

The BroadcastEngineering

DigitalReferenceGuide

A supplement to *Broadcast Engineering* magazine - DECEMBER 2006



The **best**
resource to find
solutions for
your next project

D-12: Compact Enough for OB Powerful Enough for Breaking News



*The D-12
Digital Audio
Control Surface*

- mixing router based topology
- 5.1 surround sound plus 3 stereo masters
- COMPACT – 32 faders – 53" wide/32" deep/9" high
- router based source / destination selection
- paging channel strips – 64 channels on 32 faders
- scalable – up to 64 input faders
- routable mixes
- event storage and recall
- eight stereo subgroup mixes
- eight stereo sends
- eight mix-minus outputs (can be expanded)
- four DCM faders (digitally controlled groups)
- Bus-Minus (w/TB & solo) on every input (direct out)
- pan/bal, blend, mode, EQ/dynamics on every input
- delay inputs or outputs (frames or milliseconds)
- fullscale digital peak and VU metering
- two studios, CR and HDPN/Studio 3 monitors
- talkback communication (programmable)
- mix follows talent / logic follows source
- 12 user-programmable switches (comm, salvos, triggers, etc.)
- automatic failsafe DSP card option
- automatic failsafe CPU card option
- redundant power supply option
- switched meters with system wide access (including all console inputs and outputs)
- dedicated master, group and DCM faders (no fader sharing)
- motorized faders
- pageable fader option
- dedicated LCD display per function (EQ, Pan, Dynamics)
- multiple surfaces can share I/O

With thousands of digital consoles installed, trust Wheatstone for your next project!

THE DIGITAL AUDIO LEADER

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THE BEST RESOURCE TO FIND SOLUTIONS FOR YOUR NEXT PROJECT

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* Web site. 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 ...

The *Broadcast Engineering* Excellence Awards have become the hit of the industry as stations, networks, vendors and systems integrators all vie for top honors. This year is no exception, with a record-breaking 50 entrants — all wanting to be picked as the top facility in their category!

Read, vote and win a *Broadcast Engineering* T-shirt!

After reading the entries, go to the *Broadcast Engineering* Web site, and click on the Excellence Awards button. You will be taken to the voting page. Select one entry from each category as your favorite. Provide your e-mail address to be entered in a drawing for T-shirts. Your e-mail address will only be used for that purpose.

Complete your voting by Feb. 1, 2007. The winners of the Excellence Awards will be announced in the March pre-NAB issue.

Brad Dick

Brad Dick
Editorial Director

READ VOTE WIN



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

See page 63 for this year's entries, and look for the March NAB issue to find out who the winners are!



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MULTI-IMAGE + ROUTER



Multi-room, multi-image processor + router

That's right, a multi-room, multi-image display processor and router in a single, expandable chassis. As a multi-image processor, **Kaleido-X** offers the highest level of signal flexibility. Each chassis can display 96 HD, SD or Analog inputs any number of times, in any size, across 8 displays of any resolution

and orientation. As a router, it offers switching of 96 unprocessed inputs to 48 HD/SD outputs for feeding monitors, test equipment and master control or production switchers. So if you're looking for the most flexible, most integrated monitoring and routing solution, call Miranda.

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FOR THE CHANGING FACE OF TELEVISION



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Wireless Innovations.

Sony has a history of breakthroughs in wireless microphones, including the origination of synthesized UHF technology. Our newest models continue to lead the way. The WRR-862B camcorder-mounted receiver simplifies field production with two channels of reception. The MB-X6 tuner rack streamlines multi-channel sound with six channels in a single rack unit. The sleek WRT-88 body pack lets you choose high power for maximum distance or low power for maximum battery life. Sony's 800 Series also features diversity reception, legendary build quality and an expanded range of channels to help you navigate an increasingly crowded broadcast band. Outstanding simplicity and agility... that's wireless innovation.

Discover wireless innovation at www.sony.com/proaudio.

SONY

PRO AUDIO



THE NEW WAY OF BUSINESSSM

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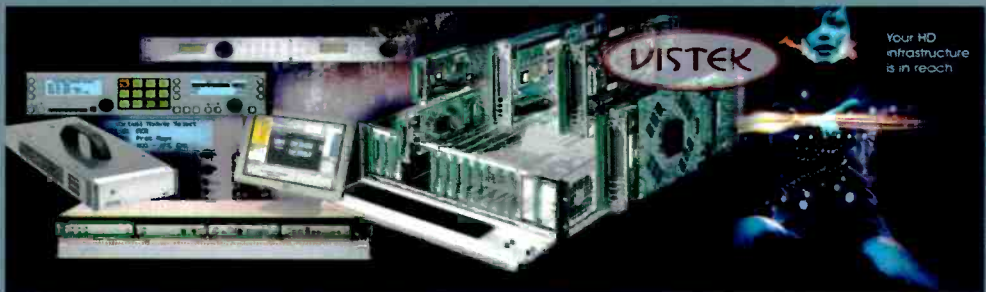
Master Control

Control & Monitoring

Routing

Router Control

Modular Infrastructure



Engineering The Broadcast Future

Pro-Bel will shortly enter its 30th anniversary year...but this is no time to dwell on the past.

Powered by one of the most remarkable recent growth records in the industry, Pro-Bel will enter 2007 with its traditional values of reliability, integrity and innovation intact and with an exciting range of ground-breaking new products due to be launched during the year.

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Weircliffe
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AUDIO ACCESSORIES

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Bittree
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COMTEK
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D.W. Electrochemicals
905-508-7500

EDCOR Electronics
505-887-6790

Martinsound
626-281-3555

NKK Switches
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SmartSound Software
818-920-9122

TRUE Systems
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Dolby Laboratories
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Neural Audio
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Orban/CRL
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AUDIO PATCH PANELS

ADC Telecom
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Audio Accessories
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Gepco Int'l
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Signal Transport
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Whirlwind
585-663-8820

HEADPHONES

Audio-Technica U.S.
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HM Electronics
858-646-8818

Telex Communications
818-566-6700

SPEAKERS

Azden
516-328-7500

Behringer USA
425-672-0816

Hosa Technology
714-522-8878

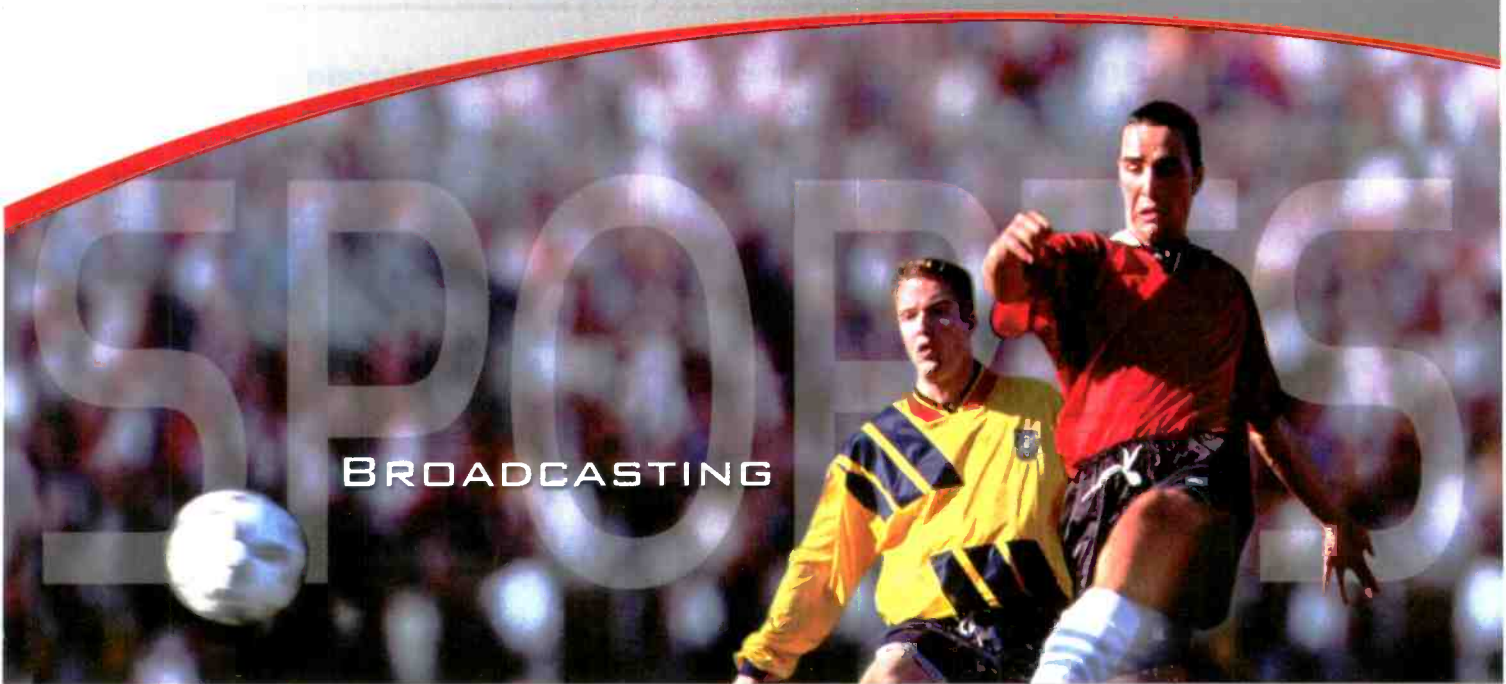
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Grass Valley
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Harrison by GLW
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Lectrosonics
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Sound Devices
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TAI AUDIO
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Zaxcom
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+4995454400

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818-920-3212

Wheatstone
252-638-7000

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Neural Audio
425-814-3200

Orban/CRL
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408-867-6519

Rane
425-355-6000

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Soundfield USA
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TRUE Systems
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AUDIO RECORDING

AUDIO PLAYBACK DEVICES

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Enco Systems
248-827-4440

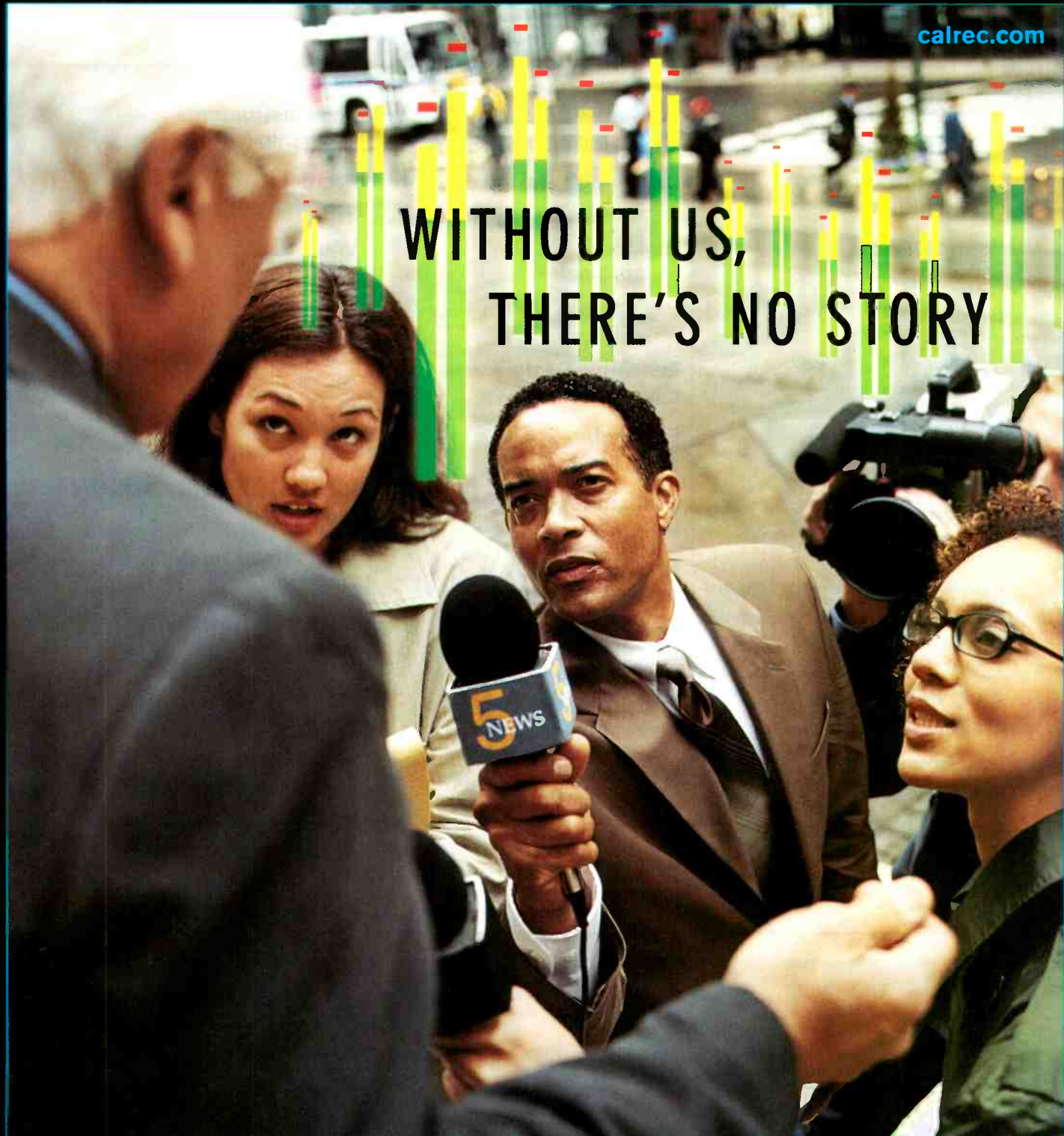
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Blackmagic Design

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Blackmagic Design

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Digigram

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Symetrix Audio
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Video Accessory
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Opticomm
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Sierra Video Systems
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Wheatstone
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WE CHANGED THE WAY YOU WILL THINK ABOUT ROUTING AUDIO FOREVER

Distributed Thinking, One Solution

The Cheetah DRS, PESA's newest multi-format audio router, uses patent pending distribution technology to route audio over Gigabit Ethernet with either a single CAT-5 or Fiber cable for multi-frame connectivity. This creates a Distributed Routing System (DRS) scalable from 64X64 (occupying 1RU frame in one location) up to 2048X2048 (in 36RU of space in one or many locations).

Cheetah DRS allows broadcasters to place input frames in equipment racks near satellite ingest from receivers, VTRs, or servers, while placing output frames closer to studio gear for distribution into audio consoles, or master control. This keeps cable runs extremely short, preserves signal quality and reduces cable costs, time of installation and maintenance. Additional inputs or outputs can be added by changing cards or increasing frames in any location. Format flexibility in the Cheetah DRS allows a mix of AES and Analog, Synchronous and Asynchronous audio, with support for Dolby-E.

Simple, Fast, Reliable

Cheetah DRS frames supports redundant power, redundant control, and quick access front-loadable, hot-swappable matrix cards.

Versatile Connectivity

Frames are available with a wide variety of interconnect options. Choose from BNCs for 75 ohm AES, as well as ELCO or DB-50 connectors for analog audio or timecode. RJ-45 connectors are used for optional RS-422 machine control. A 6-pin terminal strip version is also available.

The Clear Path for Clean Audio Distribution: www.pesa.com/drs



Cheetah DRS



Winner of
TV Technology's
2006 STAR Award



Winner of
Television Broadcast's
2006 Top
Innovation Award



24 Woodbine Ave • Suite 16
Northport, NY, USA 11768
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www.pesa.com



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202-736-1100

Autocue Systems
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Baystor
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Blueline Technology
972-353-2583

Cinegy
202-742-2736

Crispin
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Dalet Digital Media Systems
212-825-3322

Dayang Int'l
+65 647 2822

Editware
530-477-4300

Flash Technology, a division of Dielectric
615-503-2000

Floral Systems
352-372-8326

Front Porch Digital
303-440-7930

Grass Valley
530-478-3000

Harris
513-459-3400; 800-231-9673

IBIS
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Imagine Products
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Masstech Group
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MicroFirst
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Pebble Beach Systems
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Pharos Communications
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Pro-Bel
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Software Generation (SGL)
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No-fee 24/7 support for your automation software.

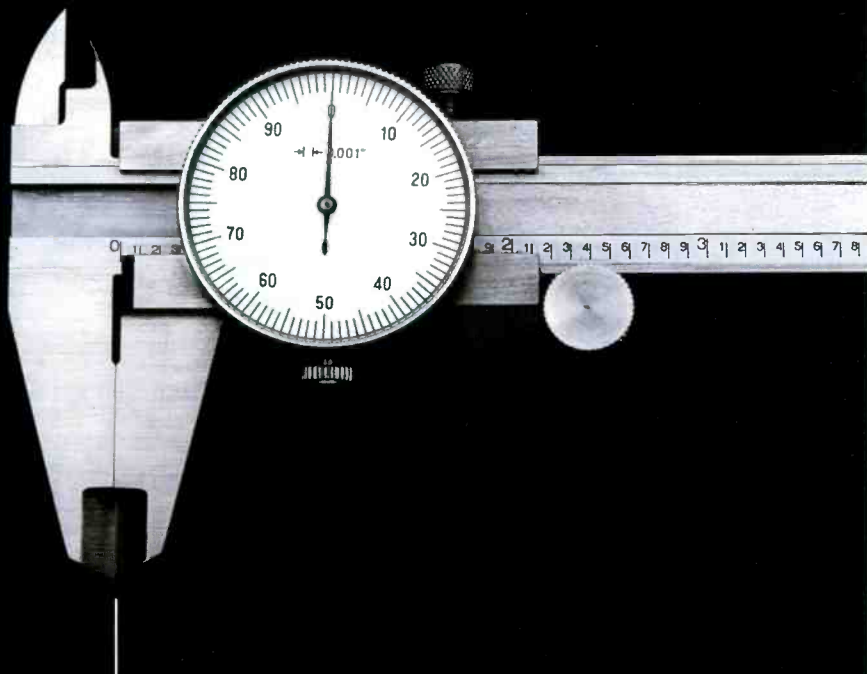


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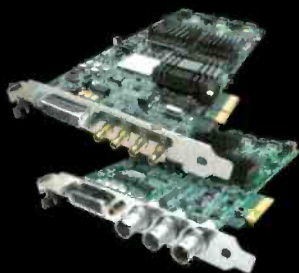
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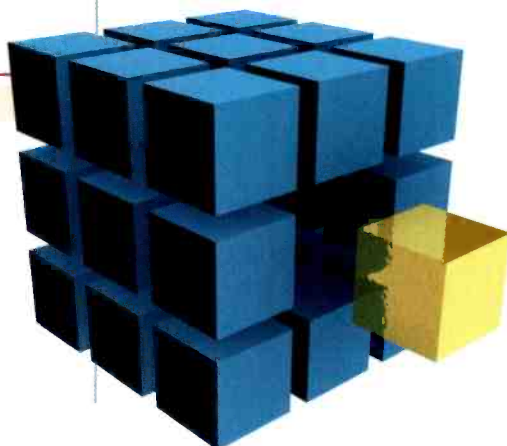
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703-550-5800



Crispin

919-845-7744



Crispin 4 Life The question isn't why we're offering no-fee support. The question is, why isn't everyone else? Introducing Crispin 4 Life. No-fee 24/7 support for your automation software. For more information, please visit our 2006 news release library, www.crispincorp.com/news.html.

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The NEXUS is the ideal digital television automation solution for local broadcast, cable, and private in-house operations. The NEXUS provides multi-channel digital video playback and recording, digital messaging/signage, DVD/VCR machine control, and video/audio signal routing. The NEXUS operates as a stand-alone device and is managed via network using provided WinNEXUS software.

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Sundance Digital

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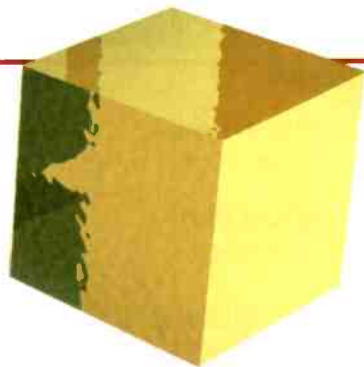
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1080i / 50, 59.94, 60 Hz
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14-bit
On/Off, Two-Variable User Adjustable
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Sync on YIG or YPrPb/RGB
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Two Single-Link 4:2:2
or Dual-Link 4:4:4 (RGB) or YPrPb
or Dual-Link 4:2:2 (1080p50/59.94/60)
DVI (Digital or Analog)
Genlock: 8V, 4:2:2, 4:4:4
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12V DC, 300mA
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Controller: 3.5 lbs (1.6 kg)

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Multi-Format:

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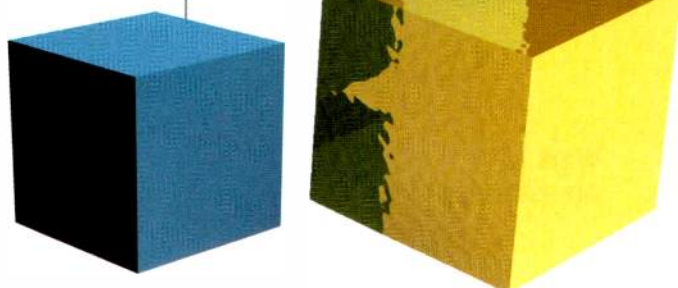
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**Video Design Software**

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WCInteractive

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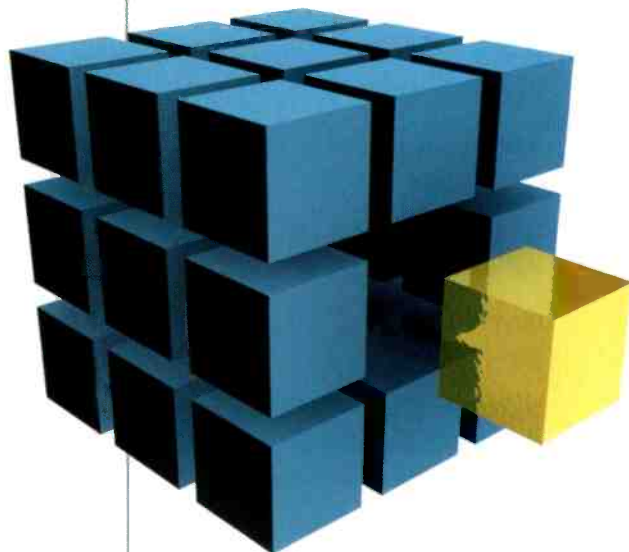
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ARRI

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SeriesONE fixtures Developed to harmonize with today's digital cameras, Brightline's SeriesONE fluorescent studio fixtures feature compact, 55-W advanced-phosphor lamps and a range of dimming-control options including phase, DMX, and DALI, with linear dimming to 1%. Compared with incandescent sources, energy-efficient Brightline systems offer substantially lower power consumption and heat generation and much longer lamp life.

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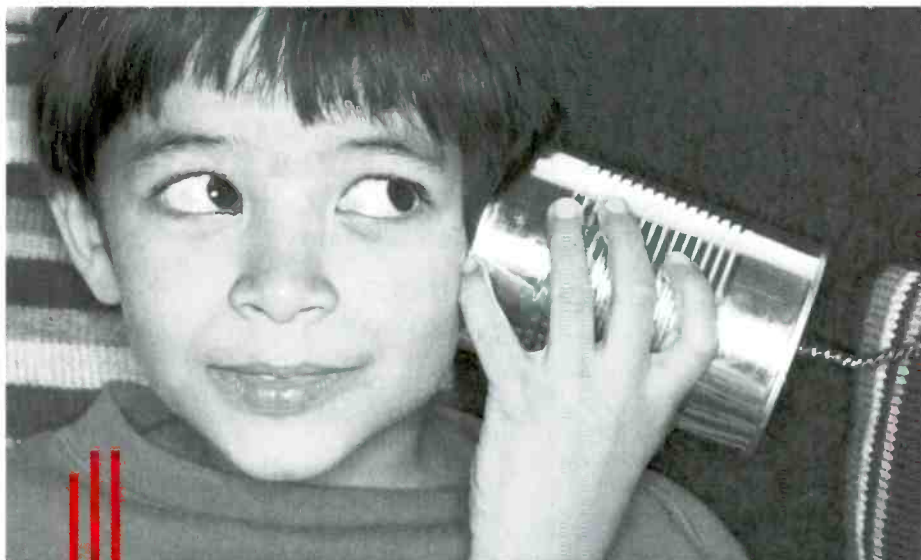
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Soundfield USA

