronizers on a single card.

www.miranda.com
Booth: N2513

VIDEO TRANSPORT SYSTEM
Artel Video Systems
DL4360x DigiLink
Combines modular transport functionalities with simultaneous internal routing of both video and Ethernet traffic; eliminates the need for external cross connects.

www.artel.com
Booth: SU6318

FIBER-OPTIC SPLITTERS
LYNX Technik yellobrik fiber-optic splitters

Three new yellowbriks are bi-directional and split optical signals into multiple paths, doubling or quadrupling the fiber functionality; includes the OSP 1812, OSP 1812 M and OSP 1814.

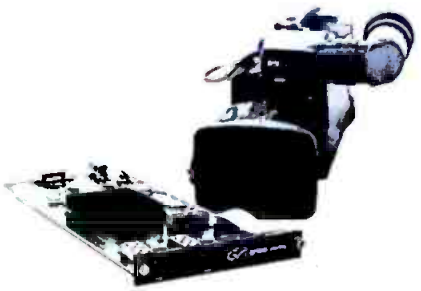
www.lynx-technik.com
Booth: N1120

ROUTING SWITCHER
Utah Scientific UTAH-100/UDS

New series provides support for 4K; routers range from 32 x 32 to 144 x1 44 and offer the same control options as the UDS routers introduced in 2012.

www.utahscientific.com
Booth: N4607

GRASS VALLEY CAMERA INTEGRATION
Riedel Communications MediorNet MN-GV-2



Allows users to network Grass Valley 3G camera systems and base station, including the LDK and new LDX series, via MediorNet; provides a solution for routing bi-directional camera signals.

www.riedel.net
Booth: C4937

Wire, cable, connectors

FIBER-OPTIC CONNECTORS
Fischer Connectors FiberOptic series

Built to withstand the elements of a rugged, harsh environment, providing virtually faultless performance; 1000 cycles mating durability without any signal degradation; water/ultrasound cleanable.

www.fischerconnectors.com
Booth: C11746

FIBER-OPTIC CONNECTOR
Optical Cable Corporation MHC II

Mini hermaphroditic fiber-optic/hybrid connector is designed to inter-connect fiber-optic channels; uses a bayonet-style, mechanical coupling interface.

www.occfiber.com
Booth: C10145

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.*

Live production servers, such as the EVS XT3, now deliver a fully integrated workflow, from content capture through post production, with tools and capabilities to support all production processes.

LIVE server technology

The approach will transform workflows from ingest to playout.

BY JAMES STELLPFLUG

The demands of today's consumer are changing video production in ways that we could not have foreseen even a decade ago. Consumers today not only demand content on their own terms — at any time and on virtually any device — but also in near-pristine quality. Today's live media server technology has advanced to enable completely automated, high-speed end-to-end workflow functionality. These state-of-the-art servers, increasingly specialized for specific media delivery needs and functionality, are delivering media with the quality, speed and reliability to meet the challenges of our new converged media landscape head on.

While the viewer may be ultimately driving innovation, new types of programming continue to spur technological advances. Live sports ushered in a generation of instant replay clips and slow-motion highlights that pushed technical capabilities. The rapid-fire nature of global news brought the need to improve workflows so news can be gathered, prepared and broadcast as it breaks. The advent and seemingly unabated growth of live variety shows and reality programming pushes for the near real-time interactivity that ultra-fast turnaround and agile production can provide. The simultaneous ingest,

recording and editing of content is the boon to today's media production. And broadcasters are leveraging the speed and mobility developed to full advantage for a range of onscreen programming.

A chain with no weak links

Disparate technologies such as cameras, production servers, controllers, switchers, and editing and automation systems must be more closely integrated for smooth and efficient workflow processes. Standard communication protocols and service-oriented architectures have been developed progressively, so that these technologies can form a whole. Seen as the central aspect for many production workflows, servers have evolved from standalone ingest and replay to fully integrated platforms, acting as a backbone for media ingest, editing, browsing and playout of production workflows.

Best-of-breed servers now deliver a fully integrated workflow, from content capture through post production, with tools and capabilities to support all production processes. They also feature an open architecture, allowing access to a host of marketplace production controllers for access and control of all content. Integrating with third-party editing tools and allowing third-party systems to control server ingest and playout channels gives broadcasters valuable, extended production capabilities. Most advanced live production servers now accept remote control protocols, making it simple to integrate with most standard automation systems, controllers and switchers. Switchers, controllers, automation systems, linear editors, as well as other systems using one of these protocols can easily and transparently interact with servers to control their content.

Natively supporting different high-quality production codecs is also critical to a fully integrated workflow, reducing the transfer time between production and post production as both parts of the process can use the same codec. In a fast-turnaround production workflow, content that is being recorded and encoded on the server is simultaneously accessible to post production. Today's servers can now more effectively ingest and store greater amounts of content of varying formats and play out multiple synchronized and simultaneous video streams — faster than ever before.

