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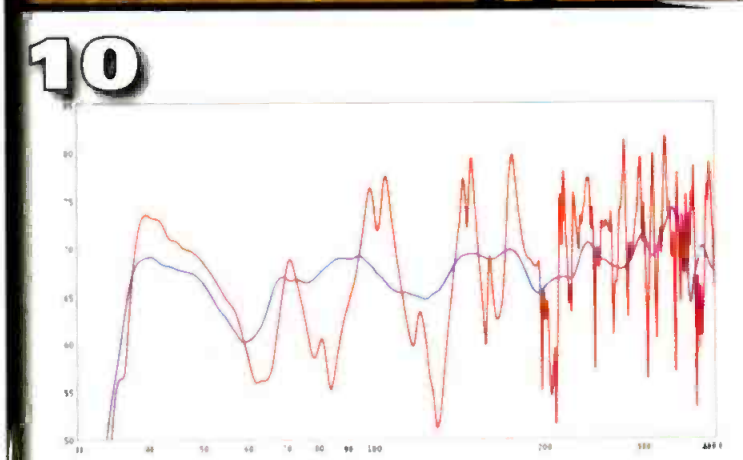
ON THE COVER:
Television spectrum repacking could lead to channel changes, and the impact of a channel change will affect more than just the transmitter. Photo courtesy ERI.



LATEST NEWS!

The Pew Research Center released its post-election look at the attitudes of voters about the elections, the campaigns and the media. Once again, television ranks No. 1 as the source of news and information about the presidential race.

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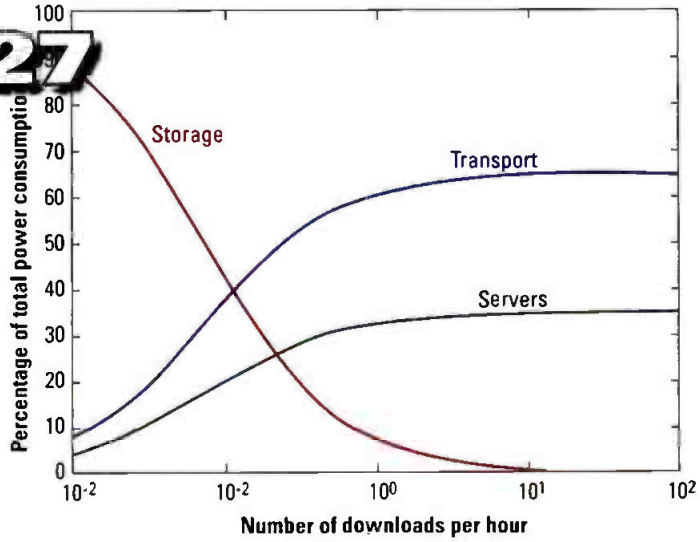

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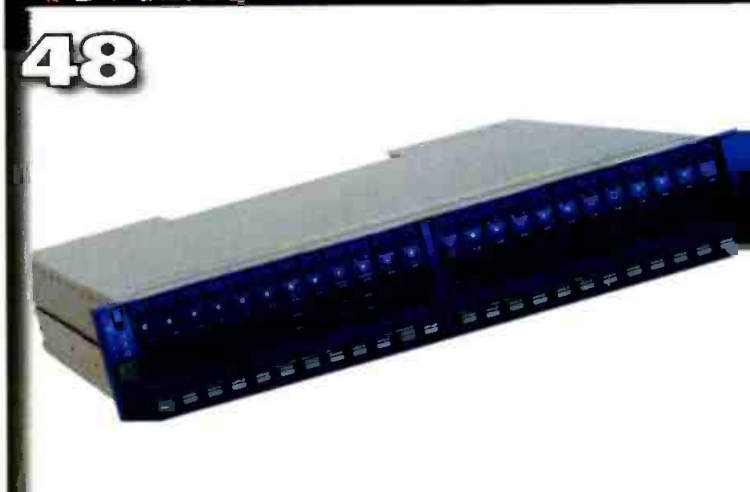

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Yogi's fork dilemma

Yogi Berra once said, "When you come to a fork in the road, take it." Perhaps it is good advice, but which way is better?

The January Consumer Electronics Show (CES) represents all things digital. It is one huge toy store with more new technology than even the NAB Show. A key part of the exhibit is new television-set technology. These TV sets are one-half of the delivery platform. Broadcasters are the other half. Because our industry has no control in the TV manufacturing process, we pretty much have to take our lead from those who do — the consumer equipment manufacturers.

Of course, these geniuses don't always get the formula right. As an example, a recent local newspaper was filled with holiday advertising inserts. Among the ads for clothing, jewelry and toys were numerous advertisements for television sets. It was curious that only two of those ads mentioned a 3-D television. Instead, this year's TV sales spotlight was on LED HDTVs, and the bigger the better! Go back only two years, and one might have thought 3-D television was the next great revolution. I suggest, in that case, TV set makers chose the wrong fork in the road.

The broadcast and consumer industries need each other to be successful. You can broadcast (some day) 3-D imagery all day long. But, if there are no receivers available, you're wasting expensive electricity. The consumer industry can manufacture 3-D TV sets, but those sets won't sell unless there is plenty of easily available content, which there is not. This represents the kind of decisions and challenges TV engineers and managers must face.

To help readers keep up with this changing landscape, *Broadcast Engineering* has scheduled several in-depth reports to help you better understand tomorrow's content delivery issues. Starting in January, we will begin a regular series of articles on the next generation of broadcast technology. January's article is a tutorial on ATSC 3.0, tomorrow's delivery platform.

Also, last October, we launched a new blog titled, "Ask The Experts." The goal is to encourage engineers to share problems and solutions in this space. The posts are written by *Broadcast Engineering* production editor Curtis Kitchen, a sports enthusiast who also operates his own blog space. If you have technical questions or need help, post your thoughts in that blog, and someone in our wide audience probably has a solution. The dialog is open and free, and some good conversations have already surfaced. All readers are encouraged to participate.

My point is that sometimes when faced with a binary choice like Yogi Berra's "fork in the road," you might wish you could take both. Life is seldom that easy. BE

Brad Dick
EDITORIAL DIRECTOR
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Loudspeaker placement

Basic acoustic rules create the foundation for good sound.

BY ETHAN WINER

Placing the loudspeakers and listening position correctly is the first step toward getting good sound, especially at low frequencies. While positioning alone won't eliminate the need for bass traps and other acoustic treatment, it's an easy and free way to reduce low-frequency response errors and improve imaging. The first step is to identify the ideal listening position within the room, and from there you can determine the best speaker placement.

The method used here is based on the 38 Percent Rule, a theory popularized by acoustician Wes Lachot. Lachot has shown that the theoretical best listening position is 38 percent into the length of the room, when measured from the front wall. This offers the best compromise of bass peaks versus nulls for any given room size. (See Figure 1.)

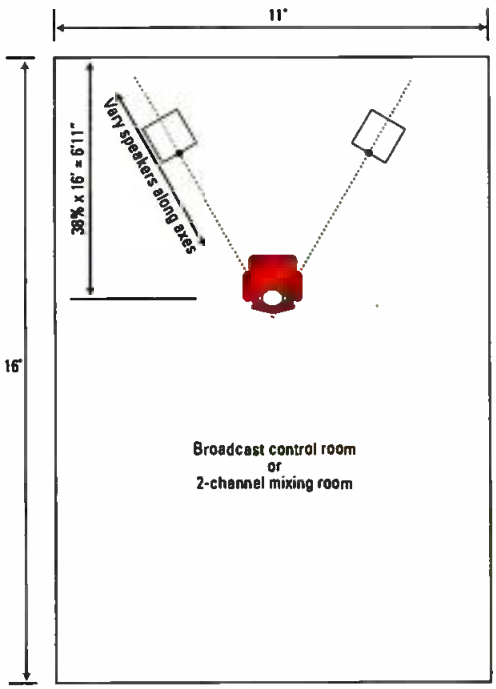

Figure 1. This shows idealized placements for the loudspeakers and prime listening seat in a room used mainly for stereo playback.

Understand that 38 percent is only the theoretical best location. It's a good starting point, but in practice it may not be best due to other factors — wall properties, speaker type and location, or perhaps a mixing console that's too large to fit that way.

Once you've decided where to put your seat, the next step is placing the loudspeakers. The speakers and listening position should define an equilateral triangle, with the distance between the left and right speakers the same as the distance from your head to each speaker. Tweeters should also be at ear level and pointed toward you for the flattest response, because most speakers have a skewed response with less high-frequency output off-axis.

Symmetry

Left-right symmetry in a room is critical for good stereo imaging. If your setup is placed more to one side of the room, instruments and voices coming equally from both speakers will not sound centered as they should. When perfect symmetry is not possible throughout a room, at least aim for symmetry in the front. The most important area is along the side walls between your head and the speakers.

In rectangular rooms, the low bass response is most lacking at the halfway points — halfway between the front and rear walls, halfway between the left and right side walls, and halfway between the floor and ceiling. Therefore, the bass response is worst if you sit in the exact center of the room, at a height that puts your ears halfway between the floor and ceiling. You shouldn't put speakers along any of those centerlines for the same reason; when a loudspeaker is in a room's null spot, its output is reduced considerably at low frequencies whose wavelengths are related to that dimension.

The best way to know if small positional changes help or hurt is with room measuring software, such as the freeware Room EQ Wizard program. This lets you experiment with different speaker distances by sliding both speakers along their axes as shown, while measuring the response at different proposed listening spots. Otherwise, simply put the speakers at a distance that's convenient and sensible for the size of your room while keeping an equilateral triangle. Ergonomics matter too!

Low frequencies

Bass frequencies are the most difficult to tame in a small room because the wavelengths are long, which requires thick absorbers called bass traps. The before/after frequency response was measured in the same room as Figure 1 and shows the room's low-frequency response before and after adding bass traps. (See Figure 2 on page 12.) You can see three severe nulls around 64Hz, 84Hz and 140Hz in the red before trace, as well as additional nulls at higher bass frequencies.

Most rooms have many such nulls in the range below 300Hz or 400Hz, but some people fear that adding bass traps will reduce the amount of bass even further. In truth, bass traps reduce peaks and also raise nulls, so they make the response flatter, rather than add or remove bass. In many rooms, the main problem is deep nulls caused by reflections from the wall behind you combining out of phase with the direct sound from the loudspeakers. Therefore, adding bass traps increases the perceived level of bass. But in some rooms, especially those that are square- or cube-shaped, peaks can dominate the response. In

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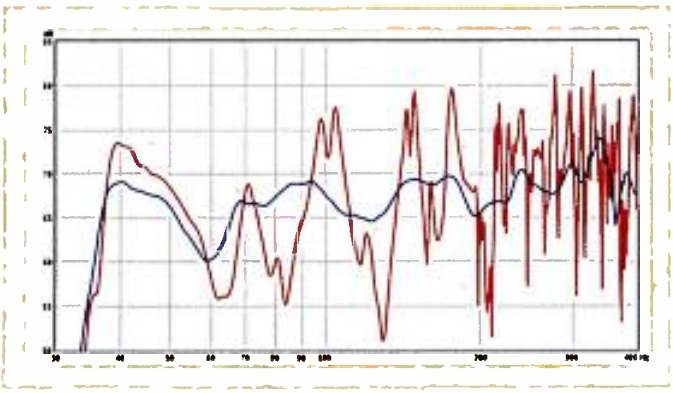
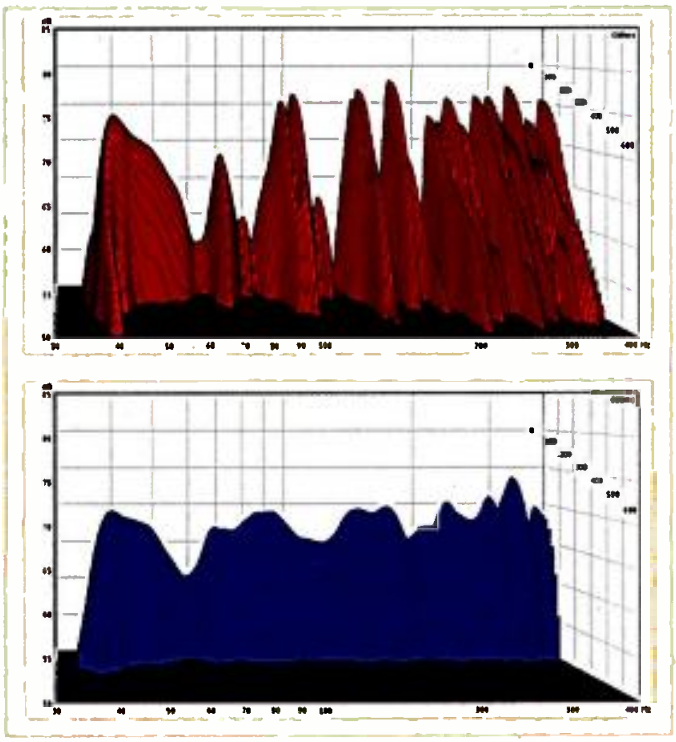


Figure 2. The low-frequency responses shown are typical for most small rooms, before (red trace) and after (blue trace) adding bass traps.



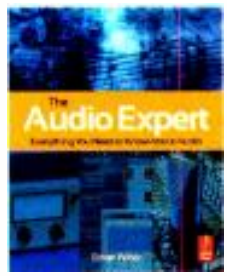
Figures 3 and 4: These graphs are derived from the same measurement data as Figure 2, but they show each peak's decay time, as well as amplitude. The red graph shows the room when untreated, and the blue graph is after adding bass traps.

that case, adding bass traps reduces the peaks, again making the response closer to flat. Whether peaks or nulls are the larger problem also depends on where in the room you listen.

Because deep nulls cause you to hear less bass than is really present, you'll tend to add too much bass to compensate. As you can see, the finest loudspeakers in the world are of little value if your room skews everything you hear this badly. When bass traps are added to a room, the low-frequency response also changes less around the room. The most effective place for bass traps is in corners where bass waves tend to gather, though other locations are also viable. Note that rectangle rooms have 12 corners: four where each wall meets another wall, four where each wall meets the ceiling and four more where each wall meets the floor. After treating as many corners as is practical, the front and rear walls are good candidates for even more bass traps. When bass traps are added, the response not only becomes flatter, but also tighter and clearer because the decay times are reduced. (See Figures 3 and 4.)

It's impossible to make any small room perfectly flat, so the more bass traps you add, the closer you'll get. It's that simple. The only trade-off is how good you want versus how much effort and expense you'll endure. The response and ringing in these graphs is about as good as can be expected in a small room, short of lining every single inch of room surface with extremely thick absorption.

Finally, it's worth noting that our ears perceive low frequencies as being omnidirectional. With content below about 100Hz, it's difficult, if not impossible, to tell where the sound is coming from. Some people think that years of acoustical research are wrong, and people can perceive bass direction at very low frequencies. But I'm convinced the real issue is buzzing and rattling from a woofer or subwoofer, or port noise from a reflex enclosure, or maybe vibration from a nearby window. If you can hear where a subwoofer is placed, and the crossover is 100Hz or lower, then something else is going on. **BE**



Ethan Winer owns RealTraps, an acoustic treatment company in New Milford, CT. This article is excerpted in part from Winer's new book, The Audio Expert, *from Focal Press. More information is available at* www.ethanwiner.com/book.htm.

Silent mics?

The FCC wants comment on fitting more wireless mics into an ever-shrinking TV spectrum.

BY HARRY MARTIN

Wireless microphones of the type used in television productions, stage shows, lecture halls and churches operate on locally vacant TV channels. But, those channels are becoming scarce. Before the digital conversion, there were many vacant TV channels in local markets, leaving ample spectrum for wireless microphones.

The picture began to change in 2009, however, when the last full-power analog stations went off the air. Because digital TV stations can be packed more tightly than analog stations, the FCC was able to free up 18 channels for wireless use, which left fewer empty channels for wireless microphones.

A year ago, the FCC approved the first operation of "white space" devices that provide Wi-Fi-like service within some of the remaining vacant TV channels. The FCC reserved two channels in every market for wireless microphones, and provided for additional channels where needed. Nevertheless, a lot more devices will be trying to operate in a lot less spectrum. Then, last month, the FCC proposed "incentive auctions" designed to encourage broadcasters to give up still more channels.

Uses of wireless mics

Despite the squeeze on spectrum for wireless microphones, they are still indispensible in the entertainment industry. Even the FCC has acknowledged the irreplaceable nature of these devices. For decades, the agency issued licenses for TV-band wireless microphones to just a few categories of users: broadcasters and broadcast networks, cable TV operators, and movie and TV producers.

Other users, such as concert venues, college lecture halls, churches and even the FCC (in the context of its own meeting room) operated wireless microphones without authorization. But, these illegal operations, well known to the FCC, were well managed and caused virtually no interference to TV stations.

Interim rule-making

The advent of white-space devices, though, brought the need for better control over who uses microphones and where. Bringing regulation into line with reality, in 2010, the FCC considered broadening the list of eligible licensees. It also took the unusual step of proposing to legalize previously illegal operation by allowing lower-power wireless microphones to operate as unlicensed devices, under the same basic rules as Wi-Fi and cordless telephones. The power limit would be lower than for licensed wireless microphones, but higher than for most other unlicensed devices, and should suffice for good sound in most halls and churches. That proposed relaxation has not yet been adopted.

Use of digital microphones

In an inquiry proceeding launched in October, the FCC wants to know if technological advances will solve the spectrum problem. The theory is if digital TV stations can fit four channels into one analog TV channel, and digital cell phones can carry 20X the traffic in the same spectrum as old analog cell phones, then why shouldn't digital wireless microphones allow similar service improvements?

In fact, digital microphones each take up about as much spectrum as their analog counterparts, but digital devices can be squeezed much closer together. Therefore, a TV channel can accommodate at least a dozen of them as compared to half as many analog microphones. However, compression of the digital signal creates audio delays that can lower the quality of digital transmissions. The Commission's notice of inquiry is looking for a way forward by seeking comment on these and related technical issues. BE

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

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

Dateline

- On Feb. 1, 2013, TV and Class A TV stations in Indiana, Kentucky and Tennessee must begin their pre-filing renewal announcements in anticipation of filing their renewal applications on April 1, 2013.
- On or before Feb. 1, 2013, non-commercial TV stations in Arkansas, Louisiana and Mississippi must file their biennial ownership reports.
- On or before Feb. 1, 2013, television stations, Class A TV, LPTV stations and TV translators in Arkansas, Louisiana and Mississippi must file their license renewal applications.
- On Feb. 1, 2013, TV and Class A TV stations in the following locations must post their 2012 EEO reports on the FCC's new public file web page and on their own websites: Arkansas, Kansas, Louisiana, Mississippi, Nebraska, Oklahoma, New Jersey and New York.

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MPEG systems

A new standard brings video-coding efficiency.

BY ALDO CUGNINI

Widely adopted video-coding standards are subject to obsolescence that follows a different form of "Moore's Law." Although silicon speed roughly doubles every 18 months, video-coding efficiency doubles about every 10 years. The longer time span is influenced by other factors, such as the time needed to replace a vast and expensive content delivery infrastructure. MPEG-2 video compression (essentially an update of MPEG-1) was first released in 1995, with digital satellite delivery a major application, followed soon afterwards by deployment on DVDs and digital terrestrial service. Although MPEG-4/AVC (aka MPEG-4 Part 10 or H.264) was released only a few years later (and yielded about a 50 percent bit-rate savings), it took well into the 2000s for the codec to become entrenched into professional and consumer applications, on satellite, cable and Blu-ray discs.

And now, the next codec is nearly upon us: High-Efficiency Video Coding (HEVC). This next-generation video standard is currently being developed by the JCT-VC team, a joint effort between MPEG and the Video Coding Experts Group (VCEG). The finalized HEVC standard is expected to bring another 50-percent bit-rate savings, compared to equivalent H.264/AVC encoding. HEVC should be ready for ratification by ISO and ITU — ISO/IEC 23008-2 MPEG-H Part 2 and ITU-T Rec. H.265 — by the end of January 2013. HEVC codecs are then expected to be adopted quickly in many devices, such as camcorders, DSLRs, digital TVs, PCs, set-top boxes, smartphones and tablets.

HEVC

The HEVC standard incorporates numerous improvements over AVC, including a new prediction block structure, and updates to the toolkit that include intra-prediction, inverse transforms, motion compensation, loop filtering and entropy coding. A major difference from MPEG-2 and AVC is a new framework encompassing coding units (CUs), prediction units (PUs) and transform units (TUs). Coding units define a sub-partitioning of a picture into arbitrary rectangular regions. The CU replaces the macroblock structure of previous video coding standards, and contains one or more prediction units and transform units, as shown in Figure 1. The PU is the elementary unit for intra- and inter-prediction, and the TU is the basic unit for transform and quantization.

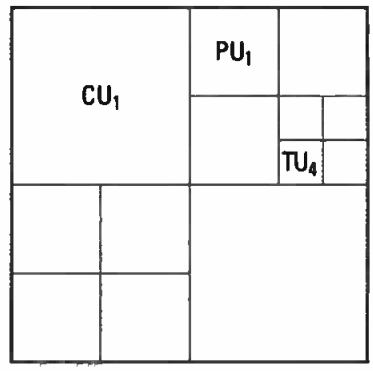

Figure 1. HEVC incorporates a new framework encompassing coding units, prediction units and transform units, which replaces the macroblock structure of previous video coding standards with one or more prediction units (PUs) and transform units (TUs).

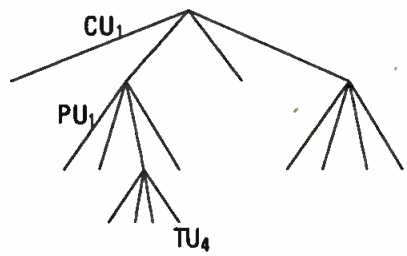

Figure 2. With HEVC, video frames are divided into a hierarchical quad-tree coding structure that uses coding units, prediction units and transform units.

Overall, this framework describes a treelike structure in which the individual branches can have different depths for different portions of a picture. Each frame is divided into the largest coding units that can be recursively split into smaller CUs using a generic quad-tree segmentation structure, as shown in Figure 2. CUs can be further split into PUs and TUs. This new structure greatly reduces blocking artifacts, while at the same time providing a more efficient coding of picture-detail regions.

MPEG-2 intra-prediction employs fixed blocks for transform coding and motion compensation. AVC went beyond this by allowing multiple block sizes. HEVC also divides the picture into coding tree blocks, which are 64 x 64-, 32 x 32-, 16 x 16-, or 8 x 8-pixel regions. But these coding units can now be hierarchically subdivided all the way down to 4 x 4-sized units. In addition, an internal bit-depth increase allows encoding of video pictures by processing them as having a color depth higher than eight bits.

HEVC also specifies 33 different intra-prediction directions, as well as planar and DC modes, which reconstruct smooth regions or directional structures, respectively, in a way that hides artifacts better.

Parallel processing

The picture can be divided up into a grid of rectangular tiles that can be decoded independently, with new signaling allowing for multi-threaded decode. This supports a new decoder structure called Wavefront Parallel Processing (WPP). With WPP, the picture is partitioned into rows of treeblocks, which allow decoding and prediction using data from multiple

partitions. This picture structure allows parallel decoding of rows of treeblocks, with as many processors as the picture contains treeblock rows. The staggered start of processing looks like a wave front when represented graphically, hence the name.

Four different Inverse DCT Transform sizes are specified with HEVC: 4 x 4, 8 x 8, 16 x 16 and 32 x 32. Additionally, 4 x 4 intra-coded Luma blocks are transformed using a new Discrete Sine Transform (DST). Unlike AVC, columns are transformed first, followed by rows, and coding units can be hierarchically split (quad tree) all the way down to 4 x 4 regions. This allows encoders to adaptively assign transform blocks that minimize the occurrence of high-frequency coefficients. The availability of different transform types and sizes adds efficiency while reducing blocking artifacts.

A new de-blocking filter, similar to that of AVC, operates only on edges that are on the block grid. Furthermore, all vertical edges of the entire picture are filtered first, followed by the horizontal edges. After the de-blocking filter, HEVC provides two new optional filters: Sample Adaptive Offset (SAO) and Adaptive Loop Filter (ALF). In the SAO filter, the entire picture is treated as a hierarchical quad tree. Within each sub-quadrant in the quad tree, the filter can be used by transmitting offset values that can correspond either to the intensity band of pixel values (band offset) or to the difference compared to neighboring pixels (edge offset). ALF is designed to minimize the coding errors of the decoded frame compared to the original one, yielding a much more faithful reproduction.

Advanced motion compensation

Motion compensation is provided by two new methods, Advanced Motion Vector Prediction (AMVP) and Merge Mode, both of which use indexed lists of neighboring and temporal predictors. AMVP uses motion vectors from neighboring prediction units, chosen from both spatial and temporal predictors, and Merge Mode uses motion vectors from neighboring blocks as predictors. To calculate motion vectors, Luma is filtered to quarter-pixel accuracy, using a high-precision 8-tap filter. Chroma is filtered with a one-eighth-pixel 4-tap filter. A motion-compensated region can be either single- or bidirectionally interpolated (one or two motion vectors and reference frames), and each direction can be individually weighted.

The JCT-VC team is also studying various new tools for adaptive quantization. After this last lossy coding step, lossless Context-adaptive Binary Arithmetic Coding (CABAC) is carried out, which is similar to AVC's CABAC, but has been rearranged to allow for simpler and faster hardware decoding. Currently, the low-complexity entropy-coding technique called Context-adaptive Variable-Length Coding (CAVLC), which was available as an option in AVC, is not available in HEVC.

With all of these improvements comes a price. Both encoding and decoding are significantly more complex, so we can expect more expensive processors on both sides. On the decoding side, this means a higher density of silicon and/or software, both requiring faster chips, and higher power consumption, but Moore's Law should help. As for deployment in portable devices, it will be an interesting challenge to realize the efficiency benefits of HEVC in devices that are demanding increasing amounts of video content. BE

Aldo Cugnini is a consultant in the digital television industry.

Network technology

Core concepts structure overall system performance.

BY BRAD GILMER

Understanding how networks function at a fundamental level is vital to understanding how overall systems perform. In 2013, we are going to take time in this column to focus on some basic networking concepts that I hope will provide you with the critical technical foundation you need to be a successful engineer in the professional media industry.

Key assumptions

As we start looking at networking, it is important to understand the history of packetized networks and some of the assumptions behind their development. Today, just about everything in computer networking flows from some important basic assumptions. As we go through this discussion, there may be cases where you might say that certain problems have been addressed, such as the "best effort" problem. This is true as networking has evolved. But in almost every case, these are adaptations that have been made to address or modify some of the initial assumptions. So, for this article, we are going to focus on the basics, realizing that there may be techniques or technologies that could be employed to modify some initial network behaviors.

Nuclear war

It may seem strange to start our discussion on networking with a discussion on nuclear war, but if you really want to understand how networks are designed, this is a good place to start.

The threat of nuclear war, which included the possibility of multiple sites being decimated all at once, led to the need for a military command and control technology that didn't have to rely on a central control system.

The period after World War II was a difficult time. The U.S. fought the Korean War, which was a proxy war between the U.S. and China, and at the same time entered into the Cold War with Russia. A nuclear arms race ensued, and some of us practiced "duck and cover" drills at school. Many in this country took the threat of a nuclear attack extremely seriously. It was in this environment that modern computer networking was born.

The country needed a military command and control technology that could survive a "smoking hole" scenario — where one or even several cities were reduced to smoking holes in the ground. The technology could not rely on centralized switching centers or a central control system. Initially, designers considered traditional systems with backup switching and control systems in several locations, but the threat of multiple successful "smoking holes" during an attack rendered these traditional designs unacceptable. It fell to DARPA (the Defense Advanced Research Projects Agency, part of the U.S. Department of Defense) to figure out a solution to this problem. This is probably the most significant key assumption; most other assumptions fall directly out of this.

Packets

Now, everyone takes it for granted that if an application wants to send information over a network, that information is broken down into small parts, loaded into the payload section of a packet and launched over a network. But remember, at the time this technology was being developed, paper punch tape and teletypes were the order of the day. These systems operated over wire-line or radio networks and required a continuous carrier in order to work. Breaking the information to be sent into smaller packets was a fundamental concept, and it is a critical assumption behind modern network design.

Best effort

Networks are "best effort," meaning packets may get to their destination, or they may not. No assumptions are made that the network absolutely will deliver any particular packet. This may seem like a crazy assumption. After all, the whole point of the system was to get absolutely critical information transferred from one place to another, possibly during a nuclear attack. But, freeing designers from the constraint of having to guarantee that *the network* was responsible for ensuring messages made it from one place to another actually allowed a number of creative solutions to the problem, many of which are employed with professional video today.

Network routers read packet source/destination information and react accordingly based on internal tables or on queries made to other routers and servers.

If a packet is lost, there are many options: The receiver could request retransmission, the receiver could mask the error without actually having the original data, or the receiver could reconstruct the missing information from additional error correction data sent separately. All of these options are solutions to resolving the fact that a packet did not arrive. The key, remember, is that they work without having to somehow ensure that the network remains viable 100 percent of the time.

Autonomous and decentralized

Another key assumption is the network does not have any centralized control system or centralized routing function. Designers wanted to ensure that, even in the case of a successful nuclear attack, the remaining portions of the network could continue to operate. Packets make their way from source to destination without a "router control system," a different approach from what we are familiar with in the video router environment.

Not only are network operations autonomous, but they are decentralized as well. For example, the Domain Name System (DNS) is a distributed database that helps computers find each other. Without it, we would not be able to use domain names such as Google.com. Instead, we would have to rely on IP addresses such as 98.223.42.21. Remember also that having a central database would violate the "smoking hole" assumption. Instead, DNS works by having tens of thousands, perhaps millions, of DNS servers available. An entry is created in one database, but this entry is then replicated across the entire Internet as different users look up the same destination entry.

Self-routing

Each packet contains information necessary to get the packet from the source to the destination. Network routers read this information and react accordingly based on internal tables or on queries made to other routers and servers. This entire process is a critical part of how the Internet works, and I will be talking much more about routing, route discovery and Domain Name Resolution as we move into the future.