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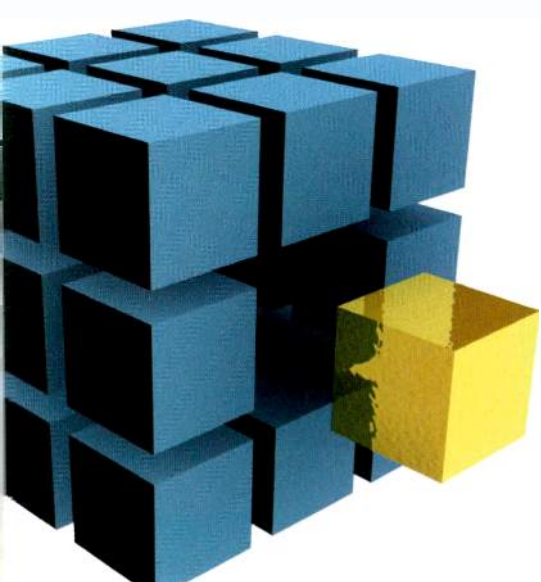
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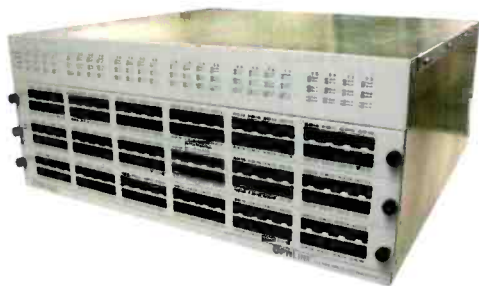
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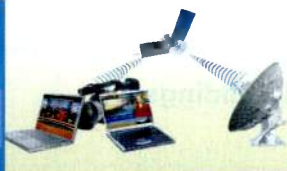
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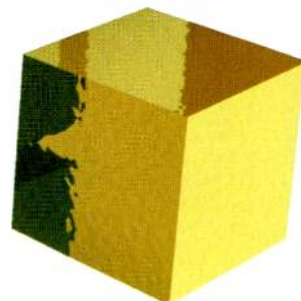
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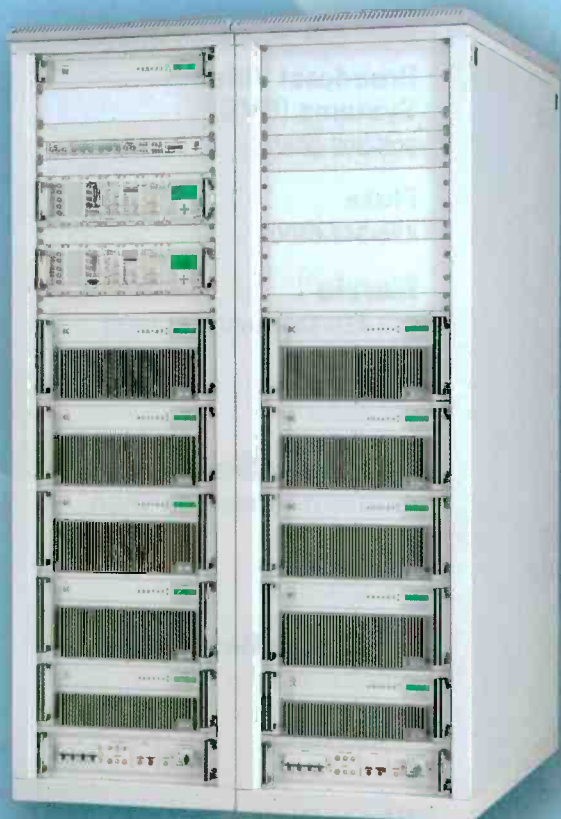
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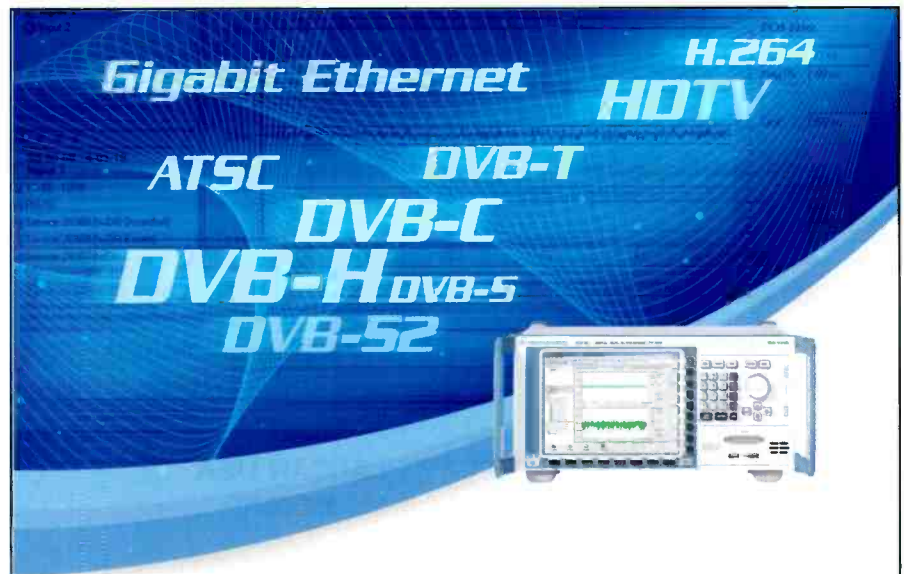
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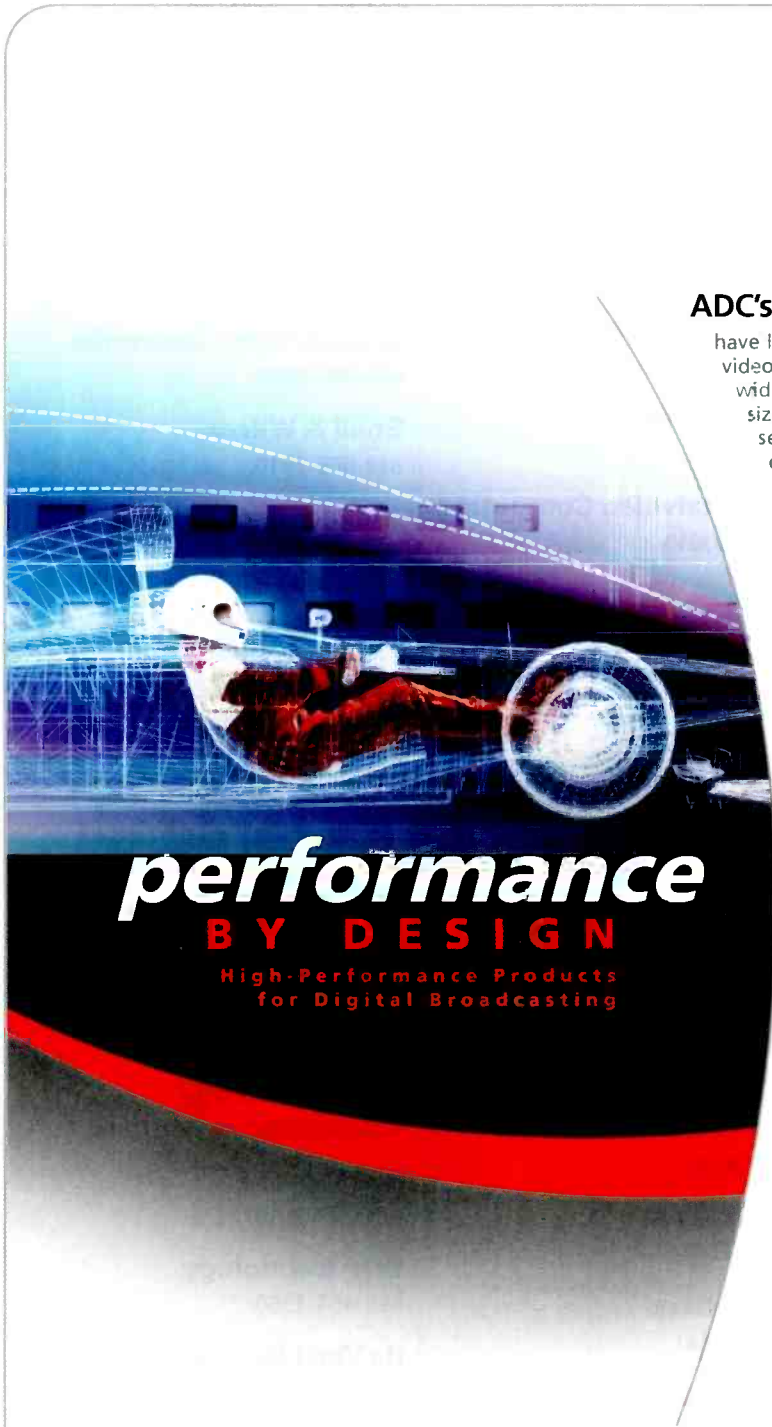
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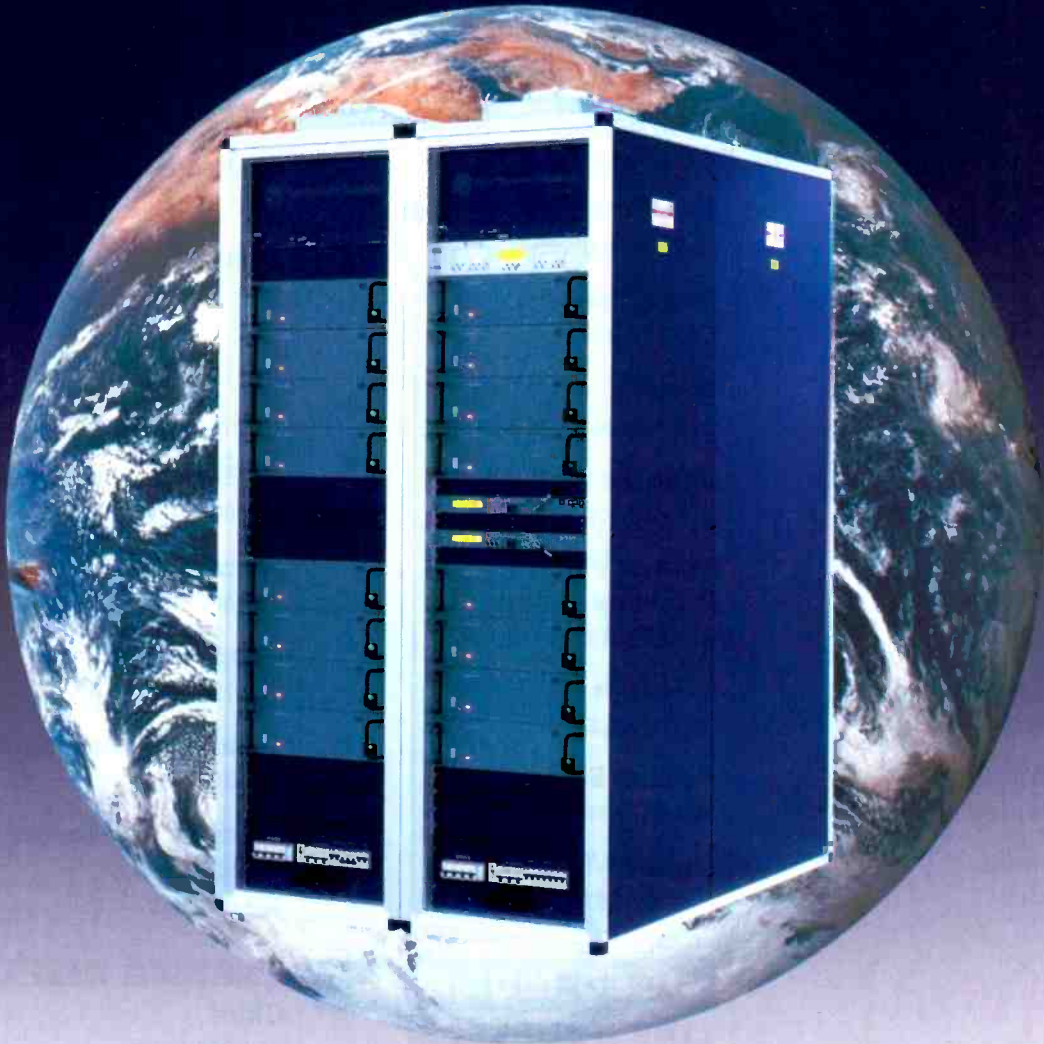
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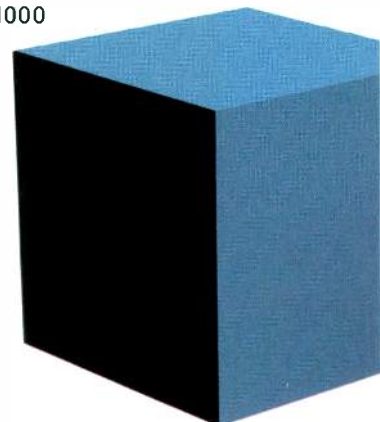
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Crispin

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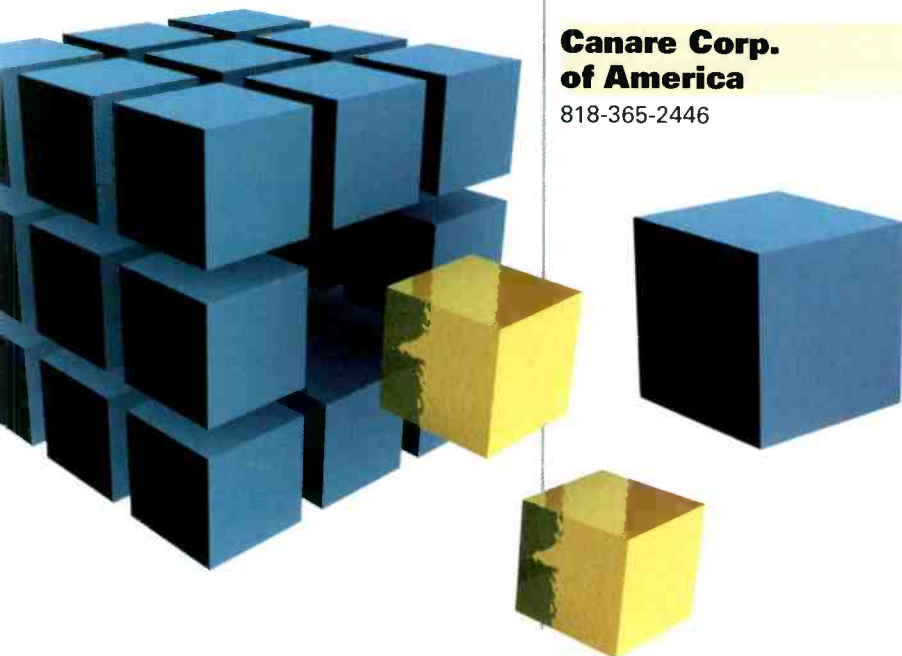
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If you would like to be entered into a drawing for one of the 20 *Broadcast Engineering* T-shirts, provide your e-mail address when you vote. It will only be used to notify winners. T-shirts will be mailed shortly after the winners are selected. Votes must be entered by Feb. 1, 2007. The winning facilities will be announced in the March 2007 issue of *Broadcast Engineering* and will receive their plaques at the 2007 NAB convention.

Brad Dick

Brad Dick
Editorial Director



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Romanian broadcaster Boom builds new digital satellite facility



Romanian DTH broadcaster Boom contracted UK-based systems integrator TSL to design and build a new digital satellite facility. The facility now plays host to 10 originated channels with commercials and 31 pass-through channels, and has the capability to expand channel capacity. A new infrastructure provides a package of 24/7 channels with pay-per-view and interactive services. It reaches 7.1 million households and is broadcast in Romanian.

With a budget of less than \$2.5 million, TSL devised a turnkey solution based on Pebble Beach System's Neptune automation. The Neptune controls the entire facility and is integrated with a SeaChange Broadcast Media Library (BML). For other parts of the workflow, Neptune also acts a mini media asset management system and data mover, allowing simple direct media transfers between the server and a Sony PetaSite S-series data archive library.

The Neptune enables operators to ingest media to the server from videotape frame accurately. The media is then quality checked, and if it's needed for playout, it remains on the server; if not, it is archived to data tape in the archive library. Neptune controls the robot and SAIT tape drives in the PetaSite directly to recover media back to the server when needed for playout without using an intermediate disk cache or third-party middleware.

A TransCast DVB/Isis system from Starfish Technologies provides subtitling. Each Isis subtitle authoring workstation has access to the browse video and subtitle databases and can work independently or collaboratively. Boom operators can open the video clips and — working in a WYSIWIG environment — create a set of subtitles to accompany the media. Or operators can import external subtitles and perform final finishing prior to transmission. Subtitles are stored on a central server, and once the project is completed, a transmission file is prepared.

During transmission, Neptune instructs the TransCast to load the required subtitle file. Then, the subtitle playout is controlled by the VITC embedded in the video being played out. Subtitles are passed to the compression systems as IP data rather than ASI. The TransCast units need to compensate for the encoding delay, so each receives a feed of the compression system ASI output to extract the necessary PCR clock data.

The technical infrastructure is based around Harris Leitch Integrator Gold wideband digital routing switchers and a Videotek SQM system. A single monitor per channel display system provides better resilience and a substantial playout gallery. The system includes a flat aluminium monitor wall with Videotek video inserters displaying the audio metering and the UMD for each channel. ■



Category

New studio technology
— station

Submitted by

TSL

Design team

TSL: Russell Grute, head of sales

Boom: Adrian Velicescu, VP

Pebble Beach Systems: Phil Moore, proj. mgr.

Technology at work

Harris Leitch

Integrator Gold digital routing switchers

Pebble Beach Neptune automation

Sony PetaSite data tape archive

Starfish TransCast/Isis authoring and IP-based subtitling insertion

SeaChange Broadcast Media Library

TSL

T-series AMUT-2MD

S-series SLS-2

speaker unit

Videotek SQM system



Comcast SportsNet Mid-Atlantic's facility expands live production capabilities

Category

New studio technology
— station

Submitted by

Harris

Design team

Barbizon Lighting:

Bill Capps

Beck Associates:

Paul Kast, dir. of eng.

Comcast SportsNet Mid-

Atlantic: Steve Weber,
dir. of eng., NE office; Eric
Swartz, chief eng.

Harris: Richard Cooper,
regional sales mgr.; Bill
Apker, product support
specialist, newsroom sys.

Technology at work

Avid iNEWS

Crispin RapidPlayX 2000
automation

Harris

NEXIO server system

NEXIO MOS Playlist
Manager

NEXIO Pilot control

NEXIO NewsFlash

editors

6800+ and NEO modular
interface products

NVISION

NV5128 HD MC

NV8256 SDI router

with embedded audio

NV5128 analog video
and audio router

Sony

DXCD50 cameras,

DVS9000 switcher,

HDWS2000 HDCAM

VTRs

SDM, LMD and FWD
series monitors



Comcast SportsNet Mid-Atlantic in Bethesda, MD, is a 24-hour cable sports network. Systems integrator Beck Associates helped design, integrate and install all equipment and consoles in the network's new origination facility, which is almost double the size of the previous one. The new facility includes a studio, a central equipment room with more than 50 racks, five master control rooms, a production control room, three post-production editing rooms, a news content playback room and nine editing suites.

The facility needed to provide greater flexibility in program distribution, while improving the quality of service to viewers; expand live production capability and allow for a seamless transition to HD in the near future; and help Comcast SportsNet go tapeless.

The new system is wideband digital at its core. Harris' NEXIO server system provides storage, editing and playout of news content. The server offers extensive third-party integration and open standards for a high degree of interoperability.

Servers play out program material in SD and HD. Program content is brought in via fiber or satellite and played directly to air or recorded on SD or HD NEXIO servers for later playback. News content is also acquired via satellite or fiber. Material is ingested into the server in SD, edited on Harris NewsFlash

high-res craft and news editors and stored on NEXIO.

NewsFlash eliminates the need to wait for transfers, dubs or field tapes. NEXIO can play out NewsFlash clips as soon as they begin copying to disk. Working in conjunction with Avid iNEWS, content is played back to air using Harris' MOS Playlist Manager. NEXIO Pilot controls and monitors. HD master control helps produce HD programming.

Networking is key in the new facility. Most devices can communicate with one another over Ethernet. More than 90 percent of the communications between devices in the facility is over a TCP/IP network. This eliminated a great deal of serial cabling, the space required to support it and the associated hardware.

The facility houses more than 150 Sony displays of various sizes. Many displays needed to be multiplexed from different sources. To lower costs, multiple, smaller monitor muxes were installed, resulting in a flexible, high-res display.

The new facility supports multiple forms of Dolby audio, both internally, and in its transmission paths. HD content is recorded and played back via server or Sony HDCAM tape with Dolby E intact.

The transition was smooth, and editors now ingest, cut and air stories without ever seeing tape. The facility produces half of its games in HD. ■

KQED-TV expands viewer programming with new digital technologies



KQED-TV, a public broadcaster in San Francisco, is engaged in a comprehensive program to transition to HDTV and integrate the latest digital technologies into its operations to expand programming services for its viewers. As part of the station's plan to digitally transition the majority of its locally produced programs to HD, National TeleConsultants upgraded KQED's production control room to HD and built a second, smaller HD/SD control room to enable concurrent production work in two separate studios.

The upgrade included Sony HDC-1000LW and 1500L cameras in the studio as well as a monitor wall in the control room that combines rear-projection display cubes from Clarity with Evertz display processors, and Sony LCD panels for preview and program.

The station currently has two Avid uncompressed HD edit suites with Avid Unity storage. Avid DNX encoding on the DS Nitris system and the Unity server improve production workflow, enabling producers to remotely access proxy video for quick logging and editing of local HD programming acquired with Sony's XDCAM HD tapeless camcorders. KQED transitioned two additional Avid suites to Avid Adrenaline platforms; those rooms have the ability to edit Avid HD compressed projects.

KQED's HD transition is part of the station's

ongoing plan to leverage the latest digital technologies to expand its programming services. Central to this strategy is the recent redesign of the station's master control. The redesign enables the station to output multiple, simultaneous over-the-air and cable channels. Previously, National TeleConsultants migrated KQED from manual control of one 20-hour-per day analog SD channel to a fully automated, server-based facility outputting six 24-hour-per day digital channels (one of which is in HD) feeding both Comcast (via fiber) and the KQED transmitter.

KQED also plans to feed programming for Northern California PBS sister stations KTEH-TV in San Jose and KCAH-TV in Monterey/Santa Cruz. (KQED has just completed a merger with these two stations). This initiative is encouraged by the Corporation for Public Broadcasting and PBS in markets where public stations overlap. The plan is expected to garner efficiencies in all three stations' broadcast operations by eliminating duplication of effort. ■



Category

New studio technology
— station

Submitted by

National TeleConsultants

Design team

KQED-TV: Lee Young, dir. of TV eng. facilities; Ernie Newmann, mgr. of eng. broadcast facilities; Frank Carfi, mgr. of TV op.; Steve Welch, exec. dir., TV eng. and op.

National

TeleConsultants: Ethan Bush, sr. proj. dir.; Peter Mason, sr. consultant; Jeff Phelps, proj. eng.; Gary Katz, on-site installation supervisor

Technology at work

Avid

Adrenaline
DS Nitris HD
Media Composer 1000
Symphony HD
Unity storage
Clarity projector and LCD monitor walls
Evertz MVP processing
Sony

DigiBeta DVW-A500
Betacam SP BVW75
DSR-1800 DVCAM VCRs
DMX-R100 audio console
HDC-1000LW, 1500L cameras
HDW-M2000, HDW-M-500 HDCAM VCRs
HDWF-900, HDW-750 cameras
MVS-8000A, MVS-8000ASF switchers
Pinnacle MediaStream



Pappas stations KREN-TV and KAZR-TV bring workflow transparency to a new level

Category

New studio technology
— station

Submitted by

Omneon/Professional
Video Supply/Utah
Scientific

Design team

Pappas Telecasting:
Dale Scherbring, VP dir.
of eng.; James Ocon,
deputy-dir. eng.; Danny
Sandoval, construction
supervisor

KREN-TV/KAZR-TV:
James Ocon, chief eng.;
Libby Heywood, studio
supervisor; Scott King,
BIT eng.; Luke Hysell, BIT
eng.; Mike Pappas, studio
eng.

KPTM-TV: Gina Dierks

KTNC-TV: Francis
Sandico, chief eng.

Professional Video

Supply: Brad

Bartholomew, pres.;
Philip Muller, eng.
supervisor

Technology at work

Avocent KVM switching
system

Black Box interfaces

Canon XLH1 HD cameras

Edius Canopus HD edit sys.

Evertz

Conversion equipment

MVP multiviewers

InPhase Tapestry

Nverzion automation

Omneon

MediaGrid storage sys.

Spectrum video server

Ross Synergy

Utah Scientific routers

Vizrt graphics



From its beginning, Pappas Telecasting Companies has been committed to being close to the community. Nowhere is there a better example of this dedication than at the newly launched studios for Pappas television stations KREN-TV and KAZR-TV within Meadowood Mall, the largest regional shopping center in northern Nevada.

The 8500sq ft digital facility in Reno hosts one-hour local news production for both KREN-TV (English-language) and KAZR-TV (Spanish-language). Pappas completed the new design and build by leveraging the collective experience of its own engineering community and Professional Video Supply.

Project engineers put systems in place that make every station asset accessible from a variety of locations. This unusual remote-control capability — which relies on an Avocent KVM switching system, Black Box interfaces and a substantial CAT 6 infrastructure — allows for a much more efficient and modern production environment by minimizing the space needed while maximizing the use of workstations, staff and media assets.

Master control is now an automation control area, shifting control over quality and programming to the traffic and programming department, now responsible for QC, ingest, and automation operations. One or two operators move between news and traf-

fic to check on automated processes such as recording of satellite feeds or to perform tasks such as trimming or cutting recorded clips. An Evertz multiviewer system and 40in LCD monitor installed in the traffic area enable staff to monitor on-air signals along with the playlist as it scrolls.

The native 1080i HD plant is built around the Omneon MediaGrid active-storage system, which provides fast and reliable access to up to 4000 hours of HD content, and a Utah Scientific UTAH-400 HD routing system, which handles routing of all signals around the facility. Canon XLH1 HD cameras are used in the studio, combined with a Ross multidefinition production switcher. A Vizrt graphics system and an Edius Canopus HD edit system are linked to the active storage system.

For automation control, the station uses a Utah Scientific UTAH-400 router, along with an Omneon Spectrum media server system for playout, running under the control of Nverzion automation. The HD output is downconverted for SD broadcasts with Evertz conversion gear.

The station also has integrated holographic storage into its facility. The InPhase Tapestry holographic drive and media support the facility's automated archive system, allowing users to record 35 hours of broadcast-quality video on a single disk at a transfer rate of 20MB/s, or just over four hours. ■

WVIZ-TV joins radio station and performing arts center to create the Idea Center



The Idea Center in Cleveland is the result of a unique partnership between three longtime Cleveland institutions: WVIZ-TV, WCPN-FM and performing arts center Playhouse Square Foundation (PSF).

By renovating one of Cleveland's historic landmarks, the group created a single space to house all three diverse operations. The building, originally built in 1912, required extensive interior and exterior restoration to transform it into the 90,000sq-ft technology, arts and education complex called the Idea Center.

The Systems Group (TSG) provided systems design and architectural infrastructure planning and consulting support as well as turnkey broadcast, A/V and distance learning system implementation.

TSG studied the operations of each media entity, including radio, TV, educational services, theatrical reinforcement, online Web delivery and A/V branding. It then worked to dovetail connectivity and operational subsystems for each entity to support current operations and long-term expansion of programming initiatives.

All signal routing, processing and transmission activities are monitored in the technical monitoring center. A pair of Barco OverView cDR+67-DLs driven by Miranda Kaleido-K2 display the more than 40 incoming and outgoing signals. This allows the operational staff

to monitor and access all mission critical systems for troubleshooting and repair.

The technical equipment room required more than 90 racks to house core systems including Grass Valley Apex, Concerto and Trinitex routers; RTS/Telex intercom systems; and Evertz reference generators. An Andrews 5.6m Ku steerable antenna and Comtek -3.8m Ku antenna were installed on the roof to receive both PBS and NPR programming.

Studio 1 features 300 retractable seats, dual lighting systems and custom floor covering, making it ideal for theater and TV production. Town hall meetings and live musical performances can be broadcast by WCPN with the help of KLOTZ DIGITAL's VADIS facility-wide audio networking solution.

WCPN's radio and streaming facilities are housed in three control rooms and three performance studios, which allow for simultaneous set up and production of mutable programs. Studio 4 houses WCPN's primary production location during the morning and evening drive times. Studio 5 serves as a recording and packaging studio, with voice tracking and multitrack editing for more elaborate pieces aired throughout the day.

The Idea Center marks the continued growth and evolution of Playhouse Square, as a performing arts center and as part of a successful downtown revitalization project with demonstrated economic impact. ■

Category

New studio technology
— station

Submitted by

The Systems Group

Design team

Ideastream: Jerry Wareham, president/CEO; Kathryn P. Jensen, chief op. officer; Tom Furnas, sr. dir. of tech.; Gary Blum, dir. of eng. WVIZ; Jim Young, dir. of eng. WCPN

TSG: John Meusel, sr. proj. mgr.; John Zulick, sr. sys. eng.; Jared Miller, proj. eng.; Bruce Lilly, proj. eng.; Anton Mittag, integration supervisor; Dillard Rice, integration supervisor

Technology at work

Andrew 5.6m Ku steerable antenna
Barco OverView cDR+67-DL
Comsat 6 940MHZ to 960MHZ grid dish
Comtek 3.8m Ku antenna
Grass Valley
Apex audio router
Concerto port router
Trinitex router
Harris
AirMonitor
AirClient
MediaClient
KLOTZ DIGITAL VADIS
Miranda Kaleido-K2



WINK-TV rebuilds in hurricane alley, adding new digital technology

Category

New studio technology
— station

Submitted by

Professional
Communications Systems
(PCS)

Design team

Professional Communications Systems (PCS): Bill Blush, VP, sales; Charles Ross, acct. exec.; Glenn Thomason, dir. of eng.; Rich Merriam, design eng., proj. mgr.; Troy Pazos, installation mgr. **WINK-TV:** Glen Argirion, eng.; Keith Stuhlmann, dir. of eng.

Technology at work

Dolby 5.1 sound system
Floral JB 2105 MC
Grass Valley
M2100 MC switcher
8964 DEC A/D and 8964
ENC D/A conversion
Encore-controlled
Concerto routing sys.
Ikegami HTM2005R HD/
SD monitors
Miranda Kaleido virtual
monitor wall
Panasonic TH-50PHD6UY
plasma monitors
Sony PVM1415/1 SD
monitors
Tektronix
SPG422 master
reference sync sys.
ECO422D automatic
changeover unit
WFM601A, WFM601M
SD scopes
WFM700 HD scope



Moving, building, upgrading, expanding and converting a major station to HD is usually enough of a challenge for an engineering staff and integrator. CBS-affiliate WINK-TV, which serves the Fort Meyers/Naples market in southwest Florida, and Professional Communications Systems (PCS) had the bar raised a few notches by nature, in the form of hurricanes Charlie and Wilma.

Emergency service needs postponed the reconstruction of the existing facility. The integration team had to wait out for both the storm and construction crews to become available. Builders first had to repair the devastating destruction to the most vital facilities in the surrounding areas.

Thanks to a large in-house power generator, WINK remained on-air without interruption during the week of widespread outages. That power enabled the complex to broadcast critical information to area residents and the governmental authorities' security and rescue forces during Hurricane Charlie.

After construction resumed, the station focused on its goal — to keep WINK at the technological forefront. The digital upgrade plan called for equipment and systems to enable simultaneous broadcasting in SD and HD, both on-air and to cable, and the ability to accommodate another SD channel in the future.

The new capabilities, featuring Grass Val-

ley master control, conversion and routing, were rigorously tested shortly after completion, when the area was struck by Hurricane Wilma. Adversity provided the ultimate comparison of old vs. new. Engineers saw a vast improvement in technical performance, and again, WINK remained on-air without interruption, providing news, weather and emergency information.

