CEDIA 2005

(dĭj-dēa) – Finding
Digital Living Opportunities
empowered by Digital Media

DIGDIA

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DIGDIA is a strategic analysis and consulting company that specializes in Digital Home markets and technologies.

One of the problems inherent in reading about a market that brings together so many different industries is a deluge of new terms. The reader may wish to print out a 30+ page glossary of Digital Home terms that can be found at www.digdia.com. A page of useful links are also there.

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1 Introduction

This report gives a quick overview of this year's CEDIA (Custom Electronics Design & Installation Association) Expo, which was held in Indianapolis. Most people know about the Consumer Electronics Show (CES), held in Las Vegas every January. Many may not know about CEDIA, which aims at the tip of the high-end market.

Most of the business is about home theaters – the type that most people can only dream about. Witness figure 1:

Figure 1 – A $600,000 home theater, with Stewart 150" FireHawk screen, Sony Qualia 004 SXRD projector, Sony 400 DVD Changer with ReQuest management, Lexicon Audio, Revel Ultima Speakers, and Crestron automated controls for Audio-Video, lighting, shades and heating. A CEDIA Electronic Lifestyles award entry.

There is much talk and controversy about the "Digital Home" these days. Does anyone really buy these fancy network controlled gadgets? Do they really work? What can you really do? A visit to the CEDIA Expo reveals that there really is a market (albeit a classy niche market), the gadgets really do work (perhaps with some glitches), and a properly designed and installed system can be very nice to have.

However, vendors should not make the mistake of thinking it is just about boxes with extreme specifications and luxury prices. The market that CEDIA represents is very sophisticated and demanding. This market also gives one a peek at the future of the Digital Home as prices come down, features become more usable, and the public wakes up towards the end of this decade.

While this report covers some highlights from the Expo, a more analytical and complete report is planned in the future.

2 About CEDIA

CEDIA (www.cedia.net) has about 3,000 member companies aimed at home theater, networking, distributed audio, home security, lighting and heating control. 2,150 are residential system contractors (or "integrators"), 480 are associate members and 310 are manufacturers.

CEDIA's main role is to train the installers, designers and small business owners, and to help them develop their business. Over 2,000 installers are CEDIA certified, meaning that they've taken a variety of courses and passed their tests.