Layers and abstraction

Networking technology is separated into layers, with each layer focused on performing a particular task. This fundamental assumption allows different parts of networking technology to evolve separately and also allows manufacturers to quickly adapt to new technologies without having to re-write applications. It also allows network engineers to organize computers into logical network groups such as news, post production, traffic, etc. while still allowing each computer to maintain a unique network address. In addition to those described here, there are many other benefits of layering, and we will also explore this topic in much greater detail in a future article.

Transmission lines and RF engineering

We might think of an Ethernet cable as, well, a cable. But, actually, it is a transmission line. In fact, the original Ethernet ran on RG-11 coaxial cable, which is almost the diameter of your thumb. Later generations ran on RG-59. That Cat 6 Ethernet cable connecting your desktop to a wall jack is actually a twisted pair RF transmission line. If you do not believe me, try using a flat telephone-type jumper cable in place of the Cat 6. It will not work. This is because of cross talk and attenuation caused by the lack of twist in the cables. When you start running into hardware-related reliability issues with network connections, remember that an awful lot of current Ethernet technology operates on RF transmission lines. Pay attention to cable quality, workmanship and the use of proper terminations.

Using UDP, poorly behaved clients can dominate a network, which destroys communication for everyone.

Shared network

Computers communicate across a shared network using the same bandwidth. There will not be a "nailed up" full-time connection from a sender to a receiver. There should be enough bandwidth for the network to function well, but that does not mean that bandwidth will always be available when it is needed. When two computers try to talk at the same time (a collision), they will both back off for a random amount of time before making another attempt.

Well-behaved citizens

A central assumption behind Ethernet networking is that applications will be well-behaved. By this, I mean applications will observe the rules of the road and will not hog all of the available bandwidth.

When Ethernet was created, the assumption was that most of the data transferred across the network would be small. (Think of file transfers of small documents, short network control messages and so on.) When you put heavy, continuous loads on Ethernet networks, they start to collapse. This is because network designers assumed that there would always be some gaps in transmission, and that everyone could find a time to talk on the network even if things were pretty busy. But, if you load a network with professional video traffic, for example, a single transmitter can quickly suck all of the air out of the room, leaving no time for others to get a word in edgewise. Similarly, using User Datagram Protocol (UDP), poorly behaved clients can dominate a network, which destroys communications for everyone. This is important since most professional video-over-IP applications use UDP.

We will explore many of these assumptions in more detail over the coming months. 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

Building a scalable MAM system

Here's an architectural model for media processing.

BY JON FOLLAND

For a media asset management (MAM) system to be truly valuable, it must offer much more than a repository for content with associated metadata and storage services. In today's file-based, software-orientated world, a MAM system must offer services for content processing and manipulation. In doing so, it orchestrates people and wider enterprise resources. Media processing is key to putting content to work in the world of post production, broadcast and distribution. Such processing can happen outside a MAM system or inside as an integrated system. Either way, processing high volumes of large media files requires careful thought.

This covers some useful software engineering approaches that can be followed when building scalable MAM systems. The main focus is on the key concepts and components — multi-tenancy, jobs, actions, quotas and resources — that must come together in an enterprise media processing component. (See Figure 1.)

Multi-tenancy

For a MAM system to be truly useful, every object and component must work within a multi-tenanted environment and, therefore, support access control and ownership. This is a critical component, and it will be shown throughout the article why it is so important.

Jobs and actions

An action is a unit of work or software plug-in that is executed against an asset or group of assets. It is the fundamental building block for media processing. An action has a type that defines the kind of work that it will carry out. It can be a general-purpose file action, such as copy and move, or a media-centric action, such as transcode, QC, package or deliver.

The key to extensibility of this paradigm is that new action types or software interfaces can be created. So, to create new types of transcodes or QCs, for example, one simply needs to implement the related action type interface to change the underlying behavior. For example, for a Deliver Action, one may develop concrete implementations of action adaptors for delivering to Daily Motion and YouTube, or to a broadcast system.

As a unit of work, the action must run within a runtime environment. In the case of media processing, this requires careful consideration as actions are often expected to run for an extended period. With this in mind, any runtime environment must be asynchronous. It must also be transactional to enable rollback from failed media processing actions such as transcodes, file moves and copies.

The fundamental wrapper for the action, in order to bring wider services such as state, transactional integrity, priority and times, is the job. A job incorporates a requirement for access to resources of a given type. In addition, a job points to a type of action and is configured to run at a certain time and with a certain priority. Jobs can be persisted in a database so that the state of the job can be retained in perpetuity for auditing and reporting purposes. Retaining its state also means a failed job can be retried, rescheduled and reprioritized if required.

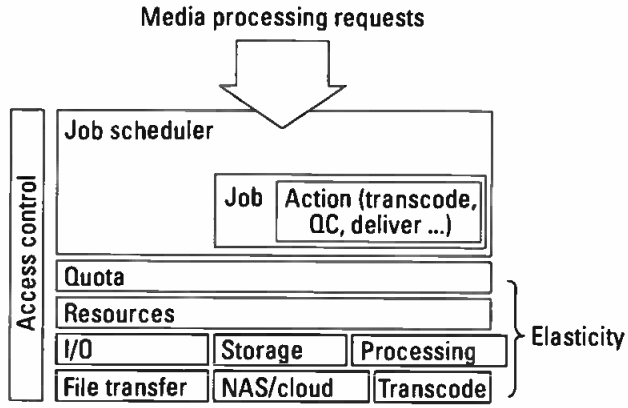

Figure 1. The key to scalability, extensibility and powerful media management is the interaction of actions, jobs, resources and quotas. These concepts and components make up an enterprise media processing system.

Given that media processing is resource-intensive and that such jobs can last for an extended period, a job is run in its own execution context by a job scheduler. A scheduler is responsible for preventing jobs from interfering with each other. If jobs are allowed to contend for resources, they will generally decrease the performance of the cluster, delay the execution of these jobs and possibly cause one or more of the jobs to fail. The scheduler is responsible for internally tracking and dedicating requested resources to a

job, thus preventing use of these resources by other jobs. When clusters or other high-performance computing (HPC) platforms are created, they are typically created for one or more specific purposes.

The job scheduler polls the jobs residing in the underlying job store (database) and executes them in an execution context. This context is injected into the job, thus allowing a running job to have access to system-wide services such as logging and system state.

In any given scheduling iteration, many activities take place. These are broken into the following categories:

- *Update state information.* During each iteration, the scheduler contacts the resource manager(s) and requests up-to-date information on compute resources, workload and policy configuration.
- *Refresh reservations.*
- *Schedule reserved jobs.*
- *Schedule priority jobs.* In scheduling jobs, multiple steps occur.
- *Backfill jobs.*
- *Update statistics.*
- *Handle user requests.* User requests include any call requesting state information, configuration changes, or job or resource manipulation commands. These requests may come in the form of user client calls, peer daemon calls or process signals.

Resources and quotas

Most media processing jobs require access to other systems and software to carry out meaningful work. For example, moving a file requires access to a storage resource, and transcoding a file requires access to transcode hardware and software. So the key to enabling scale is to understand the availability of resource.

The resource object, like an action, has a type such as processing, storage or I/O. Each type has a subtype, such as transcode. For example, processing resources could be transcoding and QC, and I/O resource could be network services for file transfer. This subtype can then be implemented for various specific resources. With a transcode, resource implementation would be a specialized software adaptor for delegating transcode requests to a transcode engine.

The resource adaptor model provides an elegant interface to the job scheduling layer, where all available resources and resource types are made available for consumption.

The benefit of the resource adaptor model is that it provides an elegant interface to the job scheduling layer, where all available resources and resource types are made available for consumption. This is where multi-tenancy comes in, as one needs to control access to resources to ensure that files, folders, transcodes, etc., can only be utilized by named users or roles.

So with the use of actions, jobs and resources, you have a layered and extensible approach to managing media assets. You can create new action types and use a whole range of networked resources for supporting all kinds of media management tasks.

However, with a resource-hungry job scheduler, executing potentially thousands of jobs, how do we ensure we make the most of our expensive resources? How do we ensure that jobs don't get starved of resource or that resources don't go idle? The compute power of a resource is limited, and over time, demand will inevitably exceed supply. Intelligent scheduling decisions can significantly improve the effectiveness of media processing with more jobs being run with quicker turnaround. Subject to the constraints of the traffic control and mission policies, it is the job of the scheduler to use whatever freedom is available to schedule jobs in such a manner so as to maximize system performance.

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job access to resources and, therefore, making the most of the resources available, is the quota. One might assume that the only parameters that are useful for orchestrating access to a resource are named user, priority, start time and end time. All are useful, but they are far too coarse-grained for advanced scheduling.

A quota encapsulates a user's access to a resource. The rules governing a user's access are retained within the quota, thus making the architecture pluggable and configurable. Remember the importance of multi-tenanting? A quota is abstract in the sense that it encapsulates different rules for different resource types.

For example, in the case of storage or folder resources, a quota represents total storage allowance (gigabytes) allowed to a certain user. It may contain a threshold for raising alerts when a user is close to reaching their limit.

In the case of network resources, quotas can be allocated in terms of bandwidth. This might be a consistent rate, contended per session or throttled at times of the day.

The beauty of a pluggable model is that access to precious processing resources can be throttled in an unlimited number of ways.

In the case of processing jobs such as transcoding, this becomes much harder to implement as the time taken for a transcode job can depend on the input format, the output format and a huge range of transcode parameters.

In the case of processing a transcode resource request, the quota may throttle total jobs per user or total concurrent jobs per user. Again, the quota may be configured or implemented to allow access at certain times of day.

The beauty of a pluggable model is that access to precious processing resources can be throttled in an unlimited number of ways. A quota could look up access to another system to see if a user has paid his or her bill or whether he or she is a bronze, gold or platinum user. Bringing cloud technologies into the quota and resource layer enable the concept of elastic computing. This makes resource scheduling much easier as the job scheduler can instantiate new resources and tear them down as and when required.

In summary, the key to scalability, extensibility and powerful media management is the interaction of actions, jobs, resources and quotas. With the work being carried out by the Advanced Media Workflow Association (AMWA), this is a great opportunity for more standardized interfaces in the area of media processing, which can only be good in a large and rich media technology ecosystem. BE

Jon Folland is CEO of Nativ.

A thick carbon cloud

Cloud storage may not be as green or as cost-efficient as purported.

BY BRAD DICK

When it comes to video production, cloud solutions may contribute significantly to energy consumption.

The cloud is widely proposed as the latest solution for at least three key media and business applications, including: Storage as a Service (STaaS), Software as a Service and Processing as a Service.

In production and broadcast environments, all three applications are sometimes seen as viable answers to the needs of a fast-paced media production center. Even so, it's the storage as a service product that is seeing the early application in the video production arena.

Storage as a Service

Some common commercial products of STaaS include Instagram, DropBox and Carbonite. Professional STaaS services are available from Amazon (Amazon S3), Microsoft (SkyDrive) and EMC (Atmos), among others.

All of these products do pretty much the same thing: You upload your data, and the company stores it. The services rely on users with a standard desktop, laptop or even a thin client to access to the data. If your application needs to store Exabytes of data, these services can be helpful and inexpensive. However, while helpful and inexpensive are nice, they don't provide much in the way of detailing how power-efficient cloud storage may or may not be.

More power efficient?

There is an oft-touted benefit of using the cloud for data storage, and that is power savings. Broadcasters are only now becoming aware of the importance of controlling power costs. One proposed way to reduce electrical costs is to move large-scale data storage off-site to a server farm.

A huge server farm may be more efficient, have newer servers consuming less power and operate with lower costs than can a local production or broadcast house — right? Cloud storage providers may tell you so, but the real answer requires some investigative work.

Let's look at a real-world example. In July 2011, the General Services Administration (GSA) announced it was the first federal agency to completely migrate its e-mail system to the cloud. The entire system now runs on Google's cloud-based storage and e-mail system. The conversion process required just more than a year.

According to Google, that project saved 93 percent on GSA's annual server energy costs. Google claims GSA's annual electrical operational costs dropped from $307,400 to only $22,400. (See Table 1.)

With regards to the GSA project, Google SVP for technical infrastructure, Urs Hölzle, wrote, "Last year, we crunched the numbers and found that Gmail is up to 80X more energy-efficient than running traditional in-house e-mail ... Our results show that a typical organization can achieve energy savings of about 65-85% by migrating to Google Apps ...

"We found that the GSA was able to reduce server energy consumption by nearly 90% and carbon emissions by 85%. That means the GSA will save an estimated $285,000 annually on energy costs alone, a 93% cost reduction."

Not so fast, Hölzle, says Tom Raftery, another expert and writer of the "GreenMonk" energy blog. The truth may not be so simple, and the fog of statistics may hide some other important considerations.

Google – GSA storage as a service project	Before Google apps	After Google apps	Savings
Total # GSA mail servers	324	61	82%
Total direct power of GSA servers (kW)	163	22	87%
Annual GSA server kWh/user	175	20	89%
Additional cloud-based kWh/user	--	1-5	2-3% increase
Annual GSA server energy server costs ($)	$307,400	$22,400	93%
Annual carbon emissions from server energy (metric tons of CO2)	1860	290	85%

Table 1. This table shows a before-and-after effect on energy consumption and costs, as reported by Google, for the GSA after the agency migrated its e-mail system to the cloud and Google Apps for Government.

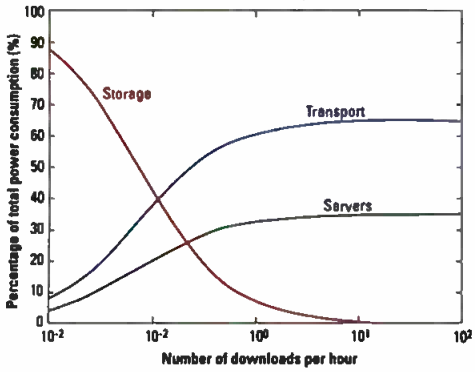


Figure 1. Shown here is the percentage of total power consumption of transport, storage and servers of a private cloud storage service as a function of download rate.

First, the GSA opted to farm out all of its computing to Google instead of choosing to update its own servers and data centers. However, according to Raftery, a 30-percent improvement in server efficiency could have been had if the agency had simply replaced its five-year-old server technology with the latest versions.

Second, what is entirely missing from the Google calculation is the cost of data transfer. For media applications, moving large files up to a cloud and down again involves three things: personnel time (transfer wait), electrical power for the local desktop/laptop and switches, and maintaining sufficient storage in the cloud. As we'll see, for applications that require repeated operator interaction with the data, transfer power costs are not insignificant.

A report from this past summer suggests that cloud proponents may be fudging the facts when it comes to claiming just how "green" cloud computing really is. (Separately, Raftery seems to confirm this idea through his GSA/Google CO2 emissions findings that are shown in Table 2.)

In the Aug. 22 report, Energy Facts Weekly quoted an IEEE Proceedings paper, "Green Cloud Computing: Balancing Energy in Processing, Storage and Transport," saying "... under some circumstances cloud computing can consume more energy than conventional computing on a local PC."

GSA CO2 production	Before Google Apps	After Google Apps
CO2/server	7.69 tons	4.75 tons
CO2/kWh/User	10.63 tons	14.5 tons

Table 2. "GreenMonk" energy blog writer Tom Raftery has noted that Google's new GSA server farm is less CO2 efficient than GSA's previous facility.

The report said, "For a private cloud storage service at a download rate above one download per hour, servers consume 35%, storage consumes less than 7%, and the remaining *58% of total power is consumed in transport.* [Emphasis added.]

"These results suggest that transport dominates total power consumption at high usage levels for public and private cloud storage services. (See Figure 1.)

"The energy consumed in transporting data between users and the cloud is, therefore, an important consideration when designing an energy efficient cloud storage service. Also, the percentage of total power consumed in servers is greater in private cloud computing than that in public cloud computing. *In both public and private cloud storage services, the energy consumption of storage hardware is a small percentage of total power consumption at medium and high usage levels.*" [Emphasis added.]

The bottom line is that there are many factors to consider before jumping into the cloud. As anyone who's actually flown through a cloud knows, the ride is often bumpy. BE

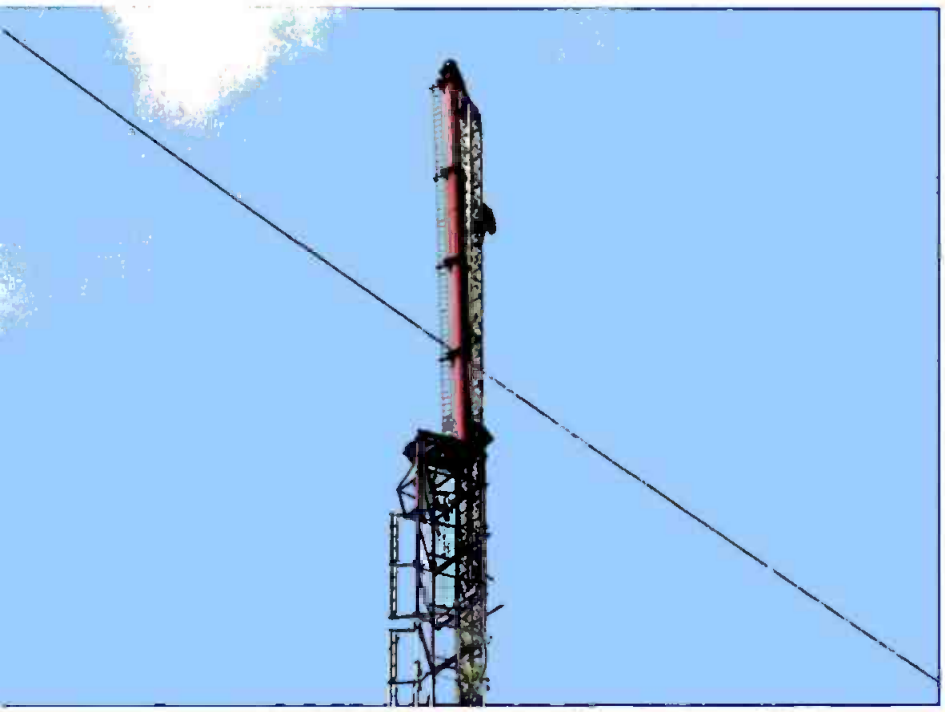
Special Report

from Broadcast Engineering

TRANSMISSION SYSTEMS

Television spectrum repacking

BY JAY C. ADRICK



The impact of a channel change will affect more than the transmitter. The rest of the RF system will contain some channel-specific components, such as the channel mask filter and likely the antenna. Photo courtesy ERI.

One of the most significant impacts on U.S. television broadcasters by the National Broadband Plan (NBP) will be the repacking of the UHF television spectrum. There are still many details to be settled, but one can assume that many television broadcasters will be forced to relocate to another channel even though they are not participating in the reverse spectrum auction process.

What we do not know far outweighs that which we know about the process. The rules for the auction and repacking process are under development. The preliminary details, subject to revision, were presented by the FCC as part of the Sept. 28, 2012, Notice of Proposed Rule Making (NPRM) (Docket No. 12-268).

The debate over the spectrum has been a hot topic well before the release of this NPRM. Through the efforts of the NAB and many state broadcast associations, Congress built in some limitations on the FCC's ability to take away broadcast spectrum. Surrendering of spectrum, sharing of spectrum or moving from UHF to VHF must be voluntary. The commission is also under an obligation to make every effort to protect a station's current coverage area.

The NBP originally recommended reallocating 120MHz of UHF TV spectrum, but reality indicates that less spectrum is likely to be reclaimed. Where the reclaimed spectrum is removed from the band is yet another issue.

The FCC proposal calls for reclaiming spectrum in two segments: one at the upper end of the band and another just below channel 37. (See Figure 1.) The proposal also calls for guard bands to separate the wireless spectrum from the broadcast spectrum. Splitting the wireless allocation into two segments doubles the amount of guard band spectrum required.

There are also proposals on how the white space users, wireless microphones and unlicensed devices will fit into and share the revised band plan. It will be a daunting challenge to fit all of these pieces together while preserving the remaining television service.

Since the auction process is voluntary, the final amount of spectrum that can be reclaimed will be determined by the number of stations that volunteer their spectrum at an economically viable price. A second determining factor will be finding a wireless bidder willing to pay more than the broadcaster's threshold selling price.

There are many unknown factors to this point, but a channel repack plan cannot be formulated until the auction process is completed and we know how many (and the location of all) channel assignments are to be vacated by stations.

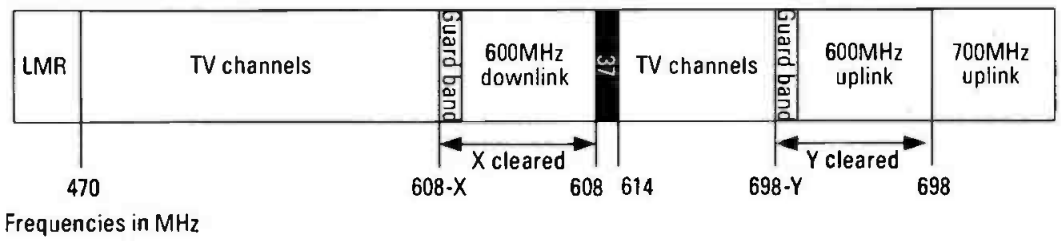


Figure 1. FCC proposed repack plan, 600MHz band

The plan submitted by Congress calls for the funding of the repack to be paid out of a $1.75 billion allocation from the auction proceeds. Congress has also decided that the repack process should take no more than three years from the time that it starts. How the cost or time duration was arrived at is anyone's guess. There may be some flawed assumptions in their decisions, which we will discuss later in this article.

Technical impact

Two years will likely pass before the auction process begins, but it is not too early for stations to think about how the repack will affect technical plans.

Many RF plants could be 20 years old if we assume that repacking will begin in late 2016 and take three years or more to complete. Transmitter technology has advanced significantly in recent years and will continue to do so. The tube and solid-state technology used in most early DTV transmitters is now obsolete, and with the exception of limited spare devices, unsupportable. Recent technology is also more efficient, resulting in lower power consumption.

Another unknown is how far the repack will move your channel assignment. Most UHF transmitter technology, whether tube or solid-state, is segmented into three frequency bands. Transmitter age and depth of frequency change will have a major effect on whether a station's transmitter can be channel-changed or needs replacement.

Let's consider how long it might take to implement a channel change that requires a move from one band segment to another for a transmitter with current technology. A transmitter with IOT technology will require new tube cavities and a new solid-state driver module. Conversely, a solid-state transmitter will need new power amplifier modules and RF combiners. The estimated time for such changes ranges from two to five days of downtime. A second, backup transmitter is required

to keep stations on the air while these changes are being made.

The impact of a channel change will affect more than the transmitter. The rest of the RF system will contain some channel-specific components, such as the channel mask filter and likely the antenna. A station that uses waveguide or even rigid line might need to replace these components.

A mask filter upgrade might be the easy part, but replacing the antenna, transmission line or both will require a lengthy process and involve placing a temporary system on the tower. The old system is then removed, and the new systems can then be installed, tested and made operational before the temporary system is removed. This entire process will typically involve an average of five weeks of on-site work by a qualified tower crew.

While Congress has made provisions for reimbursing stations that are forced to change channels, the FCC has not put final rules into place for such reimbursement.

Time constraints

Earlier I stated that some of the assumptions that led to Congress requesting that this be completed in three years could be flawed. According to tower company American Tower, there are only 14 qualified U.S. tower crews available to change out television broadcast antennas. Considering that it takes an average of five weeks per station to change out a system, 14 crews could only change out 434 stations within the three-year mandated window. This assumes no vacations or holiday downtime.

How many stations will be required to move is anyone's guess at this point because no repack channel plan has been presented.

Additional challenges

Each station affected by the channel change will be faced with a number of issues during the process. Chief among these issues will be how to stay on the air during the channel change. In most cases, it will require the complete replacement of the transmitter. This drives the question of building space and sufficient power for two transmitters, which will lead to site surveys, potential architectural changes and new building construction — and don't forget possible zoning changes. Tower changes might also require zoning changes in lieu of building changes.

The tower structure must be capable of supporting the addition of the temporary antenna system while the main system is being changed out. Things have changed since the analog to digital transition, notably upgrades to TIA/EIA tower specifications.

TIA/EIA-222-G, the national standard's seventh revision for Steel Antenna Towers and Antenna Supporting Structures, became effective Jan. 1, 2006. A tower study early in the game will show what effect the new standards might have on a station's tower structure.

Physics may also have an impact on the project. A station moving lower in frequency will see the size and weight of an equivalent antenna increase. Those forced to go to a smaller, lighter, lower gain antenna will likely need more transmitter power to provide equal coverage.

While Congress has made provisions for reimbursing stations that are forced to change channels, the FCC has not put final rules into place for such reimbursement. It has stated that it will not reimburse for lost air time.

The NPRM suggests that reimbursement could be based on actual costs paid when the project is completed, or on an estimate prior to commencement of the construction. In either case, have a plan in place and be prepared to have a viable and defendable estimate for making the channel change.

So what might be covered? Here is a list of expenses that are likely to hit a project budget:

- Engineering study to determine requirements coverage.
- Building modifications or construction.
- Electrical service modifications.
- Tower loading study.
- Building permits.
- Legal services for filing applications.
- Cost of transmitter(s), channel filter, antenna and transmission line.
- Leasing a temporary antenna and transmission line.
- Tower rigging and antenna installation.
- Proof of performance testing.
- Coverage verification.
- Clean-up and removal of old equipment.

In some cases, there might also be the cost of constructing a replacement tower, the cost of channel combiners if multiple stations are operating on a common antenna, or reject filters if multiple stations are located at a common site. Some stations may also have to change out a backup transmitter, and the few stations with alternate back-up sites will need

to make modifications.

It's hard to say if the $1.75 billion allocation for station reimbursement is enough until we know how many stations are affected by the repack. The current rule that reimbursement must take place within a three-year window is enough reason for stations to begin planning even without understanding how they are affected.

The FCC began to address the rule-making process for the auctions and repack with the release of the NPRM on Oct. 2, 2012. You, your station's management and owners have the opportunity to influence the outcome of the rule-making process by filing comments to the NPRM prior to Dec. 21, 2012. Reply comments will be accepted until Feb. 19, 2013. Engaging in the dialogue and making your voice heard is an important part of ensuring the future of this great broadcast industry.

While some voices from government and the wireless industry have made the spectrum repack seem like it will be the proverbial "walk in the park," it must be pointed out that we still have more unknown challenges than known facts. A major item to be resolved is the spectrum treaties that affect all U.S. areas within 200mi of the Canadian and Mexican borders. It is already known that harvesting spectrum and preserving U.S. television allocations in some of these areas will be a major challenge.

Another challenge is how to stage and implement the channel changes that have a relational effect on neighboring markets. Do we start on both coasts and work towards the Midwest, or do we start in the Midwest and work towards both coasts? Whatever the answers are to these issues and the resulting rules to regulate the auction and repack process, it will be interesting times ahead for station engineers, management, industry suppliers and contractors.

Jay C. Adrick is vice president broadcast technology, Harris Broadcast Communications.

IP for sports

BY THOMAS HEINZER

Sports applications have driven the adoption of IP networks, which deliver the speed and efficiency needed by live event coverage.

Sports production has driven much of the advanced video networking we see today. Live sporting broadcasts — with their highlight packages, clips and slow motion — have pushed higher-bit-rate production, low latency, greater mobility and higher-speed workflows. Viewer demand for a true HD experience on all connected devices only adds to the demands placed on video infrastructures. Networks of today are fundamentally evolving from point-to-point infrastructures to dynamic, multi-service networks that can provide content to all screens with the same speed and quality as delivered to televisions. Any-to-any connections are the true nature of this infrastructure; point-to-point connectivity no longer reflects the way media is consumed.

When properly managed, proven IT practices and IP technologies can be much more efficient and optimize many aspects of an operation — from physical resources to bandwidth — relieve financial burdens, and enable management of capital expenditures. At the same time, IP networks can provide significant value-added services, including social media capabilities.

Despite the inherent flexibility of IP transport, its cost efficiencies and the ubiquitous availability of IP networks, broadcasters still show reluctance to deploy IP for mission-critical broadcast operations. Broadcaster fears over losing apparent workflow control, and concerns over quality and security, persist. IP for the transport and management of live video sits diametrically opposed to tried-and-tested linear broadcast systems. Packet technology entails chopping signals into fragments and transporting them over an IP network for a loss of all perceived control.

Advantages of IP networks

The latest achievements in QoS, resilience, fast repair, switching speeds and scalability have made IP networks reliable enough to become not just viable, but a preferred option for video contribution networks.

The use of IP for contribution-quality video transport has also grown out of the need for efficient scaling of bandwidth. In many cases, IP's scalability has been enhanced through the use of video compression technology such as MPEG-2, H.264 and now JPEG 2000. Compression allows for every bit of available bandwidth to be optimized.

For live sports productions, IP transport reduces the need for remote broadcast and satellite uplink trucks and reduces resources required for on-site personnel, saving production and operational costs. Yet IP's advantages extend beyond operational and capital-expense cost reductions. The ability to share content quickly and efficiently on a shared IP network infrastructure creates collaboration, efficiency and agility throughout the entire broadcast value chain. Perhaps nowhere has this been seen more than in sports production, where workflows are being transformed by IP networks and all-digital systems. The resulting highly integrated workflows and efficiencies have opened the door for new second-screen solutions, providing an opportunity to leverage the often-large amounts of unused content as original premium content sent to viewers' second screens. This serves the dual purposes of engaging viewers as they consult other devices and engage in social media activities as they view their favorite sports, while creating potential new revenue streams.

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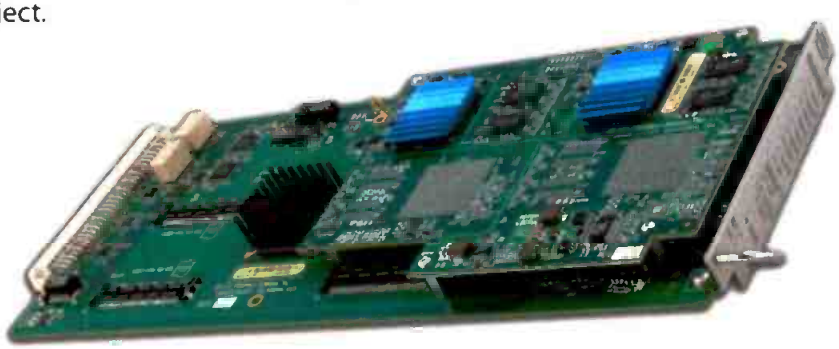

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A move to an IP-managed workflow gave a major sports league the workflow to support 16 remote locations with three decoders.

