COOL STUFF

...ouble Up

...icro Communications (MCi) has received a patent ...r its DuoBand Common Line Coupler. The coupler ...ows broadcasters to feed broadcast signals to ...oth the DTV and ...TSC transmitter ...ver one trans- ...ission line. The ...o signals are ...en "decoupled" ...t the tower. The ...oupler is designed to allow the DTV UHF signal to ...e combined with either an existing VHF or FM sig-...al. Contact MCi at (800) 545-0608.
■ For more information circle Reader Service 200
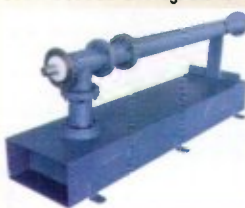
...VCPRO Profile

...ktronix has expanded its Profile family of servers ...ith the addition of the PDR400 DVCPRO server. The ...nit offers DVCPRO compression and serial digital ...ansmission interfaces to Panasonic's VTRs for the ...ansfer of compressed data. It provides faster-...an-realtime (4x) transfer of compressed video via ...DTI or fiber channel network interfaces. It can be ...onfigured for up to six video channels and 16 or 32 ...udio channels. Contact Tektronix (800) TEK-WIDE.
■ For more information circle Reader Service 201

...ew Inspiration

...uantel's latest is Inspiration, an integrated ...ews/sports production system that is the first in the ...orld capable of handling every aspect of news or ...ports operation in a totally integrated system. It's ...entered around the Clipbox video server and seam-

Inspiration - Integrated News/Sports Production System
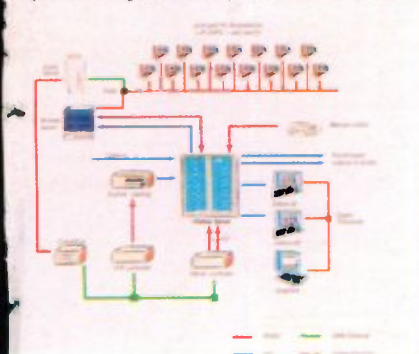
...ssly integrates the AP Electronic News Production ...ystem with journalist PC video browsing and edit-...g capabilities. Contact Quantel at (203) 656-3100.
■ For more information circle Reader Service 202

For more products see page 35

DBS Ramping Up For HDTV

Providers look to HDTV as way to gain advantage versus cable

By Peter Brown

The battle between cable and Direct Broadcast Satellite (DBS) services has service providers in both market segments scrambling for competitive advantages. Lower rates, more programming options and improved technical capabilities are the current weapons used in the fight, but in the coming months a new one will enter the picture: HDTV.

The cable industry is currently wrestling with how and when it will bring DTV services to the viewer, but DBS providers seem poised to use HDTV programming as an extra weapon.

DirecTV, U.S. Satellite Broadcasting (USSB) and EchoStar Communications are readying to offer HDTV services early next year.

Larry Chapman, DirecTV executive vice president, sees the ability to offer HDTV programming as a great business opportunity. "We want to take advantage of the digital terrestrial opportunities. As a national service we have significant advantages over cable. We see this as the combination of a defensive local strategy and an offensive revenue opportunity-based strategy with the broadcasters. We will be devoting significant bandwidth at significant cost. But the quid pro quo is obvious. In doing so, we will be in many different TV brands."

For DirecTV and USSB customers looking to receive HDTV programming on a larger dish, a new set-top box or built-in DBS receiver and a DTV or HDTV monitor will all be needed. Part of this is because the DirecTV and USSB HDTV services will be based on Galaxy III-R,

DirecTV plans to use HDTV services as a way to attract customers to its already industry-leading subscriber base.

a mid-power Ku-band satellite at 95 degrees west. The current fleet of DirecTV DBS satellites is at 101 degrees west.

DirecTV is the current leader in DBS subscribers and in a move designed to make the equipment-purchasing decision easier for customers it has undertaken a DBS hardware development partnership with Thomson Multimedia, looking to blend the hardware of

DTV sets with DBS-based HD feeds.

The link has yet to proceed beyond the memorandum of understanding or MOU phase, but it's clear that DirecTV intends to pursue a set of hardware objectives that will transform the very core of the business. The partnership calls for "the development of a new generation of interactive digital receivers

FCC Updates DTV Application Guidelines

Clarifies de minimis interference standard for non "checklist" stations

By William Meintel

The FCC's Mass Media Bureau recently issued a Public Notice entitled 'Additional Application Processing Guidelines for Digital Television (DTV),' providing additional information for those stations whose DTV service facilities will not exactly meet the FCC's allotment plan or fall within the limits of flexibility provided by the FCC.

The FCC reiterated in the notice that priority in processing would be given to "checklist" applications, followed by those of the early implementers with November 1, 1998, build-out dates. Next would be those in the top 10 TV markets, then markets 11 to 30 and finally those in the smaller markets.

What exactly will make a station's application fall out of the "checklist" category? If a station intends to move more than five kilometers from the allotted site, increase its tower

height by more than 10 meters, increase power or use beam tilting greater than one degree—or a combination of these—then its application will not be considered as a "checklist." In these situations, additional technical information will be required to verify that the proposed facility will not create interference in excess of the permitted level.

According to the notice, interference analysis should be performed in accordance with the method described in FCC OET (Office of Engineering Technology) Bulletin No. 69. Bulletin No. 69 describes how the FCC used the Longley-Rice propagation model to evaluate television station coverage and interference. Bulletin No. 69 also notes that the analysis can be performed using the FCC computer model that is available on the FCC website. Other independently developed computer software may be used to perform the evaluation.
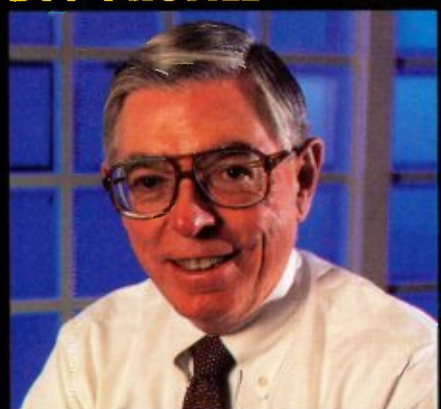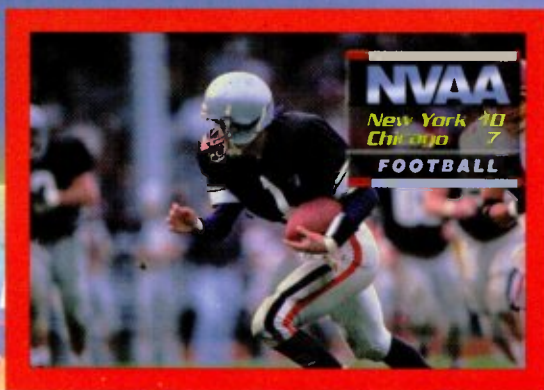
Duet:

The performance of a professional video system with the flexibility of a computer workstation.

Real-Time Digital Pro

Chyron's revolutionary Duet platform provides the cornerstone to build your DTV/HD facility.

It offers the power and interoperability to satisfy the most demanding video applications for broadcast and professional use.

Duet is an ultra-fast, Chyron quality 2D/3D video processing engine that combines real-time performance with the Windows NT open computing environment at a fraction of the cost of other high performance 3D platforms. Duet's unprecedented power supports up to 56 concurrent video streams.

Finally...the power of open computing in a professional video/broadcast package.

REAL-TIME OUTPUT

NVAA
New York 10
Chicago 7
FOOTBALL

Duet HD

Duet

Duet supports a variety of third party applications including newsroom, election and sports packages through its unique CAL API. Chyron's new Lyric character generator application provides the world's first HD graphics solution for digital television.

Step into the future with a higher power video processing platform. From Chyron, the pioneer in broadcast graphics

ALL DTV/HD FORMATS

cessing²
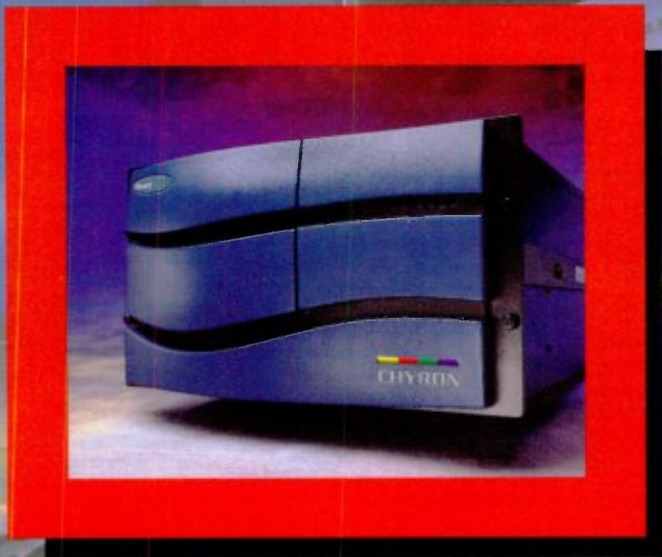
3D GRAPHICS

NFL FOOTBALL
BUFFALO BILLS 34

grammy **awards**

CHYRON®
WWW.CHYRON.COM
TEL: 516-845-2026

Duet, Duet HD and Lyric are registered trademarks of Chyron Corporation.
Windows NT is a registered trademark of Microsoft Corporation.

More Information Circle 102

News

Rebo Group Suspends Operation— But It's Hardly Rebo's End

During the past 12 years the Rebo Group has become synonymous with HDTV production, but pioneers Barry Rebo and Tomio Taki have announced that operation of the Rebo Group will be suspended later this fall. All current Rebo production work will be completed, including the final episode of Wild!Life Adventures.
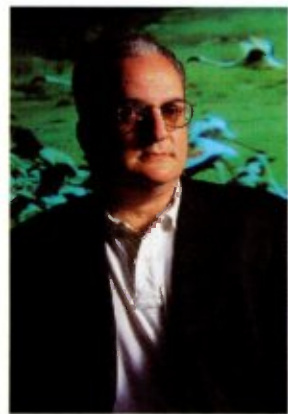
'The current structure of the company limits flexibility and is simply too expensive to maintain,' says Rebo.

While the suspension of operation could be seen as an indication of the pit-

Barry Rebo

falls and high costs of HDTV production, Rebo explains that the move is actually a reflection of changing technology that has resulted in lower costs and more opportunities.

"When we started up the Rebo Group we needed all this HDTV equipment to be in house and it was expensive and we were also set up for a not very commercially accelerated landscape," he says. "But technology has changed, it's much more readily available and to keep this sort of structure going didn't make sense."

Rebo adds that the Rebo Group was never designed to become an HDTV rental house or facility and if he continued with a business model based on 10-year old realities he would eventually "wake up and find this was a 12 person HDTV-only facility."

Rebo says future plans are for those currently working at the Rebo Group to work together on an individual basis as required for a given project. And in no way, shape or form does Rebo see the end of the Rebo Group as the end of his working with HDTV.

"People expect me to do something a little off the edge and I'm pursuing those projects while being practical," he offers. "I've been hearing that HDTV was around the corner for years and I have my own timeline on when it will really happen. Someone told me the thing to be isn't first to do something but rather first to be second. That's my new approach." ■

HOT SALES

KKYK Little Rock, AR, has chosen **Discreet Logic's** Frost broadcast graphics and virtual set system and SoftSet, the complete virtual studio design and service solution from Devlin Design Group, to build America's first all-virtual call letter station. Doug Krile, KKYK's news director, says, "We realized then that we were almost at an even-up situation, compared to going with hard sets. SoftSet and Frost provided so much more flexibility, dollar for dollar." The system is expected to go into immediate operation.

Cosmos Broadcasting Group has selected Drake Automation to install automation systems in three stations by the end of 1998 with the remaining Cosmos stations receiving systems by 2002. Drake will install **Drake Multi-Channel Automation Systems (D-MAS)** in WIFE Vansville, IN, KPLC Lake Charles, LA and WIS-TV Columbia, SC. WFIE is scheduled to go on air in October with KPLC and WIS-TV due on air in the fourth quarter.

A.F. Associates and Comark Digital Services have converted WTTO and WABM Birmingham and WVTV and WCGV Milwaukee to digital for multi-channel capability. Server-based technology forms the core of the multi-channel playout system along with dual master control rooms, a video intake area, feed record and commercial insertion/automation, a digital production control room, post production suites and a studio.

Four **CBS O&O** television stations have purchased **HyperSPACE** high definition digital video recorders from Pluto for commercial insertion. The stations, KYW Philadelphia, WCBS New York, KCBS Los Angeles and KPIX San Francisco, will use the recorders as a high definition spot server operating under Louth protocol.

CBS selected **Nucomm** to manufacture, test and commission its Dual-Channel Digital Microwave Links to be installed at WCBS New York, KYW Philadelphia and KPIX San Francisco. Each STL link will consist of NTSC encoders to digitize and compress analog signals to 15 Mbps. The 19.39 Mbps HDTV signal and the 15 Mbps NTSC signal will be multiplexed together in a Nucomm designed DIGI-MUX multiplexer for microwaving to the transmitters.

Paxson Communications purchased **24 Panasonic DVCPRO50 AJ-D950** studio editing VTRs, with DVCPRO50 to become Paxson's standard tape format. The AJ-D950's will output the 601 digital signal into video servers for play-to-air, with all the programming for Paxson's 86 stations emanating from the Florida-based operations center.

Home Box Office (HBO) has purchased more than 50 channels of **Snell & Wilcox Prefix CPP200D** compression pre-processors in a deal valued at nearly $2 million. The Prefix will process incoming analog program feeds prior to digital cable distribution. HBO also purchased **General Instrument's HDTV encoder** to compress and multiplex both SDTV and HDTV signals within a single transmission system.

CBS has selected **General Instruments DigiCipher II** system, with GI providing 12 digital 4:2:2 SDTV channels and two HDTV channels at the CBS Broadcast Center in New York. CBS affiliates will receive GI integrated receiver/decoders.

Dawn Of Digital Event Set For Nov. 16

The beginning of the digital TV era will be celebrated in Washington on Nov. 16 at "The Dawn of Digital," an event sponsored by networks, programmers, consumer electronics manufacturers and equipment suppliers.

The event will take place at the Ronald Reagan Trade Center located on Pennsylvania Avenue beginning at 2 p.m. It will begin with a summit of industry luminaries and government leaders discussing the prospects of the transition. The summit will be followed by a demonstration of DTV and HDTV receivers and then conclude with a dinner.

Vice President Al Gore has been invited to welcome the event which will be chaired by Richard E. Wiley, whose Advisory Committee on Advanced Television Service made DTV and HDTV possible. Charter sponsors include NBC, PBS, DirecTV, Sony and Harris.

The non-profit event is being produced by the *Broadcasting & Cable* Publishing Group, with special representation by three of its magazines: *Broadcasting & Cable*, *Digital Television* and *TWICE* (This Week In Consumer Electronics). Registration for individuals who want to attend the full day's events plus the dinner is $400; registration for the summit and demonstrations is $200. For information in New York call Estrella Diaz at (212) 337-7053 or in Washington call Doris Kelly at (202) 463-3700.

Understanding Data Broadcasting

By Matthew Goldman

Most of the press focus regarding the U.S. digital terrestrial television (DTTV) standard has been on video issues, particularly high definition television (HDTV) formats and the realistic timeframe for practical implementation of HDTV.

The DTTV standard, however, also supports a range of applications including multi-channel TV within a single carrier frequency (multi-program transport stream in MPEG terminology) and a variety of data services. The Advanced Television Systems Committee (ATSC) has three specialist groups which operate under the auspices of the technology group on distribution (T3) and are addressing data-related standards. These are data broadcasting (S13), interactive services (S16) and DTV applications software environment (DASE). In addition, the data implementation working group (DIWG) operates under the ATSC's implementation subcommittee (IS) to investigate systems issues involving data, make recommended practices and define requirements for data-related standards.

S13's work efforts have culminated in a proposed draft standard for ATSC Data Broadcasting (currently referred to as T3/S13-010), which should be out for ballot approval soon.

Understanding the data broadcasting standard that awaits approval begins by understanding the three data types—synchronous, synchronized, and asynchronous. Different carriage mechanisms are employed to best fit the data type.

The first data type is a synchronous data stream, defined as a continuous stream of data with bounded timing requirements. Data packets are transmitted with a periodic interval between consecutive packets and the variance on packet delivery (known as packet jitter) is kept to a minimum. The clock is forwarded with the data and regenerated at the receiver to reproduce the synchronous data stream. There is no strong timing association with any other stream in the transport multiplex (i.e., within the ATSC emissions multiplexer output).

Next is a synchronized data stream. This type of data stream is continuous and has a

Optional Program Play
with Pitch Correction

Audio/Video Preread for
A/B roll editing with 2 machines

**Frame
Accurate
Insert
Editing**

**Variable
Speed
Playback**

**Analog and
Digital DT**

**4 Audio
Channels**

Betacam SP®/Oxide
Playback Compatible

Optional SDTI/MPEG-2 Output
with 2X Transfer Speed

The most familiar VTR
you've never seen before.

If the new DNW-A75 digital VTR reminds you of Sony's legendary BVW-75, it's no coincidence. After

all, the DNW-A75 utilizes the familiar operating characteristics of the BVW-75 so you're basically

BETACAM SX up to speed on DTV production the minute you plug it in. Obviously, the

Betacam SX® DNW-A75 is fully-loaded for the future, yet it leaves nothing behind. This workhorse

takes the best of everything, like the BVW-75's familiar operation, all the Betacam SP playback features

of the BVW-65, then adds a host of DTV features that are unrivaled in the industry. **dtv**
READY

Consider all the features. A list price of $27,000. Then add the momentum of the entire Betacam SX

line and certainly, you'll set the stage for DTV production well into the future. For more information call

1-800-635-SONY, ext. A75 or visit us at www.sony.com/sx. **Choose your VTR carefully.**

MPEG-2 4:2:2 P@ML Compression   Over 3 Hours Max Playback Time   Analog Component/Composite I/O

Analog/AES-EBU Audio I/O   SDI Digital I/O - Optional SDTI Output   Complete Remote Control Operation   **SONY**

DIGITAL TELEVISION PROFILE

Dick Wiley on the divisions in digital TV

WIDE SCREEN
NARROW VISIONS

L ong out of his position of greatest public power—as chairman of the Federal Communications Commission in the 1970's—Richard E. Wiley continues to wield more influence over United States broadcast policy than almost any other individual in the private sector. His stewardship of the advanced television process was widely hailed as a tour de force, and many consider him the father of HDTV. His firm—Wiley Rein & Fielding—is among Washington's and the nation's largest, and his clients form a cross-section of the telecommunications universe. When it became evident that the digital transition was running into heavy waters, Digital Television asked Dick Wiley for his perspective. It emerged in this interview with DTV's Don West.

DTV ■ **You led the nation into digital TV and high-definition. What has gone wrong or what has failed to be done in this process, and what can be done to get us back on track?**

Wiley □ When then FCC Chairman Dennis Patrick asked me to take on the advisory committee assignment in 1987, I had to find a way to make broadcasting and cable work together. You have to have a solution that works for both, or the American people are going to be shortchanged. These are the two dominant industries.

At that point, 10 years ago, DBS really wasn't even a player. Nor was the computer industry. I figured the set manufacturers would take care of themselves, so I was thinking of the transmission industries, the industries regulated by the FCC. When we turned in our report in late '95 I think we had accomplished that goal. With the single exception of the modulation technique, QAM versus VSB, we thought we had a result that worked for both industries.

DTV ■ **Why did you stop short on the modulation technique?**
Wiley □ We didn't stop short. We had "test-offs" of all the component elements. For example, modulation and the sound system (Dolby as against the European system). I sometimes thought it might have been better if QAM had won its heat, because I knew the cable industry was committed to it. But in our tests VSB did better. It was the same thing with Dolby. However, the modulation difference can be largely obviated, at relatively low cost, through a computer chip. Moreover, the cable industry has known for four years that broadcasters were going to employ VSB. I just don't think they got ready for it. Now, some are saying they can't accommodate VSB, at least in the initial rollout.

Using that example, what I'm saying is that some of the industries have diverged here toward the end and for their own reasons, some of them competitive. *Broadcasting & Cable* magazine suggested in an editorial that our advisory committee be reconstituted to get everyone back on the same page. That may not be the right vehicle but somebody should bring these people back together again.

This is such a tremendous changeover, such a tremendous transition. We all have to think about the American public, which is going to be asked to shell out a lot of

body, is that if the public spends $7,000, $8,000— whatever it is—to buy DTV equipment, it better work for broadcast TV, for cable, for satellite and any other television medium. Because otherwise it's going to be a turnoff. And if the government was interested enough to require that broadcasters have a very rapid digital deployment, it ought also be interested in seeing that the other industries are cooperating. Interoperability has to be the threshold.

DTV ■ **Isn't there a basic difference in the way these two media approach digital? My take is that cable looks at digital primarily as more pictures while broadcasting looks at it primarily as better pictures.**

Wiley □ That's not necessarily true. Time Warner doesn't feel that way, and that's a very major cable system. HBO, Discovery and many other cable programmers are very interested in high-definition television. But some systems that need to be upgraded are worried more about capacity, and you can understand that.

DTV ■ **I had thought it was more expensive to rebuild a cable system for digital than it costs to digitally-upgrade a broadcast station, but it appears that a lot can be done at the headend.**

Wiley □ Either way, it seems to me it's in the American public's interest to have deployment by broadcast stations of the new technology and also that DTV systems be carried on cable. Ultimately, the name of the game is more cable capacity, not less, and an ability to carry all the formats. By the way, a lot of the cable systems are going to try to carry all broadcast formats, be they 480, 720 or 1080i. I think that's encouraging.

DTV ■ **Compression is another area that demonstrates the disparities in the broadcasting and cable approaches. Broadcasters hold their compression to 4 or 5 to one, while cable thinks nothing of going 8 or 12 to one. Again, in keeping with its basic philosophy of offering more and more choice, it seems to want as many pictures per square inch as possible. And while this may not be the time to discuss it, I think there's a question about the name of the game being more capacity. That certainly wasn't the case in radio, and it nearly killed the industry before it found out.**

Wiley □ I take your point. But at the moment let me be very definitive on this: Cable ought to carry the broadcast signal in its original format. It should not degrade it, and that means it has to be able to accommodate both progressive and interlaced scanning and both HDTV and SDTV. In a few years this scanning issue will be resolved because progressive scanning is likely where we're headed. I say that because film product is all progressively scanned, and that's 80% of prime time. Flat-panel displays, which I think will really drive this whole transition to digital, are going to be progressively scanned, so progressive scanning is probably where we're going to end up.

But in the interim, some broadcasters have chosen—for a lot of reasons, one of them being their interest in HDTV—to include interlace. You can get 1080 lines compressed in a 6 megahertz channel. You can't do that with progressive scanning at this time. I'm hopeful that the ultimate format will be 1080 progressive, and I think it can be. Within three to five years we're going to have further compression advances. But in the meantime there's going to be a mix of interlaced and progressive scanning.

And when you see the low-cost decoders and de-interlacers that are now available, what are we arguing about anyway? Why are we having all these fights with computer software companies, with John Malone and what-have-you, because this issue is easily resolved today. We ought to let different industries do what they want, scanning-wise, to serve their audiences and customers as they see it.

I'm just hopeful that all these diverse interests can be brought together toward a good result. In particular, I think the computer industry has a lot to offer in video. Another of our overriding goals was to have a digital standard that was harmonized with computers and other information systems. Because we want to have the Internet over video.

DTV ■ **Well, did the Grand Alliance system accommodate that?**

money to adapt to a completely new video system. They can't be told, when they put all this money out, that their equipment doesn't work with cable, or this particular set-top box works but this one doesn't. That's going to deter the early adapters and slow down the whole process, which would be very unfortunate.

I think digital is a better transmission system. We are on the right track. It will work with time. But I think FCC Chairman Bill Kennard was right in saying there are going to be bumps along the road. However, I think somebody does need to oversee the process and encourage these parties to work together for the greater good. I agree that it isn't the government's job to deliver on industry game plans. But I think that government does have an interest in this transition, and it's very important that it be maintained.

Why? Because this has not been a totally private-sector operation. The government and industry were in on this at the start and had a nine-year partnership. They can't just drop it now.

Another element that needs to be looked at is the set-top boxes, to make sure they will pass through VSB and QAM and that HDTV will be accommodated. Some set-top boxes seem like they will, other cable systems may be not so clear. It's very important that all these disparate industries find common ground to solving these problems.

DTV ■ **If we could identify the most serious problem, what would it be?**

Wiley □ Well, it doesn't seem that all these industries are arriving at the starting line at the same time, and they're not working together. It's essential that the broadcasters, the cable operators, DBS operators and the set manufacturers have a common vision on DTV and work together on it. I'm not sure that's happening.

DTV ■ **My concern is that the gatekeeper to most American TV homes is playing from a different gameplan. There are enough problems to occupy all the industries, but the one I see having the greatest effect on digital's introduction is cable. And that problem has two parts: technological and political. Modulation is part of it. The set-top box is another. Passage of the HDTV signal is another. Must carry is potentially the largest of all.**

Wiley □ All I'm saying, without finding fault with any-

Dennis Brack /Black Star

Wiley □ Absolutely.

DTV ■ **Before the compromise at the FCC?**

Wiley □ Absolutely. The compromise at the FCC, with all due respect, didn't mean that much, because whether you got all the formats in or out, the marketplace is going to determine them anyway. Incidentally, every format that the computer software companies wanted was available in our recommendations. They just didn't want some of the other formats that some broadcasters wanted. An advisory committee couldn't say to the broadcast industry: "You can't have interlaced scanning." Just as I couldn't say to the computer industry: "You can't have progressive scanning." What we did was to put in every format that anybody wanted and let the marketplace choose, while the

minimum amount of HDTV programming, even though I am an HDTV advocate. I felt the marketplace could determine this issue.

By the way, why am I an HDTV advocate? Because I think it's something better for the public. And I think it will drive the sales of digital sets. I think it's a wholly new viewing experience, it's not more of the same. It's something radically different. It gives you the theater of the home. It's going to be tremendous if the public ever gets a chance to see it.

Now, you're not going to have 24-hour-a-day HDTV programming at the start or perhaps ever, and there may be—at some points during the day—certain programming where the kind of resolution that is involved in high-definition television isn't necessary. For example, I'm not sure

that's great. But do I want to watch the Redskins game sitting up close to a small screen? The answer is no. I want to go to a large, wide screen, and have it crystal clear with HDTV—be it 1080i or 720p.

DTV ■ **Well, we've talked a bit about bringing the cable industry into the loop. How do you bring in the computer industry?**

Wiley □ Intel's statement was revealing. They said: "We've had the wrong strategy. We've been fighting the broadcasters instead of working with them. And we can accommodate all formats at relatively low cost."

DTV ■ **I take it the computer problem is less serious than the cable problem.**

Wiley □ I think the computer problem is being worked out. I think the industry always had the right vision—to some extent—for themselves and for the public. But where they went wrong was when some of the software companies tried to impose that vision on other industries. The broadcasters had a vision, too, which was wide-screen, vivid pictures, which is good for their audience. Computer people have a vision of smaller screen, up close, progressive scanning and a lot of information for their audience. The two may converge in the future, by the way, with PCTVs, but I don't think we should let one industry foreclose another industry's vision. We should let it all happen in the marketplace.

That's why we have all the formats. Not because we couldn't make our mind up. It wasn't that at all. It's because we opted for an inclusive standard that allowed every video industry to have what it wanted. If I have any disappointment it's that I think a lot of people knew what was coming here for nine years, and certainly for the last three or four years, and haven't taken the steps necessary to get ready.
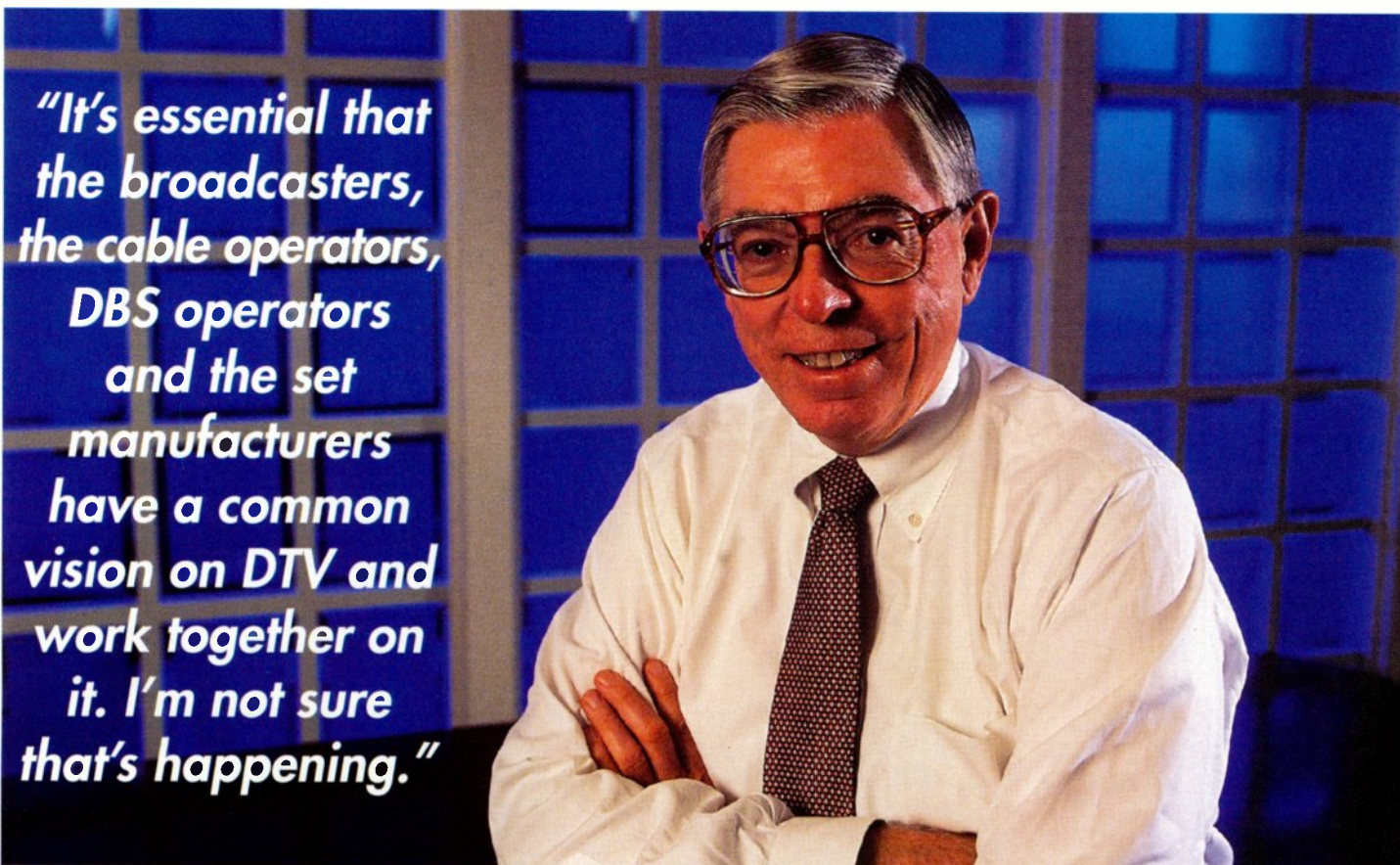
DTV ■ **Is it possible for you to enumerate what has to be done to get from here to there?**

Wiley □ Well, I think the IEEE 1394 (firewire) connection issue has to be solved—and I think it's close to resolution. That will make Hollywood feel comfortable about making its movies available on HDTV. And I think that the cable set-top box standards have to be finalized so that they will accommodate all formats. The Open Cable concept has to allow that, and I think it will. And I'd like to go even beyond that. I'm all for set-top boxes, but if some people want to have a cable-ready set that doesn't require a set-top box, I think that's probably in the public interest too. "Let a thousand flowers bloom," as an industry ad used to say.

That leaves must carry. It really is a decision the government has to make. My guess is that we may have to have some accommodation for limited channel systems. Ultimately, of course, you'd like to see all broadcast signals carried, and I think the cable people want to carry them if they have the capacity. If they don't have the capacity to do it, the hope is that they will rebuild their systems so that they can. Why not rebuild these systems, to the extent money's available, because there are more services, more programming, more cable networks out there?

Five years from now, we will look back and say, "Gee, too bad we had to go through all that but thank God we're where we are now." Five years from now the scanning, set-top box, carriage and interconnection problems will all be memories, and we'll be heading down the sunny uplands of the digital revolution.

Let's face it, this is a revolution. And it's going to change video forever in this country, and all for the better. And the mere fact that we've got some of these current problems should not cause us to think that we aren't going to get to the digital "promised land." Because we will. ■

> "It's essential that the broadcasters, the cable operators, DBS operators and the set manufacturers have a common vision on DTV and work together on it. I'm not sure that's happening."

Dennis Brack /Black Star

FCC's approach was to take out every format and let the marketplace choose. Either way, the marketplace is going to decide.

DTV ■ **So where is the crisis? Is it at the set?**

Wiley □ The digital set is going to accommodate all formats, but it may not accommodate DTV in its entirety. There may be a problem in some cable homes. And Hollywood has a problem in terms of copyright protection.

I think we ought to let the marketplace rule and we shouldn't let any industry—be it broadcasting, cable, consumer electronics or computers—game this system too much. Hopefully, because of the interposing of all these industries' self-interests, a good result will ensue. I continue to hope that the FCC will sort of look over the shoulders of these industries—and shine light into the process—to make sure the public is protected.

And by the way, I don't ascribe fault on anybody's part. This is complex, and everybody's got their own proprietary interests to serve. But I'm just too much into this, from the public interest standpoint, to think about it any other way.

DTV ■ **How do you feel about multiplexing?**

Wiley □ I always believed that the technology allows SDTV and, therefore, we ought to let the broadcasters experiment with it. It remains to be seen whether they can program and advertise those extra opportunities effectively, or whether they'll cannibalize their own primary signals. But why not experiment? I'm certainly not opposed to it at all. I didn't recommend to the FCC that digital had to be all high-definition. I didn't recommend to Chairman Reed Hundt that there should even be a

that I have to see the soaps and "talking heads" in HDTV. Why not the let the broadcasters try to find a market for local news programming or some additional kind of program where they can make money out of four channels? I just disagree with those who would totally foreclose HDTV at the outset.

DTV ■ **Is there a danger that we'll never get to HDTV?**

Wiley □ No. I think it's going to happen. One of the reasons is that we've got so much HDTV programming available. It can be easily converted from 35 millimeter cinematography film products. Moreover, there's the greatest opportunity of all: sports. Wait until you see a basketball, football or baseball game, or a track meet, in HDTV. And with CD-like sound.

DTV ■ **And when you say HDTV, you're factoring into that a large set?**

Wiley □ Yes—35 inches and above. Below that it's a little harder to see the differences. I grant that to the critics. But the large sets are the fastest-selling aspect of the marketplace. I've had a 50-inch screen for a decade or more but it's not as clear as I would like. But the clarity will improve with digital sets. And when the flat panels are available...well, I think that's going to transform the entire business.

So, when I say HDTV has always been my vision, that is not to foreclose standard definition and it certainly isn't to foreclose the image that the computer people have. Their idea of adding a video capacity to a PC at home or at my desk makes all the sense in the world to me. As I'm doing my e-mails and Internet scanning I might want to switch over and get the late-breaking news. And I think

# There are better ways to make sure your digital transition goes smoothly.

Don't leave it up to chance. Choose an innovative company with smart solutions for your digital transition. As the leading supplier of analog and digital transmission technology, Harris has a full range of products and support services that meet your needs, now and for the future, including upgradable analog transmitters that let you migrate to DTV.

Since our introduction of the first digital transmitter, we've had many breakthroughs that have become world standards. Our digital exciter is the standard for broadcasters and receiver manufacturers. But it's much more than great products that make Harris different. Being a key player in the development of

digital transmission technology has given us experience and knowledge to make things go smoother – whatever your needs.

We offer training, installation, and 24-hour technical assistance as well as many other helpful services. These are just a few of the things that make Harris a national leader and a company you can trust. So when it comes to making a smooth conversion to DTV, the best way isn't crossing your fingers, the best way is Harris.

For more information on digital television training seminars or help in designing a smart transition strategy, call 1-800-4-HARRIS ext. 3027.
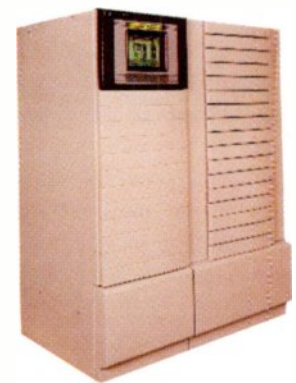
DiamondCD DTV Transmitter

next level solutions

WIRELESS

BROADCAST

COMMUNICATIONS
PRODUCTS

HARRIS
Communications

1-800-4-HARRIS ext. 3027 ▪ www.harris.com/communications

More Information Circle 107

AES points way to DTV's Audio Future

Recent convention sees audio and video professionals' needs closer than ever

By Dan Daley

Everyone likes to have a show to call their own, and broadcasters have been content to stay within the confines the increasingly massive NAB confabulations in recent years. However, with digital television on the cusp of the future and digital broadcast audio already a reality the recent Audio Engineering Society (AES) Convention, held in San Francisco Sept. 26-29, brought more broadcasters than usual to walk the floor of its growing patch of real estate in the Moscone Center in search of the tools of broadcasting's digital audio future.

"There's definitely more broadcasting people at this year's show," observes Steve Turley, marketing director with console manufacturer Harrison GLM. "They're out here looking at a lot of digital technologies, particularly consoles. It's not that they couldn't find them at NAB, but they're realizing that they need to see and check out as many new technology platforms as they can as often as they can, because the technologies are changing so fast, as are the prices. They want to have as many options as they can before they feel they have to make decisions and commit to the equipment they need to make the transition to digital. And with all of the stuff coming down the road in terms of digital audio at this show and others, it's understandable that they want to get as much information as they can as soon as they can."

There are certainly more choices by the month, and the spread between the annual NAB shows in late winter and the autumn AES shows means nearly a full technology generation passes between them. Thus, what was under consideration in March has often been superseded by October. And that's not a matter of simple hyperbole.

"I'll tell you what the AES shows are becoming: what you saw six months ago was version 1.1 and today you're looking at version 2.0," says Mike Descoteau, director of broadcast sales for Manhattan-based equipment retailer Dale Pro Audio. "What that translates into is that people are looking at the same hardware platforms, and for all intents and purposes they look exactly the same as they did at the NAB show earlier in the year. But the reality is, they've gone another generation in terms of software updates. There's more features and functionality, but you have to look really closely to see the differences, which can be quite significant. So the equipment manufacturers have to be pretty aggressive in terms of getting the points of what's new across to potential customers. There's lots of changes going on in digital audio technology, but they're not apparent to the naked eye."

New And Reconfigured

The fact that large technology platforms such as consoles can be upgraded so transparently might be somewhat confusing at times. But the good news is that such software-based

The AMS Neve Libra console was one of the many audio consoles seen at AES.

and modular enhancements have brought many more choices to the broadcast audio market. In addition to dedicated broadcast platforms from companies such as Wheatstone and Klotz, there are consoles originally developed for music recording applications and adapted for broadcast work, such as Otari's Advanta and Euphonix's CS series all-digital or digitally controlled analog desks.

"It's not difficult to configure [music] consoles for broadcast work, assuming you've done your homework and know what the broadcast industry needs in a console, versus what the music studio markets requires," explains Mel Lambert, international marketing director for Otari. "The change in broadcasting with its move to digital opens that market to more companies to sell into broadcasting as well as music. And if you look around this show you'll see that everyone's running their engines in that direction. The positive upshot is that there is no longer a cost premium for digital technology anymore, no longer a cost penalty for moving to digital technology versus analog."

Illustrative of the cross-market trend is Otari, which is marketing its Advanta to both music and broadcast (as well as post production) by emphasizing such features as an eight-channel monitoring capability to support multi-channel mixes—anything from stereo to Dolby-encoded four-channel audio to fully discrete 5.1 surround. And like other companies, Otari is asserting an ability to provide integrated solutions (the buzzword that has become synonymous with "product" in this transitional epoch), including routing and recording media platforms, such as its RADAR II 24-track hard-disk recording system (originally developed for the music recording and editing market) and its Lightwinder fiber-optical patch bay router.

Sony has similar ambitions, marketing its Oxford digital console to broadcast as well as music, putting the sale of one Oxford to National Mobile Television for its HD-2 remote production unit as the lead item in an announcement of five console placements globally at the show. "Broad-

cast and music have relatively equal status if for no other reason than that they have very similar requirements at this stage," notes Courtney Spencer, vice president, professional audio products, for Sony's broadcast and professional products group. "This is a moment of convergence, and digital is the basis of that convergence, the common format that broadcast and music share. In digital, audio is data and it works that way no matter how you apply it."

A similar note was struck by Solid State Logic, which made no effort to downplay the fact that its first Axiom MT digital console sale world-wide was to a broadcaster earlier this year. The Axiom MT's work surface is modeled directly from that of SSL's 9000J console, which has seen most of its 99 sales in three years go to music studios.