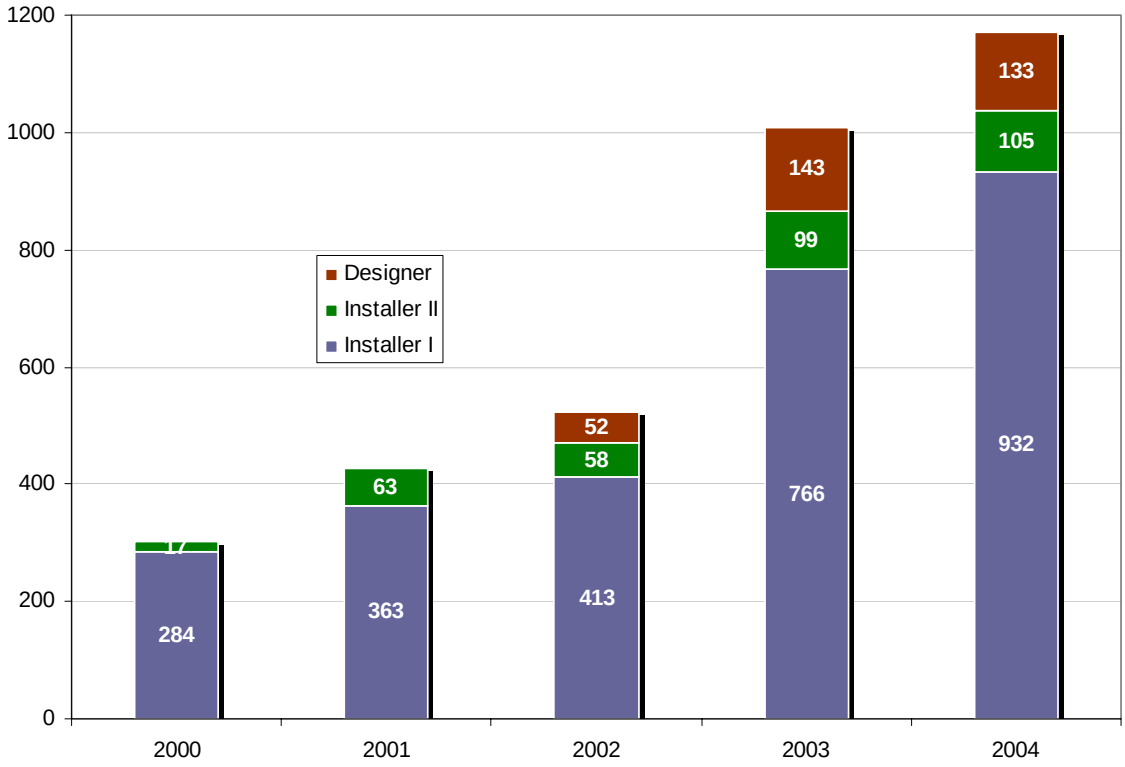

Figure 2 – CEDIA certifications for Installer I, Installer II and Designer[1]

CEDIA certification is branching out into other countries. 274 of the people certified in figure 2 were in non-U.S. countries, mostly Canada, but also including the UK, Australia and Mexico.

Installers attend classes on a variety of technical and business topics, picking from about a hundred different courses given in "CEDIA University". Vendors hold

[1] Source: CEDIA 2004 – 2005 Annual Report

classes, too, to teach the installers how to install and operate their equipment. As with other certification systems, CEDIA members must also complete at least 30 hours continuing education every three years.

2.1 Business Model

Installers are a channel for selling products, where they get around 30% to 50% margins. But, if it was just about opening boxes and plugging in cables, the CEDIA market would not exist. Prices keep coming down, and certain products that used to be a good source of profits, such a network router, are easier to buy at the local big box store.

The key elements are the design and installation services they offer. The company that installed the theater shown in figure 1 estimates that 326 hours consisting of interviews, design, installation, calibration and training went into it. Of this time, only about half was for installation. Properly estimating the time a job will take and convincing the client that it is worth it can be a challenge.

CEDIA members often work with architects and builders

2.2 Industry Situation

The market that CEDIA members target is very high end. A home theater installation starts at around $40,000 and can easily go up to $500,000 or more.

CEDIA members get competition from value added retailers, such as Tweeters and Magnolia. A person can walk into a retail store, see the products they intend to buy, and get them delivered and installed. Such a system is not necessarily “integrated” or “custom”, and CEDIA members will argue that the buyer doesn’t get the best possible experience.

The industry started with Hi-Fi Audio, home automation and security. When CRT projection televisions appeared the industry moved into home theaters. The CRT projector is now all but dead as newer digital projectors and flat panel televisions emerged.

Now the industry is evolving again as networked products are introduced. The incumbents that are threatened by this new class of product include the many universal remote control products and the more complex programmable control systems from companies such as Crestron (http://www.crestron.com/) and AMX (http://www.amx.com/).

The integrator is also left off-balance, as they now must grow new skills to deal with a different set of technologies and architectures. Some of their profit comes from simply “pulling wire” through walls, and the networked architecture has the potential to disrupt current “structured wiring” practices.

Still, the industry is in a sweet spot. The consumer is increasingly aware of the benefits of structured wiring, and many will turn to CEDIA members to complete the system. 34% of the builders of new homes now offer structured wiring as standard or an option[2]. Consumer electronics companies are introducing a whole new set of programmable products that can still command a price premium, and the consumer is intrigued by their possibilities.

2.3 Expo

Each year in September CEDIA holds their Expo. Vendors of all types show up, including anything from integrated vacuum hose systems to sophisticated multi-thousand-dollar media servers capable of holding hundreds of DVDs and piping them anywhere in the home.

Figure 3 – Main exhibit area

The Expo also includes CEDIA University, a major reason for people to attend.