THREE DECODERS SUPPORT 16 REMOTE LOCATIONS

When the production arm of a major sports league decided to move beyond file-based transfers and give its on-site studios the tools and flexibility to create compelling live sporting packages, an entirely new workflow was developed to gather, transport and manage video feeds. An IP network encompassing video compression and integrated management software enabled remote local production sites to transfer live SD content over a 100Mb/s IP circuit. Identical set-ups at each of the 16 stadiums were required to support the new solution: two Sony BRC-Z700 robotic cameras, one handheld Sony XDCAM EX3 camera and an Apple computer equipped with Final Cut for local editing. Robotic cameras could be remotely operated from the primary facility or from the local studios, with content streamed in real time.

A system management platform makes the connection to the central site, allowing on-site producers to set up video-over-IP connections and record directly to the main production facility, or record locally and transfer the files at a later time using editing software, for an entire process managed over IP. Through connection management software, the main production facility is able to use only three decoders in support of 16 different locations — dynamically shifting the connections where they're needed, either scheduled in advance or on an ad-hoc basis. On-site studios can connect directly to the production studio or use Web-based tools to manage content, with the management software providing scheduling, provisioning and monitoring of video-over-IP services.

The ability to link to 16 different locations on an as-needed basis, receiving content where and when it's needed and according to the match schedule, enables faster and more flexible content delivery, saving the costs of many more permanent connections.

Video compression

Video compression helps overcome the bandwidth constraints of the network transport infrastructure. Typically, compression involves a tradeoff between bandwidth availability, transmission cost and the level of quality required for video services at the different stages between capturing the content and delivering it to the end user. The appropriate video compression and the requirements of the underlying network depend on the specific application. For sporting events, or when transporting video feeds among teams in a production facility, video quality is prioritized above all else, requiring very high bit rates.

For our IP example discussed earlier, SD video was compressed and mapped to IP with near-mathematically-lossless compression with identical modules deployed at the transmitting and receiving ends of the system. The goal is to guarantee the highest possible visual quality with absolute minimal degradation through multiple encode/decode cycles.

Network management and quality of service

Real-time audio and video services are extremely sensitive to packet loss and delay. A quality-of-service (QoS) model must be applied to ensure that over-subscription of data will not cause video packet loss. As a result, any IP infrastructure operating in a broadcast environment must meet stringent performance and availability requirements. It must provide extremely low jitter and low delay—typically less than 80ms. To protect against delay and packet loss, broadcasters must eliminate network congestion and tightly control the amount of traffic traversing all links in the network. Other critical functions of an IP network — including service provisioning and analytics, network inventory, protection and performance management — should be controlled and managed. With today's tools, the task of 100-percent guaranteed QoS should not be daunting, as many incorporate Forward Error Correction (FEC) and a wide range of even more efficient protection schemes that correct issues caused by media adaptors in the network.

Next-generation networks

As an industry, we're building toward a time when infrastructure will cease to be a discussion point. Next-generation networks will reflect true marketplace convergence, enabling unfettered user access to high-quality content of their choice, any time, anywhere and on any device.

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Continuous Innovation

Improved workflows

An IP environment supports an end-to-end digital workflow that dynamically moves media through the production process, breaks down operational silos and supports collaboration internally. As a result, digital workflows can reduce OPEX, allow editing functions to be easily shared among different teams and significantly reduce time to air — especially important in sports and news environments.

The first stage in the lifecycle is the acquisition of video content into the IP domain. Adapting digital video onto an IP network can be achieved either directly from cameras with built-in Ethernet/IP network interface cards, or via standalone IP video adaptors or gateways.

With IP transport, the network itself determines the optimal path for transmitting traffic to its destination at any given moment and routes traffic dynamically. Rather than predetermined transmission paths set up in advance, TS packets serve as containers, which are stamped with a destination address and sent into the network. The network then uses the IP addresses to transport the packet to its destination through connectionless packet forwarding, or IP routing.

The connectionless approach of IP networks offers several advantages. First, because no paths must be established in advance, provisioning is easier and more cost-efficient. IP networks are also inherently resilient. Because no paths are pre-established, an IP network will always reroute around any link or router failure (assuming the network has been designed with resilient nodes and links). This allows IP networks to survive multiple link and node failures — something not always possible with path-protected networking technologies.

Thomas Heinzer is strategic project manager and founder of Nevion.

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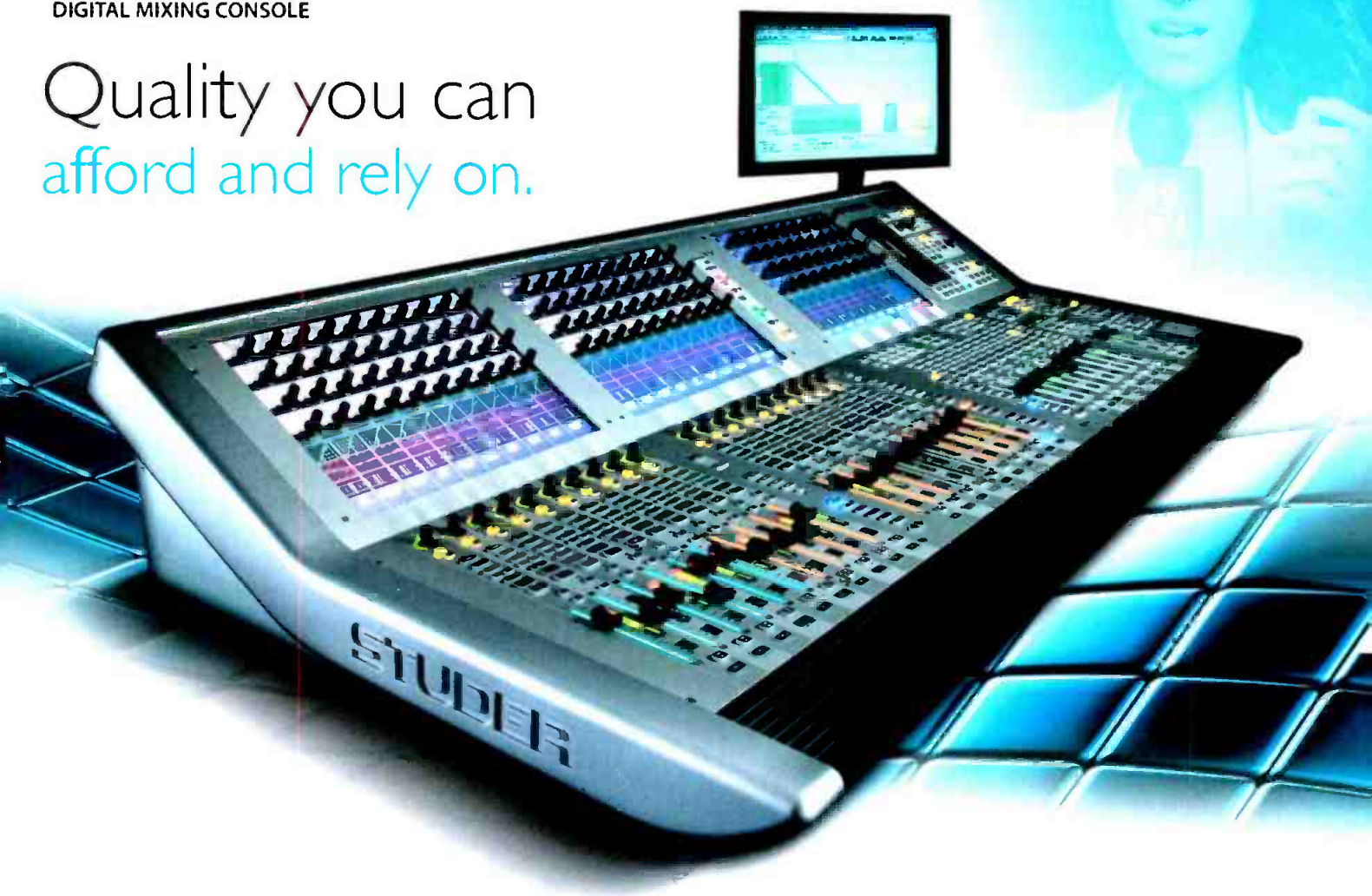

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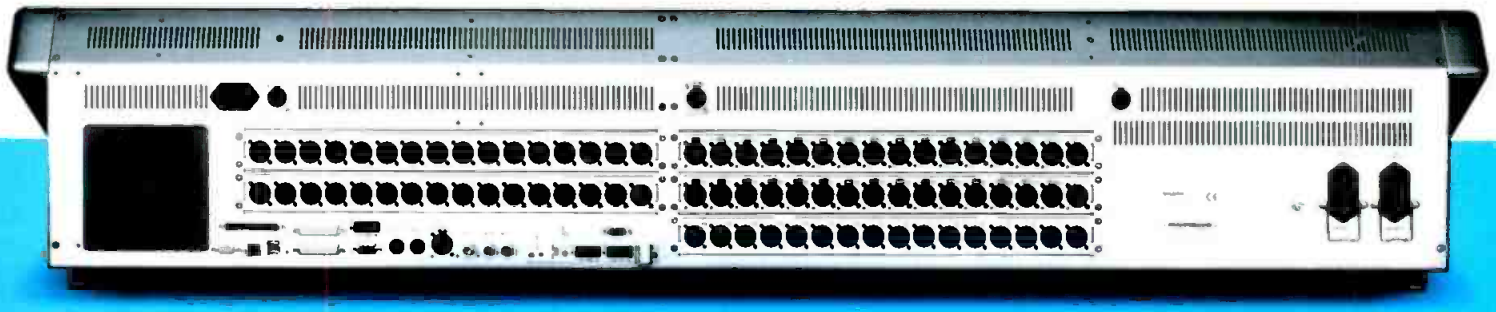

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IP and video merge

BY TOM PARISH

Companies are beginning to address the increased complexity of IP with solutions that integrate all components of an IP video network infrastructure — program acquisition from satellite, terrestrial and physical media sources in native IP, encoding, formatting, quality control/monitoring, scheduling, management and distribution via multiple media formats to the range of devices in the marketplace.

A tremendous amount of complexity must be encapsulated into such systems. But, when properly engineered and managed, modular solutions mitigate costs and often integrate with legacy infrastructures. Instead of complex, expensive installation of less flexible and less configurable equipment for video networks, IP solutions provide economies of scale in addition to bandwidth optimization.

Figure 1. A file-based workflow features an IP-centric workflow that allows different process steps to happen at the same time.

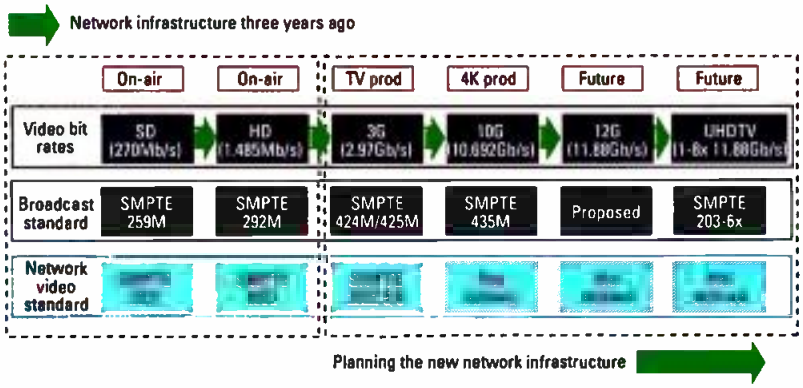

Figure 2. Broadcast center designers will have to continue to deal with continually increasing data-rate capacity requirements.

The new media broadcast center

The new media broadcast center no longer conforms to the old paradigm of tape-based workflow, where there are multiple repetitive tape-based ingests from acquisition to production/preparation to transmission and/or archival. Tape-based workflow is hard to manage and track, and is a time-consuming and labor-intensive process with QC required at every stage. Where a traditional tape-based process follows a push-based workflow of steps being processed in a serial fashion, the newer file-based workflow methodology is more of a pull process, with an IP-centric workflow that allows different steps of the process to be simultaneously performed. (See Figure 1.)

New media broadcast centers are designed to support file-based workflow where content is ingested once and made available to all work centers simultaneously. The design is centered on IP-packet technology flowing on an IT network and accessing a central shared-storage facility. The central storage facility houses all media content, including essence, metadata and other associated content. Once content is ingested, it is transformed into a file format, metadata is aggregated, and assets are bundled into a package for delivery to central storage. Typically, this bundle is a SMPTE-standard MXF wrapper. The wrapper may contain a number of different streams of essence that are encoded with one or more varieties of codecs and tied to an associated metadata wrapper that describes material contained within the MXF wrapper.

Work-center access to central storage is allowed on an independent basis, based on previously established operational workflow rules. Automated processing is managed by a MAM system, which enforces and administers the rules. An all-IP, all-IT network architecture with file-based workflow brings efficiencies the media broadcast center can benefit from. Among these benefits are: centralized and on-demand scalable computing; fast/dense networking; scalable storage; reduction of over-provisioned and under-utilized resources; and virtualization and parallel processing.

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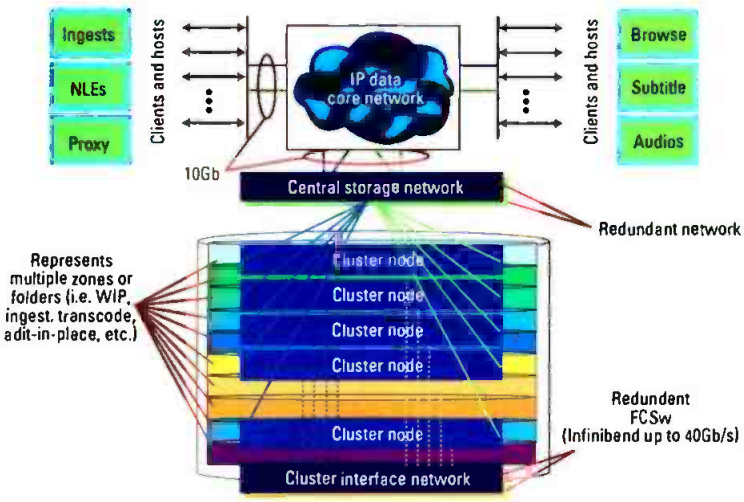

Figure 3. Shown here is a Distributed Networked File System.

IP's new-age infrastructure

In the new design, it is advised to segregate the control LAN from the mission-critical rich media LAN. While it may be appropriate to size the control network for Gigabyte Ethernet, the rich-media LAN is typically sized for 10GB Ethernet or higher. Most equipment uses Ethernet ports for monitor and control access. Having an Ethernet switch in each cabinet for aggregation reduces cabling.

The equipment and cabling design for the data-rate capacity of rich media should be sized for the present and future. With a data rate of 1.485Mb/s for 1080i HDTV, many facilities were designed to support up to only 1.5Gb/s. Today, however, some content providers are transitioning to 1080p HDTV. For the past two years, equipment manufacturers have provided equipment with 3Gb/s capability to support the move to 1080p. Concurrently, some consumer TV equipment manufacturers now demonstrate 4K HD and UHDTV that require higher data-rate capacities. (See Figure 2 on page 40.) This can be a dilemma for center designers.

Central storage design

Central storage design has been moving from a general, parallel file system to a distributed networked file system. The clustered storage Distributed Networked File System (DNFS) is fast becoming the choice for central storage in the modern broadcast center. (See Figure 3.) It is a high-performance solution combining an intelligent DNFS with modular hardware that delivers simplicity and scalability. It combines three layers of traditional storage architecture (file system, volume management and RAID) into a symmetrical system that stripes files and metadata across multiple storage nodes within a cluster. Each node is given the intelligence to know the whole system layout and where each file or its parts reside.

With low-latency Infiniband switching for inter-cluster communication, it enables each node to share information with every other node on the system.

Considering the movement of file-based workflow to the cloud, the future central-storage facility will more than likely transition

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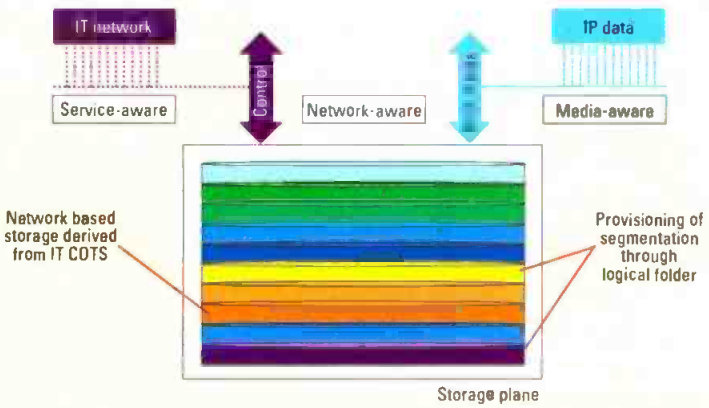

Figure 4. A future central-storage facility will likely move to IP-network-based storage derived from COTS amalgamation of virtual machines.

to IP-network-based storage derived from IT commercial-off-the-shelf (COTS) amalgamation of virtual machines. (See Figure 4.)

IP networking in the cloud

With IP/IT infrastructure and file-based workflow adaptation, there exists the fundamental technology necessary to allow much of today's workflow processing to reside in the cloud. This is centered on rule-based workflow algorithms automated by a MAM system and built on a virtual infrastructure, allowing for deployment of multiple work platforms on shared hardware, operating systems and applications.

This software-based cloud solution offers lower upfront cost and provides high scalability with flexibility. Also, many content owners' primary concern is asset security; however, digital rights management cloud solutions exist that protect content during the process.

A promise delivered

With integrated IP solutions, encompassing compression, advanced provisioning, path finding and quality assurance, broadcasters can create networks that can give greater efficiencies and resource and cost savings. IP has come of age, providing unique advantages across workflows and distribution.

Tom Parish is senior vice president of broadcast technology, Globecomm.

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File-based workflow

Operators produce content in a virtual workspace.

BY JOHN LUFF

For decades, we have had workflow in every facet of our profession. But, of course, we didn't call it that. A station had procedures connecting traffic, sales, news and master control, which today we would call "workflow" in the strictest sense.

But file-based workflow is fundamentally different. Files are transported and used in quite different ways from baseband signals. They contain more elements — audio, video and the metadata necessary to facilitate their use. Files are only representations that can be thought of as virtual assets, in a virtual workspace where workflow happens.

Metadata has always been a critical part of production, but with the advent of file-based workflow, it has had to change to accommodate the nature of the captured content. Image courtesy Grass Valley.

Early development of file-based production began in about 1995. The first on-camera file-based recording system allowed content to be moved directly, as files, to the edit room. It was still a physical process, and in many applications it still is. News production relies on moving the physical media containing files to the station, and it is likely that from there on, only the data representation will move through the rest of the workflow.

The workflow in editing is mostly shots in, completed package out, representing a pretty simple process. More importantly, the interface to the NRCS where program planning is completed is done exclusively with metadata, and perhaps proxy versions of the essence.

Metadata is used to manage the movement and storage of the content, for the metadata contains the technical and descriptive information that allows decisions about processes and the movement of essence to be made. Metadata was once on 3in by 5in file cards and on blackboards, noting where crews had been sent and what they expected to bring back.

Note that the processes are entirely IT-centric. Parsing metadata is an IT process, as is the management of a newsroom where scripts and slugs are created in a newsroom computer system. Management of the metadata begins with the creation of tags that tie together systems and content. The creation of tags facilitates communication of the steps in workflow used to transform and move content.

Our complicated processes are in a real sense no different than that of 25 years ago. We then had a multiplicity of tape formats, video standards and even interconnection methods. The net effect was to produce a technical system every bit as complex as a file-based system is today. The systems never warned you of impending failure, and the often first noted symptom was the distinctive odor of "overheated ohmite." Today, we get pinged by the SNMP management layer on our smartphone requesting we look into impending doom in a disk array.

The modern workflow is, of course, becoming more complex as producers and stations develop new uses for content formatted differently, and multiplying those options complicates workflow immensely. This has given new impetus to a movement to use Service Oriented Architecture to manage the workflow. Putting all of the transforms and processes on a bus as "services" and allowing a software layer to manage the process by calling for things like transcoding, ingest, archive, etc., can make workflow much more adaptable to change in the future. The AMWA and EBU are hard at work to solve this conundrum using what they call FIMS.

Farewell

After more than a decade, this is my last regular column for *Broadcast Engineering*. I intended to put some perspective on technological change that has swept over our industry again and again during that time period. My hope is that readers have taken my work a step further, thinking critically about what drives change and how they can take advantage of it. Occasionally, when researching an article I have Googled, I found links to articles I wrote years ago and was pleased that my thinking has evolved as technology has swept out the old and in the new.

In my 46-year career, have I worked on monochrome video and HDTV playout centers. How much fun it has been! My personal thanks to the many of you who wrote to me asking for opinions and help after reading my column. I'll miss that interaction but welcome your feedback at any time. You can reach me at 724-318-9240 or at *john.luff@HDConsulting.tv.* BE

John Luff is a television technology consultant.

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

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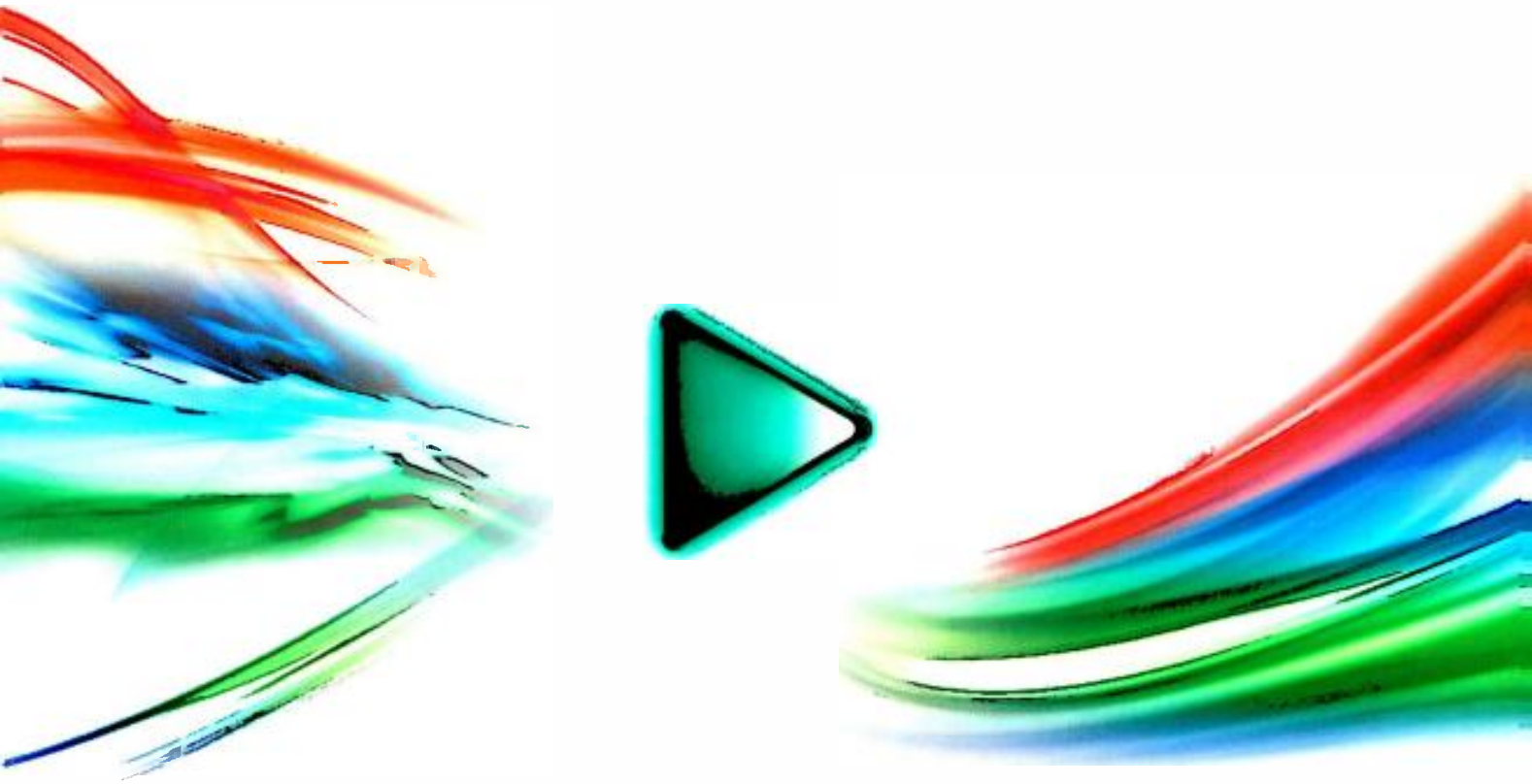

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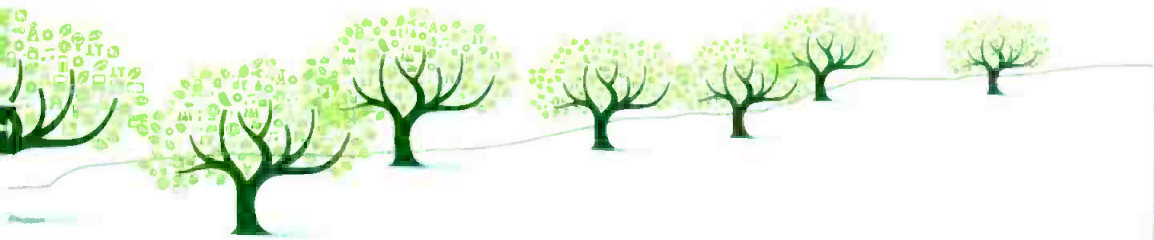

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The *Broadcast Engineering* Digital Reference Guide gathers all the information you need to locate products and vendors for your next project into one printed source.

You can identify vendors by product category or alphabetically. In addition, all of this information is available electronically on the *Broadcast Engineering* website. You can electronically search for vendors by name or product category in seconds. Go to *www.broadcastengineering.com*, and give it a try.

This year's entries are ...

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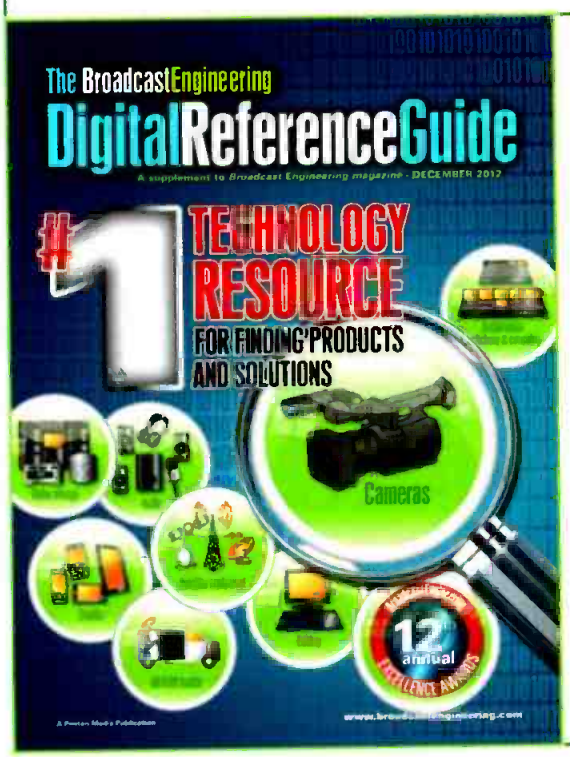
Complete your voting by Feb. 1, 2013. The winners of the Excellence Awards will be announced in the March pre-NAB issue.

Brad Dick
Editorial Director

READ VOTE WIN

You choose the winners of the *Broadcast Engineering* Excellence Awards.

See page 28 for this year's entries, and look for the March NAB issue to see the winners.