The end result? Major gains in speed, efficiency and productivity throughout the entire production chain. Integrated workflows streamline processes, and speed workflow tasks and collaboration.

Editing, content management and storage

Whether integrated into the server system or accessed through plug-ins, editing tools are capable of delivering edits without the time-consuming rendering processes of older systems. Editing software can also be optimized for the specific application, allowing support for multiple formats and resolutions on the same timeline and extended metadata management features. Some editing tools and servers are fully interoperable with all existing post-production systems. Open content management systems are critical to third-party integration and successful workflows.

Some server technology incorporates comprehensive management suites that allow ingest control, metadata management, on-the-fly browsing and editing, and playout scheduling — all managed from a single interface and data model. Running on a common platform, all network personnel can instantly share content, metadata, edits and rough cuts. The software suite integrates with third-party systems, simplifying the transfer of media to post-production tools or archiving through industry-adopted Web services. Suites such as these also allow management and recording, enabling operators to stay continuously linked to the media. In post production, editors can use the descriptive information to search for certain clips or content. The system will retrieve specific clips, and editors can manipulate them through a simple drag-and-drop sequence.

More content formats spread over countless platforms makes for complex media content management. Centralized media management systems can perform everything from instant content identification throughout multiple

platforms, intelligent media browsing based on descriptive metadata and logging to automated media digitization and robust processes for instant transcoding for greatly simplified promotion and distribution of content.

Record, edit and play out — simultaneously

Other developments, including nonstop "loop" recording, of some advanced live servers represent significant advancements to the production process. Guaranteeing uninterrupted multichannel recording and access to recorded content at any time, loop recording ensures that all recorded media is instantly available throughout the production network.

Recording starts as soon as the server is booted and remains on until the server is shut down. Recording capacity can be configured separately for each recording channel, and selected sequences can be protected and kept for as long as required without interrupting the recording process. Thus, content is available for simultaneous preview, rough editing, archiving, playback or post production.

Editors can browse and retrieve media while the server is still recording them, a significant productivity improvement compared to the old VTR workflow. It also allows operators to simultaneously cultivate content via clips and edited playlists, while producing rough-cut edits and transferring content to post production.

Playout automation

Reliability is perhaps the most important feature of any production process, and nowhere is this more significant than playout. But any automated playout system must also be dynamic, flexible and redundant. And playout is affected by the processes earlier in the chain, such as intelligent metadata during ingest. Playout automation for long-form content requires flexibility as well as highly efficient file transmission. The beauty of the best systems is their ability to remain controlled by automation while also enabling last-minute edits to be performed — only seconds before broadcast.

On the horizon

We surely haven't seen the end of media server innovation. Tools will continue to get better and faster. But server technology won't just reduce production time; it will redefine it. With the rise of applications for, and integration with, second screens, it will be more about transformation than optimization.

Next-generation servers will also be able to support multiple codec types in parallel. When recording video feeds, the encoding process will start simultaneously, making content immediately available for exchange. Providing people in remote locations with full workflow access and participation capability is another sure byproduct of our times. Access, speed and innovation will continue to transform how we work and what we see on screens of all types. BE

James Stellpflug is vice president, products and technical services, EVS.

ADDITIONAL RESOURCES

The following are available on the *Broadcast Engineering* website:

- Broadcasters hit the button for big data
- Amazon's cloud outages causing concern
- Predictions 2013: Traditional TV industry needs to get faster, more efficient and more agile

Fujinon's PL 19-90 Cabrio

The lens bridges the cinema and ENG worlds.

BY DREW LAHAT

Precision Productions+Post, based in Los Angeles, produces commercials, EPKs and online content for networks and corporations alike. Our work ranges from EFP-style interviews and documentary work to national campaigns with high production values and a cinematic look.

For many years, this translated into very different camera packages. ENG/EFP gear was finely tuned for fast, grab'n'go work, while cine gear came in a half-dozen cases and dictated a different mode of operation. The challenge was when clients and directors began asking for a mixture of both, which started to happen more often than not.

Digital cameras such as the Panasonic VariCam offer a hybrid approach but still feature a 2/3in sensor. Part of the problem is the lens. Despite rapid improvements in digital technology, optics remain stubbornly bound to the laws of physics, and bigger sensors mean big, heavy lenses and various compromises. The thought of having to lug a mammoth zoom lens around is enough to make ENG crews write off cine gear altogether.

The Fujinon PL 19-90 Cabrio (ZK4.7x19) promises to bridge the "glass gap" and offer cine lens performance with ENG ergonomics. It is a true cinema lens, covering the Super 35 sensor size with a PL mount. Its focal length translates to a versatile 4.7X zoom factor, and the aperture maintains a constant T2.9 throughout the focal range. Better yet, the lens is 9in long and weighs 6lbs. This is a blessing for handheld work since comparable cine zooms weigh twice as much, if not more.