If convergence is a reality for broadcast and music customers, it's a necessity for manufacturers, who are attempting to overlay as many digital products as possible across as wide a spectrum of applications as possible. (And then scrambling to find a way to differentiate them from each other in a crowded market.) While Lambert's comment that digital no longer comes with a price penalty is well-taken, it's also true that many digital platforms—particularly high-end ones such as consoles—are relatively recent developments whose initial users will also bear the brunt of amortizing their extensive R&D mortgages. On the other hand, much of digital's offsprings build upon previous platforms whose costs have already been largely mitigated. Thus, it's not unusual to see new products which incorporate existing components, such as new consoles utilizing proven DSP processors. And much of the digital hardware introduced in recent years has been aimed at the ever-widening base of the pro audio pyramid—the so-called project studio tier—which requires powerful processing in cost-effective packages, such as Yamaha's O2/R compact digital mixer or the more recently introduced Mackie Digital 8-Buss mixer, both available in the low-five-figures range, contrasted with the nearly $1 million that an Axiom MT can command.

What the larger, more expensive digital

engines offer is more real estate and more advanced DSP, both critical for multi-channel environments. What they share, though, is equally important: a trend towards 24-bit operation. While the end products of both music and broadcast productions eventually end up on small speakers, customers in the pro end of both markets are demanding larger word lengths and in both cases appear willing to pay for it.

The Net

There is also interest in networking, which only the high-end products can as yet deliver. Fairlight, for instance debuted its MediaLink network NT server system at AES, aimed at both post production and broadcasting markets.

"Broadcasters want connectivity," says John Lancken, president of Fairlight USA. "They want to be able to make high-end, large-ticket purchases more cost-effective by networking them and allowing them to work more efficiently, such as by allowing systems to access the same sound file databases simultaneously."

Lancken also stressed the importance of file interchange compatibility between systems, the Holy Grail of the digital era and one that has eluded manufacturers and customers for the decade-and-a-half that digital engines have been in place. The AES show also saw Fairlight announce a new interchange agreement with Digidesign for its Pro Tools system and Fairlight's MFX-3plus and FAME workstations.

Joe Bean, vice president of sales for Studer, which is marketing its digital 950 console heavily to both broadcast and now music markets, agrees, saying, "Everyone wants network capability, and that's something you're seeing all over the place at this show. Everything is a big computer now and the future is going to be server-based. Content data management is the model for the future of broadcasting—and audio in general."

Hybrid Technology

As much as digital is a buzzword for both markets, the reality is that they continue to operate in a hybrid environment, and will for some time to come, with combinations of analog and digital common at every stage of the production, post production and broadcast stages.

"There are still two distinct camps out there," says Turley of Harrison. "The mid-sized and smaller broadcasters who are going to remain primarily analog for the foreseeable future, using analog for large platforms while using digital DSP for various outboard processing functions; and the top-10 market broadcasters who have already made a lot of digital acquisitions but who still have to interface with analog parts of the process. The industry is going to operate on a sort of hybrid environment for some time to come. They'll produce in analog and mix to D-2 and then let the [analog] switchers handle the output. Let's face it—the talent is still sitting there talking into analog microphones, and that's not going to change for a long, long time." ■

GI DIGICIPHER® II ENCODER SYSTEM

The Keys to your Digital Future
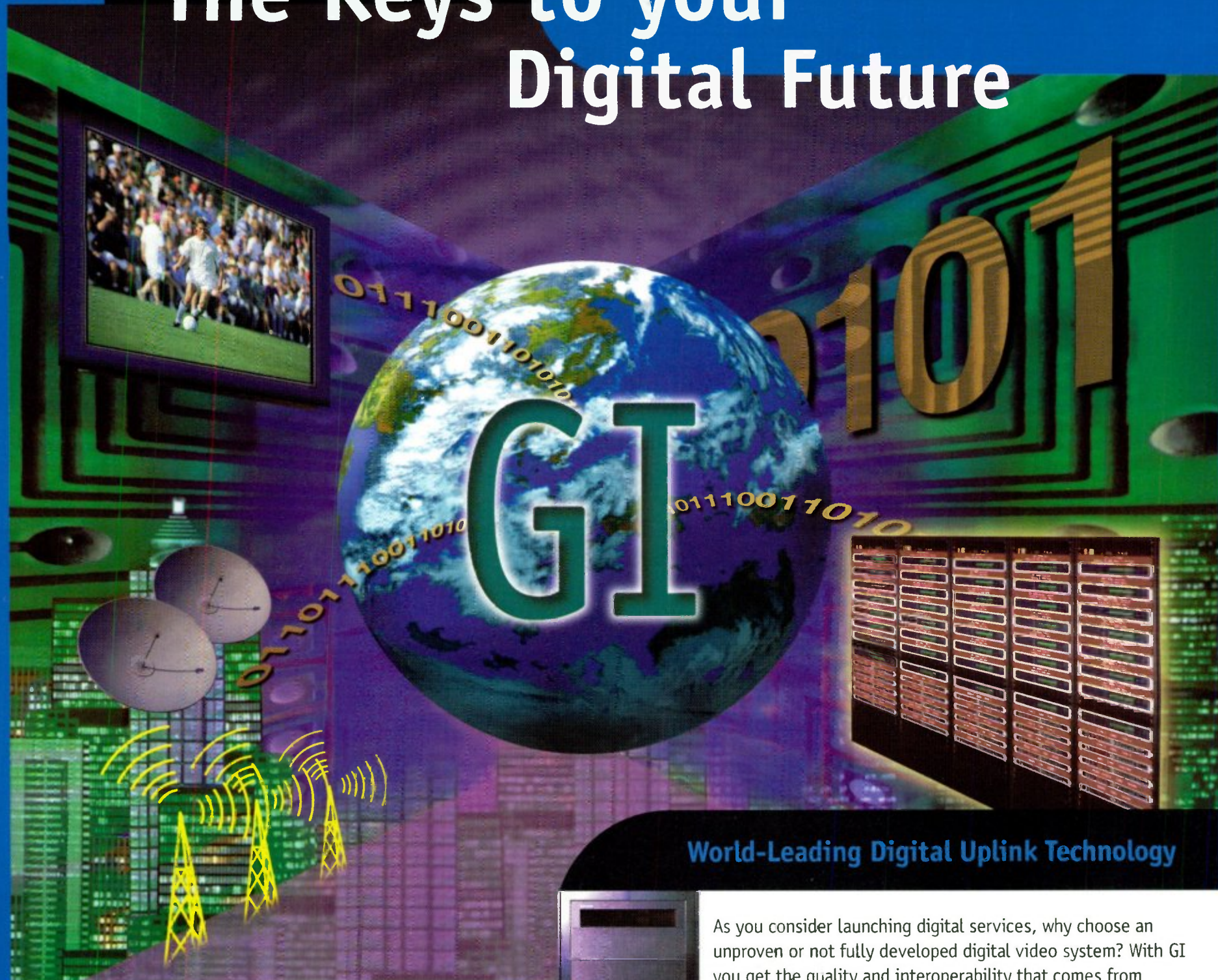
World-Leading Digital Uplink Technology

Making Every Bit Count

Whether you're sending content over satellite, cable or terrestrial links - GI's digital encoders, with patented statistical multiplexing, can yield up to 25% greater bandwidth efficiency than competing solutions.

As you consider launching digital services, why choose an unproven or not fully developed digital video system? With GI you get the quality and interoperability that comes from experience. With hundreds of MPEG-2 based programmers and digital headends installed, and millions of digital set-tops deployed, GI has the most successful digital solutions in the field.

Whether you're a satellite programmer, terrestrial broadcaster or digital cable operator, DigiCipher® II encoder systems ensure seamless cable carriage. Its open, standards-based design guarantees you compatibility today — as well as offering a smooth migration path to HDTV and other evolving digital technologies. So with GI, you're fully covered for the long term.

When it comes to digital, it makes sense to go with the industry leader. Find out how to make your network compatible with the digital future. Call us at 1-800-848-8939.

Satellite Data Network Systems
6450 Sequence Drive · San Diego, CA 92121 · Fax 619-404-2443

GI General Instrument®
Continuing to make history

More Information Circle 106

World Radio History

World Radio History

The Switch Is On

Production switcher manufacturers experience growing demand for DTV products

By Edmond M. Rosenthal

With the first high-definition production switchers now becoming available from manufacturers, the industry is beginning to see record order backlogs building up. Addressing HDTV in 1125i, 1080i and 720p formats, the manufacturers continue to add new features to their component digital lines and look toward adding all of these features to their HDTV switchers.

At Panasonic Broadcast & Digital Systems Co., Dave Wiswell, group manager of advanced digital television products, predicts any major production switcher investments in the future will be for DTV use.

"The market is opened up now," he says. "I've never seen a time where there was as much demand for a new product. It's going to be tough for us to keep up."

He points out the key factor in adapting to HDTV is the requirement for application-specific integrated circuits (ASICs) that can handle six times the internal bandwidth. This makes it two-to-four times as expensive to deliver the product, he notes.

Panasonic's switchers are addressing the 1125i standard, and Wiswell says his company plans 480p product, possibly sometime next year. Having earlier delivered prototypes primarily to facilities concentrating on telecine work, Panasonic recently introduced its AV-HS3000 "Millenium Series" of three switchers.

The future challenge, he notes, is to add more of the bells and whistles seen in component digital switchers to their HDTV successors, which require much more powerful DVE processors.

Similarly, Thom Belford, Sony Electronics product manager of editing and production systems, holds, "Our primary goal is to be able to perform in high defin-
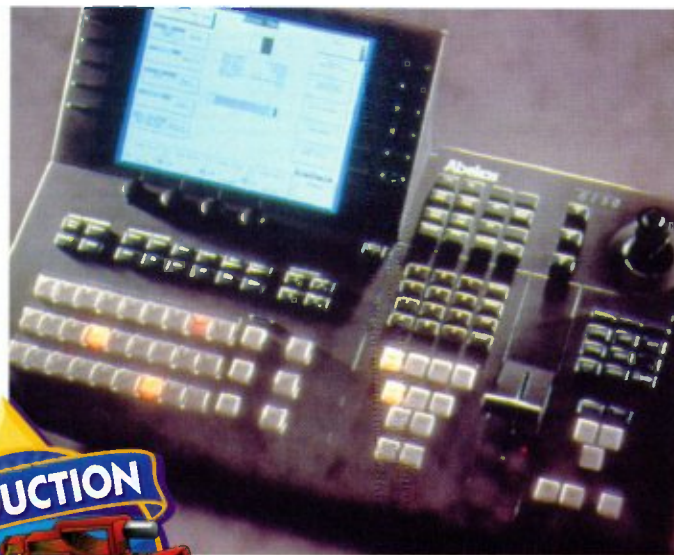
The Scitex Digital Video Abekas 8150 production switcher

ition the same functionality that we have in standard definition without sacrificing any features or benefits of long-standing and familiar operational methodology."

A current example of this, he says, is the ability to move a range of HD products into remote trucks with no additional training requirement, because the control panels are identical with those of standard definition counterparts. Adopting the 1080i standard, Sony recently announced all of its products in this standard will be able to perform in 24 frames by the spring of '99, fulfilling demands by the post community handling film-originated material.

Belford says there's "nothing official" toward offering 720p switchers but that "Sony will meet the needs of whatever the market demands." He says Sony will have a range of conversion products to allow distribution of any format from the current 1080i switchers, "but if there is a demand for all-new products, we would go in that direction."

Orders are backed up until March, he

reports, for the three-model HDS-7000 line. The HDS-7100 one M/E switcher allows addition of an integrated channel of digital effects. It has a feature set for specific market segments, including film-to-tape transfer, post production and small remote operations.

Peter Symes, manager of advanced technology for Tektronix, holds that those buying HD production switchers "will want the same production values that they have today, such as very high-quality chromakeys and mattes. There will also be storytelling effects, such as page turns and all the eye candy that's used to add glitz and motion to a production."

Tektronix's new entry is the compact 110-HD, listing at $65,000. Symes says its most obvious application is in film-to-tape transfer, along with typical longform editing, where effects are sent away to be done on resolution-independent devices like the Discreet Logic Flame. He notes, "The 110 will be quite useful for putting all the segments together because all of the editors support it."

Handling both 1080i and 720p, the switcher became available in September. Symes says it works well in a small studio or small mobile unit, being three rack-units high, 17 inches wide and 14 inches deep. He says there are no specific plans for other HD switcher products, but that the intent is to provide them as the market needs them.

Snell & Wilcox's latest line of production switchers handles both 720p and 1080i. Adolfo Rodriguez, director of marketing, says the switchers have been ordered by such facilities as HD VISION of Dallas, and Colossalvision of New York.

Snell's HD1012 is a 12-input switcher ranging in price from $160,000 to $200,000, depending on options. In the future, he reports, Snell will introduce a 10-bit DVE that can be integrated into the 10-bit switcher. The HD1024 is a 24-input version of the 1012, priced from $250,000 to more than $300,000.

Rick Lamb, marketing manager for Philips's line of business, signal processing, says his company's DD-35 three M/E switcher, priced from $250,000 to $300,000, currently offers 480p together with CCIR 601 but will migrate to higher data rates. He notes the control system communicates to the video processor through a local area network, and with this networking capability, the video processing can be migrated, for example, to the HD data rate of 1.5 gigabits.

Meeting Multicasting Needs

For multicasting in standard definition and also broadcasting in HD, he adds, the networking capability of the DD-35's control system makes it possible to operate two independent electronic processors from a single control panel—to produce HDTV in 1.5 gigabytes while continuing with standard definition production. He notes stations can continue normal production while upgrading the processor, with no need to shut down.

Customers can rest easy that the same control panel will be used by Philips in the future, Lamb points out. Integrated into the switcher is the ability to control character generators, VTRs, file servers, laserdiscs, routers and nearly all brands of DVEs, he says.

Scitex Digital Video is also taking a transitional approach to HDTV. Helen Shortal, director of marketing communications, says the company has research and development under way for a full range of ATV products. Meanwhile, she says, widescreen support is offered for all of its products with a complete range of digital as well as analogue I/Os, and HD tape machines can be hooked up with the switchers.

Shortal reports that the most recent switcher from Scitex, the Abekas A8150, has gone well beyond the limitations of TBC-style proc amp controls in color correction. It has improved control over white balance and black balance and can fix tapes that were improperly black- or white-balanced in the field. The compact compositing switcher can handle as many layers as a switcher with a larger control surface.

Cool Stuff

At the recent IBC exhibition ECHOlab offered an industry first with the announcement that all ECHOlab 5000 switchers will include 10BaseT Ethernet hardware and software. What does this mean? The 5000 switcher will now be able to import content from any device over the network, allowing the user to browse the entire studio's network of video devices and grab effects, stills, graphics and clips. At IBC the demo made use of the Pinnacle Systems booth located next door, as the operator at ECHOlab's booth was connected to Pinnacle's DVExtreme, Lightning still store and TypeDeko character generator.

ECHOlab also announced a dual-server option for the 5000, providing a second server with workstation. The two servers are integrated with a private network link, generating frame-accurate control over

all built-in devices. This doubles the computer's capacity and enables two operator use. The cost of the option is $4,000.

Contact ECHOlab at (781) 273-1512 for more information or visit www.echolab.com.

MAXIMIZE
YOUR CAMERA'S
PERFORMANCE.

Canon

One of the most important decisions you'll make about your video camera is which lens to select. Because better technology and dependable service matter, you'll want to buy your lens from a company with the most extensive engineering resources in the world and service facilities nationwide. That company is Canon. Year after year, Canon distinguishes itself as a leader in issuing new patents, setting the standards in optical technology that others follow. Over the past few years, Canon Broadcast has introduced more new and advanced technology than any other lens company.

These include:
- HD-IF, the first full line of "next generation" High Definition Television lenses;
- IFxs, the first lighter-weight, advanced-featured broadcast lens with enhanced design features;
- IFpro, the first Pro-Video lens with Internal Focus technology for the professional user;
- Optical Image Stabilization lenses for maximum image stability;
- Crossover lenses for switchable cameras;
- The latest advances in digital lens technology.

For more info
Call 1-800-321-4388
(In Canada: 905-795-2012)

http://www.usa.canon.com

Emmy winner for "Implementation in Lens Technology to Achieve Compatibility with CCD Sensors."

Canon

More Information Circle 101

DTV:
Are you prepared?

There's No Time to Lose.

Choose the most essential element for a digital television implementation.

- ❏ antenna
- ❏ multiplexer
- ❏ preconditioner
- ❏ routers
- ❏ programming
- ✓ a plan

- ❏ encoder
- ❏ transmitter
- ❏ cameras
- ❏ software
- ❏ additional staff

That's right, before anything else, before you spend a single dollar on new equipment or new programming or additional personnel, you're going to need a solid plan—a blueprint that allows you to establish goals, evaluate alternative solutions, and helps you make the wisest use of your budget dollars.

Columbine JDS has a team of experts with years of experience in digital television and multichannel broadcasting. And we've got the solutions for the digital world, including software for:

- • *Digital Transmission Management*
- • *Video Server Control*
- • *Multichannel Master Control Automation*
- • *Multichannel Program Management*
- • *Multichannel Sales and Traffic*

We're ready to help. So, before you do anything else, call and ask about our DTV products and services.

CjDS

COLUMBINE JDS

Solutions for the digital world

303.237.4000

www.cjds.com

More Information Circle 103

PRODUCTION SWITCHER ROUNDUP

ECHOlab

All three new ECHOlab 5000 model switchers have full function program/pre-set control panels for live or post production. They run 10-bit ITV-R-601 digital, support seven different digital and analog I/O formats, and have up to 33 inputs, 18 outputs, 2.5 M/E's, 6 keyers and triple chroma keyers. Every ECHOlab 5000 switcher has a built-in server running Windows NT. . The Model 5900 has 33 inputs, 2.5 MEs and 5.6 keyers; the Model 5800 has 33 inputs, 1.5 MEs and 3.4 keyers; and the Model 5700 has 21 inputs, 1.5 MEs and 3.4 keyers.

The ECHOlab 2000 family of digital video switchers are for smaller live and post studios, cable stations and mobile units.

Contact ECHOlab at (781) 273-1512 or visit www.echolab.com.

■ **For more information circle Reader Service #211**

Ensemble Designs

The Catalyst CV is a networkable component digital switcher/keyer that offers independent control of key layer and background transitions, with cut, mix and wipe effects built in. It has the same feature set and quality of a traditional switcher and is great for keying logos over program material or as a downstream keyer to a digital component switcher. *Contact Ensemble Designs at (530) 478-1830 or visit www.ensembledesigns.com*

■ **For more information circle Reader Service #212**

For.A

The VPS-300 video production system is a post production/production mixer combining a digital 4:2:2 mixer with mixing and keying capability plus 3D digital video effects. Each of the eight inputs can be selected as composite, Y/C or component video. It also has a built-in two-channel 5.5 MHz frame synchronizer, 67 dif-

ferent wipe patterns, two independent 8-bit linear key options and chroma key option.

The VPS-400D/DP has two key channels with modifiers, 80 wipe patterns, 100 event memory and built-in floppy disk. It has eight inputs and 16 optional, with serial digital component outputs.

Contact For.A at (714) 894-3311 or visit www.for-a.co.jp/

■ **For more information circle Reader Service #213**

Panasonic

The AV-HS3000 Series of production switchers, dubbed the "Millennium Series," meets the demands of HDTV adopters as it is capable of providing for 1080i/1035 material. It offers optional 525/625i through the same SDI I/Os.

The Panasonic AV-HS3110 is a 10-input maximum (four SDI inputs are standard; an option offers six more) compact-sized production switcher suitable for telecine and editing operations. It delivers 10 basic wipe patterns (SDI) to be controlled remotely from the compact 1 M/E control panel and has one program output standard.

Contact Panasonic at (800) 528-8601 or visit www.panasonic.com/PBDS

■ **For more information circle Reader Service #214**

Philips Digital Video Systems

The Philips DD-Series of component digital CCIR-601 production switchers are for live on-air production, mobile/truck and post-production applications. All models offer a traditional mix effects (M/E) cascade architecture. Two fully functional, high-quality digital keyers per mix effects as well as the DSKs, makes compositing versatile. Each keyer features exclusive DynaChrome chroma keyer for realistic keying through smoke, water, and fine detail.

Contact Philips Digital Video Systems at (800) 962-4287 or visit www.broadcast.philips.com

■ **For more information circle Reader Service #215**

Ross Video

The Ross 200 series of switchers includes the RVS 210A and RVS 216A. The RVS 210A has 10 inputs and 24 standard wipe patterns (expandable to 53). The RVS 216A has 16 inputs and 53 wipe patterns, as well as an encoded and RGB/component chroma key. Both units offer the following features: three bus multi-level effects system (MLE), four video levels, 12 event memory, RGB/component chroma keyer and three-year warranty.

Contact Ross Video at (613) 652-4886 or visit www.rossvideo.com.

■ **For more information circle Reader Service #216**

Scitex Digital Video

The Abekas 8150 component digital switcher has integrated Dveous technology available as an option. The switcher combines familiar mix/effects architecture with limitless effects layering capabilities. With three identical keyers—two in the M/E, and one downstream key in the program/preset—the 8150 makes re-prioritizing layers easy. The Dveous option is based on the twin-channel Dveous architecture and offers Super-Shadow effects and also includes Ultra-Warp and the realistic textures and light sources of SurfaceFX.

Contact Scitex Digital Video at (888) 846-7017 or visit www.scitexdv.com.

■ **For more information circle Reader Service #217**

Snell & Wilcox

At the top of Snell & Wilcox' list of switcher offering is Magic DaVE 8D. Magic DaVE 8D is an eight digital (SDI) input switcher, offering all of the capability of a conventional digital switcher allied with Magic DaVE Digital effects.

Also from Snell & Wilcox is the DVS1000, a solution for broadcasters and facilities requiring simple mixing, wipes and high-quality routing of 10-bit 4:2:2 signals.

Contact Snell & Wilcox at (408) 260-1000 or visit www.snellwilcox.com

■ **For more information circle Reader Service #218**

Sony

The HDS-7100 high definition digital video switcher is a one mix effect switcher for 1080i applications. It's designed as a cost-effective solution for telecine transfer, small post-production applications or small mobile applications. It provides 10 HD-SDI inputs as well as program, clean and two auxiliary bus outputs conforming to SMPTE 292M HDTV serial digital format. The DVS-2000C is a 4:2:2 component video switcher that accepts up to 16 serial digital inputs in a single Mix/Effect (M/E) bank.

The DVS-7200 is a two-mix/effects digital post production switcher with optional dual-downstream keyer.

Contact Sony at (800) 686-SONY or visit www.sony.com/professional.

■ **For more information circle Reader Service #219**

Tektronix

The Grass Valley 110 HD production switcher is designed for film transfer, long-form editing, small mobile units and graphics suite. The 110 features 10 inputs, including black, background, and frame-stores; Mix/Effects with mix, wipe, key, mask; 10 wipe patterns; background generator and two mattes; downstream key with fade-to-black; dedicated key and fill inputs for both keyers.

The Grass Valley Model 1200 component digital production switcher has 4:2:2:4 digital video signal processing. It offers 16 video and key source inputs. It is also DTV Ready and compatible with 16x9 picture formats. The Grass Valley Model 2200/2200-2i component digital production switchers have 4:2:2 DSP.

Contact Tektronix at (800) TEK-WIDE or visit www.tek.com.

■ **For more information circle Reader Service #220**

Video GainesVille

The Cybervision CV120 component digital switcher is a compact and flexible single ME with two key layers, Wipes, splashes, mattes, color backgrounds and key masks are standard. It can be used to directly replace an analog switcher with multi-format input options.

The CV332 has two M/Es and twin downstream keyers. The CV332 has 32 auto-timing, color correctable inputs plus internal black and two powerful "Splash" color background generators.

The MightyMix is a compact, one piece, eight-input unit with built-in DVE capability for small edit suites and limited space applications, such as mobile facilities.

Contact Video GainesVille at (352) 372-0270 or visit www.vgv.com.

■ **For more information circle Reader Service #221**

Videotek

The Prodigy production switchers provides instant access to live sources and 100 programmable effects transitions. Features for post use include look-ahead preview, multi-level background, key and downstream key transition effects, and an extensive selection of wipe patterns. Optional features include integrated stereo audio follow-through and interfaces for an external serial editor and chroma-keyer.

Contact Videotek at (800) 800-5719 or visit www.videotek.com.

■ **For more information circle Reader Service #222**

DTVPOST
for SGI

Inside...

Not The Same Old Silicon Graphics

With an NT workstation and an HDTV I/O card on the horizon SGI readies for new realities

By Ken Kerschbaumer

When it comes to workstations for the professional video market there are few that will deny that Silicon Graphics rules the roost, particularly at industry trade shows. The saying "The sun never sits on the British Empire" could very well apply to SGI workstations on a trade show floor. Odds are that even in the farthest reaches of the exhibit hall you're no more than 30 feet away from an SGI workstation helping run another manufacturer's products and demonstrations.

Of course, that same saying could also be seen as a warning. After all, the NT platform has begun to flex its own muscles in the video industry, leaving many to wonder where the SGI platform will be in a couple of years if the NT platform continues to grow in processing power with ever-increasing frequency.

Andy Sheldon, Silicon Graphics entertainment market manager, Desktop Systems Division, sat down with Digital Television to discuss upcoming SGI product developments as well as his thoughts on the industry.

What's your take on how you see the post-production community and Silicon Graphics readying for HDTV?

We've already started to see the early adopters already buying solutions to address the creation and production of HDTV. A number of orders have already been landed and a number of contracts have already been placed in Hollywood, so that move is beginning to happen.

With regards to Silicon Graphics, one of the fortunate advantages we have as a company is that we've already been working in HDTV resolution for quite a number of years because of our visual simulation market. So being able to structure an HDTV workstation or server has been quite easy for us. And third-party developers for the SGI platform already are offering products for HDTV work. Discreet Logic, for example, has a solution called Fire that runs on the Onyx2 rack configuration. Another product is a character generator from Antero which provides mainstream character generation in HD resolution.

All the things someone needs to do to put an HDTV picture on the air, like switching, mixing and up to and including advanced compositing, is now possible. And frankly, it's possible at not such a huge price differential. The HDTV character generator, for example, is not too wildly off from a high-end standard definition character generator.

At Siggraph there was mention of an HDTV input/output card from SGI for use with SGI workstations. Can you elaborate on that introduction?

One thing we're going to do is augment our workstations with the introduction of an HDTV input/output card for our workstations and servers. It will be introduced at NAB next year and will be available for our software developers towards the end of this year.

The card will support both the 720 progressive and 1080 interlace standards, so even the most stringent of the ATSC standards can be accommodated by this card. We think that's important for post-production facilities and broadcasters who are producing their own content because it will allow them to transition into HDTV when they want it.

What do you expect the cost of that I/O card to be and what will it offer the user?

It'll be under $20,000 and will offer the ability to put HDTV directly into or out of one of the workstations from an HDTV source, be it a camera, VTR or another device.

From a design standpoint we designed the card to be parallel because then we can accommodate multi standards that have been adopted by the broadcasters. For example, the current serializers on the market don't offer progressive output—they only offer interlace. And they also are single source and physically large so we couldn't accommodate them in the box.

When it comes to HDTV product development what do you see as the biggest obstacles?

From our perspective there isn't anything that we have to worry about other than this I/O card. We've already shown we offer the bandwidth in the computer, the I/O capability needed to get the data in and out of the box itself and a disk array that might be hooked up to it. So it's not like we're going to have to redesign this machine to accommodate this.

One of the interesting things from a product development standpoint is that as fast

An image created on an SGI platform using Alias/Wavefront's Maya

as we can make a computer there's always someone who can make it appear slow because the user expands their creativity. Just when you think you have two streams of compressed nonlinear editing down along comes single stream uncompressed nonlinear editing. And just when you have that sorted they want to do two streams of uncompressed nonlinear editing at 601. And just when you have that down they want to do HDTV multistream uncompressed.

One of the big buzz phrases for a lot of software developers is "resolution independence," no matter what their platform—SGI, NT or Mac. Doesn't this diminish the SGI advantage since "resolution independence" can be taken to mean "HDTV ready"?

There's a big difference between resolution independence and accommodating HDTV. The reason for that is you can't offer higher resolution unless you take away things they've had on standard resolution. For example, I think any user that was going to use an HDTV playback device would want to be sure it could play back at 30 frames per second. But the fact that your framestore was scaleable to accommodate a higher resolution of image doesn't mean that the computer can move around 165 Mbytes of data per second. So it's very important to qualify what someone means when they say resolution independence.

In the pre-press industry we've had resolution independence for a long time and when you're creating static images simply having a still store that can scale into it is all you need. But once you start talking about moving images the problem becomes compounded a hundred fold. The internal architecture of your device, be it proprietary or computer, needs to accommodate not only the high data and bandwidth in/out but also within the computer itself. And that's why we've taken the more holistic approach to create computer hardware that can generate graphics at that resolution and rate and can then be output through an I/O pipe which is wide enough to accommodate the realtime nature that we have in the entertainment industry.

It's no big secret that SGI is working on an NT-based solution. Can you tell me about what's driving that development?

I would premise any discussion about NT by saying that we don't think anyone gets up in the morning and says "I'm going to buy an NT workstation" or "I'm going to buy an Irix workstation" though we wish they did. We believe that solutions deter-

DTVPOST *for* SGI

mine what someone wants to buy.

If someone wants to buy a 2D device or a 3D device or an editing system they'll buy the best solution given the price and performance they want to sustain. In some cases that will be proprietary and in others it will be for an NT, Mac or SGI-based box.

One thing that is true about the market is that the fastest growing segment of the workstation market is NT and we want to capture a larger percentage of the workstation market. We've said quite publicly that we are not wedded to the Irix and MIPS technology to be successful. We want to make differentiated visual workstations and provide the tools to someone so they can visualize what they're thinking more quickly. If that means the applications run on NT that's fine.

The important thing for us is that we're not just making another NT workstation because there are plenty of bigger companies that know how to make those products as a commodity. And that's not a market we know or want to play in. So if all you want to do is do spreadsheets or word processing we're not the place to come to. If on the other you want to do business-to-business computing or visual computing to help you realize what it is you're looking at then we are someone to have a look at.

If today doing something was really only dependent on the CPU then there would be other companies in this industry that would be winning this business because they have faster CPUs then Intel. But that's not the case. You need a system that has a balanced performance throughout the computer. Simply having a very fast CPU or stacking a bunch of them together doesn't mean that you have an efficiency in moving the data around within the box. So we concentrate on creating hardware-accelerated graphics and we're going to continue to put a lot of R&D into that so we stay ahead in graphics acceleration. But we also spend just as much time, money and effort in making sure we can build an architecture for the computer that can accommodate those speeds.

It's always the weak-link strategy: if you create a very fast graphics system but you can't feed data in and out quickly what's the point? And the industry is starting to change. We've seen trends with mergers and acquisitions where 2D companies are buying 3D companies and blending those products together. You look at something like Softimage Digital Studio—it's an excellent example of combining a 2D composing and editing box with 3D. And their excellence in both areas will make a good compliment.

Given that that's the case, functions like editing or compositing are primarily 2D functions. Whereas 3D is a combination of not only moving pixels around but of creating 3D geometry in realtime and texture and so on. So if you designed a computer that simply did great 3D then your 2D performance would stink. And even if you were working in a workflow environment where you separated the two but then had to wait for compositing the two elements then the net result is slower performance. So our approach is that we have to design a holistic device that has great 3D performance but also complementary 2D performance.

The SGI Workstation Lineup

At the low end is the O2, a workstation that checks in for less than $6,000 and provides an integrated digital media and 3D animation device that can also play back JPEG movies, work with live sets or 3D topological texture maps with text. Because of its low price point its most popular uses include weather graphics, character generation and 2D space.

The next step up is Octane, used more for on-air realtime playback of multiple channels of graphics and/or video. According to Sheldon it's the mainstay of editing or compositing seats like Discreet's Smoke or Flame. It's also HDTV compatible, and costs between $17,000 and $40,000.

At the top of the line is Onyx2, what Shelton calls SGI's "ultimate graphics playback device. It provides additional functionality plus full-scene anti-aliasing. This provides clean insertion of video images into virtual sets or into realtime graphics playback in a template-based graphics environment or in scene recreation. So it scales all the way from a humble photo shop seat to on-air virtual studios." The Onyx 2 starts at $100,000 and goes up from there. It also is HDTV compatible.

■ For more information on SGI circle Reader Service #223

What's your take on the Discreet Logic/Kinetix merger currently pending approval?

It's been an interesting couple of months with Avid, Softimage and Discreet Logic, all global partners with SGI all being merged or acquired. We enjoy great relationships with those people and we believe the combining of those relationships will help to strengthen our business going forward.

Clearly Kinetix is going to be a target for our NT box. Today when Kinetix sells a software license we get no software or hardware revenue and we don't like that equation. We want to make a box that will run Kinetix the best on the planet for its price and so they're going to be a clear partner that we're going to focus our attention on. So in that regard it's extremely complementary to our business with Discreet Logic.

Without giving too much away our NT system will be differentiated and it will be running standard NT on a standard Intel processor. But it will be a device that is clearly differentiated and we believe it will have a price/performance ratio that will change that area of NT workstations.

One of the advantages the NT platform has is that it has Intel constantly creating more powerful processors. Is the introduction of an NT-based solution conceding that the NT platform's power is advancing to the level of where SGI is?

Intel spends more money per year on R&D then SGI has in revenue. So when you're spending that and all you do is make microprocessors and other processing chip devices you can believe that they can get a technology speed-up advantage there. And when they came and discussed their specifications for Merced it was so far beyond anything that was available on the planet at that time that it made logical sense for us at that point to make a strategic decision to switch our product line over in its entirety to the Merced chip. So as of about 2001, when Merced is available, we will offer a dual OS strategy based on a single Merced chip.

But we are very committed to supporting the Irix operating system going forward, as well as an NT operating system in an I/O 32 strategy and going forward in an I/O 64 strategy.

Can you tell us a little more about Merced?

Mused is the next generation of CPUs from Intel and it is a re-architected device that we believe has an integer and floating point performance that is far in excess of anything that will be on the market at that time. And certainly it was far in excess of our own development in the MIPS product line, which is an extremely successful RISC-based microprocessor.

If you go back three years ago SGI was best known for processing power. But if you make the move to NT then that sort of changes what SGI is about because other companies offer the NT processor. So what will that mean for the company's image?

The Discreet products have a very good market share right now so there will be a good balance of new and emerging solutions on NT and ongoing development on the Irix side where the customers know them and what to buy. And I also think we'll see a migration to some of the technologies from NT to Irix and from Irix to NT.

We're also helping do that with a partnership with Microsoft for Fahrenheit, the next generation of graphics library which is extensions on top of open GLM Direct 3D that provide developers with a single code base for development of graphics acceleration. I think that's important because developers will need to maximize investment in R&D by writing a single set of code that can be distributed across multiple operating systems.

SGI has its hand not only in the post production side of the business but also in production and station operations. And before we started the interview you mentioned how the traditional definition of production and post production is being challenged by products like Discreet Logic's Frost. Can you elaborate on that?

The nature of television broadcasting today has driven the need for more and more live reporting and today people look to TV for realtime updates because it's the fastest mechanism to deliver late-breaking news.

But that puts new challenges on the news departments as they need a production environment that is as much based in realtime as the news that is happening is. It's really important that broadcast tools are as realtime as possible.

What it boils down to is that at the end of the day a broadcaster is trying to figure out how to make the most compelling content in the least amount of time. And there the lines blur between what is post production and what is production. There will always be an opportunity for post production for things like show opens and teasers. Those are planned and you don't need to do that very quickly and the key there is integration of capabilities and cost. What we find stations looking to do is keep the costs saved in post and put that into the realtime production needs so that the station can report the news in the fastest and most compelling way. ■

There's Nothing Discreet About Facilities' Love of Discreet Logic

Across the country the combination of Discreet Logic and SGI is a winner

By Ed Eberle

Few will argue that Discreet Logic's development of editing, compositing and other post production tools for the SGI platform have been important to the post production industry. And when you speak with Michele Suissa, creative director at New York's Tape House Digital, a division of The Tape House Companies, that importance becomes all the more clear: She ranks the development of Discreet Logic's software as one of the top four most important technological advances in the industry's history.

"First was the development of one-inch tape and then the introduction of the Ampex ADO. This was followed by the Quantel Paintbox and, finally, the arrival of Discreet Logic's Flame and resolution-independent software running on SGI. That event, just four or five years ago, was a tremendous leap forward in both advancing technology and opening new creative possibilities for our industry."

Today, with the industry changing to meet the needs for DTV- and HDTV-ready material, the keywords are quickly becoming options, flexibility and speed—especially in the resolution-independent digital post production environment. Before long, broadcasters and other post production and effects clients will expect edited master videotapes in any number of formats, from 480p to 1080i and everything in-between.

When you look at the traditional online suite, they are, for the most part, incapable of delivering finished masters in varieties of resolutions. But SGI and Discreet Logic have been working overtime to build resolution-independent solutions designed for the post production, broadcast and delivery environment of tomorrow. In fact, they've offered the prospect of resolution independence since the introduction of their respective products.

With Discreet Logic's advanced editing tool Fire and its effects compositing tool Inferno both running on the SGI platform, post facilities all over the country are beginning to explore new levels of creative artistry, and they are stretching the limits of technology beyond what they ever thought possible.

Detroit-based GTN has been serving Motor City automakers for 15 years, and with a staff of more than 150, it continues to lead the region in providing state-of-the-art post production services to its clients in a wide variety of formats—from 30-second spots to corporate training and marketing.

Having adopted the SGI platform more than four years ago, the company currently runs Discreet Logic Inferno, Flame and Flint and will shortly be test-driving Fire on a battery of Onyx, Octane and Maximum Impact supercomputers and 02 workstations.

Crawford Digital in Atlanta used Discreet Logic's Inferno to composite and edit a spot for Celsius Films and the City Of Hope cancer center in Los Angeles (above).
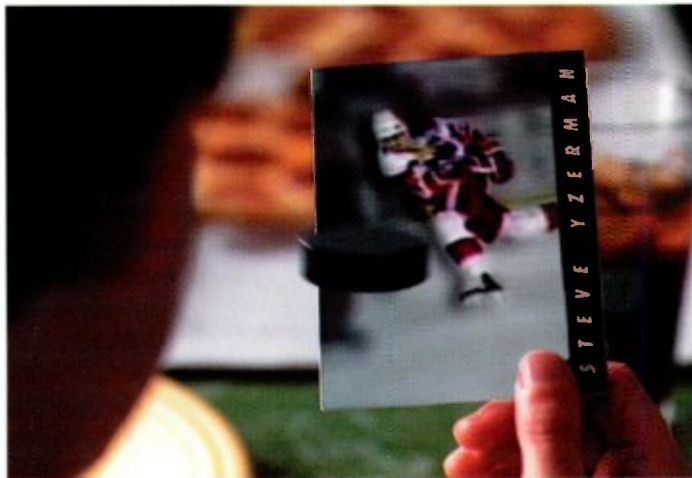
Right is a shot from an Upper Deck spot done by GTN in Detroit.

GTN Director of Post Production Gary Nichols says that four years ago SGI's open architecture was one of its most exciting qualities. But, he says, "that means very little to us because some of our SGI systems have become one-application machines. Once we installed Flame on our Onyx 1, we were booked every day and it's done nothing but Flame work since."

Nichols says that the pairing of Discreet Logic and SGI has been a hard combination to beat and it has stimulated other manufacturers to reevaluate their approach to the marketplace.

"Other companies have offered similar solutions to what we have now, but what Discreet and SGI have done is offer high-quality products at an affordable price, more opportunity for growth and a wide-open system running software that is not manufacturer dependent," he says. "The Discreet/SGI alliance has put pressure on other manufacturers to be more forward-looking while at the same time offering great hardware and software support."

As for HD work, Nichols says that, while GTN has had only a few inquiries, the company sees its initial HD market opportunities in "high-end national auto commercials and in trade show finishing for multiscreen video walls and other special events. And, he adds, "The eight-processor Onyx system running Discreet's Inferno combined with the Philips Spirit DataCine is an already established path to resolution-independent HD post."

GTN CEO Doug Cheek agrees. " Not only did we want to step up our effects capabilities with the eight-processor Inferno, we wanted complete resolution independence for the HD work ahead. At the moment there are no better tools to build that pathway than Fire and Inferno running on the SGI platform."

While some facilities complain that SGI considers its high-priced maintenance and upgrade contracts a profit center without apology, Nichols disagrees, saying, "No one can force you to upgrade your hardware and software, but if you want to run your Fire, Flame or Inferno room at peak performance over a period of years in a highly competitive environment, don't buy

the contract." he says. "That's not blackmail, that's a business decision. Just do the math. In the end, your facility is booked, you're offering your clients the best technology package available and it's a lot cheaper then buying a new box every year."

Down South

Crawford Digital, a division of Crawford Communication, the Atlanta-based post production and communications company, has been working with SGI for almost 10 years, according to Ron Heidt, Crawford Digital's visual effects supervisor. "We became involved in 3D work years ago using Alias Wavefront and got onboard with our first SGI Onyx1 running Discreet Logic's Flame about four years ago to do more EFX compositing and 2D work."