This year, as it was last year, the Expo was held Indianapolis. 26,000 people attended, 6% more than last year.

The Indianapolis convention center was packed with vendors, with overflow booths stuck in any free space, the RCA dome, and several nearby hotels. CEDIA has clearly outgrown this venue. Next year the Expo will be held in Denver.

[2] Source: CEDIA Facts: http://www.cedia.net/press_media/cedia_facts.php

3 Interesting Products

3.1 CEDIA Attitude

In some ways, while CES is much bigger, CEDIA could be said to be more interesting. This feeling may come from the higher concentration of relatively sophisticated products found in the CEDIA Expo. Most products that one sees at CES can be understood fairly quickly. Many of the products at CEDIA really do require a class to understand them.

Even the "simple" television is not treated in the same way. At CES the focus is on price, availability, features, etc. At CEDIA the installation and designer professionals look for the types of inputs (e.g. "will it accept 1080p?") and connectors (e.g. "when will HDMI 1.3 be available?") and the ability to calibrate the video to Imaging Science Foundation (ISF - http://www.imagingscience.com/) specifications. Vendors that treat the CEDIA attendee the way they treat the retailers that attend CES risk not being respected, and maybe even berated.

3.2 1080 is the Norm

1080 x 1920 resolution was first shown in CES 2005 in just about every technology,

Figure 4 – 1080i and often 1080p is now expected at CEDIA

but it was more the exception than the rule. Not too surprisingly, at CEDIA 1080i (if not 1080p) was the rule - companies have had more time to work on their newest products and CEDIA sells to the high-end. So, what were some of the newer products in this category?

3.2.1 LCOS Comes of Age

Figure 5 - Sony's 60” SXRD-based Grand WEGA television

Sony first introduced their LCOS (Liquid Crystal on Silicon) technology in a Qualia branded projector (like the one used in the home theater shown at the beginning of this report). Now they are introducing the technology in their WEGA line. The products are all three-chip designs, so there are no color wheels or associated rainbow effects.

The WEGA line uses a new smaller 0.61” SXRD (Silicon X-tal Reflective Display, Sony’s version of LCOS) chip, so the brightness is not as strong, but presumably the chips are lower in cost. The pixel pitch is 7 micrometers, while the gap between

active pixel areas is 0.35 micrometers. LCOS is faster than transmissive LCD, and this chip is said to have a response time of just 2.5 milliseconds.

The light source is a 120W mercury lamp. Sony says their contrast ratio is 10K:1, but this really says nothing. They did not state an ANSI contrast ratio, which one might assume is below 300:1.

While the set has a true 1080i resolution, it unfortunately lacks a 1080p input. A 50" version is available this month and retails for $4K, and a 60" for $5K.

Figure 6 - Sony SXRD Front Projector

The same SXRD chips are found in this $10K front projector. Part of the reason for the higher price is the 400 W Xenon lamp. The lamp has better color characteristics than the mercury lamps used in the rear projection sets, but it also cost more – about $1,000.

Another difference is that this projector also accepts 1080p signals.

Figure 7 – Brillian CEO Vincent Sollitto standing next to his new LCOS television

Brillian has been laboring to get their LCOS technology to market for a while, and they now seem to be ready. They showed off their 1080p RPTV[3] in a suite a couple of blocks from the main CEDIA exhibit floor. It has an ANSI contrast of 250, and uses a 150 Watt UHP lamp.

Brillian's business model is to sell their LCOS technology to others to embed in products. However, they also make their own line of consumer televisions. This allows them to show off their technology, keep tuned to technical needs, and make a little money on the side.

They price their televisions at a premium – $7999 for a 65" RPTV. They are only sold through CEDIA installers and ProAV channels. To justify the price, they say they put in more calibration and adjustment features into their system. They can also handle 1080p (vs. Sony's 1080i, for example).

[3] Rear projection television

Figure 8 - JVC 1080p HD-ILA 70" RPTV

JVC has been at the LCOS game the longest. They originally called their LCOS technology D-ILA (Direct Drive Image Light Amplifier), and now call their new 1080p high definition version HD-ILA.