Handheld operation of cinema cameras has always required plenty of rigging and help from camera assistants and focus pullers. With the Fujinon PL 19-90 Cabrio, much of that is gone, and the simplicity and immediacy of ENG is returned.

The most innovative part of the lens is its integrated, yet detachable, servo unit. The handgrip form factor makes ENG operators feel right at home. Three servos control focus, iris and zoom, and connect to standard Fujinon zoom and focus demand units — unheard of in the film world. On the cine side of things, the pitch gear is 0.8 and not Fujinon's usual 0.6, and the servos send ARRI LDS and Cooke /i metadata (useful for motion-control and 3-D rigs). Two switches disengage the servos for manual operation, and the whole handgrip can be easily detached from the lens for fully manual work. (It self-calibrates when reattached.)

With assistance from local outfits Evidence Cameras and Dependent Media, we were able to test the Cabrio on a variety of cameras, including an ARRI ALEXA, Sony PMW-F3, RED EPIC and even a Panasonic GH2 DSLR. The initial impression was that this is a high-end professional tool. The construction quality is excellent, with smooth and accurate ring rotation.

Optically, the lens is on par with any professional cine zoom. The 5K resolution of the RED EPIC made it the most demanding camera in our test, and the Cabrio passed with ease. Wide open, the lens exhibited minimal chromatic aberration, which was eliminated when stopped down. Distortion was present but surprisingly minor, and breathing was minimal. From the test bench to the set, we got solid, sharp footage with accurate colors.

Handheld

While the lens makes for a great lightweight zoom, it truly shines when used with a shoulder-mount camera. Handheld operation of motion picture cameras has always required plenty of rigging, with elaborate mounts, handgrips, remote control units, and help from

camera assistants and a dedicated focus puller. With the Cabrio, much of that is gone, and we regain the simplicity and immediacy of ENG. It's just a camera and a lens, and it all makes sense.

Operating in this manner emphasizes the different approaches to ergonomics in cinema versus ENG. Cine cameras come in all shapes and sizes, and care should be taken to customize a rig so the handgrip ends up in a comfortable and sensible position for the operator. The ARRI ALEXA performed particularly well in that regard since its design ergonomics are closer to the ENG form factor.

Testing the lens on the Panasonic GH2 DSLR was another thought-provoking experience. Granted, customers may not couple a $38,000 (MSRP) lens with a $900 camera, but the unlikely marriage feels surprisingly natural. It's akin to a handycam that delivers theater-worthy footage, and the fact that its weight distribution is 85 percent glass is merely a technicality. The vision of "a lens with a chip in the back" is becoming a reality.

Note that focus is as critical as in any Super 35 camera, so directly manipulating the lens can yield underwhelming results without extra experience, additional takes or a dedicated focus puller. Thankfully, using a remote-control follow focus is easy since the servo unit directly integrates with a number of wireless remote systems.

Conclusion

The lens opens up an interesting new chapter in image acquisition. Will we see it in programs such as "60 Minutes," bringing the cinema look to news? Will cine cameras become integrated in multicamera workflows? As the broadcast industry rethinks its place in a world of cell phone cameras and giant-screen TVs, the convergence of cinema and ENG will surely affect the next generation of shooters. A lens like the Cabrio simply facilitates that change. BE

The lens mounted to a Panasonic GH2 DSLR makes for an unlikely combination, but one that felt suprisingly natural.

Drew Lahat is the lead engineer at Precision Productions+Post.

Blackmagic Teranex 2D

A format converter goes under the microscope.

BY STEVE MULLEN

Because of the many cross-conversion capabilities of the VC100 from Teranex, I have long wanted one. My most critical need was the high-quality conversion of hours of analog and digital tapes going back as far as the early 1980s to pillarbox HD. Unfortunately, the Teranex VC100 cost $90,000. Even after Blackmagic bought the VC100 and began reselling it, despite a huge price drop to only $20,000, it remained an expensive tool.

At the 2012 NAB Show, Blackmagic announced a redesigned VC100 using modern chips. The new price tag — only $1995 for the standard model, called the 2D. (A 3-D version sells for $3995.) The 2D unit offers all conversions in 4:2:2 sampling for a single channel.

Both models are small rack-mount units and feature HDMI I/O, analog composite and component I/O (unfortunately, no Y/C input for legacy camcorders and decks), 3Gb/s HD-SDI in and out; eight independent AES/EBU audio I/O connections; stereo analog input/output; and a Thunderbolt port, as shown in Figure 1.

These Blackmagic models still feature high-quality Teranex processing, including format (NTSC/PAL) conversion, HD standards (720/1080) conversion, and SD-to-HD and HD-to-SD crossconversion. The latter two functions include aspect-ratio conversion (pillarbox and letterbox) and smart aspect (variable scaling to stretch 4:3 to 16:9 with minimum distortion). The 2D and 3D provide additional functions such as noise reduction and test signals, plus cadence detect and remove.