Heidt says that SGI's strengths can be summed up in one word: "bandwidth." He adds that SGI products "give us the ability to move files and render very quickly. Coupled with Discreet Logic's Inferno and Fire, SGI provides a resolution-independent solution that offers us a big advantage over our competition and sets us up for whatever might be just down the road.

Crawford sees SGI, Inferno and Fire as a unit, with Heidt describing the SGI/Discreet Logic solution as "a very open system. That means it provides plenty of options, both technical and creative, and options are what facilities and their clients are interested in today. Not being tied to any resolution limitations gives us the capability to finish in a completely high-resolution environment or at any resolution our clients might need."

He adds, "We can finish in film resolution and then down-convert to PAL or NTSC. That gives us lots of flexibility, and right now SGI is the only system that can work with the kind of high-resolution files we need."

Heidt says Discreet Logic "is a forward-looking company that has really broken new ground while being extremely open to working with us to provide the kind of products that will best serve the needs of our clients."

Dallas Heat

In Dallas, Video Post and Transfer, along with its broadcast design arm, HotHaus, are running Fire and Inferno on two SGI Onyx2s. Also in house are an Indigo2 Extreme and Indigo2 Hi Impact.

Curt Miller, director of post and graphics, says that the Discreet Logic/SGI combina-
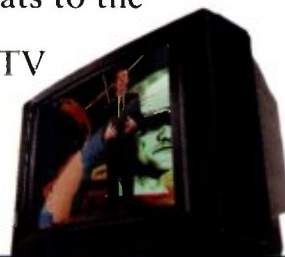
ON AIR

The new Origin
video computing
platform.
It's about time.
It's about

Introducing the Origin™ video computing platform from Silicon Graphics. It's time you had everything you wanted, everything you needed and everything your competitors didn't want you to have in one, rack-mountable, digital broadcast platform.

Time will tell which digital video formats become the standards of our industry, so the Origin platform supports them all. From the biggest uncompressed formats to the most multi-channel playout streams, from HDTV to low bit-rate MPEG, run them all today.

Time also changes everything, so we've

money.

given the Origin platform more scalability and flexibility than any dedicated box. Store months of on-line video, fast-network to any local desktop, run world-class applications, support standard automation systems and StudioCentral™ asset management environment. Want advanced graphics? Origin will let you add it. That's power and flexibility.

When you're ready to see what the best system in the industry can do, visit us on the Web. But don't wait too long. Time is money and of the two, we can only make you more of the latter.

SiliconGraphics

DTVPOST *for SGI*

tion provides the company with the ability the to do HD work efficiently and frees the entire operation from resolution concerns.

"We're prepared to finish to any resolution requirements a client might choose, which is especially important to HotHaus, our broadcast design division," he says.

Video Post & Transfer Animation and Systems Engineer Monty Shinn believes, "The relationship between SGI and Discreet is leading the way toward the natural flow of television post production. As our business model evolves, the multifunctional and open architecture solutions provided by Discreet Logic and SGI are preparing the industry to meet the needs of broadcasting's future."

As for problems with the high-powered SGI and Discreet packages, Shinn says they

are far and few between. "We have a few stand-alone boxes in house and have noticed that sometimes a dedicated box reacts more seamlessly than a open architecture system, but that's not much of a problem at all considering the level of performance."

Suissa of New York's Tape House Digital, a division of The Tape House Companies, says, "We've been on the SGI platform since we decided to go in the direction of film compositing and high-end graphics-driven advertising. We became very successful running Flame on Onyx1 and Flint on Indigo2 Extreme and have since built important relationships with both companies," he says.

Among the Discreet Logic products in play at Tape House are Inferno, Fire, Flint and Wire, for networking and infrastructure, and

Backdraft, an asset management and archiving system. The company's SGI lineup includes three Onyx1s, an Octane2, an Indigo2 Maximum Impact and an Indigo2 Extreme. "SGI technology enables to do the kind of work we do," Suissa reports. "The level of interactivity, response time and the speed of operations that we need requires the highest, most-advanced hardware, and today only SGI can support a multifeatured tool like Inferno."

Suissa recalls that, "From the very beginning the idea that we could be resolution independent and stay on the forefront of technology gave us confidence to expand our business and our world view. Knowing that we could invest in systems that would give us the power to do projects like feature-film compositing—projects that go beyond

the traditional D1 resolutions—was a tremendous boost to our confidence."

He says, "SGI-running Discreet Logic tools allow us to see all of our elements in context and to manipulate difficult composites and intricate effects while offering our clients the greatest number of resolution options."

Suissa, whose career includes stints as an editor, graphic artist and broadcast designer, says, "Among all the product environments I've worked in, the Discreet Logic/SGI environment is the most exciting because it has brought my work to a different level," says Suissa. "Before we required a complex combination of many different tools to realize relatively modest goals. With Discreet tools running on the SGI platform, we have everything in one monster application." ∎

In Brief: Discreet Logic's Product Lineup

In many post production circles Discreet Logic (soon to be known only as Discreet, pending the approval of Autodesk's acquisition and merger of Discreet Logic and Kinetix) is *the* name in post production tools. Its range of paint, compositing and editing tools are used on nearly every major Hollywood movie production that incorporates visual effects and many a television commercial has felt the artistic touch of Discreet Logic as well.

Discreet Logic's Flame is designed for digital artists who create visual effects for television broadcast, feature films and interactive media.

Flame makes use of an open architecture platform, and its toolset can be augmented by Sparks, Discreet Logic's third-party plug-ins. Users can complete effects and compositing in a true 3D space work environment offering infinite number of layers, each with independent control of key, color correction, tracking and axis attributes for in-context adjustment. A precision keyer offers variable edge treatment and softness with sub-pixel accurate gaussian blur. Shadow, reflection and transparency keying capability are also included.

Next is Effect, offering digital artists distinctive video compositing, clip animation and visual effects capabilities for the SGI O2. It offers complete resolution independence, compositing and animation capabilities, allowing digital artists to combine, enhance and modify video frames or frame sequences right on the desktop.

Fire offers an extensive online editing and finishing toolset designed for creative editing of noncompressed video, with full support for resolutions ranging from D1 to HDTV. It features a set of image enhancement, character generation and digital video effects tools all in a true 3D environment, processed at full-bandwidth RGB. This reduces the need to off-load graphics or effects work to dedicated stations.

Inferno helps artists create visual effects for feature films, commercials, music videos and broadcast programming. The system is well suited to film, HDTV and

A look at Effect in action (pictured above). At right is Fire, Discreet's online editing and finishing toolset.

Frost (bottom left) now has complete framestore integration with Discreet's other systems. Bottom right is Smoke.

commercials and features tools essential for work at higher bit-depth per color channel and spatial image resolution.

Discreet Logic's Smoke is a complete online, nonlinear editor for non-compressed moving pictures. It offers the flexibility to grow on a modular basis and is designed for post-production facilities offering commercials, infomercials, industrial videos for education and training and for broadcasters requiring versioning of promos, episodic television, documentaries and sports news (where speed and reliability is imperative). As a replacement for linear edit bays, Smoke offers an extensive

editing toolset together with an intuitive user interface, full bandwidth RGB image quality and all the productivity benefits of random access.

Discreet Logic has also released Frost 2.1. The new version represents a significant advance in maximizing the workflow of artists and graphic departments. Features include several user interface enhancements, complete framestore integration with Discreet Logic's advanced systems editing and effects product lines, graphical texture browsers, and increased performance of the Frost real-time rendering engine. The Frost system is compatible

with various Flame effects systems and Smoke and Fire edit suites.

Flint is the industry's only desktop production system optimized for the Indigo2 workstation. Flint is format-independent and can be used as a standalone finishing tool. It supports standard EDLs, importing of 3D models, and D1 I/O. Flint offers digital artists all of the tools and uncompressed image quality of Flame, a leading online system for special effects and compositing.

Contact Discreet Logic at www.discreet.com or call (514) 393-1616.

∎ **For more information circle Reader Service #224**

DIGITAL BROADCASTING
IS COMING ON FAST.
are you ready?

The AvidNews Environment is.

When top broadcasters like CNN, Tele-Metropole and the Belo Group prepared themselves for the digital broadcasting revolution, they relied on the AvidNews™ Environment to get them there. With high-caliber components like video editing and playback, media workgroup and newsroom computing systems, it's no wonder more than 1,100 broadcast sites from around the world rely on the expertise and experience of Avid to bring them into the digital broadcasting era. That's because, over the past 10 years, we've asked the right questions, and have developed digital broadcasting tools built with the specific needs of broadcasters in mind. Tools that are powerful, easy-to-use, and work as well on their own or, as part of a complete solution. When it comes to digital broadcasting, the AvidNews Environment is ready for tomorrow—today. Call us now and you will be too.

Don't settle.

Call 800 949 AVID
www.avid.com/broadcast

Avid
tools for storytellers™

More Information Circle 100

Priority Code: ANDTV698

DTVPOST *for* SGI

SGI ROUNDUP

Alias/Wavefront

Maya is Alias/Wavefront's 3D software for character animation and visual effects. Designed with an advanced architecture to deliver fast speed, productivity gains and a deep set of tools, Maya can be easily customized to fit specific production needs. Features

include node-based architecture; a full complement of NURBS and polygon modeling tools with emphasis on seamless character construction; tools for keyframe and procedural animation; deep functionality for creating and animating digital characters; and film-quality rendered images. There are also a number of modules for Maya. They include:

Maya Artisan, a modeling and animation module whose interface gives users the creative control and intuitiveness of traditional artists' brushes and sculpting tools. Features include a sculpt surfaces tool, a paint select CVs tool, and a MEL script paint tool that allows users to write their own MEL scripts and use Maya Artisan to paint on the results.

Maya F/X adds tightly integrated soft-body dynamics and particle to Maya for animation and effects, easily simulating smoke, fire, clouds, sparklers, liquid and other classic particle effects.

Maya PowerModeler gives artists flexibility and control when building sophisticated models and makes use of advanced modeling methods and booleans.

And finally, Maya Live makes realistic mixing of graphics with live action scenes fast, easy and accurate.

Also from Alias/Wavefront is PowerAnimator and StudioPaint, offering users a choice of software solutions. PowerAnimator 9 gives customers the option to migrate to Maya when it best meets their production schedule. StudioPaint 9 features compatibility with Maya and a new Shape tool for creating and editing Bezier curves and a dynamic texture list.

Alias/Wavefront's Zap!iT 2.0 is the lat-

est version of its realtime video and audio software. It includes the option to preview high definition HD720p images with audio in real time on a standard Silicon Graphics O2 workstation and support for frame-accurate remote control of most digital and analog video tape recorders. *Contact Alias at www.aw.sgi.com or call (800) 447-2542.*

■ **For more information circle Reader Service #225**

Avid

Avid Technology's Elastic Reality is a special effects system that combines advanced warping and morphing technology with sophisticated 2D animation, color correction, matte generation and compositing tools.

Avid Technology's Matador is one of the most popular open-platform paint applications for the television, broadcast and film markets, according to the company. It combines painting, special effects, rotoscoping, tracking and multi-layered 2D animation into one resolution-independent environment.

Media Illusion is an advanced digital nonlinear compositing solution for creating both subtle and dramatic effects. It merges paint, compositing, image manipulation and special effects into one artistic domain and is a powerful

companion to Avid's editing systems. *Contact Avid Technology at www.avid.com or call (800) 989-2843.*

■ **For more information circle Reader Service #226**

Chyron

Chyron's, Liberty Paint and Animation Design software offers digital artists freedom to stretch their imagination and maximize their creative potential. Liberty, operating on the Silicon Graphics platform, allows users to create with higher speed and resolution from its 32- or 64-bit canvasses. Other features include paint and animation, motion tracking, a graphical browser, enhanced rotoscoping, real-time video streaming, 3D pasting and a wider range of creative tools. *Contact Chyron at www.chyron.com or call (516) 845-2000.*

■ **For more information circle Reader Service #227**

Comunicacion Integral Consultores

Jaleo for O2 offers cost-effective, uncompressed editing and compositing. Running on the Silicon Graphics O2 line of workstations, it brings realtime capture, playout and preview with uncompressed video to your desktop. And the built in hardware acceleration features of the O2 workstation speed up the rendering of various effects including the 3D DVE. Comunicacion Integral Consultores has also released Jaleo for Octane. It offers tight integration of fully featured editing with high-end compositing, realtime processing of dissolves and wipes, the ability to add color correction or perform a 2D/3D DVE in realtime, effects with uncompressed D1 quality material and other features. *Contact Comunicacion Integral Consultores at www.jaleo.com or call (404) 504-8460.*

■ **For more information circle Reader Service #228**

CWS/LightningBIRD

The LightningBIRD Desktop NLE is a full-featured UNIX workstation-based video editing application that offers a cost effective alternative to hardware-specific dedicated video editing suites. It is hosted on the O2 workstation from Silicon Graphics, and utilizes standard hardware components. Other features include 10,000 video clips in four clip display regions and two timelines; real-time record and playback; clip and frame cut-in cut-out and more. *Contact CWS/LightningBIRD at www.cws.co.za.lb.*

■ **For more information circle Reader Service #229**

Evolving Video

Antero Ascent is an on-air graphics solution combining all the features of Antero with powerful graphics automation tools to create Antero Ascent. Three key areas developed specifically for broadcast and cable include easy to design, sophisticated templates, multi-layered effects and versatile external control for graphics automation. Features that benefit all users include DVE-style motion, 3D object import tools, audio and video clip playback and enhanced effects capability. *Contact Evolving Video at www.evt.com or call (303) 465-1556.*

■ **For more information circle Reader Service #230**

Interactive Effects

Interactive Effects has released version 3.0 of Amazon Paint, its 2D and 3D paint software. In addition to a complete redesign of the interface, Interactive Effects has added such features as the ability to assign image sequences to drawing layers. The company has also launched Projectile Paint, a new toolset
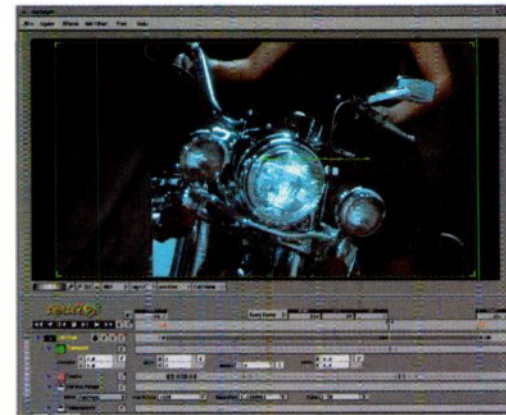
for Amazon 3D Paint, which solves the common problem of stretching and surface-to-surface continuity of brush strokes. The company's release of Piranha, its film and HDTV compositing software offers direct-from-disk realtime film resolution playback. *Contact Interactive Effects, Inc., at (714) 247-1200, or at www.ifx.com.*

■ **For more information circle Reader Service #231**

Linker Systems, Inc.

The Animation Stand is an advanced cel-based animation system with an interface natural to the artist. Cel animators can draw, ink-and-paint, auto-paint cels, animate, create special effects, edit multiple audio tracks and output to film, video, HDTV and CD-ROM, with full frame accuracy, at any display resolution. It is compatible with all display hardware. Users can create an animatic or pencil test at any point and can work with unlimited layers and a virtually unlimited array of colors. *Contact Linker Systems at www. linker.com or call (714) 552-1904.*

■ **For more information circle Reader Service #232**

MediaPEGS

MediaPEGS has released PEGS, a 2D animation production system running on Silicon Graphics stations. PEGS software digitizes the entire post-paper animation production process from scanning to recording. A professional, production-oriented tool, PEGS is a dedicated software, intended specifically for multi-media images, animated series, commercials and feature films. PEGS' success has come from its familiar look to users trained in traditional cartoon animation formats, making it easily accessible to industry artists and personnel. *Contact MediaPEGS at www.mediapegs.com or call 331-53-11-1010.*

■ **For more information circle Reader Service #233**

Metacreations

Kai's Power Tools (KPT) 3.0 from Metacreations allows users to create stunning texture backgrounds, gradients with hundreds of colors, 3D text effects, Web buttons and famous effects like Page Curl. Interface controls, built-in channel operations, visual presets, real

DTVPOST for SGI

SGI ROUNDUP

time previews and 36 levels of undo let users explore, design and easily apply imaging in seconds. KPT Texture Explorer lets you zoom and pan infinitely through your textures, as well as enhance them with built-in color convolution control. *Contact Metacreations at www.metatools.com or (800) 459-5188.*

■ **For more information circle Reader Service #234**

MTI

MTI's IntelliDeck software replaces standalone hardware used for image processing and standards conversion. It offers a faster, more flexible conversion and delivers higher quality pictures at a lower cost. The system implements universal storage formats, outputs any standard format and down-converts from HDTV to SDTV. *Contact MTI at www.pvp-burbank.com or call (818) 562-6544.*

■ **For more information circle Reader Service #235**

MultiGen

Creator is the first complete interactive realtime 3D modeling and assembly system for game developers, realtime 3D artists or visual simulation developers. Available for Silicon Graphics workstations, Creator features a WYSIWYG user interface and hierarchical database structure that gives the artist total control over the look and feel of the game.

MultiGen Pro, a comprehensive, integrated software package, is the industry's leading realtime 3D modeling and database generation system. Powerful features and options include automated development of terrain, culture and roads. *Contact MultiGen at www.multigen.com or call (408) 261-4100.*

■ **For more information circle Reader Service #236**

NewTek

An enhanced version of NewTek's popular 3D animation software, LightWave 3D 5.6 is available free to registered users of LightWave 3D 5.5. The most significant addition to the 5.6 version is HyperVoxels, NewTek's breakthrough rendering technology for greatly simplifying the creation of organic effects and naturally flowing phenomena, from viscous fluids to extremely detailed rocky surfaces. *Contact NewTek at (210) 370-8000 or at www.newtek.com.*

■ **For more information circle Reader Service #237**

Nothing Real

Shake is an open-system compositing software that's been used in the creation of feature films including *An American Werewolf in Paris, Armageddon,* and *Contact.* Shake provides a resolution-independent and scalable compositing

solution that enables dramatic improvements in image manipulation in near real-time. *Contact Nothing Real at www.nothingreal.com or at (310) 664-6152.*

■ **For more information circle Reader Service #238**

Panoptica

Panoptica's Harlequin provides users with technology that processes entire film clips. Make one edit to a clean scene and Panoptica regenerates the whole clip. With Panoptica, users can cut compositing time from months to weeks, from weeks to days, and enjoy creative freedom without breaking the budget. *For more information, please e-mail to: web@harlequin.com.*

■ **For more information circle Reader Service #239**

Photron USA

Primatte is a chromakeying system that features a unique method of calculating key values. The product also offers superb color processing on the soft-key portions of the image, clean and precise blue-spill removal functions and easy set-up and operation. Primatte can take an actress photographed in a small studio to the top of the highest mountain, to the bottom of the ocean, or even to another planet. *For more information about Primatte, contact the company at www.photron.com or call (408) 261-3613.*

■ **For more information circle Reader Service #240**

Science.D.Visions

3D-Equalizer V2 (film version), which uses SGI's ImageVision library is able to load image-subregions, instead of entire images, into memory. As a result, the speed of the workflow is dramatically increased. The motion tracking of 2K images, for instance, is up to six times faster. The ImageVision library can be extended easily by everyone, so that 3D-Equalizer is able to import any additional image format. Calculating the camera motion path of a 300-frame project with 50 points is done up to seven times faster. *For more information, visit the web site at www.sci-d-vis.com or call (415) 332-7070.*

■ **For more information circle Reader Service #241**

Silicon Grail

Chalice offers 2D compositing and image adjustment that is powerful and extensible, yet easy-to-use and affordable. Designed for digital effects professionals in the film industry, Chalice offers an extensive set of tools for multilayer compositing, image tracking, color adjustment and much more. The interactive interface uses a data flow paradigm that is easy to learn, yet sets no upper limits on complexity or creativity. This

procedural approach enables changes to be made easily, even at the last minute. *Contact the company at www.sgrail.com or call (323) 871-9100.*

■ **For more information circle Reader Service #242**

SOFTIMAGE

SOFTIMAGE DS is a nonlinear production system for creating, editing and

finishing videos such as commercials, music videos and TV programs. Using non-compressed and compressed quality images, SOFTIMAGE DS features customizable tools, providing professional nonlinear editing, compositing, paint, digital audio editing, character generation, special effects, image treatment and project management.

The latest release of DS, the version 2.0 software developers kit (SDK), is an advanced toolkit for building cutting-edge effects plug-ins for SOFTIMAGE DS 2.0. Using the open architecture of SOFTIMAGE DS, the SDK provides access to the interface and programming tools used by SOFTIMAGE DS developers and allows third-party programmers to create plug-ins that integrate seamlessly into the SOFTIMAGE DS environment.

The latest version of Toonz, 4.2, is a digital ink and paint program that allows users to capture the emotive quality of hand-drawn art and then fast forward through tedious steps like ink and paint, compositing and special effects.

Also from SOFTIMAGE is Eddie, a single system in which users can composite, color correct, paint, morph, add titles, create effects and animate virtually any parameter in a spot.

In addition, Softimage has released version 3.8 of its 3D modeling, animation and rendering software package, Softimage 3D. Features include an animation sequencer, enhanced character skinning tools and audio support.

Contact Softimage at www.softimage.com or call (800) 447-2542.

■ **For more information circle Reader Service #243**

TechImage, Ltd.

ArtiFace, lets professional digital

artists create vivid 3D facial animations without the cumbersome steps required in traditional animation key-framing processes. ArtiFace captures the facial movements of a human actor in 2D video form, extracts 3D motion data using sophisticated image analysis techniques and transfers the movements accurately and efficiently to any 3D model. In addition, ArtiFace achieves exact lip synching, in any language, automatically. *Contact TechImage at www.techimage.co.il or at 972-3-673-4591.*

■ **For more information circle Reader Service #244**

Toon Boom

TicTacToon from Toon Boom blends the tradition, technology and process of animation production while preserving the spontaneity that makes animation a craft. The system offers another dimension to drawing images—it is the only paperless vector-based 2D animation system available. Designed to be a true animation tool, it enables animators to

draw directly into the system with full pen and tablet control and manipulate images without creative constraints. *Contact Toon Boom at www.toonboom.com/home.html or call (818) 954-8666.*

■ **For more information circle Reader Service #245**

Xaos Tools'

Pandemonium is an image processing engine for design professionals using SGI workstations. Version 2.8 features 54 integrated image processing applications that include warps, trails, smoke, brushing effects and transitions. More than 1,000 preset effects allow users to find a desired look quickly and easily. Precision controls within each application offer unlimited flexibility and logical controls get users up to speed quickly.

Xaos Tools' nTITLE 2.3 is the only 2D typography tool for film and video professionals using SGI platforms. Easy to use, this version offers the power to create rolls, crawls or keyframe animations. Other features include 30 high-quality, anti-aliased fonts. *Contact Xaos Tools at (415) 743-9133 or visit www.xaostools.com.*

■ **For more information circle Reader Service #246**

THINK
outside
THE BOX

For Hotel Movie Systems

For Video-On-Demand

For Ad Insertion

For Broadband Operators

For Broadcasters

When you evaluate video servers, look beyond the box. At SeaChange we've developed breakthrough software and networking technologies that use video servers as only part of the solution. We provide systems. Complete, cost-effective digital video systems. They work in your headend or station and are designed to improve your television operation. And create new opportunities.

Maybe that's why there are more SeaChange MPEG-2 video server systems, delivering more channels than any other. So when you think about video servers, think outside the box. Call SeaChange.

SeaChange
INTERNATIONAL

SeaChange International, Inc. **www.schange.com** 124 Acton Street, Maynard, MA 01754 phone: 1-978-897-0100 fax: 1-978-897-0132
MediaCluster is a trademark of SeaChange International, Inc.

More Information Circle 111

CGs Get into Character for DTV Applications

Products begin to hit shelves for professionals looking to bring character generation into HDTV material

By Edmond M. Rosenthal

Over recent years, flexibility has become a hallmark of character generators. They've become significantly more integrated with other equipment, such as still stores, DVEs, compositing systems and nonlinear editing systems. Users have found it easy to integrate them on a networking basis. That flexibility, though, has been somewhat slower in coming in the DTV era, but coming it is.

With Chyron being the first CG maker to provide high-definition capability, others are looking in that direction.

For example, Kevin Prince, graphics business manager at Pinnacle Systems, points out that all of his company's CG products are resolution independent, so the next step is to create the hardware for the I/Os. He foresees users keeping their current CGs and upgrading the I/Os. While Pinnacle can now provide the I/Os for 480p, he notes, it cannot yet provide them for 720p or 1080i.

"We'll definitely provide that in the next 12 months," he discloses. "It's just a matter of having enough engineering staff to design the I/O cards."

For Inscriber Technology, reliance on a separate video-frame buffer for its software is the current obstacle. Sales Support Engineer Joel St. Denis notes, "We support 16:9 in terms of our software, but our software can't be used for this application because there is no third-party support for 16:9. It's up to the frame buffer to supply digital output, but we pass images to the frame buffer that are digital quality."

Chyron introduced its HDTV capability at the last NAB exhibition and is already starting to ship its new Duet video processing engine. Roy Agneta, executive vice president, says this hardware platform becomes a CG when the CG application is added. It's capable of handling any of the 18 ATSC resolutions, he adds, by changing the video I/O module. Multiple graphics pipelines are combined within the system to handle the higher bandwidth requirements.

For video-based projects, Chyron has created video-oriented cards for 1080i, 720p and 480i. For film-originated material it has a 24-field card in 1080i. As to the latter, Agneta comments, "With Duet, we're looking at the use of electronic character generation for film work because that industry is still back in the film-based methods of the '40s. I was at Paramount two or three years ago, and they were still using big mechanical devices for credits and titles."

If there's a demand for any of the remaining ATSC-approved formats, he notes, they can be handled with just a software configuration file in conjunction with one of the four cards currently offered. In a standard-definition configuration, with two channels of ITU-656, the Duet lists at $34,900. A single-channel HD version costs $64,900 and a dual-channel version is $89,800.

Agneta points out that Duet, a Windows

(Right) The Videonics PowerScript Studio 4000 is available in two models.

(Below) The Chyron Infinit character generator remains the standard by which all other character generators are judged in many circles, particularly the live news or sports producting environment.

NT-based system, is 3D capable and has an open interface so that third-party developers can create applications for it. More than a dozen have done so. This includes newsroom computer companies, which have created applications for news, subtitling and specialized sports including scoreboarding and school-closing displays.

Another step forward that is present in Duet, he reports, is the decoupling of composition from playback. He explains, "Now you don't have to actually sit in front of an expensive machine but only have to sit in front of a PC to do composition. This dedicates your character generator to on-air playback."

One of the first production and post production facilities to move heavily into HDTV, American Production Services of Seattle was recently awaiting delivery on a Duet order. Barry Ballanger, director of engineering, says it was to go into an edit bay for text titling and some minor paintwork.

"We're basically a Chyron house," Ballanger remarks. "We have six Maxes in CCIR 601, and we wanted to maintain compatibility with the networks and TV stations. Chyron has been their standard for years. Duet is pretty compatible with our Infinits and Maxes, and it's attractive to have the open platform for other software packages running on it."

Chyron's Infinit family has the capability built into its software for 16:9 displays at 480i, Agneta points out. A recent addition to this product is an internal clip player capable of playing back full-motion video with key.

Integration with other equipment has

been a major thrust at Pinnacle Systems, according to Prince. He asserts, "Because we're getting more involved with computer hardware, we're also getting more involved with directly integrating with nonlinear editing systems. We've become a plug-in to those products."

With changes in technology, he says, Pinnacle's products have greatly enhanced their special-effects capabilities, including complex 3-D motion effects that earlier had been possible only with previous rendering.

"If you're working with a Quantel Hal," Prince comments, "you're spending a lot of time in the post-production environment, and once your work is created, it's fixed. This means that if you're doing elections, news or sports, your effects are old and only of interstitial use. Our environment is a live, on-air environment where you can create instant effects."

A new Pinnacle offering is FX Deko, selling for some $40,000 and set to ship by early October. To the current Deko operating systems, it adds 3-D motion and 3-D character effects on a per-character or per-object basis. For example, a page turn isn't restricted to the entire page but can be done with individual characters or words.

Also inherent in FX Deko is a new control system that allows creation of complex motion effects for characters while hooking up to a database or automation system to automatically format the effects. Prince says FX Deko automatically understands the number of characters in a word and creates the correct effect no matter how many characters or words are thrown at the CG.

Prince comments, "The art director can now create the look he wants without having to worry about what information comes down through the automation system."

At NAB, Pinnacle introduced some new software options for the Deko product range. Sportsware allows putting a partial graphic on-air so that the graphic can be

built at the time of going to air. Typical additions are scores and names. For example, a golf graphic might be set for the 15th hole, with the name of the golfer and score added later as separate elements. This option lists for just under $1,000.

Moving in on Chyron, Pinnacle has introduced another software option called Chyron File Read. Prince says this provides the ability to read Chyron image and message files, edit their graphics and take them to air. Priced at $1,500, it also allows browsing Chyron's custom files and printing them out.

Inscriber's MVP

The latest product out of Inscriber Technology is the VMP 4.0 character generator with a suggested retail price of $6,000. Aimed at broadcasters and post production facilities, it combines character generation with an image still store, a paint package and the new CG Xtreme option, which allows animation of 2D objects and titles in three-dimensional space.

"All of these applications are integrated into one program so that you can easily drag and drop titles from the character generator to the still store," says St. Denis.

As an add-on to the existing CG Supreme software, CG Xtreme costs $1,200. CG Supreme is aimed at the broadcast linear market and allows direct takes over video in a live environment so that news personnel can drop in live titles on cue. It comes with a sequencing module that allows setting up a series of titles and playing them back using different trigger modes. Transitions can be added between each image. CG Supreme lists at $2,495.

Inscriber's CG product for nonlinear system is CG FeaturePak, priced at $995 and plugging into such systems as Adobe Premiere and Avid MCExpress NT. Many nonlinear systems now come bundled with this software, St. Denis notes. Recent upgrades to FeaturePak include texture mapping, text rotation, a logo compose module, a more friendly roll-and-crawl interface and international language support. For animating 2D titles in three dimensional space, the add-on for this software is MotionPak, costing $500.

FeaturePak requires a nonlinear editor while CG Supreme is a standalone CG requiring a Windows NT- or 95-based computer and a video frame buffer. St. Denis says a forthcoming offering is video clip playback through the broadcast CGs. ∎

CHARACTER GENERATOR ROUNDUP

Adtec

The Telecaster 1 offers sophisticated effects found in high-end CGs, blending graphics, colors, a free-format canvas, edit commands and page transitions and crawl messages. Users can choose from 112 CG pages and seven different crawl messages for programming. A template library provides another 10 per-made pages and a demo mode has 11 additional pages. An optional expansion board adds a temperature sensor, RS-232 serial port and expansion port. The RS-232 serial port provides modem access. *Contact Adtec at (615) 256-6619 or visit www.adtecinc.com*

AVS Graphics

The ManuScript character generator lineup includes the Elite and the Junior. Composite and component inputs are available for both, as well as a choice in the resolution of text—9nS on the Elite and 18nS on the Junior. Both come with an internal linear keyer standard and offer realtime operation. ManuScript has a 16.7 million colors and any part of a chracter style or page can be colored independently. All the typefaces support 44 Latin-based languages.

Burst

The MCG-3 color micro character generator is a genlockable unit that can display up to 240 characters per page. There are 16 character sizes and built-in menus, help screens and self-testing. Text input is performed with front panel push buttons in "letter up/letter down" and "cursor left/cursor right" fashion.

The MCG-2 micro character generator is a genlockable CG that overlays basic black and white characters with a selectable black and white background. Intensity is independently adjustable from white through black. It can display up to 180 characters at once and there are 16 character sizes available. *Contact Burst Electronics at (505) 898-1455 or visit www.burstelectronics.com.*

Chyron

The Infinit character generator offers two or three video channels with key, single or dual user, analog and digital output, 525 or 625 system operation and 16:9 or 4:3 aspect ratios. The third chan-

nel output provides an independent program with key in addition to the standard two channels.

Options include: Extended effects frame buffers for foreground and background compositing and effects, Transform II with enhanced, full-frame graphic animations, video clips realtime capture and playback and Imagestore. International language support has also been expanded with the addition of Chinese, Japanese, Korean, Thai, Hindi and Arabic.

The Max character generator offers many of the Infinit options and can be configured for most broadcast or post-production applications. In addition, extra expansion slots allow users to choose from a full range of options and accessories. The Max graphics system begins as a single-channel, single-user system. A complete second output channel with key can be added with composite, component or serial digital video.

The Maxine, Chyron's compact, two rack unit character generator, is compatible with the industry standard Infinit and Max graphics systems and shares many of the same features and options. *Contact Chyron at (516) 845-2019 or visit www.chyron.com.*

Inscriber

Inscriber provides impressive typographic control over each character, allowing every character to be sized, compressed, expanded, or slanted on the fly. Every character is always fully anti-aliased and Inscriber text can be sized from 10 to 999 scan lines, can be compressed to as little as 35% or expanded to as much as 335%, can be slanted from -45 degrees to 45 degrees and can be made into small caps. Character kerning and leading are also fully controllable with Inscriber.

CG Supreme also provides a broadcast-ready environment, as well as a frame grab facility and logo editor. For on-line broadcast operation, CG

Supreme utilizes video hardware from desktop broadcast vendors such as Interlace, Matrox, and Truevision to offer up to three NTSC or PAL on-line video channels with composite, RGB, Y/C, Betacam and D1 with linear key available for video input, output and preview.

CG Supreme can operate in Preview/Program or Multiple-channel mode with random access or sequenced presentation. All internal software processing is performed at full resolution 32 bits-per-pixel (4:4:4:4) and with quality text and graphics scaling and rise-time filtering. CG Supreme accommodates both 4:3 and 16:9 output and thumbnail display.

Contact Inscriber at (416) 391-4500 or visit www.inscriber.com.

Pinnacle Systems

FX Deko, introduced at IBC, is Pinnacle Systems most advanced character generator to date, offering render-free effects, looks and character animations in 3D space for realtime needs. It features 10-bit, 4:4:4 operation for the highest level of effects performance, key output and video quality. FXDeko is resolution independent, and can support most video formats including NTSC, PAL and both 16x9 and 4x3 DTV needs. It is available in two versions: as a complete hardware/software solution, or as a software package that runs with standard Open GL accelerator cards. The software version is available as an add-on option for the Company's PostDeko. Any image created on FX Deko is easily
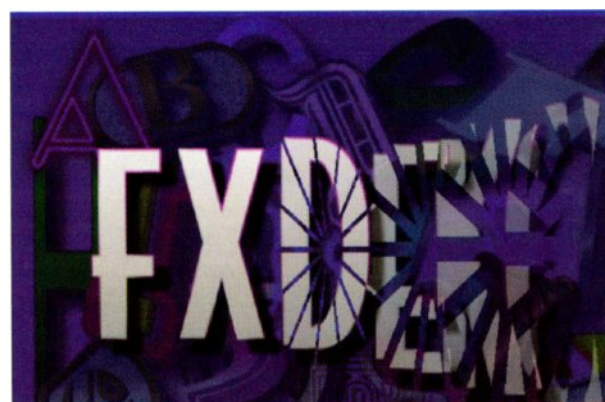
transferred to Pinnacle Systems Lightning or DVEXtreme.

At NAB Pinnacle Systems rolled out several new options for the company's Deko character generators, which are BroadNeT compliant and designed to enhance the workflow of content creation for on-air broadcast. New capabilities, part of Deko Version 3.1, enhance productivity and include an option which allows users to read Chyron files.

Also available is Deko SportsWare, allowing the easy insertion of text for on-air situations. SportsWare lets users "POP" a text selection onto an existing CG page.

The StillDeko option includes Pinna-

cle's Lightning Browse software that enables users to access the powerful Lightning Browse image management tools to store and retrieve CG files.

Contact Pinnacle Systems at (800) 4PINNACLE or visit www.pinnaclesys.com.

Scitex Digital Video

The Abekas Texus character generator allows the user to combine up to six attributes simultaneously per character. A color ramp allows for ramping between as many as 16 different colors on the character face, each with variable transparency.

Texus is based on the industry standard X Windows and Motif platforms, giving it the familiar look and feel of the word processing and graphics applications that most people are used to using. Users can also run rolls and crawls in both directions, with acceleration or deceleration as well as pop, dissolve or wipe on single characters or groups of characters. And Texus Live Video Capture, allows users to grab a field or frame off any incoming video and use this as a logo or full size background.

Texus also allows key frames to animate the position, color and transparency of any on screen text including logos. Users can animate single characters or character groups. *Contact Scitex Digital Video at (888) 846-7017 or visit www.scitexdv.com.*

Videonics

PowerScript Studio 4000 has 10-bit 4:2:2 digital video quality at 5.5 MHz bandwidth and version 4.0 software, PowerScript Studio 4000 gives the user over a million colors, anti-aliased titles and graphics with an on-air look.

Now bundled with PowerScript Communicator, PowerScript Studio 4000 CGs are available in two models: Model PS-4000 Studio has composite and Y/C video inputs and outputs Model PS-4000 Studio Component offers analog component inputs and outputs, in addition to composite and Y/C. Both models are available in PAL and NTSC.

Other features include variable width outlines and drop shadows, with variable shadow spacing and transparency. Users can justify text (left, right, and center), mix fonts on one line, wrap words or perform enhanced roll and crawl. *Contact Videonics at (408) 866-8300 or visit www.videonics.com.*

Digital TV is hot stuff. And getting hotter every day. See what's new and what's coming in digital TV at the Consumer Electronics Show, the world's largest and most comprehensive consumer technology event. Whether your thing is digital TV or something else, don't miss this one.

Because digital TV is clearly here.

EXCITE

World Radio History

THE DAWN OF DIGITAL
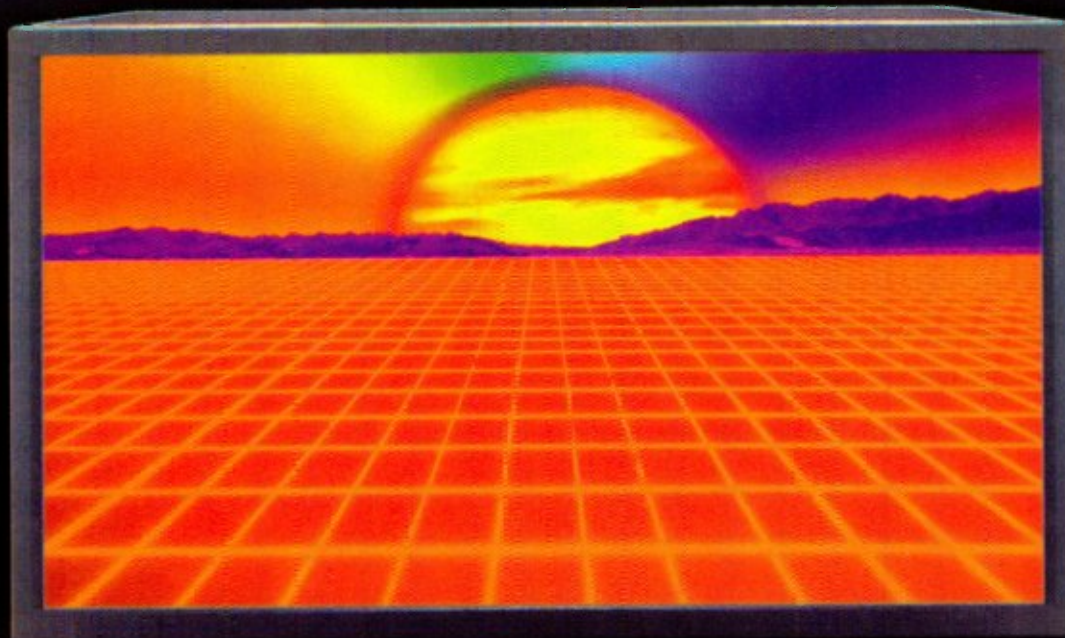
MAKE A DATE WITH HISTORY

On November 16, 1998,

government and industry luminaries will meet in Washington, D.C. to usher in the new era of digital television. And you can be part of this historic event.

Featuring an industry summit, product demonstrations, and the historic "Throwing Of The Switch" THE DAWN OF DIGITAL will stand as the defining moment for the new wave of digital communications.

On behalf of television and consumer electronic company sponsors, the event is being produced by *Digital Television, Broadcasting & Cable* and *TWICE (This Week in Consumer Electronics)*.

A limited number of sponsorships are still available. For more information call 212.337.7053.

Mark your calendars and make plans to attend this monumental event. Then get ready to make history!

THE DAWN OF DIGITAL
November 16, 1998
Ronald Reagan International Trade Center
Washington, D.C.