The televisions are all 3-chip designs, and come in 56", 61" and 70" models for $4K, $4.5K and $6K respectively. A photo of part of their engine is shown on the next page.

Figure 9 - Parts of the JVC HD-ILA engine

3.2.2 1080 DLP

Texas Instruments' Digital Light Processor (DLP) comes in a "2K" (1080 x 2048) version for digital cinema, but this chip is expensive and is not aimed at the consumer market. So, to achieve a 1080 level of resolution, T.I. is using a version of HP's "wobulation".

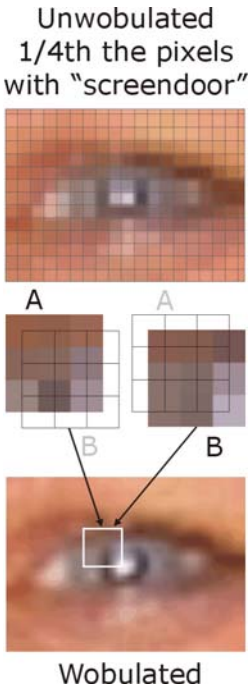

Figure 10 - Wobulation illustrated (right)

T.I.'s version is called SmoothPicture. It works by placing another mirror in the optical path that offsets alternating pixels by about a half-pixel.

The illustration to the right shows nine pixels in image A, and another nine pixels in image B. Image A is flashed onto the screen first, followed by the offset image B. The eye blends the two together and the result is shown below.

The image is not true 1080 x 1920 resolution, but it gets closer. The technique also reduces the screen door effect. Some people feel that the image is more film-like.

The difference in cost between a true 1080 DLP chip and a much smaller DLP chip is large enough to make the SmoothPicture system less expensive.

While HP first announced their televisions based on wobulation at CES, they had not publicly shown these products until recently. At the last minute they decided to have a booth at CEDIA and were placed at the far end of a hallway.

The photo below shows their 65" 1080p capable television ($5,500). Publicly, HP is trying to use the term "Visual Fidelity" technology instead of wobulation. In practice, the wobulation term seems to have stuck, and "Visual Fidelity" is simply too much of a mouthful.

Figure 11 - HP's 65" 1080p-capable RPTV

The television is not particularly aimed at the CEDIA channel. HP tends to aim its products at Best Buy. Calibration is not a big feature, and cable connectors are arranged for easier homeowner access than professional installation needs.

Figure 12 - HP's cable connector design

The above photo shows a blowup of the connectors and CableCARD slot located behind a flip-down door in the front of the television.

Figure 13 - InFocus Screenplay 777 FPTV

Not all DLP products were 1080. The InFocus ScreenPlay 777 ($15K, introduced last year) uses three 720 x 1280 DLP chips. The new Sony projector seems to beat this product hands down.

3.3 Screen Magic

While most consumers will buy a RPTV or flat panel television, many CEDIA customers look for front projection to get the big screen. One of the problems with front projection is ambient light, which is picked up by the screen and reduces contrast ratio. Thus, two screen technologies were particularly interesting to look at on the CEDIA floor.

The first one is offered by Screen Innovations. They have the distribution rights for a screen that comes from Dai Nippon Printing in Japan. The product name is Mirage.

Figure 14 - Standard screen (left) vs. Mirage screen (right)

This photo was taken slightly off angle from the projector (which can be seen in the lower right of the photo). The left side of the screen is a standard low-gain white screen. The right side is the Mirage screen. The screen was in the RCA dome, a

brightly lit arena. The screen was unshielded from any ambient light, though it was angled slightly down.

It is obvious from the photo that the Mirage screen is showing a much nicer higher contrast image. How does it work? The screen attenuates light that comes at it from the sides, such as most ambient light. Light that comes at the screen from within a 15 degree angle, such as from the projector is not attenuated.

Regular screens try to increase image brightness by building in some gain. The problem is that higher gain screens attenuate the image when viewed from off-angle. The best place is sit for a high-gain screen is directly in front of the screen. How does the Mirage screen behave when viewed from off angle?