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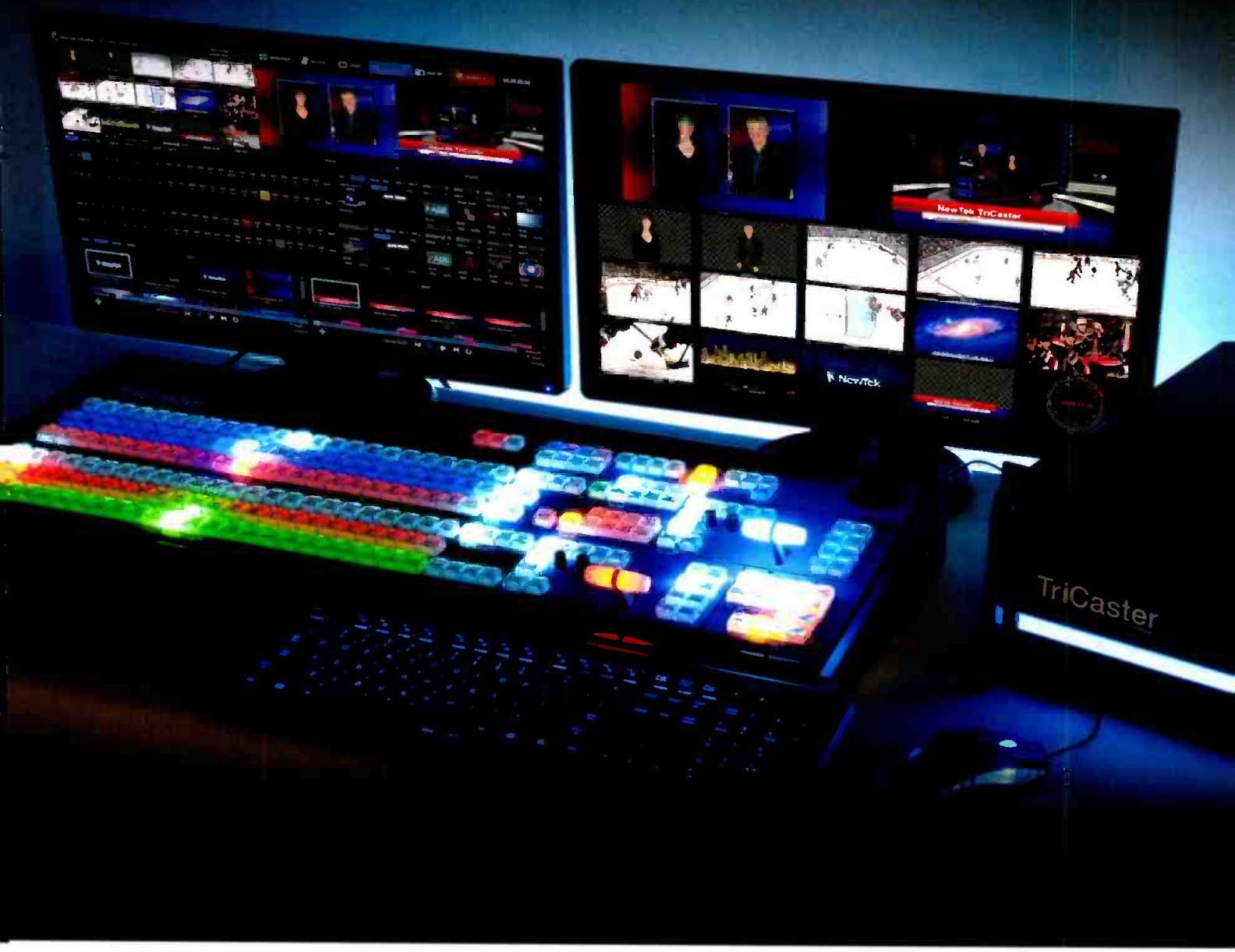

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JVC Professional Products Company
800-582-5825

Sony Electronics
201-930-1000; 800-686-SONY

Camera accessories

Bexel
818-565-4313; 800-225-6185

BMS
A Cohu Company

Broadcast Microwave Services Inc
858-391-3050; 800-669-9667

Cobham
760-496-0055; 888-880-9339

DSC Laboratories
905-673-3211; 1-866-DSCLABS (372 5227)

Frezzolini Electronics Inc / Frezzi Energy Systems
973-427-1160; 800-345-1030

Fujinon Inc
972-385-8902

Glidecam Industries
508-830-1414; 800-600-2011

Hitachi Kokusai Electric America Ltd
516-921-7200

Integrated Microwave Technologies
908-852-3700

Miller Camera Support
973-857-8300

OConnor
818-847-8666

Petrol Bags
845-268-0100

Sachtler
845-268-0100

Schneider Optics
818-766-3715; 800-228-1254

Sony Electronics
201-930-1000; 800-686-SONY

The Padcaster LLC
212-414-9570

The Tiffen Company
631-273-2500; 800-645-2522

Cameras

Adorama
212-741-0052; 800-223-2500

Bexel
818-565-4313; 800-225-6185

Blackmagicdesign

Blackmagic Design
408-954-0500

Canon USA Inc, Broadcast and Communications Division
800-321-4388

Grass Valley
800-547-8949

Hitachi Kokusai Electric America Ltd
516-921-7200

JVC Professional Products Company
800-582-5825

CGS

Character generators

Chyron
631-845-2000

Cobalt Digital Inc
217-344-1243; 800-669-1691

Compix Media Inc
949-585-0055

Harris Broadcast Communications
800-231-9673

Horita Co
949-489-0240

Miranda Technologies
514-333-1772

Orad Hi-Tec Systems Ltd
201-332-3900

Pixel Power Inc
818-276-4515

Screen Subtitling Systems
+44 1473 831 700

Vector 3
+34 934 151 285

Ventuz Technology AG
+49 40 413 66 09 70

Vizrt
212-560-0708

Teleprompters and prompting software

Autoscript
203-926-2400

The Tiffen Company
631-273-2500; 800-645-2522

COMPUTERS

Computer networking products

ATTO Technology Inc
716-691-1999

Cisco Systems
+44 20 8824 2666

IPV
+44 1223 477 000

LUTEUS
+33 183 855 004

Computer systems

ScheduALL
954-334-5406; 800-334-5083

Data storage systems

DataDirect NETWORKS

DataDirect Networks Inc
800-837-2298

SAN Solutions
775-745-8734; 866-661-7144

Sonnet Technologies
949-587-3532

Data transmission systems

HTN Communications LLC
212-239-3717

Video cards

Blackmagicdesign

Blackmagic Design
408-954-0500

Cobalt Digital Inc
217-344-1243; 800-669-1691

DEALERS, DISTRIBUTORS, INTEGRATORS

Dealers, Distributors

Broadcast Integration Services
201-777-3986

Burst
303-649-9600; 888-472-2820

CEI Communications Engineering Inc
703-550-5800

Clear-Com, an HME Company
510-337-6600; 800-462-4357

Eartec Co
401-782-4966; 800-399-5994

Full Compass Systems Ltd
608-831-7330; 800-356-5844

Geartech Technologies
514-340-0555

Nickless Schirmer & Co Inc
859-727-6640; 800-543-1584

Systems integrators

ATCi
480-844-8501

Broadcast Integration Services
BIS

Broadcast Integration Services
201-777-3986

Burst
303-649-9600; 888-472-2820

CEI Communications Engineering Inc
703-550-5800

Geartech Technologies
514-340-0555

Larcan USA
303-665-8000

Lawson & Associates Architects
301-654-1600

Salzbrenner Stagetec Mediagroup Inc USA
888-782-4391

Sony Electronics
201-930-1000; 800-686-SONY

Television Systems Ltd (TSL)
+44 1628 676200

DAWs

Enco Systems
248-827-4440; 800-362-6797

Prism Media Products Inc
973-983-9577

Sennheiser Electronic
860-434-9190; 877-736-6434

Solid State Logic
212-315-1111

Sony Creative Software Inc
608-203-2324

Duplication

Sony Electronics
201-930-1000; 800-686-SONY

GRAPHICS

Animation/Graphics software

Chyron
631-845-2000

Evertz
905-335-3700; 877-995-3700

Vector 3
+34 934 151 285

Ventuz Technology AG
+49 40 413 66 09 70

Video Design Software
631-249-4399

Vizrt
212-560-0708

Animation/Graphics systems

AccuWeather Inc

Chyron
631-845-2000

Evertz
905-335-3700; 877-995-3700

Harris Broadcast Communications
800-231-9673

Pixel Power Inc
818-276-4515

Video Design Software
631-249-4399

LENSES

Lens converter/accessories

Schneider Optics
818-766-3715; 800-228-1254

Thales Angenieux
973-812-3858

The Padcaster LLC
212-414-9570

Lens systems

Canon USA Inc, Broadcast and Communications Division
800-321-4388

Fujinon Inc
972-385-8902

Schneider Optics
818-766-3715; 800-228-1254

Thales Angenieux
973-812-3858

LIGHTING

Lighting

Adorama
212-741-0052; 800-223-2500

Anton/Bauer Inc
203-929-1100

Frezzolini Electronics Inc / Frezzi Energy Systems
973-427-1160; 800-345-1030

ikan Corporation
713-272-8822

Litepanels Inc
818-752-7009

PAG USA
818-760-8285; 888-724-8721

Paul J. Hammel & Assoc Inc, dba Tower Service & Mfg Co
800-331-5103

The Tiffen Company
631-273-2500; 800-645-2522

Videssence
626-579-0943

MICROPHONES

Microphone accessories

K-Tek
760-727-0593

Sennheiser Electronic
860-434-9190; 877-736-6434

Shure Inc
847-600-2000; 800-25-SHURE

Microphones

Audio-Technica US Inc
330-686-2600

Azden Corporation
516-328-7500; 800-247-4501

Eartec Co
401-782-4966; 800-399-5994

Full Compass Systems Ltd
608-831-7330; 800-356-5844

Sennheiser Electronic
860-434-9190; 877-736-6434

SHURE®

Shure Inc
847-600-2000; 800-25-SHURE

Wireless microphones

Audio-Technica US Inc
330-686-2600

Azden Corporation
516-328-7500; 800-247-4501

Professional Wireless Systems (PWS)
407-240-2880

Revolabs
978-610-4040; 800-326-1088

Sennheiser Electronic
860-434-9190; 877-736-6434

SHURE®

Shure Inc
847-600-2000; 800-25-SHURE

MICROWAVE & FIBER

Audio codecs (telco)

Riedel Communications Inc
818-241-4696

ENG microwave links

BMS
A Cohu Company

Broadcast Microwave Services Inc
858-391-3050; 800-669-9667

Cobham
760-496-0055; 888-880-9339

ELBER SRL

Integrated Microwave Technologies
908-852-3700

Screen Service
+39 030 57831; 888-522-0012

TVU Networks
650-969-6732

VISLINK Broadcast
978-671-5700; 800-490-5700

Vislink News and Entertainment
+44 1494 774400

Fiber optic transmitter/ receiver systems

Artel Video Systems
978-263-5775; 800-255-0228

Census Digital Inc
416-850-0071

Cobalt Digital Inc
217-344-1243; 800-669-1691

Communications Specialties Inc
631-273-0404

Evertz
905-335-3700; 877-995-3700

Harris Broadcast Communications
800-231-9673

HTN Communications LLC
212-239-3717

Media Links Inc
860-206-9163

Radiall USA Inc
480-682-9400

Riedel Communications Inc
818-241-4696

Thinklogical
203-647-8700; 800-291-3211

TV One
859-282-7303; 800-721-4044

STL/TSL links

ELBER SRL

Screen Service America
305-826-2212

VISLINK Broadcast
978-671-5700; 800-490-5700

Vislink News and Entertainment
+44 1494 774400

Telco interface equipment

Evertz
905-335-3700; 877-995-3700

HTN Communications LLC
212-239-3717

Media Links Inc
860-206-9163

Telephone hybrids

Riedel Communications Inc
818-241-4696

MULTIMEDIA/INTERNET

Interactive systems

Digital Alert Sysetms Inc
520-896-0303

IPV
+44 1223 477 000

Softel
203-354-4602

Ventuz Technology AG
+49 40 413 66 09 70

Vizrt
212-560-0708

Internet production systems

Harmonic Inc
408-542-2500; 800-788-1330

iStream Planet
702-492-5900

Livestream
877-977-8732

Primestream
305-625-4415; 888-377-4634

Telestream
530-470-1300; 877-681-2088

Vimond Media Solutions
+ 47 951 31 604

Vizrt
+46 8 522 277 07

Vizrt
212-560-0708

Media streaming equipment/services

AccuWeather Inc

Broadcast International
801-562-2252; 800-722-0400

DataDirect NETWORKS

DataDirect Networks Inc
800-837-2298

Digital Rapids
905-946-9666

DVEO division of Computer Modules, Inc
858-613-1818

Electrosonic Inc
818-333-3602; 888-343-3602

Evertz
905-335-3700; 877-995-3700

EVS Broadcast Equipment
+32 4 361 7000

Front Porch Digital
303-440-7930; 866-200-7222

Fujitsu
949-855-5500

HaiVision
514-334-5445; 877-224-5445

Harmonic Inc
408-542-2500; 800-788-1330

iStream Planet
702-492-5900

Livestream
877-977-8732

LiveU Inc
201-742-5228

Telestream
530-470-1300; 877-681-2088

Vimond Media Solutions
+ 47 951 31 604

VISLINK Broadcast
978-671-5700; 800-490-5700

WOWZA MEDIA SYSTEMS

Wowza Media Systems
720-222-4744; 888-778-7997

POWER PRODUCTS

Batteries

Anton/Bauer Inc
203-929-1100

BHV Broadcast
+44 1962 777733

Freedom-1 Portable AC Power
702-425-3285; 800-762-1435

Frezzolini Electronics Inc / Frezzi Energy Systems
973-427-1160; 800-345-1030

North Star Technical Services, Inc.
800-842-1671

PAG USA
818-760-8285; 888-724-8721

Video Technical Services Inc
717-215-4863; 800-539-4592

Battery chargers

PAG USA
818-760-8285; 888-724-8721

Video Technical Services Inc
717-215-4863; 800-539-4592

Power (AC) products

Freedom-1 Portable AC Power
702-425-3285; 800-762-1435

Staco Energy Products Company
937-253-1191; 866-261-1191

Power supplies

Staco Energy Products Company
937-253-1191; 866-261-1191

UPS systems

Hewlett Packard - Rack & Power Infrastructure Group
832-390-3098; 888-747-7225

Staco Energy Products Company
937-253-1191; 866-261-1191

PRODUCTION SWITCHERS

Compositing systems

Blackmagicdesign

Blackmagic Design
408-954-0500

DVEs

Blackmagicdesign

Blackmagic Design
408-954-0500

Keyers

Blackmagicdesign

Blackmagic Design
408-954-0500

Cobalt Digital Inc
217-344-1243; 800-669-1691

Crystal Vision Ltd
44 1223 497049

Eyeheight Ltd
+44 0 208 255 2015

Production switchers

Analog Way
212-269-1902

BHV Broadcast
+44 1962 777733

Blackmagicdesign

Blackmagic Design
408-954-0500

Broadcast Pix
978-600-1100

Ensemble Designs
530-478-1830

FOR-A Corporation of America
201-944-1120

Grass Valley
800-547-8949

Livestream
877-977-8732

Ross Video Ltd
613-652-4886

Snell
+44 1189 866123

Sony Electronics
201-930-1000; 800-686-SONY

TV One
859-282-7303; 800-721-4044

RECORDING MEDIA

Recordable media (tape and disc)

Evertz
905-335-3700; 877-995-3700

Sennheiser Electronic
860-434-9190; 877-736-6434

Sony Electronics
201-930-1000; 800-686-SONY

RF COMPONENTS

Dummy loads

Bird Technologies

Bird Technologies
440-248-1200; 866-695-4569

RF combiners

Alan Dick Broadcast Ltd
+44 (0) 1242 820972

Dielectric

Dielectric, an SPX Brand
207-655-8100; 800-341-9678

EMCEE
480-315-9283

Evertz
905-335-3700; 877-995-3700

Jampro Antennas Inc
916-383-1177

Radio Frequency Systems GmbH

RF transmitting tubes
ELBER SRL

Towers
Alan Dick Broadcast Ltd
+44 (0) 1242 820972

ERI - Electronics Research Inc
812-925-6000; 877-ERI-LINE

Jampro Antennas Inc
916-383-1177

Paul J. Hammel & Assoc Inc, dba Tower Service & Mfg Co
800-331-5103

Radio Frequency Systems GmbH

Transmission line/ accessories
Alan Dick Broadcast Ltd
+44 (0) 1242 820972

Dielectric®
Dielectric, an SPX Brand
207-655-8100; 800-341-9678

ERI - Electronics Research Inc
812-925-6000; 877-ERI-LINE

Jampro Antennas Inc
916-383-1177

Paul J. Hammel & Assoc Inc, dba Tower Service & Mfg Co
800-331-5103

Radiall USA Inc
480-682-9400

Radio Frequency Systems GmbH

SATELLITE EQUIPMENT

Satellite receivers and antennas
ATCi
480-844-8501

Comtech EF Data
480-333-2200

DVEO division of Computer Modules, Inc
858-613-1818

Inmarsat
+44 (0)207 728 1792

Newtec
32 (0)3 780 65 00

Nickless Schirmer & Co Inc
859-727-6640; 800-543-1584

VISLINK Broadcast
978-671-5700; 800-490-5700

Vislink News and Entertainment
+44 1494 774400

Satellite uplinks
ATCi
480-844-8501

Comtech EF Data
480-333-2200

GlobeCast
212-373-5140; 877-GLOBECAST

Inmarsat
+44 (0)207 728 1792

LiveU Inc
201-742-5228

Media Broadcast
+49 761 590 14234

Newtec
32 (0)3 780 65 00

Riedel Communications Inc
818-241-4696

TVU Networks
650-969-6732

VISLINK Broadcast
978-671-5700; 800-490-5700

Vislink News and Entertainment
+44 1494 774400

STUDIO ACCESSORIES

Cable management systems
Fischer Connectors
678-393-5400; 800-551-0121

Optima EPS
770-496-4000

SintecMedia
+972 2 651 5122; 1-866-SINTEC1

Engineering software
Amberfin
866-939-3167

Master clock systems
ESE
310-322-2136

Evertz
905-335-3700; 877-995-3700

Outdoor display equipment
BUF Technology
858-451-1350

Racks/furniture
Forecast Consoles Inc
631-253-9000; 800-735-2070

Optima EPS
770-496-4000

TBC Consoles
631-293-4068; 1-888-CONSOLE

Studio accessories
Aviom Inc
610-738-9005

Digital Alert Sysetms Inc
520-896-0303

Forecast Consoles Inc
631-253-9000; 800-735-2070

RTW
+49 221 70 913 0

Television Systems Ltd (TSL)
+44 1628 676200

Transport cases
Optima EPS
770-496-4000

Weather/data systems
AccuWeather Inc

Vizrt
212-560-0708

TBCS & FRAME SYNCS

Aspect ratio converters
Blackmagicdesign

Blackmagic Design
408-954-0500

Cobalt Digital Inc
217-344-1243; 800-669-1691

Ensemble Designs
530-478-1830

Evertz
905-335-3700; 877-995-3700

Riedel Communications Inc
818-241-4696

Telestream
530-470-1300; 877-681-2088

Composite/component encoder/decoders

Blackmagic Design
408-954-0500

Cobalt Digital Inc
217-344-1243; 800-669-1691

Ensemble Designs
530-478-1830

Evertz
905-335-3700; 877-995-3700

Ross Video Ltd
613-652-4886

Delay products

Cobalt Digital Inc
217-344-1243; 800-669-1691

Crystal Vision Ltd
44 1223 497049

Doremi Labs
818-562-1101

Ensemble Designs
530-478-1830

Evertz
905-335-3700; 877-995-3700

Riedel Communications Inc
818-241-4696

Frame synchronizers

Axon Digital Design BV
31 161850450; 866-757-9890

Blackmagic Design
408-954-0500

Cobalt Digital Inc
217-344-1243; 800-669-1691

Ensemble Designs
530-478-1830

Evertz
905-335-3700; 877-995-3700

FOR-A Corporation of America
201-944-1120

Harris Broadcast Communications
800-231-9673

LYNX Technik Inc
661-251-8600

Riedel Communications Inc
818-241-4696

HDTV up/downconverters

AJA Video
530-274-2048

AJA's new FS2 offers two independent streams of 3G/HD/SD 10-bit Broadcast quality video and two independent groups of 16 channel AES audio. Each FS2 video channel supports virtually any input or output: analog component or composite, 3G/Dual Stream 3G/HD/SD-SDI, Dual-Link, HDMI I/O and even Fiber. You can use the FS2 as two separate Frame Synchronizers/Format Converters, or combine the channels in a variety of powerful ways. Each channel possesses its own keyer and video proc amp/color corrector. It can up- or down-convert between SD and HD, and cross-convert between HD formats—including 3G 1080p50/60 formats. Additionally, the FS2 has full input and output signal routing, allowing any I/O port to be assigned to either processing channel.

Amberfin
866-939-3167

Atlona
408-962-0515; 877-536-3976

Axon Digital Design BV
31 161850450; 866-757-9890

BHV Broadcast
+44 1962 777733

Blackmagic Design
408-954-0500

Cobalt Digital Inc
217-344-1243; 800-669-1691

Crystal Vision Ltd
44 1223 497049

Ensemble Designs
530-478-1830

Evertz
905-335-3700; 877-995-3700

Harris Broadcast Communications
800-231-9673

Miranda Technologies
514-333-1772

Riedel Communications Inc
818-241-4696

Ross Video Ltd
613-652-4886

Telestream
530-470-1300; 877-681-2088

TV One
859-282-7303; 800-721-4044

Scan converters

Analog Way
212-269-1902

Communications Specialties Inc
631-273-0404

Ensemble Designs
530-478-1830

Evertz
905-335-3700; 877-995-3700

FSR Inc
973-785-4347; 800-332-3771

Matrox Video Products Group
514-822-6364; 800-361-4903

TV One
859-282-7303; 800-721-4044

Standards converters

Axon Digital Design BV
31 161850450; 866-757-9890

BHV Broadcast
+44 1962 777733

Blackmagic Design
408-954-0500

Cobalt Digital Inc
217-344-1243; 800-669-1691

FOR-A Corporation of America
201-944-1120

Telestream
530-470-1300; 877-681-2088

TV One
859-282-7303; 800-721-4044

Time base correctors

Ensemble Designs
530-478-1830

TV One
859-282-7303; 800-721-4044

Video A-D/D-A converters

Atlona
408-962-0515; 877-536-3976

Blackmagicdesign

Blackmagic Design
408-954-0500

Cobalt Digital Inc
217-344-1243; 800-669-1691

Ensemble Designs
530-478-1830

Evertz
905-335-3700; 877-995-3700

LYNX Technik Inc
661-251-8600

Miranda Technologies
514-333-1772

Ross Video Ltd
613-652-4886

TV One
859-282-7303; 800-721-4044

TEST & MEASUREMENT EQUIPMENT

Audio test and measurement equipment

ATCi
480-844-8501

Cobalt Digital Inc
217-344-1243; 800-669-1691

Hamlet USA at SENCORE Inc
605-339-0100; 866-4-HAMLET (426-538)

Minnetonka Audio Software Inc
952-449-6481

NUGEN Audio Ltd
+44 113 357 2250

Prism Media Products Inc
973-983-9577

RTW
+49 221 70 913 0

Ward-Beck Systems Ltd
416-335-5999; 800-771-2556

Whirlwind
585-663-8820; 800-733-9473

Wohler

Wohler Technologies Inc
510-870-0810

Compression/MPEG test equipment

DVEO division of Computer Modules, Inc
858-613-1818

Ensemble Designs
530-478-1830

Ericsson
678-812-6209

Evertz
905-335-3700; 877-995-3700

Hamlet USA at SENCORE Inc
605-339-0100; 866-4-HAMLET (426-538)

Tektronix Inc
503-627-7111; 800-833-9200

RF test equipment

Belar Electronics Laboratory Inc
610-687-5550

Bird Technologies

Bird Technologies
440-248-1200; 866-695-4569

Narda Safety Test Solutions
631-231-1700

Teamcast
+33 2 23 252680

Spectrum analyzers

Bird Technologies
440-248-1200; 866-695-4569

Narda Safety Test Solutions
631-231-1700

Sencore
605-978-4662

Sync/test generators

Blackmagicdesign

Blackmagic Design
408-954-0500

Cobalt Digital Inc
217-344-1243; 800-669-1691

Doremi Labs
818-562-1101

Ensemble Designs
530-478-1830

Evertz
905-335-3700; 877-995-3700

Hamlet USA at SENCORE Inc
605-339-0100; 866-4-HAMLET (426-538)

Horita Co
949-489-0240

Leader Instruments
714-527-9300; 800-645-5104

Tektronix Inc
503-627-7111; 800-833-9200

Test equipment-general

Blackmagicdesign

Blackmagic Design
408-954-0500

Bridge Technologies Co AS
47 22 38 51 00

DSC Laboratories
905-673-3211; 1-866-DSCLABS (372 5227)

DVEO division of Computer Modules, Inc
858-613-1818

Eyeheight Ltd
+44 0 208 255 2015

Hamlet USA at SENCORE Inc
605-339-0100; 866-4-HAMLET (426-538)

Harris Broadcast Communications
800-231-9673

Leader Instruments
714-527-9300; 800-645-5104

Narda Safety Test Solutions
631-231-1700

Rohde & Schwarz
410-910-7800; 888-TES-TRSA

Triveni Digital
609-716-3500

Volicon
781-221-7400

TV aural modulation monitors

Belar Electronics Laboratory Inc
610-687-5550

TV RF monitoring equipment

Belar Electronics Laboratory Inc
610-687-5550

Bird Technologies

Bird Technologies
440-248-1200; 866-695-4569

Bridge Technologies Co AS
47 22 38 51 00

Video analyzers

Actus Digital
+972-74-714-0800

Ensemble Designs
530-478-1830

Hamlet USA at SENCORE Inc
605-339-0100; 866-4-HAMLET (426-538)

Harris Broadcast Communications
800-231-9673

Triveni Digital
609-716-3500

Video Clarity
Tools for Video Analysis

Video Clarity
408-379-1381; 866-748-8072

Video monitors

Actus Digital
+972-74-714-0800

Blackmagicdesign

Blackmagic Design
408-954-0500

Flanders Scientific Inc
678-835-4934

LUTEUS
+33 183 855 004

Plura Broadcast
602-944-1044

Triveni Digital
609-716-3500

Video Clarity
Tools for Video Analysis

Video Clarity
408-379-1381; 866-748-8072

Waveform monitors/ vectorscopes

Blackmagicdesign

Blackmagic Design
408-954-0500

Flanders Scientific Inc
678-835-4934

Hamlet USA at SENCORE Inc
605-339-0100; 866-4-HAMLET (426-538)

Harris Broadcast Communications
800-231-9673

ikan Corporation
713-272-8822

Leader Instruments
714-527-9300; 800-645-5104

Tektronix Inc
503-627-7111; 800-833-9200

TV TRANSMITTERS, TRANSLATORS, EXCITERS & ANTENNAS

Frequency conversion equipment

EMCEE
480-315-9283

Quintech Electronics
724-349-1412; 800-839-3658

TV exciters

Axcera
724-873-8100; 800-215-2614

Harris Broadcast Communications
800-231-9673

Linear Industries Inc
847-428-5793; 877-428-5793

Rohde & Schwarz
410-910-7800; 888-TES-TRSA

Screen Service
+39 030 57831; 888-522-0012

Thomson Broadcast
413-998-1100; 800-288-8364

TV transmitters

Axcera
724-873-8100; 800-215-2614

EMCEE
480-315-9283

Harris Broadcast Communications
800-231-9673

Larcan USA
303-665-8000

Lawson & Associates Architects
301-654-1600

Linear Industries Inc
847-428-5793; 877-428-5793

Media Broadcast
+49 761 590 14234

Rohde & Schwarz
410-910-7800; 888-TES-TRSA

Screen Service
+39 030 57831; 888-522-0012

SDT ARK-6 SERIES

The Multiple Configuration Flexible Hardware Platform

The SDT ARK-6 is a Universal Driver with Multiple Front-End Boards. Available configurations: Satellite Receiver w DEC with/without CAM, Regenerative Transmitter, Analog A/V Input, Transmitter only. All, always and easily upgradeable to new features. All configurations, all modulations available: DVB-T/T2, ATSC, ISDB-T, PAL, NTSC

Screen Service America
305-826-2212

Teamcast
+33 2 23 252680

Thomson Broadcast
413-998-1100; 800-288-8364

TVU Networks
650-969-6732

TV transmitting antennas

Alan Dick Broadcast Ltd
+44 (0) 1242 820972

Dielectric®

Dielectric, an SPX Brand
207-655-8100; 800-341-9678

ERI - Electronics Research Inc
812-925-6000; 877-ERI-LINE

Jampro Antennas Inc
916-383-1177

Thomson Broadcast
413-998-1100; 800-288-8364

Wireless cable, BRS

Axcera
724-873-8100; 800-215-2614

EMCEE
480-315-9283

VEHICLES

ENG trucks

BUF Technology
858-451-1350

LiveU Inc
201-742-5228

Satellite flyaway systems

LiveU Inc
201-742-5228

Vislink News and Entertainment
+44 1494 774400

Satellite uplink trucks

LiveU Inc
201-742-5228

Media Broadcast
+49 761 590 14234

VIDEO ACCESSORIES

GPS equipment

Ensemble Designs
530-478-1830

Time code equipment

Autoscript
203-926-2400

Cobalt Digital Inc
217-344-1243; 800-669-1691

ESE
310-322-2136

Evertz
905-335-3700; 877-995-3700

Horita Co
949-489-0240

never.no AS
+ 47 22 01 66 20

Screen Subtitling Systems
+44 1473 831 700

Video accessories

Bittree
818-500-8142; 800-500-8142

Cobalt Digital Inc
217-344-1243; 800-669-1691

DSC Laboratories
905-673-3211; 1-866-DSCLABS (372 5227)

Sonnet Technologies
949-587-3532

The Padcaster LLC
212-414-9570

Video captioning equipment

Cobalt Digital Inc
217-344-1243; 800-669-1691

Ensemble Designs
530-478-1830

Evertz
905-335-3700; 877-995-3700

Horita Co
949-489-0240

Screen Subtitling Systems
+44 1473 831 700

Softel
203-354-4602

Wohler Technologies Inc
510-870-0810

Video patch panels

Bittree
818-500-8142; 800-500-8142

Switchcraft Inc
773-792-2700

VIDEO COMPRESSION EQUIPMENT

Compression encoder/ decoders

Blackmagic Design
408-954-0500

Broadcast International
801-562-2252; 800-722-0400

Broadcast Microwave Services Inc
858-391-3050; 800-669-9667

Cinegy
323-417-0880

Cobalt Digital Inc
217-344-1243; 800-669-1691

Cobham
760-496-0055; 888-880-9339

Digigram
+33 4 76 52 53 47 47

Digital Rapids
905-946-9666

Doremi Labs
818-562-1101

DVEO division of Computer Modules, Inc
858-613-1818

Electrosonic Inc
818-333-3602; 888-343-3602

Ericsson
678-812-6209

Evertz
905-335-3700; 877-995-3700

Fujitsu
949-855-5500

Harmonic Inc
408-542-2500; 800-788-1330

Harris Broadcast Communications
800-231-9673

Hitachi Kokusai Electric America Ltd
516-921-7200

Integrated Microwave Technologies
908-852-3700

IPV
+44 1223 477 000

Livestream
877-977-8732

LiveU Inc
201-742-5228

LU40 Handheld Mobile Uplink Unit
LiveU recently introduced its handheld, lightweight LU40-S uplink device for broadcasters, incorporating LiveU's proprietary internal antenna for additional resiliency and live newsgathering features, such as low latency for interview-mode. The latest addition to the LU40 product family, the LU40-S joins the LU40i device for online media launched in 2011.

LU70 Professional-Grade Mobile Uplink Unit
LiveU's flagship LU70 product is the industry's first bonded 3G/4G LTE backpack with proprietary RF technology, up to 1080 HD video and sub-second latency for a satellite-like experience. Boosted by its remotely-located antennas, the LU70 supports up to 14 cellular links simultaneously, offering extra-strong resiliency in crowded areas and on-the-move.