Product Review

Scitex Sphere Version 3 Software

Scitex Digital Video has introduced Sphere Version 3 software for its StrataSphere, VideoSphere and DigiSphere workstations. Key features of Sphere Version 3 software include: Clipsheet project organizer with sort, find and media file locator,

audio waveform level indication with enhanced digital scrub on clipsheets and tracksheets, extensive drag and drop between and within clipsheets and tracksheets, intelligent project archiving with AIT data tapes and 999 event multi-layer undo to complement Unity undo feature. Enhanced video finishing tools include a video Color Picker which allows an operator to pick and match any desired color directly from the program video monitor, then assign the color to a wipe border, key border or digital effect. *Contact Scitex Digital Video at (650) 369-5111 or visit www.scitexdv.com*

■ **For more information circle Reader Service #260**

NDS ENG Links

NDS now offers the NDS Digital Terrestrial Link (DTL) system employing OFDM digital modulation to eliminate multipathing and ghosting problems. NDS says that the link is a new solution to transmit live material over terrestrial links from urban areas because the demand for higher-quality, reliable outside broadcast links coupled with the regulatory move in many countries to reassign the 2.5 GHz frequencies has resulted in a spectrum crunch. NDS also believes that MPEG-2 digital transmissions can provide more efficient transmission of video but when used with a single carrier modulation scheme, such as QPSK or QAM, it is no more robust than analog in bad multipath conditions—thus OFDM. *Contact NDS at (714) 725-2548 or visit www.ndsworld.com.*

■ **For more information circle Reader Service #261**

Divicom InterSect

InterSect gives cable operators the ability to deliver reliable TCP/IP traffic to set-top boxes. The protocol is currently being used to deliver content on the Internet and can be used to deliver interactive applications directly to the TV. It's a highly reliable rack-mounted unit capable of connecting a hybrid fiber coax (HFC) network to an intranet and it can provide one way or bi-directional out-of-band capabilities. Multiple InterSect devices can be managed cen-

trally or distributed via the InterSect Manager using standards-based management protocols such as SNMP. One InterSect device can support thousands of set-top boxes giving the cable operator the ability to easily provide support from a single neighborhood to a complete city. *Contact DiviCom at (408) 944-6700 or visit www.divi.com.*

■ **For more information circle Reader Service #262**

Vinten OB Quattro

The OB Quattro is a versatile and portable version of the four-stage Studio Quattro pedestal, specifically designed for the needs of outside broadcast and field production. It has an "unskirted" base to reduce its weight by 115kg while maintaining its four-stage column rigidity and stability. Its height range capabilities extend from 49.8 cm to 149.8 cm with a

recommended payload capacity of 100kg. Large rubber wheels and adjustable cable guards have been added, enabling the Quattro to be operated on location and on a variety of floor surfaces. Other changes include the adoption of a smaller steering ring to enable the unit to be moved through narrow doorways, together with integral carrying handles incorporated into the base for easier handling and transportation purposes. *Contact Vinten at (888) 2VINTEN or visit www.vinten.com.*

■ **For more information circle Reader Service #263**

Xyratex Fibre Channel Protocol Analyzer Plus

Xyratex introduced its second-generation Fibre Channel Protocol Analyzer Plus (PA+) at IBC. The PA+ is designed for developers who want to build and fine tune Fibre Channel products. It provides functions for realtime capture and monitor, offline viewing and analysis of traffic at gigabit speeds for arbitrated loop, point-to-point and fabric topologies. It also offers flexibility and control in the use of high-speed data capture and streaming, decoding of standard protocols like IP, TCP, SCSI-2 and 3 and analysis of complex data streams. It can also decode and display IP.

The PA+ includes a full-sized PCI card, two DB-9 electrical interfaces and Windows 95-based XyraVIEW Pro software and can be integrated into any desktop PC or portable computer chassis for on-site testing. The interface easily converts to optical using a standard Media Interface Adapter (MIA). The hardware features a user-configurable 12MB deep trace buffer memory capable of capturing data at full gigabit speeds. With an optional buffer expansion card the total memory capacity can be increased to 24 MB. *Contact Xyratex at (949) 476-1016 or visit www.xyratex.com.*

■ **For more information circle Reader Service #2064**

Puffin Designs Commotion LE

Commotion LE is a new paint and effects tool that includes many of the features found in the Commotion package, but it leaves a few of them on the cutting room floor to allow the LE package to hit a price point below $800. It brings realtime paint over time and full-motion D-1 resolution playback and effects capabilities to the desktop. Features include full-resolution playback for instant feedback on effects,

professional brushes with a realtime brush maker, SuperClone brush to clone pixels from any frame or section of a frame and video field-based painting with the click of a button. AutoPaint for WriteOn and Wiggle effects and Filter Effect including image adjustment, keys, blurs, sharpen, noise and more are also included. *Contact Puffin Designs at (415) 331-4560 or visit www.puffindesigns.com.*

■ **For more information circle Reader Service #265**

TV/COM Domain Management System

TV/COM's Domain Management System (DMS) provides realtime network monitoring and control of broadcast equipment. It serves as the central point for the system

provider to define configurations and monitor the network. One of the challenges facing facilities is integrating equipment from several vendors, but TV/COM's DMS unlocks interoperability issues and provides the ability to control and manage a variety of equipment in an on-air, mission-critical environment. It provides the potential for the end-user to customize a system to gain maximum flexibility. *Contact TV/COM at (619) 618-3500.*

■ **For more information circle Reader Service #266**

## Sundance Digital FastBreak NT Spot Playback System

The FastBreak NT Spot Playback System integrates powerful database management capabilities with tight control of video servers and other devices for the most cost-effective commercial insertion system on the market. Each air station can control up to 10 output channels and there is no limit to the number of air stations that can be present in the system. Several prep station can be attached to the system so that dubbing of new commercials can be done from multiple locations. A new option is SalesView, giving everyone in the facility access to the FastBreak inventory database as well as allowing them to play clips from the video server.
Contact Sundance Digital at (972) 444-8442 or visit www.sundig.com.

■ **For more information circle Reader Service #267**

Camplex CP–501 Universal System

The CP-501 is a universal system that uses one 75 ohm coax or triax cable to simultaneously send NTSC or PAL component or composite video, genlock, return video, multiple audio and data signals necessary for today's remote productions, along with patented safe microprocessor controlled
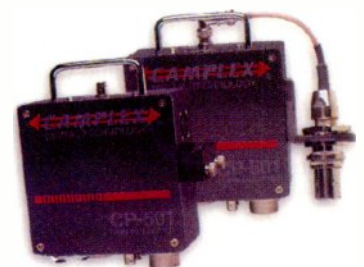
camera power. Standard features include new "digitally steered" camera automatic timing system, XLR type and 26 pin connectors, integrated design for console adaptor, new design for the camera adaptor with increased shock resistance and high temperature environment operation. Optional features include a second data channel for pan and tilt RS-232 control data, second channel program audio and triax connections. *Contact Camplex at (316) 342-7743 or visit www.camplex.com.*

■ **For more information circle Reader Service #268**

DBS and HDTV

Continued from page 1

and advanced interactive services and joint activities designed to accelerate the transition to terrestrial DTV in the U.S."

Jack Godwin, DirecTV's senior vice president for new technology, says, "When we convinced Thomson Multimedia and others to embed DirecTV into their sets and set-top boxes, we shocked and amazed the cable TV industry. The set-top boxes for DirecTV and broadcast HDTV or terrestrial digital services will really contribute to the national rollout."

Adds Chapman, "By being embedded in appliances, we'll be able to get into homes and then market directly to these consumers. What better way is there to best position ourselves than as a feature within the set?"

Chapman says the partnership refines the basic digital satellite receiver and "adds features without adding costs." The next step is to develop more advanced, higher-priced platforms with a combination of IP and local storage capabilities—the realm of what Chapman describes as "turbo-push."

DirecTV was not prepared to discuss the details of its pending HDTV launch, other than to announce the November time frame. When asked what HDTV content would be aired and for how many hours, a DirecTV spokesperson simply indicates that many negotiations are under way.

The Plant

Another factor in the equation is that DirecTV does not wish to buy a lot of equipment for its facilities. "We just want the basic capability to play back two channels of HD material and probably two pay-per-view channels," says Godwin. "We want to avoid buying first-generation hardware, although we will probably have to buy some. We already announced that Divicom was supplying our Los Angeles Broadcasting Center's SD encoders."

The LABC facility is a serial 601 plant that is taking shape quickly and should be operational by mid-1999, joining DirecTV's primary uplink for DBS services in Castle Rock, CO. Besides Divicom gear, the facility will use Snell & Wilcox converters and Thomson Broadcast HD encoders, according to a DirecTV spokesperson. DirecTV previously announced it will use a MediaStream digital broadcast server subsystem provided by Hewlett-Packard, 200 Ortel Series 5100 L-Band fiber optic links and Pro-Bel America's serial digital video routing matrix. At IBC, an announcement was made that Sarnoff and Tektronix would be jointly developing a monitoring and signal quality assurance system over the next two years for DirecTV.

Regarding a preferred HDTV format, Chapman says DirecTV is trying to remain agnostic. "The ATSC formats are easy to accommodate," he offers. "We tested 1080x1280i and found that we could carry two HD signals on one transponder."

Godwin adds that DirecTV has been drawn into a format controversy when it doesn't even think one exists. "People are too carried away with the transmission system," he offers. "The press has stated that

DirecTV will focus on one format, which just isn't true. Our encoders and decoders will handle all the ATSC formats plus the ability to address multiple formats, such as 1080x1280i."

USSB And HBO

Minneapolis-based USSB says it will be ready to launch HDTV services whenever HBO flicks the switch.

"USSB and HBO will have an HDTV demo feed up later this year consisting of a single channel of looped showroom material provided by HBO and by DirecTV," says Gary Thorne, USSB's senior vice president of business development. "The new Thomson DSS layer on its ATSC tuner can show the 480p digital signal we are uplinking today."

Like DirecTV, Thorne says USSB is agnostic when it comes to ATSC format. "At this point, we're committed to uplinking a competitive signal. From a real estate or bandwidth standpoint, 720p would be preferred, but this is a joint DirecTV-USSB effort, and we're agnostic as it relates to HD. We can go with 1080ix1920, 720p or even the 1080ix1280 that was announced at CES in January," Thorne adds.

From a programming standpoint, HBO looks like it will be the early HDTV horse to watch, offering a daily dose of 16 to 17 hours of 1080i HD content available in early 1999 using east/west feeds on existing C-Band transponders. According to Bob Zitter, HBO's senior vice president for technology operations, the balance of this simulcast of HBO's primary feed will consist of upconverted NTSC material.

"We intend to start at this level from the first day, and 70 percent HDTV content is not a shabby start," Zitter says. "We will be offering this on the same basis as our other multiplex feeds, and altogether that will represent 10 brands with 24 SD feeds. We don't have an exact start-up date yet."

The HDTV version of HBO is just that, another offering. As long as a service provider carries HBO and Cinemax, they can carry as many multiplex feeds as their capacity allows, according to Zitter. With HBO's emphasis on quality and on being a "driving, innovative force in TV entertainment," Zitter sees HBO's HDTV content edge as being consistent with the expecta-

tions of its customers.

"While the numbers will be small at first, we believe that most if not all of these initial HDTV set buyers will be HBO subscribers already. And this means that they are HBO's most loyal subscribers. By providing HDTV, we are doing our part for these customers," Zitter says.

The philosophy behind HBO's approach is simple: "If you are going to do it, do it right. Airing just an hour or two per day of HD content will not provide any value for any of these consumers who elect to buy HDTV sets, spending $5,000 or more in the process to do so."

How will USSB handle the HBO HDTV feed? USSB has not made a final decision on this and other matters, including insertion-related issues.

"We could uplink HBO in HDTV from our facility in Oakdale, MN, or other places, including Castle Rock," Thorne says.

Ray Conover, senior vice president for engineering at USSB, says, "The bulk of the work will involve a pass-through. We're not a complete serial digital 601 plant yet. While it seems to fit neatly into the DSS architecture, I have questions about how you build a control room around it. How do you monitor it, how do you conduct quality control, and who is responsible for the receiver? Are there insertion issues? That is conceivable."

No final word was available from USSB on any HD-related hardware, including HD encoders or subsystems. Conover believes that USSB has lots of resources at its disposal through its ties to Hubbard Broadcasting and Conus Communications and that USSB's response time is very quick.

"Presently, we're using the Compression Labs/General Instrument Magnitude system that was originally developed for the DSS system. That was the only option then, but now there are plenty of vendors to choose from. The question is whether they represent a significant improvement that would justify changing out our present hardware," he adds. "The driver is total signal transparency using the minimum possible bit rate."

The driving force behind any equipment-purchasing decision will be quality of the picture. "Anything that gets in the way of performance on film or video could be the reason not to select a particular product. The

test will be with eyes—mine and many other professional viewers'," says Conover. "It may appear that people are quite disorganized about HDTV, but I think what you are really seeing is people being very cautious since none of us have done this before."

Are the consumer electronics folks pushing the market before its time? Thorne says he doesn't have an answer to that question, but he does say that "this product is not complete in the traditional sense.

"For example, there is no cable interface," he offers. "The consumer dilemma is not the size of the dish or the dual location strategy, it's just the cost of the HD hardware."

EchoStar Awash in Bandwidth

EchoStar has been beaming down HBO-provided HD test content from its EchoStar III DBS satellite at 61.5 degrees west latitude for several months. This taped material is intended for HD hardware design and engineering under way at EchoStar, JVC, VTech Communications and Philips Electronics to produce a new generation of EchoStar DBS receivers, equipped with an 8-VSB tuner and what EchoStar describes as an all-format decoder (AFD).

EchoStar was the first North American service to adopt the DVB standard for its DBS platform. "Initially, we will be broadcasting in 1080i, and that's what we demonstrated in Nashville this summer, although 720p is where we would like to go based on bandwidth conservation," says Mark Jackson, EchoStar's senior president of satellite services. "We're not expecting to see any real HDTV content until late in the first quarter of 1999, and HDTV content is going to be really lagging for a while."

Jackson indicates that the EchoStar uplink facility in Cheyenne, WY, is configured to perform an HD pass-through function without any significant hardware changes.

Since its launch in the spring of 1996, EchoStar has been using Divicom encoders and a Nagra-based encryption system. "There will obviously be content requirements that will have to be addressed when and if we start HDTV encoding," Jackson says. "The real issue is that we have much more satellite capacity than our competition for HD broadcasting on a small, 18-inch dish."

EchoStar's 90 DBS frequencies currently use four EchoStar DBS satellites at 61.5, 119 and 148 degrees west. The 119 and 61.5 slots allow for total coverage of the U.S. EchoStar III, high up over the Atlantic Ocean, can be viewed by DISH subscribers on the West Coast as long as no obstacles block anything at an approximate elevation or "look angle" of 12-degrees off the horizon.

EchoStar announced last month that it would be filing a $217 million claim for EchoStar IV, which is unable to operate at full capacity. Will this situation impact on EchoStar's ability to launch new HD services? It doesn't appear to be a factor at this time.

As far as local broadcast networks are concerned and whether EchoStar will beam broadcaster's HD signals as part of its over-

Primestar is looking to offer its own originated HDTV material as well as an HBO HDTV feed.

all local-into-local strategy, Jackson indicates that no decisions have yet been. But the presence of an 8-VSB tuner in EchoStar's next generation of HDTV receivers is bound to generate some talk in broadcast circles.

Jackson also emphasizes the need to focus on frame rates and not just bit rates and bandwidth.

"Nobody wants to talk about frame rates. Running at 720p/30 frames per second is fine for movies, whereas different quality issues affect fast-action sports, making 720p/60fps necessary. A lot depends on the refresh rate on the monitor. Right now, monitors are just not that good, no matter what the screen size," Jackson says.

Primestar=Options

Primestar has several satellite options or potential locations to place HD programming on its network. In addition to its 24 Ku-Band mid-power transponders on GE-2 at 85 degrees west, it also has access to Tempo's 11 high-power DBS frequencies at 119 degrees for testing. Primestar may gain access to American Sky Broadcasting's 28 DBS slots at 110 degrees.

According to Gary E. Traver, Primestar's vice president of broadcast and network operations in Denver, other satellite options are under consideration.

The remolding of Primestar, a process that began in early 1998, is not completed. This involves changes in the organization and in ownership as well as a relocation of Primestar's executive offices from Pennsylvania to Denver.

Despite the uncertainty surrounding Primestar's corporate envelope, Primestar is moving ahead rapidly. The latest indication of this momentum involves the implementation of Primestar's new automated signal detection and monitoring system at its NOC in Bala Cynwyd, PA. Using Pro-Bel audio and video routers, Procion multimedia control and monitoring platforms, as well as a custom GUI-based automated

router driver or GUARD, Primestar in association with CoreTech Corp. is setting the stage for increased compression levels and channel density, according to Traver.

"We built the control room especially to operate in a multichannel digital environment. We multiplex lots of different services on every transponder. Utilizing available tools, such as statistical multiplexing, allows for increasing levels of compression, but it also limits the amount of bandwidth available to absorb extreme events. As a result, if one service misfires, it immediately impacts the other services across the entire transponder," Traver says. "The NOC runs the broadcast configuration of the network as well as source switching and core conditional access data."

Besides the NOC in Bala Cynwyd, Primestar uses three uplink and encoding centers to manage its services. Two of these uplinks are in Colorado, including TCI's National Digital Television Center (NDTC) in Dry Creek and TCI's Titan Road facility. A third uplink is located in Glenwood, New Jersey.

Since mid-1997, Primestar has been shifting its signal transport within the uplinks from analogue to digital serial 601 in order to improve quality and achieve greater levels of compression, according to Traver.

"We have to manage our bandwidth very carefully. As a distributor, we are planning to accept any of the formats. For HDTV transmission, we are preparing to turn around services such as HBO, and we are also making provisions to originate HD material," Traver adds. "Presently, we are setting up for a lot of experimentation. We have been using Panasonic D-5 tape decks for testing purposes. A final decision on what equipment will be used for production has not been made. The architecture may be quite different from where we are now when we deploy."

Primestar has been running high-power DBS tests on Tempo 2 at 119 degrees west, according to Traver, and he indicates that HDTV testing is starting soon.

"Everybody is going to grapple with displacement. All service providers have to struggle with finding space for HDTV programming. For example, to provide an HDTV service using 1080i requires approximately 18 Mbps. Without additional capacity, one 1080i signal can displace six to eight 3 Mbps NTSC services depending upon the compression rate. If you tried to add 10 HD channels without finding additional capacity, you could displace between 40 and 80 NTSC video channels," Traver says. "From a competitive standpoint, DBS players will have to use multiple satellites to provide a full complement of both NTSC and HD services."

Traver adds that Primestar is committed to the ATSC standard for HDTV, however, it has not made a commitment to any of the standards.

"During the early phases of the testing process, a great deal of emphasis will be placed on evaluating each of the different formats," Traver says. "The goal is to provide a service that can take full advantage of the capabilities of consumer hardware using the available bandwidth most efficiently." ∎
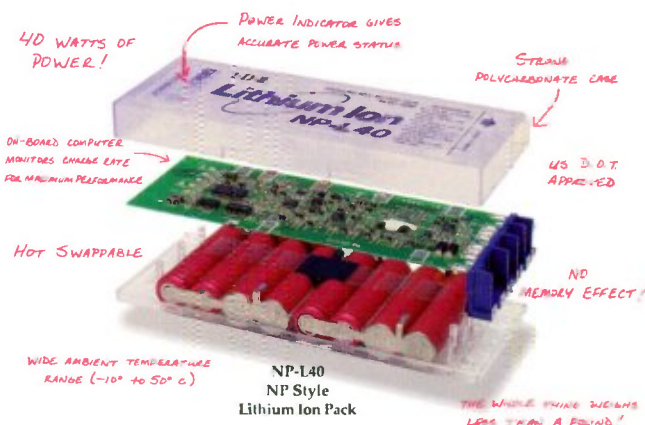
Sony Honored For Business Press Advertising—Sony America President Howard Stringer (left) and Bruce Barnet, president of Cahners Business Information, the parent company of Digital Television, chat at the recent Creative Excellence in Business Advertising Awards luncheon sponsored by the American Business Press. During the Awards ceremony Barnet presented Stringer with the third annual Norman L. Cahners Lifetime Achievement Award for excellence in business press advertising. Stringer accepted the award on behalf of Sony and Sony Corp. President Nobuyuki Idei. The Awards luncheon was held at the Sheraton N.Y. Hotel in New York City.

FCC Guidelines

but the applicant must provide a complete description of the software and how it compares with that used by the FCC.

One of the difficulties stations that don't meet the "checklist" requirements may face is trying to know if their proposals meet FCC requirements before beginning the application process. In this situation the station is advised to use a computer model designed to match the FCC's model. The reason is that small changes in the computational methods can cause large differences in the service population counts, and this is especially true in densely populated areas.

Analysis Resolution

The FCC's model for the determination of service contains individual square cells that make up a large grid covering a station's service area. In some situations, the size selected for the individual cells can greatly affect the service population statistics.

As a result the notice indicates that analysis can be performed using smaller cells (finer resolution) than the four square kilometer cells used by the FCC, improving the accuracy of the evaluation. But if an application is going to be based on such finer resolution, it must clearly indicate the cell size and request that the application be reviewed on that basis. And when filing non-checklist applications, the computational method is to be noted and all stations affected by the proposal are to be identified and the magnitude of the effect specified.

The question as to which stations are to be considered "affected" is a major factor in determining the magnitude of the analysis that needed. In this regard, the notice has provided guidelines based on the site-to-site distances between stations.

The distances in general were determined by adding an expected maximum distance to a station's service contour to the default evaluation distances that are employed by the FCC computer model. Although this is a good rule of thumb when evaluating the magnitude of the task, one is cautioned not to substitute these distances for the default values in the FCC model. Because the model already performs a similar addition, this would increase the distances considered when making evaluations, and in some cases, will show additional interference beyond that noted in the DTV plan.

de Minimis **Interference Defined**

To allow for some flexibility in making changes, the FCC developed a *de minimis* interference standard in which a certain amount of additional interference would be considered acceptable on the basis that it would not significantly affect a station's service. The standard stated that no more than 10 percent total interference would be permitted and that any individual station could not contribute more than 2 percent additional interference. However, the previous FCC release did not clearly indicate how this percentage was to be determined.

For NTSC stations the percentage is the number of persons who would lose service due to DTV interference divided by the number of persons inside the station's grade B contour. It should be made clear that this means new interference caused by DTV stations to areas that were, prior to the introduction of DTV, expected to receive service.

For DTV stations, the situation is a bit more complicated. In general, the base line against which new interference is to be calculated is the population predicted to be served if the plan was implemented without any changes to either the DTV allotments or the NTSC stations included in the FCC's planning. However, there are 260 DTV allotments that are predicted to serve fewer people than their paired NTSC station currently serves. In these cases, the NTSC population served prior to DTV implementation will be the DTV station's base line.

Also the rules do not permit changes in NTSC stations that would cause any additional interference to DTV.

The notice indicates that a proposed change in an NTSC facility causing less than 0.5 percent additional interference will be considered acceptable. The notice also states that calculations involving interference from DTV stations will be rounded to the nearest 0.1 percent, therefore making 2.04 percent acceptable assuming the 10 percent limit is not exceeded. It also says that distance calculations will be rounded to the nearest 0.1 kilometer.

The previously issued FCC Rules indicated that both DTV allotments and subsequent authorizations are to be protected based on the *de minimis* interference standard. The notice, however, stated that it is not feasible to maintain separate service base lines for both allotments and their subsequent authorized facilities and therefore the allotted facility base line will be used.

In discussion with the FCC staff, it has been determined that this means the 10 percent limit will be based on the allotment base line, but the 2 percent individual contributions will be based on the authorized facilities service at the time of computation.

If the authorized service is less than the allotted, then it cannot be reduced to less than 10 percent of the allotment service.

It also has been concluded from the notice and through subsequent discussion with the FCC staff that, in determining compliance with the 2 percent *de minimis* interference standard, computation toward DTV stations is to be based on the current DTV service and not the base line. In other words, the first interfering station may contribute up to 2 percent of the base-line value and that interference will then cause the base line to be redefined. But the 10 percent limit will still be based on the original base line.

In lieu of meeting the *de minimis* interference requirements, stations may negotiate agreements with affected stations to accept interference subject to a FCC determination that the agreement is in the public interest.

The rules allow UHF DTV stations to improve the signal level within their allotted service areas by power increases up to 1000 kW while not enlarging their service contour through the use of antenna beam tilting in excess of 1 degree. This notice reiterates the requirements imposed by section 73.625 of the rules and adds some additional guidelines for applicants. It notes that if there are no DTV adjacent channel stations within 110 kilometers or NTSC adjacent channel stations within 106 kilometers then a showing that the station's ERP toward the radio horizon is not in excess of the reference ERP is sufficient to demonstrate compliance.

Alternatively, the station may demonstrate that the predicted field strength at the F50/90 noise limited contour determined using the original allotment parameters is not exceeded. It also points out that both of these options are to be computed assuming an additional 1 dB of antenna gain over that specified by the antenna manufacturer. If there are nearby adjacent channel stations, either DTV or NTSC, then compliance with the *de minimis* interference standard must be demonstrated.

It further states that, although the rules do not require an interference showing toward stations operating on NTSC taboo channels ((2, 3, 4, 7 and 8 and 14 and 15 from the DTV channel), it is recommended that a study be made since they are also required to be protected. Because of the likelihood that NTSC taboo channels may be nearby, these may be the most likely stations to be affected by the use of beam-tilt power increases.

Besides the required technical showings the notice also states that notification of potentially affected stations is required and defines the criteria for determining nearby stations. It also notes that such applications will not be acted on for at least 10 days to allow time for objections to be filed.

One area of potential confusion may be the use of the term "Reference ERP" in the section of the notice dealing with beam-tilt computations. In the notice it is intended to mean the ERP of specific radials, taking into consideration the DTV antenna pattern associated with each allotment. It is *not* the maximum ERP value referred to in the DTV plan as the reference ERP.

To allow broadcasters the opportunity to rearrange the DTV plan to better suit their needs and those of their markets, the FCC will permit the exchange of DTV channels between stations in the same or adjacent markets. The notice indicates that such exchanges may also include parameter changes subject to meeting the *de minimis* interference requirements.

The notice also makes it easier for stations that wish to exchange station assignments that include a channel not presently allotted to any of the stations. While requiring a petition for amendment of the allotment table, such petitions, once granted, will not be subject to competing applications.

The FCC has stipulated that applications involving channel exchanges are to be filed as a package. The package is to include a cover letter explaining the proposal and how it is in the public interest, along with signed agreements from all involved parties and any interference showing necessitated by any proposed parameter changes. Alternatively negotiated interference agreements as discussed above can be submitted in lieu of meeting the *de minimis* interference standard.

Data Broadcasting

strong timing association with another stream (typically video) in the transport multiplex. It has the same intra-stream timing requirements as synchronous data streaming. An application example would be statistics data associated with a particular segment within a news program, perhaps related to a short video clip.

An asynchronous data stream does not have strict timing requirements nor any strong timing association with another stream within the transport multiplex. An example of this would be a typical Internet Protocol datagram.

It's important to remember that a data service may include more than one data type. All data types are encapsulated into MPEG-2 transport stream packets. In addition, depending on the data type, the data may be first encapsulated into the section format defined by MPEG-2 digital storage media command and control (DSM-CC, ISO/IEC 13818-6) or the PES packet format defined in MPEG-2 systems (ISO/IEC 13818-1). Data carousels—the cyclic transmission of data to a receiver using the DSM-CC download protocol—may also be used.

The proposed data broadcasting standard also defines four profiles: G1, G2, G3 and A1. The G series profiles have defined maximum system latency requirements and guaranteed bandwidth (with maximum bit rate constraints). They are designed to enable practical implementations of synchronous and synchronized data types.

The A1 profile is for opportunistic data; that is, data inserted into the remaining available bandwidth in a given transport multiplex after all necessary bits have been allocated for video and audio services. This mechanism is used to take advantage of temporarily unused bandwidth in the transport multiplex to transmit data over a network that would otherwise not have the bandwidth available to transmit the data. Opportunistic data, therefore, does not have a bound on end-to-end system latency.

Using PSIP

The proposed data broadcasting standard uses ATSC Standard A/65, program and system information protocol for terrestrial broadcast and cable (see previous article in Digital Television, June/July 1998), to identify and locate the data streams within the transport multiplex. The proposed data broadcasting standard augments A/65 by defining new data-specific descriptors and PSIP-compatible tables. To identify data services within the transport multiplex, the data broadcast descriptor (which includes the data service profiles discussed above) is included within the PSIP virtual channel table. Several other PSIP tables and descriptors were created to aid in "tuning" data services due to the complex nature of data applications, including the need to flexibly associate different data streams with a transport multiplex.

Data Implementation Working Group

DIWG's first effort in addressing a systems solution for data was to define the preferred implementation of the interface between a data server (sometimes called a data gateway) and the emissions multiplexer. Two models of data injection—push and pull—were considered. In the push model the data server streams information to the mux as governed by the particular data service's bandwidth requirements. In the pull model the "downstream" emissions mux requests information from the data server whenever there is available bandwidth in the multiplex.

A decision on which model to use is dependent upon the data application's quality of service and bandwidth requirements. Because constant rate data delivery bandwidth can be provisioned in advance within emissions equipment, the push model may be used for synchronous or synchronized data streams. However, asynchronous or opportunistic data has variable bandwidth requirements over time. This requires real-time scheduling of the emissions mux's bandwidth because the emissions mux is the final signal combination point for all emitted bit streams—video, audio and data.

Real time bandwidth scheduling is complex, particularly if advanced statistical multiplexing techniques have been employed to increase the number of video/audio programs within the transport multiplex. A very tight control loop exists in video statistical multiplexing systems and, hence, the group concurred that the video encoder-to-mux inter-face is not within the ATSC's scope. Consequently, the pull model is required so that the emissions mux can manage opportunistic data injection bandwidth in realtime to take advantage of instantly available spare bandwidth from the statistical multiplexing process.

Different Needs

Due to differences in needs, DIWG was not able to converge on a single preferred interface. Both the DVB asynchronous serial interface (DVB professional interfaces, EN 50083-9) and the SMPTE serial data transport interface (SMPTE 305M) were selected for real-time quality-of-service applications. Ethernet was considered as an alternative in cases where high quality of service was not a critical factor. In all cases, the data is encapsulated into MPEG-2 transport stream packets using the appropriate T3/S13 mechanism.

DIWG is currently defining a data injection architecture. This includes the requirements for a flow control protocol over the data server-to-emission mux interface and data variables/parameters used in provisioning and control. The architecture differentiates real-time "control plane" issues from advanced-scheduled or "management plane" provisioning issues. In other words, the approach is to separate macro level decisions that govern operation but are not time critical from micro level or tightly-controlled realtime operations. A proposed flow control protocol based on DSM-CC descriptors has been proposed to SMPTE's packetized television engineering committee for standardization. ∎

Zeros and Ones

Commentary from the Editors of Digital Television

One Page, Many Voices

Change + Focus=Success

Change + Confusion= Failure

Which of these two equations best fits the current move to DTV and HDTV? Sadly, after hundreds of meetings, thousands of discussions and millions of dollars spent in product development, the latter equation seems to offer the best description of where things stand today.

Articles in national magazines and newspapers are already bringing a message to the public that says not only are DTV and HDTV sets expensive but they also offer little value today. The real danger, however, is that the entire television community—from over-the-air stations to cable operators to consumer set manufacturers—is portrayed as confused, petty and down right greedy.

Let's face it, getting consumers to embrace the idea of purchasing a DTV or HDTV set for upwards of $6,000 is enough of a challenge. But with the numerous other difficulties and problems that will confuse and besiege the consumer, trying to get him or her to buy an HDTV set in certain parts of the country will be about as easy as getting Robert Conrad to buy a pack of Rayovac batteries. What retailer, like those in the New York City area which will have only one station (WCBS) on air by November, could honestly display an HDTV set in its store this Christmas and not feel like a snake-oil salesman?

Consumer: "The picture is amazing! I don't care how much it costs, I want one now! I can't wait to watch Monday Night Football in HDTV!"

Salesman: "Well, unfortunately, you won't be able to watch that."

Consumer: "No? Gee, that's too bad. Well, at least I can watch the X-Files."

Salesman: "Ummm, no, you can't see that either."

Consumer: "Ohhh. Hmmm. Well at least NBC's broadcast premiere of *Titanic* will blow me away."

Salesman: "Unfortunately, you won't be able to see that either."

Consumer: "What do ya mean? This set costs $6,000! What exactly will I be able to watch?"

Salesman: "Well, unfortunately, there have been some difficulties here in New York with transmitters and such thanks to the Port Authority. So as of right now you'll be able to watch WCBS for a few hours a week. But just be sure you're home during those times because there's no way to record it."

Consumer: "Ya know, I hear the new Beastie Boys record is really great. Maybe I'll just take that instead."

Simply put, the industry is on the threshold of what should be its brightest (and clearest) day. But somewhere between the end of the Grand Alliance and today something went awry. And it unfortunately has more to do with politics than insurmountable technical issues.

When the Grand Alliance first came into being it was a triumph for the industry because everyone came together to work towards a common goal—bringing beautiful pictures into the viewer's home for free. But once the Alliance's work was done the focus and promise the Grand Alliance held was replaced by industry groups quickly reverting to old habits. Self-interest quickly returned to the forefront.

The strange thing about how things have progressed is that everyone's long-term investments are tied into the success of DTV. The failure of DTV means much more than just the failure of DTV. If that's the case, then why are there so many still unresolved issues and who can solve them? Depending on whom you speak with you'll hear a different answer and probably see a finger pointed in a different direction when it comes to blame. But to us, all those fingers pointing in different directions lead ours to point in one direction for a solution. Our sister magazine, *Broadcasting & Cable*, suggested that the Advisory Committee on Advanced Television Service be reconstituted with the specific and short-term mandate of bringing all the different industry voices onto the same page.

Unfortunately, FCC Chairman Bill Kennard has not yet seen the wisdom, or the urgency, in that idea. We do, and we embrace it as well. This issue's interview with Richard E. Wiley, the statesman who superintended the birth of digital and HDTV, confirms that judgment.

The nation's digital vision should be to encourage multiple pictures and voices linked by a common technological grid. Broadcasters should be able to speak to cable, and cable to satellite, and everyone to computers, and the public should be able to choose among them at will. As Dick Wiley told us: "Interoperability should be the threshold." After that, as he said: "Let a thousand flowers bloom."

We'll buy that.

Advertisers' Index

The Advertisers' Index is provided as a reader service. Although every attempt has been made to make this index as complete as possible, the accuracy of all listings cannot be guaranteed.

**FOR MORE PRODUCT INFORMATION, REMEMBER TO FILL OUT
THE READER SERVICE CARD**

World Radio History

Platinum has the price and performance to destroy the competition.

EDITBOX® **PLATINUM**
the affordable editbox

All of the legendary Editbox toolset
delivered on an innovative low cost platform.
Now with powerful Pick and Place™ audio editing.

Magnum has no competition, period.

EDITBOX® **MAGNUM**
the ultimate editbox

This all new Editbox is the fastest and most powerful ever.
Up to four layers over a background, four hour storage,
and a blitz of new innovations, functions and controls.

Book a demo now, call 1 800 218 0051 Ext. 804.

QUANTEL

More Information Circle 110

16:9 DTV *ready*

From original screenplay
to HDTV replay

We're bringing
tomorrow
together

Bring home the vibrant color, rich details, and texture of film with the **Spirit DataCine Film Scanner** from Philips. Take film transfers to new levels with high definition and standard definition, 4:3 or 16:9 display formats, image composition control, and pure digital output. To learn more, call us toll free at 1-800-962-4287 or visit our web site at www.broadcast.philips.com

Film image: Michael Douglas, *The Game*, available on Polygram video and DVD

More Information Circle 109

PHILIPS

Let's make things better.

The

Dawn of Digital Television

NOVEMBER 16, 1998

HIGH DEFINITION TELEVISION:
YOU'VE GOT TO SEE IT ON A SONY.

SONY

For almost 30 years, Sony has been an unparalleled leader in the television industry, developing new technological advancements in both consumer and professional products. But nothing you've seen in home video – and nothing you've watched in broadcast TV – will prepare you for High Definition TV. As incorporated in the Sony KW-34HD1 FD Trinitron® Wega (pronounced VAY-guh) Flat Screen TV, High Definition is a sensory experience unlike any other. You'll be amazed by up to six times the picture detail. Widescreen images. And digital sound. To see the full glory of High Definition Digital TV, turn to the people with a firm grasp of digital technology. Sony.
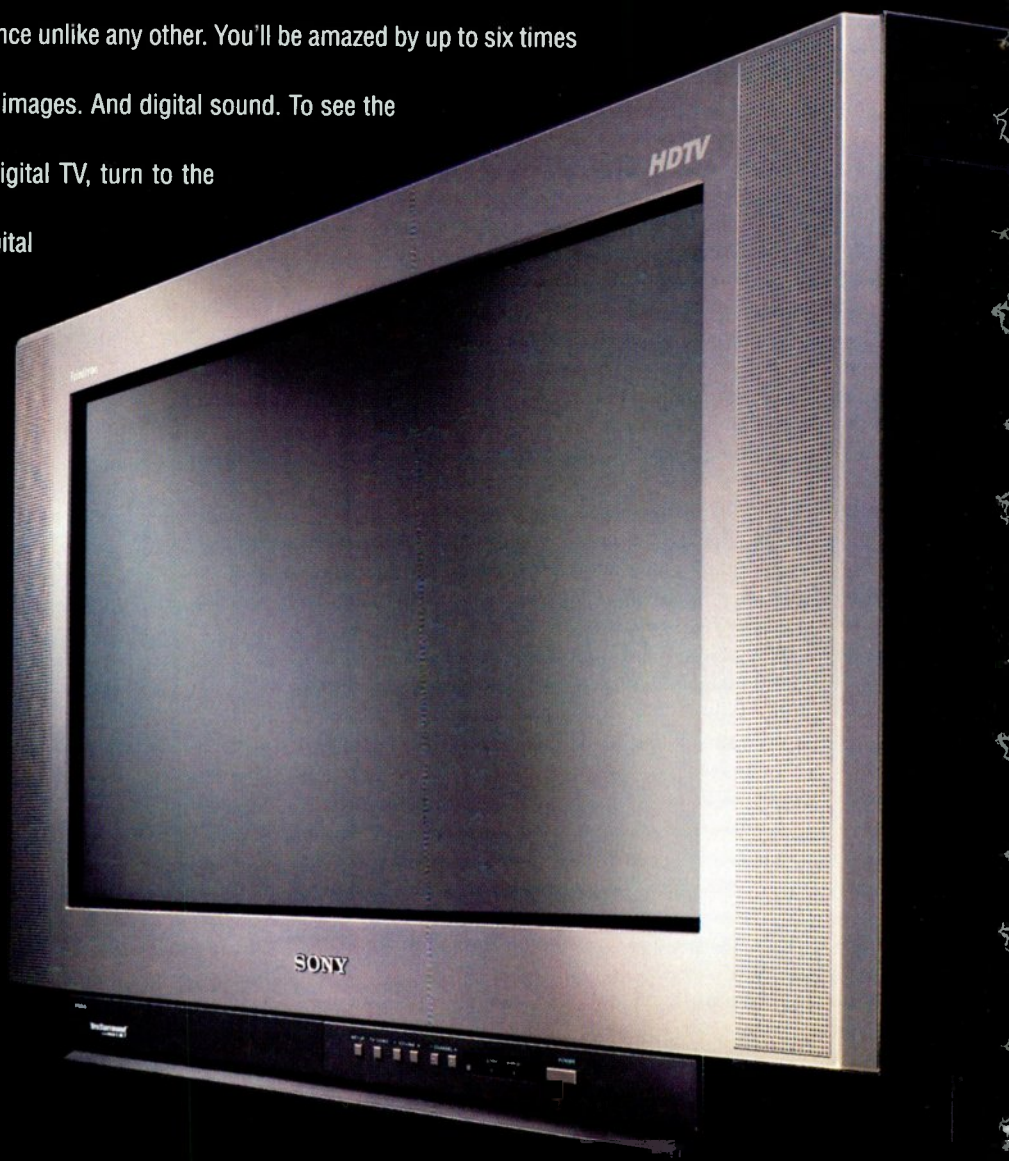
HDTV

SONY

FD Trinitron
WEGA

The Dawn of Digital Television

A Supplement to Broadcasting & Cable, TWICE and Digital Television

CONTENTS

BILL FRYMIRE / MASTERFILE

The Dawn of Digital Television

The Medium They Couldn't Kill

By Don West
Editor at Large

"This is our man on the moon." *The speaker is Gary Shapiro,
president of the Consumer Electronics Manufacturers Association (CEMA), describing
the almost-three-decades-long effort to bring television into the orbits of digital and high
definition. Begun in Japan in the 1970s, picked up in the United States during the 1980s
and coming to flower at the beginning of a new millennium. DTV has been largely a private
sector initiative, brought off by a few dedicated and determined engineers, joined
by others of vision who helped forge the new medium, finally abetted and encouraged by
a government that advanced the spectrum and provided a flexible policy for the transition.
DTV is now ready to be deployed by the world's communicators as an instrument of
programming and commerce. How they make the best of it will be the stuff of history.*

eady or not, the race to digital has begun.