The key to Teranex quality is that it can process video in both spatial and temporal domains. This is exemplified by how the unit deinterlaces incoming video to progressive video. The converter implements a moving window of four fields (two frames) to determine which pixels are in motion and which are not. Static pixels — those showing no motion across fields — are moved from the current frame into a "progressive" output frame.

Figure 1. The rear of the Teranex 2D features HDMI I/O and a Thunderbolt port.

Figure 2. Teranex 2D's display mode presents moving pixels as red pixels.

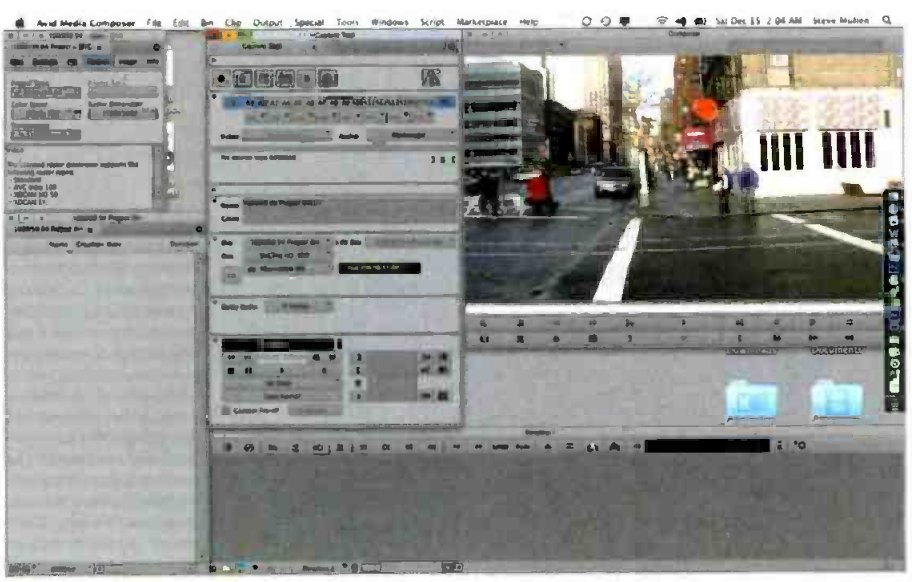


Figure 3. Shown here is Media Composer's capture window during ingest HD from an SD camcorder. Blackmagic supplies capture drivers for a number of editors, but no driver is available for FCP X.

Pixels in motion are treated differently. (You can enable a display mode in which the unit presents pixels in motion as red pixels, as shown in Figure 2.)

Moving pixels in the upper field of the current frame are moved into the upper field of the output frame—where they take their place along with the static pixels.

Pixels in motion carried within the current frame's lower field are rejected. New lower field pixels are interpolated using spatially close lines (from a nearest lower field) above and below the rejected lines. Combing on motion is prevented — although some vertical resolution is lost when the moving lower field pixels are discarded.

Field tests

The first test I performed used the Teranex 2D in standalone mode. I fed it an NTSC analog component signal from a Beta SP VTR. I selected the input type by pressing the Component button. The video output mode was set to 1080i60, and the aspect ratio was set to pillarbox to eliminate image distortion. Because all outputs (composite, component analog, HD-SDI and HDMI) are simultaneously active, I only needed to connect an HD recorder to the HD-SDI output connector. An HD monitor was connected via an HDMI cable.

For the second test, I used the unit as a capture device for several NLEs, feeding it a composite signal from a miniDV camcorder. I selected the input type by pressing the Composite button, and set the video output mode to 1080i60. I set the HD aspect ratio to "Smart," thereby creating 16:9 video. Stereo audio was fed into the RCA jacks.

Blackmagic supplies capture drivers for Adobe Premiere Pro CS6, Photoshop CS6 and After Effects CS6; Avid Media Composer 6; Apple FCP 7; and DaVinci Resolve. Once the unit is set for the desired input and type of conversion (if any), video and audio are sent via a Thunderbolt cable to the user's computer. Figure 3 shows the Media Composer's capture window during ingest of HD from an SD camcorder. Capture media type is set from within their NLE. (The device supports both RS-422 control and batch capture.)

Figure 4. The workaround for the unavailability of a driver for FCP X is to capture using Blackmagic's Media Express application, and then import the captured files into FCP X.

Unfortunately, no capture driver is available for FCP X. The workaround is to capture using Blackmagic's Media Express application, as shown in Figure 4 on page 75. (Again, the device supports both RS-422 control and batch capture.) The captured files are then imported into FCP X. Naturally, a capture can be monitored using an HD monitor connected by HDMI.

For the third test, I used the converter as an output device. Here the software situation was slightly different. Blackmagic supplies a driver that allows viewing the FCP X monitor window. However, for recording from FCP X, one must export a ProRes 422HQ file, import it into Media Express, and then play the file via the Thunderbolt cable to the converter.