Livewire Digital Ltd

Matrox Video Products Group
514-822-6364; 800-361-4903

Screen Service America
305-826-2212

Sencore
605-978-4662

Streambox Inc
206-956-0544

Telestream
530-470-1300; 877-681-2088

Thomson Video Networks
+33 2 99 27 3030

VidOvation
949-777-5435; 855-VIDOVATION

Vislink News and Entertainment
+44 1494 774400

Compression pre-processors

Evertz
905-335-3700; 877-995-3700

Livestream
877-977-8732

Telestream
530-470-1300; 877-681-2088

Statistical multiplexers

Ericsson
678-812-6209

Evertz
905-335-3700; 877-995-3700

Harmonic Inc
408-542-2500; 800-788-1330

Livestream
877-977-8732

Thomson Video Networks
+33 2 99 27 3030

Video compression systems

Amberfin
866-939-3167

Broadcast International
801-562-2252; 800-722-0400

Digital Rapids
905-946-9666

DVEO division of Computer Modules, Inc
858-613-1818

Evertz
905-335-3700; 877-995-3700

3480MXP Media eXchange Platform Evertz Compression and Media Transport portfolio has expanded to include the 3480MXP Media eXchange Platform which provides high quality and high density H.264/MPEG-2 video encoding and transcoding. The 3480MXP facilitates the delivery of HD/SD content to multi-screen platforms making it the ideal solution for broadcasters, IPTV, and cable headends.

Harmonic Inc
408-542-2500; 800-788-1330

Livestream
877-977-8732

Media Links Inc
860-206-9163

Sisvel Technology
+39 011 9904770

Telestream
530-470-1300; 877-681-2088

Telestream Vantage *provides a complete range of high-quality, reliable, video transcoding and workflow solutions – from single-server installations for automating transcoding, to very large, multi-server systems that produce and assemble millions of finished media packages.*

Thomson Video Networks
+33 2 99 27 3030

Video noise reduction systems

Blackmagicdesign

Blackmagic Design
408-954-0500

Ensemble Designs
530-478-1830

Livestream
877-977-8732

Telestream
530-470-1300; 877-681-2088

VIDEO EDITING SYSTEMS

Desktop video

AJA Video
530-274-2048

Blackmagicdesign

Blackmagic Design
408-954-0500

Dalet Digital Media Systems
+33 1 41 27 67 00

Eyeheight Ltd
+44 0 208 255 2015

IPV
+44 1223 477 000

Telestream
530-470-1300; 877-681-2088

Editing systems and components

ATTO Technology Inc
716-691-1999

Blackmagicdesign

Blackmagic Design
408-954-0500

EditShare
617-782-0479

Matrox Video Products Group
514-822-6364; 800-361-4903

Sonnet Technologies
949-587-3532

Nonlinear editors

BitCentral Inc
949-253-9000; 800-214-2828

Blackmagicdesign

Blackmagic Design
408-954-0500

EVS Broadcast Equipment
+32 4 361 7000

Grass Valley
800-547-8949

Quantel
203-972-3199

VIDEO MONITORS

Multi-image displays

APANTAC
503-968-3000

Avitech International Corporation
425-885-3863

Blackmagicdesign

Blackmagic Design
408-954-0500

Cobalt Digital Inc
217-344-1243; 800-669-1691

Evertz
905-335-3700; 877-995-3700

Harris Broadcast Communications
800-231-9673

Image Video

Miranda Technologies
514-333-1772

TV One
859-282-7303; 800-721-4044

Plasma/LCD Displays

Blackmagicdesign

Blackmagic Design
408-954-0500

Flanders Scientific Inc
678-835-4934

Hitachi Kokusai Electric America Ltd
516-921-7200

Plura Broadcast
602-944-1044

TV One
859-282-7303; 800-721-4044

Video monitors

Blackmagicdesign

Blackmagic Design
408-954-0500

FSI Flanders Scientific Inc.

Flanders Scientific Inc
678-835-4934

ikan Corporation
713-272-8822

Image Video

JVC Professional Products Company
800-582-5825

Plura Broadcast
602-944-1044

Ward-Beck Systems Ltd
416-335-5999; 800-771-2556

Wohler

Wohler Technologies Inc
510-870-0810

Video presentation equipment

Avitech International Corporation
425-885-3863

TV One
859-282-7303; 800-721-4044

Video walls

APANTAC
503-968-3000

Avitech International Corporation
425-885-3863

Blackmagicdesign

Blackmagic Design
408-954-0500

Evertz
905-335-3700; 877-995-3700

Image Video

TV One
859-282-7303; 800-721-4044

VIDEO ROUTING AND DISTRIBUTION

Control signal routers/patch panels

Blackmagicdesign

Blackmagic Design
408-954-0500

Broadcast Integration Services

Broadcast Integration Services
201-777-3986

Communications Specialties Inc
631-273-0404

LUTEUS
+33 183 855 004

Utah Scientific
800-453-8782

Video DAs

APANTAC
503-968-3000

Atlona
408-962-0515; 877-536-3976

Blackmagicdesign

Blackmagic Design
408-954-0500

Cobalt Digital Inc
217-344-1243; 800-669-1691

Ensemble Designs
530-478-1830

ESE
310-322-2136

Evertz
905-335-3700; 877-995-3700

Horita Co
949-489-0240

LYNX Technik Inc
661-251-8600

Miranda Technologies
514-333-1772

Ross Video Ltd
613-652-4886

TV One
859-282-7303; 800-721-4044

Ward-Beck Systems Ltd
416-335-5999; 800-771-2556

Video processing amplifiers

Analog Way
212-269-1902

Blackmagicdesign

Blackmagic Design
408-954-0500

Census Digital Inc
416-850-0071

Cobalt Digital Inc
217-344-1243; 800-669-1691

Ensemble Designs
530-478-1830

Evertz
905-335-3700; 877-995-3700

TV One
859-282-7303; 800-721-4044

Video routing switchers

Atlona
408-962-0515; 877-536-3976

Blackmagicdesign

Blackmagic Design
408-954-0500

Cisco Systems
+44 20 8824 2666

Ensemble Designs
530-478-1830

Evertz
905-335-3700; 877-995-3700

FSR Inc
973-785-4347; 800-332-3771

Harris Broadcast Communications
800-231-9673

Kramer Electronics
908-735-0018; 888-275-6311

Miranda Technologies
514-333-1772

Multidyne Video & Fiber Optic Systems
516-671-7278; 877-MULTIDYNE

Quintech Electronics
724-349-1412; 800-839-3658

Riedel Communications Inc
818-241-4696

Snell
+44 1189 866123

Thinklogical
203-647-8700; 800-291-3211

TV One
859-282-7303; 800-721-4044

Utah Scientific
800-453-8782

VidOvation
949-777-5435; 855-VIDOVATION

VIDEO STORAGE

Archive/DVD Storage

BitCentral Inc
949-253-9000; 800-214-2828

Crispin Corp
919-845-7744

DataDirect NETWORKS

DataDirect Networks Inc
800-837-2298

Digital Broadcast
352-377-8344

EditShare
617-782-0479

Evertz
905-335-3700; 877-995-3700

Front Porch Digital
303-440-7930; 866-200-7222

Harmonic Inc
408-542-2500; 800-788-1330

SAN Solutions
775-745-8734; 866-661-7144

Sennheiser Electronic
860-434-9190; 877-736-6434

XenData
925-465-4300

Commercial insertion equipment/software

Crispin Corp
919-845-7744

Evertz
905-335-3700; 877-995-3700

Florical Systems Inc
352-372-8326

On-air presentation systems

Crispin Corp
919-845-7744

Orad Hi-Tec Systems Ltd
201-332-3900

Pebble Beach Systems
+44 1932 333790

SintecMedia
+972 2 651 5122; 1-866-SINTEC1

Still/clip stores

Evertz
905-335-3700; 877-995-3700

Vizrt
+46 8 522 277 07

Vizrt
212-560-0708

Tape library systems

XenData
925-465-4300

VDRs (video disk recorders)

Blackmagicdesign

Blackmagic Design
408-954-0500

Doremi Labs
818-562-1101

Electrosonic Inc
818-333-3602; 888-343-3602

never.no AS
+ 47 22 01 66 20

Video servers

Broadcast Integration Services
201-777-3986

Broadpeak
+33 222 7403 50

Doremi Labs
818-562-1101

EditShare
617-782-0479

Evertz
905-335-3700; 877-995-3700

EVS Broadcast Equipment
+32 4 361 7000

Harmonic Inc
408-542-2500; 800-788-1330

Harris Broadcast Communications
800-231-9673

Hi Tech Systems
+44 1256 780880

Leightronix Inc
517-694-8000; 800-243-5589

Quantel
203-972-3199

SAN Solutions
775-745-8734; 866-661-7144

Video Clarity
408-379-1381; 866-748-8072

VTRs (video tape recorders)

BUF Technology
858-451-1350

Hi Tech Systems
+44 1256 780880

VidOvation
949-777-5435; 855-VIDOVA-TION

WIRE, CABLE & CONNECTORS

Audio cable

Clark Wire & Cable
847-949-9944; 800-222-5348

Gepco International/General Cable
847-795-9555; 800-966-0069

Whirlwind
585-663-8820; 800-733-9473

Audio connectors

Fischer Connectors
678-393-5400; 800-551-0121

Switchcraft Inc
773-792-2700

Whirlwind
585-663-8820; 800-733-9473

Fiber optic cabling

Bexel
818-565-4313; 800-225-6185

Clark Wire & Cable
847-949-9944; 800-222-5348

Gepco International/General Cable
847-795-9555; 800-966-0069

Miranda Technologies
514-333-1772

Multidyne Video & Fiber Optic Systems
516-671-7278; 877-MULTIDYNE

Optical Cable Corporation
800-622-7711

Telecast Fiber Systems
508-754-4858

Modular frame systems

Cobalt Digital Inc
217-344-1243; 800-669-1691

Video cable

Clark Wire & Cable
847-949-9944; 800-222-5348

Gepco International/General Cable
847-795-9555; 800-966-0069

Kramer Electronics
908-735-0018; 888-275-6311

Video connectors

Fischer Connectors
678-393-5400; 800-551-0121

PRODUCT INDEX

Broadcast Engineering 12th annual EXCELLENCE AWARDS

Vote now!

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Brad Dick

Brad Dick, Editorial Director

This year's Excellence Awards entries are:

CCTV Studio A and B

Excellence Award category

New studio or RF technology — station

Submitted by

Lawson & Associates, Architects

Chinese Central Television (CCTV) decided to make a significant increase in the quantity of original programming produced in the United States, for both U.S. and Chinese distribution. This necessitated an expansion of their broadcast presence in Washington, D.C., from a single studio in a 3000sq-ft facility, to a multiple studio newsgathering facility of 35,000sq ft with two studios and two control rooms. The new location provides a 24/7 workspace with a back-up generator and a self-contained cooling system. The studios have adequate cooling for the set and LED lighting, and meet studio acoustical standards.

As is typical in downtown D.C. buildings, the slab to slab clearance was 10ft, 10in, and less at post-tensioning and column capitols. Set design requirements prohibited placing the ductwork in the ceiling. This restriction resulted in using an innovative "wrap around" installation approach, maximizing both space and functionality. The end result was a clean space with only a 2in Unistrut grid secured to the underside of the slab. The Unistrut follows the slab's ups and downs to make best use of the height throughout the space.

Several factors required the mechanical equipment room be located adjacent to the main studio. This presented design challenges for sound and vibration transmission into the studio. The mechanical and acoustical engineers worked closely to address these issues. Solutions included: oversized lined ductwork, sound attenuators, equipment inertia bases, floating floor slab and spring isolation. In addition, the studio cooling unit was equipped with a variable speed drive, which can modulate fan speed as required to fine-tune air flow quantities to address any sound issues. These design elements were incorporated into an already compact mechanical room, which required a well-planned room design.

Low ceiling studio height required ducting arrangements that would maximize sight lines. By running the studio duct above adjacent rooms, utilizing side wall diffusers and a side wall duct, a cross flow air pattern was developed, moving air across the studio back to the return air opening on the opposite wall.

The studios required a controlled noise level to enable CCTV to perform its technical functions without interruption from noise. The city's height limitation required creative use of space to fit the program into the slab height available. Minimal noise from vertically adjacent tenants enabled the studios to be optimized for camera, set and lighting angles without need for specialty floor construction. The HVAC units locate directly adjacent to the studio for limitation of crossing ducts and efficiency, requiring the fan unit and pumps to be mounted on a floating concrete floor for noise control, and for return air to use an in-wall vertically oriented attenuated return air plenum. The end result is a noise level consistent with user requirements and quiet enough to record and broadcast all programs without concern for neighbors, heat load or HVAC operation. ■

Design team

CCTV/MediaLinks: Cg Lu
Lawson & Associates: Bruce Lawson, James Ahn
DesignTech: Matt Bowers, Tom Igo
Shen Milsom & Wilke
Shadowstone: Frank Marsico
Broadcast Design International: Caroline Aldridge, Tim Saunders, Nick Hutak

Technology at work

Black Tank: Brickblaster Pro
Christie Digital Systems: Vista Spyder X20-0808i processors
De Sisti Lighting: LED Fresnel
Doug Fleenor Design: DMX repeater
ETC: Element DMX control console
Industrial Acoustics Company: Sound attenuators, supply and return air
Kinetics: Slab isolation system
Litepanels: LED flood; spot; bi-focus; bi-color
Orion: Video wall; DPM-4260 42in frameless plasmas
Panasonic: 37in, 50in and 65in monitors; 103in plasma with U-touch
Philips Color Kinetics: LED vertical panels
Suncoast LED Displays: 4mm and 8mm LED video screens
Unitstrut: Lighting grid

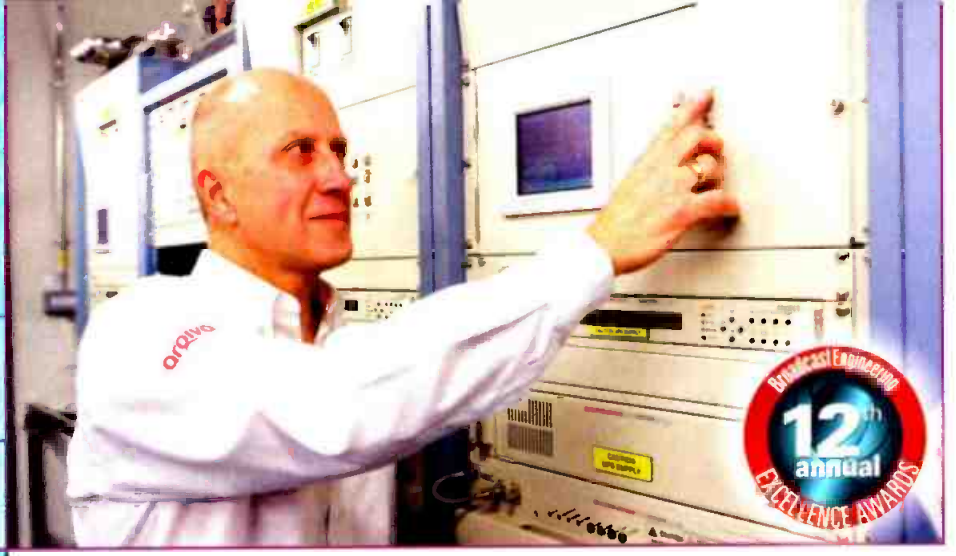
Digital Switch Over

Excellence Award category

New studio or RF technology — station

Submitted by

Arqiva



Design team:

Arqiva: Bruce Mann, sys. design mgr.; Martin Clements; Gordon Train; Ian Suart; Charles Crisp; Mark Jacobs; Duncan Gould, structural eng. mgr.; Tom Allen; Ken Richards; Danny Paul; William Ireland; Mark Lavender; John Hammond, ant. design mgr., Jez Paulson; Colin Burnell; Peter King; Pete Wall; Tim Birks

Technology at work:

Advantech: AMT-75 DVB-S2 satellite receivers
AlanDick: H-90 dipole and H72 UHF antennas
DB Broadcast: Systems integration
Kathrein: UHF antenna Type 759 17346
NEC: DTU-52 high-power, DTL-10 medium- and low-power DVB-T/T2 transmitters
RFS: PHP60E and PHP72L UHF antennas
Rohde & Schwarz: NV8600, NV8300, SCV8300, SV8400 and SLV8000 DVB-T/T2 transmitters
Screen Services: ARK DVB-T/T2 low-power transmitter/transposer
Sematron: Symmetricon GPS synchronization equipment
Sira: UHF antenna UTV 01/24 (6x4)
Spinner: BN574520 6-channel high-power combiners
Thomson Broadcast: Thomson Paragon DCP-2 DVB-T/T2 high-power IOT liquid-cooled transmitter
T-VIPS: CP515 SI manager; CP525 multiplexer; TNS547 DVB-T/T2 TS analyzer; CP560 T2-SFN gateway; CP541 T2-SFN gateway switch

In the course of the national U.K. switchover of terrestrial television to all digital, the complexities of the design of the DSO network covered three distinctive areas: the headend systems and backhaul systems, the design of structures to accommodate large UHF antenna systems and the bespoke design of antenna systems for the individual requirements of 82 main station sites across the U.K.

Headend systems are provided by Arqiva for the three commercial multiplexes and three public service broadcasters' multiplex. These systems are each fully duplicated, with each multiplex's head-end having equipment located in two separate locations. We used multiplexing and compression equipment, ensuring a high-quality end-user experience is delivered, while maintaining efficient data management. Our backhaul systems were different for each multiplex, dependent upon varied customer requirements. Dual ASI feeds were provided via diverse routes to critical sites via a combination of fiber, fixed-link, off-air feed and satellite systems. Monitoring and control systems were provided by fiber. The less critical sites used transposer technology or re-transmitters, fed from critical sites via rebroadcast antennas and satellite.

Delivery systems were sourced from a number of key suppliers and configured and designed in a number of different ways. The most critical of the sites, serving a high proportion of the U.K. population, used resilient transmitter systems in duty/standby, N+1 or active reserve configuration. We ensured that critical sites also have redundant combiners and antennas.

The principal structural design challenge was to safely install new, heavier and larger antennas at the top of 82 of the U.K.'s tallest masts and towers, many of which were already loaded to capacity and had exceeded their original design life. Arqiva's specialist structural team achieved this through research and investigation involving specialist wind tunnel testing, innovative design by extending some structures and shortening others. Conventional strengthening works included the replacement of guys. This project also created five new masts of up to more than 1000ft high, constructed for the first time in the U.K.

The antenna used combining units, which combined multiple channels together to feed a common antenna via main feeders up to 6in in diameter. The antenna comprises numerous elements arranged to distribute the signals as evenly and efficiently as possible across the vast coverage area.

Each design had to ensure viewers continue to receive television services after the switch to digital. In practice, this meant substantially replicating the coverage of the analog antenna. In some cases, the analog antenna was reused, but channel changes and the increased demands of digital TV meant many were simply replaced.

Before, during and after the replacement, disruption to the existing TV services had to be kept to a minimum. This was achieved with many techniques, including the setup of temporary masts to minimize spares, equipment sourced from a restricted number of vendors, and wideband or retunable solutions were preferred. ■

KCET-TV

Excellence Award category

New studio or RF technology — station

Submitted by

Harris Broadcast Communications and The Systems Group

When Los Angeles-area community television station KCET-TV sold its broadcast home of 40-plus years, it provided the opportunity to create a brand-new broadcast and media facility.

The goal was to design a broadcast facility using a predominately file-based workflow. The space included the fifth and sixth floors of a new high-rise in Burbank, CA, where nothing stood beyond bare concrete floors. The Systems Group joined forces with the KCET team to develop the broadcast design. Krismar Construction broke ground later that month, with the goal of turning over the broadcast area to integration by mid-December. In the meantime, The Systems Group spent time with the KCET team developing the broadcast design. The KCET team determined their preferred file system was XDCAM, choosing XOR Media servers and Avid editors to work natively in that format. 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. The router, built to 1024 x 1024 with its companion HView SX Hybrid multiviewer, was recommended by a number of users. 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. Once ingested, programming is never output as baseband video to any device unless destined for the deep archives. Fifteen Avid edit bays and Interplay users in the open newsroom/office areas are connected to two Cisco 4800 switches, which connect to Avid Isis storage via fiber.

Ross Video was the main supplier for two production control rooms. The larger room includes a Ross Vision 3 switcher, a two-channel Expression and FX Motion camera robotics, with wiring to accommodate Overdrive in the future. The studios are isolated from the rest of the building with floating floors and thicker walls to provide a soundproof, vibration-free environment.

Orad's virtual studio system provides background graphics for KCET's green-screen studio. The Orad system, in conjunction with Ultimatte and the Ross FX Motion robotic system, create virtual studio scenes that appear undeniably real. This saves money in labor, time, set construction and storage.

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 Burbank location that Friday the 13th. ■

Design team

KCET management: Gordon Bell, SVP, eng., ops., IT; Joe Saavedra, systems design; Chris Ong, network design
Project management: Enter Environments, Inc. (EEI): Tony Kantarjian, principal
Architectural design: Gensler
Architectural: Michael White and Douglas Peters, architects
The Systems Group: Paul Rogalinski, proj. exec; Frank Geraty and Grant Knox, proj. mgrs; Dave Jennings, sr. sys. eng.; Rachel Pomerantz, proj. eng.

Technology at work

Avocent KVM platform
Ericsson IRD, Voyager II L Band encoders
Harris: Platinum router; HView SX Hybrid multiviewer; 6800+ core processing gear; Selenio Media Convergence Platform (for signal encoding); Magellan and NUCLEUS routing control panels; IconMaster master control switcher; Videotek TVM9100 waveform monitors
Orad: Virtual studio system
Ross Video: Vision 3 production switcher; Carbonite production switcher; expression graphics; FX motion robotic camera system
Pebble Beach Systems: Marina broadcast automation system
Sencore: Integrated receiver/decoder (IRD)
XOR Media: Broadcast servers 1x50TB, 2x100TB

Crown Media

Excellence Award category

New studio technology — network

Submitted by

Volicon

Design team

Crown Media: Kenny Ellis, sr. IT tech. support; Brian Cullinan, dir. broadcast ops.

Technology at work

Existing corporate LAN and WAN
Cisco: D9854 IRDs
Volicon: TS systems; analog system

Crown Media Family Networks operates and distributes Hallmark Channel and Hallmark Movie Channel. Since its launch in 2001, Hallmark Channel has been one of the fastest growing major ad-supported cable networks, and today it reaches nearly 87 million U.S. homes. Crown Media ensures the quality of these 24-hour networks with the Volicon Observer TS (transport stream) digital video monitoring and logging system, which not only enables convenient remote review of live and aired content, but also facilitates rapid troubleshooting and simplifies key tasks, including loudness and closed-caption compliance, NAVE ratings assurance and traffic reconciliation. Crown Media also has installed an analog Observer system to give the company's programming department competitive monitoring capabilities. In short, the broadcaster has leveraged its monitoring and logging systems with existing networks and workstations to support, simplify and speed critical tasks all across its operations.

Encompass Digital Media plays out the East Coast and West Coast Hallmark and Hallmark Movie channels. Satellite signals are downlinked locally and decrypted by a Cisco D9854 receiver, which outputs the channel as an MPoIP multicast, subsequently delivered to the Observer system via the company's corporate LAN. The IP-based video monitoring model requires little equipment, as it depends primarily on existing infrastructure and software to run in a virtual environment.

The Observer system captures, stores and streams aired content and provides local and remote users instant access to live and recorded content — as many as nine channels — from an easy-to-use Web-based GUI. Staff from engineering, traffic, business affairs and other departments can locate and access video and then create clips demonstrating compliance with internal quality standards, federal regulations, and contracts with advertisers and distribution partners.

Observer users can go back as many as 10 days to examine and/or export content from the transport stream, or dial back as many as nine months if working with low bit-rate proxy content. DVR-like frame-accurate controls allow for easy content review. WideOrbit Orion traffic users access the system frequently to verify as-run logs. Users search and sort the as-run log via ID or commercial/program name for quick and easy ad verification with a direct link to video content. Research and production planning teams use the system for simple, cost-effective synchronized review of Crown Media and competitor programming.

The Observer system provides engineers with real-time alerts for faulty video, audio and closed-captioning — with a direct link to content and a master fault log — that make it easy to see the immediate visual impact of issues, as well as ongoing trends. Users also can capture and play back the loudness metadata that confirms compliance with the CALM Act. Crown Media relies on the Observer to ensure proper transmission and delivery of NAVE codes to Nielsen monitoring equipment. Engineers also will use the Observer to locate PIDs for SCTE-35 triggers inserted into the transport stream, verify that they were sent correctly and determine if disruptive issues were caused by local events. ■

FOX News Channel

Excellence Award category

New studio technology — network

Submitted by

Communications Engineering, Inc. (CEI)

Anyone with experience working with a national news organization will tell you how important and vital their Washington, D.C., bureau is to their operation and competiveness. Fox News Channel, (FNC), is no different, as many hours of FNC national programming originates from D.C. every day. So when it was time to make major upgrades to its D.C. Bureau, Fox News chose the comprehensive systems integration services of Communications Engineering, Inc. (CEI) of Newington, VA.

FNC and CEI worked together to define and execute upgrades to the bureau's technical infrastructure, including major changes to improve the facility's HD monitoring capabilities. New systems were added for network channel origination, and preparations were made to convert the bureau to a totally tapeless operation. All modifications had to occur within the existing operational footprint, without impeding daily production or the ability to cover breaking news 24/7. CEI studied the bureau's workflow and operational spaces, and presented design alternatives 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. New HD air chains were built to replicate the NY services for FOX News Channel, FOX News International, FOX Business Channel and FOX Business International, which continuously shadow the New York services for live, recorded and interstitial content. A fifth complete air chain was also installed as 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. The new multiviewer was equipped with 162 HD/SD-SDI and eight DVI/VGA inputs, along with 18 HD/SD-SDI and 16 DVI/VGA outputs. The fully redundant control system allows operators at each position to control the router, multiviewer displays and signal-path processing equipment. The multiviewer also provides quality control monitoring and displays alarms to trigger operator intervention when signals deviate from preset parameters.

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, ever-changing 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.

These new capabilities at FNC's D.C. Bureau improved daily news production, delivered faster remote handling and provided robust broadcast disaster recovery systems, all within the existing floor space! ■

Design team

FOX News Channel: Greg Ahlquist, sr. dir., dig. media prod.; Torrance Jones, mgr. of eng.; Marilyn Pierce, dir. of IT and tech.
CEI: Matt Weiss, proj. mgr.; Ruber Huertas, sr. managing eng.; Frank Trifiletti, sys. supp. eng.; Jeff Bates, int. mgr.; Robert Ford, installation supr.

Technology at work

ADC: Patching; connection; termination gear
Avocent: KVM switching
Belden: Cabling; cable management
Brocade: IP switches; routers
Evertz: Multiviewers; terminal equipment
Genelec: Speakers
Grass Valley: Routing switchers
Harris: Master control automation
Miranda: Master control switchers; branding engines
Omneon: Media servers
Sony: Monitors; videotape recorders
TBC: Consoles; monitor wall structure
Tektronix: Test measurement; monitoring
Telestream: Transcoders
Telex: Intercom components
Videoframe: Monitoring; control gear
Vizrt: Graphics generators
Wohler: Audio monitors

Veria Living

Excellence Award category

New studio technology — network

Submitted by

NEP Studios

Design team

NEP Studios: Barry Katz, sr. VP and gen. mgr.; Willie Sheehy, VP of NEP Studios; Frank Lanzer, sr. proj. eng. mgr.; Ray DeMartini, sr. dir. of building svc.; Joseph Caffrey, eng.; Antonio Galvalisi, eng.; Ken Benstock, facility mgr.
Veria Living: Paul Cestari, asst. gen. mgr.; David Kutz, exec. in charge of prod.; Unmesh Khadilkar, head of IT

Technology at work

Avid: Airstream four-channel video server, 64TB ISIS hard drive
Chyron: HyperX graphics system; CAMIO server
Grass Valley: Kayak switcher
Sony: HXC-100 HD cameras

With a line-up of original programming focused on natural wellness and healthy lifestyles, Veria Living has entertained and informed viewers for the past four years. Previously, the network commissioned outside production companies to create its content, but that changed in early 2012 when Veria partnered with NEP Studios to launch its own dedicated studio and post-production facility in midtown Manhattan. Veria is committed to reaching its audiences in different ways, including the ability to deliver content for multiple devices and platforms. The network felt that bringing its production capabilities in-house would make it much easier and more cost-effective to realize this vision.

NEP Studios took into account Veria's fixed budget, unique programming and post-production requirements to design and build out two fully integrated studios within its 401 Fifth Ave. facility. The seventh-floor studio is for smaller productions and more intimate/instructional programming, such as yoga classes. On the eighth floor, Veria produces its more variety-oriented talk shows and cooking programs. The studios include seven Sony HD cameras and four Avid editing suites, and both stages share a common, fully integrated control room backbone. Robust routing and switching capabilities enable Veria to produce content from either studio using a completely tapeless workflow. In addition to facilities design and equipment, NEP Studios also provides a core technical staff, including an engineer in charge, camera operators and audio/video engineers.

The facility's split-stage configuration offers the versatility and capacity to support many production formats and an ambitious line-up of programming. NEP Studios designed and executed a dual recording configuration that allows the network to produce some content in a tapeless workflow (via a four-channel Avid Airstream video server) and record to a 64TB Avid ISIS drive for line cuts that can be delivered quickly to air. By going with the XDCAM codec in an MXF wrapper, Veria is able to deliver masters without requiring additional transcoding. At the same time, it has the option of ISO recording and editing for programs that are less time-sensitive. Thus, the highly versatile design enables them to have both studios in production simultaneously, using both recording methods.

A large reason Veria chose to partner with NEP Studios is its industry reputation as a problem solver. One example was the natural gas line installed in the eighth-floor studio for the cooking shows. NEP was able to apply its expert project management skills to shepherd the application through the New York City permitting process, secure approvals and manage construction. Also, NEP played a key role in helping Veria define the format for its final production deliverables.