They're off to a ragged start, but a valiant one. Broadcasting is the first of the electronic communications media to wear the colors of the Grand Alliance digital and HDTV system that was anointed in part, but whose formats were not mandated, by the Federal Communications Commission. It's certain there will be 44 over-the-air stations in 23 markets from New York to Jackson, Miss., operational by Nov. 16, 1998. In coverage terms, they will represent 37.4%, or 37 million, of the nation's TV homes. That total will be over 40% by May 1, 1999, when affiliates of the top four networks in the top 10 markets are to go digital, and again to over 50% a year from now, when the top 30 markets are due (by Nov. 1, 1999). All TV stations must be digital 30 months after that—by May 1, 2002—if the FCC persists in its present deployment schedule.

The cable industry has by now equipped 1.1 million of its 66 million customers (1.6%) with current generation digital boxes designed to drive existing analog sets. None of those boxes will pass a digital broadcast signal. It's expected that cable's next generation of digital boxes will be HDTV-capable and soon will incorporate so-called "firewire" interconnection devices capable of supporting copy protection technology to defend copyright owners against the threat of piracy. The best estimate is that cable's plant could be digital-ready when the last digital station signs on. Some cable networks—notably HBO and Discovery—will begin HDTV programming in 1999.

The satellite industry, digital from the start in its transmission scheme, was poised to begin pumping its version of HDTV nationwide on Nov. 1. It's estimated that over 50% of the new digital sets will be equipped to receive and display those transmissions. The prospect of a strategic alliance between satellite and terrestrial broadcasters is among the most exciting developments of the digital era, with the wired nation the potential loser if the wireless industries close ranks.

The consumer electronics industry, which once thought it might sell 200,000 digital receivers in the first selling year (to fall 1999), has reduced its expectations by half, to a point something north of 100,000. One measure is that the industry is currently selling 500,000 to 600,000 large-screen, rear-projection models each year, and it believes that new digital sets might attract 50,000 to 60,000 of that buying category—something over 10%—in the next 12 months. The going price: upwards of $6,000. But projections begin to get bullish after that, with CEMA projecting 30 million digital sets sold by 2005. By that time, the price might be below $1,000. In the long run, the consumer electronics industry is an almost sure winner: it hopes to end up selling at first one and then a flood of new digital receivers into the home, duplicating over time the mass-market turnover it enjoyed when TV went from black and white to color.

At the beginning, perhaps the most ambitious schedule of digital programming will come from satellite. Together, DirecTV and USSB plan to provide two channels of 24-hours-daily HDTV programming. HBO will join that enterprise,

LEADERS RISE BEFORE DAWN

Just four years ago, DIRECTV helped usher in a new age of television with our broadcast of the first high-powered digital signal. Despite early successes, we've refused to rest on our laurels. From forging new ground as the fastest-growing consumer electronics product in history, to our groundbreaking broadcast of HDTV earlier this year, DIRECTV has remained on the forefront of the digital revolution. Now, more than four million subscribers later, DIRECTV is offering high-definition programming instantaneously to the 48 contiguous states. And since DIRECTV is the first satellite TV service whose system receiver is built into HDTV sets, we're committed to making the dawn of digital a whole lot brighter.

DIRECTV

What Are You Looking At?™

offering up to 17 hours daily, on the second DirecTV-USSB channel in the spring of 1999. ABC, on Nov. 1, began an HDTV run (720p) of *The Wonderful World of Disney* on Sunday nights and planned to show two prime-time movies, "Mission Impossible" and "Forrest Gump," on Nov. 5 and Dec. 3, respectively. CBS broadcast the first of four football games in high definition on Nov. 8 and will air *Chicago Hope* in HD on Nov. 18. PBS signed on its ambitious inaugural DTV schedule on Nov. 9, featuring such HD originals as *Chihuly Over Venice*, *Digital TV: A Cringely Crash Course* and Ken Burns's *Frank Lloyd Wright* (the last in an enhanced format).

NBC has no plans for HD broadcasts in 1998 but will begin showing *The Tonight Show with Jay Leno* in 1080i HDTV next spring. It has two HD movies on the books: "Men in Black" in 1999 and "Titanic" in 2000. Fox has begun an SDTV feed to its DTV affiliates, utilizing a 4:3 aspect ratio.

Discovery Networks began digital programming far ahead of the crowd. It has launched seven networks in cable digital, now carried in about 700,000 homes where digital boxes are available: Science, Home & Leisure, Civilization, Kids, Wings, Health and Discovery en Espanol—the first four in 1996, the last three in 1998. In HDTV, according to Charles Humbard, vice president and general manager of Discovery Showcase Networks and Advanced Television, the plans are to keep Discovery HD in front of consumers through cooperative arrangements with consumer electronics retailers to help drive set sales. "It's important that some of the first images consumers see of this new medium are provided by Discovery," Humbard says, adding that "It will be a must-have medium once you see it." He said Discovery's one caution is in transferring too much film product to a video format until all the standards issues are settled. It has 22 hours of HDTV programming on hand and 80 hours that could be available in 1999 through syndication on other networks but not through 24-hour channels of its own. Humbard thinks it will be 2000 before Discovery hits its digital stride but that the positive reaction to high definition will be far greater than the industry anticipates.

Cablevision has added its HDTV worth to the mix by unveiling an ambitious end-to-end strategy leveraging its holdings in sports, cable systems and consumer electronics stores (The Wiz), beginning with 1998-99 season New York Rangers and Knicks home games on its MSG network, followed by New York Yankees and Mets home games on Fox Sports New York in 1999.

The fact is, SDTV (standard definition digital television) will be a programming mainstay of some new digital sets in the medium's first year. Panasonic, for example, is marketing a 56-inch digital-ready, rear-screen projection unit, initially equipped only to receive NTSC, for $5,499. The analog signal will be line-doubled to 480 progressive (a distinction discussed at length in "Technical Considerations," beginning on S17), giving the consumer a picture upgraded from the normal NTSC experience. Then, for an extra $1,499, Panasonic will offer a digital set-top box that will activate the display for DTV scanning (480 interlace and progressive and 1080 interlace), should the consumer feel there is enough pure digital programming to expand his reach.

(Bill Mannion, Panasonic's general manager for TV and network systems, emphasizes, however, that HDTV will be the backbone of its marketing efforts, not SDTV. "Digital is a breadth of opportunity," he says, "built around price points, screen sizes and resolution. The consumer can participate at any level." Panasonic will offer one 32-inch SD model with a 4:3 screen at $1,799. It requires the same $1,499 set-top box to go 480p.)

SDTV, of course, is one of the two technological possibilities for broadcasters in digital television, the other being HDTV, or high definition. One well-versed observer has this view of how it could go in digital's early years:

"Once a broadcaster goes on the air, he will want to attract as many eyeballs as possible to begin to recoup his investment. If he has to wait for a high penetration of expensive high-resolution sets, he could be waiting a very long time. Even if digital is the most rapidly adopted new technology of all time, it's going to be some time before it climbs up that hockey-stick curve. On the other hand, with inexpensive digital-to-analog converter boxes—down to around $100 in three or four years—you'll be able to receive every digital signal in the market and display them on your existing analog set and realize 60%-70% of the benefits of the digital transmission—if the broadcaster is transmitting in SDTV. If he's broadcasting HDTV, however, you'll only realize

> ## "It's very important that broadcasters, cable operators and set manufacturers have a common vision on this thing."
> —Richard E. Wiley

Introducing RCA HDTV.
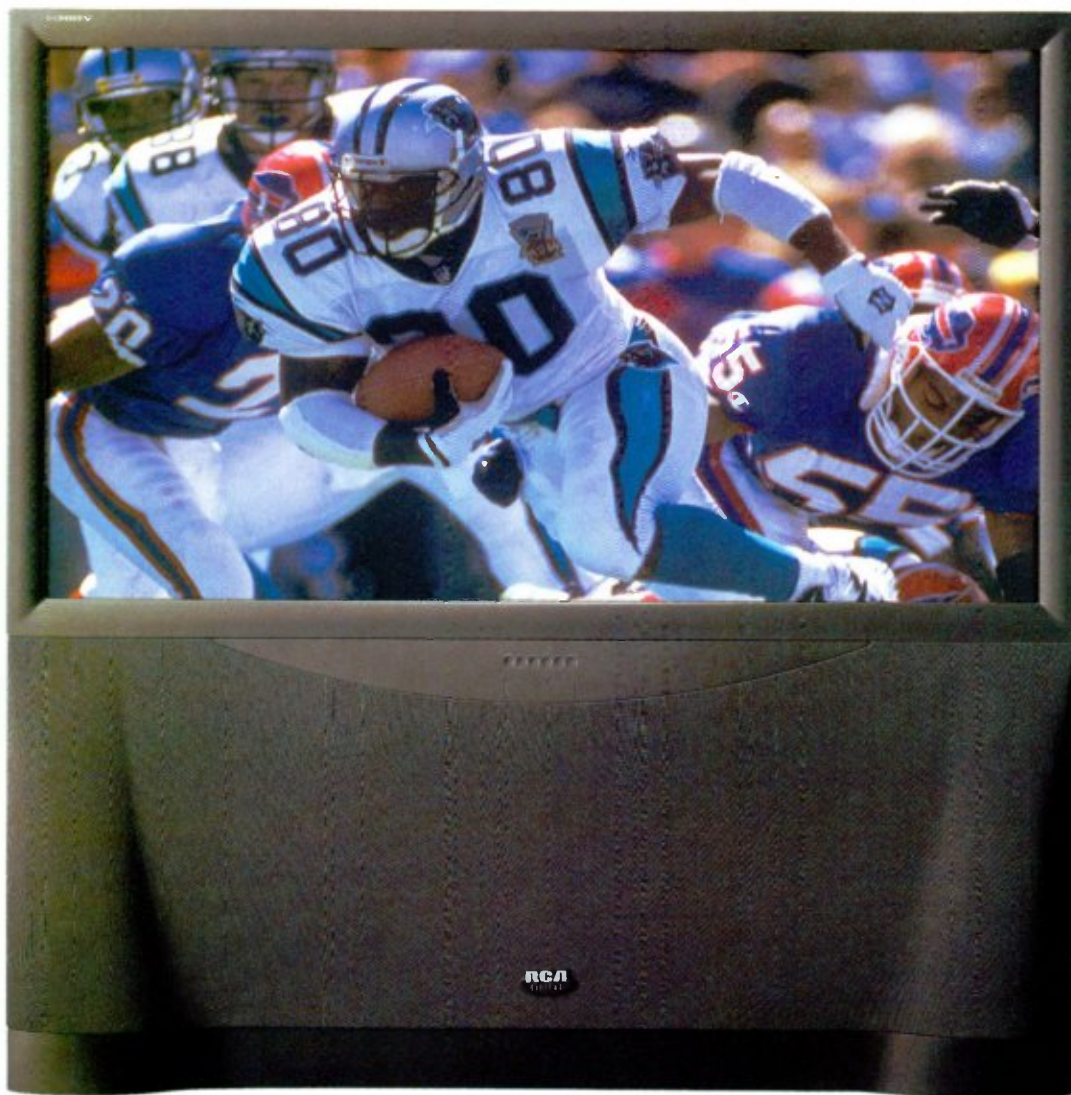
With its on-board DIRECTV receiver, the new RCA HDTV can receive virtually any available television signal, including all 18 ATSC digital formats, standard and HD satellite programming, and all current off-air and cable signals. Add to that razor-sharp digital pictures and six-channel digital audio, and the result is a future worth keeping your eye on. RCA was there when television was introduced nearly 60 years ago. Today, as television takes its greatest step forward, the leader is clearer than ever.   **Changing Entertainment. Again.™ RCA**
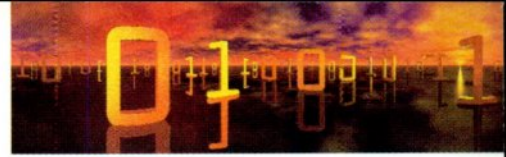
maybe 5% of that improvement, because the analog picture tube isn't designed to display high-resolution pictures."

This observer says that the improvement between NTSC and digital 480p is "enormous," with lesser percentage gains as you go up the formats to the 1080 range. Moreover, he feels the cost of the two-million-pixel-plus displays required for highest definition will be a brake on that end of the medium for some time, and points out that there's a "fundamental disconnect" between the interests of the broadcast industry and the consumer electronics industry. "Broadcasters want as many digital receivers in the market as possible once they make that investment. Price and content are the most important variables. The consumer electronics people, because of their high development costs, initially want to sell high-end home theaters, in the $10,000 range. Anyone would rather sell high-margin Cadillacs than low-margin Geos. You can sell a lot fewer but make more money."

The danger, of course, is that if consumers are willing to settle for the low end of digital, the high end might never get a chance at bat.

Whatever course digital takes in its inaugural years, it is up against tough historical precedents on the introduction of new products. The standard for success imposed by the Telecommunications Act is 85% digital penetration—that's the requirement before turning back the analog spectrum. Color TV took 22 years to reach 85%. VCRs took 16 years. CDs, after 13 years, are only at 68%.

Richard E. Wiley, the Washington paragon whose political savvy and negotiating skill as chairman of the FCC's Advisory Committee on Advanced Television Service brokered digital and HDTV through a nine-year gestation, is almost satisfied with the way things are turning out, but not quite. "You have to have a solution that works for broadcasting and for cable, or the American people are going to be shortchanged," he said. "When I turned in that report in late 1995 I thought we had accomplished that goal, with the single exception of the modulation technique, QAM [quadrature amplitude modulation] versus VSB [vestigial sideband]." VSB, developed by Zenith, won out in the committee's tests, but most observers think it could have gone either way. Said one: "If General Instrument had just been able to deliver a slightly better-working system, then broadcast might have gone QAM. And if TCI and Time Warner hadn't begun experimenting with QAM, then maybe cable would have gone VSB."

"I thought to myself it might have been better if QAM had won," Wiley says now, "because the cable industry was so committed to it." The incompatibility of the two systems can be overcome at the TV set, but hasn't been in the first generation because cable has not yet settled on a QAM standard.

At the end of the day, Dick Wiley thinks "we ought to let the marketplace rule. We shouldn't let any industry—be it broadcasting, cable, consumer electronics or computers—game this system too much. We shouldn't let one industry foreclose another industry's vision. Hopefully, because of the interposing of all these industries' self-interests, a good result will come out. I'm just hoping the FCC will continue to look over the shoulders of these industries and make sure the public is protected."

Looking back on the progress toward digital, Wiley says: "If I have any disappointment, it's that a lot of people knew what was coming for nine years, certainly for the last three or four years, and haven't taken the steps necessary to get there, to get ready. Somebody has to try to bring these people back together again. They're not coming out of the starting gate at the same point, working together. It's very important that broadcasters, cable operators and set manufacturers have a common vision on this thing."

The somebody bringing them together isn't likely to be the Federal Communications Commission, at least overtly. Chairman William E. Kennard told a New York audience—singling out a BROADCASTING & CABLE editorial that urged deputizing the Wiley committee "to get everyone back on the same page"—that he wasn't about to. Later, in an interview, the chairman said: "Nobody—nobody—can predict, with any degree of certainty, how it is all going to work out. And it is not the sort of transition that lends itself to central industrial planning. There are too many industries involved. There are too many market variables involved. And there's a real danger that if we were to mandate a particular standard now, it would become obsolete very quickly."

At still another point in that interview Kennard said: "Well, I guess the message that I'm trying to convey is that a little bit of chaos is not a bad thing when you're

"Right now we're going through pre-opening-night jitters."
—FCC Commissioner SusanNess

rolling out a new technology, and multiple industries are developing business plans to market it."

(The full interview with Chairman Kennard appears below.)

The senior FCC commissioner, Susan Ness, has a similar approach. She likens the transition to "a community theatre production that you think will never come off. But it does. Right now, we're going through pre-opening-night jitters." By the time the second generation of sets comes out most of the problems will have been solved, she says, noting that the FCC is charged with reviewing progress every two years—beginning in 2000—and that, "if the public is not enamored, we can adjust."

"I'm cautiously optimistic that this will turn out to be a medium of value to the public. The uses of this medium will be awesome, but it will take time to discover them. We've already made tremendous progress in a new technology in which no one has any experience."

There are some interindustry efforts to resolve the digital conflicts to which Ness refers, the most conspicuous a CEMA subcommittee to complete the standardization of engineering specifications for the IEEE 1394 DTV baseband interface, which eventually could afford some kind of interoperability among all components of the digital universe. This is the so-called firewire. Chairman Kennard had asked the industry elements participating in that

Steady As She Goes

How far are you willing to go to speed up the digital TV process?
Here's what I believe the fundamental obligation of the government should be. The American people made a huge investment in the broadcast industry by loaning the spectrum, and we've got to make sure that spectrum is used. That's why we came up with an aggressive build-out schedule, which we will enforce. That's why we are working with the industry to make sure that we can help facilitate tower sitings, so these facilities get built.

But beyond that, I become uncomfortable when we are being asked to basically define what the business plan should be for digital broadcast television. I talk to broadcast industry executives all the time, and they don't yet have the definitive business plan for digital television.

So I think that those of us in government, here at the agency and in Congress, should have a certain amount of humility. We don't know exactly how this technology is going to be best used in the marketplace. The people who spend all of their time worrying about how to amortize this investment don't have it all figured out yet.

And that's OK. Because, in the final analysis, there will be lots of digital business plans. Some broadcasters are talking about HDTV. Some are talking about multicasting. And all of them are making bets in the marketplace on what is the best way to amortize this investment.

It may be different for different companies, depending on whether they have content or not. It may be different depending on the markets they're serving. And far be it from me to

try to dictate what is the most acceptable way for that technology to be used.

I wasn't thinking so much of the business plan as the technological plant, and the infrastructure among they media. The compatibility issues. And the fact that the American public is going to walk into all those showrooms in November and December and find a set for $7,000 that won't receive cable. And that the broadcast signal can't be received in cable homes. That's clearly a serious issue, and we are working on that.
I sent letters to the cable industry and the manufacturing community in late summer, giving them a deadline of Nov. 1 to resolve the so-called firewire issue, the IEEE 1394 device issue. They missed by only one day. I think that is an appropriate role of government: to bring the parties into the room and try to facilitate compatibility issues.

What about the modulation issue?
I don't think it's appropriate for government to set the precise industry standards here, the technical standards.

Do you concur with the FCC's decision not to have any standards at all?
Well, we didn't have no standards at all. We set parameters on the standards. Like the transport scheme.

Yes. But the formats are all up in the air. Anybody can broadcast in anything they want.

effort to deliver by Nov. 1; they came in on Nov. 2. In a statement, NCTA and CEMA said: "Having now completed the baseline specifications for this digital interface, we believe some [set manufacturers] may produce 1394-enabled receivers with content protection technology for retail distribution by November 1999." Hollywood, has been terrified that the perfect pictures of a digital regime—and more particularly of HDTV—would lead to widescale piracy of its product. Although the actual copy protection mechanism is explicitly not part of the firewire agreement, it is moving forward in a parallel CEMA/EIA group.

Still another cooperative effort is the Cable Consumer Electronics Advisory Group formed by CEMA and the National Cable Television Association to develop a cable-ready DTV set (one that would not require a set-top box). Negotiations are now underway between cable and CEMA on the specifications. There also is an OpenCable project by that industry addressing short-term interoperability issues based on a component video interface that some set manufacturers have adopted.

Thus, there still remain technical problems standing between carriage of a digital broadcast signal by cable, as well as reception of a digital cable signal at the receiver. Just as broadcasters note that cable has

here was no mandated standard for VCRs; the marketplace worked that out. There was no mandated standard for PCs; he marketplace worked that out.

here was no mandated standard for AM stereo. And look what happened.

The marketplace decided that there was not enough of a eed for AM stereo for the marketplace to develop a stanlard for stereo, because people were getting what they eeded, stereophonically, from the FM band. I think there's lesson in that. I think it's important to recognize a couple f fundamental truths about digital television, from my erspective. First of all, it's going to happen. We are nvolved in a worldwide transition from analog to digital in very communications technology, and it's not as though

broadcasting is going to be singled out and remain in the analog world. It's just not going to happen. It's too revolutionary a technology for that to happen.

Second. Nobody—nobody—can predict, with any degree of certainty, how it is all going to work out. And it is not the sort of transition that lends itself to central industrial planning. There are too many industries involved. There are too many market variables involved. And there's a real danger that if we were to mandate a particular standard now, it would become obsolete very quickly. Digital television is a good example. Ten years ago, when people talked about digital television, all they talked about was HD. Because HD was the vision for digital broadcasting. Well, we all know now that there can be multiple visions for digital broadcasting, all of which have merit in the marketplace. If we had

known for years that they would be using VSB, so cable notes that set manufacturers have known for years that it would be using QAM. It is anticipated that all will be overcome. What will remain is the political issue of whether cable will be required to carry broadcast signals, in whole or in part. That is the thorny problem of must carry, about which more later.

Taking a philosophical perspective, some believe that just achieving this initial progress is a historic achievement that should not be minimized. One of those is FCC Commissioner Michael Powell, who said in an interview that "This is the most dramatic change in television ever. It's more important that it be done right, rather than just quickly for its own sake. The tail shouldn't wag the dog."

Powell, who at one point told a Washington forum that the introduction of digital was a potential "train wreck," goes on to say that, "In our haste, we could do it in a way that leads to an inferior product or a premature debut." Powell later said the train wreck analogy was a bad metaphor, but whereas many believe digital is in danger of moving too slowly, he believes it may be going too fast. "How is it that sets are going out this fall that can't work on cable?" he asks. "Nobody had to be a rocket scientist to know that 70% of TV homes were on cable."

"The early adopters can make a medium but they can also sink it," Powell says. "They better be

mandated that the only valid use for this digital spectrum is HD—well, some people would have been happy. But I'm not sure if, in the long run, consumers would be best served, because what's happening today? Consumers will get HD, plus some consumers will get standard definition in multicasting. This is a good thing in the marketplace. For 20 years, policymakers have been moving towards more of a market-based approach to regulation. And it's worked. Why, suddenly, should we reverse course because we have this digital broadcast technology? It's just sort of curious to me.

Do you think that, down the line, there will be a regulation requiring cable to must carry digital signals?
Here's my view on must carry. First of all, must carry is part of the Communications Act, so it's part of the law. The real question is how must carry should be implemented in the digital world. The broadcasters have come to the agency and they've said: "We want full must carry. We want carriage of the analog and the digital signal."

My response to that has been, you need to think through that request as a legal matter. Because I was general counsel here when we fought two cases in the Supreme Court, to defend the statutory must-carry requirement for the analog world, and it was not an easy fight. You know the case. We had to remand. We had to build a record. We had to go back up. And the Supreme Court recognized that the cable industry does have some modicum of First Amendment rights. Now, if the broadcast industry comes to the agency and says: "We want not one, but two, channels on the cable basic tier," my sensi-
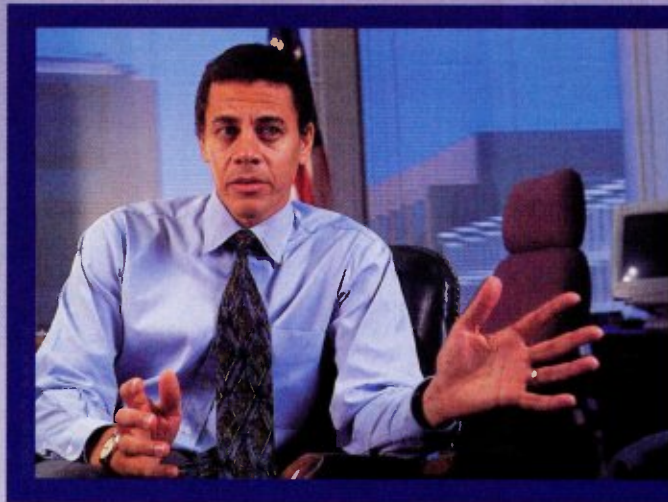
> **"I become uncomfortable when we are being asked to basically define what the business plan should be for DTV"**

bilities as a lawyer tell me, "Well, you've got to make the case for that." And that is going to be a fairly difficult burden. If you're telling cable systems, including those that are capacity constrained, to give two six megahertz channels to every local broadcast signal, I have difficulty understanding how we can make that case in the Supreme Court, and we know the cable industry is going to take this all the way, as they always have with must carry.

That speaks to the law. What is good public policy?
As a matter of public policy, I think we are entering an era where it's going to be incumbent on anyone who wants carriage on a cable system to be able to make a market case for it. Must carry is not really an issue for the major networks right now. Because they get carriage. They negotiate retransmission consent agreements. They don't necessarily receive cash, but there's consideration exchanged, and there's a symbiotic relationship there. The cable industry needs the network affiliates in order to pull together a package that's marketable to their subscribers. So must carry, as it traditionally has been, is really more of an issue for the independents and the upstart networks. They need to make a compelling case to

impressed. You can set acceptance back by taking one step forward and three back. Time is not infinitely malleable. Mistakes can have backsetting consequences." In the final analysis, Powell sees nothing wrong with considering relaxation of the digital deployment deadlines for broadcasters while other players in the digital equation are catching up. The complete Powell interview appears in the November issue of Digital Television magazine.)

The Powell point of view is paralleled by that of Decker Anstrom, president of the National Cable Television Association (NCTA). "I really hope, in terms of a spotlight here in Washington, we don't get people to think that, come Christmas, the stores are going to be crammed with all these sets and there will be hours and hours of programming, because there won't be. Or that their cable systems are ready go digital. Those of us in the cable industry continue to believe that the transition from analog to digital is an important and even historic one, but that it's going to take time. The thing we have to avoid more than anything else is unnecessarily raising expectations or rushing to bad judgments. We're in this field of dreams period right now. If we build it, will they come? It's the first stage of a very long process."

Anstrom said cable is spending at the rate of $6 billion annually to upgrade its plant infrastructure for digital and a whole generation of new services, including high definition. That process will begin

policymakers that they have a broadcast signal that uniquely serves the public interest, and if they're asking the government to go to cable—which has First Amendment rights—and ask it to basically prefer the broadcast speaker over their own editorial selections—well, that, in my view, is a fairly dramatic request to bring to government.

What was so bad about the idea of reconstituting the Wiley commission, and that you rejected so summarily?
I think that Dick Wiley did a masterful job with the advisory committee, but I also think that we've moved into a new phase with digital, and it seems to me that the DTV roll out doesn't really lend itself to central planning.

Do you think the marketplace will work fast enough to avoid a situation in which digital is introduced, nobody can work with it and everybody's unhappy, so the idea is rejected? That's my concern. Not that the problems won't be solved some day, but that they won't be solved quickly enough.
Well, I guess the message that I'm trying to convey is that a little bit of chaos is not a bad thing when you're rolling out a new technology, and multiple industries are developing business plans to market it.

One of the reasons why I didn't think an advisory committee, at this point, makes sense, is because I think the broadcast industry has already made some fundamental choices about the digital standard. And they're going to have to live with those decisions. You know, the VSB standard is one that the broadcast industry embraced. It is not that flexible a standard. For example, it doesn't lend itself to mobile applications. So if one application for digital is to have a mobile technology—which I could see could be really quite valuable in the marketplace—broadcasters and their engineers have decided this is not what they want. And so to convene another advisory committee and start reversing some of those basic decisions seems to me to be an invitation for another 10 years of handwriting. I believe there is enough market pressure driving toward solution of the modulation conflicts that either the engineering community or the technical community will develop that solution. Or not. But it's not going to be mandated by lawyers and engineers sitting in a room in Washington.

What will be your thumbprint on digital TV?
Well, we are going to make sure that this spectrum is used, and we're going to aggressively enforce the build-out schedule.

On broadcasters?
Yes.

How about the rest of the world? The gatekeepers that are going to slow this down. Broadcasters can build like crazy, but cable's got 70% of the penetration.
But broadcasters do have an alternative delivery system to digital. It's an over-the-air technology. Cable is not their only gateway into America's homes. And some innovative people are thinking more about the over-the-air delivery aspects of digital than cable, and that's a good thing.

Yes, but it's a hard row to hoe. But while we're on that subject, what about the idea of a strategic alliance between broadcasters and satellite?
That makes a lot of sense for a number of reasons, not only to spur the roll out of digital, but also to bring more competition to cable. And I'm a staunch supporter of local into local. It's my hope that this controversy we're having about the Satellite Home Viewer Act will put more momentum behind efforts to get local into local, because I think that would be a good thing for consumers. My general response to all these issues is not to say: "Well, we've got to have a solution faster." Some of these decisions can't be rushed. The marketplace is going to work them out as quickly as it can. ■

think
bigger
[wide screen view]

think
sharper
[crystal clear picture]

think
better
[unbelievable sound]

think
zenith
[the people who bring you HDTV]

When HDTV was just a concept back in the 1980s, Zenith was there. We were the first TV manufacturer named to the FCC's blue ribbon panel of HDTV standard-setting experts. We developed one of the first prototype HDTV systems, and we were the first to use digital technology and propose computer-friendly progressive scanning. We were the first to develop a broadcast system that won't interfere with today's TV signals and the first to introduce an HDTV-ready projector. We were a founding member of the Digital HDTV Grand Alliance and earned an Emmy for our pioneering work.

Most significant, Zenith developed the digital transmission system adopted by the FCC as part of the ATSC DTV standard.

So, as America ushers in the digital HDTV era, you can count on Zenith to be there with leading-edge, easy-to-use technology, just as we have for 80 years. When you think HDTV, think Zenith. Bigger. Sharper. Better.

zenith Z

#N8080-1098

to kick in in late 1999/early 2000 when most urban and suburban cable systems—serving roughly 75% of cable's customers—will have been largely rebuilt to 750 Mhz, with rural and small-town systems taking some seven years to reach 550 or 750 Mhz capacity. "When we finish our rebuilds we'll have much more capacity to offer more high definition than anyone else," Anstrom says. On top of that is deployment of digital set-top boxes, with hope of having an interoperable model (that could move with a sub-scriber anywhere in the United States) by July 2000. They would be available either from a cable operator or a retail outlet.

Moreover, in collaboration with Hollywood and the set manufacturers, cable is coming to grips with the firewire problem that exposes programmers in terms of copyright protection. He expects cable net-works to begin transmitting high definition in the first or second quarter of 1999.

Anstrom emphasized cable's early-on digital enthusiasm and said it wouldn't be the last to ful-fill the medium's promise. "From our perspective digital allows us to be more efficient in terms of delivering more signals, and we know that people always want more. More choices, more options, more opportunities. It's also at the core of our abil-ity to offer high-speed data and Internet access services, which we believe is going to be a huge new business for the cable industry. And then there's high definition as well."

Anstrom also pointed out that broadcast net-works and major MSO's were negotiating retrans-mission consent agreements for digital program-ming even now, hoping to avoid governmental intervention and to create a new revenue stream even in the early days of DTV product. "We serve nearly 70% of the homes in this country," he said. "Our customers are going to want digital and high-definition television, and we'll deliver it. But," he cautioned again, "these things don't happen overnight."

Even while professing his commitment to the medium, the NCTA president continued to sound a "realistic" and "methodical" alarm, and to keep broadcasting digital at arm's length. "We weren't the ones who went out and asked for free spec-trum. We weren't the ones who agreed with Chair-man [Reed] Hundt on a schedule for deployment of digital television. We weren't the ones who cre-ated a lot of expectations about Christmas 1998, and hundreds of thousands of television sets being out there. And I think people now have to take a deep breath and come back to the fundamentals. All of this is really complicated. It doesn't lend itself to rigid timetables."

A funny thing hap-pened on the way to digital TV: the whole world of electronic communications turned upside down. Hear Paul Misener, now the chief of staff to FCC Commissioner Furchtgott-Roth, who was in the early 1990's the right hand to Richard E. Wiley in inventing the new medium:

"It would have been so much more simple had other things not happened in the decade since the FCC began to investigate advanced television—so many other changes in the communications world that dramatically affect the role of television, ana-log or digital, in people's lives. You can't have a
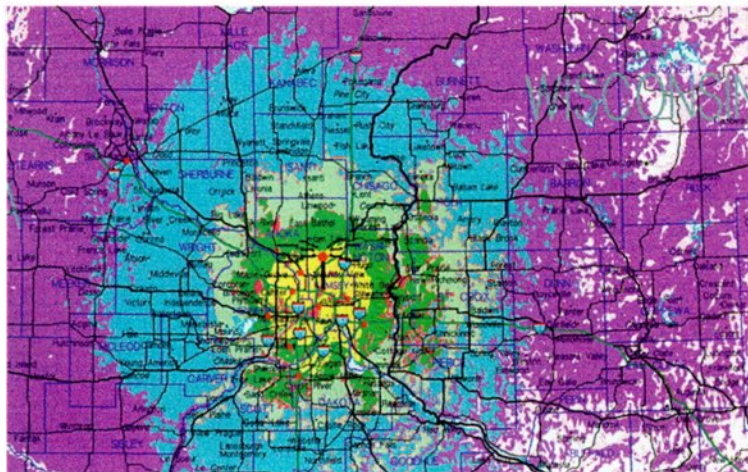
Minneapolis-St. Paul, MN TV Antenna Selector Map: Now you see it, now you don't.

conversation in Washington without mentioning the Internet. And it's not just that. It's computing technology, it's digital technology, not just digital transmission of TV pictures but digital everything, that has increased the flexibility of all media. One way to look at the Telecommunications Act is as a recognition, albeit incomplete, that technology has become so flexible that virtually any kind of ser-vice provider can provide any kind of service. Telephone can now do lots of things that go well beyond the voice conversation. The obvious is data. There are, of course, faxes and now video and all sorts of stuff over a twisted pair of copper.

"Cable, instead of just being this one-way, multi-channel video delivery service, now has all these other capabilities tossed on. The cable plant is being rebuilt for bi-directional use, largely for Internet connections. All this is going on while there's this debate over exactly how we transition broadcasters to the next level of technology. And the beauty of it—the positive, easily understood aspect of all that's going on—is the invention of digital trans-mission by General Instrument in 1990, when it decided to take some of its black box defense tech-nology and apply it to video transmission. That's when they whispered to Lex Felker and Joe Flaher-

The one partner who lets you lead.

Converting? Consolidating? Confused? You need a partner who knows all the intricate steps necessary to take you to your next level without stepping on any toes. You need a partner who can take your lead and support you with 77 years of broadcast leadership. You need Harris Broadcast Systems. From studios to mobile systems, from transmitters to antennas, from components to networks, Harris is your single-source provider for TV, radio, and systems integration. So when you're ready to take those next steps, give us a call. We'll be more than happy to put you on our dance card.

next level solutions

WIRELESS

BROADCAST

COMMUNICATIONS
PRODUCTS

HARRIS
Communications

1-800-4-HARRIS ext.3056 ▪ www.harris.com/communications

ty and Dick Wiley and the advisory committee that this might be possible for over-the-air.

"But in the background, all this other stuff is changing. Some people are spending more time in front of PCs than in front of TVs. They're beginning to enjoy the interactive aspects of Internet communications, of e-mail, of web surfing. The development of this wonderful and glorious digital standard has not been in a vacuum. Television broadcasting used to be in a class by itself and was treated separately. Now it's one of many digital devices and technologies and delivery systems out there, and that is going to change the policymakers' analysis of it slightly. But probably the best news of all is that we're becoming less and less important in this whole thing, we policymakers."

There are two views of the political process that led up to digital's adoption: Reed Hundt's and that of everyone else. The penultimate FCC chairman was viewed as a foe of HDTV, despite public pronouncements to the contrary, and was considered by insiders to be carrying water for Microsoft's Bill Gates. That meant progressive at all costs, 1080 at no costs and, in the end, no governmentally mandated standard.

"We wasted two years, thanks solely and personally to Reed Hundt," says one who was close to the process. "He dissembled and screwed everything up. The Grand Alliance (AT&T [Lucent], General Insrument, MIT, Philips North America, Sarnoff Corp., Thomson Consumer Electronics and Zenith) almost fell apart over his insistence on incorporating standard definition TV, which wasn't in itself a bad idea, but one the world already knew how to do. And then, after it was incorporated, he said he didn't want a standard anyway. First he would encourage the process, then he would ignore it. All in all, he cost us an extra two years and it made broadcasters and the manufacturers that much more jittery about going forward. When you think about it, that means the cable interface problem we're still dealing with today could have been solved two years earlier."

Hundt's basic problem, in the minds of many, was

Footnote: Under the ATSC standard the continuous MPEG-2 transport stream rate of a 6 Mhz digital channel is 19.392658 megabits per second (Mbps), rounded generally to 19.4. Some in the industry, however, use the lower number of 19.3 Mbps, referring to the approximate digital payload after the MPEG packet sync signal has been taken away. For the purposes of this article, and consistency, "The Dawn of Digital Television" has chosen to use 19.4 Mbps throughout.

that he didn't believe in broadcasting, much less in HDTV. He was said to feel the spectrum could best be used for other purposes, and that television should just be carried by cable. Indeed, the FCC order setting aside the digital frequencies requires only the broadcast of one signal equal in quality to existing television (NTSC)—requiring as few as 4 to 6 megabits in each 19.4 Mbps* (6 channel)—leaving some 13+ to 15+ megabits to be used for any other digital purpose. Some see significance in Gates' having asked, on a visit to the FCC, how much it would cost for him to purchase 6 Mhz nationwide, presumably for a Microsoft-owned network that could broadcast minimal conventional television while concentrating on data and other digital purposes. Coincidentally, producer Steven Spielberg arrived at the FCC to complain about the 16:9 aspect ratio, saying it should be 2:1 to more nearly match theatrical screens. Both incursions were short-lived but effective in their impact on the process.

On top of that, according to this source, "Gates just didn't want to put what he thought was costly computing and de-interlacing circuitry into a computer, and he was willing to scuttle all the broadcasting industry's plans to get his way, not even knowing what he would do if he won." In the end, he did win. The FCC's final action was to adopt the DTV transmission standard put forward jointly by the Wiley advisory committee and the Advanced Television Systems Committee (ATSC) in a 60-page plan, minus one-half page—Table Three, which defined all the 18 video scanning formats. That means a licensee can transmit any video program format he can devise. The miracle is that all the manufacturers and broadcasters, in an effort orchestrated by ATSC, have so far stuck together voluntarily to offer the 18 formats, creating a de facto standard. But that could change. The standards could be narrowed by attrition, or expanded—in a closed system, such as the direct satellite platform—by some new approach, leaving the consumer in the position of trying to catch a moving target.

Reed Hundt, not surprisingly, has a dramatically

> "If I were to put my finger at a time to really begin to watch this move, it would be Christmas 1999."
> —NCTA's DeckerAnstrom

DTV:
We're ready.

abc

different view of the process. He believes broadcasters had no business plan in mind for the high-definition TV they were pursuing when he came into office, and no conception at all of the digital universe they were entering. Hundt believes DTV can be the salvation of over-the-air television if it will but end its reliance on government and embrace the marketplace—an opinion echoed by Blair Levin, the FCC's chief of staff during the Hundt administration, who says: "The best things we did [concerning digital and HDTV] are the things we didn't do." Nor does Hundt shy away from many of the accusations made about him. Yes, he insisted on SDTV, and he was close to Gates. "I begged Gates to get inolved," the former chairman says.

(Excerpts of the Hundt interview appear on pages 20 through 23.)

Wiley thinks the computer problem will work itself out. "The computer people have always had the right vision for themselves and for the public—a vision of smaller screen, up close, progressive scanning and a lot of information for their audience. Where they went wrong was in trying to impose their vision on other industries. Broadcasters have a vision too, which is wide screen and vivid pictures. The two may converge in the future with PC/TVs. But, again, I don't think we should let one industry foreclose another industry's vision."

Technical Considerations

T rying to understand the digital dilemma is like trying to hold mercury under your finger; it keeps squirting off in another direction. Nevertheless, a review of the technology is essential to keeping up.

The Grand Alliance system of digital television partially adopted by the FCC enables transmission of a single high-definition program or several so-called "standard definition" (SDTV) programs with clarity similar to today's TV. In broadcasting, as many as four or five SDTV signals can be transmitted simultaneously within a broadcaster's 6 Mhz channel. Cable television, using its own digital transmissions, might carry upwards of 12 signals within each of its 6 Mhz channels. The capacity for simultaneous data transmissions on either broadcast or cable boggles the mind.

There are two big differences between today's analog broadcast and cable television systems and their new digital counterparts. The first is the relative freedom from interference that digital provides. No longer will "ghosts" appear around characters on the screen every time an airplane flies over. No longer will "snow" obscure the football game when your neighbor decides to vacuum his carpet. And no longer will people on the outskirts of town be relegated to cloudy, fuzzy broadcast pictures.

Of course, they may get no picture at all. With digital, either you get it or you don't. Those who do will get a crisp, interference-free picture. Those who don't—as they do now—may have to rely on cable or satellite for their video input.

The second big difference between digital and the existing analog television system is that one is malleable (digital) while the other is not (analog). In digital, all transmissions are reduced electronically to a code of 0's and 1's, the same kind of magic that makes computers possible. In that form, they can be manipulated in a number of ways to rearrange the picture elements as operators and the mix of services see fit. That has been going on for years inside the television plant, and conspicuously within such devices as character generators and servers.

Analog is much more "what you see is what you get." The picture essentially goes in and comes out the same way, occupying the same amount of spectrum space no matter what. Digital programs take up only what is required for a particular unit of information. For example, a 6 Mhz digital broadcast channel is capable of carrying 19.4 Mbps of information. A motion picture broadcast in full HDTV at 1080p/24 frames a second may take up 13 or 14 Mbps. That leaves enough spectrum to broadcast, say, two 480i or p programs simultaneously. Thus the efficiency of digital, and the temptation to multiplex—that is, to broadcast several programs in one 6 Mhz channel.

