Servers Follow Divergent Paths

by Andrew von Gamm

The current server market seems to have split into two camps: SMP and MPP. Compared to the amount of information needed by the Internet or any other network, video delivery needs massive capacity indeed.

**CHOOSE YOUR SERVER**

"There is no one server technology that has all the right answers for all markets," said Scott Watanabe, spokesman for video server technology at CableLabs, which leads research and development for the U.S. cable industry. But does he see the earlier gains being made in SMP systems?

"They are within budget and some of them are ready to go," he said.

He points out that PC-based CD video disks can be used for added storage, and the bigger networks needing massive economies of scale may migrate to MPP.

By taking another look at the market and placing major products such as news and films on near video-on-demand, there can be 10 viewers per stream, some say even more.

Current thinking in Europe is placing the time delay for hit movies much further apart than was originally envisaged. Voices from within major media companies like Kirch and CLT are talking of NVOD time separations at half an hour or even longer, meaning current broadcast servers or even tape could be used.

By projecting a price of US$300 per stream, Intel is threatening to increase the goals of future VOD disk-based servers. Intel is basing its system around the P6 and P7 chips. By 1996, says Christina Blackwell, Intel's multimedia marketing manager, they will be shipping systems containing up to 256 P6s handling 10,000 streams per system for six streams per system for locally based near video-on-demand (NVOD); RISC-based UNIX systems using SMP and providing some 150 streams for such projects as local video-on-demand; and lastly, the MPP system providing up to 100,000 streams for true video-on-demand for the mass-market consumer.

**PRICE CONSCIOUS**

As in all things, success will be a question of price. Current wisdom sets the goal at about one stream of video for about five subscribers and the target cost for a stream at US$500. That is an investment of US$1000 per subscriber.

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LEADING FIRMS FORM LATIN AMERICAN SATELLITE SERVICE

RIO DE JANEIRO, BRAZIL

Add two powerful names to the list of companies backing a Murdoch/TGQV Globo satellite direct-to-home venture for Latin America. Mexico’s Grupo Televisa and the U.S.’s Teleso Communications Inc. (TCI)

The addition of these two media giants brings a wealth of programming options for the service, which is expected to launch later this year.

The service is likely to compete directly with a DTH system from Hughes Communications, operator of the Direct TV venture in the U.S. The Hughes Latin American service is supported by Venezuela’s Cisneros Group, Brazil’s Televisión Abril and Mexico’s MV’S Movision.

The addition of Grupo Televisa to the Murdoch team leaves in doubt an earlier plan by Teleso to launch the Galavision satellite service aboard PanAmSat, of which Televisa owns more than 40 percent. Murdoch and TGQV Globo have already lined up 11 transponders aboard the Inelsat VII-Abird.

Still the partnership will bring a vast array of programming to the service. Grupo Televisa will supply its numerous Spanish-language soap operas and variety shows, while News World 95 will take the extensive line-up from its network in the U.S., BSkyB in Europe and Star TV in Asia. Meanwhile, TCI can offer up programming from more than a dozen cable channels in the U.S.

One-Man Crews Gain Stature

BERLIN

The days of three- and four-man news crews are over as new digital OB cameras make it easier for individuals to provide the same service.

Such was the message of Michael Rosenblum, president of NYT Video News International, at the recent News World 95 conference here in November.

“The new small (US$3,000) systems like the Panasonic DVC Pro can be used by a new breed of news-gatherer: the video journalist, or VJ[,]” Rosenblum told an audience of leading news executives from across Europe.

Rosenblum blasted the established news organizations for the way they work.

“It is like having the print journalist come along with one guy holding the paper and another holding the pencil and third guy doing the interview,” he said.

“If I have five people out there, then each one should have a camera. To do it any other way is a huge waste of resources.”

The very portability of the DVC Pro system proved to be its downfall during the show when the only one was stolen off the Panasonic stand during the first day.

At an earlier session, Jeff Meadows of Quantum and Steve Owen of Panasonics agreed that the number of formats will increase dramatically.

“This is just the beginning,” Meadows said.

“Get ready for the biggest format war you have ever seen.”

As an exhibition, News World 95 with just 35 stands, is still rather small, but most of the market leaders were there and every major broadcast news organization was represented. Altogether 550 delegates attended this first attempt by Media Ventures International (MVI) Ltd. of London to hold an annual fair for the news gathering market.

REGULATION

DENMARK STEPS UP Deregulation Process

COPENHAGEN

The Danish Parliament has reached an agreement in which Tele Danmark, the Danish telecommunications group, will give exclusive right to give distribution and TV network transmission but will be allowed to enter the programming business.

The deal, which encompasses a host of telephone- and network-related matters, is the second in a series of recent agreements aimed at liberalizing the Danish telecommunications sector.

The radio and TV portions of the agreement are slated to take effect July 1, 1996, with full deregulation of the industry expected by January, 1997.

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General Danmark was privatized in April, 1994, with the intention that it would take part in telecon deregulation.

TELECOM

ATM DEAL REACHED

OTTAWA, CANADA

Telecommunications equipment manufacturer Northern Telecom (Nortel) and software developer Microwave Systems Corporation of Des Moines, Iowa, have struck a deal that could hasten the introduction of interactive video signals over ATM (Asynchronous Transfer Mode) telephone lines.

The two companies plan to enhance Microwave’s “DAVID” (Digital Audio/Video and Interactive Developer software) by making it capable of handling ATM data transfer.

DAVID has been adopted as a de facto standard for set-top manufacturers such as Scientific-Atlanta and Philips and Zenith.

If successful, the combined ATM/DAVID architecture would allow telecommunications to significantly reduce the cost of delivering a mix of digital pay-per-view programming, video telephony and a host of educational and commercial services over their broadband networks. By doing so, Canada’s New Brunswick Telephone (NB Tel) — which is planning to deploy the ATM/DAVID technology — will have positioned itself to compete effectively with cable TV.

Separately, both technologies seem well suited for their upcoming marriage.

On the one hand, ATM’s ability to digitally expand or contract the bandwidth of its transmission channels — limited only by the overall carrying capacity of fiber or coaxial transmission lines — means that it has the capacity to carry and manage two-way video services on a telephone-style network.

“We believe that ATM end-to-end in the network is the right avenue,” said Steve Naor, Nortel’s business manager of broadband software products.

“We can enable software operating systems (such as DAVID) in the home that can manage ATM service.

“The first application for this will be interactive services that involve video delivery,” he added.

On the other hand, DAVID technology has already won wide acceptance among cable companies and telecos as a possible platform for interactive television (ITV).

For instance, Bell Atlantic, Telecom Italia, Hong Kong Telecom and Telecom Australia are already testing interactive DAVID ITV networks over fixed-capacity ADSL lines. Meanwhile, Nynex is testing it over a fiber/coax system, and Cox Cable over an analog network.

According to Naor, NB Tel intends to rollout the ATM/DAVID boxes in the Canadian province of New Brunswick next year.

“NB Tel does not look at this deployment as an experiment,” he said.

“The view is that this is a pilot that will eventually lead to the provision of ATM/DAVID services across New Brunswick.

“This actual customer is even looking, on a trial basis, at taking fiber to the home,” added Arthur Ollunna, Microwave’s strategic marketing manager.

“So we are talking major bandwidth here.”

Romanian Broadcasters Launch Compressed Services

BUCAREST

Two of Romania’s leading broadcasters are planning to initiate digital compressed services as a way of expanding programming offerings without tying up additional transponder space.

Antena 1, the country’s first private network, and Central European Media Enterprises (CME) partner with Media Pro International (MPI), have both selected Scientific-Atlanta’s PowerVu system.

Antena 1 will upload the service using a 4.2-meter ground-to-satellite system.

In addition to more programming, the MPEG 2-based PowerVu system will allow Antena 1 to provide additional teletext services, a separate stereo audio channel and high-speed data transmission.

MPI also plan to upload their PRO TV service from a 4.5-meter dish in Bucharest. The service will be downlinked from Eutelsat II F1 at more than 100 receive stations across the country.

CONTENTS
Gaining on Electronic Cinema

by Jim Mendrala

Electronic Cinema is a technology that is the subject of intense research by a number of leading companies around the world. In the near future, theater-goers will see bright, high resolution images of at least 35mm quality, projected onto a wide screen. This idea of converting movies into high-resolution, digital bit streams (or packets of data) for delivery to theaters with quality as good as the film itself has the major motion picture studios turning to interactive development as an eye toward the economic realities of electronic distribution.

Electronic Cinema can bring a number of important advantages to the evolution of the film industry. First is the amount of time and money saved, an especially important consideration to the producer and distributor. Second, Electronic Cinema can equal or better the very best cinema of today with its 35mm or 70mm quality images. Technically, with today's technology, there is no reason why film images (limited only by the film itself) cannot be projected electronically on the big screen.

FUTURE VISION

Some people believe that HDTV is the cinema of the future. But HDTV has some inherent problems, as we shall see. Its resolution, though much better than that of super-16mm quality, is only half the possible of 16mm images. The incompatible frame rate, inadequate bandwidth, inadequate number of scan lines, interlaced fields and bandwidth-limited color all combine to stymie efforts at real qualitative improvements in image quality for the wide-screen cinema. The broadcast-imposed standard of 30 frames per second in the country have to tend to the application of a time- and money-saving video technology to Electronic Cinema.

Today, movies prints are sent via land, sea and air to various theater chains. Even though security is tight, piracy of the print does happen. Prints for a typical movie are expensive. They can average as much as US$2,700 per print copy. Prints also show wear and tear. They get scratched and creased, or they break and can be spilled back together while the audience sits and waits. Sometimes print reels irreparably get out of sequence. Also, when switching from one reel to another, the film might be projected out of focus, sometimes for only a short time, sometimes for the length of the whole reel.

In the near future, a whole new way of delivering movies will evolve. Films today, with existing HDTV technology, can be transformed into a digital signal using either the NHK 1125/60 HDTV system or the European 1250/50 HDTV system. With the 1125/60 HDTV system, the frame rate is 30 frames per second (fps). This is not desirable, particularly in the U.S. where film is shot and projected at 24 fps. The 1125/60 HDTV telecine must convert the 24 fps to 30 fps using the 3:2 pulldown technique, which is not always precise. Various digital compression schemes, such as MPEG, have ways to look only at the actual 24 fps, thus freeing up some of the time that would be wasted on compressing a video frame made up of one field of the previous film frame and one field of the next film frame. Sometimes the 3:2 pull-down detectors get fooled. This is another reason why Electronic Cinema in the U.S. cannot be led by conventional HDTV television technology.