Veria will begin airing a minimum of five new shows in the first quarter of 2013, all of which were shot and produced in the NEP studios. This will result in a huge increase in new, original daytime content for Veria viewers to enjoy — a level of growth that would not be possible without dedicated studio facilities. By supporting Veria's requirement to rapidly develop content, NEP Studios has enabled the network to move to the next level in targeting different audience segments with its programming — an important factor for any TV network. ■

All Mobile Video Epic truck

Excellence Award category

New studio technology — HD

Submitted by

TSL Professional Products

Live to theatre broadcasts of music concerts, awards ceremonies and sporting events is taking the consumer world by storm. The combination of HD/3-D screens and high-quality surround-sound systems in theatres gives fans the next best thing to being there. All Mobile Video's Epic truck is at the forefront of live to theatre broadcasts, multicasting multiple HD/3-D video and 5.1 audio productions to both designated ACN theatres and broadcasters.

The truck is equipped with a choice of either18 HD or 9 stereoscopic HD 3-D camera systems, as well as a TSL SoundField UPM-1 stereo to 5.1 upmixer. This gives All Mobile Video the flexibility to deliver any HD/3-D video production with 5.1 audio regardless of whether the audio production was done in 5.1 or stereo. You'd be hard-pressed to find a comparable mobile unit for live to theatre coverage capable of delivering realistic and immersive audio atmospheres.

All Mobile Video's Epic 3-D production vehicle has been widely relied upon for critical 3-D and HD high-end event broadcasting for such high-profile events as the MTV Movie Awards, the BET Awards, "The Daily Show" from the democratic and republican conventions, Victoria's Secret Fashion Show and the Rock and Roll Hall of Fame Induction Ceremony.

The design philosophy behind the Epic truck is to be on the cutting-edge of technology, yet comfortable and simple to operate. The TSL SoundField UPM-1 stereo to 5.1 upmixer fits perfectly within this philosophy with its state-of-the-art algorithm and ease of operation through only five physical front-panel controls.

At the MTV Music awards pre-show, All Mobile Video used TSL's SoundField UPM-1 stereo to 5.1 upmixer to create surround sound from the pre-produced video packages provided by the edit houses. These were then seamlessly integrated into the discrete 5.1 audio mix.

5.1 monitoring is always a challenge when designing a new truck, and problems range from the size, shape and acoustic properties of the room, as well as noise from the outside world. All Mobile Video took this issue very seriously, fitting the Epic with specialized flexible lead sheets to keep external sound out while at the same time isolating sound within the audio room. Acoustical foam was sprayed into the joints, corners and behind racks during construction, and the wall coverings have special acoustics properties for room separation.

MADI played an important role in the audio chain, and a large amount of MADI streams are employed to ensure security and reliability inside and outside the vehicle to help maintain signal integrity. Multichannel metering is available in all engineering stations, and fiber was an integral part of the design, helping to both save weight but also to maintain signal quality in high-bandwidth signals. So many fewer copper runs also aided in keeping the truck cooler.

The Epic has been embraced by many different All Mobile Video clients as their go-to production facility. From the front to back, it uses cutting-edge technology in all areas to ensure that all the needs of all departments will be met. It's a state-of-the-art mobile production unit that provides clients with the technology, comfort and space they need to make the highest quality live event production.■

Design team

All Mobile Video: Ian Vysick, audio dev. specialist; Lee Blanco, director of eng.; Paul Brinkman, mobile div. supervisor; Darryl Coleman, Epic eng. in charge

Technology at work

Apogee: Wordclock generating and distribution
Bittree
Chromatec: Multichannel audio metering
Coleman Audio
DK-Technologies
Dynaudio
Leitch
Miranda: Multiview video monitoring
PatchAmp
PESA: Video, audio and time code routing
RME: MADI routing, conversion
Sony
Soundfield: Stereo to 5.1 upmixing
Studer: Studer Vista mixing platform
TASCAM
TC Electronic: Audio delays and outboard processing
TSL Professional Products: Monitoring
VSM: Single-unit controllers of multiple devices

BuffVision

Excellence Award category

New studio technology — HD

Submitted by

Burst Communications

Design team

Burst Communications: Jim Schoedler, sr. proj. dir.; Dale Scherbring, CPBE, VP of eng.; Zettalee Gowen, install supervisor; Letha Koepp, logistics coord.; John Switzer, VP of systems integration
WJHW: Todd Semple, sr. consult.; Tom Falgien, CTS, CET
PCL Construction Services: Ankit T. Sanghvi, DBIA, LEED® AP, proj. mgr.; Chris Mullin, site superintendent
Daktronics: Scott Louwagie, proj. mgr.; Mark Johnson, regional sales mgr.
CU Athletics: Thomas P. McGann, assoc. AD; Deric Swanson, dir. of BuffVision; Eric Pelloni, assist. dir. of BuffVision

Technology at work

AJA: FS2 and KONA
Clear-Com: Wireless intercom
Ensemble Designs: Scaler
Evertz: Routing switcher; fiber transport; routing; multiviewer
Fujinon: 42X and 22X lenses
Ikegami: Monitors
JVC: Blu-ray/DVD
Marshall Electronics: Monitors
Panasonic: Cameras
RF Central: Video wireless system
Riedel Communications: Intercom
Ross Video: Vision production switcher; XPression CG; BlackStorm video server
Sony: Monitors; POV camera
TBC Consoles: Consoles
Telecast Fiber Systems: TPOV; CopperHead fiber systems
Tightrope Media Systems: ZEPLAY slow-motion platform
TVLogic: Monitors

Tucked away on the service level of the Coors Event Center on the University of Colorado's Boulder Campus is the headquarters for the CU Athletics scoreboard production team, also known as BuffVision. This state-of-the-art HD control center drives video replays at the Coors Event Center at Folsom Field, located a half-mile away. Denver-based systems integrator Burst Communications was selected as the design/builder for the WJHW specified video replay system.

This system produces live shows of Buffaloes basketball, football, volleyball, etc., for both the videoboard and Pac-12 Network streams. The project included two new multimillion-dollar Daktronics HD video scoreboards at Folsom Field and was managed by PCL Construction Services.

The goal of the new facility was to build a central video production facility in support of all of the campus's athletic venues. The infrastructure for this is based on fiber interconnection primarily using Evertz fiber transport products. A major fiber expansion between these venues was required and was managed by the campus IT department.

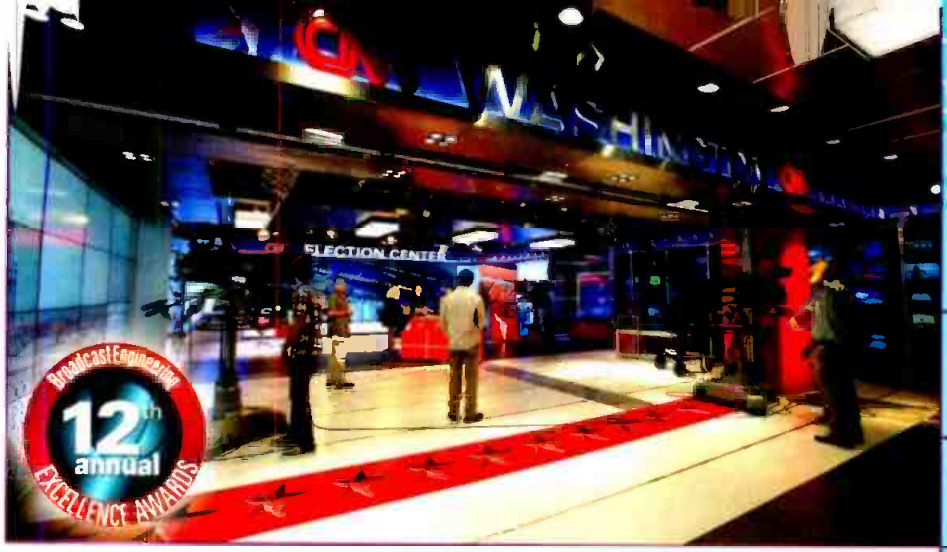
This project included significant construction on the service level of the Coors Events Center, while other parts of the center were in normal and constant use. Event conflicts and construction delays are all challenges that Burst has experienced, but by coordination with the GC, other trades and with the facility, substantial completion was on time.

The control room supports multiple venues, connected by fiber. Evertz has a fiber product line that allows any type of signal to be transported. For this build, a combination of analog video, analog audio, intercom, data and HD/SD video are carried over fiber. Burst designed a fiber patching solution for the BuffVision staff that separates it from campus IT facilities. This created a demark that allowed BuffVision staff to change fiber patches on its own.

Evertz was selected for the core systems and fiber infrastructure due to its reliability, cost effectiveness, product integration and design approach. The X-LINK interconnection between the Evertz Xenon routing switcher and its multiviewer simplifies installation and allows any source in the switcher to be available on any of four multiviewers. Evertz's MAGNUM controls the core system, and it allows operators to manage all broadcast chain components from one control point.

The multiviewers drive four displays, including two large LCD displays used by the director, producer and TD for the main show. A second set of large LCD displays is used by replay and is available for a second TD at a second production switcher control panel. This second position is planned for occasions when events overlap to produce a second show or feed a separate main show cut to the Pac-12 Network broadcast or stream.

Other key products selected for versatility, reliability, ease of interfacing and operational ease: a Riedel dual matrix intercom system, a Ross Vision production switcher with two control panels and Ross XPression character generator, Ross BlackStorm video server and two Tightrope ZEPLAY slo-mo systems. ■



CNN-Washington, D.C.

Excellence Award category

New studio technology — HD

Submitted by

Lawson & Associates, Architects and CNN/Turner Broadcasting

CNN made the decision two years ago to relocate its election coverage from New York to its Washington, D.C., hub, and what a full-court press it became! First, it needed to expand its TGR by 70 racks, and start a major integration project. Then, it renovated the Larry King Studio into a prime-time control room for up to 20 positions, with the capability to adjust to 40 people during coverage of special events. Studios were equipped with touch screens, projectors, acoustical glass wall dividers and 1000 new dimmer circuits.

The TGR was designed to house two different rack areas. The high-heat area is served by in-row coolers. These units run off the condenser water distribution system, initially built by CNN, and expanded to accommodate the new load in the building. This area is isolated with sliding doors at the end of this row. The remaining racks area, which is cooled by a pair of redundant big box Lieberts, is ducted into each row. The original and new racks are supported by a new 500kVA UPS.

The control room was designed wider than it is deep for two reasons: It maximizes the number of people who can be positioned in the front two rows, and it allows CNN guests to view monitors from the back windows that line the corridor serving the floor. The audio control room also provides guests and employees a great experience to watch live TV on location.

The studios were stripped out to replace the 20-year-old dimmer wiring, mechanical capacity was increased, and the new on-air set was designed and built to maximize every shooting angle. "The Situation Room," "John King, USA," "State of the Union" and "Reliable Sources" all share the space with Election Night coverage every two years. ■

Design team

Lawson & Associates: Bruce Lawson, principal; James Ahn, architect
CNN/Turner: Matt Speiser, asst. bureau chief; Jan Hoover, proj. mgr.; Tu Vu, eng. mgr.; Guy Pepper, set design; Steve Alperin, proj. mgmt.
HPD: Bill McPherson, principal; Mike Olsen, engineer
DesignTech: Tom Igo, pres.; Matt Bowers, VP
Clickspring Design: Steve Dvorak, VP of design
Boyce Products: David Boyce

Technology at work

By CNN

NBC WMAQ-TV Chicago

Excellence Award category

New studio technology — HD

Submitted by

NBC Universal

Design team

NBC: Janet Golden, VP broadcast ops. and tech.; Trisha Hockings, mgr., studio ops.; Ken Jackson, mgr. of tech. ops.; Mark Luciano, mgr. of IT; Ana Acevedo, mgr., fac. and sourcing; Lane Lucatorto, EIC; Edward Dabrowski, E.D.G. supr.; John Pachuta, sr. eng.; Rick Vogt, supr., tech. maint.
NBC Chicago Engineering Development Group: Sys. integration
David Risser, head carpenter; Mack Elwood, lead stagehand

Technology at work

Avid: ISIS 5000; Interplay production; 7-Media composers; 1-Symphony; Interplay Archive
Black Box: KVM system
Calrec: Artemis Beam digital audio console, with Bluefin 2 high-density signal processing, 64 multilayer faders and eight Hydra2 I/O boxes
Canon: Lenses
ETC: Sensor3 light dimming system
EVS: XS servers; IP Director suite of production and broadcast tools; XTAccess/MediaXchange A/V file-conversion and interoperability solution
Miranda: Kaleido-X multiviewers; Desité2; modular distribution amps; and XVP processors
RTS: Adam intercom system
Sony: MVS-7000X switcher; HSC300 HD cameras; HDCAM VTRs
Spectra Logic: T380 digital storage solutions

A monumental undertaking took place at the NBC WMAQ-TV studios in Chicago this past summer, with the announcement that the new "Steve Harvey Show" was coming to town.

We needed to gut and rebuild one of Chicago's largest studios and control rooms. The facilities were 22 years old and still in the hybrid analog-SDI state, with the goal to build out a brand-new facility with state-of-the-art equipment and design, of course in HD. With many of the decisions still up in the air, including the actual requirements needed for the show, management assembled a great team of engineers, stagehands and in-house carpenters. We had to have it ready to go for the late summer start-up, which gave us less than five months to complete the project from design and ordering of equipment through fax check.

Having an older studio meant that we just couldn't start with a new build-out. It was time to remove everything, including the old wiring, floors, walls and ceilings. We added eight new Avid edit suites, two assist stations with router controls to each room, 10 new green rooms, and a video shading room with eight Sony HD cameras, Sony monitoring, Sony RCP panels and MSU. Also included were new tripods, Canon lenses, and a Steadicam and Jimmy Jib.

The audio booth was gutted from floor to ceiling and consisted of a new monitor wall and a Calrec Artemis digital audio board with new digital processing. The control room itself was another full gut job, including all the cabinetry and soundproofing. The cabinetry and consoles were designed, constructed, installed and wired in-house, which allowed us to customize every cabinet for the room and equipment at a fraction of the cost. This included 14 new workstations. The room consists of an HD Chyron, a new teleprompter system, a Sony MVS-7000X switcher, and, of course, a 10-panel Sony wall-control room monitoring system. This was all tied together with a Miranda KX system, and all computers are networked by a complex KVM system.

Next, the studio's old beta tape room was gutted. We added a state-of-the-art EVS room with 10 channels of recording and four channels of playback, including 16 channels of embedded AES audio. The room also includes two Sony HDW-2000 record decks.

The studio itself was completely redone — from re-wiring the lighting grid with 510 dimmer circuits to building a spectacular new set for the "Steve Harvey Show." A digital Yamaha M7CL PA audio board (interfaced to Calrec using MADI), Meyer audio speaker cabinets, under-seat and overhead speaker monitoring systems were engineered for the audience. We added a new IFB, in-ear eight-channel monitoring systems, upgraded Cell-Com communications, four rear-screen projectors, two subwoofers, an array of new video monitors and 24 channels of Shure wireless microphones.

New office space also had to be created for a staff of more than 100 new employees using wireless telecommunications networking.

We are proud to have this premier production facility at NBC Chicago. ■

NTV Plus

Excellence Award category

New studio technology — HD

Submitted by

Calrec Audio

Design team

NTV Plus: Andrey Markov, deputy of broadcast svc. superior; Boris Speranskiy, tech specialists superior; Egor Sakharov, sr. specialist at sound; Alexey Fadeev, sr. specialist at IT
Okno-TV: Roman Katrovskiy, proj. designer
PTS: Pavel Klevtsov, proj. design eng.; Andrey Likhachev, proj. design eng.; Stanislav Golubkov, chief eng. of sys. proj.

Technology at work

Calrec: Artemis Beam audio consoles; Hydra2 audio routing system
Colin Broad: SR-4 serial remote/synchronizer
Dynaudio: Air 6 audio monitoring
Evertz: Video signal processing equipment
Grass Valley: Kayak HD video console
Riedel: Artist communication system; MediorNet fiber-optic signal transport system
RTW: Audio signal measurement and monitoring

In addition to being the first Russian satellite broadcasting company, NTV Plus was a trailblazer in bringing HD content to its audience, now totaling 2 million in Russia and the Ukraine. Today it offers more than 200 channels — both original and retransmitted — that include HD and 3D channels.

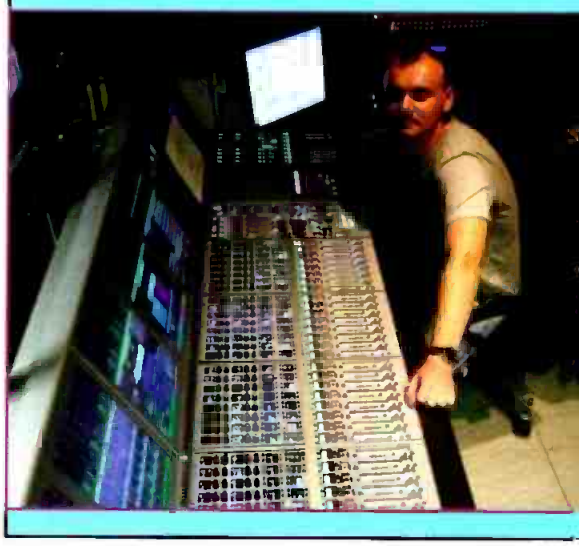
In 2009, NTV Plus launched its first end-to-end fully digital live production studio, "Sport-5," which allowed it to perform HD broadcasting with 5.1 surround sound. Sport-5 enabled NTV Plus to show the 2010 Champions League Finals in 3D and 5.1 in cinemas across Russia and to continue its role as a Russian pioneer in implementing modern broadcast technologies. Nevertheless, the company decided that a single 5.1-capable studio would not be enough to maintain this position.

In the beginning of 2012, NTV Plus began improvement of its Moscow facilities and upgraded two live production studios with two Calrec Artemis Beam 48-fader consoles, networked with Calrec's Hydra2 audio routing system. The Artemis consoles are configured with 24 mic/line inputs, 64 AES3 inputs, 16 HD-SDI de-embedders, a Dolby-E decoder and eight opto inputs. Each of the consoles produces four groups of 16 audio channels of program output for multichannel audio. While the consoles are dedicated for live broadcasting purposes, they offer the functionality that NTV Plus requires, as well as flexible configuration and operation. Their modular design and large assortment of options enables smooth integration with other equipment. Each customized Calrec panel sits in the control surface and houses a Colin Broad SR4 serial remote/synchronizer for efficient control of multiple playback/record machines from the Artemis desk.

The plug-and-play architecture of the Hydra2 system allows NTV Plus to connect consoles together simply and enjoy seamless, scalable audio networking and resource sharing. Hydra2 enables either console to access any I/O on the network. This approach supports redundant system configuration that ensures live shows are seamless, and it facilitates easy network expansion with additional consoles and I/O. Integrated with a Riedel MediorNet fiber-optic signal transport system, the Hydra2 gives NTV Plus a highly efficient signal transport network with limitless possibilities within NTV Plus premises.

Today, the Calrec mixing consoles allow NTV Plus to produce live 5.1 surround and stereo shows simultaneously for different feeds. The system also makes it easy for NTV Plus to move 5.1 content between studios and to connect external sources to any console. As a result, NTV Plus can maximize its productivity and realize larger, more complex productions, which in turn offer the potential for greater revenue generation.

NTV Plus quickly demonstrated this new flexibility and capacity during its 2012 Wimbledon broadcast and hired an additional three consoles for its coverage of the London 2012 Olympic Games at its remote production at IBC London. The flexibility of its existing system will enable the broadcaster to continue expanding its HD 5.1 capabilities and to maintain its reputation as a technologically pioneering company in the Russian broadcast market. ■



Pacific Television Center Los Angeles

Excellence Award category

New studio technology — HD

Submitted by

D Pagan Communications

Design team

PacTV: Jakob Nielsen and Mike Finley, engs.
Robert Ward & Associates: Robert Ward, architect
High Tech Furnishings: Custom console build
Kier Construction: Mike Kier, construction
Veneklasen Associates: James Good, acoustic design

Technology at work

Adtec: EN-81 HD/SD MPEG-2/MPEG-4 encoders; RD-60 receivers
CompuSat: Satellite dish control
Ericsson: 1920 x 8200 receivers; 5782 encoders
Evertz: RF router; VIPA multiviewers
For-A: FRC-7000; UFM30-FRC frame rate converters
Grass Valley: Trinix router; Encore Control facility router
HP: MS6200 server/workstations
Samsung: Videowall; 400UX-3 LCD monitors
Sony: HDCAM and Digital Betacam cameras
TV Logic: LW-243(3G) and LW-173W(3G) LCD monitors
Wohler: AMP1-E8MDA speakers

When Pacific Television Center (PacTV), a Los Angeles-based independent global transmission and production company, decided to renovate the master control room at its Los Angeles facility, it sought to enhance the company's monitoring and transmission capabilities significantly. In turn, this would support the facility's move to complete HD operations.

Over the last few years, PacTV's worldwide client roster has grown significantly, requiring increased staff and monitoring resources. To address these issues, the company has transformed its facility into a functional space that enables the PacTV team to collaborate more effectively on multiple projects.

The renovation in Los Angeles was also a catalyst for the company's planned global renovation, which would include its sister facilities in New York and London.

Where the previous MCR housed just two workstations, the renovated one now features five, along with 12 screens. This has allowed PacTV to bump the number of feeds it monitors from 64 up to 162. Once the monitoring wall in the space is fully populated, the company expects it will be able to monitor up to 249 feeds. The circuits it currently monitors in Los Angeles include such top-tier city hubs as New York; Washington, D.C.; Atlanta; London; Sydney; Auckland; and Toronto, among others.

Among the other pieces of equipment the new MCR incorporates are new, custom-made High Tech Furnishings consoles and multiple Evertz 7867VIPA multi-image display processors, as well as an OmniTek HD waveform scope for measuring Dolby E streams. In addition, PacTV will now be able to monitor its feeds using four new quality-control stations, contributing a new level of productivity to the facility's workflow.

PacTV recruited Veneklasen Associates to design the acoustics in two of its facility's three studios in Los Angeles. The studios have been fully upgraded to HD, soundproofed with new acoustical treatments and equipped with new Sony HXC100K HD cameras.

PacTV commissioned the architectural firm Robert Ward & Associates to establish and maintain a consistent design across the additional PacTV facilities. According to Robert Ward, principal architect at Robert Ward & Associates, this presented its own challenges.

"When we were asked to look at the development of the MCR at PacTV Los Angeles, we knew this would be challenging, as we were tasked with designing a state-of-the-art facility while keeping the existing MCR up and operational," he says. "Fortunately, the team at PacTV was a dedicated and resilient crew. They were able to work around the most difficult of our construction issues."

"PacTV started with one outbound loop to Australia," says Richard Neri, president, PacTV. "With the growth of circuits, we needed to rethink the way we monitored connectivity. We had to take our facility to the next level, and this redesign has done just that. By increasing our monitoring capabilities, we can easily keep our clients up to date on all projects. ■

Turner Studios

Excellence Award category

New studio technology — HD

Submitted by

EVS

With 27,000 hours of content and more than 6000 live sports events to record, log, edit and broadcast every year, Turner Studios has a big responsibility to provide the production systems and personnel that support Turner Sports coverage for many of the top U.S. national sporting leagues. The group 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 the onset of 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.

One of the biggest challenges of designing and implementing the system was integrating solutions from several best-of-class manufacturers — including EVS, Active Storage, Apple, Dalet, Quantum, NetApp and Stainless Code — to create a customized workflow solution.

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 within seconds through EVS XTAccess servers to create duplicate high-resolution growing feeds on redundant Quantum StorNext SAN systems. The XTAccess cluster also creates proxies on NetApp NAS storage for immediate logging on Stainless Code desktop logging 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.

Turner Studios Sports Central provides a growth-ready platform that can expand in any needed area of feeds, playout, storage or distribution. It allows Turner Sports to send content to partners quickly and efficiently, within seconds of air, and meet the demands of today's fast-paced content anywhere, anytime, any-screen world. ■

Design team

Turner Studios: Craig Heyl, SVP; Kenneth Brady, VP, sys. tech. and digital media; John Luegering, VP, sports prod. and tech. ops.; Kevin Shorter, VP, eng.; Peter Fredlund, sr. dir., sports tech. ops.; Jeff Sharpe and Brian Raslawski, dir. of eng., data sys.; Jeff Carlson, dir. of eng., editorial; Stacey Rivers, dir., tech. proj. mgmt.; David Broyles, mgr., tech ops.; Tony Tam, tech ops. spc.; Katherine Evans, app. dev. dir.; Mark Gaybba, proj. mgr.; Rana Khalid, sr. software dev.
Turner Sports: Tom Sahara, VP, ops. and tech.; Chris May, library mgr.; Eddie Daniels, mgr., tech. ops. eng.; Debbie McMinn, dir. of ops.

Technology at work

Active Storage: ActiveRAID
Apple: FCP 7
Dalet: Enterprise; WebSpace; Xtend
EVS: XS; XT3; XTAccess; IP Director
NetApp: OnTap; FAS3240
Quantum: StorNext
Stainless Code: Stainless logger

WFMJ

Excellence Award category

New studio technology — HD

Submitted by

TI Broadcast Solutions Group

Design team:

WFMJ: Jack Grdic, GM; Bob Flis, chief eng.; Charlie Wiesel, asst. chief; Mona Alexander, news dir.; Sheila Miller, exec. producer; Ken Sechrist, IT mgr.; John Luff, owner's rep. and consultant
TI Broadcast Solutions Group: Michael Wright, principal in charge; Brad Baldwin, proj. mgr.; Mitch Jones, principal eng.; Steve Bennett, installation mgr.

Technology at work:

ATEN: KVM system
Grass Valley: Edius Storm 3G Elite editing systems; K2 Summit ingest and playout servers under Aurora control; 70TB iSCSI SAN storage platform; Stratus with NRCS plug-ins
Leader: LV5800 waveform monitor
Miranda: Kaleido-KX multi-image processor
Ross Video: QMD production switcher; Expression graphics systems
RTS: Adam M intercom system with MADI interface
Samsung: LCD monitors
Sony: HXC100K cameras
360 Systems: Digicart E/X audio clip players
TASCAM: CD players
Utah Scientific: 400 Series HD routing
Vinten: Radamec Fusion studio robotics
Wheatstone: D-8 audio console with MADI interface
Wohler: Audio monitors

The process of converting from SD to HD for local news always creates apprehension. In the case of WFMJ, in Youngstown, OH, the decision was made to use the twin opportunities of the November Sweeps and the national elections as a chance to make a splash in the market and maintain its local lead in news ratings. Long before the national Presidential campaign starting dropping money in Ohio, a plan was developed to cut over barely three weeks before one of the most important news events of the year.

The transition included not only a new control room layout and hardware, but also a complete overhaul of field acquisition, and news editing and playout to HD at the same time. The transition was accomplished on schedule, and without losing a single newscast. The space was in use, however, so a "leap frog" strategy had to be developed that allowed first the old CRT monitor wall to be demolished, and the wall between the existing audio control room and production control to be removed to make room for both a new flat-panel monitor wall and new production control desk to be dropped into the space that was opened up. Wiring in the new rack room area began a month before the first milestone, and in early October, the first pieces — including the new monitor wall and consoles — were put in place. Then an orderly transition began by moving the producers to a temporary location at the old front bench, followed by a new Wheatstone D-8 audio console and the removal of the old analog audio console. This left all of the major pieces in place for training prior to cutover.

Two weeks later, over a long weekend, the rest of the transition was accomplished, and the first HD newscasts were produced with little fanfare and remarkably few problems. The new graphics signaled a major change in the look of the programs, and an improved intercom, stunning HD pictures and heavier use of graphics completed the makeover.

WFMJ chose to implement Ross Video switching and Expression graphics hardware in anticipation of converting to Ross Overdrive news automation after one of the ratings books in 2013. Cameras were changed in 2011 (Sony HXC100 on Vinten Radamec robotic pedestals), and were ready to be switched to HD. The field cameras chosen were Sony PMW350s, with Fujinon lenses. The editing and playout choice was Grass Valley's latest Stratus/Edius/Aurora playout, tightly integrated to the ENPS newsroom computer system. On cutover weekend, the Edius and Aurora systems were put in place at the same time the control room was completely changed out, two floors above.

The project manager for WFMJ, John Luff, helped WFMJ select a firm with experience with all aspects of the design and complicated transition. TI Broadcast Solutions Group was chosen to manage the technology and complete the entire installation. With all departments in the station participating throughout the project, the final equipment list was tailored to WFMJ's unique needs. Training everyone on all the new technology occupied everyone's attention in October, and it paid huge dividends. ■

WNJU Channel 47

Excellence Award category

New studio technology — HD

Submitted by

Ross Video

Faced with the challenge of doing a complete high-definition upgrade while maintaining its standard-definition broadcast, WNJU Channel 47 successfully completed an infrastructure build that included new production and audio control rooms, a station router, new graphics and studio sets.

The engineering team, located in Fort Lee, NJ, the flagship television station of Telemundo Television Network, designed and integrated the new facility entirely in-house without using third-party management or integration services. This allowed creative flexibility to design and accommodate as needed while controlling cost.

WNJU was conscious of the needs of all of its departments. It worked closely with its production and news teams, as well as other staff during the entire design process. It was important for WNJU to be inclusive, creating an atmosphere comfortable for the whole team, right down to lighting and color of the new ergonomic chairs.

WNJU faced many challenges. In order to realize the desired adjacencies, the existing control room was moved to a new location in order to make way for the new one. Faced with limited rack space, on-air equipment had to be relocated, while new equipment was installed in its permanent location. A comprehensive plan was developed to share content and sources in both the existing SD and new HD infrastructures.

Adding some complexity to the build, structural changes in the facility needed to be completed in order to accommodate new furniture and equipment. Old sets were migrated to different areas of the studio to allow for construction of new sets. Overall, the advantage of managing the project internally outweighed any disadvantage, giving WNJU the ability to customize and adjust on the fly while maintaining news and broadcast operations during the change.

The new control room was custom-designed from top to bottom. New desks and consoles were incorporated, along with a new theatrical acoustical ceiling. To reduce heating, new dimmable LED lighting was installed in the production control and audio rooms. For the director and OverDrive Automated production control system operator in the control room, a pod-type workflow was created. It was important to ensure that the APC operator could navigate through the equipment easily while maintaining necessary lines of sight with crew and monitoring. The new audio board allowed creation of access tiers for operators, depending on their experience and abilities. WNJU strategically laid out the monitor wall to achieve optimum line-of-sight for control room staff, while still incorporating it as a backdrop for part of the main set.