For other supported applications, the included drivers enable direct export to the converter. No matter the export method, all output ports are active, with the signal type determined by the buttons that control its conversion operations. Therefore, during export, format (NTSC/PAL) conversion, HD standards (720/1080) conversion, SD-to-HD crossconversion, and HD-to-SD crossconversion are possible.

During export, format conversion, HD standards conversion, SD-to-HD cross-conversion and HD-to-SD crossconversion are possible.

Unfortunately, the one conversion I needed most was not available. You cannot, using Media Express, play an SD file through the Teranex and capture it as an HD file. You must record the exported file and play it back for capture. For those of us who are in an "all files on hard disk" environment, this is an obvious downside.

However, despite this, the Teranex 2D performed flawlessly in all tests, as did the bundled Blackmagic UltraScope and Blackmagic Disk Speed Test. BE

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

Harris Broadcast's Platinum IP3

Multi-path, multi-frame routing is now a reality.

BY KERRY WHEELES

The router has long been the traffic cop of the broadcast facility, directing signals to various control rooms and destinations around the plant. But, it's become clear that traffic direction alone is insufficient to support today's ever-increasing signal volume and complexity.

The usefulness of increased router capability extends well beyond the traditional call-letter station. Central-casting facilities and satellite headends support many more channels today compared to one decade ago, and mobile production trucks often require 512 x 512 matrices or larger. Meanwhile, facilities like sports venues and houses of worship are asking more of their routers, from increased signal capacity to tighter integration with complementary systems.

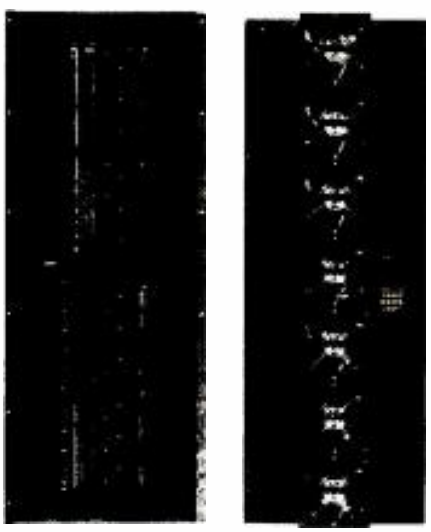
Meeting these expanded signal routing and management requirements is just one reason that Harris Broadcast has introduced the Platinum IP3 router. It delivers multiformat signal routing up to 576 x 1024 in a single 28RU frame, and scales to more than 2048 x 2048 in multi-frame configurations.

Additionally, the router breaks new barriers for signal redundancy, on-air expandability, stability and control, while also offering the industry's first path toward true network convergence within the router.

From there to here

High-density routing, integrated processing, reduced power consumption and smaller rack-space requirements remain significant capabilities in the IP3 design as an extension of the established Platinum architecture. Notably, the original Platinum's inclusion of a dual-path routing architecture was a big technical stride, enabling completely independent audio and video paths for every slot within the frame. This enables a completely embedded routing infrastructure without sacrificing matrix size.

The IP3 evolves this concept with the industry's first triple-path architecture. The third, separate path is designed to accommodate data-centric elements that might include program-associated metadata, graphical elements or pure IP signals. The ability to support separate video, audio and data paths is what makes the IP3 the first router architecture that promises true network convergence as the industry moves from pure baseband to a hybrid infrastructure.



The IP3's technologies introduce faster processing and increased bandwidth to support triple-path architecture.

Unique architecture

The road toward creating the industry's largest-capacity router and first triple-path routing architecture begins with the product's unique design characteristics.

The IP3's enabling technologies introduce faster processing and increased bandwidth to support the triple-path architecture, reducing hardware and accommodating more signals. The design also greatly simplifies wiring and integration and eliminates the need to take stations off the air while scaling into multiple frame systems.

Large routing systems involve multiple separate frames due to physical limitations for signal capacity. Traditionally, this requires external distribution amplifiers to support signal expansion to multiple frames. To expand into additional frames, the user must unwire each input from the first frame and run it through a distribution amplifier to the original and new frame or frames. Further adding to the complexity, outputs from two frames, each with unique sets of inputs, require a secondary switching matrix to avoid "blocking" signals. The expansion process requires the user to "break" the signal upon adding another component — thus taking the station off air.

The IP3 design builds distribution amplifiers into the routing frame, employing a single-wire connection to bridge each input module to the next frame — without breaking signals from the first frame. Additionally, an intelligent output module design ensures that each new input, regardless of which frame it enters, is available to all router destinations.

This architecture provides seamless expansion between multiple frames, reducing wires and without taking the station off air. Furthermore, the common architecture preserves the initial investment — and ensures no limitations for future expansion.

Mix and match

The benefits of multiviewer, frame sync and other component integration within router frames is immediately clear from the space- and power-saving perspective. Harris Broadcast's philosophy of providing generic slots for such products within the router remains unique, eliminating the need to define future needs for each task when purchased. This ensures that users aren't dead-ended if they wish to scale multiviewer outputs to more control rooms in the future, for example.