FILM RATES

The American Society of Cinematographers (ASC) has insisted upon a 24 fps rate. With the European 1250/50 HDTV system, the frame rate is 25 fps. This is closer to the 24 fps used in the U.S. and the one the ASC (ASC) is insisting on. Film in European and other 50 Hertz countries is projected at 25 frames per second. The difference between 24 and 25 is 4 percent. With Electronic Cinema, films can be shown at their original frame rates, be it 24 fps or 25 fps.

Some of the above HDTV systems use a 2:1 interface, yet the film is scanned progressively and converted to interlaced scan. The main reason for using the 2:1 interface was primarily to reduce flicker. Electronic Cinema progressively scans the film. One movie print contains up to six images, the film progressively and generates a digital file for every frame, with a resolution equal to or better than the film itself. We have seen the results on the wide-screen in such films as 'Forest Gump,' 'Apollo 13' and others. Those digital bit streams were put back on film with no apparent loss of resolution even though they were manipulated through various types of computers.

As you can see, capturing a film digitally with quality as high as the film itself is becoming a reality.

Let's look at a typical film projecotor. The projector has either a two- or three-blade shutter that allows each frame to be displayed two or three times per frame. Thus, what is seen on the screen is either 48 or 72 pictures per second at a 24 fps rate. Because of the light loss with a three-blade shutter most theaters use a two-blade shutter. This gives a perceptible flicker that gets worse as the amount of light is increased. Flicker tends to disappear when the display rate approaches 60 fps.

Today's digital technology, to display a picture two or three times between frames is not a problem. 24 fps can be displayed at 72 (3x24) pictures per second and 25 fps can be displayed at 75 pictures per second, well above where flicker tends to be perceptible. MPEG compression, in a way, does this now that the 24-frame image is decompressed and its output displayed at 30 fps.

Most compression schemes are upwardly scalable. This means that if MPEG, as an example, is used, it could be scaled to do wide-screen, Electronic Cinema including scope-type films with their 2.35:1 aspect ratios.

Today, when a producer or film studio transfers a film to video, the process is very lengthy. A colorist does a scene-by-scene color correction on the film. The film from the lab, as good as it is, is not as color correct as is required in an HDTV viewing situation. After the scenes are color corrected, the film is transferred into a digital signal and recorded. Electronic Cinema would be no exception. A colorist would be required here also. As a matter of fact, the only difference is that the film would be observed on a large screen, not a small CRT-type of monitor. Because of the phosphors, CRTs cannot display as much color as the film image contains. New projectors can display as much color as the film has.

HDTV has reduced resolution in the color. Equal resolution color is absolutely necessary for big widescreens, something HDTV cannot deliver.

COMPRESSION PRO

Lately, a new person has been added to the list. A compression/colorist who does both functions and is known as a Compression/Colorist. This person not only optimizes the color but also the compression. The main reason for the compression is that today's films are destined for bandwidth-limited systems. A CD-ROM, for example, cannot support the high data rates necessary for wide-screen, high-resolution pictures. Even the new Digital Video Disk (DVD) is only up to standard broadcast quality. The so-called "Sweet Spot" in MPEG encoding for professional broadcast quality is around 6 MHz. For HDTV and wide-screen Electronic Cinema, the data rates are much higher. Today, it is not only possible to record that high amount of data with existing technology, it is possible to distribute that data by fiber optic links or, more economically, by satellite.

Today's satellites are designed for the traditional data, communication and television type of signals. Even with today's satellites through, the much better Electronic Cinema type of pictures are possible. In the near future, satellites dedicated to Electronic Cinema movie distribution will be in place to replace the current system of distribution.

Since the signal is digital, no loss of quality would be visible to the movie-goer. And because it is digital, various encryption schemes could be employed to protect the feature from unauthorized exhibition or piracy.

Once the digital bit stream reaches the theater, either via fiber optics or satellite, it is only a matter of displaying. Projection systems today fall into three main categories: emissive, transmissive light valve, and reflected light valve. Emissive displays (continued on page 13)

SHOW LISTINGS

6-8 February — Australian Cable & Satellite Television Sydney. The conference at Darling Harbour will host this examination of the Australian Pay-TV and other interactive developments. For information, contact AIC Conferences, GPO Box 3924, Sydney, NSW, 2001; Australia; telephone: +612-210-5777; FAX: +612-221-7773.

13-16 February — Wireless Technologies Mexico Mexico City. The World Trade Center will be the site of this examination of the wireless technology industry. For information, contact organizers at J. E. Krause de Mexico, Rio Marmel No. 6, Col. Cuauhtemoc, 06500 Mexico City; telephone: +522-592-3297; FAX: +522-592-6613.

22-25 February — Middle East Broadcast Bahrain. The Bahrain International Exhibition Centre will house this even highlighting modern video and film transmission and production. For information, contact Philip McKeen at Overseas Exhibitions Ltd., 11 Manchester Square, London, W1M 5AB, UK, telephone: +44-171-986-1951; FAX: +44-171-935-8625.

27 February-1 March — Comdex Mexico Mexico City. The Interface Group brings its highly successful computer technology to The Sports Palace for an exhibition of everything from networking technology to mobile radio. For information, contact organizers at 300 First Avenue, Needham, MA, 02194-2722; USA; telephone: +1-617-449-6600; FAX: +1-617-449-3434.

4-7 April — Broadcast Thailand '96 Bangkok. The Queen Sirikit National Convention Center will play host to this gathering of audio and video specialists. For information, contact organizers at Reed Trudex House, 323 Bird Street, Office Villa, Muang Thong Thani, Cheierawattana, Nonthaburi 11120, Thailand; telephone: +662-503-2199; FAX: +662-503-4100.

15-18 April — NAB Las Vegas. The National Association of Broadcasters will host U.S.'s premiere broadcast and production technology exhibition, set to draw record crowds again this year. For information, contact the association at 1771 N Biscayne Boulevard, Suite 200, Miami, FL 33132, USA; telephone: +1-202-429-5350; FAX: +1-202-429-5406.

Send announcements and updates to TV Technology International, P.O. Box 1214, Fala Church, VA 20241 USA, or FAX: +1-703-998-2986.
Compression Offers a Post Solution

by Chris Dickinson

LONDON

Digital formats are being used in the transmission area of television and video more and more, which inevitably involves the increasing use of compression.

In what is perhaps a rare moment of consensus across the industry — widely put down to the charms and persistence of the MPEG governing committee — MPEG-1 and now, more commonly, MPEG-2 are accepted as standard tools for initiating compression, albeit with the proviso that one person’s MPEG-2 may differ from the next.

COMMON GOAL

There are a number of projects working on creating MPEG-2-based studio systems. The goal of all of them, though, is finding the most efficient ways of compressing an image so it uses the least amount of storage space while the pictures still remain “watchable” for the viewer. With MPEG-2, a scheme of compression ratios allows the user more freedom to choose how much compression and so how much picture quality to trade off for additional storage space.

Of course, as network bandwidth increases and storage costs come down, the need for compression will itself be reduced, but that, as they say, is another story.

Leading the rush of compression systems for production equipment are a number of groupings, two of the most prominent of which are Tektronix, with the MPEG-2 system it uses in its Profile disk storage system, and Sony, which has SX and the Serial Digital Data Interface (SDDI) standard.

Tektronix is collaborating with Texas Instruments (TI) on the definition of a codec architecture supporting the MPEG-2 4:2:2 profile. Tektronix vice president for strategic planning, says he wants to involve other companies beside TI in developing the MPEG-2 system.

“We are enthusiastic about working with TI, a world class leader in digital signal processing, to help further the development of open systems through MPEG-2 4:2:2 profile coders,” Ferbrache said. “Tektronix has contributed to open systems and we will engage in similar relationships with other companies who share our commitment.”

Sony utilizes SX system, which is used in its newsgroup systems and forms the basis of the compressed news format Betacam SX. According to Sony, the 4:2:2 studio profile compression system is a “highly efficient interference compression method.”

Meanwhile, Panasonic has chosen to focus on the internationally agreed upon DVCPRO system, the basis of a range of equipment being launched by the company.

In essence, standard compression techniques found in MPEG-2 are applied, while maintaining the 4:2:2 color structure and the full number of lines in each frame. SX, like MPEG-2, uses a video signal compression algorithm based on Discrete Cosine Transform (DCT) technology.

The compression system in the equipment, SDDI, which is an extension of the current Serial Digital Interface (SDI) standard, handles the moving of data around a studio complex or newsroom.

The DVC Pro line from Panasonic could potentially provide various amounts of compression.

The end goal, say BBC researchers, is to produce “true” motion vectors, leading to higher quality pictures.

“The approach is driven by the observation that it is possible to perform high-quality motion-compensated temporal interpolation (for example, in standards converters and advanced slow motion generators) and obtain excellent results without the use of any prediction error signal to correct errors in the interpolation,” the BBC says. “Such interpolation is based on the use of ‘true motion vectors’ and the use of fallback modes designed to produce visually acceptable pictures. There may, therefore, be an advantage in the use of such a philosophy when forming predictions for P and B pictures in an MPEG coder.”

The BBC says the results of tests so far have been encouraging, though there is still a lot of work to be done.

MIND OVER MATTER

The Bolton Institute in the U.K. has approached compression systems from a different angle, having done work on neural network technology. Neural networks are based on the learning mechanism of the human brain. The structure of a neural network consists of a number of computation units or processing elements to imitate neurons and couplings among them.

The Bolton Institute argues that by modifying the function of the processing elements, various learning algorithms can be designed to take advantage of the parallel processing in neural networks. This could, in theory, give a huge increase in the capacity of a compression system.

Satellite Firms Unite Behind MPEG-2 Delivery

by Chris Dickinson

LONDON

There are a number of practical, satellite distribution systems on the market that use MPEG-2 compression. These vary from professional signal distribution to DirecTV home transmission systems.

The leading vendors include General Instrument (GI), Scientific Atlanta and Digi-Media Vision (the former advanced products division of NTI now owned by New Media International).

GI originally did not support MPEG-2 but moved toward the standard as its acceptance grew. The company has its DigiCipher I system for encoding and decoding video for satellite relays. Up to 24 digital or 16 analog channels can be sent over a single transponder.