The upgrade has enabled the station to record both SD and HD feeds from CBS. HD is provided over the air and is fed, via fiber-optic cable with backup, to the cable systems. Seventy percent of prime-time HD is broadcast in Dolby 5.1.

When not carrying HD programming, WINK upconverts 480-line video scans to 1080 lines to allow smooth transition between HD and non-HD programming. The HD/SD simulcasting is interrupted during opportunities to distribute original HD programming from CBS, as is done during the NCAA basketball tournament.

Automation has been a key factor in the success of the upgrade and the transition to a digital workflow. In addition to increased capacity, the station no longer has to deal with cumbersome workarounds. Routing sources are more efficient, and workflow is improved.

The rebuild allows WINK to be at the forefront of programming and technology, and to provide better, faster news. ■

WHDH-TV goes all-digital with its new production control room



WHDH-TV went on-air from its new production control room in December 2005. The Boston-based NBC affiliate transitioned to all-digital status with the creation of a new control room within its existing facility.

Rather than hiring a systems integrator, the station relied primarily on its own day-to-day operators for the control room's design and layout. Likewise, the station's maintenance staff handled construction.

The control room was designed with non-linear/digital playback in mind. A Grass Valley Kalypso production switcher was upgraded to an HD Duo for improved DMEs and the enhanced operating flexibility allowed by more aux busses and internal memory.

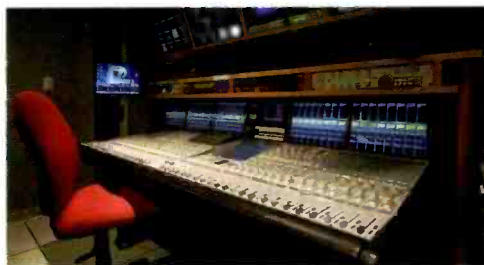
The station also added additional Ikegami video monitors to the new control room, along with new Hewlett-Packard flat-panel computer displays for operators. Additional equipment, including Clear-Com intercom panels and PESA router panels, was relocated from the old control room.

From the December 2005 opening through May 2006, the station was on the air with Sony BetaCam SX videotape playback. In June, the station transitioned to playback from an Avid Unity ISIS system — a major undertaking. The system includes two ISIS engines, 10 AirSpeeds — three for playback

and seven for record — and 12 NewsCutter Adrenalines for editing.

The modest dimensions of the audio control room presented multiple challenges, which were met with several technical and creative solutions. With its small footprint, the Solid State Logic C100 digital broadcast console was literally a good fit. The console satisfies the demanding production needs of the station, where an average of seven hours of local news is produced daily. Other key features include the speed of its operating system, its flat-panel TFT displays, the flexibility of its metering and its reliability. In addition, the console will make the station's transition to surround sound in a few years an easy one.

Other audio control room solutions include wireless computer keyboards, reducing desktop surface area needs. Rather than pivoting to a computer located to the side, LCD screens suspended over operators' desktops can be positioned to the individual's liking, saving additional space. ■



Category

New studio technology
— station

Submitted by

Solid State Logic

Design team

WHDH-TV: Chad Murphy, technical dir./video switcher; Gary Cormier, dir.; Donna Judge, Jeff Johnson, Jennifer Murphy, Tony Caracciolo, audio ops.; Art Murphy and Dick Ober, eng. crew chiefs; Rob Page, Bernie Solinger, Dave Lawry and Ken Ford, maintenance technicians; Mike Williams, eng. op. supervisor; Sam James, news op. mgr.; Mike Smith, director of administration and finance; Jim Shultis, director of eng.

Technology at work

Avid
NewsCutter Adrenaline
Unity ISIS file system
Clear-Com intercom panels
Grass Valley Kalypso
HD Duo production switcher
Hewlett-Packard flat-panel computer displays
Ikegami video monitors
PESA router panels
Solid State Logic C100 digital broadcast console



WTAP-TV makes the jump to multichannel digital broadcasting with a facility upgrade

Category

New studio technology
— station

Submitted by

AZCAR/Utah Scientific

Design team

WTAP-TV: Kevin Buskirk, broadcast eng.; Joseph Dumas, former chief eng.; Larry White, production mgr.; Roger Sheppard, gen. mgr.

AZCAR USA: Paul Ohodnicki, project mgr.; Hakim Kharbut, lead eng.; Jack Ormond, sr. systems eng.; Mike Walter, sr. systems eng.; Steven Wang, systems eng.; Doug Waldron, site supervisor

Technology at work

Clear-Com Eclipse-32 intercom matrix
Evertz VIP 4 multi-image processor and VIP 12 multi-image processor
Omneon Spectrum server
Ross Video SYNERGY 2.5 MD switcher
SqueezeMAX digital video effects system
TANDBERG Television 5780 HD encoders
5720 SD encoders
MX5000 multiplexer
Utah Scientific UTAH-400 SD/HD router
SD/HD MC-2020 master control switchers
Wheatstone G6 audio mixer



On April 1, 2006, WTAP-TV, the Gray Television NBC affiliate in Parkersburg, WV, went from broadcasting a single NTSC television channel to broadcasting an additional four digital channels — NBC, NBC HD, FOX and UPN. It was a transformation that required a complete overhaul of its facilities. Not only did it have to replace most of the 1970s-era broadcast equipment with new state-of-the-art digital gear, but also it had to rebuild the station from the ground up. WTAP's biggest challenge was that it all had to be done in just four months.

The station enlisted the help of AZCAR for the design, integration and equipment procurement. An outdated electrical system had to be replaced with all new wiring and advanced surge protection. The one large space that housed both master control and the central equipment room had to be expanded and then divided to provide a discrete master control operation center, which would be essential when running multiple channels from the one facility.

The studio production control room was enlarged from 275sq ft to 728sq ft. A Ross Synergy 2.5 multidefinition switcher and Evertz multi-image displays were installed in the production control room, along with a Wheatstone G6 audio console.

The core infrastructure that WTAP and

AZCAR chose was built around a UTAH-400 routing switcher and an MC-2020 HD/SD master control switcher from Utah Scientific. An Omneon Spectrum server with 19 SD and HD I/O ports was specified with 464 hours of storage. The server is able to accommodate multiple format playback. If operators are playing out one program in HD, they can simultaneously play out the same episode in HD, with no need for up- or downconversion. The UTAH-400 router was selected because it could handle all the HD and SD formats that would be used, including 720p for both FOX and NBC HD signals, and a 480p SD signal for MyNetworkTV (which replaced UPN in September).

All signals within the facility are routed through the switcher, including the playout of programming from the server, which goes to air via Utah Scientific MC-2020 HD/SD master control switchers. The four master control switchers provide the station with a full range of mixing and keying functionality and drive all the switching and routing functions within the station's master control room. Each master control unit features two keyers per channel, which allow for a flexible approach to clean-feed and regional-feed applications. The switchers also provide the station with full audio mixing capabilities using embedded audio, ensuring timing between video and audio will always be in-sync. ■

EchoStar delivers regional content with uplink project



To meet the demand for both SD and HD local-in-local channels for its DISH Network customers, EchoStar set out a plan to significantly expand its channel carrying capacity. After considering several traditional approaches, the design team devised an approach that uses four regional uplink centers strategically located across the country. This new design was based on the idea of delivering regional content only to the regions where it was required by leveraging the spot beam capability of EchoStar's latest satellite, Echo Ten.

The EchoStar design team focused on developing the new uplink centers to be operated as cost effectively as possible. By making broad use of IT network-based remote monitoring technologies, EchoStar monitors all of the regional uplink signals at its primary facilities in Cheyenne, WY, and Gilbert, AZ. The new regional uplinks significantly increase the number of SD and HD local-in-local channels EchoStar is capable of delivering to its customers while providing a flexible and cost-effective new platform for future growth.

The company selected AZCAR to provide system integration services for the build out of the four facilities in Spokane, WA; Monee, IL; Mount Jackson, VA; and New Braunfels, TX. The systems integrator provided project management, engineering support, CAD, pre-build, installation and commissioning services

for all uplink sites. Multiple installation teams were deployed for the simultaneous builds of several sites led by a core management team. Although identical, each site had its own set of variables to manage.

The integrator provided engineering support in developing the new buildings' room layouts, completion of the detailed design and generation of the construction level drawing sets. Once approved, implementation teams immediately began building cable assemblies for installation at each site. Where possible, the install teams also pre-built and pre-tested system racks while the new building sites were under physical construction. A site supervisor for each location managed the local coordination between the building trades and the install teams. Install crews, materials, pre-built racks and cable assemblies were strategically timed to arrive on-site just as they were required. As the on-site installation neared completion, AZCAR's commissioning engineers began testing the new facility infrastructure, making any adjustments and changes required to ensure the new facilities were ready for final engineering setup and testing.

Completed both on time and on budget, each of the new regional uplink facilities is a success, providing EchoStar with a flexible and scalable platform from which to deliver new and innovative consumer and commercial media services. ■



Category

New studio technology
— network

Submitted by

AZCAR

Design team

AZCAR: Bruce Long, sr. VP, business implementation; Doug Waldron, installation super.; Matthew Brown, proj. mgr.; Tom Ferguson, proj. eng.

EchoStar: Brent Gale, VP, oper. and regional oper. group; Jeff McSchooler, VP, eng. and eng. and oper. team; Paul Bellotti, dir., architecture and architectural and design group

Technology at work

Confidential



Lifetime's new facility supports the multichannel network's continuous growth

Category

New studio technology
— network

Submitted by

Ascent Media Systems &
Technology Services

Design team

Lifetime: Gwynne McConkey, SVP, operations, info. sys. and technology; Pete Sgro, VP/GM, op. and eng.; Don Jarvis, VP of eng.; Carl Charleson, dir., digital media applications;
Ascent Media Systems & Technology Services: Howard Dixon, sr. proj. mgr.

Technology at work

ADIC (Quantum) Scalar
10K robotic archive
Avid Symphony Nitris;
ISIS
Barco fDR 70 displays
Cisco Catalyst 6513
switches
EMC 15TB Clarion SAN
Harris
ADC 100 automation
H-Class media ingest
Masstech MassStore
Miranda
PresStation switchers
Imagestore Intuition
Kaleido K-2 display
processors
I Control SNMP
NVISION NV8256Plus
routing switcher
Omneon Spectrum media
servers
Optibase Media ingest
system
Venaca S3 DAM system



Lifetime's 50,000sq-ft Technical Operations Center at 111 8th Avenue in New York City is the culmination of many years of intensive planning, driven by the vision of an HD-ready facility using complex digital media systems and applications. The end result: a virtually tapeless delivery to air workflow for LMN — the two highest-rated women's networks on ad-supported basic cable in the U.S. — Lifetime Real Women, as well as new broadband programming in development for Lifetimetv.com.

Ascent Media Systems & Technology Services headed a design team that included Lifetime's engineering department as well as the network's newly formed Digital Media Task Force, a team comprised of broadcast and IT engineering experts.

From the outset, plans were in place for a centralized digital asset management system and a data center relocation, naturally blending the previously diverse cultures of broadcast and IT. The biggest design challenges involved the digital media applications and infrastructure supporting the production systems, vendor development partnerships and interoperability, and change management surrounding entirely new workflows. Equally critical was the selection of a media asset management partner. Following a comprehensive review process, Venaca's S3 production system was selected to serve as the core digital media

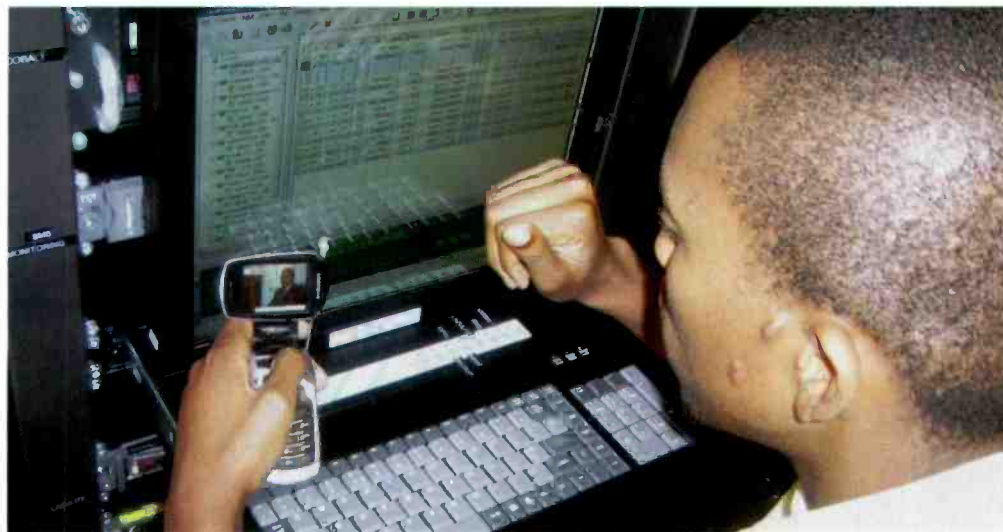
application.

The design team enabled Lifetime to proactively and effectively mesh the divergent approaches to systems engineering that have existed between broadcast and IT implementation. When evaluating NLE systems for the new facility, broadcast engineers learned the merits of full requirements gathering and product gap analysis organized by the IT project manager. Similarly, during the design of the facility's network infrastructure, IT engineers gained an appreciation for the unique and often pragmatic needs of a 24/7 environment that cannot tolerate downtime. Careful attention was also paid to the media switching architecture, VLAN administration and security.

Ascent and Lifetime designed a core routing system with simplicity as the primary goal. After years of using multi-layers and sub-routers, Lifetime's new facility uses HD, SDI, embedded audio and time code as the base signals.

Lifetime now has four QC/ingest suites where program materials are encoded into the production system; 12 nonlinear post-production suites, a graphics and digital media services bureau, an audio production suite, a four-pod master control complex, a transmission control room and a central technical area dedicated to broadcast and IT equipment. ■

MultiChoice extends its services to mobile devices, using DVB-H broadcasting



In 2006, MultiChoice, a satellite broadcaster based in Johannesburg, South Africa, extended its services to mobile devices using DVB-H digital terrestrial broadcasting.

After a brief evaluation of the available options, MultiChoice signed a contract with Grass Valley in April, with the intention to be on-air in June for the FIFA World Cup. The Grass Valley systems' turnkey approach was vital to meet the deadline.

Site acceptance tests were completed on schedule at the end of May. A successful live capability demonstration ran throughout the World Cup. The trial has since grown to 4000 major cities around the country. Trial results have been positive, with audience appreciation still on the rise. Subject to regulatory approval, MultiChoice is operationally and technically ready to launch a commercial DVB-H service.

The mobile TV headend housed at the MultiChoice headquarters uses Grass Valley Argos H.264 mobile TV encoders, supporting 20 channels, and two more for redundancy. The encoders are automatically controlled by the Lazulite network management system. A Grass Valley Opal DVB-H IP encapsulator packages the channels into a single IP stream, with the electronic service guide (ESG) automatically generated by Grass Valley's Jade. The design is based on a n+1 redundancy architec-

ture at each level of the chain (SDI, IP, ESG).

The service is managed by a SmartVision Mobility platform, which is currently configured for up to 30,000 licensed users. As well as controlling subscriber access, SmartVision manages the content and allows interactive services and video on demand to be added as consumer demand grows.

The IP stream is directly routed to local DVB-H transmitters and sent via satellite using the Opencast multiple file transfer system to more remote areas. To provide the ability to transmit regional content, a package called Eyegate provides signal filtering as well as satellite demodulation and bit rate adaptation. As the whole DVB-H broadcast is on a single frequency, Eyegate also incorporates a GPS receiver for precise synchronization.

An important part of the turnkey system was a Cobalt DVB-H data stream analysis tool, which allows MultiChoice to fine tune its transmissions to ensure a consistent quality of service. A scaled down set of equipment for use in the laboratory was also supplied. This allows the company to hold its own test and evaluation trials, such as qualifying new handsets. Currently, Sagem handsets receive the broadcasts.

MultiChoice is so confident in the system's ability to provide coverage in South Africa that it has begun a second venture to bring DVB-H mobile TV to neighboring countries. ■

Category

New studio technology
— network

Submitted by

Grass Valley

Design team

Grass Valley: Didier Brugel, sales

MultiChoice: Gerdus van Eeden, CTO

Technology at work

Grass Valley

Argos H.264 encoders

Cobalt analyzer

Eyegate remote stream grooming

Jade ESG generator

Lazulite systems manager

Opal IP encapsulator

SmartVision Mobility service platform

Irdeto conditional access system



Rainbow Networks improves efficiency with hybrid multichannel master control room

Category

New studio technology
— network

Submitted by

Communications
Engineering Inc. (CEI)

Design team

Rainbow: John Barbieri, SVP and general mgr.; Mike Mallozzi, VP, Broadcast Engineering and System Design

CEI: John Wesley Nash, executive VP and COO; Jim Conley, SVP and CTO

Technology at work

Avocent KVM switching systems
Dolby audio processing systems
Evertz MVP MultiViewers and distribution/conversion equipment
Grass Valley
K2 media servers
Maestro SD/HD master control switcher
Harris automation systems



Rainbow Network Communications is a supplier of SD and HD program origination and distribution services to the multimedia industry. From the Rainbow Media Technology Center in Bethpage, NY, Rainbow provides support for more than 35 channels of programming distributed in the United States and around the world.

With a complex array of live and pre-recorded programming to handle, Rainbow recognized the need for a new generation of live video (LV) multichannel master control rooms. It entrusted this challenge to system engineering firm Communications Engineering Inc. (CEI) and the Rainbow engineering team.

As the design team began to define the technical requirements for these new rooms, the need to create a master control switching environment that could deal flawlessly with five AES pairs (10 related channels) of audio became apparent. This need was a substantial departure from the capability of most master control switcher systems, which provided processing for only four AES pairs. Rainbow processes source audio in analog or digital formats associated with HD and SD video. The possible variations in audio included combinations of embedded or discreet, multiple AES channels, encoded in various Dolby formats. This was achieved by de-embedding, decoding and re-embedding the audio along

with its Dolby metadata on the way into the master control switcher, which then processed each channel discreetly. The opposite procedure was performed on the master control switcher output prior to being sent to the transmission air chain.

The LV control rooms employ the Evertz HD AES audio de-embedder, capable of eight AES pair (16 channel) operation, including built-in Dolby decoders and a feature set defined by CEI in concert with Evertz. Signal sources available to the LV rooms include SD and HD tape systems, multiformat servers incorporating more than 65 hours of immediate online HD storage, and live satellite feeds, all under either manual or automation control. SD signals are upconverted as needed and integrated into the HD environment. Grass Valley's Maestro SD/HD branding master control switching was also installed for managing signal processing.

CEI created an adaptable test and monitoring equipment design that would transparently adjust to deal with each signal format based on triggering information tied to the source of each signal. Monitor wall displays driven from Evertz MVP MultiViewers automatically track the master control channel status, and a KVM switching system brings virtually every critical keyboard and monitor device interface within easy reach of the operator. ■

"The Daily Show With Jon Stewart" relocates to house larger laughs



In just two weeks, the entire cast and crew of "The Daily Show" moved from NEP Studio 54 into a new space across town in New York City from the smaller digs it had occupied since 1998. New construction to prepare the facility and make room for expanded offices and production space began in January 2005 and spanned six months.

John Chow, NEP Studios' vice president of engineering, oversaw the engineering project. The show desired to have all of the production rooms located on the same floor. Also, the graphics workstations are now located close to the editing systems so that the staff can collaborate on projects more effectively.

The show's producers wanted the tape operators to be able to see the control room, so a hole was cut and a window built between the two. In most cases, the show's staff would rather communicate across the rooms to one another than send and grab a file off of a network. However, the staff does have access to a Telex/RTS Matrix intercom system with wireless intercoms units.

Chow also supervised the purchase of new digital production equipment, as well as the transfer of existing systems to the new facilities. The facility, however, did not go completely digital. (It's 601 digital and AES with analog video and audio layers.) There's a Grass Valley Venus analog router with dozens of Grass Valley Gecko signal conversion cards and numer-

ous Betacam SP decks in use. However, it does take advantage of several digital islands — for editing (Avid Media Composer Adrenalines) and graphics (VizRT|Trio, Quantel Paintbox, three Adobe After Effects workstations with Xsan, etc.) — connected via a GigE connection. Five Avid workstations share material via a LANShare server with 2.88TB of storage.

The show also uses five Grass Valley M-Series iVDRs (two record and two playback channels, with 16 hours of 25Mb/s storage per unit), Profile servers (eight channels), TiVo DVRs and four digital betacam VTRs to capture images off-air for use in the show. The editors also use Sony DVW-M2000 and DVW-A500 source decks.

A new Solid State Logic C100 digital audio console serves as the centerpiece of a retrofitted audio production room. The new version 2 software includes expanded I/O capacity and TouchPan, a feature that allows Lustre to have full 5.1 panning access on every channel from the console's central touch screen.

A renovated control room features a four M/E Sony DVS-9000 SD production switcher, fully loaded with 80 inputs and 48 outputs. Images are stored for each night's show on a Pinnacle Systems Lightning server, which can be called up through the switcher for insertion into the show as well. Ikegami monitors fill out a comprehensive monitor wall, where the director and TD sit and call the shots. ■



Category

New studio technology
— network

Submitted by

NEP Studios/Solid State
Logic

Design team

NEP Studios: Barry Katz, sr VP and gen. mgr.; John T. Chow, VP eng.; Kevin Tobin, chief eng., Studio 52; Lorenzo Handsford, eng., Studio 52; Adriane Truex, facility mgr., Studio 52; Bill Willig, project mgr.; Ray DeMartini, dir. of support services, eng. & facilities; Kevin Tobin & Ed Modzel, design eng.; Sonny Waysack, installation supervisor;
Kossar & Garry
Architects: Alan Garry, "The Daily Show"; Jill Katz, line producer

Technology at work

Adobe After Effects
Avid Technology
Media Composer
Adrenaline systems
LAN Share server
Grass Valley
Gecko signal converters
M-Series iVDRs
Venus routing switcher
Ikegami monitors
Pinnacle Systems
Lightning stillstore
Quantel Paintbox
Solid State Logic C100
Sony
DVS-9000 switcher
DVW-M2000/DVW-A500
Telex/RTS Matrix
intercom systems



Trinity Broadcasting Network centralizes with 10-channel digital master control

Category

New studio technology
— network

Submitted by

TV Magic

Design team

TBN: Ben Miller, VP of eng.

TV Magic: Steve Sagady, design eng.; Steve Schwartz, sr. eng.; Brian Dugger, special proj. eng.; Kevin Bohn, proj. mgr.; Dmitry Vayner, proj. supervisor

Technology at work

Avocent KVM switching
Clarity Baycat displays
Dolby E

DP-570 encoder
DP-570 processors

Grass Valley

Profile servers
Encore control system
Ikegami CRT monitors
Linear Acoustic Octimax
5.1 surround sound processor

Masstech MassLogger
Miranda

Densite terminal gear
Kaleido-Alto processors
Kaleido-K2 processors

Myers ProTrack
NVISION NV5128 MC
switchers

Panasonic DVCPRO HD
VTRs

Sony IMX VTRs
Sundance Titan
automation

Tektronix
WFM700A waveform
vecoscope

WVR-6100 SDI rasterizer



With the help of TV Magic, Trinity Broadcasting Network (TBN) has established central-casting capability, completed a network-wide shift to digital broadcasting, introduced two new channels and created a tapeless platform on which to launch additional channels in the future.

TBN content is originated at the network's Tustin, CA, master control facility, where the network just completed an overhaul to establish a digital master control system that includes nine SD and one HD channel.

The centralized master control system pushes content out to TBN's 32 newly upgraded affiliate stations for DTV broadcasting and an international broadcast audience. TV Magic supplied the equipment and installed the system without compromising the operation of four existing master control channels running TBN, KTBN, The Church Channel (TCC) and JCTV.

The new digital master control system is built around Grass Valley Profile servers and Sundance automation. A mirrored media access network Profile system with more than 700 hours of SD and 50 hours of HD storage facilitates the ability to broadcast ingested material and maintain a robust backup to air. Sundance Titan automation has the ability to interface to the facility's Myers ProTrack traffic and operations software.

NVISION NV5128 master control switchers were chosen because of its independence from the station router, allowing a more traditional signal flow and greater redundancy. The switchers also allow operation of both master control hardware panels and software panels on any channel simultaneously. Three NV5128 frames accommodate the 10 master control processors.

Miranda products were used extensively for both multiviewing and modular equipment. Master control uses two Miranda Kaleido-K2 multiprocessors to feed Clarity Baycat LCD displays, creating the glass cockpit look in master control and also providing display redundancy in case of failure. Three Miranda Alto processors monitor all outgoing video and off-air returns, and are displayed around the facility. An extensive iControl monitoring and control environment facilitates quick triage of all signal paths.

All work positions use Avocent KVM user stations that allow connection to the more than 100 computer-based devices and equipment GUIs.

TV Magic provided component and system training, as well as training to familiarize TBN staff with workflows for ingest, asset management, and actual scheduling and playout. The iControl installed both in Tustin and at affiliate stations will allow further opportunities for consolidating network operations. ■

Crystal Cathedral shines with an all-new HD infrastructure



Robert Schuller's "Hour of Power" is produced at the Crystal Cathedral, a TV studio for televised congregational Christian worship. Recently, the program enlisted systems integrator TV Magic to design and install a new HD production infrastructure for the Crystal Cathedral.

Five Grass Valley LDK4000 1080i HD cameras and various switching sources record through seven Avid HD Adrenaline nonlinear editing systems to a Unity centralized storage system. This allows staff to take advantage of Avid's multicam editing features, with editing of program content beginning immediately following each Sunday service. Due to the live nature of the program, one challenge was to place all seven Avid systems into record mode simultaneously.

TV Magic worked as a technical liaison with Avid and other manufacturers to integrate the facility's new production gear in an efficient workflow. The systems integrator also installed a Grass Valley Kayak HD two M/E digital production switcher. One M/E is used with an auxiliary panel to provide switching and keyed graphics for presentation and image magnification on the Cathedral's Jumbotron.

Within the control room, an Evertz MVP multi-image display and monitoring processor feeds four Panasonic HD plasma displays, allowing production personnel to monitor

all switcher sources, previews, programs and Jumbotron feeds. The system supports display of up to nine cameras.

Today, production staff shoot the live service and send all camera feeds, ISO feeds and the director's cut to the Avid system just 10 minutes after the service. The seven Avid systems capture all video, and on Monday, they serve as individual edit bays for work on different pieces of the show.

The Avid systems feed two virtual edit bays, one equipped with Digidesign's Pro Tools HD for sweetened audio layback. The other Avid systems ingest archived material from tape and output rough-cut versions of the program for audio sweetening and approvals.

All of the Avid systems are situated in the machine room located in a different building; editors use an Avocent KVM switching system to work on these systems remotely.

Live audio is captured directly into a Pro Tools HD multitrack session. A mixed-down version is provided to the remote Avid systems. Edited versions are provided back to audio for sweetening. Once audio is completed, it is laid back directly into the timeline using drag-and-drop functionality.

The HD upgrade allows the "Hour of Power" production team to deliver a much-improved SD signal to broadcasters and high-quality programming to the growing number of TV stations making the leap to HD. ■



Category

New studio technology
— HD

Submitted by

TV Magic

Design team

TV Magic: Gus Allmann, design eng.; Jack Efromson, proj. eng.

Crystal Cathedral: Jim Penner, exec. producer of ministries; Peter Richardson, chief eng.

Technology at work

Avid
Pinnacle Deko HD CG
Media Composer
Adrenaline editing stations
Unity shared storage
Avocent KVM system
Canon lenses
Digidesign Pro Tools
audio post-production system
Dolby encoders/decoders
Evertz multi-image processor
Grass Valley
LDK4000 HD cameras with triax
Routers
Kayak HD two M/E switcher
Miranda terminal gear
Panasonic
DVCPRO HD VTRs
HD plasma displays
Sony monitors
Tektronix test equipment
Yamaha surround sound speakers



ION Media Networks' new HD-ready facility supports the transmission of 12 digital feeds

Category

New studio technology
— HD

Submitted by

Omneon

Design team

Garrett Communications:
Paul Garrett, integration team

ION Media Networks:
Brian Reitmeyer, chief sys. design; Dave Glenn, pres. of eng.; Matthew Gluntz, Sal Pistone, integration team; Mark Greenlee, VP network op.; Vincent Giordano, chief eng.; David Goosey, network eng.; Brian Reitmeyer, sr. sys. eng.; Dan Cusmano, sys. eng.; Brian Pinta, sys. eng.