(However, a football game broadcast live at 1080i/60 fields would take up nearly the full 19.4 Mbps and leave no room for multiplexing. Hence the temptation for television operators to opt for the lower resolution levels.)

Chuck Sherman, executive vice president for television at the National Association of Broadcasters (NAB), says that future general managers will have two budgets to worry about—their normal operating budget and the budget for bits. Making maximum use of digital spectrum will be like filling airplane seats, he said, or maximizing the sale of commercial inventory before it's gone forever. He says, however, that multiplexing on a regular basis is at least five to 10 years away, awaiting

> "A terrific display shows all the quality, and it shows all the flaws, too. If they make a lousy-looking picture and put it on a good display, I assure you it looks like a lousy-looking picture."
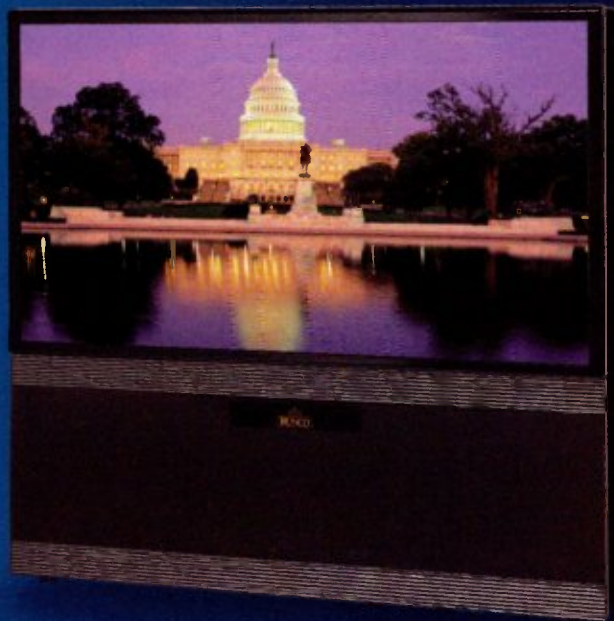
sufficient digital penetration to make it fly.

The secret to digital malleability is compression. In analog, all elements in a scene are captured, transmitted and displayed over and over again in each succeeding frame. In digital, a picture element that does not change or move is captured only once and is thereafter ignored or refreshed only periodically. All those bits that might have been used to capture non-changing picture elements are saved in digital, allowing the overall picture to be "compressed"—that is, sent using fewer digital bits. Without compression, terrestrial HDTV in 6 Mhz would still be beyond reach. An uncompressed HDTV signal at 1080i, for example, might require 27 Mhz to transmit, the equivalent of almost five normal television channels.

The good news is that compression enables the best of signals to be transmitted. The bad news is that there is no limit to how bad a signal it makes possible, if the provider so decides. HDTV can compound the problem. As one source put it, "A terrific display shows all the quality, and it shows all the flaws, too. If they make a lousy-looking picture and put it on a good display, I assure you it looks like a lousy-looking picture. Every manufacturer is making better and better displays. In current resolution, everything's becoming crisper. In high resolution everything's becoming startlingly better and cleaner. The better the displays get the more you'll see the bad stuff."

Cable, in a sense, gets two bangs for every digital buck. Its 6 Mhz channels afford just under 40 million bits per second, compared to broadcasters' just under 20 million. By definition, therefore, over-the-air broadcasting is a tougher trick, with some of the transmission devoted to protecting the signal from interference. On top of that, cable can use its existing plant architecture for digital—the same wires, the same repeaters, the same amplifiers. It's a matter of how the signal is put in at the headend and taken out at the set-top box. One observer, emphasizing these advantages, said: "Digital is a no-brainer for cable." Nevertheless, those in that medium would note that cable still has to build its plant one home—and one digital box—at a time, and at a current capital expenditure of billions annually.

The Grand Alliance system incorporates 18 formats, but in actuality there are 36—matching precisely multiples of the existing analog system's field rate. Only 14 are for conventional television—the four 480 lines/640 pixel formats are for computers (VGA). The FCC does not require broadcasters or set manufacturers to use any or all of the 18 formats, which break down into two general video scanning schemes, interlaced (traditionally preferred by broadcasters) and progressive (preferred by most in the computer world and cable). They then divide into three basic resolution modes—that is, the number of vertical lines per screen. Those choices are 480, 720 and 1080, which further break down into aspect ratios and picture rates. Thus we speak of 480i, 480p, 720i, 720p, 1080i and 1080p. Regrettably, at present, no one now knows how to do 1080p at 60 frames, the rate required for live or electronic TV, because the bit rate exceeds 19.4 Mbps.

Then there are the pixels—the number of picture elements in each line of horizontal resolution. The ATSC DTV standard calls for 704 pixels (for the 16:9 or 4:3 aspect ratios) or 640 pixels (for 4:3 only) in the 480 format. There are 1280 pixels in 720 and 1920 pixels in 1080 (both 16:9 only). Generally speaking, the objective quality of a picture is determined by multiplying pixels times vertical lines. At the low end for conventional TV (omitting the computer formats), 480i/704 produces 337,920 pixels, 720p/1280 produces 921,600 pixels while high-end 1080i/1920 produces 2,073,600 pixels—1,152,000 more than 720. The argument comes in when you consider frame rates: interlace pixels come in every 30th of a second while progressive pixels come in every 60th of a second—twice as fast.

If that weren't complex enough, there are three frame rates—that is, the number of individual snapshots transmitted each second. They are 60 frames per second interlaced and progressive (for live transmissions), and 60 frames progressive, 30 frames progressive and 24 frames progressive for film. Interlace, itself a veteran compression technique, is considered by some to be better for motion while progressive is favored for graphics, but you can get an argument on that subject in any bar frequented by two or more engineers. All computer displays are seen in progressive, which explains that medium's hope that broadcasters would choose that format.

For Those Keeping Score, These Are the 18 Formats:

	Lines of Vertical Resolution	Pixels	Aspect Ratio	Frames Second and Scanning Format
HDTV	1080	1920	16:9	60i
	1080	1920	16:9	30p
	1080	1920	16:9	24p
	720	1280	16:9	60p
	720	1280	16:9	30p
	720	1280	16:9	24p
SDTV	480	704	16:9	60i
	480	704	16:9	60p
	480	704	16:9	30p
	480	704	16:9	24p
	480	704	4:3	60i
	480	704	4:3	60p
	480	704	4:3	30p
	480	704	4:3	24p
	480	640	4:3	60i
	480	640	4:3	60p
	480	640	4:3	30p
	480	640	4:3	24p

Broadcasters, who see convergence a long way off, if ever, believe the computer industry should go the extra mile to convert interlaced programs into progressive in the computer. Intel, among others, has been developing chips to do so, and other manufacturers are reportedly working on new computer cards (chips) that will handle all broadcast and cable formats along with all computer formats.

The two 480 formats are essentially equivalent to present day NTSC (National Television Systems Committee) transmissions. Both 720p and 1080i are acknowledged as HDTV, although the latter delivers more than twice as many pixels per frame while the former delivers twice as many frames per second.

The lowest-cost way for broadcasters to proceed into digital is simply to digitize their present 480i transmissions—essentially the technical scheme for direct broadcast satellite today, which begins with an analog signal, transmits it in digital and then brings it back to analog at the set. The next most economical way is to go 480p, although that requires an investment in progressive equipment or new, switchable 480i/p equipment.

The 720p option has appeal for a number of broadcasters who think it high enough in quality to satisfy the public's itch for HDTV while being more readily in sync with digital displays and computer data formats and conserving spectrum for data or multiplexing. (CBS's Joe Flaherty is

Reed Hundt's
Majority of One

The former chairman of the FCC was at odds with broadcasters almost from the first day of his administration, and things haven't changed much over the years. He heard a different drummer than did his predecessors—on HDTV, particularly—and insisted on relying on the marketplace rather than industrial policy. History will judge the rightness of his point of view. The Dawn of Digital began this interview with Chairman Hundt—now in private practice—by reciting criticisms that had been leveled against him by others.

Hundt: First of all, what the high-definition story is all about is a misnomer concealing a lobbying strategy which in turn surrounds the lack of any business plan. I came to this conclusion with astonishment and sadness after more than a year, all through 1994, of studying the issue. I was stunned to discover how insignificant were the resources devoted by broadcasters to research on this topic. Even now, years later, it turns out that the so-called Grand Alliance did not have a good plan with respect to the cable conduit or with respect to antennas. Even now, it turns out that they have never done adequate testing for multicasting. Even now it turns out that their field testings were less robust and less reliable than testing of virtually any other technology in any other market.

I'm sorry all this is true, but the reality is that when you rely on the government and your lobbyist to make your business plans you're stepping out on a sheet of ice and you're going to break through and find yourself up to your neck in cold water.

The truth of the matter is that there never was any groundswell among broadcast licensees to go digital. There never was any self-initiated entrepreneurial business plan to pursue this opportunity. There was only a broadcaster-manufacturer-lobbying alliance to make sure that the licenses were awarded to a select group instead of put on the market for sale to whoever really wanted them.

It's also clear that if local over-the-air broadcasting is going to survive on a long-term basis, it will only be by going digital.

For multiplexing?

For all the ways that digital is relevant. One, delivering more bits—which can be voice, video or data. In other words, more. Two, for compatibility with all forms of receivers—and I mean not only PCs and TVs, but the real reality of 10 years from now, which is heterogeneous devices that fundamentally are receivers of digital bitstreams. Three, for the purpose of strategic alliances with other industries, such as telephone and satellite. And four, for the new media, for the new forms of content that fundamentally will be digitally-based. So it had to be digital.

Here's what it did not have to be. It did not have to be a single pretty picture. And that's why the very first thing I did

among those unconvinced of 720's frugality. By his calculations, 720 at live or electronic rates—60 frames—uses eight-ninths the bit rate of 1080i/60, while only film transmissions at 24 frames can fit two programs into one DTV channel simultaneously.) The "picture on the wall" displays, using a plasma technique, will be progressive scan at 480, 720 or 1080. One of the superb advantages of digital, of course, is that the transmission mode need not be the display mode. For example, a signal broadcast in 480p can be displayed at the set in 1080i (scan-converted), although the quality may suffer, particularly on large-screen sets. Conversely, a DTV signal broadcast in 1080i can be received and scan-converted to 480i—and,

through a set-top box, converted to analog for display on an existing NTSC set.

The new DTV aspect ratio is another complicating consideration. The analog television picture is 4:3—four elements wide by three high. Digital is 16:9, similar to the dimensions of a theatrical screen and more in keeping with the eye's viewing propensity. It is the aspect ratio that forces television to scrap its present sets in favor of a new generation, or go through the rest of time with black bars over and under or around its picture. (Proving that there are no absolutes in digital, that statement, too, is subject to challenge. Devices have been developed to stretch or reposition 4:3 pictures to 16:9, and vice versa.)

> **"If free TV is surviving as a cable transmission, then I say why are we talking about digital transmission over the air? It's only an over-the-air medium that is truly universal."**

was to say: "This isn't high definition. It's digital." Even now there's a strong school of thought, including lots of people in Congress, who just don't get that and don't believe it, and who think that the future of broadcasting is just a prettier picture.

I think fundamentally, one, it's wrong and, two, it's an attempt to dictate to the marketplace that which the marketplace will decide on its own—namely, what do consumers really want. And so the outcome for me—once I really formed a view on this—was that this was a classic case of the United States pretending to be Japan.

What does that mean?
Meaning let's have the government and a couple of representatives of selected industries decide what consumers are going to buy, without ever relying on competition or the reality of the marketplace to make that determination. I didn't want and I'm proud that I didn't have any part of that.

I did not buy into the plan I inherited, and it is not now the rule. So we got rid of simulcast. We got rid of the HD require-

ment. We got rid of the standard. We got rid of basically all of the key tenets of this, in my view, bankrupt policy.

The bottom line here, the virus here is governmental involvement and it infects everybody—senatorial involvement, FCC involvement. For broadcasters to be successful on a long-term basis in this intensely competitive world, one, they have to go digital and, two, they have to go without the government. They have to do their thing their way, market by market by market, and they have to stop thinking that the government will save them or will help them or will condition them or will constrain them, or anything.

It's hard to go without the government when you're a licensed medium.
Actually, it's easy to do, if you just adopt that as your view. Although there are constraints: newspaper-broadcast crossownership, cable-broadcast crossownership constraints, the ones that we got rid of like the financial interest-syndication rules, the prime time access rule, these have economic significance. They all should be eliminated. You've got to get rid of

Digital also plays to six-channel Dolby surround sound, a technology already popular with audiophiles and subscribers to direct broadcast satellite. In the opinion of many, it is this sound capability that truly distinguishes DTV from other media, and that will account for much of its popularity in the marketplace.

Policy and Politics

When the FCC first set up its advisory committee on advanced television, it had only HDTV in mind. The chairmen of that day—Dennis Patrick, who began the process, and Al Sikes, who took up the baton and pressed for an all-digital solution—wanted the country to enter the next century with a new transmission system that would dwarf the existing NTSC. It was Chairman Reed Hundt who turned away from a concentration on HDTV and insisted that the advisory team concentrate on including standard definition TV—that is, 480i or p—and make concessions to the computer industry. It was Hundt, too, who led the commission into a marketplace policy of imposing no single digital program format standard on broadcasters. (The FCC did, however, adopt mandatory standards for digital compression, transport and transmission.) The FCC has no authority to impose transmission standards on cable.

Cable and the computer industries, to which large HDTV displays in 1080i were not as important as multiple channels progressively scanned, lobbied

all of this for broadcasting to survive as a viable free over-the-air local medium. I mean all of those things: free, over-the-air, local. For it to survive, it's going to be necessary to get rid of all of those constraints.

Why? Isn't the industry doing well now? I know that ratings are off.
No, no, no. This industry as an over-the-air medium is not doing well now. See what I'm saying here? I'm not being clear. Over-the-air, over-the-air, over-the-air. How many people are watching broadcasts over the air?

Oh. OK.
If free TV is surviving as a cable transmission, then I say why are we talking about digital television over the air? I don't have any doubt that an individual broadcaster armed with must-carry rights and armed with franchise rights as to content can in effect buy a cable channel. He can acquire a cable transmission right digitally on a long-term basis. But that is not a free over-the-air medium. And all of this is supposed to be about not just preserving the economics of a particular business, you know, like a station group. It's really supposed to be about preserving a free over-the-air medium, because it's only an over-the-air medium that is truly universal.

But that medium, that free over-the-air medium, is seriously jeopardized when virtually all of the network strategies do not depend on over-the-air.

What do you think of a strategic alliance with satellite?
Terrific. Great. Go for it.

Would you not say the same thing about a strategic alliance with cable?
The problem is that satellite is over-the-air and universal and cable is not. If you do the deal with cable—which broadcasters are apparently doing again, for the second time—you are cutting yourself off from the universality of any over-the-air transmission system.
So you do believe in over-the-air, contrary to what's been said of you.

I believe this. I believe the only reason why government should care about broadcasting is that it is universal, and it's the over-the-air dimension that makes it universal. Do you see what I'm saying? I mean, poor people and old people and people with second television sets and all of that aren't reached by a monopolist cable connection, and never will be in any time frame we can imagine. If you want to preserve that there's no reason for any government role whatsoever. If you want to preserve that then, boy, it better be digital and it better be that your policies at the government level create every opportunity in the world for digital alliances.

Now, the logical ones are satellite and telephony. You also need to open the door to newspaper/broadcast combinations that will strengthen both of those industries, both of them being industries in trouble.

Why telephony?
Telephony solves your two-way problem. In other words, a telephony/over-the-air broadcast combination is one in which the two-wayness of telephony complements the universality of the broadcast. And, of course, when I say telephony I'm also thinking of wireless telephony.

So let me give you an imaginary combination. The local telephone company and the local broadcasters sell to the consumers a package that is a local area network in your house, a wireless LAN in your house, and a broadband digital bit-stream from your television station and a narrow-band connection on your telephone line. And then the services are voice, video and data. That's a darn compelling proposition, and that competes vigorously with cable.

Another way to go—and I don't think this should be mandated by government—would be a satellite combination. But then the broadcasters should very aggressively be promoting changes in the law to allow satellites to pick signals up and send them back down. Instead of being the enemies of change, they should be for a change in the law in this respect.

But here's my main point, that local broadcasters and broadcast groups have regrettably become addicted over the

against federally-mandated standards and for flexibility (SDTV as well as HDTV). Some broadcasters agreed, hoping that multicasting—that is, broadcasting a number of channels simultaneously—would produce more revenue than would HDTV.

There is no unanimity among the four major networks as to which way to go. CBS, influenced importantly by Joe Flaherty, is the most enthusiastic about 1080i. (Flaherty not only is the CBS senior vice president for technology but shares credit with Dick Wiley as the father of HDTV.) Fox and ABC are the least enthusiastic. NBC is somewhere in between. None of the networks has yet made known a business plan for multicasting, although such broadcasters as David Smith of Sinclair are vocal on the medium's prospects. At the

dawn of digital, however, Sinclair is waiting and seeing, neither multiplexing nor going HDTV.

Those who feel digital is getting off to a rocky start usually point to cable as the problem. That medium now effectively controls access to some 70% of American TV homes, although both terrestrial and satellite broadcasters have access to those same rooftops, and broadcasters' new digital spectrum has distinct advantages in competing with cable on a reception-only basis. Cable has only limited plans to pass broadcast signals, and those on a pay tier. Its modulation technique of choice (QAM) is incompatible with the Grand Alliance's or ATSC's VSB. The first digital sets will not be equipped to receive digital cable without a set-top

"I hear a sucking sound of broadcasting being pulled into the cable system... Once national advertising goes somewhere else you know the jig is up."

are over 210 million freestanding analog TVs out there, blah, blah, blah. Who are they kidding? You know, 120 million of them are already connected to cable. Logically, they are not going to be replaced by $7,000 receivers, not when the cable industry is going to offer $200 modems. And those numbers—the cable connections and the watching of cable channels instead of broadcast—appears to be moving inexorably by two or three percentage points a year, year and year out. Over a 10-year period you get to a tipping point. When you get down to 30%, 35%, 25%, then somewhere down the line, below where we are now but above zero, somewhere the advertisers actually just move—lock, stock and barrel. Once you lose universality you lose national advertising. Once it goes somewhere else you know the jig is up.

Now an individual broadcaster armed with must carry and armed with proprietary rights as to content—well, the day comes when he just turns off the power and becomes an incorporeal business, one that simply has a cable channel. Fine, no problem. They'll make money. They'll have brand names. But that's the end of the free over- the-air transmission.

decades to the idea that the lobbyists will just take care of their business. And it's not going to happen over the next 10 years that way. I'm not saying they're doomed tomorrow. I'm saying that 10 years from now, if people don't come up with entrepreneurial ideas, the broadcasting industry will be basically so diminished from what it is today as an over-the-air medium that it will be unrecognizable and not the factor it is today in our culture or in Washington.

Cable does not give us universality. Why do we have universality in telephony? Because we have government regulation of plain old telephone service that flattened the price so low that we have 95% penetration. We don't have that in cable. The 1992 Cable Act specifically denied the federal government the ability to set the prices on the entry package and gave that power to the localities, which did not use and do not use it to create a vanilla service. That's why we don't have universality on cable.

So the thing lost in this migration that I fear is the universality of the medium. I hear a sucking sound of broadcasting being pulled into the cable system. And everybody says there

Do you have any specific rejoinder to the remarks about you and Bill Gates?
I begged Gates to get involved. I wish that he'd gotten more involved. I wish the whole PC industry was more enthusiastic about merging with broadcasters. I wish that the PC hardware people had more enthusiasm about joint ventures with TV manufacturers. The problem is that, by and large, the PC and hardware and software industries don't believe in the future of, one, TV manufacturers and, two, broadcasters. So they have devoted their attention, as everybody sees, to cable. It takes two to tango.   ∎

The Origin video computing platform. It's about time. It's about money.

ON AIR

It's time you had everything you wanted, everything you needed and everything your competitors didn't want you to have.

Time will tell which digital television formats are best for your business, so the Origin™ video computing platform supports them all. From 1080I, to 720P to SDTV, multi-channel playout to hundreds of simultaneous MPEG streams, run them all today.

SDI
DVCPRO™
MPEG 1
MPEG 2

ORIGIN
VIDEO COMPUTING PLATFORM

HDTV ↔ SDTV

UP TO
100
MPEG 2
STREAMS

w w w . s g i . c o m

Time also changes everything so we've given the Silicon Graphics platform more scalability and flexibility than any dedicated box. Store weeks of video on-line, browse clips at any desktop, or build a more efficient automated news production operation. Want advanced graphics? Silicon Graphics workstations are at the heart of today's HDTV on-air graphics offering power and flexibility.

When you're ready to see what the most widely-used open system in the industry can do for you, visit us at www.sgi.com/broadcast/. But don't wait too long.

Time is money and of the two, we can only make you more of the latter.

SiliconGraphics

box—a decision attributed by cable to the consumer electronics industry. And the first digital boxes the cable industry has deployed will not pass a broadcast DTV signal. Interoperability remains out of reach although not out of sight, depending on development of the right digital boxes.

The fact is, cable has a different vision for digital. It wants to compress as many signals as possible into its existing plant, avoiding the need for costly upgrades. That's particularly true of its second-largest operator, TCI, which has led the way in standing pat on digital upgrading. Others, like Time Warner and Cox, are in the "big pipe" cable category. Moreover, all in cable are concerned that if broadcasters take the high-definition route, and then secure must carry, they will have to drop some of their own programmers. (One of the most vocal naysayers is C-SPAN's Brian Lamb, who has yet to get his C-SPAN-1 on every cable system, much less C-SPAN-2, and fears wholesale displacement if digital must carry is imposed.) TCI's John Malone, making clear his reluctance to accommodate broadcast HDTV, has called 1080i a "spectrum hog." (A single 6 Mhz cable channel, wider than a broadcast channel, can carry two 1080i programs, but can carry 12 to 24 in 480. TCI reportedly reduces some of its 480 program transmissions to 240 lines, a quality approaching VHS, and occupying only 1.4 Mbps.)

The cable strategy is much more akin to Microsoft's, which may partly explain the enthusiasm shown by Bill Gates' participation in Comcast and that of his former partner, Paul Allen, in buying into Marcus Cable and, prospectively, Charter Cable. Indeed, cable's technological attention has been turned to the development of high-speed modems to compete with the telephone companies for Internet access and IP (Internet protocol) telephony.

The Satellite Option

The most dramatic prospect on the digital and HDTV horizon is the possibility that terrestrial broadcasters will strike a deal to have their signals joined at the hip with direct broadcast satellite providers. That's the vision of DirecTV President Eddy Hartenstein, who has from the beginning set aside channel positions 1 through 99 on his DBS system in hope of one day incorporating broadcasters. Thus, rather than relying on cable's multi-channel providers to reach 70% of the country beyond existing broadcast antennas, broadcasters would bet on satellites to help build their digital base.

This is how it would work:

DirecTV would operate just as it does now, digi-

tally, to an 18-inch dish at the consumer's home. Local broadcasters' analog and digital transmissions would be picked up by an independent antenna, roof-top or otherwise. (Because most digital will be in the UHF band, that antenna could be smaller than the six-foot arrays that festooned rooftops in earlier days.) The existing DirecTV digital-to-analog receiver would be replaced by a device that would combine all the signals, along with a fully integrated navigation or guide system. (That receiver might cost $400 initially, essentially equivalent to one of cable's digital boxes.) DirecTV has already made arrangements for such an element to be incorporated in all digital sets produced by Thomson (RCA) and Hitachi, and is making similar arrangements with other set manufacturers.

Independent of that potential alliance, DBS will be a medium with which to contend. DirecTV's own feeds and those of HBO will dwarf those of other providers at digital's outset, and are likely to be among those relied upon to demonstrate digital in the nation's television showrooms. It will take advantage of whatever's available in the new digital environment, from John Glenn in outer space to C-SPAN. It is already broadcasting movies in six-channel Dolby audio digital and will have high- definition movies in its pay-per-view window.

HDTV Unity Motion, a start-up provider based in St. Louis, says it is involved in the entire process, including equipment sales, programming, transmitting and display. It plans to support a 100,000 subscriber base by spring 1999.

NAB's Chuck Sherman confirms that broadcasters are interested in the possibilities of an alliance with satellite, but says there are concerns that the satellite industry has played fast and loose with the law by bringing distant network signals into competition with local affiliates. "We're anxious to do business with them if they abide by the law. We want partners who will operate with faith and trust," Sherman said.

The broadcaster-satellite consortium could be accelerated by a service being offered by Bell Atlantic, which says it will provide the TV home

"Cable Inc. collectively hopes that digital will never catch on."
—DirecTV's
Eddy Hartenstein

Immaculate reception.

It's simply the most revolutionary idea in television broadcasting since color. It's called HDTV – high definition television. HDTV lets you experience a digital world or unprecedented picture clarity and detail. The most captivating colors ever seen. And the bone-jarring impact of Dolby Digital* surround sound. All in a new cinema-style, wide-screen format. At Panasonic, we're ready to launch you into the age of digital television now. With our new HDTV-compatible, wide-screen projection television. And our remarkable digital set-top decoder box.** Panasonic HDTV. You've got to experience it for yourself. From now on, you'll never watch television the same way again.

16:9
wide screen

For information call 1-800-211-PANA or www.panasonic.com/tv
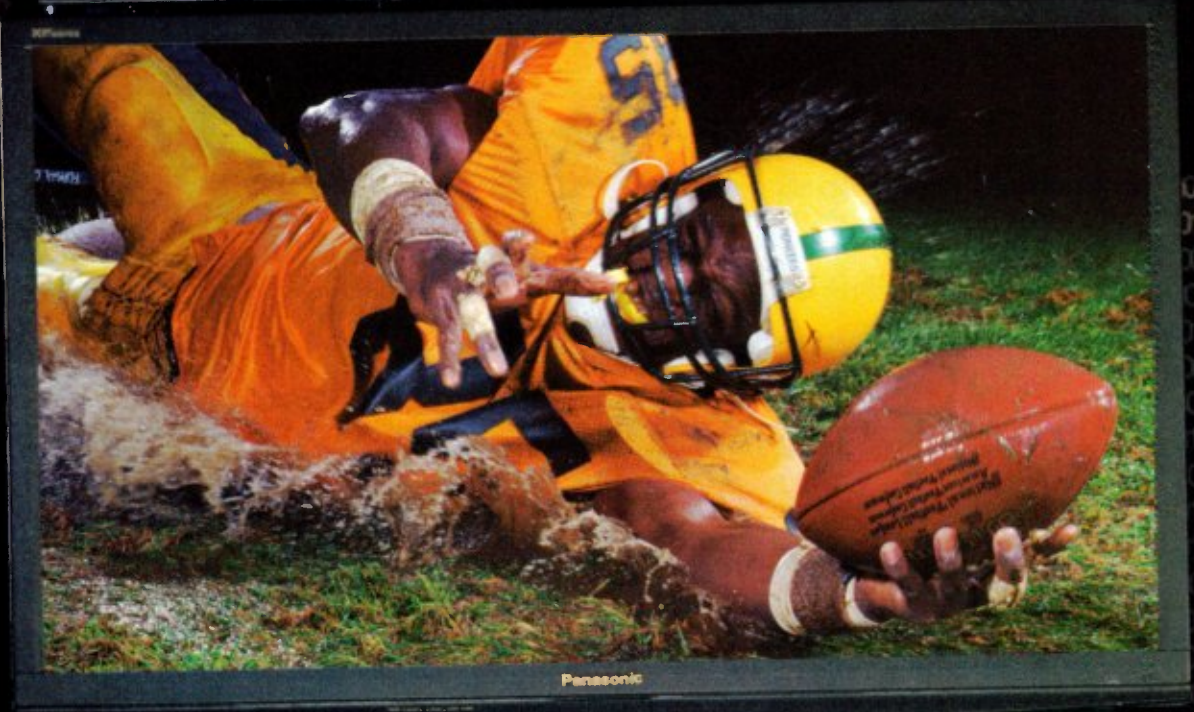
1.5
MILLION
PIXEL CLARITY

Panasonic
just slightly ahead of our time

with a satellite dish and terrestrial broadcast antenna, and the appropriate receiver, for an initial installation charge of $199 and box rental of $6 a month. The business approach is similar to one advanced by Preston Padden when he was directing Rupert Murdoch's now-defunct ASkyB direct satellite system, which planned to bring in a number of local signals by satellite and was negotiating with telephone companies to handle the marketing and billing.

Hartenstein has pioneered in setting up new relationships with the consumer electronics manufacturers and retailers, whom he believes broadcasters have historically ignored because "they had a lock on the spectrum and they expected the world to come to them." Indeed, he was named last month by CEMA as the first non-manufacturer on its board.

Satellite's advantage over both terrestrial broadcast and cable is two-fold: its signal reaches the entire country in one bound, and its capacity far exceeds either of its present rivals. DirecTV, for example, now has 1,000 gigabits per second of capacity that it can divvy up, digitally, any way it chooses. "A channel is not a channel is not a channel," Hartenstein emphasizes, when it comes to digital. As has been explained previously, operators can assign just as much digital capacity as necessary for a particular program. Cable, on the other hand, has been made "bandwidth-starved" by the advent of digital, in Hartenstein's opinion, having to rebuild its plant if it is to accommodate broadcasters' signals as well as its own. "Cable Inc. collectively hopes that digital will never catch on," he says.

Direct satellites now have about 8% penetration of the U.S. TV market, with 4.1 million consumers on the DirecTV-USSB platform, 2.2 million on PrimeStar and 1.5 million on EchoStar. The last two have a primarily rural orientation, while DirecTV-USSB is primarily urban.

Strategic Considerations

There are more ways than one to skin this cat," Hartenstein says of the race to digital and HDTV. He believes the medium was launched in a sweeping torrent of words that oversimplified the problem. "I've walked around the development labs where they are doing this thing and it is unbelievably complex. But it's going to be everything anyone dreamed of."

One way or another, digital will do more than change the pictures on television. It will change the balance of power.

For broadcasters, who have suffered erosion in market share for decades, digital offers a chance to recapture audience through quality programming and multiplexing. Because of the quality and robustness—no ghosts, no snow—of the digital signal, it also offers hope of recapturing viewers who ordered cable primarily because of deficiencies in the broadcast picture. As described previously, the digital picture is either perfect or nonexistent; the ability to receive does not fade away, it falls off the cliff.

Moreover, digital will improve both standard definition and high-definition broadcasts, allowing broadcasters to enjoy at least the same kind of picture enhancement that characterizes DBS. If that can take place through a roof-top antenna, broadcasters can begin to reconnect with an audience they had long conceded to cable.

The broadcasters who "get it," in Hartenstein's view, are opting to go faster rather than slower in implementing digital. They see there's a market niche to be captured, he says, "and if they sit around and whine about cable carrying them, they're going to lose."

For cable, which came into being precisely to extend and enhance broadcast signals, digital is a mixed bag. Once it teamed up with fixed satellites to foster delivery of more and more signals nationally, choice became cable's raison d'etre. Digital compression became the potential vehicle for John Malone's vaunted 500 channels—but not 500 HDTV channels. Moreover, as long as must carry is either the law of the land or a guiding principle of telecommunications policy, the expansion of broadcast spectrum becomes a spectre to cable.

Nevertheless, cable, too, has to go with the digital program. Decker Anstrom notes that "We can't afford in the marketplace to ever have a picture that is not as good as one of our competitors. And I think this is what drives this whole enterprise. If your neighbor has a picture that's better in terms of resolution quality than you have, you're going to think about getting television from this distributor. So we can't just use digital for more television. We have to use it for better television, too."

But just as cable looks forward to digital, it

> "Future general managers will have two budgets to worry about— their normal operating budget and the budget for bits."
> —NAB's Chuck Sherman

looks over its shoulder at analog. "There are 250 million analog sets out there that people like, that work, that deliver pictures that people are happy with," Anstrom say. "The notion of disenfranchising 250 million sets gives us pause."

Emphasizing that analog will be around ad infinitum, if not forever, he refers to "the little secret we all know: that broadcasters are never going to give back their analog spectrum." Anstrom doesn't seem to mind; he notes that a lot of cable networks will continue to be in the analog format. It explains his and cable's digital approach: not to be the first by whom the new is tried, nor yet the last to leave the old behind. "We have a world in which the average cable customer is going to receive anywhere from 60 to 80 channels in analog format for the rest of our professional lifetimes. That's a reality. And anything we do to start changing that, I think, is going to create unholy hell and will have the effect of stopping this whole digital transition."

Anstrom takes leave of a reporter with the cable mantra: "Don't mistake our being methodical for a lack of enthusiasm."

For consumers, digital offers almost the ultimate in a home viewing experience. Over 20 million homes now have large-screen sets that cost, on average, $3,000. That is seen as dramatic evidence of pent-up demand for what the consumer electronics industry will deliver next.

For broadcasters, the big question is whether or not to multiplex—or, indeed, whether or not to go high definition. Most will do both, to a greater or lesser extent. But multiplexing also offers the possibility of introducing pay TV into the broadcast spectrum. For example, networks and their affiliates might offer one NFL football game on Sunday for free, but offer three other games simultaneously for a fee of, say, $10, which might be split with the league. The set-top box connection—in tandem with cable's or otherwise—would make possible the collection of such fees.

Present law specifies that if broadcasters do charge they must, in turn, pay a fee to the government. One who has observed the process closely decries that policy as a brake on innovation. "Broadcasters get the licenses for free. And the FCC must give them flexibility. But if the broadcasters use the flexibility to make money, other than through advertising, they have to pay a tax. The irony is that if broadcasters merely do the old stuff, just exactly what they've been doing, they don't pay a fee. But if they innovate and are successful and can actually generate more revenue, they get taxed on it. All economists will tell you, don't tax innovation. If you want people to experiment and try things new, don't tax it before you even know what it is. Cable, of course, wants the tax, because cable doesn't want broadcasting to succeed."

Former Senator Larry Pressler advanced a variation on the taxation idea. He suggested that, after a period of time, a fee be placed on the analog spectrum—to tax the old and encourage the new.

There have been suggestions that broadcasters in a community could band together their multiplex operations to compete with cable. Few give credence to that idea. But many are sanguine about the possibilities of using multiplex to expand existing broadcast operations—for example, for offering an all-local-news channel, or a local sports channel, or breaking up the evening newscast into simultaneous news, sports and weathercasts. If they don't, the argument goes, cable will.

Ready, SETS, Go

The transition to digital is only the beginning in the vision of Gary Shapiro, the CEMA president who contributed the man on the moon analogy to the beginning of this article. "What we call HDTV today will in 50 years be laughable. This is just a leap before we take the next leap."

Taking a less quantum view, Shapiro says that "10 to 15 years from now our children will look back on current television the way we look at turntables—as historic anomalies. If they turn the channel and it's not HDTV they'll skip it. All the debates over format and cable will only be of historic interest. We are inevitably hurtling toward HDTV."

What about analog? It will coexist with digital as black and white and color coexist now, in Shapiro's opinion. "There is always a market demand for lower-priced product—we're still selling one million b&w sets every year."

As for digital sets, he says the initial public reaction and interest are so strong that there's no hesitancy by set manufacturers to enter the fray—

> "What we call HDTV today will in 50 years be laughable. This is just a leap before we take the next step."
> —CEMA's Gary Shapiro

an opinion borne out by "The Dawn of Digital Television" story about the retail experience, beginning on page 40. He cautioned, however, that the early adopters are not always a good indicator of what a new market might be. "Great products often do fail—sometimes because the publicity exceeds the product. Or the timing can be wrong." Cable, he said, will be disadvantaged until its interface problems are solved.

The CEMA president said a record 24 million sets were sold in 1998—in three of every 10 American homes—and concluded that HDTV was enlarging the market for analog. And the word is spreading, he says: "By this time next year you will see HDTV in airports and sports bars—50%of Americans will have seen HDTV a year from now."

Must Carry

If the broadcasting and cable industries have yet to meet on the digital playing field, they have met about must carry. "We take the position that must carry is an absolute requirement," says Chuck Sherman, executive vice president for television for the National Association of Broadcasters, "except for the small, mom-and-pop cable operators. We may be willing to give cable systems a chance to build out their plants while we're building out our programming, but at the end of the day we believe all analog and digital signals should be carried, up to one-third capacity as provided in the Cable Act."

Moreover, he says, there should be no material degradation of the 19.4 bitstream. "What we put in the bitstream—including multiplexing—should come out," says Sherman, excepting only premium (pay TV) channels.

Over our dead bodies, is the position of the cable industry. "We believe it's unconstitutional and an infringement of our rights," says Decker Anstrom. "The notion that the government is going to compel cable to carry both broadcasters' analog and digital signals as a mandate during this transition period, which is going to stretch eight years or longer, is a remarkable governmental intrusion into the marketplace. Broadcasters would be better served, as I think we would and would consumers, by putting our energy into hammering out business relationships that work for both sides, and for consumers, rather than trying to get the government to come in and tell people to do things."

Concludes Anstrom: "We will never agree to any form of digital must carry, and if the FCC acts we will appeal it all the way to the Supreme Court. We will never again accept cable networks being relegated to second-class citizenship. The notion that every broadcaster's voice is more important than any cable network's voice can't be right. And remember, no broadcast station is going to lose its voice here because the analog signal is never going to be returned. That's the issue before the commission: our having to carry both the digital and analog signals."

Both the NAB and NCTA have made their positions official before the FCC, which has begun a notice of inquiry into the subject. No one knows how it will turn out, but the fight will be bloody and hard fought.

In the meantime, major players on both the broadcasting and cable side are meeting behind closed doors to effect an industry compromise that could avoid governmental intrusion. Essentially, it would create a pay tier for broadcast digital on cable, creating a new revenue stream in which both cable and broadcasting would share. Both major networks and major MSO's are involved in this effort, which many believe will be blessed with success by year's end. But while such an agreement would put out the immediate fire, and set a new precedent, it will leave many stations out of the loop. The disposition that will govern the widescale must-carry dilemma that will face both industries once digital is full blown will remain up to the FCC and the courts. "Broadcasters could be bitching and moaning about cable carriage for years," says one observer.

FCC Chairman Bill Kennard has his own view on the subject. "If the broadcast industry comes to the agency and says: `We want not one, but two, channels on the cable basic tier,` my sensibilities as a lawyer tell me, `Well, you've got to make the case for that.' And that is going to be a fairly difficult burden. If you're telling cable systems, including those that are capacity constrained, to give two six megahertz channels to every local broadcast signal, I have difficulty understanding how we can make that case in the Supreme Court, and we know the

"The early adopters can make a medium but they can also sink it. They better be impressed."
—FCC Commissioner Michael Powell

Here's to the leaders of the digital television revolution.

WXYZ

KTVU

KTLA

WMUR

KDFW

WJBK

WSB
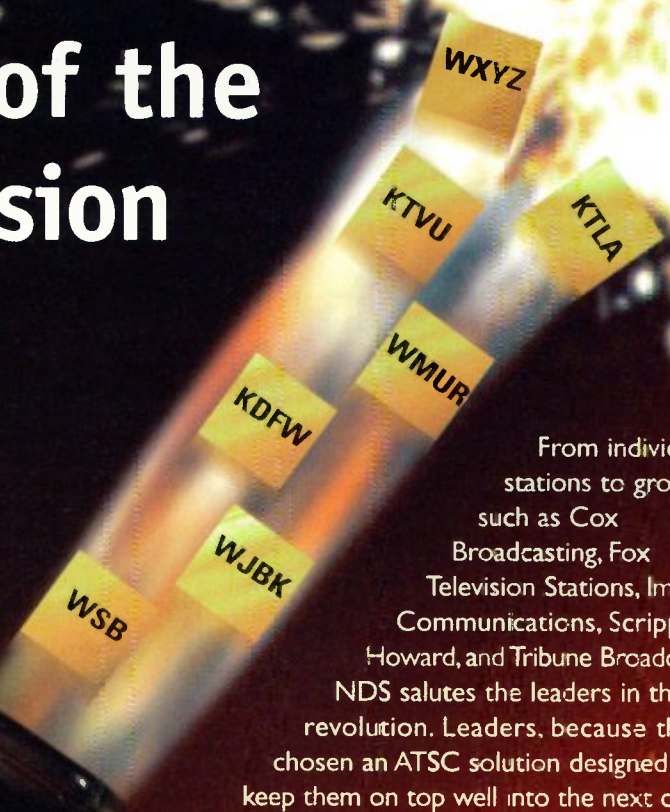
From individual stations to groups such as Cox Broadcasting, Fox Television Stations, Imes Communications, Scripps-Howard, and Tribune Broadcasting, NDS salutes the leaders in the digital revolution. Leaders, because they've chosen an ATSC solution designed to help keep them on top well into the next century.

Whether it's high definition encoding or multicasting, network splicing or ad insertion, full system control or traffic interfaces, NDS has the solutions today for every digital resolution.

Over the last decade NDS has pioneered the development of end-to-end MPEG, DVB and ATSC solutions. But our success depends on customers like these, who are looking to the future and making the right choices today. To them we say, "Thanks," and to you we say, "Join the revolution!"