The company also has DigiCipher II. According to GI, DigiCipher compression is optimized for television, with MPEG-2 compression for video at lower bit rates. One of the main GI products incorporating DigiCipher II is the DSR-3200 integrated receiver/decoder for use with private network digital television. GI officials say key features of the compression system are its moderate memory requirements, its access speed and its ability to work with the company’s Jerroll access control products.

The latest version of DigiCipher II is dual mode with MPEG-2 that enables mixed format video, audio and data services on a common multimedia platform.

GI also has its new DigiCable system, which uses DigiCipher II and MPEG-2. DigiCable works by compressing up to 16 channels into a standard 6 MHz (for NTSC) or 8 MHz (for PAL) of channel spectrum.

Scientific Atlanta has a number of products using MPEG-2 compression and has been a supporter of the standard since its early days. The company introduced what it claims was the first MPEG-2 digital set-top box for the Time Warner and USWest trials in the U.S. It has also introduced head-end products like the Compression Management Controller and the Broadband Integrated Gateway, with two-way real-time QPSK signalling and 64/256 QAM downstream modulation.

The Model 8603 and Model 8603X are Scientific Atlanta’s mass set-top box systems, both using MPEG-2.

Digi-Media Vision (DMV) has the NTL-developed MPEG-2 and DVB-compliant System 3000 distribution system for relaying compressed television signals to cable headends. There is also a new MPEG-2 satellite newsgathering system that allows broadcasters to send digital signals from the field back to the studio.

The codec in the system multiplexes the coded signals and then adds digital scrambling to provide secure program transmission. The digital stream is then forward-error-corrected and modulated onto a single 70 MHz (or 140 MHz) IF carrier.

With huge cost savings at stake from the ability to squeeze multiple programs through a single channel, it appears that the satellite industry will be one of the driving forces behind compression technology for some time to come.
Plasma Screens Come Into Focus

by Charles White

LAS VEGAS
Plasma video displays came a step closer to commercial roll-out recently as the thin screens made their debut at the Comdex Fall show in Las Vegas.

The displays can be manufactured larger than any conventional picture tube yet developed and will soon provide large, space-saving color screens, first for television applications and later for computers.

DUELING SCREENS
Two competing technologies were shown at Comdex. Sony's Plasmamon is a modification of traditional plasma technology that delivers a brighter, sharper picture. Following close behind was Fujitsu with a true plasma display, and although the picture quality did not quite equal Sony's, it sported a 42-inch screen versus Sony's 25 inch.

Since the displays will be first introduced in the Japanese market in 1996, all were using the NTSC wide aspect ratio (16:9) that is prevalent in Japan today. Fujitsu predicted it would be first to sell a plasma display, citing late 1996 as its rollout date. Sony was a bit more conservative, hoping to deliver its screens sometime in 1997.

Fujitsu's screen, a mere 1.38 inches thick, is a true plasma display that works with two transparent electrodes on its front glass plate with a corresponding electrode on the rear glass plate. In between the two sets of electrodes is a discharge cell filled with a plasma mixture of neon and xenon gas. When voltage is applied between the electrodes, a surface discharge generates ultra-violet radiation, which then excites red, green and blue phosphor dots. The full-color picture is displayed by controlling the luminescence of each individual color phosphor.

"The structure is very compact," explained Stuart Hough Fujitsu's marketing manager for the U.S. "It is very simple to produce. There are only five major steps in the manufacturing process.

"The primary advantage of this type of display is that it can be viewed from a wider angle. In Fujitsu's demonstration, this was dramatically obvious when viewing the screen from the side. When viewing Sony's screen from that same angle, the picture quickly deteriorated, looking like a negative image of itself. Sony officials were quick to point out that this off-axis deterioration problem would be fixed before the units were brought to market.

PLASMA LIGHT
Sony's Plasmamon display, slightly thicker than Fujitsu's but still picture-frame thin, works more like active matrix liquid crystal displays in use on smaller laptop computer screens today. Instead of using the plasma discharge as a light-emitting source, the Sony technique, called Plasma Addressed Liquid Crystal (PALC), uses the plasma discharge phenomenon as an electrical on/off switch. The screen's brightness is supplied by a backlight that Sony says is a distinct advantage because the screens will last much longer than a true plasma display.

Sony has taken a more complicated chemical etching manufacturing process used by co-developer Tektronix and simplified it for mass production by using a manufacturing method that is much like a printing process. To further simplify manufacturing, the Plasmotron monitors do not need a separate driver for each pixel of the liquid crystal. According to James Dalton, director of corporate development at Tektronix.

"There are no fancy microelectronics involved. This device is just empty space: some grids, glass and metal. There is nothing else in it." True plasma displays have been criticized for the limited length of service compared to the PALC type of plasma displays. However, all of the true plasma displays, Fujitsu believes its entry will have the longest life.

"The surface discharge electrode structure is unique to Fujitsu and developed by us," Hough said. "It is superior to the opposed electrode structure which other vendors are using. Our screen delivers higher luminance and longer life of the product."

The displays can be manufactured larger than any conventional picture tube yet developed...

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Pushing the Compression Edge

by James Careless

TORONTO

In its current configuration, digital video compression (DVC) has worked wonders in squeezing four digital channels in the same bandwidth required for one uncompressed analog feed. However, bigger and better things lie ahead, as TV Technology discovered in discussion with two leading-edge DVC companies, Compression Labs, Inc. (CLI) and Iterated Systems Inc.

Based in San Jose, California, CLI has arguably been the pivotal player in the research that led to the development of MPEG-2 compression. A measure of CLI's impact is the fact that its "Magnitude" MPEG-2 encoders/decoders are currently being used by both DirecTV and USSB (United States Satellite Broadcasting) to provide more than 200 channels of digital video and audio to their DBS customers.

AND FURTHER STILL

However, CLI still wants to take DVC even further. That is why it has developed "Statistical Multiplexing," or "StatMux," a recently patented technology that allows users to pack five or even six channels — rather than four — into a single analog channel. It has recently been incorporated into Magnitude equipment.

StatMux can do this because it has the realtime ability to reallocate bandwidth from channels that do not need it — channels showing relatively fixed scenes — to channels that do. This is possible because current fixed DVC channel allocations each have extra bandwidth allocated to them to handle signal-load "peaks," such as fast-moving camera pans during sporting events.

In most cases this bandwidth is not being used during transmission. That is why a multiplexer like StatMux, which is capable of monitoring multiple signal requirements in real time, is able to reallocate this bandwidth from relatively stable channels to channels that need the extra data space, in much the same way that ATM (Asynchronous Transfer Mode) equipment allocates bandwidth on a needed, rather than a fixed, basis.

"The key here is that demand is created within the encoder itself by looking ahead and determining on a frame-by-frame basis the degree of difficulty of encoding materials coming into the encoder in real time," said Jim Lakin, CLI's vice president marketing and development. "We are able to allocate bandwidth virtually on the fly.

"What that does is it actually allows you to increase the number of channels within a multiplexer," he added. "... you can not only improve picture quality with this technique, but we actually make available additional bandwidth for additional channels, which of course translates into additional revenues for broadcasters."

Lakin says CLI is also working to squeeze more signals into bandwidth by improving the transfer of film to video. This is particularly important to NTSC countries. Because film only requires 24 frames a second, NTSC broadcasters currently send out six redundant frames per second (fps) to bring it in line with the format's 30 fps rate.

Obviously, these six frames could be eliminated and the bandwidth freed up for other uses, if equipment were developed that could compare the frames to each other in real time, deleting those that are redundant.

EVEN MATCH

Lakin says such "detelecing" equipment already exists, but that it is only currently capable of reducing the frame rate to 29 per second, due to the challenge of doing such complicated analysis in real time. However, he says that CLI's latest research has resulted in equipment that can drive this rate down to 25 frames/second, which exactly matches the PAL rate and frees up more bandwidth in NTSC countries for other uses.

"What this means is that the demand is that rather than transmitting one movie four times (within the same bandwidth), I may be able to transmit the same movie five or six times," Lakin said, "or I may be able to transmit two different movies in the same transport."

Other DVC applications being developed at CLI include a DS-3 multiplexer interface capable of transmitting a package of digital channels at 45 megabits/second (Mbps).

"That means that we can use a standard telco interface to transmit very large numbers of channels," Lakin said.

Meanwhile, Iterated Systems Corp. of Atlanta is taking an entirely different approach to DVC. Since 1987 Iterated has been using the mathematical phenomenon of "fractals" — equations that create images in which the parts are similar in shape to that of the whole — to devise data-reducing ways to store still images on digital form. In essence, the "Fractal transform" method searches for self-similarities within a bitmapped image and expresses these relationships in mathematical terms.

This is possible because fractal images themselves are created through the translation of fractal formule into computer images. Computer-generated graphics created using fractal geometry can be made to resemble naturally occurring shapes, such as a snowflake, a mountain range or a fern, says Brian Meek, Iterated's director of product marketing.

"So it occurred to Dr. Michael Barnsley (founder of Iterated) that he should be able to go the other direction and create a computer program that could take a digitized photograph and deduce the fractal codes that could best describe and recreate that image," Meek said. "This idea ultimately led to the discovery of the Fractal Transform method of image compressions, the founding of Iterated Systems and the release of software and developer libraries that utilize this technology."

FRAC TAL FORMULA

Iterated's success in developing software capable of doing this — defining an image into a fractal formula that contains much less data than the original and requires far less bandwidth for transmission — has allowed the company to break into the CD-ROM still image market, and to make progress using fractal DVC for non-real-time store-and-forward video storage applications.

"We had set out to prove to the world that video could be done using fractal technology," Meek explained. "That is why MCI and Iterated formed an alliance in 1994 to further develop image compression technology for telecommunications."

At present, fractal DVC has yet to reach the stage where it can deliver broadcast-quality video in real time. Still, there is the undeniable lure of fractal technology's amazing ability to squeeze a lot of information into a relatively small mathematical formula.

"I definitely believe that VHS quality and better will eventually be achieved at ISDN rates," Meek says. "That is something I feel pretty comfortable with."