Technology at work

Barco
Hydra processors
OverView DLP projector
Solaris LCD flat screens
Harmonic
MV-100 encoders
MN20-4 remultiplexers
Harris ADC automation
Masstech MassStore media asset management
Omneon Spectrum servers
Snell & Wilcox
RollCall, RollMap,
StorageTek
L700 tape library
FlexStore arrays
Utah Scientific Utah-400 router
Videotek RS-12DV switchers



In entering the digital age, ION Media Networks replaced its legacy analog infrastructure with an HD-ready plant. While remaining on air, ION Media rebuilt its Network Operations Center (NOC) to support the transmission of 12 digital feeds, comprising main programming feeds as well as backhaul channels, delivered via satellite to 60 stations across the country.

The network's team essentially built a new facility right next to its existing facility. Testing and training on the new system took place while the traditional playout operations went on normally. After transmission went live on the new system, the analog infrastructure was kept as a backup before being disassembled. Today, the entire digital facility is contained within five rooms.

At the heart of the NOC sit two Omneon Spectrum media servers, each configured with 10 inputs and 20 outputs, providing both main and backup systems for a fully mirrored operation at all times. Each system currently has a capacity of 1800 hours of playout at 10Mb/s. In addition to handling feeds delivered to the group's stations, the server outputs are used for quality control and monitoring.

Running under the control of Harris ADC automation, the servers allow operators to take advantage of automation control, with a new level of functionality in accessing, navigating and playing out media clips. The serv-

ers occupy 2RU and can be upgraded to HD.

The automation system also manages Masstech asset management software and a StorageTek L700 tape library with a capacity of 27,000 hours, 4000 of which are already in use. Harmonic provided encoding, and Snell & Wilcox provided the facility's new distribution, conversion and processing gear, which supports HD and SD signals. On-air material is switched via Videotek switchers, and the main in-house router is a Utah Scientific Utah-400. A Barco processor monitors all return feeds and sends images to both Barco DLP projection and LCD flat screens.

Engineers turned an old storage room into an equipment room with requisite power and air-conditioning. Other existing technical areas were also revamped, adding the necessary cable infrastructure, patch bays and routers to support digital and HD operations. The entire facility power grid was reworked to provide separate A and B power to every rack, with each source protected by its own 80KVA UPS and 350KVA generator. All of the operational elements of the facility are situated together, rather than separated by racks of equipment.

ION Media experienced a smooth and successful transition from analog operations to an HD-ready facility. Its 12 fully automated network channels can run with minimal intervention. Despite space limitations, the new facility has plenty of room to grow. ■

New Century Productions' latest HD truck is designed for major sporting events



When New Century Productions (NCP) set out to build its latest HD production truck, it was looking for a solution that would keep even large shows inside a single truck. With some careful planning, it was able to pull it off in the new 53ft expanding NCP-VIII HD. The truck is HD- and SD-capable and provides everything necessary to produce major sporting events such as the U.S. Open tennis tournament, where the truck made its debut with CBS in August 2006.

A major innovation in the truck is the drop deck in the production room. The floor of the production room steps down below the normal floor level of the truck, making the room feel larger and increasing the space available on the monitor wall to accommodate an additional row of monitors. The room, which is built around the Grass Valley HD Kalypso production switcher, can seat 12 people comfortably.

A fully outfitted truck of this size is completely router-dependent. For the router, the company selected the UTAH-400 system from Utah Scientific for its compact size, reliability and control capabilities. The system consists of three router frames in one package, including a UTAH-400 288 x 576 video frame configured for 256 SD inputs with 288 analog NTSC and 96 SD outputs; a second UTAH-400 video frame loaded as a 128 x 128 HD router; and a UTAH-400 288 x 288 audio

frame configured for 208 x 192 AES audio and 48 x 64 analog stereo audio.

This configuration allows the company to drive every monitor in the truck from the routing switcher and allows the use of common analog monitors throughout, even while all the switching is done at the SDI level. Because all the configuration setups can be saved from any particular job, most of the truck can be instantly configured or reconfigured for a particular client at the touch of a computer icon.

For recording and playback, the truck is equipped with the specific tape decks required to meet the preferences of each client. Production servers from EVS handle most replays, with the clients hauling their production elements, highlights and whole shows from truck to office (or truck to truck) on X-File transportable disk drives.

In the audio booth, the need for maximum power in a minimal space drove NCP to choose the Calrec Alpha digital audio mixing desk with its new Bluefin technology. This enables the desk to provide 78 full 5.1 surround sound channels from its complement of 162 stereo and 156 mono channels and eight surround groups. Each channel and group is fully equipped with full EQ and dynamics. The system has 23 minutes of user accessible delay elements, four surround main outputs, 48 multitrack outputs and 20 aux feeds. ■



Category

New studio technology
— HD

Submitted by

Utah Scientific

Design team

NCP: Mike Mundt,
Marc Altman

Diversified Systems:
Alan Bourke

Technology at work

Calrec Alpha digital audio mixing desk

Chyron HyperX graphic system

Evertz upconverters, downconverters, crossconverters

EVS production servers

Grass Valley HD Kalypso production switcher

Pinnacle Deko 3000 graphics system

Ikegami HDK-79ECT digital multistandard cameras

Utah Scientific

UTAH-400 routing switcher

SC-4 control system



New England Sports Network's new HD facility

Category

New studio technology
— HD

Submitted by

The Systems Group

Design team

The Systems Group:

Joe DiFrisco, sr. project manager ; John Zulick, sr. project engineer

Venue Services Group:

Josh Einstien, project manager; Andre Ferrer, coordinating manager; Mike Young, sr. project engineer; Mike Meglathery, project engineer

New England Sports Network:

Dave Desrochers, chief engineer; Les Correia, asst. chief engineer

Technology at work

Chyron Duet HyperX HD/SD switchable CG
Evertz MVP multi-image display and monitoring systems
EVS HD XT2 disk recorder
Leitch
NEXIO NX4200HD server
NEXIO NX4000XS shared storage server
NVISION
NV5128-MC multichannel master control switcher
RTS/Telex ADAM intercom system
Sony MVS-8000 production switcher
Solid State Logic C100 consoles



In February 2006, The New England Sports Network (NESN) relocated to a new facility in Watertown, MA. The original facility, based in Boston's famed Fenway Park, was becoming too small for this fast growing network.

A new 40,000sq-ft facility was designed to accommodate their rapidly growing sports coverage in the New England region of professional, college and high school teams. These teams include the Boston Celtics, the Boston Red Sox, the Boston Bruins and the New England Patriots.

NESN's new facility consolidates operations around a centrally located core of technical rooms. The technical core rests on a raised computer floor with 1ft of usable space below, allowing for easy access and room for future expansion. The equipment racks are Middle Atlantic 36in deep cabinets. At the heart of the system in the central equipment room is an all-digital NVISION 128 x 128 SDI/2X AES router, an RTS ADAM intercom matrix system, as well as supporting modular products from Leitch, Evertz and Miranda. The QC station uses a Videotek rasterizer and Wohler AES audio monitor.

The two production studios, one 50ft x 50ft studio and a 40ft x 50ft studio, with Sony HDC910 cameras and a 192 circuit lighting system, installed by Barbizon, produce from multiple venues for post game shows, as well

as from the NESN sports news desk.

Two production and audio control rooms support the studios. These audio control rooms are built around two Solid State Logic 32-fader, five-bay C100 mixing consoles. The production control rooms each have a monitor wall, front and rear production consoles. The two production control rooms share a multiformat four M/E Sony MVS-8000A with built in DVE, two Chyron HyperX CGs. A single shading room feeds both production control rooms and has the capability to support up to 12 cameras.

NESN now broadcasts both in HD and SD from one master control room using two NV5128 master control switchers containing one HD channel and three SD channels. All of the control rooms are supported by two Evertz 48-input MVP systems, allowing for virtual monitor walls.

The tape control room houses two Sony HDCAMs, one Sony DVCAM, five Sony Betacam machines, a Grass Valley two-channel server and an EVS HD XT2 two-channel disk recorder. The operators for the tape control room sit at a freestanding four-bay TBC console with an EVS server station, KVM and QC position.

NESN's new facilities enable optimal ease of operations, while giving viewers an enhanced experience for all of their favorite New England sports events. ■

Rainbow Media's VOOM HD Networks efficiently manages its HD storage



VOOM HD Networks, a subsidiary of Rainbow Media, provides movies on five of its 15 channels throughout the day, which led to the network finding itself overwhelmed by the task of managing the HD content storage playing out nearly 150 HD movies.

VOOM HD's channels include movies, sports, music, travel, fashion, the arts, cartoons and news. Each of these HD video files is about three times the size of equivalent SD programs. Rainbow Media had established a data tape-based playout model for SD assets used by its national networks, but the faster operation of the data tape drives compared to the network's server systems resulted in bottlenecks at the server. The network wanted to approach HD content management from a new angle.

To manage efficient storage of the network's significant library of large HD files, the network turned to Front Porch Digital's DIVArchive. The storage system enables interoperability between large digital media storage devices, video servers, editing systems and digital media workflow applications, simplifying the process of preserving, managing and accessing content.

The network had two main objectives: to ensure that all the VOOM content could easily be transferred in and out of nearline storage faster than real time, and, in the process, to

maximize efficient use of the data tape technology being used.

In order to achieve these objectives, a two-tier storage layer was incorporated into the design under the management and control of DIVArchive. The first tier uses 20TB of Nexsan ATABeast FC disk storage, and the second tier uses an ADIC Scalar 10K library with seven IBM LTO tape drives. The DIVArchive Storage Plan Manager policy engine controls all of the network's content throughout its lifecycle and stores it on the appropriate devices based on performance and cost.

The network now stores any new HD content on the disk system for 30 days, then transfers the media to data tape and stores it in a scalable data tape library. The timeframe corresponds with the time a particular HD video file remains among current movie offerings. As a result, the content most in demand can be accessed quickly by the facility's Harris ADC automation system and Grass Valley Profile MAN video servers for playout. As content ages, it is stored in a more cost-effective, long-term archive.

Today, two separate DIVArchive systems are in operation. One handles the facility's SD archives and the other handles HD assets. As the network continues to refine its use of the system for HD archiving, it will take advantage of the disaster recovery capability and the expandable 300TB data tape library. ■



Category

New studio technology
— HD

Submitted by

Front Porch Digital

Design team

Front Porch Digital:

Jeffrey Chen, delivery specialist eng.; Jeffrey Esposito, solution architect/proj. mgr.; Lou s Brown, sys. eng.; William Price, support eng.

Rainbow Network

Communications: Mike Mallozzi, VP of eng.

Technology at work

ADIC Scalar 10K and StorNext File System
Brocade 3800/3900 FC switchers
Front Porch Digital DIVArchive
Grass Valley Profile MAN video servers with UIM
Harris ADC 100 automation
IBM 3580 LTO2 tape drives
Nexsan ATABeast disk arrays



Times Square Studios transitions to HDTV without interruption

Category

New studio technology
— HD

Submitted by

National TeleConsultants

Design team

ABC 66th Street master control facility: Robin Thomas, dir. of eng. services; Steve Machanic, proj. mgr.; Philip Waldman, systems eng.; Raul Rapalo, systems eng.

Times Square Studios/GMA: Jeff Hartnett, dir. of technical op.; Robert Agnello, supervisor of technical eng.; Doug Schuetz, GMA eng.

National

TeleConsultants: Steve Mendel, proj. dir.; Keith DeBelius, sr. consultant; Tom Levno, sr. consultant; Yves Schanck, sr. consultant; Alex Cheng, sr. eng.; Dave Tosh, sr. eng.; Jeff Phelps, proj. eng.; Terry Priesont, dir., implementation services

Technology at work

Clarity Lion DLP displays
EVS XT2 HD/SD server
Leitch NEO servers
Miranda K2 display processors
Sony
HDC-1500 cameras
HDS-X5800 HD routing switchers
MVS-8000A HD production switchers
Zandar display processors



Converting an existing studio complex to HD is no small task, especially when the revision can't interfere with live daily two-hour network broadcasts originating from the same facility. Such was the challenge for National TeleConsultants' project team during its significant design upgrade of core engineering facilities at Times Square Studios in New York City, where "Good Morning America" (GMA) and other network programming is produced. In order to accommodate daily production of these shows, SDTV program video was switched live in a temporary mobile production trailer parked outside.

The project also included a coordinated HD/SD redesign of ABC's 66th Street master control facility, where GMA's production, news ingest, editing, playout and release control room are located. New equipment included up- and downconversion, frame syncs and HD terminal fiber gear; the facility is linked via fiber to Times Square Studios. National TeleConsultants worked under a strict requirement to limit its work at ABC's 66th Street facility to specific times of the day. The facility is the origination point for the entire network's HD programming; all work had to be done within a set schedule with no exceptions.

Times Square Studios was expanded to support two control room facilities and upgrades to two Sony HDS-X5800 routing switchers.

This expansion ensured that everything the studio was already doing in SD (and more) could also be done in HD.

The redesign included HD color correctors and Leitch NEO servers to enhance on-set graphic capabilities. Nine Sony HD cameras, connected via newly added SMPTE hybrid cabling, were installed for use in both studios as well as outdoor positions that provide TV audiences with background views of Times Square. Camera control facilities were extensively modified to support the new Sony HD cameras. An upgrade to both the GMA control room and a second control room included installations of Sony MVS-8000A HD production switchers.

The GMA control room was also outfitted with a new monitor wall employing four Miranda K2 display processors and five Clarity Lion DLP displays, along with a combination of LCD and CRT monitors to provide virtually unlimited options for viewing configurations. Zandar display processors were installed in the Control A audio room.

National TeleConsultants provided the Times Square Studios/GMA project with workflow consulting and analysis, technology consulting, technical systems design and integration, facility testing and commissioning, specialized project management and logistics. On Nov. 3, 2005, GMA viewers witnessed a technically flawless launch in both HD and SD. ■

UNC-TV's HD production facility includes multiple production control rooms



The University of North Carolina Center for Public Television (UNC-TV) contracted AZCAR for its DTV upgrade, including multiple production control rooms, transmission and studio facilities at its Research Triangle Park, NC, location.

The facility includes two Grass Valley 256 x 256 wideband digital routers, four 256 x 256 AES routers, a 128 x 128 timecode router and a 128 x 128 NVISION machine control router. AZCAR designed and installed two HD video production control rooms with Sony MVS switchers and accompanying multichannel (5.1 surround) audio production control rooms using Solid State Logic audio consoles. Each SSL C100 Digital Broadcast Console was equipped with 128 digital inputs/outputs.

Additional major components of UNC-TV's production capabilities include Sony HD studio camera systems, Chyron HyperX HD graphics and XClyps clip store and an RTS ADAM intercom. An advanced multichannel audio edit room uses Digidesign's ICON control surface. The network also required multiple audio configurations with support for closed captions, SAP and ancillary data. The inter-format dubbing and production area used Sony HDW-M2000 VTRs and Leitch signal processing, format and ratio conversion equipment systems. Teleprompter and CG systems use a MOS interface to the ENPS newsroom system.

A major challenge for the upgrade was to transition legacy digital systems to the new facilities and to maintain all production and Network Operations Center (NOC) on-air operations without interruption. This project took more than nine months to complete. The company pre-built some major sub-systems in Pittsburgh and was on-site for almost six months. During this time, the network continued to operate without any loss of production or on-air time. The facility design required ultimate flexibility. Either of the two video and two audio control rooms can access both studios and any combination of eight HD studio cameras.

UNC-TV's NOC provides outgoing feed support for 1080i and four, or more, 480i SD services. These services are provided on a 24/7 basis to the statewide transmitter network, cable systems and Direct Broadcast Satellite systems (DBS). UNC-TV is North Carolina's statewide digital public TV network and operates 11 NTSC transmitters, 11 ATSC transmitters and 23 NTSC translators. ■



Category

New studio technology
— HD

Submitted by

AZCAR

Design team

AZCAR: Jim Naughton, lead design eng.; John Jay, proj. mgr.

UNC-TV: Kip Campbell, dir., new technologies; Charlie Allen, chief eng., studio

Technology at work

Avocent 64X64 KVM switching
Canon XJ25X6.8 lenses
Chyron
HyperX HD graphics
XClyps clip store
Digidesign ICON control surface audio edit system
Evertz MVP multi-image system
Grass Valley SMS series AV routers
Ikegami HTM-1505R video monitors
Leitch X75HD processors
Solid State Logic C100 series audio console
Sony
HDC-900 series HD studio cameras
HDW-M2000/1 HDCAM VTR
MVS-8000 switcher
LMD230WS LCD monitors
Telex/RTS ADAM intercom
Vinten Quattro with Radamec pan and tilt heads



WGBY-TV delivers HD programming with redesigned studio control room

Category

New studio technology
— HD

Submitted by

Ross Video

Design team

WGBY-TV: Rus Peotter, general mgr.; Lynn Roginski, deputy general mgr. and dir. of content delivery; Ray Miller, chief eng.; Chris Schwantner, dir. of info. technologies; Bill Rhodes, dir. production services; Keith Clark, local production mgr.; Dave Fraser, assistant local production mgr.; Ray Laferriere, sr. editor; Marc Rhinehart, sr. dir.; Mark Langevin, videographer, video/ videotape op.; Jay Buckley, editor

Technology at work

Avid Pinnacle Deko 1000 Ikegami
HDK 790 E cameras
V-LCD monitors
Harris/Leitch NEXIO XS
3600HDI server
NVISION NV9601 router
Panasonic
AJ-HDX 400 camera
HD-1200A
DVCPRO, Betacam SP
Ross Video Synergy MD production switcher
Toshiba
P32LSA 32in LCDs
P27LSA 27in LCDs
Zandar Predator multiview signal distributor



WGBY-TV is a public TV station in Springfield, MA, that produces more than 120 hours of local programming annually. The plant was revamped to a multichannel facility with one HD and four SD channels.

The design team's goal was to create a production facility with the ability to produce local programming in HD while maintaining current operations during the transition.

First, the station created a mock layout of the proposed new production control room. WGBY staff contributed input regarding layout and equipment decisions. Based on the feedback, a new production control room was designed and equipment purchases began.

Because the new facility would need larger monitors to accommodate the 16:9 format, additional space was needed. The station cut back an existing riser that supported the CG/prompter positions and altered the assistant producer's workstation, which created the additional space. This enabled the technical staff in the control room to clearly view all production elements.

An existing linear suite was converted into a fully functional backup control room. This space had similar equipment to the older control room and allowed WGBY to keep its local programming on-air during the transition.

The main production control room was completely gutted. The space was renovated

with new cabling to accommodate both digital and analog communications. Forecast Consoles provided the main support consoles. Ross Synergy provided a two M/E Synergy MD switcher. Once the switcher was in place, the team began rewiring the room.

The Synergy switcher was an integral part of the transition, and plays a major role in future broadcast capabilities. The switcher gives staff the ability to integrate additional production equipment and provides more potential to deliver quality programming.

WGBY supports content for satellite feeds and teleconferences, as well as media distributed on the Web. The station also revamped edit facilities and field acquisition gear.

Panasonic AJ-HDX 400 field cameras acquire content in 1080i HD DVCPRO format. That material is then captured in the Avid Adrenaline suites and edited in either 4:3 SD, 16:9 SD or HD. The content can be played back in the HD control room via an HD deck or captured in the server. WGBY purchased an Avid Pinnacle Deko 1000, which is connected to the Avid Unity, giving the ability to move graphic components and motion elements from one location to another.

On Oct. 9, 2006, WGBY began broadcasting five nights a week of high-quality, locally produced programming in HD. The new control room is well equipped to handle any type of production well into the future. ■

New router helps CDOT, police and Homeland Security keep Charlotte streets safe



When the Charlotte Department of Transportation (CDOT) needed to facilitate traffic during a street construction phase, it set up a camera monitoring system. Capturing video of the streets and traffic light patterns, the cameras linked to a small router in the CDOT's headquarters.

Later, when the Charlotte police department wanted to monitor accidents and other city incidents, the CDOT shared its network and helped create a police observation center. Then, as Homeland Security plans in Charlotte came to fruition, the network had yet another use. With the addition of the Homeland Security program, the network needed a larger router to handle the versatility and the capacity from the three projects. It needed a router with a higher frame rate because it didn't want the picture to break down during transmission.

Systems integrator ClarkPowell recommended Sierra Video Systems' Sequoia router not only for its high-quality switching capabilities, but also because of the company's Trade-Up program. The program allows a system credit based on the age and price of the original Sierra Video system. The program was designed to ensure that customers could grow with their product investments.

The Sequoia is the glue for all three projects in Charlotte — the CDOT, police monitoring

and Homeland Security. Currently, the system uses a 256 x 256 router, but a larger capacity unit, such as a 512 x 512, will be needed within the next two years.

The system includes 96 cameras throughout the city. Fiber-optic cable connect back to the Sequoia router in the control center, and video signals are sent to various displays for monitoring. The system also has storage capacity for up to 64 cameras so that police videos can be searched and archived as needed.

Although each department can operate another's cameras, network control must be enabled by the individual departments in order for someone else to use it. The police control center, which has 10 flat-screen displays that can be split into four screens each, is staffed with people to monitor the video during peak hours, as well as during city events.

The network encompasses projector screens and flat panels both at police headquarters and in dispatch areas, as well as two dozen 20in video monitors and an 84in subdivided projector screen at the CDOT control center. Selected officials at the CDOT's headquarters also have display monitors in their offices.

The system is based on an open architecture made up of routing, displays, distribution and storage, with lots of room for vertical growth — and a variety of opportunities for other agencies to get on board. ■

Category

New studio technology
— non-broadcast

Submitted by

Sierra Video Systems

Design team

ClarkPowell: Bob Carswell, system design eng.; Marty Meredith, business development

Technology at work

Draper rear projection screen
Sierra Video Systems Sequoia router
Sony
Flat-panel displays
Projector
Video monitors



Enon Tabernacle Baptist Church's massive HD multimedia facility

Category

New studio technology
— non-broadcast

Submitted by

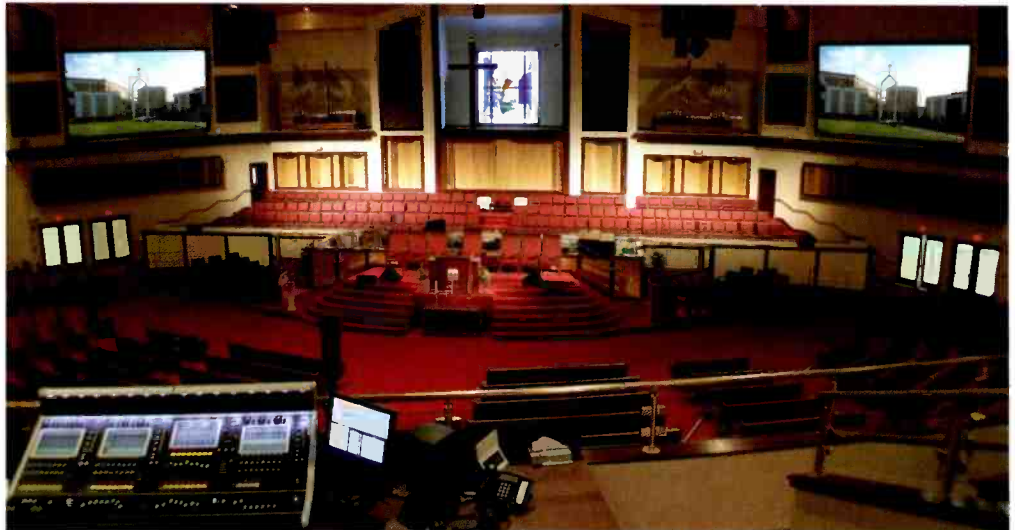
AZCAR

Design team

AZCAR: Norman J Cleary, sr. consulting eng.; Lawrence St-Onge, lead/audio eng.; Thomas Moorhead, video eng.; James Viviano, proj. mgr.

Technology at work

Aviom mixing system
Christie LS+58 projectors
Crestron control system
DiGiCo
D5 Live audio console
DS-00 audio console
Evertz
5600 sync and frame
+HTG HD-SDI test
signal card
+STG SDI test signal
card
LG
MU-50PM1M plasmas
MU-60PZ95V plasmas
Meyer
MSL4, UPA-1P speaker
cabinets
700HP subwoofers
Panasonic AJ-HD1200A
Pinnacle Deko 1000HD
Pioneer PRV-LX1
Ross Synergy switcher
Sony HDC-X310
Soundweb London
BLU80 DSP, BLU32 DSP
processors
Telemetrics
PT-HP-S2, PT-CP-S2
pan/tilt heads
CPS-ST-S camera
control system



Success brings both rewards and challenges. After the congregation of Enon Tabernacle Baptist Church grew to 7000 members, a new facility was necessary. AZCAR was chosen to help define, engineer and deploy the technologies necessary to support a new 94,000sq-ft facility. The challenge was to develop audio, video and graphics systems capable of elegant productions when operated by non-professionals.

Music set the quality standard for the sanctuary sound system design. The DiGiCo D5 Live, 96 input front-of-house console, and the DS-00 post-production digital audio console address the challenge posed by a program of this size and complexity.

Meyer MSL4 two-way high directivity cabinets and UPA-1P active cabinets make up the stereo speaker clusters. UPA-1Ps are also used for choir monitors and distributed delay. Meyer 700HP active subwoofers complete the main speaker system configuration. Soundweb London BLU80 and BLU32 DSP processors drive the sanctuary speaker systems. Aviom personal monitor mixing is provided for all musicians.

HD 1080i is the production and internal distribution video format. Two 136in x 240in projection screens powered by Christie LS+58 projectors with HD-SDI input modules flank the choir and pulpit. Ten 50in LG MU-50PM1M plasma screens are positioned

for under-balcony and choir viewing, and one 60in LG MU60PZ95V is located at the balcony rail for viewing from the pulpit. Displays are driven by an HD-SDI distribution system.

Staffing was a major consideration in the decision to deploy a Telemetrics touch-screen controller and three-camera robotic system. Cameras include a Sony HDC-X310 box camera with HFU-X310 fiber interface. Recallable real-time motion and 160 pre-settable shots per camera require only one operator.

Graphics for both the sanctuary video screens and the video program stream are generated using two systems: Pinnacle Systems Deko 1000HD and EasyWorship.

The multipurpose venue called for a substantial AV component to the video systems design. Format compatibility with analog and digital formats was necessary. The facility includes a Ross Synergy 1.5MD digital switcher. Crestron touch-screen control, with custom GUI, control HD-SDI and RGBHV analog video routers, and other devices.

HD mastering and tape playback use Panasonic AJ-HD1200A recorder/players. An HD Final Cut Pro Studio NLE suite is being added to the facility. The program stream is also downconverted to SD and recorded on a Pioneer PRV-LX1 with SDI input card. This allows simultaneous recording on a hard drive and dual DVDs for high-speed DVD duplication immediately following a service. ■

Modeo's mobile television network: The next-generation broadcast center



Crown Castle International lauched a mobile TV network, Modeo, using 5MHz nationwide spectrum acquired from the FCC.

AZCAR provided systems design and technology integration services. The goal of the project was to develop a DVB-H-based broadcast center that met the challenge of delivering high-quality content to mobile devices.

The greatest design challenge was to bring together the latest in traditional broadcast and next-generation mobile TV technology into a cohesive, efficient broadcast center supporting dozens of mobile content channels and file services.

The facility supports the ingest of many different content types and sources to include both linear and nonlinear content sources delivered by satellite and IP-based transport services. Fixed-mount Patriot antennas and a multibeam Simulcast antenna from ATCi provide simultaneous reception of all satellites in the geostationary arc. All L-band signals are transported from the antenna farm to the broadcast center using Force fiber interfaces.

Content source channels specifically repurposed for the project are streamed via IP using MPEG transport interfaces with FEC, and have provided faultless QoS during trials.

In addition to the linear feed ingestion, file-based delivery, encoding, storage and playout is being implemented using an Omneon Spec-

trum server, as well as Telestream and DRM encryption servers, which will allow flexibility in the customization of content.

Grass Valley provided the core linear channel compression and IP encapsulation systems. ARGOS encoders are tailored specifically for the demanding compression requirements for mobile platforms. The compression system is deployed in an N+M redundant configuration, with fully automatic service restoration provided by a Lazulite management platform.