The router also accommodates combination cards within any slot, allowing users to take full advantage of the triple-path architecture. This could include routing video inputs over one router path, and demuxing audio from those inputs over a second path. In this example, IP3 users might simultaneously route metadata from these signals over the third path, using built-in encoding and decoding capability, all without sacrificing video matrix size in the same frame.

Redundant crosspoints to protect all critical signal paths further enhances value. This router's architecture shields all video, audio and multiviewer crosspoints, eliminating any single point of failure.

This is far more advantageous to a traditional architecture that uses separate outputs from router crosspoints to feed external multiviewers. Those outputs can only see the frames' inputs, and cannot see the muxed outputs or audio feeds. Viewing the actual output would first require wiring it back to an input.

The IP3 architecture demuxes audio signals on the inputs and routes the signal through the audio path to the output slots. This allows monitoring of those audio signals on the integrated multiviewer, providing a clear view of what is going to air.

It should be noted that overall system protection is further enhanced through a fully redundant control system and power supplies.

Total control

Enhanced control across the infrastructure allows for simple, dynamic updating of software-centric devices and operations. The IP3 addresses this trend by enabling updates to databases and sources without taking the system down. This allows users to make firmware updates, test new software and recall specific operational settings without interruption. It also simplifies troubleshooting issues, allowing for quick layout changes, alarm settings or bypass options to route around problems.

Harris Broadcast Magellan control panels offer a common solution to manipulate these tasks across the entire infrastructure, including all integrated routing systems and external components from terminal gear to video servers. The product-agnostic design ensures interoperability with non-Harris Broadcast components.

Enhanced control allows for simple updating of software-centric devices and operations.

User control is also enhanced through easy router configuration and maintenance. Further, the router brings all settings into a common matrix. This is a big advantage over clustering settings across various matrices, such as separating SDI and HD operations. A logical mapping system enables systems integrators and users to quickly make proper connections.

Moving forward

The future-proof design looks beyond baseband/IP convergence to cover ultra-high-bandwidth needs including 4K, 6GB/s routing and beyond. Harris Broadcast is already showing the ability to move high-bandwidth graphical elements approaching 10GB/s through the Platinum IP3. The takeaway, though is the router allows users to build fully embedded, smartly scalable routing solutions that meet present day needs and beyond, for fixed and mobile facilities. **BE**

Kerry Wheeles is director of product marketing for routing, multiviewers, master control & branding at Harris Broadcast.

LTFS and asset management

An IT standard future-proofs broadcast assets.

BY TONY TAYLOR

It is all too easy to think of asset management as an activity in the present tense: It is a system to help us find content now. But its historical role is every bit as important. For a broadcaster, the asset management system should support the ingest of library content as well as new material, and most important, it should protect it for the future.

Today's content will probably have commercial value; it will be a source of continuing revenue. And it will certainly have cultural and social value, as a history of what we watch. So it is vital that the content is not just preserved, but is accessible far into the future.

The challenge here is that technology is constantly changing. The way that we store content is necessarily migrating, which is generally a good thing, as each new generation brings improved quality and performance. But the flip side of technological innovation is that the old formats become obsolete. If you have an archive on 2in quad VTR tape, then today you have a serious problem accessing it.

In broadcast, we have a secondary problem. For most of its history, the particular challenges of television meant that we were forced to rely on application-specific technologies, and these inevitably were driven by proprietary standards. Today, much of what we need to do can now be accomplished by standard IT equipment and protocols — but the temptation remains to continue the mantra that television is different; therefore, it needs specific solutions.

So we continue to see proprietary solutions proposed for the broadcast industry. That raises a number of issues, including portability — it is hard to take one proprietary solution to another vendor's hardware — and cost — it is expensive for the broadcast industry to keep reinventing the wheel.

As an asset management specialist, focusing on the challenges of preserving archives and making them widely available, I would argue that now is the time to take that giant step away from proprietary solutions toward an IT standard that is designed specifically to meet the challenges of longevity and portability.

Linear Tape File System

The Linear Tape File System (LTFS) is a file system for data archives, developed by IBM but published as an open standard and now widely adopted by leading vendors. Interestingly, although it was designed as an IT-industry open standard, the proponents of LTFS chose to launch it at NAB in April 2010.

What makes LTFS different from existing schemes, and where does it sit alongside the familiar LTO series of tape formats? The key is in the FS part of its name: It is a file system. Specifically, it is a *self-describing* file system. It defines the organization of both data and metadata on each tape.

That means that tapes written in the LTFS format can be used independently of any external database or storage system. So an LTFS-format tape can be taken from one system — such as an asset management system — and read by any other without problems. Arguably, for the first time, digital assets are truly portable.