What is obvious from this outlook is that DVC still has room to grow. Whether it is simply a better utilization of existing modems, as demonstrated by CLI, or an entirely new approach being researched by companies like Iterated Systems, it is clear that we will see more — and better — forms of the digital video compression in the years ahead.
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Keeping Tabs on Video Servers

3,800 streams and costing about $10 million. A prototype system has been developed using 16 Pentium-based boards each capable of delivering up to 1,000 MPEG streams. This system is being designed for a variety of communications applications and seems to target the SGI Challenge XL on economics. The challenge can hold up to 36 400MHz processors with a bus speed of 1.2 GHz and enough bandwidth to put out more than 3,000 video streams. According to CableLab's Wattau, a solution to the demand for entry level local-based near video on-demand could be CD video and the coming super density (SD) video disk. Prices for a CD video system could be as low as the basic system within a couple of years and they could be hooked onto a network, just one stream at a time. A very different approach is being taken by suppliers to the broadcast market, but the two segments are not entirely different. The Phillip/BTS Media Pool provides the broadcast complete random access and off-line editing and has the ability to provide enough output streams for NVOD. This could provide broadcast access to the VOD market and an in-house system at the same time.

SERVER SUCCESS

The server is one of the key technologies in the coming super density (SD) video market and the server market is growing rapidly. According to European sales manager George Boal, this has been almost exclusively to broadcasters, though he was able to announce a side to a German medical research facility for the stereoscopic (3D) recording of operations, including brain surgery.

The Profile uses so-called intelligent MJPEG compression that varies the amount of compression according to the content of the picture. Typically, for high-quality broadcast applications the 4:1 to 8:1 range is used, giving quality superior to Betacam SP. Video files are managed by a single Intel 960 chip and can be in two or four-channel configuration. The hard disk array ranges from 16 to 100 GB, giving 40 minutes to 9 hours of playing time at the high-quality setting. All four channels are fully bi-directional (i.e. record or playback) regardless of what the others are doing. Like the Profile, Quantel's new Clipbox is able to register considerable interest from the new breed of multiple-channel broadcasters who wish to put dozens of digital channels out over satellite and cable. The first major sale for the Clipbox was to CLT, which acquired 300 hours worth of storage with an unspecified number of editing systems. The system is to be combined with the IBIS Linspace automation system and linked to NetBox and EditBox editing systems, while a Hal Express is to cover graphics. Because all the systems will draw material from the ClipBox, results of production and post-production work will be immediately available for transmission.

This instant availability is an important point: any future VOD market may not need broadcasters. Producers and TV journalists will be able to access data banks directly, and the traditional gateway function of the broadcast may be replaced by multimedia and telephone companies. Systems like the ClipBox and Profile provide the ability to put multiple NVOD signals on digital cable and satellite today, rather than wait for the solutions of tomorrow.

One of the things being used to trigger the multimedia market is what DEC calls the "Content Creation Center." which is a fancy expression for an office that helps the customer create interactive multimedia software packages using still and moving video and hypertext. The first such office was opened in December 1994 in New York, and DEC hopes to have similar facilities throughout the world. Each office is planning to have about 20 people. Hewlett-Packard claims to be taking a different path with what they call an "upgradable, loosely coupled architecture" called the Video Transfer Engine. However, at first inspection, it seems to fulfill very much the same role as an SMP system. It is a UNIX-based system that should be able to handle 5,000 to 10,000 video streams.

Sony has unveiled a server system to provide multimedia and VOD using what Sony claims is a unique software platform. Sony announced the new system in the hope that it will boost the VOD market that has fallen "short of expectations." Called the Interactive Video Communications System (IVS), it is the link between the server and the set-top box. According to Claude Buard, director of Sony Telecommunications Europe, the IVS is to be shipped by the end of 1996.

BOXED IN

In the meantime, Oracle and Hitachi have developed an interactive television system for on-line shopping, news and VOD. Hitachi is to continue to develop its set-top boxes and Oracle to field the system and a new system is designed to link the two. Sony is now in talks with Oracle and Hitachi with a view to combining their systems with the IVS architecture, although Buard said that his company did not expect VOD to take off within the next three years. Sun has launched a new server for the provision of video across networks for corporate use. Called the MediaCenter, the server is designed for financial services, training applications and retail outlets. Sun is developing a series of VOD products and software to be packaged with the MediaCenter. Systems start at $33,000 and Sun has a top-of-the-line model that will provide 65 hours of video and support 270 streams. The server is to integrate with Oracle and Sybase software and was to begin shipping in December.

However, Sun may not have the market all to itself as Microsoft gets ready to roll out its new server software package based on the Windows NT Server operating system and DEC and NetScape are also getting ready to launch competing systems, and Netscape Chairman Jim Clark announced at Geneva that his company had "completed talks with telecommunication providers for the Netscape commerce provider."

Many voices in Europe regard the idea of video servers becoming a commodity and discount these developments as being too far from reality. Michail Malis, of IBM's interactive TV department in Stuttgart, told the Imagine conference that building a server is very easy, and even a network building customer acceptance is quite simple. He places the costs of VOD at well over US$1,000 a stream and the network installation costs at US$70 to $100 per customer.

He also points out that the present video rental customer pays just US$2.25 a film. It would take 14 years just to make return on investment, he said.

Ranged against this view are such figures as those from DEC's director of interactive multimedia, Phil Corman, who said "Let's face it, telecommunications are doomed to become a commodity..."
Electricity in its Most Basic Form

by Brian Flowers

American humorist James Thurber used to tell about his grandmother who would go around the house making sure that all the light bulbs were screwed in tight to ensure that electricity did not leak out of the sockets. While this may have had a calming effect on the poor woman’s psyche, it is clearly not based on any scientific fact.

Of course, this is excusable because her daily life did not revolve around an understanding of the nature of electricity. And yet it is surprising how many people whose lives do require such understanding — such as television engineers, both veterans and novices — are clearly lacking.

Any elementary discussion of electricity requires some basic physics. We should start with the basic units of classical physics, namely length, mass and time, using the MKS system (meter-kilogram-second).

**PLATINUM DEFINITION**

A length of one meter used to be defined as the distance between two lines on a bar of platinum kept at a constant temperature in Paris. But this has been superseded by 1,650,763.73 wavelengths in a vacuum of a specific radiation from krypton-86.

A mass of one kilogram is the mass of a well-preserved block of platinum at the International Bureau of Weights and Measures at Sèvres, France. But it is also the mass of one liter (0.001 cubic meter) of pure water at a certain temperature.

One second used to be derived from the time between the meridian (when the sun reaches its highest point as seen from a given place on the earth’s surface) on two consecutive days, this being equal to 24 x 60 x 60 = 86,400 seconds.

Since the rotation of the earth is not absolutely steady, a more precise definition of a second has now been adopted, namely the time interval corresponding to 9,192,631,770 oscillations of caesium-133. Using this definition, it is sometimes necessary to add an extra second to the last day of the year to bring Greenwich Mean Time in line with Astronomical Time.

Incidentally, do not make the mistake of thinking that the Earth revolves once every 24 hours. In fact, since the Earth orbits the sun once a year, it actually revolves about 361 degrees in 24 hours. Hence it revolves 360° in 24 x 360°/361° = 23 hours 56 minutes.

The bridge from the above classical physical units to electrical units is provided by the definition of the ampere, namely the current that produces a force (due to the interaction of the two resultant magnetic fields) of 2 x 10^{-10} newtons per meter between two infinitely long wires of negligible cross section, which are one meter apart in a vacuum. For calibration purposes, the two wires are made into two parallel flat coils, one being fixed and the other one being attached to a sensitive balance.

**NEWTONIAN PHYSICS**

The newton is defined as the force that will accelerate one kilogram one meter per second per second (force = mass x acceleration). Hence we have now defined the unit of electric current, the ampere (or amp), in terms of MKS parameters, but it remains a basic unit. The dimensions of the newton (mass x acceleration) are M.L.T.

**The use of length, mass and time as basic dimensions is valid only for the familiar world of classical Newtonian physics.**

An electric current corresponds to the flow of electrons through a conductor, or through a vacuum in the case of a cathode-ray tube. The unit of electrical potential that makes the electrons move is the volt. Some substances allow the flow of electrons more easily than others, metals being generally good conductors. This is because the metal atoms easily pass electrons from one to another, whereas the atoms or molecules of most other substances do not.

Gases conduct when their atoms or molecules are ionized, as in a neon sign. Ions are also produced when substances dissolve in water, so brine is a good conductor, whereas pure water is not. Dissolved molecules dissociate into two parts, with one having too many electrons and one having too few. The two parts, ions, thereby acquire a negative and a positive charge respectively.

We should now introduce Ohm’s law, namely I = V/R, where:

- I = current in amps,
- V = potential difference in volts,
- R = resistance in ohms.

When one volt produces a current of one amp through a resistance of one ohm, one watt of power is produced. This heats the resistor. If you don’t make toast or to boil a kettle of water. For this you need a few hundred watts.

A power of one watt produces energy at the rate of one joule per second, and one joule is the work done when a force of one newton moves its point of application one meter in the direction of the force. Think of pushing your car when you refuse to start and you will immediately understand that this involves quite a bit of work.

One horsepower is 746 watts, so one manpower is about 100 watts, although some athletes can produce several hundred watts for a few seconds.

So 1 joule/sec = 1 watt = 1 volt x 1 amp, or in general terms: W = V x I.

Combining this equation with Ohm’s law also gives us W = V/R and W = I x R.

The dimensions of work are M.L.T^2 (force x distance), so the dimensions of power are M.L.T^-1 (work per unit time).

Hence, the amp is defined in terms of MKS units, and the watt is derived from MKS units. The volt is derived from the watt and the amp, and the ohm is derived from the volt and the amp.

However, the use of length, mass and time as basic dimensions is valid only for the familiar world of classical Newtonian physics. For a more comprehensive description of the universe, we must include relativity and quantum theory.

The three universal constants are actually the speed of light (c), the gravitational constant (G), and Plank’s constant (h). The latter relates energy quanta and electromagnetic radiation frequency by the equation: E = h x f, where E = the smallest quantum of energy that can be emitted at a given frequency,

- h = Plank’s constant,
- f = frequency of the emission.

Hence, Plank’s constant is (h) = E/c, so it has units of energy x time. Its actual value in MKS units is about 6.6256 x 10^-34 joule/seconds. Like the speed of light (c) and the gravitational constant (G), Plank’s constant (h) has the same value for any observer anywhere in the universe.