Electronic service and program guides are generated and managed using Penthera Broadcast Center. The Penthera servers inject control and services data into the multiplexed digital transmission stream.

All systems are continuously monitored by a comprehensive control system that includes Evertz VistaLINK, which monitors the baseband and network distribution systems, and Lazulite, which manages the encoding and encapsulation systems. In addition, all incoming and outgoing programs are presented on an Evertz MVP, which provides continuous confidence monitoring of the service and allows rapid resolution of service queries.

The project was successfully completed in early 2006, with ongoing upgrades and changes supporting shifting network requirements and content channel lineup as Modeo moves from user trials to commercial launch. ■

Category

New studio technology
– non-broadcast

Submitted by

AZCAR

Design team

AZCAR: Tom McDonough, sr. consultant, lead proj. eng.; Greg Abel, proj. eng.; Dave Coopey, pro. mgr.

Modeo (formerly Crown Castle Mobile Media): Matt Sturgill, VP Pittsburgh operations, Modeo Broadcast Center; Johnny Village, Crown UK technical consultant

Technology at work

ATCi Simulcast antennas
Avocent AMX5010 KVM switches

Evertz
MVP multi-image processor
500/7700 Series modular VistaLINK system management

Force
2990 L-Band fiber transmitter
3000 L-Band fiber receivers

Grass Valley
ARGOS WM9 encoders
Concerto SDI switcher
Encore control
Lazulite management
Omneon Spectrum server
Patriot satellite antennas
Penthera Broadcast Center ESG server
Telestream Flip Factory



PhRMA's new studio makes creative use of space in historic building

Category

New studio technology
— non-broadcast

Submitted by

Communications
Engineering Inc. (CEI)

Design team

CEI: Vince Forcier, project mgr./lead design; Jay Wood, eng.; Larry Tai and Harry Arter, integration

PhRMA: Ken Johnson, SVP, PhRMA Communications and Public Affairs; Kevin Barbour, dir. of broadcast services, PhRMA Communications and Public Affairs

Technology at work

Apple Final Cut Pro Studio HD
Chyron MicroX CG and graphics system
Evertz VIP video monitoring and display
Grass Valley Kayak-DD-1 production switcher
Leitch Panacea SDI and AES routing
Sony
DXCD50WS cameras
HDWS280 HDCAM recorder
MSWM2000/1 MPEG IMX VTR
Vinten Multicontroller II robotic camera control system



The Pharmaceutical Research and Manufacturers of America (PhRMA) represents the country's leading pharmaceutical research and biotechnology companies. Its mission is to conduct effective advocacy for public policies that encourage discovery of important new medicines for patients by pharmaceutical/biotechnology research companies.

To assist with the dissemination of its message, the company hired systems integrator Communications Engineering Inc. (CEI) to provide a turnkey design and integration solution for a new studio, control room, field production and edit systems.

However, the company's headquarters presented significant challenges to designing and building the facility. The association is located in a historic building in downtown Washington, DC. Space was limited, and preservation guidelines allowed only minimal alterations. The entire project area consisted of a 220sq ft room for editing, production control and all support equipment, and for a 525sq-ft studio in an adjacent room.

The studio lighting systems were designed for a grid height of only 9'6". Additionally, five portable/desktop Apple Final Cut Pro nonlinear edit systems were installed. Due to space requirements, the facility also had to be capable of being operated by a small staff.

The design maximized the available space

while still providing all the required features. The facility has full bandwidth connectivity to Verizon's Audio Visual Operations Center (AVOC). It provides instant access to all major networks, major media plants, Capital Hill and several commercial teleports. PhRMA can instantly respond to any event that affects the companies it represents.

A single control room accommodates traditional studio productions and nonlinear editing. The innovative layout and design allows high-quality production that usually requires two to three times more space. The Evertz VIP multi-input display processor allows easy reconfiguration between studio production functions and editing.

The studio and control environments are fully integrated into the facility's Video Teleconferencing (VTC) systems. The integration includes full IP control and return routing to studio monitors. Multiple current and legacy VTR formats are supported, and DVD authoring capabilities allow another means of connecting with the audience.

By combining dynamic design work with leading-edge technology, CEI and PhRMA were able to create a comprehensive facility that helps the company fulfill its mission while still maintaining the integrity of its historic environment. ■

Resurrection Life Church expands with new user-friendly control room design



Resurrection Life Church in Grandville, MI, had a rapidly growing congregation and limited seating, so it was imperative that the church build a new 4300-seat auditorium. The expansion included an auditorium, a concourse between the new and old facility, a chapel, a choir room and a TV control room with broadcast audio capability, to give both the attendees and television/Web stream viewers a high-quality experience.

Challenges to the new facility included inadequate lighting and audio design, and the need to create connectivity between the old post-production facility and the new control room, which houses an Avid Unity system. This required some creative design to include fiber-optic runs of more than 700ft. In addition, the Avid editing systems needed to connect to the two ingest AirSpeeds as well as the playback AirSpeed over the same distance.

Everything is digital in the new control room except the live audio feeds from front of house and TV audio. The television audio consists of a DiGiCo DS-00 digital mixer, two Otari 48-track hard-disk recorders/editors and a Digidesign Pro Tools HD2 workstation, TC Electronic Finalizer and other assorted items all connected to the Unity.

Making the control room and engineering area volunteer friendly required forethought. The entire production centers on the Ross Synergy 3 switcher. The switcher controls

eight cameras, a Deko 3000, AirSpeed server and tape decks, as well as other graphic and video inputs. The switcher allows many of the church service elements to be prebuilt through custom controls. The switcher is easy to operate, which is especially important for the volunteers assisting with production.

Directly in front of the switcher, the technical director faces two 40in LCD Kaleido multiview displays, four 20in LCDs for broadcast/IMAG program and preview, as well as other assorted confidence monitors.

The real workhorse for the system is the terminal room, which houses tape decks, ingest and playback servers, camera controls and routers. This equipment helps terminate hundreds of miles of audio and video cabling.

A homegrown graphics system was used prior to the purchase of the Deko 3000 unit. The decision was to go SD for video acquisition and where it was feasible upgrade to ATO high-definition. The new 72x HD lenses for the two center cameras offer a big advantage. The future flex fiber installed is future proof for high-definition.

The facility is set up for 16:9, which has only caused a few problems with the special event performances with 4:3 requirements.

Eventually Resurrection Life Church intends to go HD. The congregation's feedback to the new services has been positive. The facility provides an entirely new experience. ■



Category

New studio technology
— non-broadcast

Submitted by

Ross Video

Design team

Resurrection Life Church: Joe Tucker, exec. producer/dir.; Tim Ostrom, production mgr. and TV sys. eng.

Holland/Simpson: Jon Simpson, consultant

Verdier Ventures: Jacques Verdier, design eng.

Acoustic Dimensions: Craig Jenson, owner; Robert Rose, proj. mgr.
Avid: Tony Arata, channel mgr.; Becky Phelps, sr. consultant;

Lighting Design: Dale Mauck, lighting designer

Jones & Phillips: Ted Paget, lighting designer; Naomi Ybarra, lighting designer

Signasys: Jim Borgiola, sr. eng.

Technology at work

Avid
Pinnacle Deko 3000
Media Manager
Unity media network
AirSpeeds
Express Pro upgrades
Cammate Systems 2000 series cranes
Grass Valley
LDK 500 cameras
LDK 500 camera
Miranda Kaleido-K2
Ross Video
Synergy 3 switcher



Rogers Television's new nine-channel master control facility

Category

New studio technology
— non-broadcast

Submitted by

Sundance Digital

Design team

Rogers Television:

Pierre Fortin, national mgr, production eng.;
Jim Montgomery, sr. sys. designer

Sundance Digital:

Eric Harrington, dir. of eng. and customer support; Kurt Caruthers, dir. of sales, Canada and the central region

Technology at work

Harris/Leitch

Integrator Gold router
NEXIO servers
X75 synchronizers
SuiteView multidisplay processor
Inscriber RTX
Sundance Digital Titan automation



Several years ago, Rogers Television acquired cable operations in New Brunswick, with six TV stations operating on a rudimentary system of manual tape playback and router switching. The stations broadcast a total of nine channels in addition to a couple of basic network feeds originating from Moncton.

Management saw the opportunity to take advantage of the existing fiber-optic interconnections between stations, upgrade to a modern automation system and centralize playback in one master control location. It also wanted to continue having live programs originate from stations in the cities of Moncton and Bathurst, which both broadcast two channels (one in English and one in French), Saint John's, Fredericton, Edmundston, Acadian Peninsula and Miramichi. These stations produce almost all of their content in-house. They do not use syndicated programming, or accept paid advertising, but run regular breaks and promotional spots.

After deciding to automate at a centralized master control, Rogers began evaluating automation systems. Sundance Digital's Titan automation was selected because the system is modular, IT-based and has the flexibility to go easily beyond nine channels if more channels are needed in the future.

On the first floor of the Moncton facility, the old master control was left intact while a

larger area was gutted on the third floor to accommodate the newly designed facility. The larger space was necessary because the old station was only playing out four channels at the time, and the new master control would be handling all nine for the province.

Today, the Rogers Moncton master control has consolidated nine playlists, all handled by a single master control operator for the entire province. Each of the six cities is tied via fiber to Moncton and can inject live programming into their playlists along with a mix of server program content and planned breaks coming off the Harris/Leitch NEXIO servers. Now there are only a few tape roll-ins a day. Each playlist is encoded in MPEG and distributed around the province to the individual head-ends for distribution to the cable systems. The old master control was recycled into new office space.

The new master control facility has improved productivity. People who used to deal part time with tape playback are now free to focus their efforts on creating program content. In a small system, this reclaimed time is substantial. More importantly, playout is smoother and delivers a more professional product to the cable subscriber. If Rogers adds more French language channels, they can be accommodated. The facility is engineered for five more SD channels, although the router core is SD/HD, and the video servers can be upgraded to HD. ■

SES AMERICOM expands its satellite services with new IP video service



SES AMERICOM's new IPTV distribution service, IP-PRIME, leverages both satellite and fiber networks for secure and reliable delivery. The service has already garnered widespread interest and real-life deployments among large and small telecom operators across the country and around the world, who until now have faced major financial and technical barriers to adding IPTV to their service portfolios.

The SES AMERICOM IPTV broadcast center in Vernon Valley, NJ, is an open IPTV distribution platform, which offers IP-PRIME customers the ability to choose among IPTV technology providers and their components, including set-top boxes, security, conditional access, encoding and network monitoring, and middleware from innovators such as Amino, Harmonic, IDC, NDS, Scientific-Atlanta and Siemens. Scientific-Atlanta provides multiple key technologies in support of IP-PRIME, including an MPEG-4 HD and SD encoding system and network monitoring center — all fully integrated and operational — and its ROSA Network Management system.

By the time IP-PRIME makes its commercial debut in early 2007, it will offer more than 300 SD and HD channels. The National Rural Telecommunications Cooperative, representing more than 1000 rural and independent telecoms throughout the United States, is already deep into successful end-to-end IP-

PRIME trials in four markets across the country. The service delivers from the point of IPTV programming origination all the way to the IPTV set-top box in the consumer home.

Meanwhile, BellSouth has been trialing the second flavor of IP-PRIME for more than a year — the transport of IPTV content to the telco's video hub, where it is handed off to BellSouth for delivery to authorized subscribers. The quick and affordable delivery of IP-PRIME programming requires more than a technologically advanced solution, it also relies greatly on SES AMERICOM's established relationships with worldwide programmers and networks.

IP-PRIME represents a significant advancement in the efficient DSL delivery of high-end video services to the home. By transporting quality video over a reliable and secure hybrid satellite/fiber distribution network to authorized IPTV telecom hubs, it arms phone companies of all sizes with a cost-effective solution for delivering voice, broadband and video over a single line to the home. The solution enables telecoms to bypass extensive and expensive fiber installations and accelerate their IPTV initiatives by months, even years.

More than 30 TV programmers and networks representing 300 video and audio channels have signed IPTV transport agreements, and the IPTV solution is ahead of schedule as it approaches its commercial launch. ■



Category

New studio technology
— non-broadcast

Submitted by

Scientific Atlanta

Design team

Scientific Atlanta: Tom Beachem, sr. sys. eng., digital media networks; Vance Cook, dir. of sys. eng., digital media networks

SES AMERICOM: Alan Young, CTO; Bryan McGurick, president of media and enterprise solutions; Steve Osman, IP-PRIME design and marketing; Ramiro Reinoso, IP-PRIME engineering

Technology at work

Amino AmiNET 130 IPTV set-top boxes
Harmonic ProStream 1000 with ProCipher AES scrambling and bulk descrambling technology
IDC DVB-S2 satellite receivers
NDS
Metro middleware
Synamedia IPTV software
Video Guard conditional access
Scientific Atlanta D9034, D9154 MPEG-4 HD/SD encoders
ROSA Network Management and Control System
Siemens middleware powered by Myrio



The Tribune media center consolidates and maximizes production

Category

New studio technology
— non-broadcast

Submitted by

The Systems Group

Design team

Tribune Broadcasting:
Ira Goldstone, VP/chief technology officer; Cissy Baker, Washington bureau chief; Jack Devedjian, facilities mgr.; Don Rooney, proj. mgr./eng.; Chris Novack, dir. of eng.; Derek Danilko, associate eng.

The Systems Group:
Scott Griffin, VP of eng.; Carl Van Dusen, proj. mgr.; James Tome, proj. eng.; Christian Freeman, integration supervisor; Matt Marino, lead technician

Technology at work

Evertz
MVP monitoring
7700 and 500 series
modular cards
Grass Valley
Encore routing control
Venus SDI and port
routers
M-Series servers
DNP production suite
Leitch DPS-575 and X-75
syncs
Mackie 24-8 bus mixers
Quintech L-band routing
Raritan Paragon KVM
matrix
Sony DFS-700 switchers
Tektronix WVR
rasterizers



In fall of 2005, Tribune consolidated its Washington, D.C., publishing and broadcast bureaus into a single facility on the seventh floor of the historic Woodward & Lothrop Building. The Tribune media center houses bureaus for Tribune Broadcasting and Tribune newspapers such as the *Los Angeles Times*, the *Chicago Tribune* and *Newsday*. The Systems Group (TSG) designed and integrated Tribune Broadcasting's TV news bureau into the media center.

TSG was charged with updating the bureau to a digital infrastructure, integrating key pieces of legacy analog equipment, providing extensive satellite downlink and uplink capabilities and improving workflow through server-based nonlinear editing and playback. A key consideration in equipment selection and system design was operational simplicity for the staff.

The Grass Valley DNP platform was chosen for its integration of desktop editing, ENPS interface, and server-based recording and playout with M-Series servers. An SD-SDI facility router using embedded audio ties the new digital systems to islands of analog equipment converted with Evertz modular cards.

Two operationally identical control rooms include Sony DFS-700 switchers and Mackie 24-8 bus mixers to allow the bureau to provide two simultaneous feeds to its more than two dozen sister stations across the country.

An Evertz MVP system provides control room operators with flexible video monitoring of feeds with 40 video inputs driving three large DLP screens. A Raritan Paragon KVM matrix (for 16 users and 64 computers) connects operators in control rooms, the news desk, and to resources in the equipment room.

Vincor installed four steerable satellite dishes ranging in size from 3.6m to 4.9m on the rooftop. The 4.9m dish is used daily for uplinks to Tribune stations, including from Boston, New Orleans and Sacramento, CA. CompuSat software by Image Engineering controls primary and backup devices in the uplink chain, as well as satellite receivers and Quintech L-band routing for downlink signals. Incoming feeds from satellite, microwave, fiber and WAN are converted and synchronized by Leitch DPS-575 and X-75 frame synchronizers.

To support the bureau's publishing and broadcast newsrooms, the local cable television feed is supplemented with 30 channels of in-house material, including national satellite news and feeds from the House and Senate chambers. This augmented cable channel line-up is distributed to each desk in the media center.

Tribune's new facility makes optimum use of the updated digital infrastructure and ensures the smoothest possible workflow. ■

CHUM broadcast center in Toronto automates its music video storage



The CHUM broadcast center in Toronto operates 24 TV channels and produces a large portion of its own content. As the broadcaster moved toward facility-wide use of file-based platforms, the tens of thousands of hours of content requiring storage made asset management and archiving a significant element of the network's upgraded operations.

CHUM operates six music video services, and the assets for those channels alone comprise 45,000 music videos.

Prior to deploying a Front Porch Digital DIVArchive system along with a Harris DAM system, the network's on-air personnel and producers had to sign out all the tapes they needed, take them back up to a viewing bay equipped with a VTR, find the part of each tape they needed, dub those segments off the tape and return the tapes to the library.

This process was time- and labor-intensive. The solution was to dub tapes that needed to be reviewed, evaluated or copied in part, but with thousands of dubs being made each year, the cost of supplying and working with tapes added up.

As the network grew, engineers installed more server-based systems, which moved the company toward file-based operations. Now, with an archive system in place, each of these transfers represents an opportunity to capture and store media for future use. All media as-

sets are ingested through a combination of Pinnacle, Leitch and Grass Valley broadcast servers, and are available on users' desktops throughout the facility.

Front Porch Digital's integrated BitScream transcoder enables in-path transcoding of high-res files off the servers to create Windows Media 9 low-res proxy files, which are made available at the desktop by the storage and management systems. Closed-caption information extracted from transcoded video is searchable as well.

The partial-restore functionality of the archive allows users to lift short segments out of longer pieces using time code data. These tools have eased the process of locating and accessing content. Desktop browse, search and transfer capabilities allow the network to maximize the creative resources within its 42 edit suites by reducing ingest time.

Digitized content is stored on two robotic tape systems. The network's music video library is stored on an Asaca 1450 system with 1450 DVD optical RAM disks providing 14TB of storage. A Sony PetaSite is dedicated to long-form storage, and has six SAIT drives to provide 6000TB of storage.

The archive has been online for two years, and the network has already expanded the capacity capabilities of the system, and soon plans to capture raw footage from its electronic field production units into the archives. ■



Category

Station automation

Submitted by

Front Porch Digital

Design team

CHUM: Bruce Cowan, dir. broadcast technology; Lane Steinhauer, mgr. broadcast eng.; Brad Schroeder, sr. broadcast sys. eng.; Richard Powrie, sr. broadcast sys. eng.

MuchMusic: Neil Staite, dir. of operations

Technology at work

Asaca AM-1450 library with DVD-RAM optical disk

Brocade SilkWorm 3800 and 3250 fiber channel switches

Cisco 3750 Ethernet switches

Front Porch Digital BitScream transcoders
DIVArchive archiving system

Grass Valley Profile SD and HD servers

Harris Invenio DAM browse clients

Harris/Leitch VR-400 servers

IBM e-series x346 servers, actors and transcoders

Nexsan ATAboy
Pinnacle MediaStream servers

Sony SAIT PetaSite



KGW-TV updates automation and servers, preparing the station for future growth

Category

Station automation

Submitted by

Sundance Digital

Design team

Belo: Craig Harper, exec. dir. of tech.; Reed Wilson, tech. mgr.

Beck Associates: Bill McKenna, dir. of eng.

Sundance Digital: Robert C. Johnson, president; Eric Harrington, dir. of eng.; Niambi Atamah, mgr. of training and customer communications

Grass Valley: Sam Peterson, mgr. technical sales

KGW-TV: Eric Dausman, dir. of eng.; Tim Kerr, asst. chief eng.; Josy Ansley, op. mgr.

Technology in action

Grass Valley

K2 servers

M2100 SD MC switcher

M2100 HD MC switcher

Trinix 128 x 128 router

Encore controller

Sundance Digital

IntelliSat satellite

antenna scheduler

Titan Air station

Titan list processor

Titan sync processor

SQL server

Prep Stations

DataMover

SIDON controllers

Telestream Flip Factory

Videotek Legalizer

Wohler AMP1-S8 audio

monitors



When the automation and servers are eight years old, no longer supported by the manufacturer, and the servers lack the storage capacity for a growing facility, it's time to explore new options. This was the case for KGW-TV, a Belo station in Portland, OR.

The station determined that Sundance Digital Titan automation offered the best technology and operational flexibility, along with solid support and a favorable pricing structure. The decision on a replacement video server, however, was up-in-the-air until Grass Valley approached KGW with the opportunity to be the first facility to install its new K2 series — an advanced IT-based media server and client system designed specifically to share and reuse digital media assets.

The new Titan and K2s went on-air smoothly in January 2006, with only the typical speed bumps associated with training everyone on new gear and user interfaces. Since then, the system has been extremely reliable. Titan automation and K2 servers currently support five different program streams: KGW's analog and HD channels, NBC's Weather Plus channel with commercial insertions, interstitials for the Portland Zone of Northwest Cable News (Belo's 24 Hour cable news channel) and cut-ins for CNN Headline News.

KGW's program streams are managed through Titan's Air Control interface and are

specifically designed to give master control operators an information-rich GUI for multichannel, server-based playlist supervision. The main screen features a horizontal timeline overview of all active channels, as well as a separate area for playlist-specific details.

Secondary FlexEvent actions are displayed adjacent to each element to help visualize when their triggers will occur. Playlists have individual security rights, enabling authorized users at any Air Control station — either locally or remotely — to select, view, manage and control any channel from any list processor visible within Titan's network domain. KGW's automation system also includes a facility-specific traffic interface to OSI, the group's preferred vendor. All software was pre-installed on 4RU, enterprise-grade Pentium-based Windows workstations with mirrored hard drives and redundant, hot-swappable power supplies for greater reliability. Redundancy was further enhanced using Sundance TitanSync with auto-failover capability and a fault-tolerant external SQL data server.

KGW plans to expand on-air services in the future, and its present Titan configuration can readily accommodate more channels. Titan can manage a number of list processors and playlists in high channel count environments. When the time comes, the system will be easy to upgrade with additional K2 server capacity and Titan automation components. ■

Trinity Broadcasting Network inspires with automated master control across 32 affiliates



Two years ago Trinity Broadcast Network (TBN) needed to find a way to comply with new FCC regulations for digital television. TBN also wanted to use this upgrade to enable affiliate stations to receive network feeds and insert local programming and interstitials.

The exceptional size and scale of the project led the network to seek out help from systems integrator TV Magic. TV Magic designed an inexpensive but flexible automated master control system that supports five DTV channels and allows for unattended operation. TV Magic also installed that system across all 32 of the network's affiliate stations throughout the United States. The time frame from design to installation for the project was 18 months.

For each unique TBN affiliate, a separate full-power master control system was designed, built, tested and configured. TV Magic coordinated its field crews with stations to ensure timely receipt of gear, installation, cutover and training. TV Magic crews traveled from site to site to install the new systems into each station, often working around obstacles including limited space and ongoing operations. The systems integrator performed on-site operator training as part of the install, and TV Magic engineers provided telephone-based technical support for any operations or engineering issues at the affiliate stations.

Each system includes a multichannel server

with ingest and playout, branding with squeezeback, a character generator and logo insertion, plus EAS, and other FCC compliance — controlled through a flexible automation system. A customized Sundance Digital Titan automation system enables the unattended operation capability desired by TBN. The integrated broadcast system also incorporates Miranda terminal gear and Imagestore channel branding processor, Masstech loggers, 360 Systems or Omneon media servers, and Keywest Technology secondary logo insertion and EAS systems. The system is housed in two full-sized APW racks.

While TBN stations will continue to do some local ingest and production, the automation system was built with Miranda's iControl system so that the network can develop remote monitoring capabilities that will provide much greater control over station operation from the network's new master control facility in Tustin, CA. This will enable off-site engineers to see and fix problems before affecting the on-air signals.

The automation of all 32 affiliate stations presented a technical challenge in designing a system that could be adapted to each facility's existing infrastructure, and installed in a compact time frame. The new automation supports the network's current broadcast goals and will facilitate more sophisticated control capabilities in the future. ■

Category

Station automation

Submitted by

TV Magic

Design team

TV Magic: Gus Allmann, design eng.; Dan Allmann, proj. eng.; Richard Craig, on-site eng. and installation supervisor;
TBN: Ben Miller, VP of eng.

Technology at work

360 Systems Image Server 2000
Key West Technology Logostar LGST-200 LGS
Masstech MassLogger
Miranda
Densite terminal gear
Imagestore branding engines
Omneon Spectrum media server
Sundance Titan automation system



WCIU-TV increases station productivity with automation upgrade

Category

Station automation

Submitted by

VCI

Design team

WCIU-TV: Kyle Walker, dir. of eng.; Charlie Fisher, asst. chief eng.; Tony Fraveletti, Shawn Zhang, Bernie Hoelting, Dak Wudyka

VCI: James Brown, division mgr. automation; John Buszinski, professional sales, service and support; Richard Rominger, sr. quality eng.

Technology at work

Avid
Unity
DekoCast SD/HD
Bittree audio patch panels
Harmonic MV-45 and MV-450 encoders
Harris/Leitch
NEXIO video server
6800+ modular platform
NEO modular platform
X75 converter/sync
LG 50in plasmas
Marshall LCD monitors
Miranda Alto HD
Pathfire Server Connect
Pro-Bel routing and control
Switchcraft video and data panels
Telestream traffic manager
VCI Xe automation platform



Chicago independent station WCIU-TV operates six broadcast channels. Syndicated programs are a major part of the station's schedule. On a typical day, dubbing and prepping of Pathfire syndicated program content can take about 16 hours. On high-volume days, up to 50 programs need dubbing, requiring even more resources and time. To keep up with six channels, WCIU has multiple media preparation workstations — 70 devices that have to be controlled.

WCIU was looking for a solution to eliminate the need for human intervention so that Pathfire's syndicated program content could be sent seamlessly to the video server and the metadata to VCI's Xe automation platform. The station also sought an efficient way to control and manage workstations in a compact and scalable manner.

The station found solutions to both issues with VCI automation technology. WCIU addressed the issues of human intervention with the Pathfire system with Xe's Intelligent Transfer Technology. This advanced architecture and database allows the Xe system to direct the file-based workflows in today's digital operations. Xe manages and tracks content across the operation. It controls the devices to store and move content. The system moves content where it needs to go, when it needs to be there to provision the workflow requests,

including on-air channels or streams, with little or no human intervention. It moves Pathfire programs or channels rear-line, archived content to the on-air transmission chain to fulfill scheduled playout. It automatically moves expired content to the nearline archives or deletes expired content.

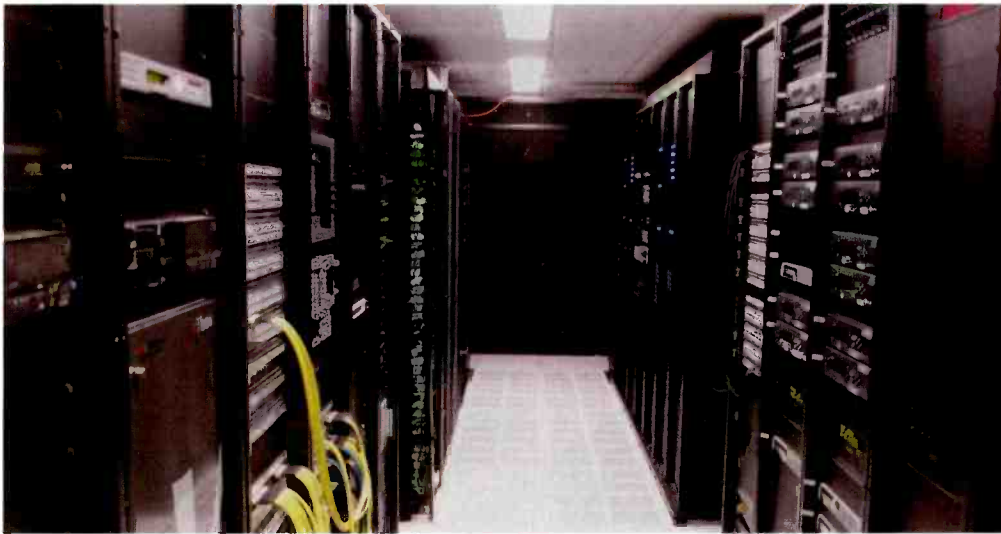
The engineering staff can now focus on areas that require engineering intervention, such as satellite downloading and quality control rather than spending time on repetitive tasks.

The Xe system also brought new efficiencies and savings from reduced video tape usage and tear and wear.