NDS
WORLD LEADER · WORLD VISION

NDS Americas Inc.
3501 Jamboree Road Suite 200, Newport Beach, CA 92660
949.725.2542 www.ndsworld.com

cable industry is going to take this all the way, as they always have with must carry."

Conclusion

The quid pro quo for the grant of digital spectrum to broadcasters was that their analog spectrum would be returned, once the transition was essentially complete. The government budget process is counting on that return in 2006, but only if digital penetration has reached 85%. This analysis has found no one who thinks that will happen. Most of those not friendly to broadcasting believe, perhaps cynically, that it will never happen.

One scenario has it going this way:

Not only is the analog spectrum to be returned in 2006, but that spectrum is to be auctioned in 2002, in anticipation of the return. The buyer, however, cannot claim the spectrum until digital penetration reaches 85%. It took color TV 22 years to reach 85% penetration. On that basis, the buyer would have to wait 16 years for his prize. So who would step up to the auction? Probably only today's digital broadcaster, who might buy his analog channel, say, for a dollar. In time, he could then convert that channel to digital and have two properties in the digital age.

What is certain is that there are more than 200 million analog sets out there now and the consumer electronics industry is selling over 20 million more each year. And they keep getting better and better. Digital set makers note that an analog tuner is one of the less expensive components of their new receivers, and they're prepared to keep them installed ad infinitum. And even if broadcasters go off the air in analog, the sets can be retrofitted.

In the short run (say, the 12 months beginning today), digital TV and HDTV may move at a pace disappointingly slow to many. "We're entering the beta year," says Blair Levin, who thinks most of the onerous interindustry problems—at least the technical ones—are on the verge of yielding. That's also the point of view of the NCTA's Decker Anstrom, who says: "If I were to put my finger at a time to really begin to watch this move, it would be Christmas 1999."

As Dick Wiley puts it: "Five years from now, we'll look back at this and say, 'Gee, it's too bad we had to go through all that but thank God we're where we are now. Let's face it, this is a revolution, and it's going to change video forever in this country, and all for the better. The mere fact that we've got some of these problems should not cause us to think that we aren't going to get there. Because we will." ∎

The View from Joe Flaherty

The last stanzas go to Joe Flaherty, the remarkable CBS engineer and executive who made digital and HDTV happen against most of the odds and much of the competition. In a statement prepared for "The Dawn of Digital Television", he said:

"DTV and HDTV are a total replacement of America's TV carriage and delivery systems, and will affect every aspect of the broadcasting, cable and DTH satellite business. It is vital to understand that wide-screen, high definition is not just pretty pictures for today's small-screen TV sets. Rather, it is a wholly new digital platform that will support the larger and vastly improved displays in development for commercialization. HDTV is better than it looks! The display devices are the limiting quality factor. While improvements are being made by the month, as of now, no display has achieved the full quality potential of America's HDTV system.

"Subjectively, like many things, beauty is in the eye of the beholder, and some will prefer one DTV format to another, the objective quality of each notwithstanding. Nevertheless, full HDTV quality will rapidly improve and will continue to widen the gap between it and all lesser formats.

"On Nov. 21, 1985, I delivered a lecture entitled '2001: A Broadcasting Odyssey,' in which I said in part:

" 'As we evaluate tomorrow's TV and HDTV and plan for its implementation, we must bear in mind that today's standard of service enjoyed by the viewer will not be his level of expectation tomorrow. Good enough is no longer perfect, and may become wholly unsatisfactory. Quality is a moving target, both in programs and in technology. Our judgments as to the future must not be based on today's performance, nor on minor improvements thereto.'

"Beware of a poverty of vision." ∎
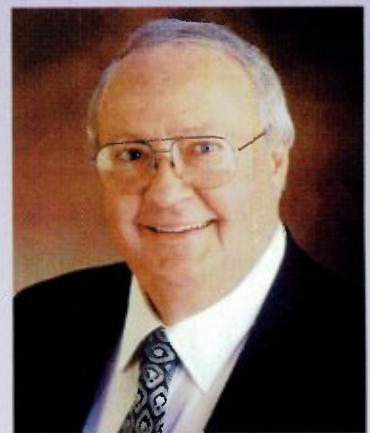
The SharpVision 64" High Definition Television.
Missing teeth and broken noses never looked so good.

With the amazing clarity of the SharpVision Rear Projection High Definition Television (HDTV), you'll never forget a face. Our built-in DTV Decoder and 64" widescreen give you incredible high definition resolution for all digital programming. Even traditional broadcasts and other video sources like DVD will look better than ever. And Dolby® Digital outputs provide for a whole new earth-shaking dimension in audio reality. Plus, SharpVision HDTV is upgradeable, ensuring your system stays current with future technologies. But words can't begin to describe SharpVision HDTV. Visit your SharpVision dealer for a demonstration. And discover why the face of television will never be the same.

SHARP VISION®

www.sharp-usa.com
Call toll free: 1-877-DTV-SHARP
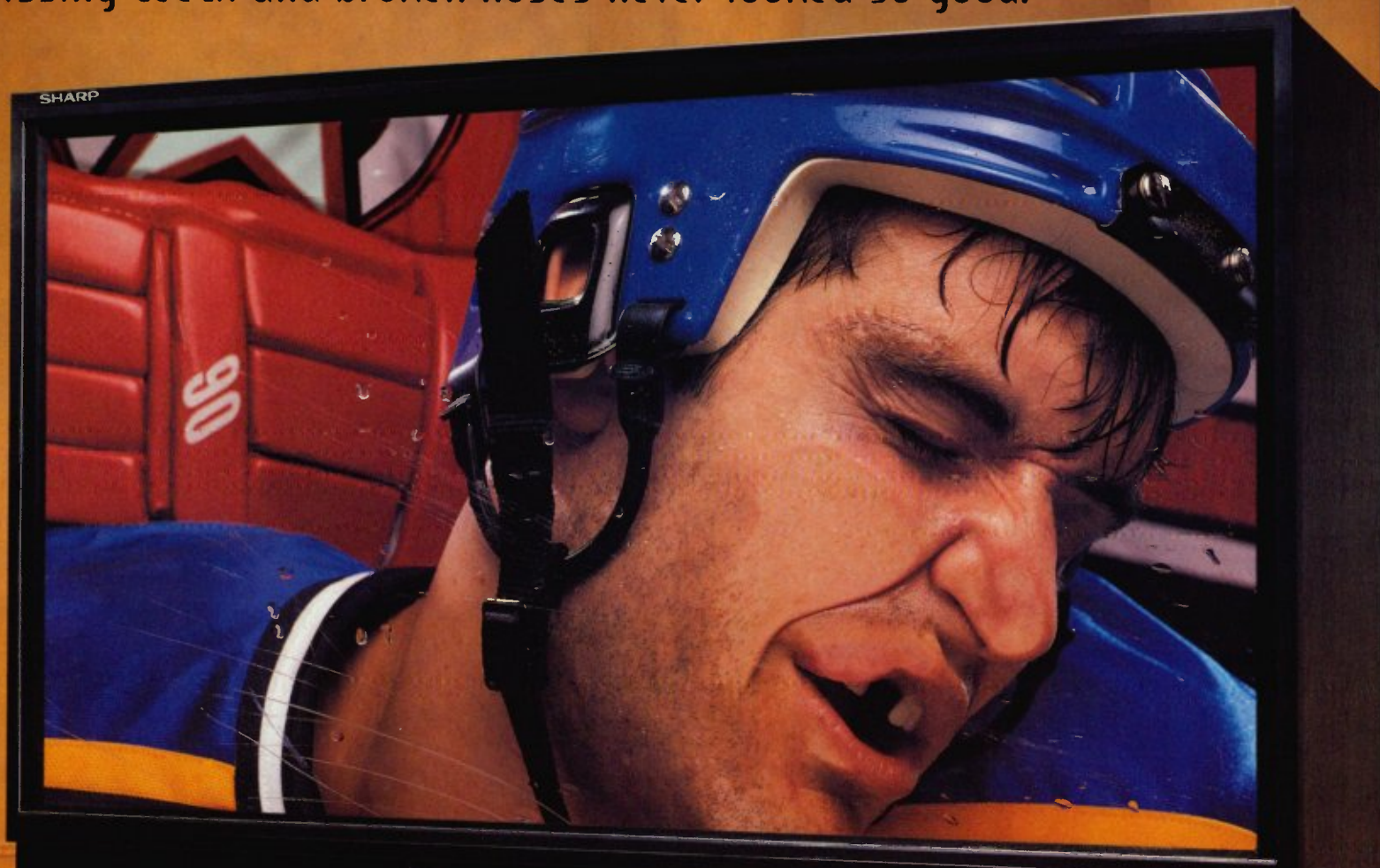
SHARP.
FROM SHARP MINDS
COME SHARP PRODUCTS

An Honor Roll for DTV

These are not the only heroes, sung and unsung, in the pioneering of digital television, but they come conspicuously to mind. Their ranks are being augmented daily by those putting the medium to work.

Stan Baron, NBC engineer who created the ATSC's standards documentation for both SDTV and HDTV.

Jon Blake, broadcast lawyer and prime mover in mobilizing the industry behind DTV.

Jim Carnes, Sarnoff Corp. futurist and visionary, member of the Grand Alliance.

Joel Chaseman, group broadcaster (Post-Newsweek) active in carrying the advanced TV banner to his colleagues in the industry.

Jules Cohen, veteran engineer who set the RF (radio frequency) criteria that the DTV system had to meet.

Joe Donahue, Thomson Washington representative who broke the deadlock standing in the way of formulating the Grand Alliance.

Irwin Dorros, Bellcore chief scientist who insisted on MPEG all the way.

Peter Fannon, whose Advanced Television Test Center (ATTC) proved the technology, fair and square.

Alex Felker, former aide to FCC Chairman Dennis Patrick, who gave the Wiley committee its policy framework.

Joe Flaherty, CBS's world-class engineer who joined the fight for HDTV in the 70's and has never given up. In the opinion of many the father of HDTV.

Bruce Franca, deputy chief of the FCC's Office of Engineering & Technology, who steered DTV's standard and table of assignments to completion.

Robert Graves, head of the Advanced Television Systems Committee, which brought the U.S. standards to earth and now is selling them around the world.

Dick Green, head of CableLabs and one of that medium's primary contributors to the DTV process.

Tom Gurley, ATTC's methodical test planner and director, now chairman of the HDTV Model Station technical committee.

Paul Hearty, head of Canada's Advanced Television Evaluation Laboratory, who conducted DTV viewing tests with the public.

Jerry Heller, GI executive who greenlighted development of an all-digital system.

Bob Hopkins, ATSC executive director who supervised the standards writing and crafted their adoption by the ITU and other international standards bodies.

Reed Hundt, controversial FCC chairman considered by broadcast insiders as much against as for the process, but who in the end brought it home.

Larry Irving, then chief aide to House Telecommunications Subcommittee Chairman Ed Markey, now head of the National Telecommunications and Information Administration, who rallied early congressional policy on advanced television issues.

Jim McKinney, veteran bureaucrat and engineer who excelled in both the public and private sector, who persuaded the industry to adopt the ATSC standard.

Bruce Miller, DTV operations leader at PBS and successor to McKinney as head of the HDTV Model Station Project.

Paul Misener, right hand to Dick Wiley through the advanced television process.

Masihiko (Mori) Morizono, Sony television chief who committed to make and sustain the first generation of HDTV production products.

Susan Ness, FCC commissioner who played a key role in policy development when the chips were down and mediated the so-called computer compromise.

Robert Niles, who anchored the ATTC technical committee to insure thorough and proper testing.

Woo Paik, General Instrument engineer who cracked the code to compression and designed the first all-digital HDTV transmission system.

Dennis Patrick, FCC chairman who activated the advanced television process and named Dick Wiley and Joe Flaherty to implement it.

Jerry Pearlman, president of Zenith, who championed HDTV and pioneered DTV simulcasting.

Jim Quello, FCC commissioner who saved the spectrum for digital television in the first place, and remained the broadcast medium's steadfast supporter.

Bob Rast, General Instrument's gift to the Grand Alliance, responsible for making the whole more than the sum of its parts.

Glenn Reitmeier, early MPEG enthusiast and advocate for full computer-friendly interoperability.

Charlie Rhodes, ATTC's hands-on chief scientist and backbone of the ATTC testing process.

Mark Richer, PBS technology executive who chaired the Systems Committee Working Party 2 that oversaw testing progress.

Bill Schreiber, MIT advanced television program leader, proponent of progressive scan and vocal critic of the HDTV developmental process.

David Siddall, legal assistant to Commissioner Susan Ness, who had strong staff influence on the FCC's policy formulations.

John Sie, an early voice in cable calling for a digital rather than an analog future.

Al Sikes, second FCC chairman on the watch, who encouraged a digital solution, discouraged enhanced television and declared: "Let's go for the gold"—HDTV.

Masao Sugimoto, NHK's technical chief who preceded even Flaherty in high-definition innovation.

Craig Tanner, then CableLabs advanced TV leader, now executive director of the ATSC, who is taking standards development to its next dimension.

Victor Tawil, mainstay of Association for Maximum Service Television engineering who helped bring order out of the chaos of channel assignments.

Margita White, president of MSTV, who took the policy reins for the broadcast industry in pursuing a digital and HDTV solution.

Dick E. Wiley, chairman of the FCC Advisory Committee on Advanced Television Service and the individual most responsible for shepherding digital television through the technological and political wilds.

Warren (Bud) Williamson, broadcaster and former chairman of MSTV who led the political fight in HDTV's crisis years.

The High Cost of Pioneering in DTV

Some stations are spending $6 million just to pass the network signal; Sinclair's not spending anything at all

By Glen Dickson
Broadcasting & Cable

With over 40 stations scheduled to be on air with DTV this month, broadcasters are pleased with the progress they've made in migrating to digital television. But with the exception of a few aggressive DTV pioneers who are actively pursuing local DTV production, most stations are taking a wait-and-see attitude on doing anything more than passing

WMUR-TV Manchester, N.H., got a jump start on digital in 1995 when it moved into a renvated facility with a digital platform that cost $8 million-$9 million.

through their networks' DTV feed and upconverting their NTSC programming until they see significant penetration of consumer DTV receivers.

WCVB-HD Boston, for example, has no timetable for local HDTV production. The Hearst-Argyle station and ABC affiliate plans to pass through the network's 720P high-definition prime time programming, which should average about two movies a week, and simply upconvert its existing NTSC programming to 720P the rest of the time.

"We're going to eventually evolve to that," says Paul La Camera, the station's general manager. "Right now, we're just working to get the pass-through set up. We're very pleased to make the deadline."

La Camera says that so far WCVB-TV's digital conversion has gone "very smoothly." He's also happy with the early HDTV programming commit-

ments from ABC.

"The network, like us, sees the great importance of high definition in reclaiming the free over-the-air TV audience," says La Camera.

Early DTV stations have a reason to be cautious, as most have already spent several million dollars just to get on air with a digital signal [see chart at right]. The biggest cost for most is in either building a new broadcast tower or strengthening an old one.

"It's very individual, because of the complexity of this buildout," says Bob Turner, vice president of engineering for the A.H. Belo station group. "You have a big variable in towers. Some need a little work, some need a lot of work, and some need to be replaced, which can swing [tower] costs from $500,000 up to $3 million."

Tower costs are followed by the purchase of a transmitter ($400,000 to over $1 million, depending on power requirements) and antenna and accompanying transmission line ($300,000 to $500,000). At that point, many stations will have spent $3 million to $5 million even before buying a new digital studio-to-transmitter link ($150,000 to $200,000) to connect their master control facility to the transmitter site.

The next big-ticket item for stations is an ATSC-compliant encoder, which is used to compress both network and local programming to 19.4 Mb/s for local DTV broadcast. While there was preliminary discussion among broadcasters of a strict pass-through scenario under which local stations would simply retransmit pre-encoded network feeds, without having to buy an encoder, stations need an encoder to perform commercial insertion and broadcast local programming in digital. So most have bought encoders, to the tune of $300,000 to $500,000 for a system that can encode both HDTV and SDTV. The only exceptions are some PBS member stations that will simply pass through PBS's pre-encoded 19.4 Mb/s satellite feed in the early going.

To receive DTV network feeds, stations need an integrated receiver/decoder and a new satellite modem, which run around $50,000 to $60,000 for HDTV-capable equipment. That doesn't count any costs for new satellite dishes or modifications of the

satellite downlink infrastructure.

Stations who want to play back their own commercials in HDTV will need HD-capable tape decks (around $90,000) and some basic HD routing (roughly $60,000). They'll probably also want to buy an HD switcher ($200,000 to $400,000) and some monitors, which run $6,000 to $15,000 apiece. Automating their master control for their new DTV channel will cost another $200,000 to $350,000. That doesn't include digital audio encoding, test and measurement equipment and all the little "glue" pieces that hold a digital plant together. It also doesn't include the $30,000 a month that high-powered UHF stations can spend on electricity.

A.H. Belo has been one of the most aggressive station groups in embracing digital, and is up and running with HDTV stations in Dallas, Houston and Seattle. Belo's Turner says that the basic DTV conversion to enable network pass-through and local origination at Belo's 17 stations will probably run from a low of $6 million per station to a high of $12 million in markets where Belo might need to build a new 2,000-foot tower.

"The basic hard-core stuff is coming in around $6 million, and with the tower, running up to $7.5," he says. "But that's strictly pass-through with commercial insertion and the ability to play back syndicated programming."

Ratcheting up to full-blown HDTV production for local news is a different story. "It wouldn't surprise me if the production part didn't cost $15 million," says Turner. "That's not going to be incremental cost, that's replacement of existing equipment."

Stephen Flanagan, vice president of engineering for Post-Newsweek Stations, doesn't want to disclose what they've spent so far on DTV transmission and doesn't want to speculate on what local DTV production might cost. But he says that Post-Newsweek, which is scheduled to launch DTV stations in four markets in 1999, won't be spending much on studio infrastructure equipment until HDTV sets start selling.

"There's no sense doing too much until the TV sets are available," says Flanagan. "I think it's neat that there are a few folks out there who are pioneers and are putting signals on the air—but no one's watching."

Post-Newsweek has divided its capital spending on DTV at each station into five steps: getting a full-power DTV signal on the air; playing commercials in the new digital format; playing syndicated programming in the new digital format; doing news in DTV; and shutting off NTSC, which Flanagan says could prove costly in terms of writedowns on obsolete equipment.

"We're [budgeting] each step individually, and we'll respond to each step as the market does and there's a business there," says Flanagan. For example, the playback of syndicated programming in digital could be as soon as two years away or as much as a decade away, he says.

Flanagan adds that each network's choice of digital format "is a real moving target" as well. While Post-Newsweek is currently planning to broadcast 1080I at its CBS and NBC affiliates and 720P at its ABC affiliates, Flanagan says "it would not surprise me if in two years people change in one direction or the other. ABC could change to 1080I or another network could go to 720P. At this early stage, no one's casting anything in concrete. I know we're not."

One station group that isn't casting anything digital in concrete is Sinclair Broadcast Group, which suffered big financial losses in October and has announced plans to sell some of its 56 owned television stations [BROADCASTING & CABLE, Oct. 12, 1998]. While Sinclair has a number of stations in the top 30 markets that are due to launch DTV in November 1999, the station group hasn't yet placed purchase orders for any DTV transmission equipment. For now, Sinclair will stick to simply planning and designing its DTV stations.

"We're waiting to see what kind of performance we get with the consumer-grade receivers that come into the market over the next 90 days," says Nat

HDTV Transmission Cost Estimates

Tower work	$500,000-$3 million (for new tall tower)
Antenna and transmission line	$300,000-$500,000
Transmitter	$400,000-$1.25 million (depending on power)
Studio-to-transmitter link	$150,000-$200,000
Upconverter	$80,000-$120,000
Router	$60,000
Master control switcher	$200,000-$400,000
Satellite downlink (HD modem and IRD)	$50,000-$75,000
HD tape decks (for commercial insertion)	$90,000-$110,000 each, minimum of three
HD monitors	$6,000-$15,000 each, minimum of five
Encoder	$200,000-$500,000
Total estimated costs:	**$2.2—$6.5 million**

not counting various infrastructure equipment, test and measurement gear, automation systems, or any production equipment

12,003 THINGS TO THINK ABOUT WHEN LOOKING FOR A VIDEO SERVER.

The first 12,000 are the number of Tektronix Profile server channels already installed — four times the installations of any other server. Number 12,001 is the Profile's ability to function as a workhorse server across a wide range of applications. Number 12,002 is our professional-quality PDR300 MPEG2 4:2:2 format. And number 12,003 is the leadership and experience Tektronix brings in delivering turnkey systems that move broadcasting technology forward.

For even more to think about, call 1-800-TEK-VIDEO, dept. 713 or visit www.tek.com/Profile/12,003

Tektronix

Ostroff, Sinclair vice president of new technology. "We're so close to having a public vote on digital TV, that for our shareholders, it's prudent to wait and see the public reaction to digital before we start spending serious capital."

Recent financial problems notwithstanding, Sinclair has always been critical of the 8-VSB modulation scheme used by the ATSC transmission system and its ability to be effectively received by consumer sets. To that end, Sinclair plans to buy its own cadre of consumer receivers and test them in markets that have multiple DTV stations, such as Philadelphia and Chicago. "We want to see whether the receivers are good enough to solve the multipath problem with the 8-VSB modulation scheme," says Ostroff.

Sinclair has also questioned the business case for HDTV and has instead talked about the potential benefits of multicasting with its stations' DTV spectrum. Not surprisingly, Ostroff is critical of the limited HDTV programming plans announced by CBS, ABC and NBC.

"They're disappointing and inadequate given the magnitude of the investment being asked," says Ostroff. "The network's performance in providing compelling programming for DTV is pathetic."

Ostroff thinks that digital set-top boxes, not new HDTV sets, will be the driver for early DTV programming. "You've got 300 million [analog] receivers out there," he says. "Are we just going to write them off?"

Belo's Turner is more sanguine about the quantity of early HDTV programming and its potential to drive set sales, citing not only the HDTV programming plans of ABC, NBC and CBS but also the HDTV plans of cable networks HBO and Discovery and start-up satellite provider Unity Motion. He says to put the DTV movement in context, one must recall color television's early days of one hour per week on one network.

"If you look at the overall universe out there, there's going to be an awful lot of programming material to drive this much earlier than we saw with color," says Turner. "Sure, I'd like to have HDTV 24 hours a day—I'm ready. We'd sell sets like crazy and the transition would happen in five years. The reality is, it costs a lot of money for the networks to transfer footage. But I think it will happen a lot quicker than people think." ∎

DTV STATIONS LAUNCHING BY NOVEMBER 16, 1998

Market Rank	Market	Percentage of TV HHs	DTV Station*	DTV Channel	Analog Station	Analog Channel	Owner	Affiliate
1	New York	6.854%	WCBS-DT	56	WCBS-TV	2	CBS	CBS
2	Los Angeles	5.167%	KABC-DT	53	KABC-TV	7	ABC	ABC
2	Los Angeles	5.167%	KCOP-DT	66	KCOP	13	Chris Craft	UPN
2	Los Angeles	5.167%	KCBS-DT	60	KCBS-TV	2	CBS	CBS
2	Los Angeles	5.167%	KNBC-DT	36	KNBC-TV	4	NBC	NBC
2	Los Angeles	5.167%	KTLA-DT	31	KTLA	5	Tribune	WB
4	Philadelphia	2.684%	WPVI-DT	64	WPVI-TV	6	ABC	ABC
4	Philadelphia	2.684%	KYW-DT	26	KYW-TV	3	CBS	CBS
4	Philadelphia	2.684%	WTXF-DT	42	WTXF	29	Fox	Fox
4	Philadelphia	2.684%	WCAU-DT	67	WCAU	10	NBC	NBC
5	San Francisco	2.383%	KRON-DT	57	KRON-TV	4	Chronicle	NBC
5	San Francisco	2.383%	KPIX-DT	29	KPIX-TV	5	CBS	CBS
5	San Francisco	2.383%	KTVU-DT	56	KTVU-TV	2	Cox Enter.	Fox
5	San Francisco	2.383%	KGO-DT	24	KGO-TV	7	ABC	ABC
6	Boston	2.199%	WCVB-DT	20	WCVB-TV	5	Hearst-Argyle	ABC
6	Boston	2.199%	WHSH-DT	23	WHSH-TV	66	USA Bcst.	HSN
6	Boston	2.199%	WMUR-DT	59	WMUR-TV	9	Imes	ABC
7	Dallas	1.972%	WFAA-DT	9	WFAA-TV	8	A.H. Belo	ABC
7	Dallas	1.972%	KDFW-DT	35	KDFW-TV	4	Fox	Fox
7	Dallas	1.972%	KXAS-DT	41	KXAS-TV	5	NBC	NBC
8	Washington DC	1.968%	WJLA-DT	39	WJLA-TV	7	Allbritton	ABC
8	Washington DC	1.968%	WUSA-DT	41	WUSA	9	Gannett Bcst.	CBS
8	Washington DC	1.968%	WRC-DT	38	WRC-TV	4	NBC	NBC
8	Washington DC	1.968%	WETA-DT	27	WETA-TV	26	Public	PBS
9	Detroit	1.858%	WXYZ-DT	41	WXYZ-TV	7	Scripps-Howard	ABC
9	Detroit	1.858%	WJBK-DT	58	WJBK-TV	2	Fox	Fox
10	Atlanta	1.733%	WSB-DT	39	WSB-TV	2	Cox	ABC
10	Atlanta	1.733%	WXIA-DT	10	WXIA-TV	11	Gannett	NBC
11	Houston	1.676%	KHOU-DT	31	KHOU-TV	11	A.H. Belo	CBS
12	Seattle	1.558%	KOMO-DT	38	KOMO-TV	4	Fisher	ABC
12	Seattle	1.558%	KCTS-DT	41	KCTS-TV	9	Public	PBS
12	Seattle	1.558%	KING-DT	48	KING-TV	5	A.H. Belo	NBC
23	Portland	1%	KOPB-DT	27	KOPB-TV	10	Public	PBS
25	Indianapolis	.951%	WTHR-DT	46	WTHR	13	Dispatch Bcst.	NBC
28	Charlotte	.865%	WBTV-DT	23	WBTV	3	Jefferson-Pilot	CBS
29	Raleigh	.839%	WRAL-DT	53	WRAL-TV	5	Capitol Bcst. Co.	CBS
31	Milwaukee	.814%	WMVS-DT	8	WMVS	10	Public	PBS
32	Cincinnati	.811%	WLWT-DT	35	WLWT	5	Gannett Bcst.	NBC
33	Kansas City	.087%	KCPT-DT	18	KCPT-TV	19	Public	PBS
34	Columbus	.752%	WBNS-DT	21	WBNS-TV	10	Dispatch	CBS
46	Harrisburg	.596%	WITF-DT	36	WITF-TV	33	Public	PBS
71	Honolulu	.384%	KITV-DT	40	KITV-TV	4	Hearst-Argyle	ABC
84	Madison	.318%	WKOW-DT	27	WKOW-TV	26	Shockley Comm.	ABC
89	Jackson	.303%	WMPN-DT	20	WMPN-TV	29	Public	PBS

*Although several stations identify their digital station call letters with -HD (WRAL-HD, WCBS-HD) for promotional identification, the official FCC-mandated digital station tag following the call letters is -DT.

The Early Adopters Are Getting a Jump on HDTV

Retailers are bullish about customer response even before the programs arrive

By Jill Bilzi

TWICE

ustomers are "blown away" with the look and sound of high definition television, retailers report, and — with the help of a lot of explaining and demonstrating from salespeople — some are buying HDTV-ready sets despite initially high price tags. Sticker shock is out there, but good, patient salespeople and a dynamic demonstration of both standard definition TV (SDTV) and

Dow Stereo/Video customer Allen Farwell of San Diego takes delivery of one of the first Panasonic HDTVs sold at retail this summer.

HDTV can help customers get over the cost of the new technology, according to retailers

"We have focused on what consumers can see now," said Tom Campbell, spokesperson for Dow Stereo/Video in San Diego, which sold one of the first HDTV-ready sets in the nation. "That's our selling position and it has worked tremendously."

"We have sold dozens and dozens of HDTV sets," Campbell said. "Our customers are buying them now to see SDTV without any boxes or conversion, and they're also investing for the future when broadcasters start their HDTV programming."

At Dow Stereo, salespeople give customers a three-tiered demonstration, showcasing SDTV first, using cable signals, then DirecTV going through an HDTV set and finally an HDTV program on an HDTV-ready set. The salesperson then goes back to regular cable channels to show customers that they can enjoy high-resolution SDTV while they're waiting for broadcasters to deliver HDTV signals.

"We show our customers that they don't have to wait for the future to enjoy this technology," Campbell said. "When they see regular cable TV converted to SDTV, they want it now."

Retailers who have held HDTV demonstrations, seminars and in-store roundtables say there is no question that the public is "hugely impressed" by the ultra-clear images and sharp sound the format delivers. High price tags on HDTV sets have given some customers pause, but others are snapping up the new technology as eagerly as audiophiles, videophiles and early adopters.

At Ultimate Electronics, the Colorado-based regional chain that also sold one of the first HDTV-ready sets in the nation, President David Workman said that the "wow factor" is a key element in early HDTV set sales. "People see it and people want it," Workman said of HDTV. "We are fortunate to have such a stunning product that really moves consumers to make that purchase." Ultimate held demonstrations for 4,000 consumers during the weekend of July 31, with the help of Panasonic's sales and marketing executives, as well as factory engineers, discussing digital broadcasting issues and what consumers should expect when purchasing television sets over the next 10 years.

Workman added that the sales training that his employees have had has been vital in educating consumers about digital TV on the sales floor. He called it "a time-consuming process" but thinks it is critical during the HDTV transition period.

Another "Customers-are-absolutely-blown-away-by-HDTV" testimonial was given by Mark Esposito, marketing director for Home Theater Store in Houston and Dallas, the first Texas retail-

er to commercially sell an HDTV set to a consumer. "The key is to show them the picture and let them hear the sound, then deliver a clear, concise explanation of all the options out there."

To help ease people into HDTV's initial steep cost, salespeople at Home Theater Store are encouraging customers who are already planning to invest over $3,000 in a big-screen TV to step up to Mitsubishi's model 5803, an HDTV-ready set that sells for $3,999. Salespeople explain to customers that they can return to purchase the $3,000 set-top converter box when HDTV broadcasts start hitting the airwaves. "We're going to sell hundreds of big-screen TVs from now until Super Bowl anyway," Esposito says. "So, if people were looking for a quality 50-inch in the [Mitsubishi Diamond] series, they very often step up to a $3,999 set when they learn about HDTV."

Esposito and his staff have been at work doing what most higher-end retailers have spent this summer and fall doing — holding demos and seminars on SDTV, HDTV and the coming revolution in digital broadcasting. Many of the demos are sponsored by TV manufacturers, while others are set up independently by retailers using engineers from local TV stations. "I think the educational end of HDTV is probably the most important aspect of the whole changeover," says Craig Abplanalp, owner of two Definitive Audio stores in Seattle and Bellevue, Wash. "Our customers reacted very positively to our demos, but they also had a lot of questions that had to be answered."

Abplanalp said the classic early adopters were the ones who purchased his first HDTV sets, many of whom attended Definitive Audio's live HDTV broadcast uplink with Unity Motion earlier this year. He said other customers were more concerned about price, even though the retailer's clientele is upscale and Definitive Audio sells between eight and 10 data-grade front projection TV sets a month at $10,000 each. "We have a lot of customers who are concerned about the price, but we also have a lot of customers who don't care," Abplanalp said. "I think we've talked people out of purchases, but then we've gained their trust and respect."

In general, he said, customers have been able to understand the concept of the new digital TV system after they attend a seminar. "I think Mitsubishi did the best job explaining the difference between HDTV and SDTV," Abplanalp said. "Now, the issue of standards has a lot of people confused." To clear up the complex issue of broadcasting standards in the new format, Defin-

Panasonic Television Division's assistant GM Nate Apfelbaum demonstrates the company's HDTV-compatible widescreen projection TV to consumers this summer at Ultimate Electronics' SoundTrack store in Denver.

During the HDTV demonstration at Home Theater Store in Houston this summer Mitsubishi executives demonstrated their 16:9 73 inch HDTV projection TV, model 73-803. Pictured with the set are (left to right) Jim Landrum, account executive, Mitsubishi; Mihir Mody, CEO, Home Theater Store; with Matt Pugel, regional VP; Max Wasinger, VP sales & marketing; and Aki Yamamoto, product manager, all from Mitsubishi.

itive Audio will sponsor, in February 1999, an informational in-store party that features demos of four different standards, each one in a separate room. Visitors will be able to see the difference in vertical display resolution between 480p, 720p. 1080i and higher. Abplanalp has already sent direct mail to his entire customer base announcing the event. "It won't be a selling event," he said. "It's a catered party. We're trying to answer questions, deal with issues and get people comfortable with HDTV in general."

At Dow Stereo, the owner is spending

1979
THE FIRST CLOSED-CAPTIONED NETWORK BROADCAST

1984
THE FIRST STEREO TV BROADCAST

1990
THE FIRST DESCRIPTIVE VIDEO BROADCAST

NOTICE A TREND AROUND HERE?

The **DIGITAL REVOLUTION** is here and **PBS** and its **MEMBER STATIONS** are leading the way!

In **NOVEMBER** we'll have...

THE FIRST
NATIONAL BROADCAST OF A TELEVISION PROGRAM SHOT IN HD VIDEO

THE FIRST
BROADCAST OF A PROGRAM CONTAINING ENHANCED DIGITAL CONTENT

THE FIRST
NATIONAL HD PROGRAM DESIGNED TO INFORM AUDIENCES ABOUT DTV

THE FIRST
CONSUMER-FRIENDLY DTV WEB SITE ON PBS ONLINE

PBS

IF PBS DOESN'T DO IT, WHO WILL?

VISIT US AT WWW.PBS.ORG

$100,000 to rewire existing stores to showcase HDTV signals. Campbell reports that Dow Stereo has also taken the unusual step of applying to the FCC for a test license so the retailer can create a Dow station on UHF to broadcast HDTV signals.

For national big-box retailers, the issue is how to retrofit and redesign stores in order to accommodate the new, larger format HDTV sets. Best Buy, for example, has created Concept IV, a new retail strategy developed with HDTV in mind. The chain believes the format will increase sales of all digital technology products, especially HDTV. The strategy is already being used in the company's newest store, in Framingham, Mass. "We believe the future is going to be HDTV," said Michael London, senior VP merchandising at Best Buy and a key figure in the development of the Concept IV strategy. "We will be able to demonstrate HDTV much more efficiently with our new retail format."

To that end, Best Buy moved its commodity-priced TVs (9-inch to 27-inch) and VCRs (priced at $100 to $150) to a new, smaller "quick serve" area. The retailer took away square footage from the 27-inch and smaller TVs and used it to create a larger home theater/big-screen TV area, which is now located adjacent to the audio department. The new floor plan showcases higher-ticket projection TVs and 30- to 35-inch big-screen TVs, and will, ultimately, be home to Best Buy's selection of HDTV sets.

The redesigned, larger home theater area also features a 17-foot video display wall at the back of the store, ideal for showcasing the crisp, clear images that HDTV provides.

Getting customers comfortable with the new technology is a theme echoed by several other retailers, including Esposito in Texas. Home Theater Store has already held an advance showing of Mitsubishi's giant 73-inch 16 x 9 widescreen HDTV set, which, Esposito said, "whet the appetite of hundreds of Houstonians" who attended the event. Now, the retailer is making sure that people do not avoid HDTV because they assume it is too confusing and too

"We believe the future is going to be HDTV. We will be able to demonstrate HDTV much more efficiently with our new retail format."

— Michael London, Best Buy

far in the future. Esposito has purchased 12 billboards throughout Houston and full-page ads in newspapers touting the sheer pleasure of watching and listening to HDTV. The billboards feature such taglines as: "HDTV: Immaculate Reception" and "The Idiot Box Is Now a Genius." Home Theater Store also sent 30,000 direct mail pieces to potential customers inviting them to an Oct. 29 in-store event that showcased a live HDTV broadcast on KHOU, a CBS affiliate in Houston, of John Glenn's space shuttle launch.

"We're not taking a back seat on this. We're embracing it fully so our customers will too," Esposito said. "We didn't want to put [HDTV] behind a velvet rope like something at the World's Fair. We wanted to show people that the future is now." ∎

How does Philips know so much about Digital TV?

Well, we helped develop it.

PHILIPS WAS A FOUNDING MEMBER OF THE "GRAND ALLIANCE" THAT CRAFTED THE STANDARDS FOR DIGITAL BROADCASTING. IN FACT, PHILIPS WAS A LEADER IN THE DEVELOPMENT OF DIGITAL TV, LONG BEFORE MOST OF THE INDUSTRY HAD EVEN STARTED THINKING ABOUT IT. ALL THIS, PLUS PROVEN TECHNOLOGY COVERING ALMOST EVERY FACET OF DIGITAL BROADCASTING, MEANS CALLING ON PHILIPS IS A SMART WAY TO ENSURE YOU MEET THE CALL OF THE DTV FUTURE.

Philips is proud to be the major sponsor of the Harris/PBS DTV Express.

Let's make things better.

PHILIPS

Consumer electronics manufactures take different routes to DTV

By Greg Tarr
TWICE

s broadcasters begin to put the first digital signals on the air, some consumer electronics manufacturers are still scrambling to bring high-definition TV receivers to the marketplace.

Why? Chalk it up to on-going debates over standards setting and programmers' concerns with copy protection and conditional access security. As for the lack of true interactive data features in Generation 1—let's just say it's another example of computer industry vaporware. We have been assured that DTV datacasting will get here someday, but exactly when is still anybody's guess.

In the hope of getting at least the digital interface connection (expected to be IEEE-1394)

Faroudja is currently offering two DTV-ready rear projection TVs including this 48" widescreen unit which displays 1080i HDTV signals supplied by an external decoder.
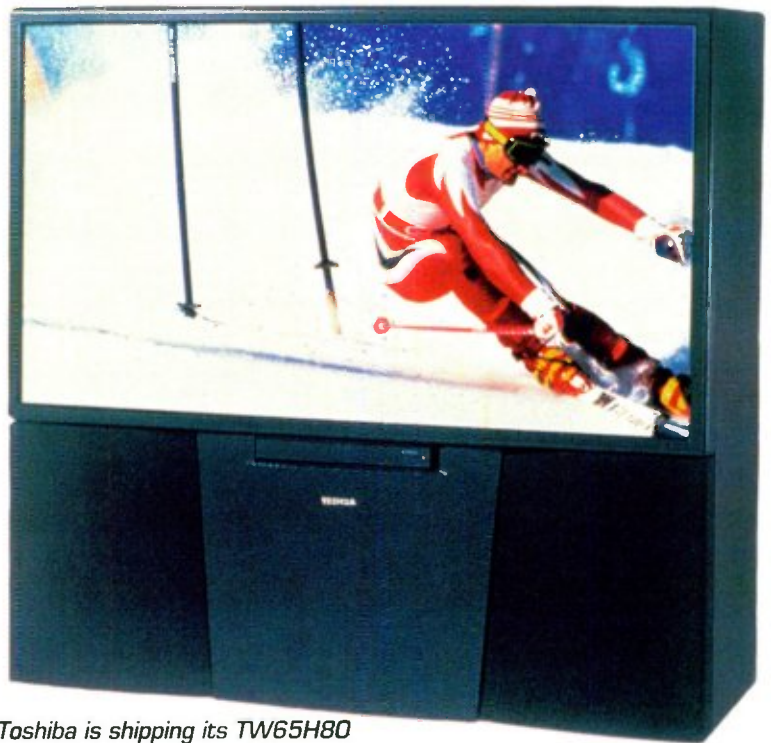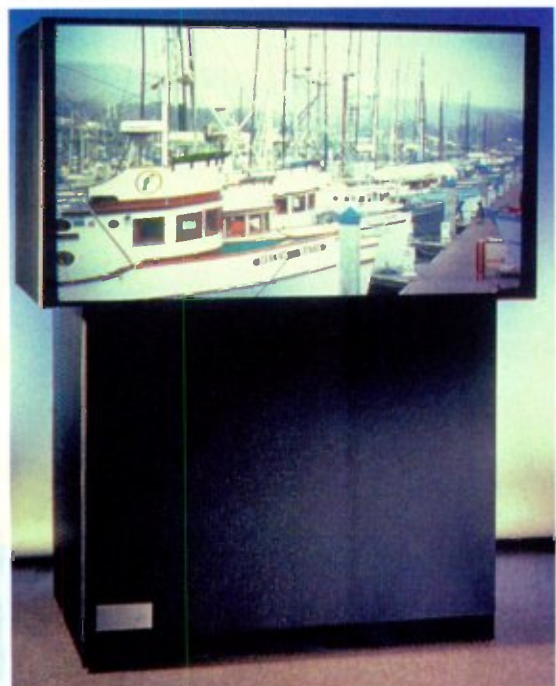
Toshiba is shipping its TW65H80 DTV-ready rear-projection TV which will display 1080i signals froman external decoder as well as 480p images from a new DVD video player.

included in their products. some manufacturers have left their plans open until the last minute while awaiting a late industry consensus. But the cold truth is that few of these products will be able to connect in the digital domain with future cable boxes and digital VCRs. Meanwhile. the delays have kept some manufacturers from diving into large-scale production this year.