In contrast the mass of a moving object varies according to the formula:

\[ M = \frac{M_0}{\sqrt{1 - v^2/c^2}} \]

where:
- M = mass,
- M_0 = rest mass,
- v = velocity,
- c = speed of light.

From this equation it follows that an object moving at the speed of light would have infinite mass, which explains why only entities with zero mass, such as photons, can travel at the speed of light.

Similarly, the moving object’s length in the direction of motion becomes shorter as it goes faster, and its time slows down as seen by a “stationary” observer. In fact (length x time) is a constant, so the moving object’s seconds become longer in inverse proportion to its reduction in length.

This leads to the “twins paradox,” whereby one twin sets off on a very fast space flight and comes back to Earth many years later in his time, to find that his brother has aged 20 years.

This time-slowing effect has a practical effect on the business of television transmission. For instance, it reduces communications satellite oscillator frequencies by a few Hz in 10 GHz. Otherwise, the effect is completely swamped by other variations, such as Doppler effect and oscillator instability. In fact, to complete the analysis, we should also realize that for objects on Earth, the effect of gravity slows their time as if they were floating in free fall, such as satellites. However, for satellites the speed effect far outweighs the gravity effect.

**LIGHT SPEED**

The fact that the speed of light is a universal constant also means that we are not really entitled to define length and time separately, since as soon as one is defined, the value of the other follows automatically from the value of c.

Hence length, mass and time, are not really basic units at all, but they can usually be regarded as such in our everyday world. This is just as well, because most people are so used to the classical concepts that they have great difficulty in accepting the implications of relativity and quantum theory.

Even Einstein had problems with the implications of quantum theory, leading to his remark that, “God does not play dice.” But experiments carried out since Einstein show that God not only plays dice but is also not averse to a game of poker.

An engineer at the European Broadcasting Union for 33 years, Brian Flowers was the former head of service and project manager for the EBU’s European Control Center in Geneva. He was recently transferred to the Transmission Technology sector at the EBU. He studied engineering at the University of Southampton and served for two years in the Royal Artillery and the BBC. He is a member of the Royal Television Society and was recently accepted as a member of the IEEE.

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Disk Technology Through the Ages

by John Watkinson

Today's disk drives are descendants of magnetically coated drums.

Today's disk drives are descendants of magnetically coated drums. These were large cylinders coated with the same oxide as was used on tape. Fixed heads, similar to tape heads, accessed signals recorded on circular tracks. The time taken to access any data was no more than one revolution and usually averaged half a revolution. This is called rotational latency. Clearly, faster access would require higher rotational speed. But with conventional magnetic recording, the contact between the head and drum would cause frictional heating and wear. The first breakthrough was to lift the head off the drum surface by feeding compressed air to the interface area. This eliminated friction and allowed a dramatic increase in speed. Soon, it was discovered that a suitably shaped head would produce its own lift and would fly automatically. Air is viscous, and a fast spinning drum carries around with it a thin layer of air turning at the same speed. Upon leaving the drum's surface, the air speed falls off. Figure 1 shows face area, and switching from drum to disk allowed a huge increase in area because several disks could be stacked on a common spindle. The large number of tracks now available made it uneconomical to provide a fixed head for every track. The first practical multiplatter disk drive, the IBM RAMAC, had only a single pair of heads. These were mechanically driven from one disk platter to another along a vertical axis, and the drives rotated radially to the selected track. The two heads could access tracks on both sides of the platter.

**TWO HEADS**

This soon gave way to a better compromise in which each platter had its own pair of heads. All of the head pairs were mounted on a common positioner that only moved radially. With mechanical positioning like this, the rotational latency has to be added to the positioning latency. It is important to be able to move the heads from one track to another at high speed. Early drives used hydraulics to move the heavy head assemblies. The development of the power transistors allowed the moving coil positioner to take over and this has remained the dominant technology, except in low-cost, low-quality applications were stepping motors were used.

It is well known that when dirt separates the tape from the heads on an analog audio recorder, the high notes get muffled. This is exactly what happens in a disk drive because of the air film between the heads and the disk. Without the air film, the heads burn up. The loss of high frequencies restricts the recording density in comparison to a system having heads in contact. As I said earlier, rapid access and cost per bit are mutually exclusive.

Disk drive development is driven by intense competition between manufacturers. The drive with the fastest access will capture certain markets; the drive with the lowest cost will capture others. Driving down the cost per bit requires the recording density to rise, and there are several areas that affect recording density. Advances in media and heads allow the same electrical energy to be induced from a smaller area of the disk. Improvements in precision and cleanliness allow the head closer to the disk without crushing. Improved modulation schemes allow a higher bit rate without increasing the signal bandwidth. More powerful error correction allows the data to be extracted with the same reliability from a noisier signal. More accurate positioning mechanisms keep the heads more closely registered with the tracks.

As all of these effects multiply, it will be clear that a 10 percent improvement in every one has a dramatic effect on the overall performance. Consequently, the speed and capacity of drives has advanced dramatically, with the density typically doubling every few years. Although the evolution of the disk drive has generally been incremental, there have been two quantum leaps in development that have allowed performance to rise even faster.
than usual. The first of these was the development of the servo surface. The positioning accuracy of the drive limits the density. Prior to the servo surface, temperature changes would cause the data tracks to expand and contract, resulting in tracking errors. The tracks had to be made wide so that they could be read over a reasonable temperature range. With servo surface technology, one surface of the disk pack is dedicated to the alignment patterns, which are read by a servo head. This servo surface expands and contracts in step with the other surfaces, canceling out errors due to temperature changes. The loss of one surface is wiped out by the increase in storage capacity allowed by narrower tracks that can now be reliably accessed.

ON TARGET

The second quantum leap was Winchester technology. The name came about because the project number at IBM was the same as the model number of the famous rifle. The Winchester disk drive departed from tradition by fixing the disk pack in the drive so it could not be exchanged. This lead to a number of advantages. The entire assembly could be sealed against dirt, so the flying height of the heads could come down, reducing spacing loss and driving up the along-track density and the data transfer rate. With no need for interchange, the tracks could be made narrower and put closer together. The drive would only have to read tracks it had written itself, so no head adjustment was needed.

While the Winchester drive was a giant breakthrough in disk technology, it brought about a requirement for high speed tape drives to back up the data because the disk packs could no longer be removed. Unlike exchangeable pack drives, failure of a Winchester drive usually led to loss of the stored data. So much for the myth that disk and tape compete.

Figure 3 shows how disk technology developed. TRONNS take several directions. At the leading edge, applications that were impossible become feasible. At the trailing edge, existing applications may become cheaper, or they may become smaller. There are many good reasons for making disk drives smaller. A small disk requires a shorter positioner travel and smaller, lighter head arms. The entire positioner can be driven much faster with benefit to the access time. Today, very small drives are available that are no larger than a postage stamp. These plug into chip sockets and compete with RAM where the fastest access time is unnecessary.

For a given storage requirement, it will be faster to use several small drives rather than one large one. As the greatest volume market for disk drives is in personal computers, small drives may well be cheaper as they are made in greater quantities. A further advantage of using a series of small drives is that error correction techniques can be used to protect against the loss of a drive. In RAID (redundant array of inexpensive drives) technology, data to be recorded is assembled as code words that include a certain amount of redundancy. The code words are not recorded on a single drive, but are uniformly distributed across several drives. The redundancy in the codewords is such that the data lost by the failure of any one drive can be fully restored by the error correction systems. The failed drive is replaced and the system recreates the data it held.

John Watkinson is an independent consultant on digital audio, video and data technology and is the author of seven books on the subject, including the Art of Digital Audio and the Art of Digital Video. He is a fellow of the Audio Engineering Society, a member of the British Computer Society and is listed in Who's Who in the World. Based in England, he regularly presents papers at conventions of learned societies and has presented training courses for studios, broadcasters and facilitators around the world. He is currently working on a video fundamentals book. John can be reached at +44-1734-834-285, or read his web pages at http://www.pro-bel.com/guest/john/

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Searching for Useful Gadgets

by Craig Johnston

For most of our lifetimes, computers have “been there to help us.” Until the introduction of the personal computer, the “us” that got help were mostly large institutions that could afford large mainframe systems.

FOCUS ON GADGETS

I do not plan to write about dedicated computer applications. TV Technology has writers who live and breathe these machines and who make their livings operating them. Software and peripherals that run on PCs or Macs but which perform the same function as dedicated machines will also be outside my scope.

As you will see below, I am looking for, well, gadgets.

The first gadget program I remember falling in love with was called LOG-IT 100, distributed by Comprehensive Video Products. The software was on a ROM chip that plugged into a Radio Shack Model 100 laptop, and there was a cable that plugged into the modem or cassette port on one end and the timecode output of a video tape machine on the other. While playing a tape at regular speed, pushing the F2 key on the laptop read the tape’s timecode into RAM, and connected that to whatever description you wanted to type about the current scene. The completed logs were printed on an inexpensive nine-pin dot matrix printer.

This was the most popular piece of equipment I have ever bought. It removed the drudgery of logging videotape. Even though they were not usually the ones who logged the tapes, the video tape editors loved it too; the logs were legible and the timecodes were accurate. And because logging could be done in real time (the logger did not have to stop the machine each scene to write down the timecode), the logging process did not get put off or ignored. To the people who used it, the LOG-IT 100 became indispensable.

SELECTIVE GADGETS

I will give you another example of a gadget program that has been very useful. Called Select-A-Lens v. 1.1 from Fujinon, it is a Windows program that lets me put in three lens parameters, and solve for the fourth. For instance, I know my center field camera is 400 feet away from home plate, and I want to be able to frame a six-foot tall batter head to toe. By inputting those two parameters (plus my 2.3-inch imager size) the program tells me I need a 440mm lens. Of course, the next screen tells me which Fujinon lenses to use, but that is why the software is free.

I used Select-A-Lens just the other day. We were moving our news department into a new space and we needed to decide where to locate the newsroom update camera. One of the questions we needed to answer was how much of the background wall we would see. I could have carried the camera up to the new space, or I could have looked the numbers up on a lens table, but instead I answered my question using a gadget program.

Here is a look at one final gadget, called Scriber, which is sold by a company I used to work for, Pacific Lotus Technology. Scriber decodes closed captions and writes them to text files. It comes in either a DOS or Mac version, and uses a small piece of peripheral hardware (which comes bundled with the software) called a Telescriber that plugs into a PC serial port or a Mac modem port.