To address the device control and resource management needs, WCIU used the VCI eXtensible Device Server (XDS), a reliable IBM server with dual power supplies and system drives. A dual XDS server and three 32-port device master units use standard Cat 5 cable to communicate and connect to all 70 devices. All devices can be shared and available in a pool. They are locked when in use. The system has flexible resource management in that priorities can be set and adapted for each individual device.

The functionality of the Xe system allows WCIU to be proactive, rather than reactive. Now the station operates more efficiently and reduces the errors made as a result of manual data input. ■

MediaFLO USA's nationwide network delivers TV-quality mobile entertainment



MediaFLO USA, a wholly owned subsidiary of Qualcomm, is building a nationwide network using UHF channel 55 to deliver premium, TV-quality mobile entertainment and information services.

To make quality mobile TV a reality, the company built a nationwide transmission network and a facility that houses both broadcast and network operations. Currently, it is preparing for its service launch with launch partner Verizon Wireless in the first quarter of 2007. Content delivery specifications include a resolution of 320 x 240, supporting QVGA quality at up to 30fps with stereo audio. The company's signal will be transmitted terrestrially among the major markets using Orthogonal Frequency Division Multiplex (OFDM) and a layered modulation technique.

The company contracted Diversified Systems to develop the infrastructure requirements and workflow models for its new Broadcast Operations Center (BOC) in San Diego. Because the company integrates its services with network providers that adhere to the rigorous standards of reliability required within the telecommunications industry, high availability was a core design criterion. Maximum redundancy, monitoring and control were requirements throughout all points of the system. The workflow approach required adherence to operational simplicity, employing a maxi-

imum amount of process automation without sacrificing reliability.

Once system requirements were finalized, the systems integrator began the design and integration phase of the project. Build-out of the BOC facility began in January 2006, with a completion date of May 2006.

The facility uses a hybrid SDI/ASI infrastructure, leveraging the SCTE 30/35 standard for turnaround programming, while SDI with embedded audio is used for live events, interstitial material and originated programming.

To maintain a high degree of system visibility, Evertz Vistalink SNMP monitoring and control is employed throughout the infrastructure of the BOC. Information and channel monitoring is displayed across 18 Clarity Puma 50in displays using the Evertz MVP MultiViewer image processor. BOC personnel can manage system integrity and signal quality throughout the entire nationwide enterprise. Also core to the project is NVISION's NV-8256 Plus digital video routing switcher, as well as the NV5128-MC master control system for live events. In the SDI domain, Omneon servers running in a fully mirrored array are controlled under OmniBus automation. Lastly, turn-around channels are processed in ASI across SeaChange servers with Terayon stream groomers. ■

Category

Network automation

Submitted by

Diversified Systems

Design team

Diversified Systems:

Adam Salkin, Mike Meglathery and Gerald Kaminitz, project eng.; Duane Yoslov, VP and sr. proj. mgr.; John Bunton, lead eng.

R. Orange Engineering:

Markus Mahan, installation mgr.

The Willis Group: Willis Peligian, consultant

MediaFLO USA: Ben Higley, broadcast eng. mgr.; Fred Baumgartner, dir., broadcast eng.; Tom Mikkelsen, sr. dir., broadcast oper.

Technology at work

Clarity Visual RP
WN-5020-UXP/GV 50in displays

Evertz
VistaLink monitoring
MultiView image processor

NVISION
NV5128-MC master control switcher
NV8256 Plus digital video router

OmniBus Colossus automation system
Omneon Spectrum video servers

SeaChange Master Video Library and SpotPlus server

Terayon DM6400 digital stream management



Scripps Networks' new media logistics division enables internal content sharing

Category

Network automation

Submitted by

Omneon

Design team

Ascent Media: Brian Luscombe, proj. mgr.; Elena Gribanova, proj. mgr.; Marc Bressack, VP sales, systems integration; Steve Sabin, sr. proj. mgr.

Scripps Networks: Blake Shelton, IT operations sr. mgr.; Chuck Hurst, VP, systems development; Darryl Richards, systems eng.; Jason Norton, dir., IT operations; Jerry Nantz, chief eng., integration proj. mgr.; Joanne Woods, dir. network operations; John Ajamie, sr. VP, media logistics; Pamela Johnson, IT proj. mgr.; Scott Wilkerson, sr. systems eng.; Tim Motley, dir. duplications, QC, new markets

Technology at work

Linear Acoustic OCTiMAX 5.1 audio processor
Omneon Spectrum server
Masstech Hierarchical Storage Management system
OmniBus Systems Colossus automation
Snell & Wilcox MEMPHIS HD encoders
StorageTek nearline archive
Teranex Volare FlexView



Scripps Networks worked with systems integrator Ascent Media to transform its broadcast operations department into a new media logistics division. The company's new IT-based infrastructure serves as a platform for leveraging its growing asset library across traditional broadcast channels and emerging platforms and channels, while also enabling the sharing of content internally.

The new infrastructure provides a stable on-air platform for SD channels that were migrated onto the new playout system throughout 2006. It also allowed the network to launch Food Network HD and HGTV HD. The Food Network HD and HGTV HD programs are shot at a 16:9 aspect ratio and then ingested to an Omneon Spectrum media server via Snell & Wilcox MEMPHIS HD encoders. The encoders ingest the HDTV content, integrating two of the systems with the servers to encode all HGTV program material acquired, as well as HD commercials and promos.

The network uses one 24TB Spectrum media server to support HD ingest and two 12TB Spectrum systems for redundant playout operations. Under the control of an OmniBus Colossus automation package, the servers provide a scalable server platform that will facilitate the network's future growth and integration with systems, including the facility's Avid editing systems. Colossus manages

archiving of content from the servers via a Masstech Hierarchical Storage Management system, to a StorageTek nearline archive. OmniBus OPUS interchange software will enable data exchanges between automation and a DAM system yet to be installed.

The MXF-compliant servers allow operators to intermix SD and HD content while handling audio tracks independently. As HD material is ingested, Dolby E 5.1 audio is decoded and re-embedded as discrete tracks, which can be moved throughout the facility, without introducing delay, and then converted to 5.1 immediately prior to transmission.

The servers and Teranex Volare FlexView upconvert playout material from SD to HD as necessary, and the OmniBus system simplifies audio playout by initiating creation of upconverted stereo audio to 5.1 audio. These processes eliminate post-production work.

Interstitial content originated in SD is upconverted via the Volare FlexView, which proportionally stretches the left and right sides of a picture by 25 percent, leaving the center 50 percent intact, and doubles the resolution so that both the aspect ratio and line number are consistent with HD pictures. A Linear Acoustic OCTiMAX 5.1 audio processor upconverts stereo inputs to surround sound.

The network's new streamlined operations provides a foundation for the company's forward-looking approach. ■

WECB-TV's central multicast facility shrinks in size but grows in power



Smaller is better these days at WECB-TV in Madison, WI. On Feb. 23, 2006, WECB's new system broadcast eight channels of educational programming throughout Wisconsin and the Duluth, MN, market. Automation was the linchpin of an innovative strategic plan.

Consider WECB's situation: It serves as the central master control facility to playout SD and HD for the statewide PBS network comprised of WHA-TV in Madison, WHWC-TV in Menomonie, WPNE-TV in Green Bay, WHRM-TV in Wausau, WLEF-TV in Park Falls and WHLA-TV in Lacrosse. In addition, WECB feeds educational programming to WMVS/WMVT-TV in Milwaukee and to WDSE-TV in Duluth, MN.

To make a seamless transition from an outdated system to a new and more powerful one required some out-of-the-box thinking. WECB designed and built a new broadcast operations center. In the process, the broadcaster scrapped its old facility, 8000sq-ft with multiple control rooms and gear that was either outdated or soon to be.

WECB's new operations center is a modern, streamlined 5000sq-ft facility with a single unified master control room. It also houses a compact Bassett tape library system, a new Omneon video server and a Masstech archive system, all under the command and control umbrella of Sundance Digital's Titan, a mul-

tichannel, server-based automation system designed for geographically distributed central casting. Titan is integrated with IntelliSat, Sundance Digital's satellite feed recording and management system, as well as Sundance Archive Manager (SAM) to coordinate online and nearline media storage. Today, approximately 15 people operate and maintain an automated 24/7 multicasting operation that is smoothly integrated with the other sub-systems within the facility.

Titan automation provided WECB exactly what it needed to smoothly make its dramatic transition, the ability to update information either within the ingest application or via its ProTrack traffic system, and to keep the two critical databases synchronized. Because Titan employs a distributed processing and SQL database architecture, WECB got the resiliency it needed without a single point of failure in the system. Titan has brought much better integration of the traffic process, improved overall workflow and given WECB the ability to program more channels without increasing staff size. Most importantly, Titan has reduced discrepancies and significantly improved on-air quality.

Smaller is definitely better and even more powerful than ever. The Wisconsin Educational Communications Board is newly equipped to meet the challenges and opportunities that lay ahead. ■



Category

Network automation

Submitted by

Sundance Digital

Design team

WECB-TV: Jim Blaubach, op. mgr.; Mike Norton, sr. maintenance eng.; Phil Mikalofsky, sr. maint. eng.; Fred Sperry, transmission control coord.; Don Huggill, sr. eng.; Vicki Kipp, sr. eng.; Bonnie Briggs, TV continuity mgr.; Pete Ives, technical services mgr.; Jim Klas, dir. of media tech.

Sundance Digital: Robert C. Johnson, president; Eric Harrington, dir. eng. and customer service; Kurt Caruthers, dir. of sales, central region and Canada

Roscor: Rick Craig, project eng.; Chad Thielen, project eng.

Technology in action

Grass Valley routing
Harris/Leitch 3900 Series
conversion equipment
Masstech archive
Miranda
Imagestore
Presmaster
Omneon video server
Sony
LCD displays
HDCAM VTRs
Sundance Digital
IntelliSat
Titan automation
SAM
Wohler audio monitoring



Viacom's Supersuites allow rapid deployment of additional networks

Category

Network automation

Submitted by

The Systems Group

Design team

Viacom: Lionel Hightower, VP eng.; Mike McMakin, dir., proj. management; Tom Fumante, dir., eng.

TSG: Scott G. Griffon, proj. dir.; Bob Sharp, proj. mgr.; John Zulick, sr. systems eng.; Chris Butler, integration supervisor; Darwin Clermont, manufacturing mgr.; Rich Citelli, test eng.

Technology at work

Evertz
MVP multiview processor
5600MSC & ACO reference headend
7700 and 500 series modular equipment
Grass Valley
Trinix routing
Venus routing
Jupiter routing
Harris ADC-100 Air automation
Miranda
Imagestore SD and HD branding
Presmaster automation
NEC 61in plasma screens
Norpak VBI processing
Omneon Spectrum servers
Pinnacle MediaStream servers



Viacom Networks has maintained its Network Operations Center (NOC) in Hauppauge, NY, for more than 20 years. As the group conceived and launched new networks, the technologies used were chosen on an as needed basis.

In the summer of 2005, to accommodate a number of expected network launches, Viacom engineering conceived the Supersuite concept. The idea was to provide a common user-friendly design to accommodate all network requirements, allowing for the rapid launch of a new network within six to eight weeks of the request from operations. The new design would support a flexible, standardized and interchangeable operating paradigm so that any operator could command any channel from any workstation under a highly automated control system.

Having worked together on other critical projects, Viacom turned to The Systems Group to detail the concepts and bring the plan to life in a short four-month project cycle timed to launch the first four networks.

Supersuite supports 16 SD channels and four HD channels under the control of five monitoring positions, all under the watchful eye of a single supervisor in the NOC control room.

The Supersuite uses a robust technical

core, consisting of Harris ADC automation, Grass Valley routing (Venus/Trinix matrices under Jupiter control), Evertz 500 and 7000 series modular products and MVP multi-image processing, via NEC 61in plasma screens on custom mounts provided by Forecast Consoles. Four-channel audio is supported for each SD channel, with 5.1 capability in place for the HD channels.

The monitoring system includes several custom scripts to simplify and automate the configuration and setup time of a network that may be switched via an extensive KVM to another operator position.

Channel content is delivered via Omneon Spectrum servers (long form) and Pinnacle MediaStream servers (commercial spots) via Miranda Imagestore and Presmaster combination providing all of the branding required for each network application.

Supersuite has been a successful concept that allows Viacom the benefit of rapid deployment of additional networks under a fixed cost model that will support future growth of the broadcaster. ■

Globo News migrates to a file-based workflow, increasing productivity



Globo TV in Brazil faced the challenge of deciding the best way to migrate from its tape-based workflow to a file-based one. The network chose its 24-hour news channel, Globo News, to be the host of an experimental and innovative tapeless implementation.

The main priority for the network was reliability and redundancy to provide uninterrupted programming and to establish ingest servers with local storage for backups, and standalone playout servers that could operate independently of the system. The same playout servers also had to receive multiple simultaneous streams faster than real time.

The system had to use a high-quality, low-res file format with jog/shuttle operation, frame accuracy and allow access to these files while recording. It also had to be flexible to support multiple file formats and all AV effects. It needed an integrated logging system for news and sports programs to allow collaborative work between the archive and news production teams, and needed to be able to keep the original bit stream of the video from ingest to playout, except on the segments where effects were applied, to avoid cascading compression and decompression processes. Finally, the system needed to completely integrate with Sony XDCAM.

Based on these concepts, two independent, yet integrated, systems were implemented.

One was designed for the daily operation of Globo News and the other system was implemented to be used during the 2006 FIFA World Cup. The two systems consisted of 14 ingest machines; five low-res editing suites; one high-res editing suite; 20 desktops for browsing low-res materials, with the capacity to export them directly to the playouts without rendering; two desktops for real-time logging; and storage with 900 hours (at 40Mb I-Frame) in a fully mirrored configuration.

The system operates transparently with MPEG-2 AVI/MXF (high-res) and Windows Media/MPEG-4 (low-res). The renders are MPEG-2 bit stream aware, so the original bit stream remains unchanged on the final files without recompression.

Logging interfaces were implemented, with a GUI heavily based on icons that allowed for real-time logging. As a result, it was common to produce more than 500 clips for each game. Queries like "+Ronaldo +goal +replay" were not only fast, but also retrieved every matching video with the starting point of play at a corresponding event.

The implementation required intense training and continuous monitoring of the workflow changes. The project resulted in an improvement of the overall technical quality and a huge increase in productivity. The same team now produces up to three times more edited materials for the channel. ■



Category

Newsroom technology

Submitted by

TV Globo

Design team

Alvaro Antelo, proj. mgr.; Andrea Cruz, developer; Bruno Guedes, developer; Charles Prado, developer; Daniel Monteiro, proj. mgr.; Diego Ramos, developer; Eduardo Costa, developer; Fabio Castro, developer; Isabelle Desbois, developer; Rafael Antony, developer; Silvio Pereira, mgr., R&D

Technology at work

Adobe Premiere Pro
Dell
PowerEdge 1600 server
PowerEdge 2850 server
Powerconnect 5224
network switchers
Globo TV software
Matrox DigiSuite LX
boards
Sony XDCAM decks



Lincoln Financial Group creates a tapeless workflow for three local stations

Category

Newsroom technology

Submitted by

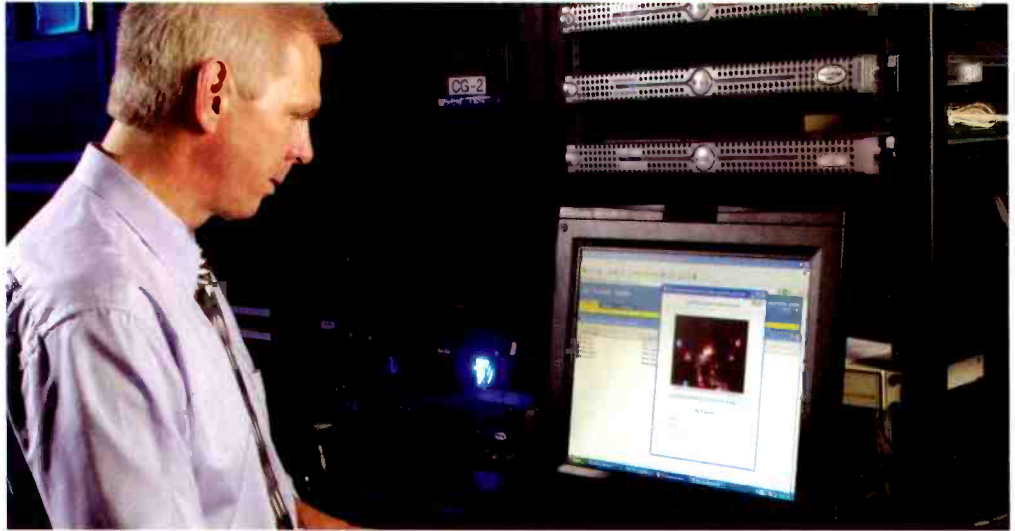
Crispin

Design team

Crispin: Rodney Mood, CTO; Jim Zagrobelny, VP of software development; Dave Blatchford, sr. software eng.; Will Owen, sr. software eng.; Bob Valinski, dir. of business development; Tom Kingsley, chief sales eng.
Lincoln Financial Media
WBTV-TV: Henry Boze, VP eng./TV; Don Shaw, dir. of op./eng.; Dennis Milligan, news dir.; Ron Yoslov, chief eng.

Technology at work

Autocue QNews
newsroom computer system
Crispin NewsCat
Grass Valley NewsEdit



WBTV-TV, in Charlotte, NC, is owned by Lincoln Financial Group, which also owns WWBT-TV in Richmond, VA, and WCSC-TV in Charleston, SC.

As WBTV moved to nonlinear editors and video servers, it recognized a need to reduce the time-consuming process of dubbing news stories to videotape. Looking to complete the tapeless workflow, the station became a beta site for Crispin's NewsCat automation in October 2005. NewsCat provided a return on investment almost immediately. The station eliminated tapes and VTRs in the edit rooms and reduced the amount of real estate needed for the tape library — an estimated 35 years worth of news tapes. To date, WWBT has archived more than 14,000 clips.

Overall, WBTV produces 58 hours of news each week. Much of this content needs to be archived. To date, the station has archived more than 12,000 clips.

The entire archive system only occupies 8RU. This includes the database/Web server, low-res encoder and 5.6TB of RAID storage.

NewsCat makes an archive copy of each clip on the Profile after airing, based on the rundown. It provides a method to easily locate material at a later date. Archived video clips are linked to a database containing all script information from the QNews newsroom computer system.

The database functionality includes an extensive search function. Producers and editors can search for a story using traditional parameters. Low-res proxies are created for each archived clip, enabling journalists to preview material on their desktops before restoring to the edit room. Users can also create a library of generic file video by annotating news footage with keywords and descriptions.

The browser-enabled system allows all producers to simultaneously access archived video clips using a standard Web browser from anywhere on the network. This eliminates the need for dedicated software terminals, which not only enhances workflow but also makes it easier to maintain the system.

The video storage solution enables users to retrieve about 12 months of the most recent news video using nearline storage. Older material is permanently stored as a digital file on removable media, which is tracked by the archive database.

By using relevant, archived news footage more frequently, WBTV improved its on-air appearance. NewsCat was the last piece of the station's tapeless workflow, which led to increased operational and staffing efficiencies.

WCSC produces five-and-a-half hours of daily newscasts, including a half-hour daily newscast for FOX affiliate WTAT. Its NewsCat installation took place over a few weeks in August 2006. ■

Media 3 designs luxurious broadcast facility in Midtown Manhattan



Media 3 just completed a live broadcast facility elegantly disguised as a luxurious Midtown executive club. Working with TPG Planning and Design, Media 3 designed the facility with maximum flexibility and sophistication in mind to accommodate a clientele that regularly includes heads of state, CEOs and celebrities.

The new 16,000sq-ft facility supports two control rooms, five studios, broadcast service panels and 24 fiber tie lines to Ascent Media's Fifth Avenue hub. Every source and destination throughout the facility is on a Miranda router, eliminating the need for any hard patching. From anywhere in the facility, guests can monitor up to four signals simultaneously to keep current on world events that could affect their impending appearance.

The facility's four live-shot studios are pre-lit and always ready to go at a moment's notice. The facility is designed around Media 3's BureauCam live-shot system. BureauCam is a fully engineered studio solution in a single control panel that reduces engineering time and cost. More importantly, nontechnical users can easily operate it.

The live-shot control room is capable of controlling up to eight local or remote BureauCam studios simultaneously. The latest BureauCam BCS-3500 master control unit replaces up to 50 individual pieces of equip-

ment per studio and integrates robotic camera positioning and shot control with presets, on-air switching, integrated CCU, audio/video routing and distribution, external lighting, and machine control.

In addition, it has communications intercom features, such as dual internal IFBs and external IFP insert points. It also offers signal monitoring, including audio and video output level indicators, communications and connectivity status indicators, a programmable character inserter for location ID, and an internal CATV tuner to monitor on-air return signals. Remote operation is handled via network or dial-up, and all real-time diagnostics are accessed via its integrated Web server. The main output of the BureauCam can be simply connected to the fiber transmitter or uplink. After adding a couple of pots lines for IFB and PL, it's ready to go.

The facility also houses a 20ft x 30ft production studio. The adjacent all-digital control room is based on a Broadcast Pix 2100 switcher with four keys, three DVEs and chromakeys, an Inscribe character generator with animations, clip store, still store and logo generator. DigiBeta and DVD burners are integrated for live-to-tape and tape-and-ship applications.

Designing the facility around BureauCam has allowed most of the racks to remain relatively unpopulated and available for future expansion and customer co-locating. ■



Category

Newsroom technology

Submitted by

Media 3

Design team

Media 3: Damon Haimoff, president

TPG Planning and Design: Neil Tucker, studio dir.; Omar Bustamante, architect

Technology at work

Broadcast Pix Slate 2100 production switcher
Marshall V-R151PAF-SD TFT LCD monitors

Media 3
BureauCam studio control
BCS-3500 remote live shot systems

Miranda
NTW-VD6464 SDI router
NTW-AD6464 AES/EBU router

Panasonic AW-E860 CCD convertible cameras
Sony LMD-4420 quad LCD monitors



RAI creates modern news bureau in Manhattan

Category

Newsroom technology

Submitted by

Grass Valley

Design team

RAI: Michael Harabin, head of production; Sal Paglia, chief engineer

The Systems Group: Michael Panico, lead systems designer; Francesco Mari, head of production

Technology at work

Avid Pinnacle FX Deko character generator
Grass Valley

Aurora newsroom system

M-Series iVDR digital disk recorders

Kayak DD production switchers

Concerto routers with Encore control

Kameleon and Gecko infrastructure modules

NetCentral monitoring software

Sony

BVW-550 studio cameras

XDCAM PDW-510 camcorders

XDCAM PDW-1500 compact decks

Betacam SP VTRs



RAI, the Italian state broadcaster, maintains a large news operation in the United States, based in New York. The facility supports the expanding demands of its parent company in Rome, supporting five main channels.

The result was a crowded and labor-intensive setup based on tape operations. Incoming feeds were recorded to four decks simultaneously to provide copies for everyone who needed them. Editing was in linear A/B suites, which gave little flexibility to add much in the way of production values to the packaged reports. As two of the edit suites were also the control rooms for the studios, the pressure on facilities was enormous.

The decision was taken to move to a new site in lower Manhattan, and The Systems Group (TSG) was appointed as systems integrator. TSG worked with RAI in the United States to develop a new environment that, while not being completely tapeless, adopted the best of modern, integrated digital technology to deliver both the workflows and cost efficiencies RAI sought.

The new space features five NLE suites, as well as one linear edit room. The two production studios each have their own control rooms. They can also be linked by fiber. There is also scope for graphics, voiceovers, radio production and a central machine room.

The equipment is based around Grass Val-

ley Aurora (formerly NewsEdit) digital news production equipment, including five XT editors and two LT laptop editors. The building's computer network also allows journalists and producers to access browse resolution material from any desk.

The central servers hold 200 hours of on-line storage plus 1000 hours of browse storage. Providing ingest and playout are four Grass Valley M Series video disk recorders, each with two input and two output channels. These can be used for multiple channels of ingest, for playout into productions in the studio or down the line to Rome, or any combination. The flexibility of the system, together with the two studios and newsroom cameras, is such that the center can deliver live feed to three different networks simultaneously.

Field acquisition is by Sony PDW-510 camcorders to XDCAM disk. Each producer has a compact XDCAM deck. With the Grass Valley Aurora Browse desktop editor, any producer or journalist can create a rough EDL using select takes from XDCAM disks and content from the central servers.

The resulting production workflow has eliminated the bottlenecks of tape operations and reduced the huge amounts that were being spent on tape stock. The new way of working has been quickly accepted by journalists and production staff, leading to better communication and collaboration. ■

Ascent Media Group selects SGI technology for ProdNet



To address the problems of faster turnaround in a 4K data-centric media environment, Ascent Media Group (AMG) gutted its 100,000sq ft building in Burbank, CA, and rebuilt it from the ground up. The company chose SGI as prime contractor, and SGI Professional Services worked hand-in-hand with the group to design and integrate AMG's data-centric production network, ProdNet, which is dedicated to manufacturing, repurposing and distributing large media assets in huge volumes. It also offers studio clients secure methods for accommodating a large variety of deliverables.

The SGI InfiniteStorage CXFS shared file system was a major product component for AMG, particularly in the telecine department, where each frame must be handled as an individual file. The frames add up to 24 files for each second of film. In addition, file sizes range from moderate to large, depending on whether they are HD, 2K or 4K resolution.

At the core of ProdNet are three SGI metadata servers based on SGI Origin 350 technology, each with eight CPUs, acting as the SGI InfiniteStorage CXFS servers for the storage system.

In addition to increasing the speed of workflow, another advantage of ProdNet is the ability to do several jobs concurrently. This is achieved by parallel processing, powered by SGI CXFS-based metadata servers

that power the heart of the I/O, and the SGI InfiniteStorage TP9500 system. It is capable of being dynamically allocated from one department to another as needed. Instead of doing the processes in a linear fashion, workloads can be stacked on top of each other and done in parallel. The DVD can be working on the same title and the same files as audio, telecine and/or the language localization services.

In the 4K suites, which use Quantel iQ and Quantel's new Pablo Suite, a complete color-grading suite expressly designed for digital intermediate work, the company has found that the SGI server, storage and networking systems that power ProdNet are getting some of the fastest feeds and speeds.

ProdNet's advanced network security Web was developed following extensive research and consultations with such agencies as the Motion Picture Association of America (MPAA) and government law enforcement agencies. The entire facility is monitored 24 hours a day by a file-based video surveillance system.

ProdNet was fully up and running in September 2005 with one SGI InfiniteStorage TP9500 storage system. A second SGI InfiniteStorage TP9500 and a TP9300 storage system have since been added, giving the company a total 100TB of enterprise-class storage in addition to 80TB in local caches around the facility. ■

Category

Post and network production facilities

Submitted by

SGI

Design team

AMG: Kevin Sanders, CTO of media management services

SGI: Kevin Smith, SGI Professional Services

Technology at work

SGI

Origin 350
InfiniteStorage Shared Filesystem CXFS
InfiniteStorage TP9500
InfiniteStorage TP9300

Quantel

iQ digital intermediate system
Pablo Suite for color correction



Discovery Communications adds a multipurpose HD control room

Category

Post & network production facilities

Submitted by

National TeleConsultants

Design team

Discovery Production

Group: Diane Tryneski, executive VP; Tony Cole, VP eng.; Peter Riordan, VP post production

National

TeleConsultants: Chuck Zujkowski, executive; Yves Schanck, Tom Levno, conceptual design; C. Stan Ellington, industrial design; Peter Mason, Alex Cheng, Don Markus, Erik Swanson, Mike Udell, systems design; Matt Pierce, installation supervisor

Technology at work

Avid Deko 3000 Hybrid CG
Calrec Zeta 100 console
Clarity Bobcat monitors
Evertz 3000 MVP display
EVS XT2 HD/SD servers
Grass Valley

Encore router

Kalypso Duo switcher

Kalypso still store

LVS controllers

Sony

BVM-D20F1U monitors

DVWV-A500 Digital

Betacam VTR

MSWM-2100 IMX

recorder

HDWF500 HDCAM VTR

SRW5500 HDCAM SR

recorder

Telex/RTS Adam-CS

intercom



This year, Discovery Communications added an HD control room to its production center in Silver Spring, MD, to serve the expanding HD and SD production needs. The new room needed to be easily configurable between HD and SD and serve triple duty as a control room for live events, a post-production editing suite and a program-reformatting room. National TeleConsultants designed and created this multipurpose HD/SD room.