By all appearances, the digital television buzz swirling across the country for most of the year will develop into little more than a call for consumers to visit their neighborhood electronics stores this Christmas season to see a high-definition TV set. Only a handful of set makers will actually have products ready to sell by Christmas, and most markets of the country won't have demonstration models until early next year.

Still, most manufacturers and retailers aren't

SEE NO EVIL
HEAR NO EVIL
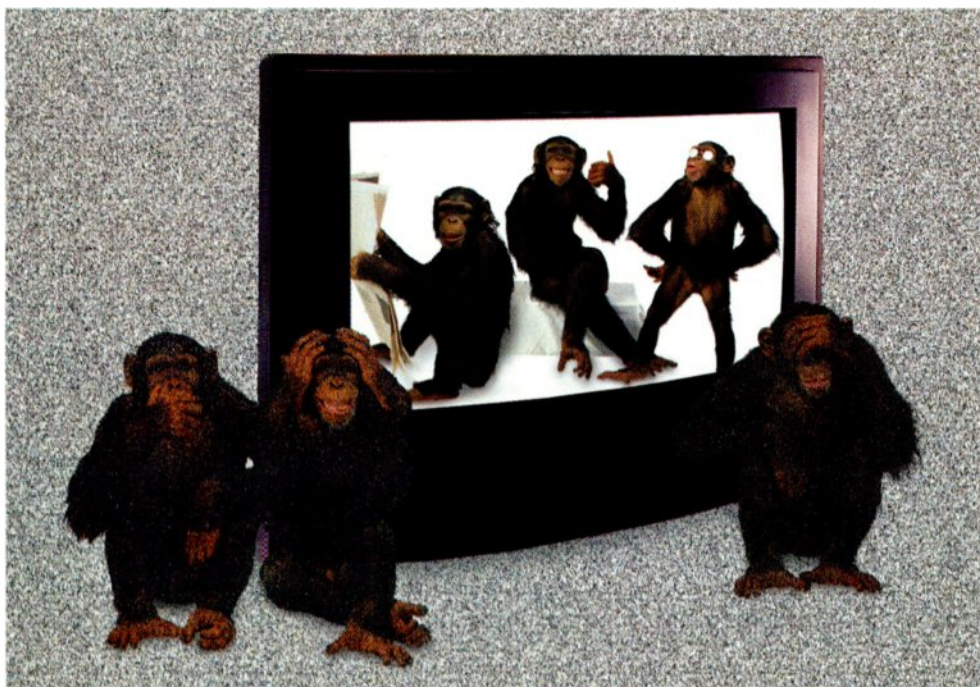
Digital video should be perfect. No visible anomalies. No audible glitches.

So we don't monkey around. Sarnoff is a leader in digital video, HDTV, and PC convergence technology. In hardware and software, from MPEG compression to motion tracking, in studios or home receivers, we set new standards.

Use our technology to create digital video products that grab viewers' attention, and to make them compatible with the rest of the market.

You can license Sarnoff technology. Partner with us in a new venture company. Contract with us for R&D. In digital video, Sarnoff speaks no evil.

Contact us at **609-734-2507**, or check out our web site at **www.sarnoff.com/ad/digital** for more information.

201 Washington Road
Princeton, New Jersey 08540-6449
© Copyright 1998 Sarnoff Corporation. All rights reserved.

SARNOFF®
Corporation

reserving springboard space from the highest window ledges. Due to the high price and lack of coast-to-coast over-the-air digital broadcasts, many CE industry veterans never expected heavy sales volume for the first digital sets. Instead, the game plan has long been to use HDTV as a lure to retail showrooms, where Christmas shoppers can view the new technology and then, after a dose of sticker shock, opt for the better value offered by current large-screen analog TV equipment.

The strategy is already working. In spite of

ALL SETS FOR HIGH DEFINITION

Whether a PDP, rear-screen CRT projector or front projection system, the first HDTV sets will all be several thousand dollars higher than most of today's comparably sized NTSC products and virtually all will be followed by more complete products in the next 12 to 24 months. But for those with the will and the money, the first HDTV will include the following products (charts include listings for HDTV-capable equipment only. HDTV-ready displays will require an optional set-top tuner/converter box to receive DTV broadcasts.):

Brand	Display Model	Screen Type	Full-HDTV Display Size	On-Board Line Capability	Number of NTSC Routing	DTV Set-Top Tuners	Interface	Available	Price
Ampro	5200	3-chip DLP Front PTV	Variable	720p 1080i	Yes	0	RGB H&V-sync	Now	$69,995
Ampro	HD-4600	"9"" CRT Front PTV"	Variable	720p 1080i	Yes	0	RGB H&V-sync	Now	$29,995
Ampro	HD-3600	"8"" CRT Front PTV"	Variable	720p 1080i	Yes	0	RGB H&V-sync	Now	$22,995
Ampro	HD-2600	"7"" CRT Front PTV"	Variable	720p 1080i	Yes	0	RGB H&V-sync	Now	$14,995
Faroudja	RP-4800	CRT Rear PTV	"48W""–16:9"	720p 1080i	Yes	0	VGA D15	Now	$15,500
Faroudja	RP-5800	CRT Rear PTV	"58""–16:9"	720p 1080i	Yes	0	VGA D15	Sept. 1998	$35,000
Hitachi	60SDX88B	CRT Rear PTV	"60W""–16:9"	1080i	Yes	2	Component (Y-Pb-Pr)	Oct. 1998	$4,299
Hitachi	36SDX88B	Direct View	"36""–4:3"	1080i	Yes	2	Component (Y-Pb-Pr)	Oct. 1998	$2,799
Mitsubishi	VS-50803	CRT Rear PTV	"50""–4:3"	1080i	Yes	2	Proprietary RGB H&V-sync	Sept. 1998	$4,299
Mitsubishi	VS-60803	CRT Rear PTV	"60""–4:3"	1080i	Yes	2	Proprietary RGB H&V-sync	Sept. 1998	$5,399
Mitsubishi	TS-55813	CRT Rear PTV	"55""–4:3"	1080i	Yes	2	Proprietary RGB H&V-sync	Nov. 1998	$4,299
Mitsubishi	WS-73903	CRT Rear PTV	"73W""–16:9"	1080i	Yes	2	Proprietary RGB H&V-sync	Oct. 1998	$9,999
Mitsubishi	VS-70803	CRT Rear PTV	"70""–4:3"	1080i	Yes	2	Proprietary RGB H&V-sync	Oct. 1998	$6,499
Mitsubishi	VS-80803	CRT Rear PTV	"80""–4:3"	1080i	Yes	2	Proprietary RGB H&V-sync	Nov. 1998	$9,999
Mitsubishi	WS-65903	CRT Rear PTV	"65W""– 16:9"	1080i	Yes	2	Proprietary RGB H&V-sync	Nov. 1998	$6,499
Panasonic	CT-36DV60	Direct View	"36""– 4:3"	1080i	No	1	Component (Y-Pb-Pr)	Sept. 1998	$3,199.95
Panasonic	PT-56WFX90	CRT Rear PTV	"56W""–16:9"	1080i	No	2	Component (Y-Pb-Pr)	Now	$5,999.95
Pioneer	PDP-501MX	Plasma Panel	"50W""–16:9"	720p	Yes	0	Component (Y-Pb-Pr)	Sept. 1998	$25,000
Pioneer Elite	PRO-700HD	CRT Rear PTV	"64W"""	1080i	Yes	2	Expansion Slot Connection For SH-D07	Nov. 1998	Expected to be $7,500
Runco	DTV-1000	CRT Front PTV	Variable	720p 1080i	No	0	RGB-BNC	Now	$48,000
Runco	DTV-852	CRT Front PTV	Variable	720p 1080i	Yes	0	RGB-BNC, Component Video	Now	$14,995
Runco	IDP-950	CRT Front PTV	Variable	720p 1080i	No	0	RGB-BNC, Component Video	Now	$19,995 w/doubler pckg
Runco	Ultra IDP-980	CRT Front PTV	Variable	720p 1080i	No	0	RGB-BNC, Component Video	Now	$22,995
Runco	DTV-991	CRT Front PTV	Variable	720p 1080i	No	0	RGB-BNC, Component Video	Now	$24,995
Runco	Cinewide 5800	CRT Rear PTV	"58W""–16:9"	1080i	Yes	2	RGB-BNC, Component Video	Sept. 1998	$10,995
Sony	VPH-D50HTU	CRT Front PTV	Variable	720p 1080i	Yes	0	RGB H&V-sync, Component (Y-Pb-Pr)	Oct. 1998	$13,990
Toshiba	TW65H80	CRT Rear PTV	"65W""–16:9"	1080i	Yes	2	Component (Y-Pb-Pr)	Sept. 1998	$5,999
Toshiba	TP61H95	CRT Rear PTV	"61""– 4:3"	1080i	Yes	2	Component (Y-Pb-Pr)	Sept. 1998	$4,999
Toshiba	TP71H95	CRT Rear PTV	"71""–4:3"	1080i	Yes	2	Component (Y-Pb-Pr)	Sept. 1998	$6,999
Unity Motion	UHD-3200	Multi-scan	"32W""–16:9" Direct View	720p 1080i	Yes	0	Component (Y-Pb-Pr)	Oct. 1998	$6,995
Vidikron	Vision One	CRT Front PTV	Variable	720p 1080i	No	0	RGB-BNC	Now	$49,995
Vidikron	Vision Two	CRT Front PTV	Variable	720p 1080i	No	0	RGB-BNC	Now	$29,995
Vidikron	VPF40HDX	CRT Front PTV	Variable	720p 1080i	No	0	RGB-BNC	Now	$15,995
Vidikron	VPF50HDX	CRT Front PTV	Variable	720p 1080i	No	0	RGB-BNC	Now	$19,995
Vidikron	Image Two	CRT Front PTV	Variable	1080i	No	0	RGB-BNC	Now	$9,995
Vidikron	Stratos	DMD Front PTV	Variable	720p 1080i	No	0	RGB-BNC	Now	$59,995
Vidikron	Epoch D-300/351	LCD Front PTV	Variable	1080i	No	0	Component (Y-Pb-Pr)	Now	$6,995
Zenith	Pro 900	CRT Front PTV	Variable	720p 1080i	No	0	RGB H&V-sync	Now	$12,600

Our goal: To fill the world with faces like these.

The new Pioneer will lead the way to the future of entertainment.

The world of entertainment has changed since Pioneer was born in 1938. So, we have expanded our mission, from "Creating better sound and images" to our new goal: "A vision of fun for everyone." To reach this goal, we've developed new products like our exciting plasma displays. We will explore digital frontiers in home networking, car navigation and, of course, audio and video. That's why we've created a bold new corporate logo—a reminder that Pioneer is not just making new products. Pioneer is reborn.

Pioneer

The SharpVision TU-DTV1000 set-top DTV decoder will receive and decode all 18 ATSC formats and will include an expansion port to add on a digital interface in the future.

Mitsubishi's HD-1080 set-top decoder will power the company's seven-model DTV-ready rear-projection TV line, but its proprietary connection means it will not be compatible with any other TV maker's digital-ready display monitors.

the media hype surrounding the launch of DTV broadcasting this year, the Consumer Electronics Manufacturers Association has reported record sales for most analog color televisions with screen sizes of 30 inches and larger.

For those that will insist on having the latest and greatest, the omission of the few aforementioned items won't spoil all the fun. In fact, the electronics and cable industries have agreed to an interim connection solution using component video (Y-Pb-Pr) jacks to link digital cable boxes with digital TVs or set-top DTV decoders. Plus, roof-top antennas and even satellite hookups should be available in some areas to capture

DTV signals off air.

In order to bring products to market for the start of digital broadcasting, electronics manufacturers have elected to take several different routes to digital television development. About a dozen brands have elected to deliver true HDTVs with ATSC digital and NTSC analog tuners built in. These sets, called DTV or HDTV receivers, will eliminate much of the fuss and muss associated with setting up a system of separate components.

To get around this obstacle, some manufacturers have elected to offer a component approach to DTV adoption. Consumers can buy an HDTV-

DTV SET-TOP RECEIVERS/CONVERTERS

Brand	DTV Format Model	Output	Scan Conversion	Includes NTSC DTV Display	Includes NTSC Receiver?	Built-In AC-3 Line Doubler?	Decoder	Available	Suggested Retail Price
Mitsubishi	HD-1080 3 Formats	All 18 Table 480P>960I, , 720P>1080I 1080I>1080I	NTSC>960I ,480I>960i , H&V-Sync	Proprietary RGB	No	No (2-channel)	Yes	November	$3,000
Panasonic	TU-DST50 3 Formats	All 18 Table All Formats>NTSC All Formats In Native Form 720P>480P 1080I>480P 480I>480P	Switchable: (Y-Pb-Pr)	Component Video	Yes	No	No	Oct. 1996	$1,699.95
Pioneer Elite	SH-D07	1080I All Formats>480I All Formats>480P All Formats>1080I	Switchable: for Pro-700HD	Expansion Slot Connection	No	No	Yes	Nov. 1998	$2,500
RCA	DTC100 3 Formats DSS, NTSC HD, via DirecTv	All 18 Table	HDTV>1080I SDTV>480I	RGB via VGA	Yes	No	Yes	Q1 1999	$700
SharpVision	TU-DTV1000	1080i All Formats>480I All Formats>480P All Formats>1080I	Switchable: (Y-Pb-Pr) RGB H&V-Sync	Component Video	No	No	Yes	Oct. 1998	TBA
Sony	DTR-HD1	480I 480P 1080I	Switchable: 480I 480P 1080I (Y-Pb-Pr)	Component Video Yes	(2-channel)	No	TBA	Dec. 1998	$1,599
Toshiba	DST-3000	480P 1080I	Switchable: 480P 1080I (Y-Pb-Pr)	Component Video	TBA	TBA	TBA	First Half 1999	TBA
Unity Motion	Set-Top IRD 720P/60 1080I/30	480P/60 fps 1080I>1080I	480P>480P 729P>720P (Y-Pb-Pr) RGB H&V-Sync	Component Video	No	No	Yes	Sept. 1998	$2,495
Zenith	IQADTV1W	1080I	All>1080I	RGB H&V-Sync	No	Yes	Yes	4Q 1998	TBA

Panasonic PT-56WXF90 HDTV-ready rear-projection TV has been unofficially recognized as one of the first HDTV products on the market. But the 56" widescreen unit requires an external decoder (which is just now reaching the market) to present DTV images.

capable of presenting on screen. As stipulated by CEMA, to be a "DTV" product, a set must be able to receive all 18 formats and display them to the highest capability of the monitor display. These displays will be split into two basic flavors: standard-definition TVs (SDTV) and high-definition TVs (HDTV). Due to the initial high prices and the desire to create the maximum possible impact at the outset, virtually all of the first DTV sets planned for market over the next year will be HDTVs or HDTV-ready systems.

As defined by CEMA guidelines, a HDTV set must:

• Display a DTV picture with a vertical display resolution of 720p or 1080i or better.

• Display a widescreen picture.

• Reproduce Dolby Digital surround sound in 5.1 discrete channels.

Standard-definition televisions must display all DTV formats at resolution levels lower than HDTV (typically 480i or 480p) and be able to produce some form of "usable audio." No aspect ratio was specified.

Most HDTV equipment to be made available this year will present HDTV in 1080i form. When such a set receives the 720p HDTV broadcasts from an ABC or Fox network affiliate, it will typically up-convert the signal from the 720 progressive format to 1080 interlace. In some sets, the 480i, 480p and NTSC formats are line doubled and up-converted to fit a 1080i display, although the end result is noticeably inferior to 1080i in its native or unconverted form.

One exception to the 720p rule will be a handful of XGA-quality flat-screen plasma display panels (PDPs), which do not require raster-scanning techniques to present an image and therefore offer all images in progressive-scan form. Some of these pricey flat panel displays promise enough resolution to produce true 720p when connected to the appropriate set-top tuner/decoder. ∎

ready monitor and separate set-top tuner/decoder to receive these broadcasts. Then, as the technology advances, they can swap the set-top box and hold on to the pricey display monitor. One manufacturer has also included an expansion port that will connect with some future adapter to enable the addition of a digital interface.

Because the DTV standard allows for over 18 different picture formats, electronics manufacturers have a wide range of choices to use as the primary display formats their products will be

Film: The Winner and Still Champion in HDTV

The more things change, the more they stay the same in production, too

By Michael Stroud
Broadcasting & Cable

'Chicago Hope', ordinarily shot on film, was captured direct to HDTV.

or years, the quest for high definition has been an effort to match the quality of 35mm film. Now that television has reached that pinnacle, film may be more popular than ever.

The reason: television's digital transmission system can take greater advantage of film that ever before. And because network dramas are coming in at $1.5 million an hour, all those long years of expertise built up in Hollywood's studios are in ever greater demand.

But like any champion, it faces a challenger. Now that HDTV has arrived, the prospect of so-called "direct capture"—shooting in a television format rather than transferring from film—is attracting new adherents. Fox, for example, tried its luck with the first entertainment episode to be shown on CBS in HDTV: the Nov. 18 episode of *Chicago Hope*, ordinarily shot in film.

Marker Karhadian, president of production equipment rental company Plus Eight Video, estimates he's done about 150 rentals of HDTV camcorders to local producers in the five months he's been in the business, and predicts that three episodic TV shows will be shot in the format by next fall.

Many in Hollywood, however, remain skeptical about HDTV's potential, whether through film or direct capture. Asked at last July's annual press tour how seriously he took the technology, one top network executive wondered aloud how seriously a technology deserved to be taken that commanded "an audience of 24" in the entertainment community.

And broadcasting in HDTV doesn't necessarily mean shooting in it. ABC's first HDTV efforts focus on broadcasting movies that have been transferred from analog formats—less cumbersome than renting expensive HDTV cameras to shoot their own. Such transfers are estimated to add $10,000-$50,000 to the cost of one episode, but that price will go down as the networks begin dealing in greater 35mm-to-HDTV volume.

For a show like *Chicago Hope*, with its documentary style, the electronic format may have an advantage. The viewer will detect a difference between the crisp. clean lines of HDTV and the warmer, softer tones of film, says Jim Hart, the Fox-based producer: "It's the difference between painting in oils and in water colors."

It's just that kind of distinction, of course, that has kept Hollywood primarily in the film camp for years, along with a generations-long preference for film's flexibility in editing and special effects.

Saying he'd rather lead than follow, Pierre DeLespinois, executive producer of Talisman Crest's *The Secret Adventures of Jules Verne,* a $50 million series being shot entirely in HDTV for the Canadian Broadcasting Corp. and international distribution, explains that the economics of the new medium attracted him. He estimates film would have cost millions more, and says: "I could not afford it."

According to Joe Flaherty, CBS's senior vice president for technology, the lion's share of prime time programming continues to be shot in 35mm film—81% thus far in 1998. Videotape came in second with 10% and super-16 just behind that with 9%. Those three categories accounted for 177 hours, occupied by 197 programs.

"I think HDTV as a whole will strengthen film for years to come," Flaherty says. "It is high definition, to begin with. It has all the equipment in place. It has all those artisans, and in many ways they're still the best. Film is going to be hard to dislodge." ∎

Fast Foward Progress of Broadcast Equipment Suppliers

Current slow sales expected to bounce back once broadcasters find their business model

By Ken Kerschbaumer
Digital Television

t was only a few years ago that discussions at National Association of Broadcasters conventions concerning HDTV production and transmission equipment would have focused on the incredible costs. "HDTV World," a demonstration area set up at one NAB convention in Las Vegas in the early part of the decade might well have have been called, "If You Think Your Facility Can Afford

Panasonic is currently developing DVCPRO100

This Equipment, You're Crazy World."

But a lot has happened since then. This past NAB convention offered an improved generation of HDTV equipment that, while still expensive, was much more reasonable. Most importantly, manufacturers agree that by the next those attendees looking to purchase equipment for HDTV and DTV transmission and production will find a number of options and that competition between manufacturers in product areas will begin to drive prices down on all gear.

All in all, the pieces are beginning to fall into place.

David Wiswell, business manager, advanced television, Panasonic Broadcast & Digital Systems Co., says: "I think the equipment is cheaper than people really thought it would be. There was a lot of posturing a year or two ago on price differences, but I think the cost of HDTV equipment is much

less than it was two years ago. There was no market to justify developing new technology because the HDTV market was very small. So with this transition there's been a reason to bring the prices down on the technology."

"All the equipment is becoming a reality," says Hugo Gaggioni, Sony Business and Professional Group director of DTV Technology. "It wasn't too long ago that people were saying all that could be done in the way of HDTV programming would be telecine transfers. But now they're talking about football coverage and things like that."

Challenges Ahead

The challenge faced by broadcasters and manufacturers alike in the move to DTV and HDTV transmission is a daunting one. Those who create and transmit DTV and HDTV programming are being asked to invest in equipment that isn't guaranteed to show a return on investment. And manufacturers are being asked to make investments in research and development of equipment that might never actually be purchased in great quantities.

Adding to the difficulties is that many of the technical issues are still being ironed out by industry engineering groups. But probably the biggest problem is that DTV and HDTV will require new business models on the part of broadcasters, and that uncertainty is resulting in less-than-stellar sales for many equipment manufacturers today.

"Our industry is in a serious slump," says Ed Grebow, president and CEO of Chyron. "No one who services the broadcast industry is doing well. There's a tremendous hesitancy to come into digital equipment until it's clear as to what the future holds."

Tektronix President Tim Thorsteinson adds: "Our customer [base] is undergoing a business change and the industry is in a difficult period. If you look at the net profit generated by the move to DTV and HDTV, it's not attractive."

Because there is no specific cause for the slump, it's difficult for manufacturers to figure out how best to improve sales. For example, some industry professionals wonder if the ATSC Table 3, offering 18 different DTV and HDTV formats, would be better if it had offered only one choice, 1080i for

example. This would allow broadcasters and manufacturers to move toward one common display goal, cutting research and development costs for manufacturers while allowing broadcasters to map out capital expenditures with greater precision.

Panasonic's Wiswell, however, says the flexibility of the table is something not to be taken lightly. "A table of different image formats means that manufacturers can build equipment for different business scenarios," he says. "The idea is that we aren't boxing ourselves into a technology corner and that's the blessing of DTV. It seems confusing, but it's only confusing because it's something new and we aren't used to it. The reality is it's going to offer a lot more flexibility and business opportunities than we had in the past."

In The Meantime...

So how exactly will the industry battle out of the sales slump many manufacturers face? Some manufacturers speculate that there could be some companies that lose the battle and fall by the wayside, while others see increased consolidation as manufacturers go beyond simply working together to leverage strengths by actually joining ranks.

Thorsteinson adds that for some manufacturers the solution to the current lack of sales is to look to develop additional products. "Many suppliers right now are choosing to increase engineering expenditures to be successful. But we see the key as getting the cost structure in line because you can't really grow out of this. It's going to be a tough couple of years."

Bob McAlpine, Pesa Switching Systems senior vice president, sales and marketing, sees increased synergies between manufacturers as one way to attract new sales. "Manufacturers are going to have to work together because we can't put the resources together individually," he explains. "Adding to the difficulties is that software engineers are at a premium right now."

But even working together can be tricky business. Mike D'Amore, president of Philips Digital Video Systems, thinks one of the major reasons for the current state of confusion in the U.S. is the fear of antitrust lawsuits: "As manufacturers we've become so paranoid about talking to one another because of collusion and antitrust. We need a greater freedom to work together."

With a table of 18 different formats broadcasters face greater choices and challenges when it comes to choosing a business model and then outfitting their facility to meet that model. D'Amore says there are three things a facility must do to best prepare for future demands. First, convert any current analog facilities to digital, then make sure they are

switchable between 16:9 and 4:3, and finally, realize that bandwidth has value.

Also helping ease the conversion, according to D'Amore, is understanding that DTV and HDTV are two different things. "First, don't confuse DTV and HDTV," he says. "You always have to start with the premise: Will DTV happen? Yes. Once stations understand that then they have to look at the bits they're transmitting and realize that every one saved is important."

D'Amore's point of bits is one of the recurring themes in discussions with manufacturers: almost everyone agrees that the broadcasters' new rev-

enue generator in the digital age won't be programming as much as it will be the digital bandwidth. With the use of efficient digital technologies broadcasters can maximize compression, thereby maximizing the amount of bandwidth available to offer additional, potentially revenue-generating services.

Grebow says the important thing is for every broadcaster to begin the conversion from analog to digital, regardless of when they are mandated by the FCC. "This is not something you can do overnight," he explains. "It's important that you get experience in a small way before you rush in and place orders. We're encouraging people to try some HD production, to try some digital equipment."

Resolution Differences

The majority of attention in the trade and business press has focused on the networks and how they expect to implement HDTV technologies—most notably 1080i and 720P. However, manufacturers say that 480p equipment is a serious option

The SGI Workstation Lineup
At the low end is the O2, a workstation that checks in for less than $6,000 and provides an integrated digital media and 3-D animation device that can also play back JPEG movies, work with live sets or 3-D topological texture maps. The next step up is Octane, used more for on-air realtime playback of multiple channels of graphics and/or video. At the top of the line is Onyx2, SGI's "ultimate graphics playback device. It provides more functionality plus full-scene anti-aliasing.

for mid- and small-market stations. Wiswell and D'Amore both point to the validity of 480p as an important standard in DTV. It eases the burden on a facility's infrastructure while bringing viewers an improved picture over today's analog interlace offering, albeit not as breathtaking as 720p or 1080i.

Wiswell explains that Panasonic sees 480p as a natural for electronic news demands. "If you look over the history of formats, stations in the larger markets adopted Betacam SP, while in the smaller markets they adopted it later or went with something

(Above) The Videonics PowerScript Studio 4000 is available in two models.

(Right) The Chyron Infinit character generator remains the standard by which all other character generators are judged in many circles, particularly the live news or sports productiong environment.

else. Those stations that want to adopt something that distinguishes them from the competition will look seriously at 480p because manufacturers can make 480p equipment and systems that are priced to fit into the right business scenario for them."

Another advantage Wiswell sees 480p offering broadcasters is that, with careful planning, a station can get its facility ready without significantly changing its implementation of a 601 infrastructure. "As they're laying out an SDI infrastructure they should make sure they can handle 360 Mbps so they can handle 480p 4:2:0 as well," he explains.

Gaggioni offers one interesting alternative for broadcasters to consider. "Some of the sets being

offered to consumers can upconvert the broadcast signal to amazing HDTV-like pictures or native 480p. It's not inconceivable that you could send a high-quality standard-definition signal and let the receiver do a fancy upconversion. Some stations are looking to do the upconversion at the station and then send out that signal, but that penalizes the station as far as channel capacity. By letting the set do the work broadcasters could eat their cake and have it to. That's something not too many people have thought about, but it's possible."

One of the top technical challenges all broadcasters face in implementing DTV broadcasts begins at exactly that—the top. With new transmission requirements come new demands on a station's broadcast tower. And tower manufacturers are already seeing broadcasters slip into some difficult situations.

"On the tower side broadcasters are discovering that the right solution isn't immediately available and that the changes are much more difficult than they thought," says Ray Carnovale of Larcan LeBlanc. "If they want to make the existing tower work for both analog and digital it's going to be more expensive if they don't want to make compromises. The ramp-up so far has been slower than we expected."

Carnovale says he's surprised at the paucity of tower orders to date, adding that the longer stations delay investigating how they're going to transmit their DTV signal and how that impacts tower construction and retrofitting, the stickier the situation is going to get. "Sooner or later there's going to be a capacity crunch and you're going to see stations missing their on-air dates."

Shattering Myths

Even though DTV and HDTV broadcasts are entering only their third week of official existence, there already have been a number of articles in the consumer and trade press pointing out the shortcomings and reasons why the new technology is an expensive failure. The sets are too expensive, there isn't any programming, the pictures can't be received in every part of town—the list, at this point, seems long. So are these early reviews any reason to doubt the potential for DTV? Gaggioni says he can na meother technologies that received rough treatment early on.

Wiswell is also bullish on the future of DTV, if for no other reason than that it's here today. "The biggest myth was that DTV would never happen, and that's slowly fading away," he says. "Now we can get down to the serious business of figuring out how to implement it and stop arguing about whether it's going to happen or not." ∎

The PC Is Still Missing in the PC/TV

Convergence is still circling offshore, but there's no landing in sight

By Richard Tedesco
Broadcasting & Cable

t wasn't that long ago—at the 1997 NAB Show—when computer powers Microsoft, Intel and Compaq spun out their vision of a progressive-scan future—with consumers eagerly buying TV-ready PCs to see it.

The reality in the marketplace has been dramatically different, with no major computer makers rushing to produce Cadillac PCs equipped with tuner cards, anticipating that interactive age of enhanced data broadcasts. Dell Computer CEO/founder Michael Dell recently observed that pairing the two technologies results in "a really bad personal computer and a not-so-good TV."

Dell is still officially considering preinstalling tuner cards. But Compaq quit building tuner cards into some high-end machines several months ago after a brief run. Now it offers the cards at less than $200 strictly as an option, according to Trey Smith, vice president in Compaq's advanced products group, who terms it a "strategic shift" after its own consumer research indicated a limited market for TV-on-PC. "People want enhanced functionality with their viewing experience, but they don't necessarily want their computer in their living room," says Smith.

Compaq is simply broadening its digital sights, according to Smith, who points to a recent deal with Time Warner's Road Runner as a basis for a digital strategy to explore the more obvious, if less glitzy, means of utilizing bandwidth to deliver diverse content. And the idea of casual TV viewing via PC appears to be in disrepute. "You can go well beyond putting a tuner in a PC for the person who wants to watch the World Series while he's checking his e-mail or whatever," Smith says.

So Compaq will continue to explore the possibilities, as the computer industry's pitch for progressive scan grows more appealing among broadcasters. That has nothing to do with any expectation of TV/PCs proliferating, and Intel had already broken ranks with its computer com-

patriots late last year when it declared its intention to adapt its datacasting to any format. And Ron Whittier, Intel's senior vice president in charge of its content group, declared the NAB proposal "a smashing failure."

It certainly appears to be in high tech limbo, notwithstanding Microsoft's estimate that it is putting three million to four million video-enabled Windows 98 machines that come with WebTV for
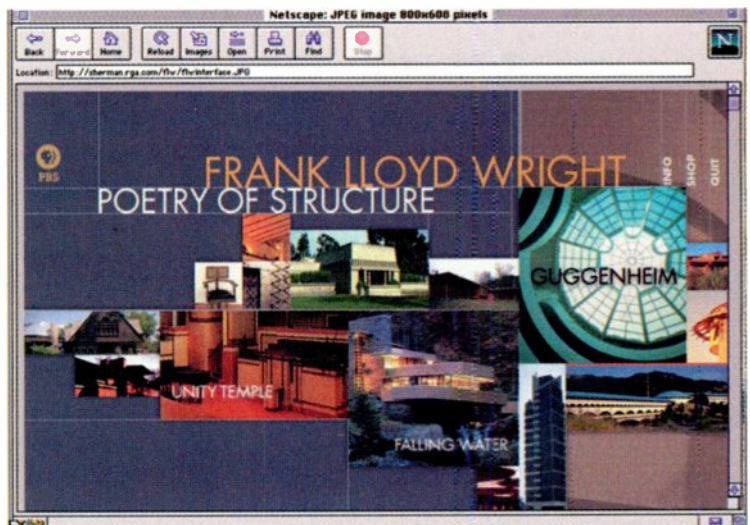
Windows installed. That's a basic format that includes an electronic program guide, but the PC user still has to supply the tuner cards, which Steve Guggenheimer expects to dip below $100 in cost in time for the Christmas selling season.

Microsoft and Compaq are both optimistic that eventual establishment of PC receiver standards by the Advanced Television Enhancements Forum in which both companies participate will accelerate the advent of enhanced digital broadcasts.

Jim Berger, a Washington attorney with Dow, Lohnes & Albertson, who's been involved in the standards effort, agrees it's crucial to content development. "If you get a foundation standard here, the guys in the garage know what to write the software to," says Berger. "It lays the foundation for combining TV and HTML." (HTML is the language in which most Web content is created.)

Berger believes that the immediate prospects

PBS was planning to broadcast enhanced versions of a Frank Lloyd Wright documentary with a digital interactive PC element.

for data-enhanced broadcasts are bright among broadcasters opting to use the 480P transmission standard and put the excess bandwidth to use for ancillary interactive services that could also enhance their revenues. "The bottom line is, you have a lot of bits," says Berger. "Bits are bucks."

The question is just how stations address the possibility of generating revenues from ancillary datacast services that supplement programming with information and transactional functions.

Intel and Microsoft are actively exploring the technology. Intel and PBS are poised for a datacasting trial built around a Frank Lloyd Wright documentary this month, while Microsoft and a host of programmers are set to start monthly datacast events for WebTV for Windows and its WebTV parent.

"Pairing the two technologies results in a really bad personal computer and a not-so-good TV."

—Dell Computer's
Michael Dell

Those are the brightest points on the horizon for the very gradual dawning of datacasting as TV signals' migration proceeds slowly to a very limited universe of PCs.

Neither Intel Corp. nor NBC have ever estimated the universe of users for their nascent Intercast datacast service, which had its biggest moment at its debut in the glow of the 1996 Summer Olympics. Intercast content was also developed by NBC to complement *The Tonight Show* and NFL games, when the network was still carrying games last season. MTV and The Weather Channel have also developed content for the Intercast format, which provides Pentium users wired with the requisite tuner data transmitted through the vertical blanking interval while they view TV programming on PC screens.

Intel's PBS test will be its first effort to combine video and data digitized and integrated for PC. Whittier calls it "an enhanced capability in the digital domain where video and data can be combined in ways that are more aggressive."

Ken Burns's recent Lewis and Clark documentary series on PBS had some rich content online with the prospect of more as it contemplates digitizing the entire series.

This month, six PBS stations were to carry enhanced versions of Burns's Frank Lloyd Wright documentary, with an expanded beta phase of datacasting slated to begin in January or February. The digital interactive PC/TV experience will present virtual walking tours of Wright's architectural handiwork, including "walk-throughs" of New York's Guggenheim Museum. "The viewers will be able to go into rich, graphically-intense environments that we could never deliver on the Web," says Cindy Johanson, vice president of PBS Online.

The entire video of a Mike Wallace interview with Wright will also be accessible to a limited number of viewers equipped with the high-end PCs and tuners needed to see it. PBS is proceeding with its six-station alpha phase with enhanced treatment of a children's series during the 1999 first quarter. It's all intended to demonstrate "how digital TV takes that step toward real convergence," as Johanson puts it.

Meanwhile, Microsoft is moving ahead with development of content for its WebTV for Windows format, which is starting to accommodate an increasing amount of content being developed for WebTV. Some stations of Tribune Broadcasting, the first station group to work with Microsoft, are developing content for both formats, and WGN-TV Chicago produced interactive content for a Chicago Cubs telecast in WebTV for Windows. Other Cubs telecasts will likely get the interactive treatment next season as part of a potpourri of content to be tailored to the format, according to Steve Guggenheimer, Microsoft group product manager for digital TV. Awards telecasts, similar to NBC's recent Emmy Webcast, are likely candidates.

While this isn't yet truly digital, it prefigures the kind of content that will be produced in a fully digital environment. In Microsoft's current approach, disparate data is transmitted through the VBI and then reassembled with the video on the PC screen.

"A lot of what's happening in analog will translate to digital," says Guggenheimer, adding, "Once it gets integrated and easier to use, ultimately, it will become an integral part of all PCs." He declines to estimate the percentage of PCs currently equipped with the required tuner cards.

Microsoft sees the current phase as an experimental period it expects will fuel projects with E! Entertainment, The Weather Channel, The Discovery Channel and MTV, and possibly Sinclair Broadcasting stations, among others, according to Guggenheimer, who says the onus is on programmers to produce for the format. "Interactive programming isn't going to be one of those things where you just pick it up and get it right," he says. "If you're going to make mistakes, you want to do that when you don't have a lot of eyeballs."

Judging from the present rate of penetration for TV-ready PCs, Microsoft, Intel and company have plenty of time left for trial and error. ∎

The real voyage of discovery
consists not in seeking
new landscapes,
but in having new eyes.

MARCEL PROUST

cbs is proud to lead the way in the
new age of digital communications

18 Broadcast Formats

	Vertical Pixels	Horizontal Pixels	Aspect Ratio	Frame Rate	Sequence
1.	1080	1920	16:9	23.97/24.0Hz	Progressive
2.	1080	1920	16:9	29.97/30.0Hz	Progressive
3.	1080	1920	16:9	29.97/30.0Hz	Interlace
4.	720	1280	16:9	23.97/24.0Hz	Progressive
5.	720	1280	16:9	29.97/30.0Hz	Progressive
6.	720	1280	16:9	59.94/60.0Hz	Progressive
7.	480	704/720	4:3	23.97/24.0Hz	Progressive
8.	480	704/720	16:9	23.97/24.0Hz	Progressive
9.	480	704/720	4:3	29.97/30.0Hz	Progressive
10.	480	704/720	16:9	29.97/30.0Hz	Progress
11.	480	704/720	4:3	59.94/60.0Hz	Progres
12.	480	704/720	16:9	59.94/60.0Hz	Progr
13.	480	704/720	4:3	29.97/30.0Hz	Int
14.	480	704/720	16:9	29.97/30.0Hz	In
15.	480	640	4:3	23.97/24.0Hz	
16.	480	640	4:3	29.97/30.0	
17.	480	640	4:3	59.94	
18.	480	640	4:3	29	

No resolution.

Highest resolution.

While the outcome of the great
compression format debate is
uncertain, one thing is known:
when you originate on film,
you capture the highest possible
resolution from the outset.
Six times more than the
closest digital format.
So, no matter how they stretch
or squeeze it, your creative vision
will still be seen more clearly
than ever before.

Kodak
Motion Picture Film
What high definition is shooting for.

COOL STUFF

Dolby Laboratories

Dolby is introducing a new 5.1-channel Dolby Digital reference encoder that sells for only $5,000, just one-quarter the cost of its predecessor. The DP569 supports encoded bit rates from 56 to 640 kbps and channel configurations from mono to 5.1-channel surround sound. Fault-monitoring circuits warn of system failure and bypass connections for hot-standby operation in broadcast operations is included, and the unit also lets broadcasters use timecode to trigger configuration changes automatically. Contact Dolby at (415) 558-0200 or visit www.dolby.com.

■ For more information circle Reader Service 200

SporTVision Systems

Viewers of ESPN's NFL telecasts have been able to see one of the cooler new technologies to hit the airwaves—SporTVision Systems' "1st and Ten." The system displays a yellow line that appears to be painted across the football field at the first down marker. The

location of the first down yard line is entered into the system's computer, which also gathers data on the cameras' pan, tilt, zoom and focus functions. Using this information, the system can tell where in the frame of video the line should appear. The computer then analyzes the line 30 times per second and determines whether the images in the frame of video are field, a player, the ball or something else. Contact SporTVision at (212) 245-5800 or visit www.sportvision.com.

■ For more information circle Reader Service 201

For more products see page 26

DTV: Real at Last

Networks Begin Providing Stations With DTV Signal

By Edmond M. Rosenthal

The first transmissions of HDTV may have been strictly "voluntary," but the Big Four networks took it as seriously as the absolute requirement to deliver the signal to the top 10 markets by May 1 and the top 30 by November, 1999.

With DTV transmissions on a national scale underway, all the networks indicated that they were both ready and willing to begin the DTV era.

Typical of the general attitude is a comment from Andy Setos, executive vice president of The News Corporation's News Technology Group: "It's a tall order and it will change everything, but we're up to the challenge and enthusiastic about it."

NBC is transmitting its HDTV feed from a facility in its Rockefeller Center-based Genesis plant.

Voluntary or not, the networks have a significant number of affiliates receiving their transmissions. At ABC, Preston Davis, president, broadcasting, operations and engineering, estimates some 15 stations are on the receive end, including ABC owned-and-operated (O&O) stations KABC-TV Los Angeles, WPVI-TV Philadelphia and KGO-TV San Francisco. He indicates KGO could be delayed until the middle of November or later while the station deals with a neighbor-

The Dawn of Digital Television
NOVEMBER 1998

BroadcastingCable TWICE DigitalTelevision

EXTRA ADDED ATTRACTION
A definitive special report that captures a new medium as it is on Day One and as it will be going forward.

Many Technical Issues Remained Unsolved

Work and discussions are underway to make DTV all it can be

By Matthew Goldman

So, you've heard the news: 42 stations will be broadcasting digital television signals this month, far exceeding the voluntary commitment made by 26 stations, and the signals will reach over one-third of television-viewing households. Note that the first "official" FCC date for DTV operation (the Fifth Order) is not until May 1, 1999, for the top four networks in the top 10 market.

The good news is that these volunteer sta-

tions demonstrate that the networks, station operators and equipment vendors are committed to making terrestrial DTV a reality.

With all these stations on the air you'd reason all the open technical issues have been resolved, right? Not true, and that's where the bad news is. There are many issues remaining to be resolved before even some of the basic elements that are taken for granted in today's analog/uncompressed plant can be imple-