This technology was developed in Japan for use in teaching English as a second language, but I think it has numerous application in broadcasting. A news director could monitor his competition with it and not only know the order of their stories, but read their scripts as well. It could be used to monitor and transcribe weekend news coverage, making it easier for producers to choose sound bits.

MUSIC ON TAP

A final goal for this column is a wish list section. I would like a generic music library catalog on computer. Although I have never worked with one, I understand certain music libraries offer a computer database of their selections with

(continued on page 18)
Surround Sound Monitoring Tips

by Terry Nelson

In last month’s column, we made a cursory tour of modern trends in audio for video production and started to take a closer look at the development of stereo sound through to surround sound production.

This month’s column will look at several monitoring solutions currently available to facility executives wishing to move seriously into surround sound mixing but who do not have the space or budget to consider large film-style mixing theaters or dubbing stages.

Multichannel sound formats tend to use LCR (left-center-right) screen channels and either mono or stereo surround channels. The Dolby stereo cinema format uses four channels, LCRS (left-center-right-surround), that are matrixed down into stereo compatible tracks (Lt and Rt) when decoding is not available. A subwoofer channel is often derived from the left and right channels for subwoofer information.

LCR RULES

To keep viewers firmly engaged, a basic mixing rule is to put the main effects and music tracks into the left and right channels and dialog into the center channel. The surround channels should be used for ambiance and diffuse sound effects to put the viewer inside the action without attracting attention away from the screen by using discrete sound cues.

The moment attention is pulled away from the screen, the magic is broken and the viewer is back in the living room and no longer in the film, sporting event or whatever is being watched and listened to.

The importance of the sound cues gives rise to different requirements for the screen loudspeakers and the surrounds. The LCR loudspeakers are required to give a broad stereo image across the entire audience and not just on one “sweet spot,” as is often the case with music systems.

Research has shown that the front speakers should have a tightly controlled vertical pattern — as little as 15 degrees — and a wide horizontal pattern for the viewing area. The narrow vertical pattern puts the sound pretty much into the plane of the viewer’s ears and diminishes the risk of interference through unwanted room reflections.

Surround monitoring for small environments is more than just a few extra loudspeakers. The diffuse sound field of a good cinema is achieved by an array of surround speakers around the rear half of the auditorium. In a small space, a large number of speakers becomes impractical, and reducing the array to one or two

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CONTINUED FROM PAGE 17

Gadget Search

WAV files (or their Macintosh equivalent) allowing users to actually audition a few seconds of each cut on the same multimedia computer that runs the database. An ideal system would allow users to ask for a list of, for example, medium-slow tempo, romantic, steel guitar, 30 second music beds. In a few seconds, a list of perhaps five selections would appear on the screen. By highlighting a selection and pressing the mouse button, users would hear five seconds of that selection.

That is much more advanced than the database that came with one of my music libraries. But I have a couple of music libraries and I do not want a separate database for each one. I would like a gadget program that would allow me to import the databases offered by several different music libraries, manually add information from another library that may not offer its catalog in database form, and easily capture a representative portion of each cut off the library’s CD collection as a WAV file.

Am I a dreamer?

If any readers have a favorite gadget program they would like others to know about, send me a note through TV Technology. And if there is a program you would like to see, put it down on paper and send it in. You never know, you could spark an enterprising program developer into action.

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units per side gives rise to problems of directionality. The best solution is to use dipole loudspeakers, from which no direct sound is aimed at the listening area and the surround information remains diffuse. So what is a dipole speaker? The simplest way to describe it is to compare its polar response pattern with that of a figure of 8 microphone; it diffuses sound at either side with nothing in the middle. Placed on or near a wall, the speaker will throw sound along the walls and/or (if it is tilted) up into the ceiling but not directly into the room at the listening position.

**HOW LOW?**

Low frequencies tend to add excitement to the viewing and listening experience. However, it is worth mentioning that for many people, what they call bass is more like low mids. Real subwoofers should ideally not be coming into play above around 100 MHz and should extend down to at least 30 Hz, if not further. I mentioned monitoring solutions, so what are they? For studios wishing to apply a monitoring standard similar to that used in film mixing, a look at the Lucasfilm THX program is worthy of consideration.

Although the program was designed for dubbing stages and cinemas, there is a system for small film and video mix rooms; the Apogee MPTS-1 system. Literally a scaled-down theater system, the THX-designed MPTS-1 features three-way LCR components, dipole surrounds, separate subwoofers (either 2 x 15 or 2 x 18 inches) and a controlled/crossover unit with switchable film and television frequency response characteristics. Because the Apogee system falls into the THX program, you will have to get your room certified by THX to benefit from the use of the name and logo, and this will mean that certain electro-acoustic standards will have to be met. The front monitors will also have to be mounted into a vertical baffle wall or the THX-approved "Baffle" assemblies.

**STEP DOWN**

Although this is worthy of consideration, the expense may deter smaller operations. But do not despair, there is another solution: the home THX system.

The rapid rise of the home theater prompted Lucasfilm to develop the Home THX program to provide optimum playback facilities for video and television entertainment. Incorporating the essential features of a cinema system, Home THX components feature front speakers with correction directionality, dipole surrounds and real subwoofers; THX-approved Dolby ProLogic decoders are fitted with THX circuitry for proper frequency response in a domestic environment, and approved power amplifiers provide the power and response necessary for film and television soundtracks.

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**THOUGH expert advice is recommended for installation, a Home THX system does not require room certification, but it does provide a very cost-effective solution to the problem of a reliable monitor setup for surround sound mixing and previewing.**

There is now a wide selection of Home THX-approved equipment, and although some of them are rather pricey, there are others that will make your company's accountant happy while at the same time provide you with what you want: a compatible surround monitoring system you can trust.

Terry Nelson is co-principal of Studio Equipment in Yverdon-les-Bains, Switzerland. He began his professional audio career in 1967 and has worked in the areas of sound reinforcement, recording studio design and mobile operations and has more recently become involved in turnaround studio projects for music, film and television.
**USER REPORT**

Scitex Takes TJFX to 10 Bits

by Dave Levy

Director
TJFX Limited

LONDON

The Mill is one of the major facilties houses in the Soho district of London, a region of the city where most of the top post houses in the country can be found. The facility has 12 edit bays using two Discreet Logic Frames, two Flints, two Quantel Henriks and three A34s. The balance is taken up with two Avid suites and a Quantel Harlequin. Telecine is sourced from two Ursa Golds on the ground floor. TJFX provides the 3D graphics with six Softimage Extreme seats running on Indigo2 platforms.

COMMERCIAL WORK

The core business for the Mill is commercials, with many award-winning high profile campaigns to its credit. The D-1 SGI (serial digital video) infrastructure at the Mill gives a standards-independent environment allowing regular TV work in either 625 or 525 digital.

All of the commercial work destined for television leaves the building on D-1 tape, which is also used for archiving and "in progress" storage. For us in 3D, this means that we need a bridge from the RGB Softimage elements residing on our IRIX network disks to a full resolution, uncompressed D-1 signal that can be piped to the rest of the building for compositing. For this we need a machine that can sit on the graphics network and be capable of real-time playback.

In the graphics department we have access to six digital disk recorders (DDRs). We have three A60s, one A66, a DPS PVR for tests and the Disks from Abekas (now Scitex Digital Video). All of these reside on the Ethernet and the Disks also is directly connected to one of the SGI Indigo2 systems via SCSI. All of the DDRs, with the exception of the analog PVR, output serial D-1 streams to the 128 x 128 router.

Like all animation houses, we have been waiting for a method of transferring our 24-bit RGB graphics to a system that will give us the required dynamic range of at least 10-bit uncompressed YUV, data integrity (error correction at last), simple multi-user networking (TCP/IP with no faking) and rapid transfer of data between machines and color spaces (fast SCSI with real-time RGB-YUV-RGB conversions). The Diskus does all of these things and is a considerable improvement over the previous two generations of Abekas disk products.

Since the Diskus is the first Abekas DDR that is quiet and small, we decided to put it in the actual work area with the operators. This allows us to use SCSI for a transfer rate of several frames a second.

The Ethernet is also much improved, with transfer rates of under a second per frame.

Having the machine in the production area has led to clients operating the Diskus with the GUI and mouse. This can be a useful distraction long renders. But seriously, the interface is so simple that users can instantly jog and step through material to indicate points of interest to the 3D operator.

It might be of interest to note that we do not use either the hard or soft control panels available with the machine, as the GUI provides all the functionality required. However on a networked real-time D-1 I/O for around the cost of a mid-range workstation.

IN FAVOR

We have had our Diskus for about a year. It has stabilized well after the beta release and is the most sought-after DDR on the network. Since its introduction, SGI has brought the Impact Indigo2 range onto market with the SGI straight from the computer chassis.

But I think that SGI may have missed the point slightly. D-1 component is not the most advantageous format, especially in the color channels, although the demo on ultra-SCSI running a Ciprico raid at Siggraph was impressive.

However, as with all these intracomputer solutions, you have to ask yourself if it is worth having an internal solution which effectively freezes out the use of the SGI...
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KOLD Serves Up Video With Hewlett-Packard

by Rod Dominovski
Master Control Tape Operator
KOLD-TV

TUCSON, Arizona

KOLD-TV Channel 13 is a CBS-affiliated member of the 81st market. At our state-of-the-art, 25,000-square-foot facility, we offer sales and commercial production services as well as news and community service support.

In the fall of 1994, KOLD updated its spot-playback system. We installed a Hewlett-Packard Broadcast Video Server (BVS), which was quite a jump for our station. However, we felt that passing up an LMS system was the correct way to go because we wanted to move toward a tapeless environment.

Some of the criteria that we used in choosing a server were reliability, video quality, functionality and cost savings. We purchased the BVS system because HP met our criteria and offered us features that were not available in any other system. At the time of the purchase, KOLD became a Beta test site for the server. While working closely with HP over the past year, we have built a relationship that has been truly rewarding.