To serve these varied tasks, equipment choices included a Grass Valley Kalypso Duo HD/SD production switcher, an Avid Deko 3000 Hybrid SD/HD character generator and EVS XT2 HD/SD production servers with Grass Valley LVS Live Event Management System controllers to record and play audio and video on short turnaround, as needed.

In order to provide complex communications often required for live events, a sophisticated, easily programmable intercom system was needed. For this, a Telex/RTS Adam-CS 64 x 64 Matrix Intercom was chosen to support live-event production.

In addition to the technical and operational requirements, the control room had to physically fit within an existing space not originally intended for this purpose. The space did have several crucial features already in place, including sound-isolated walls and close proximity to the in-house production studio.

Flat-panel, large-screen HD LCD monitors from Clarity and Sony helped make efficient use of space; they take up far less space than traditional CRT monitors. The addition of an Evertz 3000 MVP multi-image display processor enables control room users to quickly reconfigure the room's monitors for live HD/SD production or post-production work. This programmable system allows directors to resize and reassign video fed to the displays in any desired format at a moment's notice.

To put a premium on space, the HD control room needed to include an audio control room. In order to accomplish the sound isolation needed, a room within a room was constructed for audio control. A compact Calrec Zeta 100 24-strip/96-input audio console combining features for post with the redundancy needed for live production was installed, as well as other space-saving audio equipment from 360 Systems, Denon, Pioneer, Shure, Sony, Tannoy and Tascam, further maximizing the use of space in the audio booth.

The result of the collaboration between National TeleConsultants and Discovery Communications yielded an HD control room with versatile, forward-thinking HD/SD equipment choices designed to serve Discovery Communications' many networks and prevent the need for forklift upgrades far into the future. ■

ION's creative services team experiences a more collaborative workflow



ION Media Networks, formerly Paxson Communications, is a network television broadcasting company. ION operates 60 broadcast television stations, including stations in all of the top 20 U.S. markets, reaching more than 92 million homes in the United States.

The station group centralizes its creative services operation at ION's headquarters in West Palm Beach, FL. The creative services team of 17 supports all branding, on-air promotions and graphic design for the company. The staff uses three Apple Final Cut Pros, four Autodesk Maya stations, four Avid Adrenalines and three graphics/Web design stations to create broadcast promotions for delivery across the station group network.

While the existing content creation tools from Apple, Autodesk and Avid empower the team to deliver results, the workflow for centralizing graphics and packages for transmission was cumbersome and posed a detriment to the original high-quality output. Because none of the content creation systems seamlessly integrate with one other, the creative services team needed to put their promotions to tape, then ingest, transcode and deliver media files via Telestream downstream to an Omneon Spectrum video server located at ION's Network Operations Center in Tampa, FL.

Finding a solution to simplify the downstream workflow, remove the need for tapes

and optimize the signal quality was necessary.

The broadcaster chose EditShare technology to streamline the process. Deployed in August 2006, the system allows workstations to share a common pool of media files, removing the need for tapes and compression. Unlike typical SANs, this system supports file-level sharing. This allows multiple editors to write to the same volume simultaneously. The installation immediately elevated collaboration among the creative services team, simplified the workflow downstream and maintained the signal integrity of the final package.

The system allows the group's editors, graphic artists and sound mixers to work collaboratively with a common, automatically protected pool of media files. The system's project-sharing feature allows multiple Avid editors to open up and work from the same project simultaneously, gaining instant read-only access to bins and sequences.

The installation has resulted in enormous cost savings for the TV group. The facility no longer has a need for tapes, tape handling and storage. Engineers need only support one solution instead of several. And EditShare's cross-platform media management capabilities negate the need for costly proprietary hardware to facilitate media sharing and delivery. The new system benefits ION's facility by optimizing workflows, producing high-quality results and reducing costs. ■

Category

Post & network
production facilities

Submitted by

EditShare

Design team

ION Media Networks:
Robert Cummings, chief
eng.; Julio Bonet, chief
eng.

EditShare: Andy Liebman,
president

Technology at work

Apple
Final Cut Pro
Autodesk Maya
Avid Adrenaline
EditShare
Omneon Spectrum video
server



Letterman Digital Arts Center manages high-res digital content

Category

Post and network production facilities

Submitted by

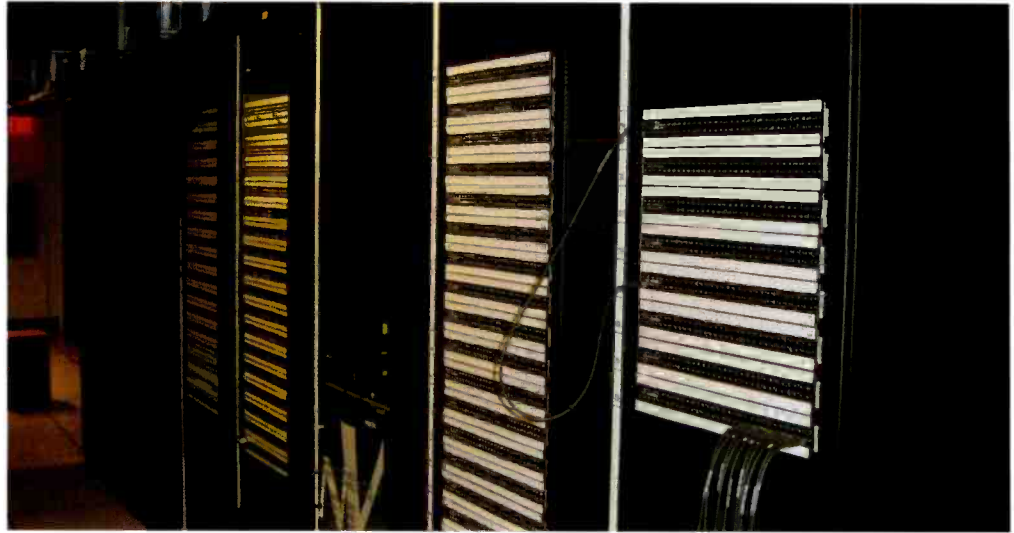
Diversified Systems

Design team

Gerald Kaminitz, lead eng.; Marcus Mahan, Bridget Gundy, installation mgrs.; Patrick Caley, sr. proj. mgr.

Technology at work

ADC patch panels
AMX touch panels
Christie Digital CP2000H video projector
Evertz converters
NVISION
Synapse ASM/SAM A/V Bridge
NV5128 multiformat routers
NV9000 router control
NV8256 Plus video routers
NV7512 audio routers
NV5256 RS-422 machine control routers
4000 series converters, mix/minus and time-delay modules
JVC
BR-7000UR VHS VTR
BR-S8222 S-VHS VTR
Panasonic AJ-HD3700H D5 HD VTR
Philips DMS6000 D6 HD VTR
Sony
BVM-D20F1U
BVU-950 U-Matic VTR
DVR-2000 D1 VTR
HDW-F500 HDCAM VTR
PCM-7030 DAT recorder
PVW-2800 Betacam SP VTR



The Letterman Digital Arts Center (LDAC), inaugurated in June 2005, is the home of Lucasfilm, LucasArts and Industrial Light & Magic, which is one of the world's largest visual effects houses. It resides in a 23-acre, 860,000sq ft production campus in San Francisco's Presidio National Park.

With film project generating data upward of 30TB, the main challenge in designing the media infrastructure was enabling huge amounts of data to be transferred to any part of the facility on a moment's notice.

Systems integrator Diversified Systems was responsible for mapping and laying the enormous amount of cabling throughout the campus, most of which was run beneath the 18in raised floors or through overhead cable trays. This, combined with the hot-swappable capability and front-serviceability of NVISION routers, allows the center's upgrades and service to be a simple, non-disruptive event. The router design also dramatically reduces the amount of rack space needed for the same number of ports.

The LDAC includes three main theaters and seven viewstations. The Premier Theater is a 298-seat screening room equipped for digital and film projection. An NVISION router provides access to any media source in the facility. Two 65-seat Dailies Theaters for viewing visual effects, editing and digital color timing are

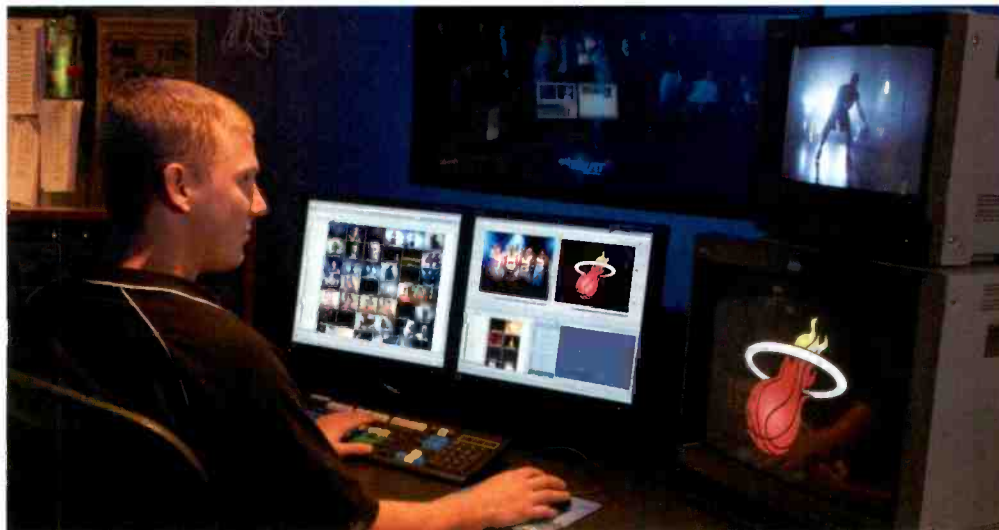
served by a single control booth also equipped with two NVISION routers. The seven 20-seat viewstations provide an intimate setting for reviewing work at a detailed level. The theaters are tied directly via fiber to the facility's core NVISION router in the media data center (MDC).

The center uses Super Wideband SDI, with NVISION routers handling video, AES audio, time code, machine control and other tasks. A/D conversion is handled by NVISION ASM10 modules, which provide audio and video A/D conversion, frame synchronization and audio embedding in a single unit.

The heart of the facility's media system is the MDC, which houses nonlinear editing systems and custom-designed media servers. An NVISION router serves as the core routing system for delivering high-res images to the digital theaters, screening rooms and workstations.

Adjacent to the MDC is the master control room (MCR), which contains tape decks in various formats, as well as modular NVISION ASM10 units used for A/D conversion. Even though the theaters are equipped with one or two tape decks, the more expensive HDCam, HDCamSR and D5 decks are located in a central location — the MCR. NVISION routers enable access to any deck in the facility from any theater, which makes for a more cost-effective solution. ■

Miami HEAT speeds video production workflow with storage technology



The National Basketball Association (NBA) 2006 World Champion Miami HEAT awarded SGI the contract to upgrade its tape-based ingest environment to a scalable content management solution. The HEAT asked SGI to design a small, bundled system that could fit in one rack and provide ingest, storage, editing and archive of game footage. It wanted to eliminate the duplication of digitizing media, as well as increase its edit stations from three to five.

Its media production department purchased an 8TB SGI InfiniteStorage NAS 2000 comprising of an SGI InfiniteStorage S330 storage array and an SGI Origin 350 server to create a turnkey Network Attached Storage (NAS) environment for its five Avid Liquid editing stations and two graphics workstations (one Mac and one PC).

Housed atop the AmericanAirlines Arena in downtown Miami where all home games are played, the media production department functions as an in-house post-production studio for the HEAT's marketing department. The rotating staff of 15 producer-editors uses the SGI NAS system to create content for HEATV, an in-arena network that broadcasts to 20,000 basketball fans each game night. The department also produces content for NBA TV, seen nationally, as well as Sun Sports, the exclusive regional TV partner of the HEAT.

Seventy broadcasts are produced by the Miami HEAT on Sun Sports. In addition, HEATV produces a half-hour exposé-type program, "Inside the HEAT." The network's content is also streamed to www.HEAT.com. All types of corporate presentations and sales presentations for big sponsors are produced by the mini post house, in addition to promotions to boost ticket sales for the numerous events that come to the AmericanAirlines Arena during the NBA off-season.

Working in an SGI shared storage environment, where content is digitized once and then immediately accessible as context-specific data to all, allows producers and editors to put more time into the actual creation of a promo, graphic, program or marketing piece. While the 8TB system suffices to take the team through the season, it also chose the scalable SGI NAS system because it's plug-and-play.

SGI Professional Services integrated the encoders, asset management software, Avid nonlinear editing workstations and graphics workstations to create one centralized, shared environment. Creating a workflow where media gets digitized to a central storage provides the tools needed to produce all the different presentations for all the different mediums, and has significantly improved workflow and efficiency. ■



Category

Post & network
production facilities

Submitted by

SGI

Design team

The HEAT Group:

Ed Filomia, sr. dir. of
broadcast services; Dave
Vickery, head eng.; Alex
Rojas, mgr. of IT; Mack
Shedenhelm, chief editor

SGI: Bill Buhro,
solutions architect, SGI
Professional Services;
Chris Walker, project
mgr., SGI Professional
Services; Ron Short,
solutions architect;
Carlos Iglesias, SSE

Technology at work

Avid Liquid nonlinear
editors

SGI

InfiniteStorage S330
storage array
Origin 350 technical
server



MTV Networks goes on the road with its HD mobile unit — Pegasus

Category

Post & network production facilities

Submitted by

MTV Networks

Design team

MTV Networks: Michael Bivona, vp of eng. and production technologies; Danny Walters, remote dept. EIC; Shipley Landiss, eng. mgr.

Diversified Systems: Alan Bourke, proj. mgr.; Kent Green, design eng.; Lars Osterlind, design eng.

Technology at work

Calrec Alpha 100 audio console

Evertz

VIP multi-imagers

VistaLINK monitoring software

EVS LSM-XT HD disk recorder

Ikegami HDK-79E cameras

Mobilized Systems custom trailer

Samsung 21in LCD monitors

Sony DVW-M2000 DigiBeta VTRs

MVS-8000 four M/E multiformat video switcher

SRW-5500 VTRs

Utah Scientific 400 series routing switchers



With the launch of MHD (an HD network) and increased demand for in-house HD content acquisition, MTV Networks needed an HD mobile unit. Systems integrator Diversified Systems helped the broadcaster design a double-expando Mobilized Systems trailer named Pegasus.

With 16 Ikegami HDK-79E cameras, the unit can easily switch between fiber-optic and triax-based camera cable systems. The cameras can output resolutions of 1080i/720p HD and 480i/480p SD at multiple frame rates.

A Sony MVS-8000A four M/E multiformat video switcher with 80 inputs and 48 outputs provides a smooth transition between HD and SD. A key element of the switcher's architecture is separate control and data LAN design. This design allows for dedicated control panel communications to the mainframe, eliminating unnecessary data traffic.

Sony BVM HD/SD series monitors were installed in critical viewing locations such as camera tracking, video shading, and program and preview. Two 32in Sony HD/SD monitors for program and preset provide an incredible viewing experience within the production control room. The monitor wall also includes 14 Sony BVM 14in HD/SD series monitors for camera tracking and 21 Samsung 21.3in LCD monitors fed by Evertz VIP multi-imagers.

The truck's tape area features 16 Sony

SRW-5500 HD videotape recorders, which can record and playback both HDCAM and HDCAM-SR formats. The recorders can also playback and downconvert SD DigiBeta tapes. The Sony HD decks allow for dual record of both HDCAM and HDCAM-SR. They can also record up to 12 discreet audio channels. A six-channel HD/SD EVS LSM-XT HD disk recorder and two Sony DVW-M2000 DigiBeta VTRs were also installed.

Pegasus features a Calrec Alpha 100 digital audio console with 144 analog mic/line inputs, 144 analog line outputs, 128 AES inputs and 128 AES outputs. The Alpha 100 provides a dual port MADI interface, 64 channel faders, 48 mono multi-track busses, 5.1 mixing and monitoring, Dolby E capabilities, and has recently received Calrec's Blue Fin upgrade.

Evertz VistaLINK software enables monitoring and set up of individual modules from one central location. A VIP system is a critical component of the monitor wall, allowing for programmable quad splits with UDMs in both HD and SD resolutions. Utah Scientific 400 series routers provide critical A/V routing. Pegasus also features extensive fiber, triax, coax, audio and intercom connections, as well as independent HD and SD outputs.

Pegasus has successfully completed productions such as the "MTV Video Music Awards," "MTV Movie Awards" and various shoots for MHD, VH1, Comedy Central and CMT. ■

West Post Digital moves its busy edit facility in two days



Imagine Friday afternoon pulling the plug on a busy 6000sq-ft edit operation, moving all the equipment to a new 20,000sq-ft facility, and being ready to serve clients on Monday morning. That's what happened at West Post Digital.

Moving to a new custom-built facility and expanding system capability gave West Post an opportunity to upgrade to a high-tech routing system.

Prior to the move, the new machine room was outfitted with 21 racks, almost doubling the old capacity, providing space for new gear and leaving guest positions. Network Electronics' VikinX 128 x 128 modular router was installed with three cards: a 32 x 32 SD-only card, and two 32 x 32 HD cards, leaving 32 x 32 for future expansion.

The video router can distribute dual-link 4:4:4 HD and also allow dual rate equipment without separate SD and HD inputs and outputs. The facility routes time code and RS-422 machine control through Network's Compact series routers. The routers are PC-based, programmable, network configurable and can be controlled from any area in the facility. A week before the move, Network's technical team came to the new location loaded the database, tested the unit to make sure it switched properly and provided training.

Several nonlinear systems reside in the machine room and are used remotely through

Gefen Cat 5 extenders. Cat 5 extends to the keyboard, video and mouse in the edit rooms, which are equipped with program and status monitors, a client monitor, two VGA monitors and test instruments. Each bay can call on any edit system. The router has a lockout function, so an editor cannot step on another program.

The da Vinci color correction presented a major challenge to a fully embedded system. There is a two-frame delay in the color correction system from the input to output, and West Post needed to listen to the program audio and have the time code in sync. Because the system could not handle audio and time code, it had to be delayed externally. The router sends the source SD or HD video to a de-embedder on its way to the system SD or HD inputs. The de-embedded AES is then sent through a delay and through a re-embedder, where it is combined, in sync, with the color corrected output of the da Vinci. The source LTC time code is simultaneously sent through a delay unit and then along with the da Vinci output shows up together in sync as a router source for distribution to destination DVRs and monitoring in the edit bays.

The embedded HD and SD routing system makes editor and client time more productive, providing greater flexibility to schedule edit bays and giving West Post Digital more system capacity to grow. ■



Category

Post & network
production facilities

Submitted by

Network Electronics

Design team

West Post Digital:

Todd Brown, partner;
Kenny Fields, partner

Field Effect Technical

Services: Michael Baker,
owner

Network Electronics:

Larry Enroth, SW sales
mgr.; Paul Lowry,
technical specialist

Technology in action

AJA Video Kona 2 video
capture card

Apple

Final Cut Pro

Xserve RAID

Avid

Adrenaline

DS Nitris

Symphony

Unity 30TB

da Vinci 2K color

corrector

Network Electronics

A6464 audio router

SL-D32P bidirectional

data router

VikinX Sublime 128 x

128 modular router

Panasonic DVCPRO-HD

Sony

D2

Digital Betacam

BetaSP

Betacam SX

DDV

DVCAM

HDCAM

XDCAM



KWHY-TV relocates transmitter for better coverage and reduced costs

Category

RF systems

Submitted by

Grass Valley

Design team

KWHY-TV: Doug Lung, regional VP tech.; Doug Garlinger, RF eng. mgr.; Steve Colley, mgr. technical maintenance and transmitter; Vicky Harrison, VP WC studio op.; Mike LoCollo, dir. sys. eng. and maintenance; Brian Lowe, mgr. sys. eng.; Richard Westcott, VP, tech. and broadcast eng.

Grass Valley: Bill Onyski, program mgr.; Jim Rogers, western regional sales mgr.; Gary Kelly, field service eng.; Charles Kelly, field service eng.

Technology at work

Burk Technology
GSC3000 remote control system

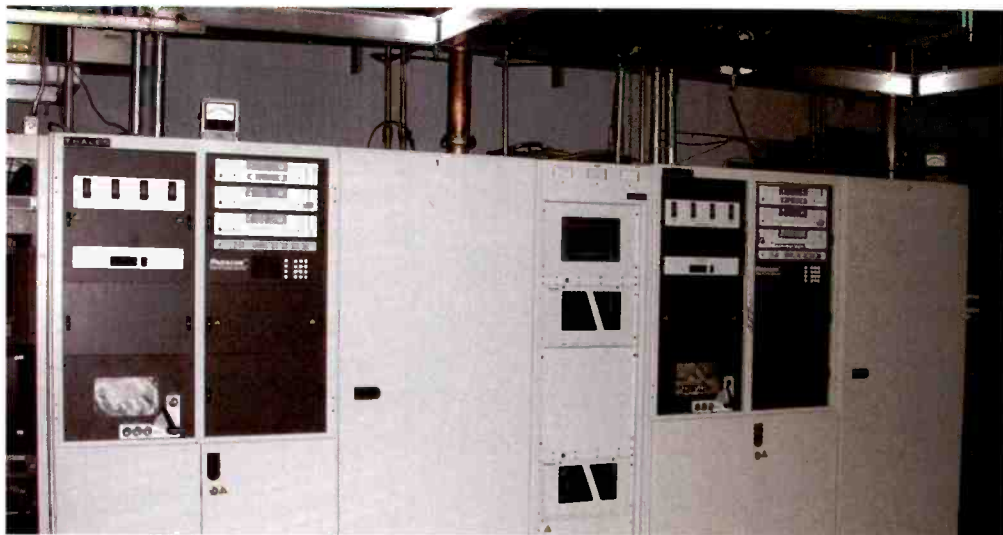
Dielectric TFU-26GTH
slotted-coaxial antenna

Grass Valley DCX
Paragon digital transmitters

Statmon Technologies

Axess remote control and facilities management system

Videotek DDM-540 8VSB demodulator and test system



KWHY-TV is an NBC owned-and-operated Spanish-language station serving the Los Angeles Hispanic market. The station's analog channel 22 and digital channel 42 have been co-located since 1999 at the Mt. Wilson RF complex.

The present transmitter building will be vacated at the end of analog television. The KWHY-DT facility has been operating at 86kW ERP. However, RF studies determined that the ERP could be increased to 486kW. The studies also showed that coverage of the Hispanic community could be enhanced for the digital age by relocating to neighboring Mt. Harvard and sharing a transmitter room with sister station KVEA-TV Telemundo on analog channel 52.

Mt. Harvard is only accessible by four-wheel drive vehicle. Electricity rates in Southern California are among the highest in the nation. For these reasons, KWHY determined that reliability and efficiency were prime design factors for the replacement transmitter. Having evaluated the options, the design team selected the Grass Valley DCX Paragon digital transmitter, using up-to-date MSDC IOT technology.

KWHY already used a Grass Valley DCX transmitter for its digital service from Mt. Wilson, and the team considered moving it to the new location. However, they came up with a more imaginative solution. The existing DCX transmitter at Mt. Wilson was converted

to an IOX analog transmitter by swapping out the exciter and modifying the RF system. This gave the station a newer, more reliable analog transmitter, retaining the existing one as a full-power backup. New DCX Paragons were installed at Mt. Harvard for the digital channel.

A single DCX Paragon amplifier cabinet is capable of providing the required KWHY TPO of 19.5kW. A second DCX Paragon cabinet was installed as a standby. This particular configuration, using MSDC IOT technology, maximized electrical savings and allowed KWHY to qualify for a substantial business incentive rebate from Southern California Edison, which helped offset the capital expenditures of the equipment.

A Dielectric TFU-26GTH slotted-coaxial antenna with 1.6° of electrical beam tilt and 0.6° of mechanical beam tilt was selected to optimize coverage of the Los Angeles metropolitan area, mounted on an existing 100ft tower. Tower work was performed by Stainless and Sunray Services. KWHY-DT went on the air from Mt. Harvard on June 28, 2006. ■



A**Ac-cetera**

Pittsburgh, PA; Tel: 412-344-8609;
Web: www.ac-cetera.com

AccuWeather

State College, PA; Tel: 814-235-8601; Web: www.accuweather.com

Acorn RF/Teracom Components

South Casco, ME; Tel: 207-627-7474; Web: www.acornrf.com

Acrodyne Industries

Elmira, NY; Tel: 607-215-0653;
Web: www.acrodyne.com

Active Power

Austin, TX; Tel: 512-836-6464;
Web: www.activepower.com

ADC Telecom

13625 Technology Dr, Eden Prairie, MN 55344; Tel: 952-917-0454;
Fax: 952-946-3292; E-mail: bill.fuesz@adc.com; Web: www.adc.com; Contact: Bill Fuesz

Adrienne Electronics

Las Vegas, NV; Tel: 702-896-1858; Web: www.adrielec.com

Adtec Digital

Nashville, TN; Tel: 615-256-6619;
Web: www.adtecinc.com

Advanced Test Equipment Rentals

San Diego, CA; Tel: 858-558-6500; Web: www.atecorp.com

Advent Communications

Chesham, Bucks United Kingdom;
Tel: +44 1494 774400; Web: www.adventcomms.com

AJA Video Systems

Grass Valley, CA; Tel: 530-274-2048; Web: www.aja.com

Alcatel

Plano, TX; Tel: 972-519-2641; Web: www.alcatel.com/microwave

Analog Way

New York, NY; Tel: 212-269-1902;
Web: www.analogway.com

Angenieux

Totowa, NJ; Tel: 973-812-3858;
Web: www.tccus.com

Anixter

Glenview, IL; Tel: 224-521-8425;
Web: www.anixter.com

Antenna ID Products

Glenmoore, PA; Tel: 610-458-8418; Web: antennaid.com

Anton/Bauer

Shelton, CT; Tel: 203-929-1100;
Web: www.antonbauer.com

Apple

Cupertino, CA; Tel: 408-974-1010; Web: www.apple.com/finalcutstudio

AR Products/Guy Cable Vibration Control

Lexington, MA; Tel: 787-862-7200;
Web: www.arproducts.org

**Ardendo**

Danderyd Sweden; Tel: +46 730 808032; Web: www.ardendo.com

ARRI

Blauvelt, NY; Tel: 845-353-1400; Web: www.arri.com

Ascent Media Systems and Technology Services

Northvale, NJ; Tel: 201-767-1200; Web: www.ascentmedia.com/systems

Associated Press/ENPS

Washington, DC; Tel: 202-736-1100; Web: www.enps.com

Astro Systems

Baldwin Park, CA; Tel: 626-336-7001; Web: www.astro-systems.com

ATCi

Chandler, AZ; Tel: 480-844-8501; Web: www.atci.com

ATI (Audio Technologies Inc.)

West Berlin, NJ; Tel: 856-719-9900; Web: www.atiaudio.com

Audemat-Aztec

Miami, FL; Tel: 305-249-3110;
Web: www.audemat-aztec.com

Audio Accessories

Marlow, NH; Tel: 603-446-3335;
Web: www.patchbays.com

Audio-Technica U.S.