It also makes for extraordinary resilience, as shown in Figure 1. Should the worst happen, and fire or flood destroy your entire archive system, a completely new asset management database could be built from LTFS tapes.

Some argue that LTFS is not the solution because it is a compromise design, created with the emphasis on simple portability rather than incorporating all the bells and whistles that they believe we need. That is the

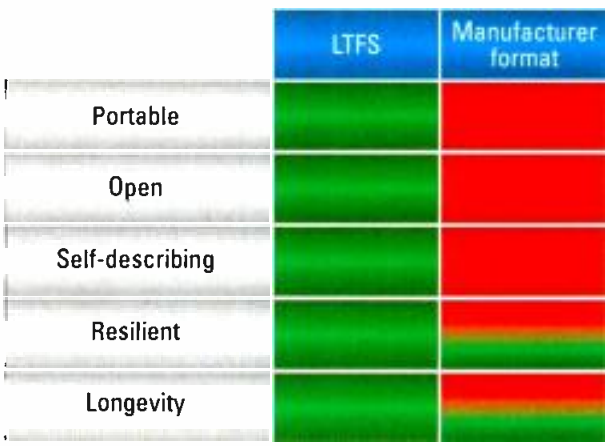


Figure 1. LTFS offers the resilience and longevity that other broadcast-industry solutions have lacked.

thinking behind the development of AXF, for example, the archive format some vendors are advocating.

AXF is certainly more comprehensively tuned to the needs of audio-visual asset management, but it is essentially just another wrapper format for essence and metadata. AXF compatibility would address the portability issue, but does little for longevity. And does the broadcast world really need yet another wrapper format?

Longevity

I keep emphasizing longevity, because I believe preserving content far into the future is a critical consideration. There is general agreement that LTO tapes are the preferred solution, but even this widely recognized standard — open and freely available, like LTFS — is the subject of continuing evolution. We shall shortly see LTO-6 gaining ground on LTO-5, and many broadcast archives have a mixture of earlier LTO formats.

Will we ever stop archiving data to tape? There are advocates of MAID storage: the massive array of idle disks. This uses large numbers of disks to store data, which are spun down or run at a low idle speed when not in use to minimize wear, giving them a much longer life than active disk drives, as well as minimizing power consumption, even in large archive capacities.

At the 2012 NAB Show, there was at least one demonstration of practical holographic storage. And there may be new data archive platforms that have yet to hit the headlines. The point is if they, too, adopt LTFS, they become effectively transparent to the asset management system. Hybrid storage no longer becomes another system level processing overhead; it all looks like a single archive.

Open standard

Finally, and I cannot overemphasize this point: LTFS is a widely supported format in the IT industry, developed originally by IBM and maintained by a broad consortium of manufacturers. It is worth repeating that LTFS is an open standard, freely licensed to anyone who wants to implement it.

The IT world has R&D budgets we in broadcast can only dream of, and it can invest unimaginable sums in tailoring perfect products to make the best of good open standards like LTFS. Products already exist and many more will follow, I am certain. The IT industry's economies of scale mean that these products are cost-effective, allowing broadcasters and their specialist vendors to concentrate investment where it is really important — on the applications, not the underlying hardware.

This is not the time for broadcast vendors to reinvent the wheel yet again. We do not need to add complexity through new wrappers, application-specific hardware and proprietary formats.

As an industry, we have to acknowledge and accept that where they meet our requirements, standard IT solutions will deliver better value, better reliability and better future evolution. LTFS is the perfect example and the ideal opportunity for broadcasters to look to future-proofing their technology and their assets. BE

Tony Taylor is chairman and CEO for TMD.

ADDITIONAL RESOURCES

The following are available on the *Broadcast Engineering* website:

- Goodbye spinning disks
- Is video editing in the cloud real?
- Crystal ball: Where is the industry headed?

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Editorial Director: Brad Dick, brad.dick@penton.com
Editor, World Edition: David Austerberry, [redacted]
Managing Editor: Susan Anderson, susan.anderson@penton.com
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Production Editor: Laura Dixon, laura.dixon@penton.com
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Brand Manager: Carmen Lake, carmen.lake@penton.com
Sr. Marketing Manager: Kim Davidson, kim.davidson@penton.com
Director, Online Sales: Angie Gates, angie.gates@penton.com
Production Coordinator: Curtis Jansen, curtis.jansen@penton.com
Audience Development: Sonja Trent, sonja.trent@penton.com

Penton

Penton Media, Inc.
249 West 17th Street
New York, NY 10011
Chief Executive Officer: David Kieselstein, david.kieselstein@penton.com

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Broadcast Engineering, March 2013, Vol. 55, No. 3 (ISSN 0007-1994) is published monthly and mailed free to qualified persons by Penton Media, Inc. 9800 Metcalf Ave., Overland Park, KS 66212-2216. Periodicals postage paid at Shawnee Mission, KS, and additional mailing offices. Canadian Post Publications Mail Agreement No. 40612608. Canada return address: Bleuchip International, P.O. Box 25542, London, ON N6C 6B2. POSTMASTER: Send address changes to Broadcast Engineering, P.O. Box 2100, Skokie, IL 60076-7800 USA. CORRESPONDENCE: Editorial and Advertising: 9800 Metcalf, Overland Park, KS 66212-2216 Phone: 913-341-1300; Edit. fax: 913-967-1905, Advert. fax: 913-967-1904. © 2013 by Penton Media, Inc. All rights reserved.