THE SET-UP

Our current Broadcast Video Server (BVS) set-up consists of a single (main) BVS with one channel in and two channels out. The BVS is controlled remotely by Louth Automation's HP Ad Management System. The AMS is a client-server based system that communicates with the BVS and external VTRs via RS-422. The AMS computers are connected through a LAN that distributes master control and production functions among various workstations. We use the BVS/AMS system to edit and transmit the daily log (playlist), dub spots from tape to tape, preview spots and create and run compiled tape backups. Our BVS contains six disk drives with a RAID level 5 configuration. Encoding at a 10 Mb-per-second compression rate gives us approximately 3 minutes of material. When loaded, the operator creates a mismatch list that pinpoints spots with discrepancies between the traffic log and information in the AMS database. With the help of the Traffic Department, the operator uses the mismatch list to make corrections to the playlist, which helps us avoid on-air problems.

SWITCHER LINK

In the Master Control Department, we use a Grass-Valley Master 21 switcher. The AMS is connected to the preroll transition switch via GPI. The playlist is activated and spot playback begins when the operator presses the preroll transition. Currently, we use one of the two BVS channels for air playback. We use the second output channel for spot preview and compliance. However, when necessary we can easily switch the second channel to the air playlist. Checking in commercial material is simple. Each day we download a dub (spot) list from the traffic workstation to the master control HP Ad Manager. Operators call up the spot information from the downloaded traffic spot list. This eliminates errors that might occur if the operator loaded information manually. Once operators are ready to dub spot to the BVS, they press a single function key. The spot is copied to the BVS and the AMS database is updated. Once the dub is completed, the operator can review it for quality instantly. The database, which contains information on all spots in inventory, can be printed and made readily available to the Traffic, Sales and Master Control departments. This is an efficient way to manage disk space in the BVS.

In addition to spot playback, our news operation uses the BVS to air news opens, bumpers and related news items. We look forward to future non-linear news editing systems that will directly feed the BVS and be controlled by a separate playlist. This will give our news department a huge advantage in the marketplace.

FAVORITE FEATURES

There are many features of the Hewlett-Packard Broadcast Video Server that we truly appreciate. Among these are:

- Reliability. During the year that the BVS has been on the air at KOLD, it has been extremely reliable, especially when compared to our previous spot playback system. With the BVS system's reliability, we rarely miss spots. That adds up to cost savings because we have fewer errors and fewer make-goods.

- Since September 1994, we have experienced only one drive failure that, because of RAID protection, did not take us off air. Reconstruction of the drive was simple; it occurred without affecting the on-air product.

- Maintenance. Because the only moving parts of the BVS system are within the disk drives, there is no maintenance, which is another major cost saving.

- Suppliers. We have a doubt. HP has lived up to its reputation in service and support. Having been a beta test site for the product, service was a major factor in our original decision to purchase, and it continues to be an advantage.

HP provides support in real time via a modem connected to the BVS 2E. Using the modem, a support engineer can diagnose problems and—in many cases—correctly instantly. No problems are too small for HP to work on, and the company always finds a solution. The support staff is well-organized, knowledgeable and quick to respond. And they do so with a smile.

WE OPTIONED FOR DIGITAL BETACAM

Our current Broadcast Video Server (BVS) set-up consists of a single (main) BVS with one channel in and two channels out. The BVS is controlled remotely by Louth Automation's HP Ad Management System. The AMS is a client-server based system that communicates with the BVS and external VTRs via RS-422. The AMS computers are connected through a LAN that distributes master control and production functions among various workstations. We use the BVS/AMS system to edit and transmit the daily log (playlist), dub spots from tape to tape, preview spots and create and run compiled tape backups. Our BVS contains six disk drives with a RAID level 5 configuration. Encoding at a 10 Mb-per-second compression rate gives us approximately 3 minutes of material. When loaded, the operator creates a mismatch list that pinpoints spots with discrepancies between the traffic log and information in the AMS database. With the help of the Traffic Department, the operator uses the mismatch list to make corrections to the playlist, which helps us avoid on-air problems.

On the recording side, we wanted Digital Betacam as quickly as possible to create masters in the new digital format. The trick is that not only must we add Digital Betacam ourselves, the demand develops to transmit in the same format, completing the circle. Eventually, we will record, process and broadcast in a totally digital environment.

Within a year, NOB installed 300 Digital Betacam machines, more than half with analog playback capability. It was a very easy exchange for us, because all we had to do was remove the analog machines from the racks and replace them with their digital counterparts. Now, we use Sony DYW-AS10P players and DWV-AS10P machines for a variety of different applications, such as transmission, editing and recording in studios and OB vans.

Eventually we will only use fully digital machines. The advantages of Digital Betacam are obvious. There are no more dropouts, and the four audio channels that are fully editable are extremely useful—a major advantage in the Netherlands where everything is produced in stereo. Also the user-friendliness of Digital Betacam is an important factor. Everybody is used to working with Betacam SP, and the operation of the digital machines is practically the same.

ONWARD AND UPWARD

NOB has already established a digital infrastructure, a massive project due for completion in October 1996. We are changing the present facilities from analog PAL to component digital. Production satellites are connected through a central routing system, and all equipment is linked via SDI (Serial Digital Interface) with embedded audio. Eventually there will be digital uniformity to work in and outside NOB in a completely transparent manner. We also buy our cameras to be ready for a completely digital chain in 4:3 or 16:9 from acquisition to transmission.

In the long term, the reliance on Digital Betacam is more a matter of cost of ownership than replacement costs. Analog equipment always required extensive tuning, and these costs will mainly disappear.

We are working to ensure that, is that what our customers expect from us. We will keep investing in new technologies. Widescreen is one example, and news gathering is another. These are not only gathering digital equipment, but we are heading toward server and compression technology with determination.

Editor's note: During his long career in the industry, Rob ten Stielhoff has worked for companies such as Sony and Tektronix. In 1985, he and two partners started the high-profile company, AVP, which produces top-end TV commercials. AVP developed into a subsidiary of NOB and in early 1995 ten Stielhoff moved to his current position.

The opinions expressed above are the author's alone. For further information, contact Sony in the U.K. (telephone: +44-1256-550-011; FAX: +44-1256-474-385), or circle Reader Service 54.
Vision SD 12 and SD 22
Panasonic

Vision SD 12 and SD 22 are the first heads with the "Serial" image pickup system. The system consists of a unique pin-through channel 6-bit recording or two sets of 12-bit recordings, with the second set partially converted to 6 bits. The pin-through system allows for high-speed, high-quality images. It features an array of digital abilities, including:

- Includes a 150-170,000-pixel color viewfinder. More pixels provide crisper images.
- A high-definition, high-resolution, high-quality viewfinder. The viewfinder also features 120 degrees vertically for shooting subjects from high or low angles, and its professional design means it won't get in the way.
- Variable high-speed shutter (1/6000-1/30000) in 1/6000-1/30000 increments.
- Built-in Digital Electronic Image Stabilizer (DES) compensates for all kinds of shaking, particularly effective when the digital zoom is employed.

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- Also available on the Real Impact, Real Avid Impact, and Real Avid Impact Deluxe, providing complete, professional digital video capabilities, professional audio and video manipulation, professional effects editing to Windows. Real Impact allows you to edit and modulate the picture with ease and achieve professional results.
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Vidpro Video Lighting System

Designed for video, the Vidpro VLS-61 kit provides all the key elements for creating a professional-quality lighting set at a fraction of the cost of similar accessories. The Vidpro VLS-61 kit includes: 2x610W Studio LED light with Bowens socket; 2x610W Studio LED light with Bowens socket; 2x610W Studio LED light with Bowens socket; 2x610W Studio LED light with Bowens socket; 2x610W Studio LED light with Bowens socket; 2x610W Studio LED light with Bowens socket; 2x610W Studio LED light with Bowens socket; 2x610W Studio LED light with Bowens socket; 2x610W Studio LED light with Bowens socket; 2x610W Studio LED light with Bowens socket; 2x610W Studio LED light with Bowens socket; 2x610W Studio LED light with Bowens socket; 2x610W Studio LED light with Bowens socket; 2x610W Studio LED light with Bowens socket; 2x610W Studio LED light with Bowens socket; 2x610W Studio LED light with Bowens socket; 2x610W Studio LED light with Bowens socket; 2x610W Studio LED light with Bowens socket; 2x610W Studio LED light with Bowens socket; 2x610W Studio LED light with Bowens socket; 2x610W Studio LED light with Bowens socket; 2x610W Studio LED light with Bowens socket; 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EVS Lets Editec Take it Slow

By Steve Cotterill
Managing Director
Editec Ltd.

ATHERSTON, U.K.

Editec Ltd. was formed about four years ago with the aim of providing quality equipment and crewing for sports slow-motion operations. The company can also supply a complete OB consultancy, systems engineering and editing service.

Our clients include BBC, BSkyB, Sportsworld, ITV Sport, Granada and various OB facilities companies worldwide. Editec is currently the only U.K. company hiring out LMS (Live Slow-Motion) systems, and also runs advanced operational courses on LMS operation.

Two years ago, Editec decided to investigate "state-of-the-art" slow-motion systems with fast access replay. Several manufacturers were approached, and sales information and specifications were obtained from a wide range of companies. Available products were either RAM-based with capacities between 30 seconds and five minutes or disc-based with various duration and compression options.

Of all the systems considered, the EVS system appeared to offer the best in quality and facilities, and was available for demonstration on a live OB of my choice. This was more than could be said for the other manufacturers. My impression was that competitors' systems were mainly on paper or at very best, prototypes.

In preparation for the demonstration, I was invited to visit the EVS factory in Liege, Belgium. I spent the day being trained on a three-minute EVS LMS RAM recorder. EVS explained that this product was near the end of its life, and that a new disc-based system would soon be available. One very interesting point was that existing customers could have their RAM-based machines upgraded to disc. Apparently this has always been, and still is, the EVS policy — standard mainframe for all products, upgradeable when required.

I was very impressed by the LMS. Primarily a slow-motion machine, it had a built-in target tracking system, paint package, split-screen analysis system and digital mixer, with clip and playlist management. The main selling point of the system was its ability to stay in record mode at all times, even when replaying a clip.

Another superb facility was the ease and speed with which a slow-motion compilation for a program closing could be made. Within a few days, Yves Rolus, the EVS Sales Manager, bought a system into the U.K., and I had arranged three live OBs and seven days with BSkyB. These went very well, and immediate requests for the system to be used on future programs were received.

As a result of the high level of interest, I purchased the first system in the U.K. a three-minute RAM recorder — and planned to upgrade to disk when available. Now, Editec owns two LMS disk recorders. The systems, now widely used on sports OBs, will usually be supplied as a package, with a trained operator.