Figure 15 - Mirage screen off-angle comparison

It seems the Mirage screen works fairly well even when viewed off-angle.

Sony showed a screen that is supposed to produce similar results. They call it the ChromaVue High Contrast screen. This screen works along different principals. It attenuates light that is not red, green or blue (the colors used in the projector). The screen works by putting quarter-wavelength coatings on it. Their demo is shown below.

Figure 16 - Sony ChromaVue screen demo

To show off the technology Sony cheated a little. Notice that they are shining a light directly on the ordinary white screen, but that same light is not being aimed at the ChromaVue screen. The booth area also had an overhead screen to block out ambient light in the exhibit hall – strange, since the screen is supposed to attenuate such light in the first place. Overall, the Sony screen did not seem to perform nearly as well as the Mirage screen.

3.3.1 Sexy Backlit Screen

Shown below is a 100" translucent acrylic screen from Nippura. The image is projected from the back. The screen is free-standing, so it almost looks like the image is floating in air. The effect is very eye catching.

If you hang the screen from the ceiling you can project a different image from either side of the screen. People watching the same screen will see two different images depending upon which side you are sitting. A 41 x 73" screen is about $8,600.

Figure 17 - Nippura Blue Ocean backlit screen

3.4 Servers

Proponents of the so-called Digital Home envision media servers in the home that pipe music, photos and videos, including HDTV to each room throughout the house. Detractors say that no one will ever want this vision, let alone be able to afford it and figure out how to use it.

Both are right and wrong. The customers that CEDIA serves are buying and using such systems today, but they certainly are not affordable for most.

3.4.1 Kaleidescape – Heads I win, Tails you lose

The system that has been out in front of the pack for some time comes from Kaleidescape. A typical starter system runs about $30,000. You can store all of your DVDs onto a hard drive and call them up for viewing from another room.

The interface gives you movie poster art and other details to help you find and pick what to watch. A number of slick visual features make searching for a movie entertaining in of itself. Kaleidescape packages these features into a Movie Guide service.

Figure 18 – Kaleidescape's media server, with front door shown open (right)

CEDIA people are very familiar with Kaleidescape. They also know about a lawsuit that was brought against them in a California court by the DVD Copy Control Association[4].

Kaleidescape was very careful about controlling the way DVD content is stored and handled in their system. They worked with the DVD CCA to make sure they were in compliance. So it came as a surprise amongst CEDIA members that the lawsuit was filed.

Kaleidescape is being very careful about how they describe the situation. They try to point out that it may be more of a technicality than something fundamental.

Kaleidescape is about the only system that records DVDs onto a hard drive as a standard advertised feature. There are other ways to get DVD content onto a hard drive, but they are much more in the grey area legally. Other media server-type products could easily offer the same feature, but they don't. They are waiting to see what happens to Kaleidescape first.

It is an interesting situation. For the moment, Kaleidescape owns their market and charges a hefty premium for their product while others are afraid to venture in.

But, if the lawsuit goes against Kaleidescape their market is suddenly redefined. They may have to find a new way to store DVDs. The MPAA is actually sympathetic, and supports "secure managed copy", a method that allows storing of movies on hard drives. The blue-laser disk formats for HD support such an approach, but the final specifications are not yet in place. At the least, it is disruptive for Kaleidescape.

On the other hand, if the lawsuit goes in favor of Kaleidescape there will be a rush of new competitors who only need to flip a switch to turn on similar functionality. These competitors have products that drastically undercut Kaleidescape's prices. Kaleidescape's user interface service is nice, but can it justify today's price premium?

Meantime, Kaleidescape is about to add music distribution features to their system.

3.4.2 Sony

Sony is offering a packaged system approach. Realizing that a large part of an integrator's cost is in labor, Sony has a pre-packaged home theater rack that they sell for about an 8 to 10% premium over the cost of the individual parts. The rack also comes with a warranty, and a one-day replacement system for any component needing repair.

The rack shown on the next page is one such system. It has a dealer cost of $3,630.