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INTERNATIONAL

Europe
Richard Woolley
+44-1295-278-407
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richardwoolley@btclick.com

Israel
Asa Talbar
Talbar Media
+972 (77) 562-1900
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Japan
Mashy Yoshikawa
Orient Echo, Inc.
+81-3-3235-5961; Fax: +81-3-3235-5852
mashy@fa2.so-net.ne.jp

Asia Pacific
Tan May Ling
InterAct Media & Marketing
+65-9623-1405; Fax: +65-6265-3000
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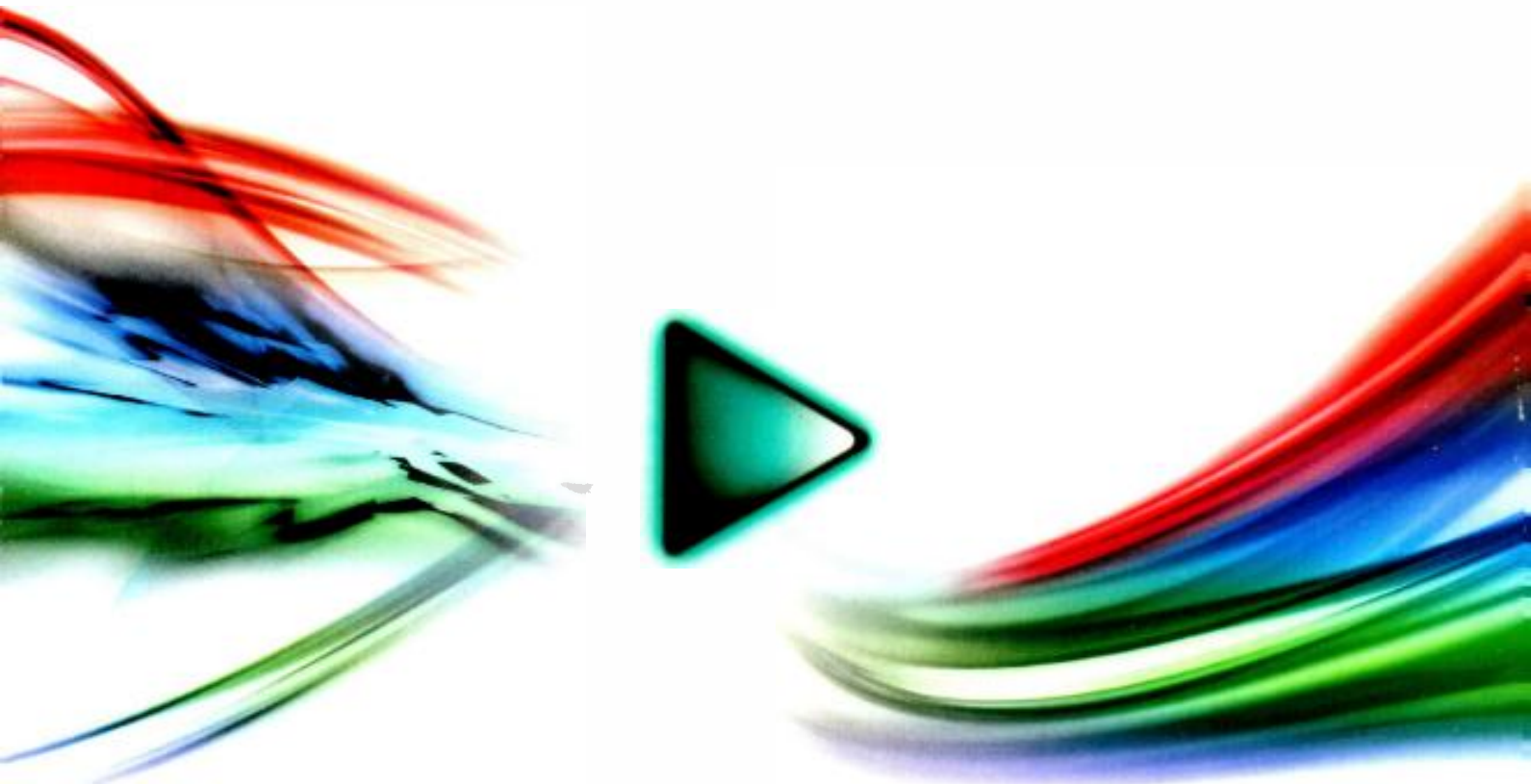

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