Stow, OH; Tel: 330-686-2600;
Web: www.audio-technica.com

Audiolab Electronics

Roseville, CA; Tel: 916-784-0200; Web: www.audiolabelectronics.com

Auralex Acoustics

Indianapolis, IN; Tel: 317-842-2600; Web: www.auralex.com

Autocue Group

Mitcham, Surrey United Kingdom; Tel: +208 665 2992;
Web: www.autocue.com

Autocue Systems

Charlotte, NC; Tel: 704-377-1496;
Web: www.autocue.com

Autodesk

Montreal, QC Canada; Tel: 800-869-3504; Web: www.autodesk.com/me

Autoscript

London United Kingdom;
Tel: +44 20 7538 1427; Web: www.autoscript.tv

AVEC

Finleyville, PA; Tel: 412-429-2000;
Web: www.aveceng.com

Avid Technology

Tewksbury, MA; Tel: 978-640-6789; Web: www.avid.com



Aviom

West Chester, PA; Tel: 610-738-9005; Web: www.aviom.com

Avitech

Redmond, WA; Tel: 425-885-3863; Web: www.avitechvideo.com

Axcera

Lawrence, PA; Tel: 724-873-8100; Web: www.axcera.com

Axon Digital Design

UDENHOUT Netherlands; Tel: +31 13 5116666; Web: www.axon.tv



A Z C A R

AZCAR

Canonsburg, PA; Tel: 724-873-0800; Web: www.azcar.com

Azden

Franklin Square, NY; Tel: 516-328-7500; Web: www.azdencorp.com

B

B&H Photo Video

New York, NY; Tel: 212-444-5028; Web: bhphotovideo.com

BAL Broadcast

Newcastle, Staffordshire England; Tel: +44 247 6316500

Band Pro Film & Digital

Burbank, CA; Tel: 818-841-9655; Web: www.bandpro.com

Barco Visual Solutions

3059 Premiere Parkway, Duluth, GA 30097-4905; Tel: 678-475-8000; Fax: 678-475-8100; E-mail: james.durant@barco.com; Web: www.barco.com; Contact: Jim Durant

Baron Services

Huntsville, AL; Tel: 256-881-8811; Web: www.baronservices.com

Bauhaus Software

San Antonio, TX; Tel: 210-212-7530; Web: www.bauhaussoftware.com

Baystor

Apollo Beach, FL; Tel: 888-229-7867; Web: www.baystor.com

Behringer USA

Bothell, WA; Tel: 425-672-0816; Web: www.behringer.com

Belar Electronics Lab.

Devon, PA; Tel: 610-687-5550; Web: www.belar.com

Belden

Richmond, IN; Tel: 765-983-5200; Web: www.belden.com

Bella

Burbank, CA; Tel: 818-563-9500; Web: www.bella-usa.com

Benchmark Media Systems

Syracuse, NY; Tel: 315-437-6300; Web: www.benchmarkmedia.com

Berkeley Nucleonics

San Rafael, CA; Tel: 415-453-9955x265; Web: www.berkeleynucleonics.com

Bescor Video

Farmingdale, NY; Tel: 631-420-1717; Web: www.bescor.com

beyerdynamic - USA

Farmingdale, NY; Tel: 631-293-3200; Web: www.beyerdynamic-usa.com

Bittree

Glendale, CA; Tel: 818-500-8142; Web: bittree.com

Blackmagic Design

Milpitas, CA; Tel: 408-954-0500; Web: www.blackmagic-design.com

Bluefish444

S Melbourne, Vict Australia; Tel: +61 39682 9477; Web: www.bluefish444.com

Blueline Technology

Lewisville, TX; Tel: 972-353-2583; Web: www.bluelinetech.com

Bogen Imaging

Ramsey, NJ; Tel: 201-818-9500; Web: www.bogenimaging.us

BOXX Technologies

Austin, TX; Tel: 512-835-0400; Web: www.boxxtech.com

Brauner USA

Las Vegas, NV; Tel: 702-365-5155; Web: www.braunerusa.com

Brick House Video

Allentown, PA; Tel: 610-437-2251; Web: www.philipcooke.com

Brightline

Bridgeville, PA; Tel: 412-206-0106; Web: www.brightlines.com

Broadata Communications

Torrance, CA; Tel: 310-530-1416; Web: www.broadatacom.com

Broadcast Microwave Services

Poway, CA; Tel: 858-391-3050; Web: www.bms-inc.com

Broadcast Software Solutions

Atlanta, GA; Tel: 770-978-9450; Web: www.broadcastsoftware.tv

Broadcast Supply Worldwide

Tacoma, WA; Tel: 253-565-2301; Web: www.bswusa.com

Broadcast Video Systems (BVS)

Markham, ON Canada; Tel: 905-305-0565; Web: www.bvs.ca

BUF Technology

San Diego, CA; Tel: 858-451-1350; Web: www.buftek.com

Burle Industries

Lancaster, PA; Tel: 717-295-6888; Web: www.burle.com

Burlington A/V Recording Media & Equipment

Oceanside, NY; Tel: 516-678-4414; Web: www.burlington-av.com

Burst Electronics

Albuquerque, NM; Tel: 505-898-1455; Web: www.burstelectronics.com

C

C-COR

Centennial, CO; Tel: 303-967-9803; Web: www.c-cor.com

Calrec Audio

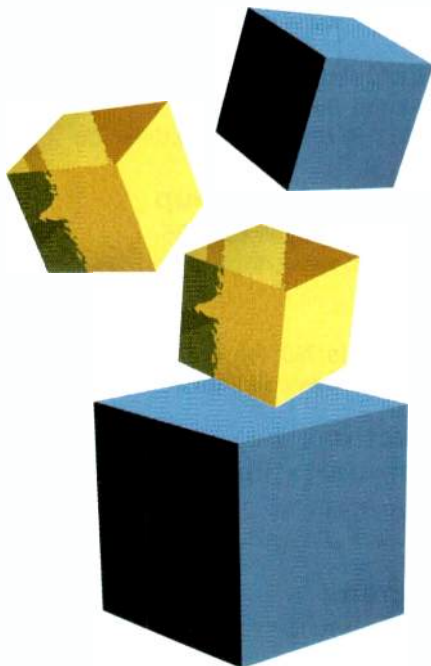
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bctv@cusa.canon.com; Web:
www.canonbroadcast.com;
Contact: Gordon Tubbs

Canon U.S.A., Inc. delivers consumer, business-to-business, and industrial imaging solutions, which include HDTV and SDTV optics. The company is rated #35 on the BusinessWeek list of "Top 100 Brands." Its parent company Canon Inc. (NYSE:CAJ) is a top patent holder of technology, ranking second overall in the U.S in 2005.

Cartoni USA

N. Hollywood, CA; Tel: 818-760-8240; Web: www.ste-man.com

Celco

Rancho Cucamonga, CA; Tel: 909-481-4648; Web: www.celco.com

Chief

Savage, MN; Tel: 952-894-6280;
Web: www.chiefmfg.com

Christie Digital Systems

Cypress, CA; Tel: 714-236-8610;
Web: www.christiedigital.com

Chyron

Melville 11747, NY; Tel: 631-845-2000; Web: www.chyron.com

CineBags

Glendale, CA; Tel: 818-662-0605;
Web: www.cinebags.com

Cinegy

Washington, DC; Tel: 202-742-2736; Web: www.cinegy.com

Cinekinetic

Thornlie WA Australia;
Tel: +618 9459 3690; Web:
www.cinekinetic.com

Clarity Visual Systems

Wilsonville, OR; Tel: 503-570-0700;
Web: www.clarityvisual.com

Clark Wire & Cable

Mundelein, IL; Tel: 847-949-9944;
Web: www.clarkwire.com

Clear Blue Audio Video

Westminster, CO; Tel: 303-412-9477; Web: www.cbav.com

Clear-Com

Emeryville, CA; Tel: 510-496-6600;
Web: www.clearcom.com

Cobalt Digital

Urbana, IL; Tel: 217-344-1243;
Web: www.cobaltdigital.com



Communications Engineering

Newington, VA; Tel: 703-550-5800;
Web: www.commeng.com

Communications Specialties

Hauppauge, NY; Tel: 631-273-0404;
Web: www.commspecial.com

Communtek Video Systems

New York, NY; Tel: 212-967-1774;
Web: www.communtekvideo.com

Components Express

Woodridge, IL; Tel: 630-257-0605; Web: www.componentsexpress.com

Comprompter News and Automation

La Crosse, WI; Tel: 608-785-7766;
Web: www.comprompter.com

Computer Prompting & Captioning (CPC)

Rockville, MD; Tel: 301-738-8487;
Web: www.cpcweb.com



COMTEK

Salt Lake City, UT; Tel: 801-466-3463; Web: www.comtek.com

Controlware Communications Systems

Neptune, NJ; Tel: 732-919-0400; Web: www.cware.com

CPI - Eimac Division

Palo Alto, CA; Tel: 650-592-1221; Web: www.eimac.com

CPI Satcom Division

Palo Alto, CA; Tel: 650-846-3803; Web: www.cpii.com/satcom

Creative Media Products

Chapel Hill, NC; Tel: 919-883-4193; Web: www.cmpsales.com

Crispin

4022 Stirrup Creek Dr, Ste 320 Box 6A, Durham, NC 27703; Tel: 919-845-7744; Fax: 919-845-7766; E-mail: welisten@crispincorp.com; Web: www.crispincorp.com; Contact: Brian Gleason

Founded in 1997, Crispin is a leading worldwide provider of broadcast automation software, equipment, services and support. Building on its legacy of innovative, market-leading automation solutions, Crispin's complete line of products streamline the flow from asset acquisition through media management and on to presentation, helping facilities meet the needs of multichannel, network, centralized control and DTV environments.

Regional Sales

United States (Southwest and Southeast) and South America
tel :: 281.370.7555

United States (Northeast and Central) and Canada
tel :: 908.237.0512

United States (Government and Community Access Sales)
tel :: 919.845.7744

Crystal Vision

Cambridge, United Kingdom;
Tel: +44 1223 497049; Web: www.crystalvision.tv



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Curious Software

Santa Fe, NM; Tel: 505-988-7243;
Web: www.curious-software.com

D

D.W. Electrochemicals

Richmond Hill, ON Canada;
Tel: 905-508-7500; Web:
www.stabilant.com

da Vinci Systems

Coral Springs, FL; Tel: 954-688-5600; Web: www.davsys.com

Da-Lite Screen

Warsaw, IN; Tel: 574-267-8101;
Web: www.da-lite.com

Daily Electronics

Vancouver, WA; Tel: 360-896-8856;
Web: www.dailyelectronics.net

Dalet Digital Media Systems

New York, NY; Tel: 212-825-3322; Web: www.dalet.com

Dayang Int'l

Singapore Singapore; Tel: +65 647 2822; Web: www.dayang.com

DAZ Productions

Draper, UT; Tel: 801-495-1777;
Web: www.daz3d.com

Dedotec USA (Dedolight)

Cedar Grove, NJ; Tel: 973-857-8118; Web: www.dedolight.com

DELEC Audio

Goellheim Germany; Tel:
+49635113170; Web: www.delec.de

Devlin Design Group

San Diego, CA; Tel: 858-535-9800; Web: www.ddgtv.com

Dialight

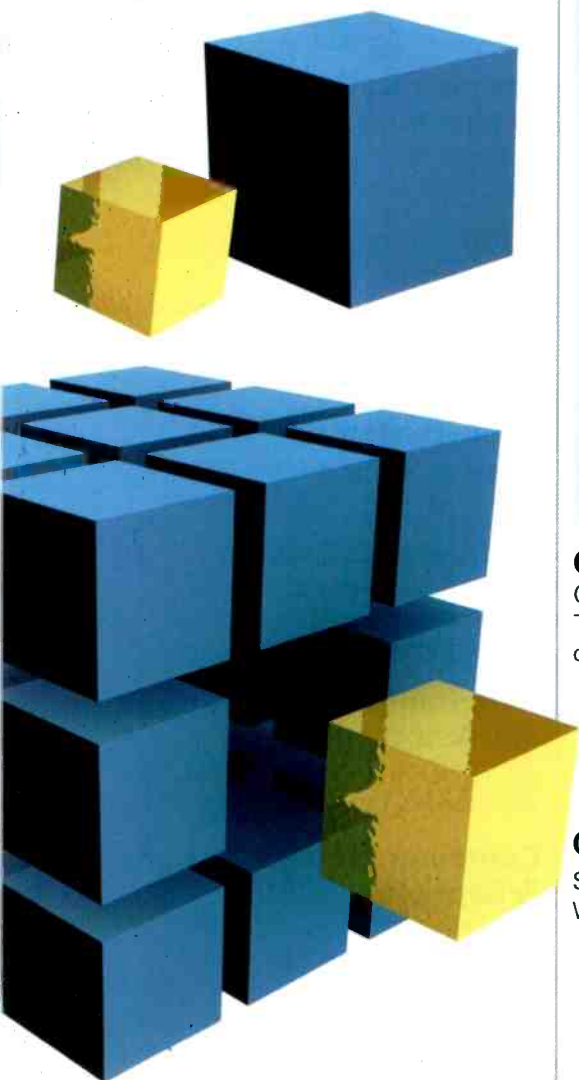
Farmingdale, NJ; Tel: 732-919-3119; Web: www.dialight.com

Dielectric Communications

Raymond, ME; Tel: 207-655-8100;
Web: www.dielectric.com

Digigram

Arlington, VA; Tel: 703-875-3100;
Web: www.digigram.com



Digital Alert Systems

Oracle, AZ; Tel: 520-896-0303; Web: www.digitalalertsystems.com

Digital Design Group

Santa Clara, CA; Tel: 408-727-2447; Web: www.digitaldesign-group.com

Digital Rapids

Markham, ON Canada; Tel: 905-946-9666; Web: www.digital-rapids.com

Digital Vision

Solna Sweden; Tel: +46 733 552602; Web: www.digitalvision.se

Directed Perception

Burlingame, CA; Tel: 650-342-9399; Web: www.dperception.com

Discount Video Warehouse

Mt. Prospect, IL; Tel: 800-323-8148; Web: www.dvwonline.com

DK-Technologies America

Felton, CA; Tel: 800-421-0888; Web: www.dk-technologies.com



DMT USA

West Deptford, NJ; Tel: 856-423-0010; Web: www.dmtonline.us

DNF Controls

Sylmar, CA; Tel: 818-898-3380; Web: www.dnfcontrols.com

Dolby Laboratories

San Francisco, CA; Tel: 415-645-5000; Web: www.dolby.com

Doremi Labs

Burbank, CA; Tel: 818-562-1101; Web: www.doremilabs.com

Drastic Technologies

Toronto, ON Canada; Tel: 416-255-5636; Web: www.drastictech.com

DSC Laboratories

Mississauga, ON Canada; Tel: 905-673-3211; Web: www.dsclabs.com

DVC Digitalvideo Computing

Herrsching Germany; Tel: +49 8152 93010; Web: www.digitalvideo.de

DVS Digital Video

Burbank, CA; Tel: 818-846-3600; Web: www.dvsus.com

E

e-mediavision.com

Hounslow, Middlesex England; Tel: +44 208 755 2014; Web: www.e-mediavision.com

E2V Technologies

Elmsford, NY; Tel: 914-592-6050; Web: www.e2v.com

Efficient Antenna Systems Inc. (EASI)

Clear Lake, IA; Tel: 641-424-5079; Web: www.easisat.com

EDCOR Electronics

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Editware

Grass Valley, CA; Tel: 530-477-4300; Web: www.editware.com

EEG Enterprises

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Electronic Script Prompting

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Electronic Visuals

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Electronics Research

7777 Gardner Rd, Chandler, IN 47610-9219; Tel: 812-925-6000; Toll Free: 877-ERI-LINE; Fax: 812-925-4030; E-mail: sales@eriinc.com; Web: www.eriinc.com; Contact: David White

Electrophysics

Fairfield, NJ; Tel: 973-882-0211; Web: www.electrophysics.com

Electrorack Enclosure Products

Anaheim, CA; Tel: 714-776-5420; Web: www.electrorack.com

Electrosonic

Minnetonka, MN; Tel: 952-931-7500; Web: www.electrosonic.com

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Southfield, MI; Tel: 248-827-4440; Web: www.enco.com

ENSEMBLE DESIGNS

Ensemble Designs

Grass Valley, CA; Tel: 530-478-1830; Web: www.ensembledesigns.com

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Extron Electronics

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Faraday Technology

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Fast Forward Video

Irvine, CA; Tel: 949-852-8404; Web: www.ffv.com

Fischer Connectors

Alpharetta, GA; Tel: 678-393-5400; Web: www.fischerconnectors.com

Flash Technology, a division of Dielectric

Franklin, TN; Tel: 615-503-2000; Web: www.flashtech.com

Florical Systems

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Fluke

Everett, WA; Tel: 425-347-6100; Web: www.fluke.com

FOCUS Enhancements

Campbell, CA; Tel: 800-338-3348; Web: www.focusinfo.com

FOR-A Corp. of America

Cypress, CA; Tel: 714-894-3311; Web: www/for-a.com

Forecast Consoles

Dear Park, NY; Tel: 631-253-9000; Web: www.forecast-consoles.com

Fortel DTV

Duluth, GA; Tel: 630-377-4580; Web: www.fortelDTV.com

Frezzi Energy Systems, a division of Frezzolini Electronics

Hawthorne, NJ; Tel: 973-427-1160; Web: www.frezzi.com

Front Porch Digital

Boulder, CO; Tel: 303-440-7930; Web: www.fpdigital.com

Frontline Communications

Clearwater, FL; Tel: 727-573-0400; Web: www.frontlinecomm.com

FUJIFILM

Fuji Film USA/ Recording Media Div.

Valhalla, NY; Tel: 914-789-8100; Web: www.fujifilmusa.com

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Wayne, NJ; Tel: 973-633-5600; Web: www.fujinonbroadcast.com

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GE/Int'l Fiber Systems

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Gee Broadcast Systems

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Gefen

Woodland Hills, CA; Tel: 818-884-6294; Web: www.gefen.com

Genum/Video Products Div.

Burlington, ON Canada; Tel: 905-632-2996; Web: www.gennum.com

Gepco Int'l

Des Plaines, IL; Tel: 847-795-9555; Web: www.gepco.com

Gerling and Associates

Sunbury, OH; Tel: 740-965-2888; Web: www.gerlinggroup.com

Glidecam Industries

Kingston, MA; Tel: 781-585-7900; Web: www.glidecam.com

Graham-Patten Systems

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Hewlett-Packard - Rack & Power Infrastructure Group

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HHB Communications

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Iconix Video

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Web: www.iconixvideo.com

IDX System Technology

Torrance, CA; Tel: 310-891-2800; Web: www.idx.tv

IFS GE

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Maywood, NJ; Tel: 201-368-9171; Web: www.ikegami.com

Image Video

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Imagine Products

Carmel, IN; Tel: 317-843-0706; Web: www.imagineproducts.com

Innovision Optics

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Jampro Antennas/ RF Systems

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Indianapolis, IN; Tel: 800-428-4424; Web: www.jdsu.com

JVC Professional Products

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K-Will

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KAE

Salt Lake City, UT; Tel: 801-238-2300; Web: kaecorp.com

Kathrein Scala Div.

Medford, OR; Tel: 541-779-6500;
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Keywest Technology

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Web: www.klotzdigital.com

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KTech Telecom

Chatsworth, CA; Tel: 818-773-0333;
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L

L-3 Communications Electron Devices

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Mount Marion, NY; Tel: 845-339-9555; Web: www.lairdtelemedia.com

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Web: www.leaderusa.com

Lectrosonics

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Leightronix

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Web: www.lightwareinc.com

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7009; Web: www.litepanels.com

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www.lstelcom.com

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8506; Web: www.modo3d.com

M

M Klemme Technology

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MagicBox

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0606; Web: www.lcdracks.com

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0303; Web: www.medea.com

Media 3

New York, NY; Tel: 212-983-5200;
Web: www.liveshots.com

Media Computing

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Web: www.mediacomputing.com

Media Concepts

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3600; Web: www.mediaconcepts.tv

Micro Communications

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Web: www.microfirst.com

Microwave Radio Communications

Billerica, MA; Tel: 978-671-5700;
Web: www.mrcbroadcast.com



Middle Atlantic Products

Fairfield, NJ; Tel: 973-839-1011;
Web: www.middleatlantic.com

Miranda Technologies

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7400; Web: www.miteq.com

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Modulation Sciences

Somerset, NJ; Tel: 732-302-
3090; Web: www.modsci.com

Modulus Video

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Mohawk

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Motorola

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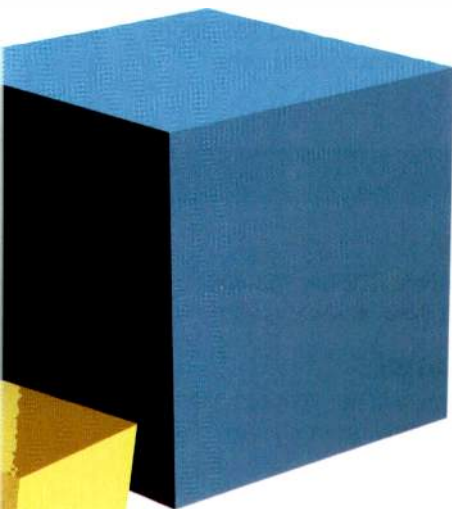
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OConnor Engineering

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Odds On Recording

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Omneon Video Networks

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Omnibus Systems

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Optibase

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Hollywood, CA; Tel: 323-466-5444; Web: www.pipo.cc

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Professional Communications Systems

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Web: www.pcomsys.com

Propagation Systems Inc. (PSI)

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Q

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Radian Communication Services

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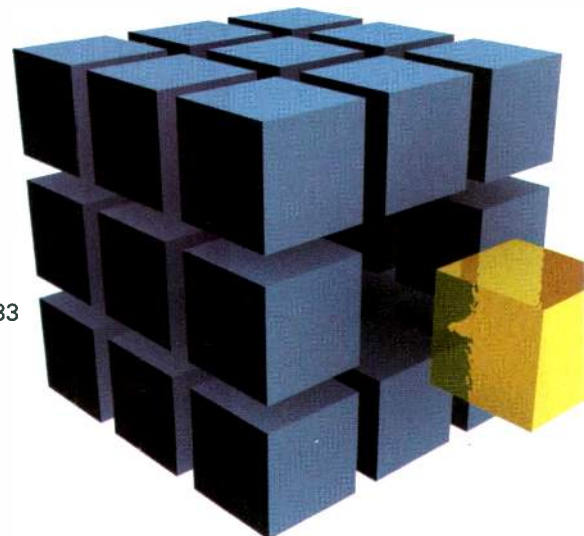
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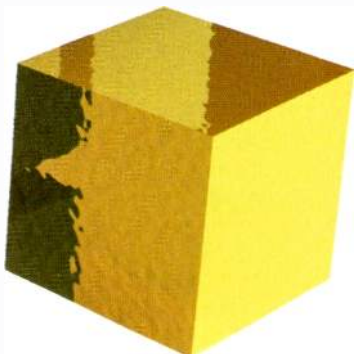
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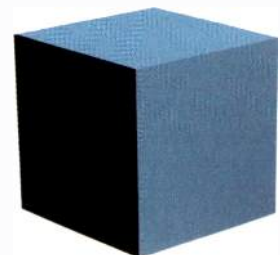
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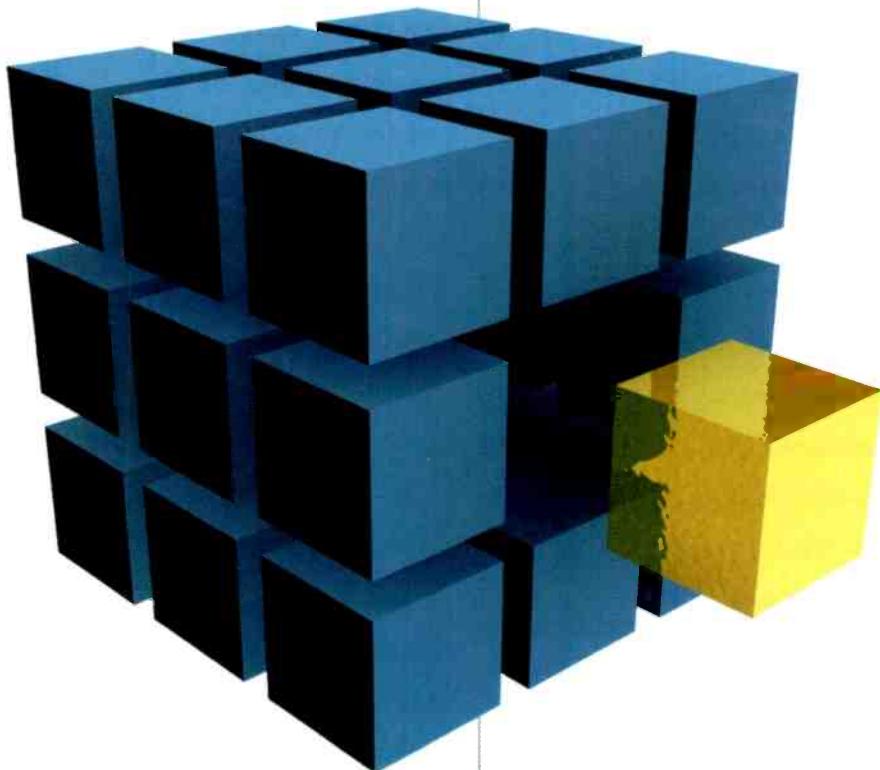
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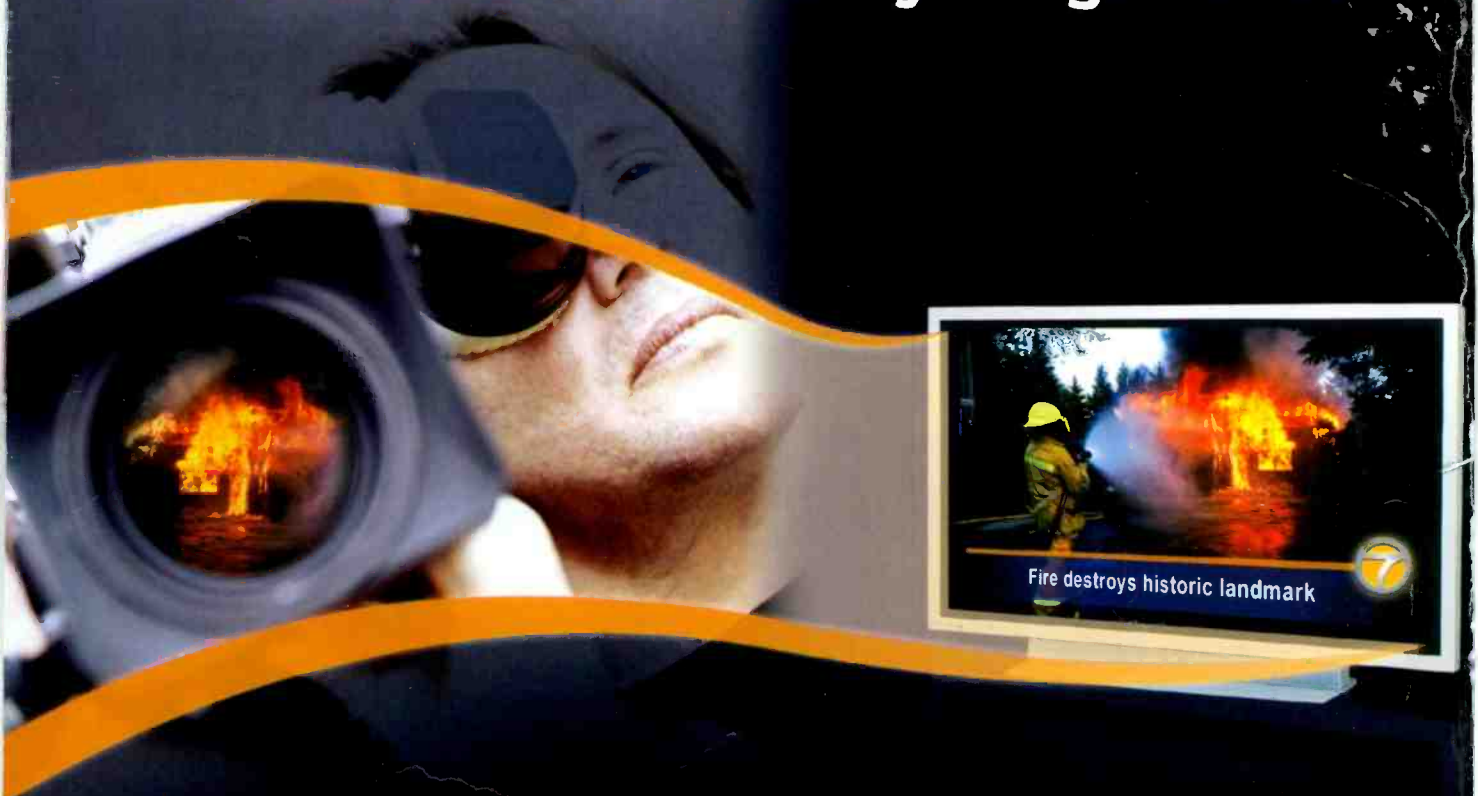
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