WNJU's new set consists of LED, plexi and brushed aluminum, giving it a polished new look. Implementing vertical monitors and RGB light boxes around the set allowed the color of the walls to change as needed. A whole new WSI weather and traffic system was integrated and displayed on a new multiview monitor wall. Wireless microphones were upgraded to low-profile body packs, which made the talent happy. ■

Design team:

WNJU: Leonard Stote, dir. of tech. & ops.; Edwin Torres, mgr. of tech. ops. eng.; Stephen Allen, IT mgr.; Mike Polzer, eng.; Manny Torres, eng., Hector Izquierdo, eng.; Leonard Griffin, eng.; Carlos Sanchez, GM; Jose Morales, VP of content

Technology at work:

AJA Video Systems: HDMI converters
Autoscript: Camera prompter
AVCOM: Spectrum analyzer
Canon: Camera
Chyron
Evertz: Weather video monitor wall processor
Forecast Consoles
Gefen: HD/SDI converter
Lectrosonic: Wireless microphones
Miranda: Densité terminal equipment; HMP-1801 solid state media server; IRD-3811 decoder; Kaleido-X multiviewer, routing
NEC Display Solutions: Wall system
Quintech Electronics: RF router
Ross Video: OverDrive automated production control system; Vision production switcher
Samsung: Monitors
Sony: HDC1450R studio cameras
Solid State Logic: C10 HD console
360 Systems: HD video server
Vinten: Robotics
WSI: HD weather system

World Wrestling Entertainment

Excellence Award category

New studio technology — HD

Submitted by

The Systems Group (TSG)

Design team:

WWE: Mike Grossman, SVP, tel. ops.; Lionel Hightower, VP, eng. and broadcast ops; Tracey Arrowood Shaw, VP, TV and network ops.; Sal DeMaio, dir., eng.; Jonathan Solomon, sr. broadcast eng., PM; Dan Keene and Jason Miller, sr. broadcast engs.; Zack Riccobono, broadcast eng.
The Systems Group: Scott Griffin, principal and VP, eng. and tech.; John Meusel, Jr., sr. acct. exec. and proj. mgr.; Jeff Rivera, Christian Dam, Jim Driscoll, sr. sys. eng.; Juergen Kircher, int. supr.

Technology at work:

Avid: MediaComposer
Avocent: HMX KVM platform
Euphonix: System 5 audio mixer
Evertz: EQX video router; EMR AES and data routers; data ports; VIP-X multiviewer systems; Magnum Control system; fiber terminal equipment
Grass Valley: Aurora edit systems
HP: z800 workstations; KH 120 nearfield powered monitors
RTS/Telex: RVON communications system
TBC: Custom millwork

World Wrestling Entertainment (WWE) in Stamford, CT, has solidified the way it creates and distributes content with a new expansion project that added a new surround sound audio production room; 10 HD edit rooms; a state-of-the-art HD ingest, QC and transmission suite; and a private fiber-optic ring that connects three separate WWE locations. WWE doubled its operations space and significantly increased production and postproduction capabilities.

After WWE announced plans last year to expand its distribution, systems integrator The Systems Group (TSG) in Hoboken, NJ, was engaged to work alongside WWE to design, manage and build the new areas. That was in January. The challenge was to get it all online by April 1. With the engineering staffs of both organizations working closely together, they got it done on time and under budget. The technical infrastructure was upgraded and expanded, including new routers for HD-SDI video (576x576), AES audio (192x192), time code and control, and advanced audio and video monitoring. WWE can now quickly deploy and support multi-screen distribution initiatives.

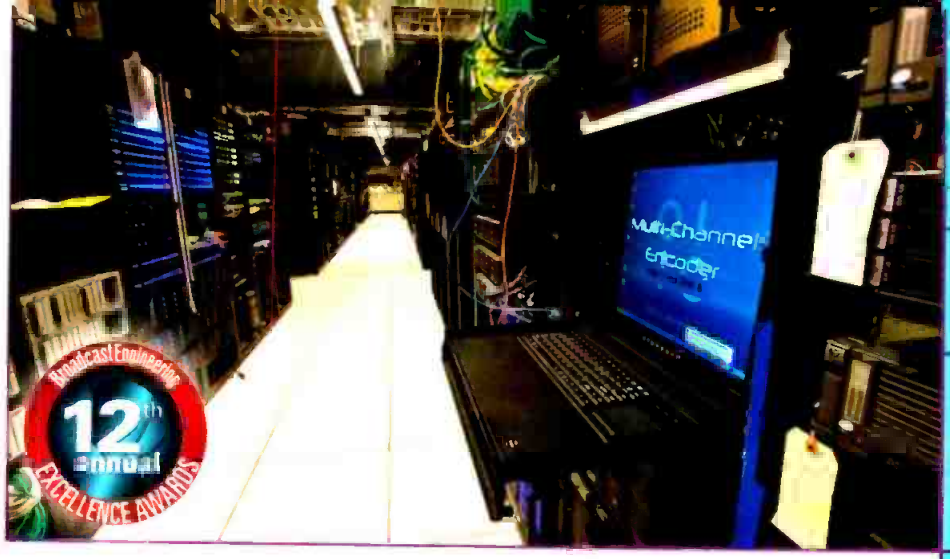
Working weekends and early mornings so as not to disrupt the facilities' existing operations, John Meusel, Jr., senior project manager, and his TSG team implemented a workflow crafted by WWE Engineering that allows WWE staff to route any signal to any location via the new Evertz routers, using Evertz multiviewers to monitor the signals. The WWE workflow included signal control and distribution system to allow operators to adjust signal paths on any router with a few keystrokes. Further leveraging private IP connectivity, nearly 50 RTS RVON intercom panels were installed across the facilities.

The editing department expanded its editing capacity with five new Avid Media Composer and five Grass Valley Aurora Edit systems, all connected via Ethernet and fiber to central server rooms. The 5.1 audio suite ("Audio 3"), located at WWE's 120 Hamilton Ave. building, includes a Fairlight digital audio workstation and Euphonix System 5 mixing console. Although most signals are routed with embedded audio, users have the ability to split audio signals for postproduction purposes.

WWE facilities are connected via bidirectional redundant dark fiber circuits. Along with the fiber equipment at each remote facility, WWE installed a router to manage video cross-connects between sites. This is an ideal setup that allows for last-minute changes, as these locations are not staffed by WWE.

The installation and integration occurred in stages as time and opportunity presented itself. Working with WWE staff, TSG executed the entire router infrastructure rebuild over a single weekend in January, including running new cabling and tightly integrating to legacy systems that were not replaced.

Thanks to a variety of Evertz and other equipment, WWE now has the solid foundation it needs to get in the ring and successfully wrestle different types of content that delivers programming not only to television viewers, but also the Internet, mobile and OTT platforms. TSG has made it easy for WWE to move to the next step in its business model. ■



WRAL Studios

Excellence Award category

New studio technology — HD

Submitted by

WRAL-TV and Capitol Broadcasting Company

In 2007, WRAL-TV, the first commercially licensed HDTV station (1996) based out of Raleigh, NC, began a large-scale renovation of its entire technical facility. The goal was to simplify workflow and day-to-day operations while developing a production hub for all of its local outlets.

When the HD plant launched in 1996, it was as an experimental station. During the next 15 years, equipment was incrementally added to suit the needs of the station as it grew. The facility became a conglomeration of products of various vintages from multiple vendors, which led to an inefficient and somewhat awkward operation, and made for complex growth as new projects were launched.

The renovation of the WRAL facility included an all new master control capable of switching up to 16 program streams, three additional production control rooms, the renovation of one older control room, three additional studios, 14 new "craft-style" edit suites and a whole new tech core to support it all. From day one, it was decided to completely eliminate all analog and SD sources. Internally, the plant is completely HD with embedded audio. All non-HD programming is converted to HD as it enters the facility, and any SD subchannels are switched at HD and downconverted just before transmission.

The project began with a yearlong "architectural and core building" rebuild. While staying on the air, 25000sq ft were demolished and rebuilt from roof to basement. The equipment and power upgrades included all new HVAC, power distribution, UPS and generator.

The schedule then took a two-year break. In 2011, the project was restarted in earnest. By Christmas of that year, a new technical core, master control, QC/receive control, a full-sized production control room and two mini control rooms/studios were launched and on the air. In 2012, yet another full production control room and two more stations were added to the new master control. Currently, there are seven programs streams being generated in MCO with another 12 possible streams being delivered to the Web and mobile viewers.

The design criteria bridged many gaps. Traditional linear production had to be at the basic core, but in no small way is it wrapped tightly by file-based workflows. On top of the 8.5 hours of news per day (delivered to WRAL, WRAZ and WILM), there is need for local production of commercials, PSAs, promos and documentaries. The tech rebuild included tying in a fat networking capability of file transfer and transcoding between the many server systems (Omneon, Bitcentral, K2 , Telestream, Rhozet) and editor systems (EDIUS, FCP and Avid). Additionally, six new 4.5m sat dishes were added. A 64 x 64 RF router was added to allow for flexibility in the QC/receive operations room.

Many separate silos were combined to make the user experience easy. From day one, the intention was for everything to be as simple as a press of a button or the click of a mouse. WRAL can now easily use any of the four control rooms to switch a show in any of the six studios, using any of the 15 HD cameras or five HD microwave receive sites, four Internet/cell-based receive system or 20 satellite IRDs to supply programming to any of the six stations, 12 Web streams or 25 edit suites — all in HD, and all at the same time. ■

Design team

WRAL Engineering: Peter Sockett, dir. of eng. and ops.; Fred Kelly, eng. mgr.; Matt Brandes, transmitter supervisor; Mike Upchurch, lead design eng.; Mike Mory; Bill Weinel; Charles Braswell; Tony Gupton; Tony Patterson; Chris Cormier; Rick Congleton; PB Jernigan
Beck Associates: Fred Beck, pres.; Bill McKenna, sr. eng.
ARCHITEKTUR: Thomas Crowder, principal; Sara Felsen, lead designer
Archteck: Don Archiable, principal

Technology at work

ADC: Patching
AJA: HD-SDI-to-HDMI conversion
Avocent: KVM
Belden: Cable; connectors
Bit Central: Précis/Oasis News Production System
Brocade: Network switching
Broadcast Pix: Slate Mini Studio production switchers
Chyron: HyperX graphics
Evertz: EQX router; EMC MCO; Overture branding; Glue, VIP multiviewers; XRF router
Grass Valley: K2 server
Harris: X-50 and X-85 frame synchronizing; test and measurement
Image Video: Tally; UMD
Omneon: Spectrum video servers
Ross: Vision production control switchers
Sony: HDC-1000 and HDC-1400 cameras; monitoring
Telex: ADAM intercom
Wheatstone: D-10 production control audio consoles; WheatNet-BRIDGE routing

Miami Marlins Production Facility

Excellence Award category

New studio technology — non-broadcast

Submitted by

Avid

Design team

Miami Marlins: Larry Blocker, dir., game pres. and events; Eric Ramirez, mgr., game pres. and video prod.; Randy Cousar, eng. dir.
WJHW: Chris Williams, consult.

Technology at work

Canon: HD servo zoom lenses
JVC: SR-HD1500US JVC Blu-ray disc and HDD recorder
Sony: HDC1400R HD studio cameras; PDW700 XDCAM HD camcorder; MVS 7000 production switcher; HDW-M2000/20 HDCAM master studio VTR; PDW-F1600 XDCAM HD professional disc recorder

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.

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.

Logged clips are added to our Avid Interplay asset management system, which we use to perform a wide array of search, retrieve and archive functions. From there, we send content to the board with multiple Avid AirSpeed playout servers.

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. Producing all our own TV spots internally, we do a 15 and 30 for every Friday, Saturday and Sunday game in both English and Spanish. 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.

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 and build identification with our fans.

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 a viewer misses 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.

This type of anywhere-anytime access would not have been possible without the Avid systems we now have in place. And the best part is that the workflow just keeps getting easier and faster. For example, everyone has their XDCAM drive and can ingest footage at their edit station, so any shot that someone has logged in is accessible by anyone.

It's what keeps us all working together in an entirely collaborative environment to create the kind of content that keeps fans coming back time after time, and get it faster and easier to air than ever before. ■

KSL-TV

Excellence Award category

Station automation

Submitted by

NVerzion

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, making this process extremely time-consuming and cumbersome, as each content delivery system had its own procedure for acquiring content.

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. By backing up the station's equipment, the automation platform ensures continuity for KSL's 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.

The automation runs on off-the-shelf hardware, offering an easy integration path with the station's existing third-party equipment. Utilizing 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. A TeraStore RAID-protected nearline/archive storage solution decreases the amount of required video server online storage, reducing the station's capital and operating expenses.

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. NCompass provides operators with simultaneous access to all of the station's content from an intuitive user interface that makes content acquisition more seamless and less time-consuming. Operators can set preferences for file naming and program segmenting, as well as manually drag and drop file transfers, to streamline operations.

The new automation system helps engineering staff efficiently manage additional stations like KJZZ while utilizing significantly fewer resources. KSL estimates that the NCompass ingest manager alone offers its master control operators about a 40-percent to 50-percent time savings compared with the station's previous manual-based workflow. By significantly speeding up the station's content ingest, the automation system allows KSL's engineering department to devote more time to quality control so that it can deliver a higher quality on-air presentation. ■

Design team

KSL: Brent Robinson, chief eng.; Rick Housley, broadcast/IT eng.; Katrina Kimball, broadcast eng.; Master Control operations crew
NVerzion: Lynn Williams, eng. proj. mgr.; Scott Murphy, pres.; Reed Haslam, dir. of sales and marketing

Technology at work

Centaur: Content delivery system
DG: Content delivery system
Extreme Reach: Content delivery system
Harmonic: Spectrum media servers
HulaMX: Content delivery system
Javelin: Content delivery system
NVerzion: NBase SQL media database manager; NView database viewer; NControlMC Master Control transmission playlists; NConvert manual and automated 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; TeraStore nearline storage archive
On The Spot Media: Content delivery system
Pathfire: Content delivery system
PitchBlue: Content delivery system
Utah Scientific: 400SD/HD routers; MC-2020 SD/HD master control switchers
WideOrbit: Traffic system

Maharaja TV (MTV)

Excellence Award category

Station automation

Submitted by

Maharaja TV (MTV)

Design team

MTV Sri Lanka: Tharaka Mohotty, head of eng.; Tharanga Silva, proj. mgr./broadcast design; Chamin Bandara, broadcast facility eng.; Gamage Jayantha, infrastructure design eng., with eng. team
Essel Shyam Technologies, India: Automation, server solution/integration

Technology at work

ADC: Audio patch
Belden: A/V cabling
Canare: Video patch
Clear-Com: Eclipse 32 intercom
Harris: IconMaster master control switcher
Junger: B46 digital audio compressor
Leitch: NEO-2 master clock
Media-X: Automation software
Neutrik: A/V connector
Nevion: SD6464M and SL-SD1616-R router
Omneon: Spectrum system
Rane: MLM-103 audio line mixer
Snell & Wilcox: IQ modular cards for A/D, D/A conversion, MUX, DA
Rane: MLM-103 DigiBeta compact player; DSR1800AP DVCAM recorder; LMD-1410 video monitor; 55EX720; 32BX320 LCD TV
Tektronix: WFM6120 waveform monitor
Tannoy: Reveal 501
Wohler: RMT-150-SD multi-interface video monitor

The leading private television network in Sri Lanka, Maharaja TV (MTV) moved to a digital ingest, playout and delivery facility with a master control system for its channels Sirasa TV, Shakthi TV and MTV Sports in June 2012, celebrating 20 years in the industry with a newly introduced station automation system.

Delivering best-quality content to satisfy the viewers, as well as to cater to the needs of its clients efficiently and effectively by conforming to world standards, were based on the objectives and the design goals, which were set accordingly to match tomorrow's technology in the context of broadcast engineering. The main deliverables planned for the MCR were digital ingest and playout, automation of three channels, up-to-the-minute verification of commercial airing status in reconciliation and digital delivery at final out, as well as acquire program and commercial content directly from external sources in file format.

The project was started from the site preparation stage at a new location with the civil and electrical works, including interior, raised floor, power distribution/protection, air conditioning, ergonomically fabricated console/furniture, etc., which were designed by the engineering team of MTV and outsourced for the completion of infrastructure. There were some difficulties to overcome during a similar-capacity project, such as logistics, time factor and coordination, and one of the challenges was to work together consistently with three distributed locations: the production facility base at STEIN Studios, the sales/scheduling/news operations in commercial capital city, and the presentation and graphics/master control at the station.

The preliminary design according to the broadcast technical requirement was also done by the MTV engineering team, with the intention of giving exposure of state-of-the-art technology to the entire work force involved in operational activities as well. Then the design was developed further with server and automation technology by the selected integration company, Essel Shyam Technologies from India. The automation for ingest and playout was a proprietary application software developed by Essel Shyam called Media-X and could integrate successfully with advanced Omneon Spectrum server technology from Harmonic. Including the HD-ready IconMaster master control switcher, most of the video equipment was from Harris. In addition, the routers were from Nevion, and the glue equipment was from Snell, with more products from other well-known brands such as Sony, Tektronix, Clear-Com, Rane, Junger, Wohler and Tannoy, while selected brands for cable, connector and patch were Belden, Neutrik, Canare and ADC.

With the implementation of the new system, the existing activities have changed significantly to experience the advanced technology not only from the outlook, but also in terms of productivity. From the ingest stage through the final out, and up to the verification of aired items, the entire workflow has been streamlined as a result of the perfect match of the application software with selected server architecture and related products powered by market leaders of broadcast equipment manufacturers. ■

Centralcast

Excellence Award category

Network automation

Submitted by

Myers Information Systems and Evertz Microsystems

Embracing all nine public television stations within the state of New York, and the stations of the New Jersey Public Television (NJTV), Centralcast consolidates broadcast operations into a single hub that maximizes operational efficiency with a minimum of overhead expense. WCNY in Syracuse, the groundbreaking model's lead station, went online in late 2012 from a 3500sq-ft Joint Master Control Operation (JMCO) located within the station's new 57,000sq-ft Broadcast and Education Center. The other station partners, including WCFE (Plattsburgh), WLIW (Garden City), WMHT (Albany), WNED (Buffalo), WNET (New York City), WPBS (Watertown), WSKG (Binghamton) and WXXI (Rochester), plus NJTV and a national PBS specialty programming service, are slated to follow in short order, bringing the total number of program streams to 35.

On the technical side, Centralcast's JMCO incorporates a data-driven, automated workflow solution that reduces risk while increasing flexibility, performance and scalability. The system, which operates with a "monitoring by exception" mindset, notifies the on-duty operator only if a problem develops. It relies heavily on the end-to-end content management and play-to-air automation solutions of Evertz Microsystems, consisting of Mediator (content management and playout automation), OvertureRT LIVE (playout), SuperNAS (storage), MAGNUM (unified facility control)/VUE and VistaLINK (SNMP based network management).

Myers Information Systems' ProTrack TV traffic and scheduling software integrates with the Evertz Mediator software, completing the end-to-end workflow. ProTrack centralizes content acquisition and metadata management, facilitates content sharing among stations, captures content revisions, and tracks media assets across both central and local libraries. Knowing schedule and usage needs, ProTrack ensures that programs and other broadcast content are acquired in-time for air. ProTrack is also instrumental in managing media assets to optimize available storage.

ProTrack, used by virtually all PBS member stations, was initially designed to meet the unique requirements of public broadcasting, and has grown from there. Its scheduling and business management software has long been a key to the success of individual stations. Standardizing all Centralcast stations under a common traffic system creates a unified and streamlined workflow.

The JMCO facility is expected to save some $25 million over 10 years in reduced equipment, operating and maintenance costs. And since the facility can support up to 200 DTV channels, additional revenue may be generated by offering the service to other regional broadcasters. Azzurro Systems Integration is serving as the systems integrator for the JMCO project.

Centralcast represents a new era for Public Broadcasting, one that combines cutting-edge technology with a rational approach to operational efficiency. The innovative endeavor will go a long way toward helping member stations become more self-sufficient, while ensuring the availability of high-quality PBS content to the area's loyal viewing audience for years to come. ■

Design team

WCNY: Robert J Daino, pres. & CEO; John Duffy, sr. VP & COO; Harry Goldberg, VP, tech. ops.; Steve White, dir., tech. sys.
Myers: Crist A. Myers, pres. & CEO; Tracy Carter, CTO; Eugene Diana, software architect; Nancy Carter, dir. of sales & customer relations
Evertz: Tim Murphy, dir. - file based solutions; Spencer Rodd, tech. dir. - Pharos Division; Wesley Thiessen, solutions architect - file based workflows; Rakesh Jalali, sr. staff eng. - file based work flows; Kevin Hellam, VP of global delivery & support
Azzurro: Paul Berg, dir. of tech.; Steve Sabin, sr. proj. mgr.

Technology at work

Evertz: EMS 12-channel MPEG-2 HD/SD ingest; OvertureRT LIVE HD/SD playout with advanced branding; MAGNUM unified facility control; VUE customizable user interface; VistaLINK network management system; Mediator content management and automation; EQX 3G/HD/SD core router; 3480ENC4H264SD quad SD H.264 and MPEG-2 encoder; modular gear signal management, transcoding and monitoring
Myers: ProTrack broadcast management system; Joint Master Control (JMC) configuration; ProTrack JMC automation integration; ProTrack JMC content management

PAC-12 Distribution Center

Excellence Award category

Network automation

Submitted by

Comcast Media Center

Design team

Comcast Media Center: Paul Catterson, sr. dir., broadcast eng.; Greg Forget, sr. mgr., broadcast eng.; Jeff Hagny, mgr., proj. ops.; Rich Rivera, mgr., broadcast sys. integration; William Calton, sr. dir., broadcast ops.; Michael Harrell, dir., distribution eng.; Judy Bandstra, sys. design eng.; Kerry Hart, sys. design eng.; Mike Walker, network eng.; Gregg Browne, mgr., network ops.; Jeremy Harrison, mgr., on-air ops.; Lisa Gallagher, dir., customer solutions; Tiffany Maestas, client svc. mgr.

5280 Broadcast: Tony Roccanova, dir., engineering; Danny Rowland, integration mgr.; Ryan Mattingly, lead tech; Reggie Newlon, lead tech;

PAC-12: Hal Reynolds, sr. VP, technology; Ky Bell, dir. of programming

Technology at work

Avid: Sundance Digital Titan automation
Chyron: ChannelBox
Cisco: Network routers; switches
Dalet: Media asset management
Evertz: EQX routing; MVP multiviewers; EMC master control switchers; 7800 series modular products; Vistalink monitoring and control
Front Porch Digital: DIVArchive
Linear Acoustic: AERO.file
Omneon: Spectrum; MediaGrid
TBC Consoles: IntelliTrac; SmartTrac

On Aug. 15, 2012, 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 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 dictate. 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. This content is 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.

Given the versatility of the operation, there were some unique challenges with the design. The need for geographically diverse control over certain systems (e.g. automation, MAM, signal routers, M&C) required specialized network topology and security measures as well as deliberate user permissions sets to all systems. In addition to the internal system configurations, closely coordinated nomenclature usage, SOP development and exception handling practices were essential.

With seven networks — one national and six regional — PAC-12 wanted to sell unique advertising on each network while airing both common and unique events. To take advantage of this opportunity, yet avoid unnecessary cost, CMC implemented a unique automation system "linking" feature. This feature allows a single operator, from any of the regional live pods, to switch that event across multiple regional networks, even with discrete commercial inventory.

To assist the command and control staff with situational awareness, CMC augmented its award-winning "Heads-Up Display" technology specific to the PAC-12 operation. This feature allows the operators to keep their heads up, focused on programming quality and technical system performance, thus keeping the traditional automation display available for supervisory staff to manage exception handling and other off-normal conditions. ■

Associated Press DSNG vehicles

Excellence Award category

Newsroom technology

Submitted by

Ericsson

In an age where consumers have become used to watching their chosen content — sport, movies or drama — in HD, it is reasonable that they expect that high quality to be replicated across all programming. As such, there is increased demand for HD news and current affairs coverage; consumers want to see breaking stories in the highest picture quality possible.

As a global provider of news, Associated Press (AP) supplies content to half the world's population every day. With the migration of all its news operations to HD, AP is meeting the market demands of its viewers and maintaining the competitive edge by delivering news content as quickly as possible. By creating the best experience possible for its viewers, AP is ensuring that it remains one of the largest and most trusted sources of independent newsgathering for the foreseeable future, and has set a benchmark for others in the industry.

AP worked with a carefully selected set of vendors to facilitate this experience; one vendor highlighted here is Ericsson, who supplied AP with cutting-edge video MPEG-4 compression equipment. The AVP 3000 Voyager DSNG (digital satellite newsgathering) and RX8200 IRD solution have enabled AP to deliver the highest picture quality with efficient use of satellite bandwidth, for its newsgathering and live video services, as well as providing high-quality video links for AP customers. This deployment has allowed AP to compress the HD content, resulting in a greatly improved picture quality with a low data rate, even for those customers still using SD.

Building on 15-plus years technology leadership in mobile television, Ericsson's AVP 3000 Voyager represents the new generation of video acquisition and delivery solutions. It is one of the most advanced DSNG units on the market, offering unprecedented flexibility and usability.

Crucially, as well as enabling HD newsgathering, it offers AP the potential to upgrade to a 1080p50/60 resolution, JPEG2000 format and even extends integration into a 4K (UHDTV) contribution system.

Along with other selected vendors, Ericsson's video compression solutions have enabled AP to be one of the first newsgathering organizations to make the ground-breaking move toward all-HD operation. This migration represents the latest success in the longstanding relationship between Ericsson and AP, who have been working together closely to ensure the infrastructure upgrade runs smoothly. With Ericsson having provided the first generation of MPEG video technology to AP 17 years ago, AP and Ericsson have a firm relationship and long-standing working commitment.

AP's migration to HD was unique, and one of the largest challenges lay in the fact that it was the first in the news industry to go all-HD on a global scale. AP delivers sports, news and entertainment to broadcasters; the final test was to ensure a timely global technology roll-out. This required spending time with its strategic vendors to ensure a global solution was delivered on time and within budget while maintaining year-round, round-the-clock news operation to AP customers. ■

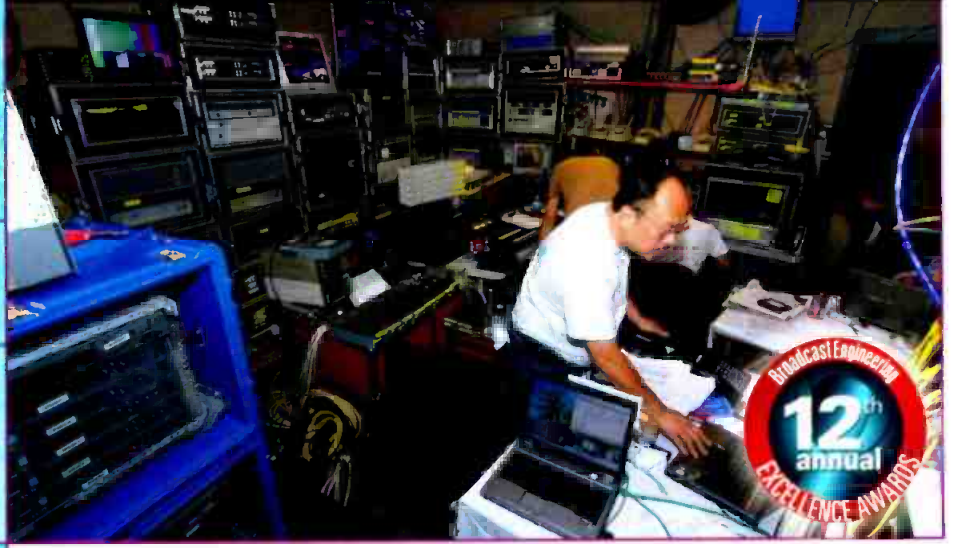
CBS News

Excellence Award category

Newsroom technology

Submitted by

Fujitsu Network Media Solutions



Design team

CBS: Greg Coppa, dir. of advanced tech. and eng.; Mel Olinsky, dir. of ops; Marc Zito, VP of telecom. and data networking

Fujitsu Network Media Solutions: Glen Green, dir. of sales, Americas; Rich Harvey, mgr., prod. mgmt.

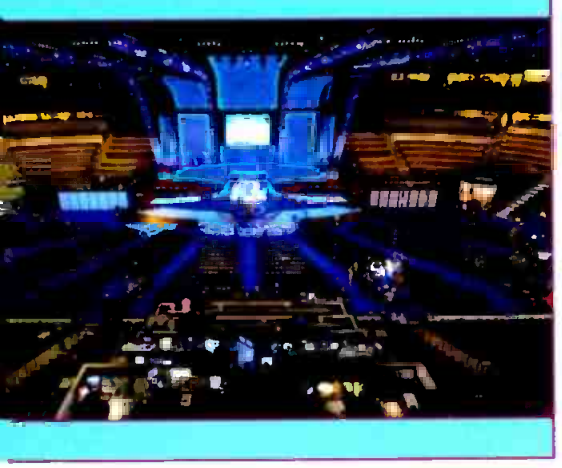
Technology at work

Cisco: Digital Content Manager (DCM) MPEG processor

Fujitsu: IP-9500 H.264 AVC encoders

Sencore: 3187B modular receiver decoders

Sony: XDCAM HD cameras



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

The main objectives of the project were to minimize expenses by leveraging existing and new technologies, while also ensuring an excellent video quality. A key challenge was convincing the company's corporate IT department that CBS News transmissions could utilize existing corporate bandwidth without causing any quality of service issues to the network. Working closely with members of the IT department, CBS News' engineering team experimented with transmitting video and audio over the IP network from different locations such as Los Angeles, Chicago and San Francisco to New York, and evaluated the impact of the transmissions on the network. Ultimately, the testing proved that CBS News transmissions would not impact network bandwidth.

Instrumental to the success of CBS News' new IP-based newsgathering workflow are the Fujitsu IP-9500 H.264 AVC encoders. Several years ago, when CBS News transitioned to HD, it deployed Fujitsu encoders in order to optimize satellite and fiber bandwidth for HD broadcasts. When the network began implementing an IP-based newsgathering workflow, it discovered that the encoders could be used to simultaneously transmit high-quality HD audio and video over fiber, IP and satellite, without requiring additional hardware.