In its basic form, the LMS can be a direct replacement for a standard Beta SP machine, although the mainframe is 1 RU higher. By its nature, the LMS offers instant re-cue of slow-motion replays. In fact the dual access enables the material to be available before the action is finished. Try doing that on tape.

During quiet periods or at half-time, filling material or pieces for analysis that have been previously stored are available for instant replay. There is more waiting for the goal that is 70 minutes back on a 90-minute tape.

If required, several pieces can be "boltsed" together very quickly in a playlist, with a dissolve between each. This feature is used by BSkyB to lead into commercial breaks and presenter montages. At full speed, a highlights package can be played with audio crossfades between clips.

The "icing on the cake" with the LMS is the available software options. Briefly, there is a built-in telerecording system, a tracking split-screen system and a target-track package that allows an operator to follow a player with a circle, highlight or $4 zoom lens. These can be controlled from a graphics tablet or remote touch screen.

A version of LMS called Super LMS is now available. This system is a direct disk replacement for the Sony supermotion tape recorder. Future products include a two-camera version and a system with dedicated editing facilities.

EVS plans to be involved in a joint venture at the Atlanta Olympics. EVS will supply the recording medium for the new Panasonic high-speed camera, and NBC is looking into using LMS units to enhance its Olympic coverage.

As you can probably guess, I am a fan of the EVS system. For the basic slomo operation, the system makes the operator's job much easier. It is truly wonderful to have the ability to check something without the risk of missing important action. The technology enables operators to become more inventive and adventurous, and the program most certainly gains from this. In fact, I have found that operators actually look forward to working with the system.

Editor's note: Steve Cotterill spent 10 years at Central TV, and two years as VTR supervisor at OB company 021 TV. His video experience started with two-inch Quadruplex ACR 25 cart machines through one-inch HB U-Matic, Beta SP and Digi.

The opinions expressed above are the author's alone. For further information, contact Steve Cotterill (telephone: +44- 1827-717-354; FAX: +44-1827-717-474), or circle Reader Service 114.

BSkyB Cuts a Strong Profile

by David Sparks
Chief Engineer
British Sky Broadcasting

LONDON

Before Tetronix launched its Professional disk recorder (PDR) in Europe, I had a sneak preview — well, a detailed one, in fact, of the system at Odetics in Los Angeles. My reaction was such that we "designed in" the profile as part of our long-term plans as long ago as October of 1994.

Why the interest? As chief engineer at British Sky Broadcasting (BSkyB), I was looking to find a more efficient system to replace our seven-year-old tape based system. Running 10 channels meant that we had to copy every promo and commercial 10 times. That adds up to a lot of tape, heavy maintenance costs and a considerable amount of operator time.

FORWARD THINKING

At the same time, with a clear long-term strategy to produce a CCIR-601-quality network infrastructure across our broadcast operations, any new system would have to be fit and robust. Setting at the hype aside, I have encountered only two video servers that actually work as they are intended — the Profile being one.

So what is the Profile exactly? It is a four-channel digital disk recorder delivering first-generation Betacam picture quality and CD-quality audio. In effect, it has the functionality of four conventional VTRs.

At BSkyB, we now have eight Profile systems with three hours of storage on each, which we use principally for commercials and promos. A master copy is retained on an LMS1000, played down to the Profile system and then played out as required.

For me, and I suspect for most broadcast engineers, one of the system's main attractions is that it not only acts like a VTR and configures like one in an overall system, it even looks a bit like one. Something that looked and acted more like a computer would undoubtedly meet with more resistance, regardless of its capabilities.

The Profile is very practical. With a single large video server, any station would be at risk. Conversely, with a cluster of Profile systems, that risk is minimized and I always have a reserve running in duplex for each of the four units.

Of course, as with any new system, there were a few bugs at the outset, and at first it did not have its own protocol. However, these issues are solved now, and overall control is very good.

The VTR emulation protocol is now a standard feature and implements a large portion of the Sony BW75 Betacam VTR command set. This enables the Profile to mimic the ballistics of a mechanical tape transport and, as a result, it may be substituted anywhere a BW75 is in use.

AUDIO, TOO

Embedded audio has also been added since the product was launched. This greatly simplifies planning and signal routing by multiplexing four channels of digital audio into the digital serial video stream. The systems sit inside a new multichannel complex here at BSkyB. Housed in one room, this is designed for future expansion, such as the new joint venture channels with Granada anticipated later this year. It is very cost-effective as it allows two operators to manage up to 12 channels, as opposed to one per channel previously.

When fully operational this month, the new set-up, which was supplied by Drake on a turnkey basis, will still retain program material in a traditional Betacam tape format with the entire system controlled by a Drake D-MAS automation system.

In the immediate future, we are also looking at expanding the use of the Profile systems into news and sports. Longer term, our goal is to network the Profiles, delivering all the benefits of a large server, and roll them up into a fully digital operation that could perhaps be transmitting on the MPEG-2 standard.

However, that is for tomorrow. Today, any chief engineer would find it well worth the time the take a look at the Profile system.

Editor's note: David Sparks leads a team of 12 engineers at Sky based in Odetics, West London. He's responsible for the broadcast side of the network, including its five studios transmitting 10 channels.

The opinions expressed above are the author's alone. For further information, contact Tetronix (telephone: +1-503-627-7111; FAX: +1-503-627-2465), or circle Reader Service 97.
"Would you believe that 2,3* square meters are enough to install our 40kW IOT transmitter?"

* 24.7 square feet

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Circle 61 On Reader Service Card
In 1995 two new premises were opened and the edit facilities have been expanded to handle S-VHS cassettes. Two more JVC S-VHS SR-S360E recorders, including a 525 NTSC 3.58 S-VHS. In 1994 a broadcast standards converter and several more JVC S-VHS machines were purchased.

BIGGER AND BETTER

In 1995 we moved to our new premises and the edit facilities have been expanded to handle S-VHS cassettes. Two more JVC S-VHS SR-S360E recorders, including a 525 NTSC 3.58 S-VHS. In 1994 a broadcast standards converter and several more JVC S-VHS machines were purchased.

SAFE AND SURE

As our business has developed, we have found the S-VHS format and the JVC machines to be reliable and we have been able to maintain our high standards while saving us considerable time and cost. As the older VHS-only machines become expensive to maintain they will be replaced by S-VHS machines that can handle both S-VHS and VHS.

In our operation, there will always be a need for U-Matic Machines. We hold a library of 6,000 U-Matic cassettes, but because of the cost, ordinary VHS will be the standard for audition cassettes for a very long period. The standard is quite suitable for revision purposes and we will only need higher quality S-VHS for transmission purposes.

Service 24.

The LD-100 disk recorder from FOR-A is a non-linear, random access, compression-based recorder that is NTSC, PAL, PAL-M and PAL-N compatible. The system has a digital serial component, YPBP, analog composite and Y/C input/output.

The system has selectable JPEG compression rates, RS-422A and RS-232C input/output and comes with two audio channels that can be expanded to four. The system allows for up to 83 minutes of record capacity and the DOS-based, PC-controlled software has menu select operational settings and an overview main menu.

The LDR-100 can be used as a standalone or as a control system operated by the Symphony desktop production system or CLASP automated management systems.

For more information, circle Reader Service 19.

The CLIPBOX video server from Quantel is a random access, simultaneous multi-user server that provides up to 40 hours of on-line random access storage.

The unit is an intelligent server with multiple inputs and outputs and built-in database management. Its discretionary compression allows uncompresed component digital video to be stored alongside grid-compressed material on a clip-by-clip basis.

Any stored material is simultaneously available at any of the multiple output points without copying. CLIPBOX contains a built-in TCP/IP interface, allowing it to be easily networked to all of Quantel’s products.

For more information, circle Reader Service 135.

The VideoStore disk-based digital ad insertion system by Sony now includes a wide area networking (WAN) capability and an increase in the number of channels to which a VideoStore system can play out.

Other enhancements include the ability to play out commercials at two resolution levels and an expansion board to help align horizontal and vertical motion estimation/compensation.

In addition, the VideoStore has an embedded clip identification for traffic and billing verification, a dedicated RS-232C port for remote diagnostics and a vertical interval closed caption board.

For more information, circle Reader Service 68.
Want to Sell

- **Batteries**, all manuals, low hours, $850. E8, 708-823-6130.
- **Motorola Z28L**, exc condition, $1,150. E8, 507-663-2413.
- **Panasonic S V S H S**, lens, hard case, plate & Canon J15X9.5 KR S lens, i t e b o a r d s w / b o t h c a b l e s, p o w e r s u p p l y, $6700. Sunada Productions, 808-737-7030.  
- **New**, approx 75 hrs use, like new, paid $3300, asking $1580. Canon LX100

**Digital Effects**

- **Ampeg AD108**, 3 channels, 1300 watts, $795; 300 watts, $300; B-Stock, 216-695-1220.
- **Ampeg AD100 A/B**, $300, AVPS, 703-527-1000.
- **monitors**, $795; 300 watts, B-Stock, 216-695-1220.
- **Ampeg SVT 810E**, $185; 300 watts, B-Stock, 216-695-1220.

**EDITING EQUIPMENT**

- **Matrox Gemini 3**, exc condition, new, $950; D-Stock, 216-695-1220.
- **Matrox Gemini 2**, exc condition, $500; D-Stock, 216-695-1220.
- **Matrox Gemini 1**, exc condition, $250; D-Stock, 216-695-1220.
- **Avid/Emberget**, exc condition, $250; D-Stock, 216-695-1220.
- **Adobe Premiere Pro CS4**, exc condition, $450; D-Stock, 216-695-1220.
- **Adobe Premiere Pro CS5**, exc condition, $950; D-Stock, 216-695-1220.
- **Adobe Premiere Pro CS6**, exc condition, $1250; D-Stock, 216-695-1220.
- **Adobe Premiere Pro CS7**, exc condition, $1500; D-Stock, 216-695-1220.
- **Adobe Premiere Pro CC**, exc condition, $1850; D-Stock, 216-695-1220.
- **Adobe Premiere Pro CC**, exc condition, $2500; D-Stock, 216-695-1220.
- **Adobe Premiere Pro CC**, exc condition, $3000; D-Stock, 216-695-1220.
- **Adobe Premiere Pro CC**, exc condition, $3500; D-Stock, 216-695-1220.
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