When used as part of the new IP newsgathering workflow, the Fujitsu IP-9500 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. Via powerful error correction and retransmission technology, the encoders protect the integrity of CBS' IP networks by preventing corruption and loss of data. Advanced video compression and transmission technologies ensure a high video quality with very low latency. During large-scale broadcast events, a Cisco Digital Content Manager (DCM) multiplexes the content prior to decoding, further reducing production and manpower costs.

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. CBS News 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 successfully deliver life-saving information to its viewers on the East Coast. ■

KKTV

Excellence Award category

Newsroom technology

Submitted by

TVU Networks

Design team

Gray Television: Jim Ocon, VP of tech.
KKTV: Mark Doan, chief eng.; Christopher Fleming, asst. chief eng.; Louis Santiago, media control center supervisor; Liz Haltiwanger, news dir.; Tim Merritt, former GM

Technology at work

Apantac: LV multiviewer
MRC: Traditional microwave gear
OnCall Communications: IP satellite system
Panasonic: AG-HPX500 P2 camcorder; AJ-HPX2700 P2 camcorder
Rhozet: Carbon coder
Ross Vision: Switcher
Sony: EX3 cameras
Telestream: FlipFactory
TVU Networks: TVUPack 8100 cellular uplink transmitter; TVUPack 3100 receiver
Utah Scientific: UTAH-400 video router
Vizrt: Graphics system
Yamaha: DM1000 audio boards

In 2011, KKTV, a Gray Television-owned and -operated station based in Colorado Springs, CO, redesigned its ENG workflow and processes in order to dramatically increase the station's ability to bring more and higher-quality live shots to its daily broadcasts and be prepared to better cover major events that affect the community.

At the beginning of the project, KKTV was looking for a more flexible, cost-effective way to deliver live shots to viewers without having to rely exclusively on traditional microwave OB vans. Additionally, the station was looking for solutions that could complement its recent HD build-out, and deliver a high-quality HD picture. An internal design team of KKTV and Gray engineers worked closely with consultant Sean Harper of Sharper Enterprise and engineers from TVU Networks and OnCall communications to deploy a network of ultra-mobile ENG units that expanded the station's ENG capabilities by 300 percent.

The upgrade paid off in a big way for KKTV in the summer of 2012, when the Waldo Canyon wildfire devastated Colorado Springs. As the fires raged out of control, KKTV was able to deliver 130 consecutive hours of live coverage of the breaking news surrounding the fire to viewers whose lives were affected by the disaster and were desperate for information. Using the TVUPack 3G/4G mobile uplink solution, KKTV was able to deploy camera operators at a moment's notice to key locations around the city.

With TVUPack, KKTV was able to deliver real-time live video from places inaccessible with a traditional OB van such as delivering live shots behind the fire lines, inside of evacuation zones and from moving vehicles. Throughout the event, KKTV kept five to seven photographers standing by on-scene, giving the station the ablity to go live from multiple locations at once.

As the fire worsened and 3G/4G network conditions deteriorated due to heavy traffic, KKTV deployed mobile satellite systems from OnCall that were integrated with TVUPack and enabled continued broadcasting over the satellite link whenever 3G/4G coverage was unavailable.

The TVUPack moble uplink solution fit seamlessly into KKTV's existing newsroom workflow, which includes a Utah Scientific 400 series video router, a Ross Video Vision switcher with OverDrive automation, a Yamaha DM100 audio board and Apantac LX Multiviewer. Using the Harris ADC-100 automation system, KKTV was able to easily manage personnel shift changes throughout the crisis, enabling the station to seamlessly stay on air for more than five consecutive days.

Using solutions from World Now, KKTV was able to not only broadcast breaking news on air, but also deliver live streaming online to viewers worldwide. KKTV also leveraged apps for mobile devices that enabled viewers to track developments of the fire for as long as broadcasts were on-air.

Executives at KKTV believe that their ability to marry new technology with traditional newsgathering techniques enabled them to deliver powerful live images of the disaster that ultimately helped with the evacuations and saved lives. ■

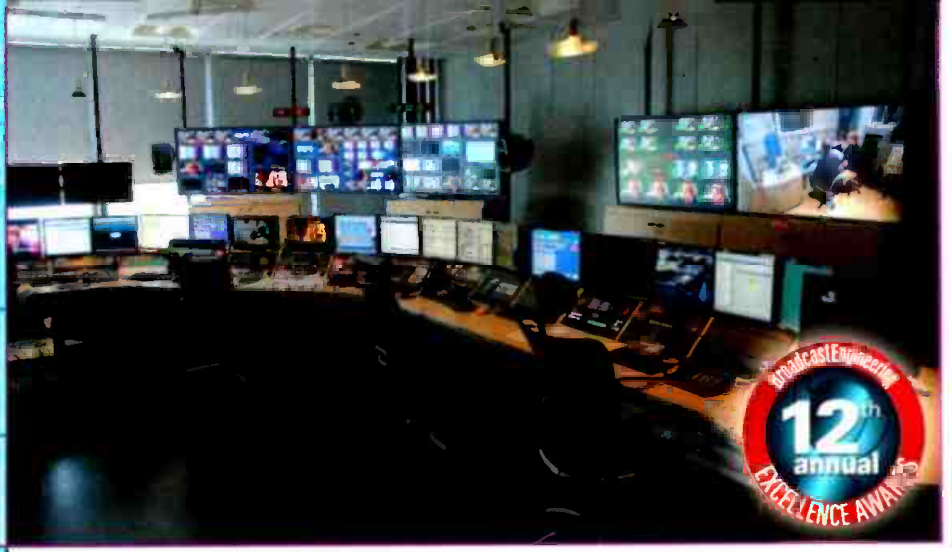
Arte Production and Playout Centre

Excellence Award category

Post & network production facilities

Submitted by

Broadcast Center Europe (BCE)



Design team

Jean Lampach, exec. mgr.; Patrick Bernard, proj. mgr.; Sven Weisen, on-site proj. mgr.; Jean Jungels, workflows and servers; Angelo Rubino, MAM coordination; Frédéric Fievez, Nicolas Serres, storage; Steve Heiles, Jean-Paul Mouris, sys. adm.; Flavio Marredda, audio adm.; Pierre Espen, integration proj. mgr.; Xavier Boschian, networks and IT assets

Technology at work

Avid: PAM – MAM
Avocent: KVM
Axon: Glue – Dolby
Cisco: Nexus switch
Dolby: DP600
EVS: OpenCube
FlipFactory: Pipeline
Genelec: Audio monitoring
IBM: Workflow Engine – Archive
Interra Systems: Baton
Isilon Systems: Storage
Lawo: Audio mixing console
Linear Acoustic: Loudness control
L-S-B: VSM
Minnetonka Audio: Audio file analysis
Miranda: A/V mixer and multiviewer
Ninsight: Subtitling
Omneon: Prod and Diff video server and NAS
Phoenix: GPI mng
Preview: Cabling
Rhozet: Transcoding
Riedel: Live dubbing system
SGT: Automation
Snell: Video mixer – Glue
Studer: Audio router

To guarantee the durability of its activities in Europe, the cultural channel Arte has adapted its site to HD. Arte has also decided to transfer the entire workflow of the company to a file-based environment by adopting the AVC-I@100Mb/s MXF OP1b-wrapped format.

BCE had to play the card of flexibility by ensuring the evolution of the channel without jeopardizing the smooth process of daily operations. The project was thus achieved in two years with, first, the upgrading of the "production" facilities and second, that of the "broadcasting" facilities.

The first step of the project consisted in the implementation of a centralized management system of the production's content (PAM), which deals with material management and filing, including a thesaurus function.

BCE also implemented a centralized ingest platform. Working with many countries and thus juggling with countless formats and content sources, this platform can digitize almost anything and convert videos into Arte's working format. The platform's automation ensures the running of the VTR and OTA signals but also allows the opposite process, i.e. the recording of file content on a tape.

All computer equipment from the editing room and control room (80 clients) has been transferred to the mechanical room in order to decrease noise nuisance in those rooms. Equipped with a KVM system, the rooms are connected with the client through IP. The audio editing rooms are equipped with the Satellite Video System, which facilitates operation by separating audio and video during the exchanges and by gathering them automatically for the final version. The editors can also work with "nonflat" sessions (distinct audio and video tracks) in order to allow an easy integration of additional audio tracks.

The studio manager has direct access to 22 video channels. The audio engineer has access to the main audio router (64,000 channels) and, therefore, to all the sources (signals from the studio, videos, microphones and voices from the translation system). The redundancy of the rooms can be done immediately thanks to the KVM system.

The installation was carried out while the site was in full operation. BCE had to update the technologies without disturbing their users' habits.

The new platform incorporates quality control in terms of audio (conformity with the EBU-R128 loudness standard) and video. The "workflow engine" enables file transfer from a storage location to another.

Working with programs in two languages, Arte now works with content whose audio and video tracks are distinct. Therefore, when a modification is made on the audio, all that has to be done is change the related track without having to recalculate the global file.

The main benefits achieved were:

- Optimization of the workflow.
- Giving up tapes in favor of the file.
- Easy management of the media's audio versions.
- HD at every level from production to broadcasting.
- Facility open to the future supply of new broadcasting vectors. ■

Modern VideoFilm

Excellence Award category

Post & network production facilities

Submitted by

Utah Scientific

Modern VideoFilm is a post-production house with 30 years of credits on countless high-profile television programs and feature films, including "Modern Family," "The Walking Dead," "Avatar" and "Real Steel." Modern VideoFilm employs nearly 500 artists, technicians, engineers and support personnel in four primary facilities in Southern California. It also has a Scottsdale, AZ, operation that is part of the electronic delivery system.

To take advantage of growth opportunities, Modern VideoFilm upgraded its infrastructure in 2011-'12 to expand its file-based capabilities and allow for better geographic coverage. That upgrade included a new 96,000sq-ft facility in Burbank that serves as the company's headquarters and main data center.

Any room in the facility can serve any purpose — from color correction to editorial, image processing to sound — simply by connecting desktops to different equipment and systems. Rooms are connected to the central data room via preterminated fiber and a routing switcher, and all image and sound files are available, by permission. Using the latest technology (which can be upgraded easily), Modern VideoFilm has the flexibility to handle any project.

Because Modern VideoFilm daily handles time-sensitive, file-based material, the new facility had to be extremely reliable. Therefore, the goal was to design an infrastructure with sufficient connectivity and storage because the facility needed to accept and distribute data as fast as clients could provide it.

To do this, Modern VideoFilm installed a UTAH-400/XL routing switcher in a 1056 x 1056 frame. The UTAH-400 is capable of processing embedded audio that Modern VideoFilm distributes around the facility. The UTAH-400 has 3G capability for routing any signal type, and the flexibility to handle multiple standards simultaneously. Compatible with the company's Miranda NVISION digital control system, the UTAH-400 houses all video SDI sources and destinations, which means Modern VideoFilm could forego installing video and audio patch panels — saving money and significantly improving reliability.

Modern VideoFilm also relies on Harmonic's MediaGrid system for production and transport storage because of its architecture (it can be implemented as a single-volume NAS) and performance characteristics (deterministic read-write speeds comparable to most SANs). MediaGrid is used across the IP infrastructure (making system management much easier than with a multivolume fiber-channel SAN), and file fragmentation never compromises performance.

Aside from a tight design-and-build timeline, designers faced a connectivity challenge given the building's size. Copper connectivity wouldn't work because of distance, so a significant fiber infrastructure was built into every room.

Innovations in the LEED Gold-certified building include a custom-built access-control system for maximum security; multiple layers of soundproofing drywall and sophisticated door seals for sound isolation between rooms; and the most efficient chiller system on the market.

Thanks to smart design and choice of equipment, Modern VideoFilm has a flexible, reliable, secure new facility that can thrive in the post-Internet age. ■

Design team

HOK (Architecture Firm): David Leckie, proj. mgr.
HBC (GC): Tom Listerud, proj. mgr.
Studley: Laura Whelan, proj. mgr.
WM Group (Mechanical/Electrical Engineering): Ali Sherafat, pres.
Pinnacle Communications (Facility Wiring): Avo Amirian, CEO
Modern VideoFilm: Alan A. Hart, EVP, eng.; Ray Shantz, VP of eng., content services & TV; Marvin Hall, VP of eng., feature film; Mark Lindey, IT sys.; Bill Womack, sr. eng.; Kim Roberts, dir. corporate svc.; Charley Lux, eng.; Siegfried Heep, chief sys. eng; Eric Benton, audio eng.

Technology at work

ADC: Fiber products
Apple: Servers; desktop computers
Avocent: KVM switches
Brocade: Fibre channel switch (256-port, 16GB)
Chatsworth Products: Racks; cable management
Dell: Servers; desktop computers
EMC: EMC Isilon NAS
Force10 Networks: Ethernet switches
Harmonic: MediaGrid NAS
HP: Servers; desktop computers
Quantum: StorNext SAN
Smardt Chiller: HVAC
Thinklogical: KVM switches
Utah Scientific: UTAH-400/XL 3G SDI routing switcher

NBA Digital Broadcast Operations Center

Excellence Award category

Post & network production facilities

Submitted by

The Systems Group

Design team

NBA: Steve Hellmuth, EVP of ops. and tech.; Mike Rokosa, VP, eng.; Andrew Surfer, dir., dys. eng.; Frank Harvey, dir., tech. svcs.; Takashi Kohiyama, dir., sys. dev., Keith Horstman, VP, dig. media mgmt.

The Systems Group: Paul Rogalinski, sr. proj. mgr.; John Zulick, sr. sys. eng.; Rachel Pomerantz, sys. eng.; Jose Morales, asst. proj. mgr; Matt Marino, int. supr.; Jim Driscoll and Graaf Ali, sys. test engs.

Technology at work

Apple: Final Cut Pro; Xsan
Chyron: HyperX3 graphics
Cisco: Ethernet and Nexus core switches
Crestron: Control system
Harris: Encoders/decoders; ADC automation; NetVX; Nexio servers; NetPlus M400 decoders; X75 frame syncs; Videotek vectorscopes
Miranda: Kaleido multiviewers
Nvision: 576 x 1152 I/O router; 128 x 128 I/O time code router; 256-port control router
Planar: Margay II rear-projection cubes
Ross Video: QMD switcher with Overdrive
RTS/Telex: Intercom
Sony: LUMA, LCD QC monitors
Wheatstone: Bridge Audio MXR/RTR

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 to national and international outlets around the world.

The project — which included a major renovation of a single large floor, with equipment installation completed in October — now features 16 edit rooms, four game rooms, a broadcast operations center, a technical operations center, a digital media management control room, a tape dubbing room, a central machine room, a small Flash studio, graphics and logging areas, audio sweetening, a voiceover booth, and a broadband edit area.

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 is dedicated to serving the NBA International Channel, which handles all master control activities (server playout and channel branding), as well as live-game operations.

The new floor houses all of the NBA's ingest and archiving activities, whereby every game (historical and new) is systematically logged, and appropriate metadata is attached to each clip. The NBA began the process a few years ago to ensure the entire history of the league was digitized and easily accessible. Thousands of hours of game footage dating back to the late 1940s will continue to be archived, digitizing 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.

Each NBA arena across the country has Harris Nexio video servers, which record every camera view and are directly tied (via HSAN) to the facility in Secaucus. The games are encoded as ASI signals at each arena to conserve transmission capacity, and then decoded in Secaucus to turn them back to baseband video for editing and archive. HarrisX75 frame syncs are used to clean up the signals, and then they get reconverted back to ASI before being sent to the HSAN and then transmitted to outside parties via IP.

The new technology facilities and the High-Speed Arena Network were designed leveraging the virtualization capabilities of Cisco's flagship Nexus 7000 series switches and ASR routers in a fully redundant configuration. The bandwidth needs are met with top-of-rack Catalyst series switches and next-gen Cisco ASA firewalls capable of 40Gb/s throughput and 10 million concurrent sessions.

The new facility also offers plenty of room for growth, while supporting the NBA's desire to offer live games and repurpose content to create new types of programs for TV, the Internet and mobile platforms. ■

Pac-12 networks

Excellence Award category

Post & network production facilities

Submitted by

Diversified Systems

Design team

Hal Reynolds, Scott Adametz, Chris Fehring, Michael Harabin
Owner's rep project mgr.: Richard Pancoast of Place Partners
HLW: David Swartz, Keith Hanadel, Steve Burton
Diversified Systems: Marcus Mahan, proj. mgr.; Greg Doyle, lead eng.; John Hartwell, proj. asst.; Mark Sackett, proj. asst.; Andre Ferrer, proj. asst.; Walt Thomas

Technology at work

Calrec Audio: Artemis and Artemis Light
Dalet Digital Media Systems: MAM
DataDirect Network Networks: storage
Evertz: EQX router, 576 x 576
HP: Servers
Nexus: Audio router, 120 x 32 analog, 128 x 304 AES
Ross Video: Carbonite 2/16 (x3)
RTS: ADAM intercom
Sony: HDC-1400 (x4) for main studio; HDCP1 (x3) for secondary studios; MVS7000X switchers
Yamaha: O2R96VCM digital mixers (x3)

The Pac-12 Conference launched a new group of seven sports television networks dedicated to the coverage of sports and other academic interests of the universities within the conference. Diversified Systems was contracted to provide consulting, design and build services in December 2011, to be operational by August 2012. The 70,000sq-ft facility is located in the heart of San Francisco.

The networks feature 24-hour coverage of classic-to-current Pac-12 sports, including Olympic sports. In its first year alone, the network plans to deliver 550 live sports events. To do this, the conference provides fiber connectivity between the Pac-12's schools and its San Francisco studio. Up to seven simultaneous live feeds will be centralized and provided to the linear or digital networks.

The timeframe given to all parties was unusually short, at just over seven months, and needed to be ready for the beginning of the conference Fall 2012 football schedule. This is a little less than half of what would typically be planned. Since the same schedule applied to the general contractor, it meant the systems integrator (Diversified) would be installing equipment while the contractor was still putting up walls.

The studio is located on the second floor of the building. To obtain optimal studio height, the slab at the third floor was cut out and additional reinforcement added back into the building to carry the load outward from the open area. The structural engineer devised a plan of gluing fiber reinforcement to the floor at intervals below the studio floor to carry the load. Similar reinforcement was added to heavy load areas in the CER.

The CER uses hot-aisle containment and in-row cooling. Cooling equipment consists of multiple small units by APC, integrated into each row of racks, rather than the typical large CRAC units pumping air into the entire environment. Local circuit breakers at each rack are used rather than a centralized breaker panel. This allows for any voltage/amperage needed directly at each rack.

Diversified built the infrastructure as a 3G backbone, including cabling and much of the "glue" equipment. Choosing a single manufacturer — Evertz — for router, multiviewer, tally and "glue" allowed the use of a single control network (VistaLink) over much of the technical domain.

Aside from the aggressive launch schedule, with the amount of quick turnaround of broadcasts and post-produced events, a fully file-based mode of operation was necessary to meet this schedule. Production is automated using Dalet Sports with Data Direct Networks as the tier-1 and tier-2 storage platform. Dalet was chosen for its ability (and willingness) to match the needs of the client. Leon Schweir, SVP of productions and operations at Pac-12 Enterprises, said, "There are other great products out there that are good at the MAM, or they are good at the server-based part, but the editing part falls off to some other vendor, or they don't have the interface for logging. So, for us, we have a system in Dalet that covers everything from start to finish."

Wednesday, Aug. 15, 2012, saw the successful launch of the network, promptly (as promised) at 6 p.m. PDT. ■

Time Warner Cable SportsNet

Excellence Award category

Post & network production facilities

Submitted by

Diversified Systems

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Design team

Time Warner Cable-Sports: Mark Coleman, VP, ops.; Andy Murphy, sr. dir., eng. and ops.
Gensler Associates: John Wiedner , sr. assoc.; Matthew Lunn, assoc.; Katie Buchanan, assoc.; James Lee, assoc.
Diversified Systems: Darrell Lew, sr. proj. mgr.; Todd Pekala, sr. sys. eng.; Greg Doyle, sr. sys. eng.; TJ Kortlever, sys. eng.; Andre Ferrer, sys. eng.; Mark Sackett, sys. eng.; Larsen Cottrell, installation supervisor

Technology at work

Apple: Mac Pro, Final Cut Pro 7
Autoscript: Teleprompter system
AVCOM: Spectrum analyzer
Avocent: KVM system
Bosch/RTS: ADAM intercom system
Calrec: Artemis Light audio consoles
Cambotics: Camera robotics
Canon: HJ17ex7.6B lens
Chyron: HyperX two-channel CG
Dalet: Media asset management
DDN: Server system
Evertz: VIP-X; EQX ; EMS; Mediator
EVS: Production management system
Genelec: Room speakers
Harris: VTM-2400 rasterizer
Lectrosonics: Wireless antenna sys.
Miranda: Converters
Samsung: 55in LED displays
SMT: Sports ticker system
Sony: HDC-1500R; MVS-8000; OLED displays; HDW-D1800; PDW-F1600
Spectra Logic: T950 tape archive
Strand Lighting: Consoles
360 Systems: Instant Replay
Telos: Nx-12 telephone hybrid
Wohler: Audio monitor panels
Volicon: Observer monitoring system

Time Warner Cable (TWC) has ventured into a new business service by creating a regional sports network in a major market. The new entity is Time Warner Cable SportsNet. This facility supporting the Los Angeles and the greater Southern California market is located in El Segundo, CA. TWC SportsNet has obtained the broadcast rights for the next 20 years for Los Angeles Lakers basketball. TWC SportsNet also has 10-year broadcast rights for Los Angeles Galaxy soccer starting in 2014.

To showcase the games, TWC launched two regional sports networks in HD, including the nation's first Spanish-language regional sports network, with state-of-the-art facilities to bring fans compelling Lakers content using the latest technology. They will be available to all satellite, cable and telco distributors in the Lakers' territory, which includes all of Southern California, Nevada and Hawaii.

The networks include a number of elements custom-designed for Lakers fans, including a single destination where Lakers fans can find all locally televised home and away games, and a variety of new and original Lakers' content featuring behind-the-scenes, personality and classic programming.

In addition, the Spanish-language channel is a stand-alone RSN with its own dedicated production of game telecasts and other unique content tailored to Spanish-speaking Lakers fans — not an SAP feed.

There are three network channels originating from the facility: TWC SportsNet, TWC Deportes and a second English-language regional network. The design concept was to build two studios with two separate production control spaces, each supporting English- and Spanish-language channels respectively, with their own individual program and content requirements. The facility has three major studios with architectural infrastructure for three production support spaces.

The technical and production spaces are housed in a 40,000sq-ft industrial space. There is an adjacent 25,000sq-ft building for executive and administrative staffing. The production building was a vacant, empty shell in July 2011. Diversified collaborated with Gensler and Associates architectural firm to lay out the studios and technical spaces with adjacency and physical workflow considerations. During the architectural programming, schematic and design development phases of the project, Diversified Systems contributed A&E criteria to the project's mechanical and electrical consultants, all the while working to provide detailed systems design and implementation services.

Because the team had but 14 months to turn an empty shell into a working facility, each shareholder recognized the need for constant collaboration, communication and coordination. Applying those three C's, the project team did not experience any difficulties during the design/build. The only constraint was keeping the project within budget, but value-engineering from the start allowed the team to adjust to the realities of cost without affecting performance.

Using the experience of Diversified's project managers and engineering staff guaranteed close integration of the various manufacturers and equipment vendors. Integration, commissioning and training were well-organized and provided a seamless process to the customer. ■

West Works Studios

Excellence Award category

Post & network production facilities

Submitted by

Comcast Media Center

Design team

West Works Studios at Comcast Media Center: Paul Catterson, sr. dir.; Robert Baker, mgr. of eng.; Todd Smoots, mgr. of ops.; Judy Bandstra, prod. eng.; Kerry Hart, prod. eng.; Tom Wise, prod. eng.
Avid: Bruce Jones, Rich Griffin
Wise Guyz Global Integration: Bruce Harvey

Technology at work

Avid: ISIS 7000; Interplay PAM version 2.5; Symphony 6.0 with Nitris DX hardware; AirSpeed classic with DNxchange

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 to ensure West Works Studios could continue to output the high-quality product that customers were accustomed to, while also becoming more competitive in the national marketplace.

First, the legacy edit rooms were relocated in order to position them closer to the facility's main entrance and client services such as the commissary, conference rooms and business offices. The move provided an additional benefit as the rooms had previously served as an audio post-production operation and were optimized for audio sweetening, music composition and voice-overs, with lounge-like comfort. Two of the edit suites were constructed as multi-function edit (video and audio edit) using ProTools systems, each with a look into the 200sq-ft "quiet room" — a floating floor, mechanically-isolated space.

Though the environment was now more comfortable, the heart of the system delivered the biggest impact to the space's upgrade. An Avid Isis 7000 system (running Interplay 2.5, Symphony 6.0 and four multichannel Airspeeds) was provisioned to allow direct-to-disc ingest and edit-on-the-fly in a newsroom-style capture-and-edit workflow.

Because West Works Studios provides a large quantity of B2B services to organizations outside of Comcast, resource availability and scheduling can be the largest challenge. With the enterprise-level 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. Those issues have all but vanished.

But, the success is reflected in the volume of work being performed. Within two weeks of the finished installation, West Works Studios began performing the weekend capture and edit of every Southeastern Conference football game for the CSS regional sports network. These packages are acquired via occasional satellite or fiber feeds, captured to AirSpeed, stored in ISIS and edited on Symphony — all managed in real-time under the Interplay Production Asset Management umbrella. ■

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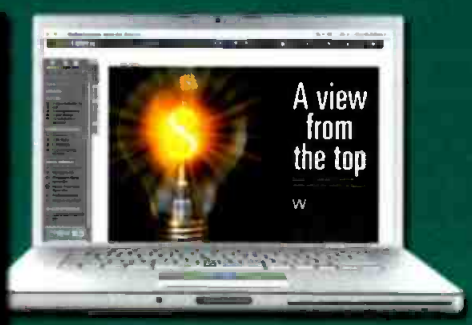

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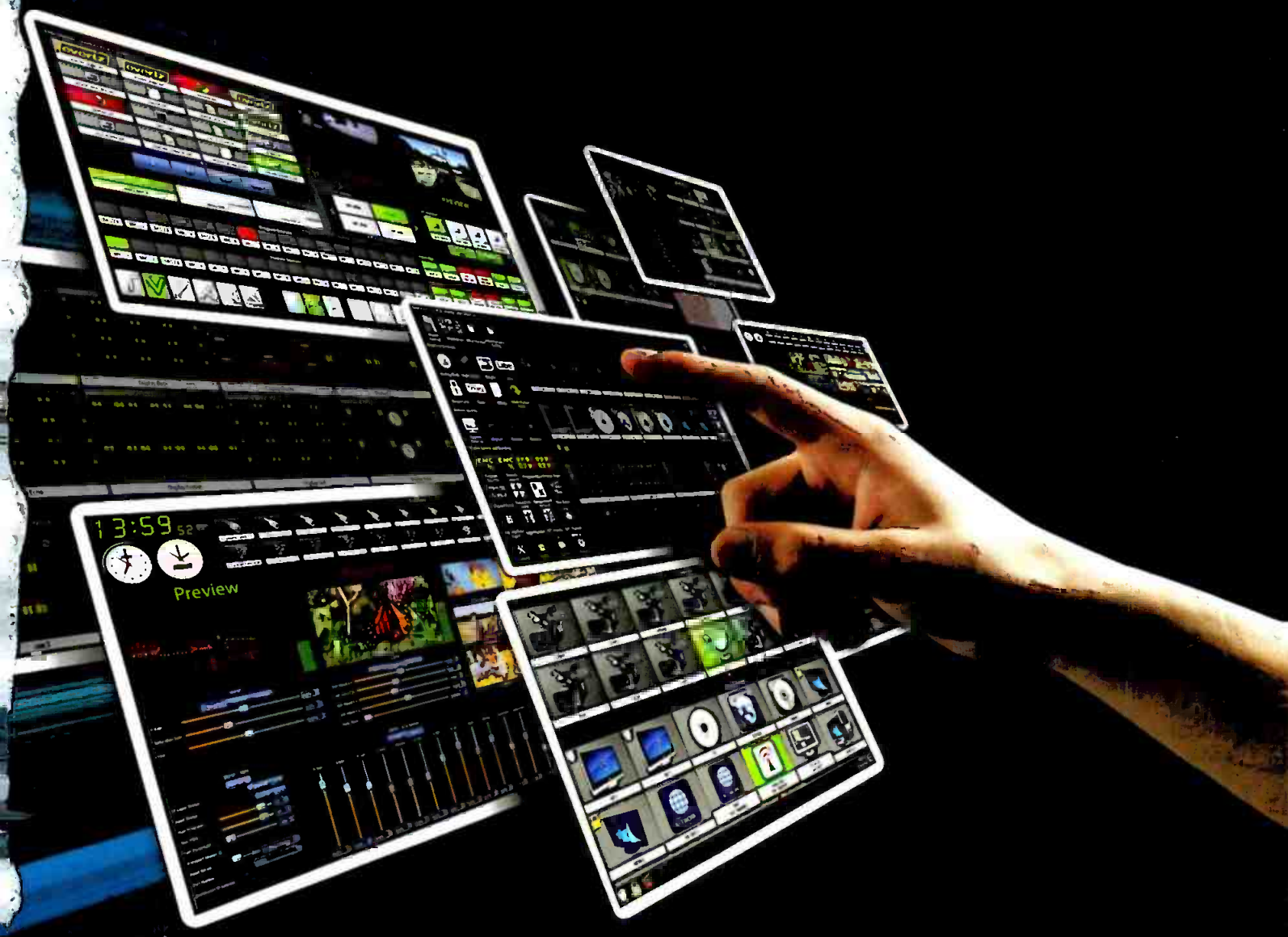

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PLAYBOX TECHNOLOGY

From a Single Channel Playout Server to a Multi Channel Turnkey Broadcast Centre

It's All in a PlayBox

- **Single and Multi Channel Playout Automation with interactive CG and Graphics**
- **Traffic Management • Media Asset Management and Archive • Newsroom System**
- **Remote Redundant Playout • Ad Insertion and DPI • Time Shift**
- **IPTV and Internet TV Solutions**
- **Available in HD / SD and DVB (ASI/IP)**

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