[4] http://www.kaleidescape.com/files/legal/DVDCCA-vs-Kaleidescape-Complaint.pdf

Figure 19 - Sony pre-packaged home theater rack

Sony recently formed a New Home Entertainment Solution group that is responsible for these types of products. This group was first announced at the International Builders Show last January in Orlando.

Other products from Sony include an integrated DVD and CD unit for the wall called the Wall Station. Now you don't have to step into a closet where your rack of equipment is to pop in a new DVD. One model (DVP-NW50, $700) is for DVDs, and another (CDP-NW10, $500) is for CDs. Sony estimates that the installed price for these units would be $2,000 and $1,000 respectively. These were first shown at the start of this year.

There were other Sony products, such as the control unit shown on the next page.

Figure 20 - Sony DVD Wall Station

Figure 21 - Sony Control

3.4.3 Klipsch Zon

An interesting product comes from Zon – not so much for the concept as much as the eye catching product design. Notice a similarity to the Apple iPod (also shown in the photo below).

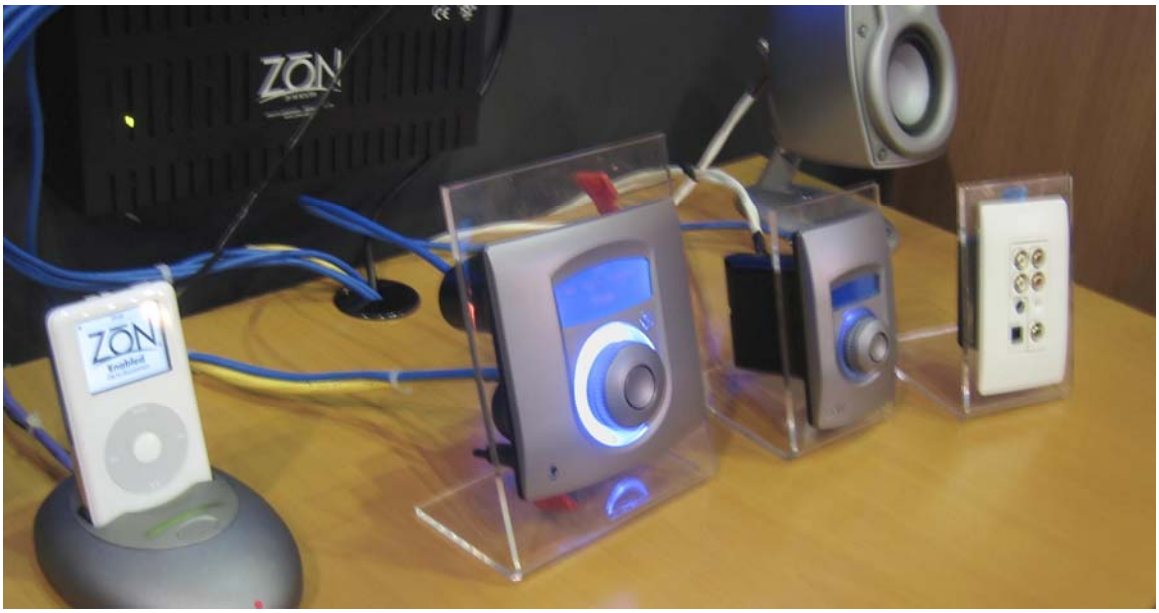

Figure 22 - Zon whole house audio control

Klipsch has the exclusive rights to distribute the Zon products. The control is fairly simple and intuitive to use, and it is very eye catching. The center unit in the photo is the main control unit. The lit circle lights up when the user touches the knob, and a blue dot indicates volume. The photo does not clearly show this dot on the main unit, but you can see what it looks like in the satellite unit to the right.

The main unit can select the audio source and set volume. The satellite unit works with the main unit. Cat-5 cable is used as wiring. Pricing averages about $1,000 a room.

The units also include an intercom and an IR sensor to pick up remote control commands that are fed back to the CD player, etc., via IR-blasters.

3.4.4 ReQuest

ReQuest uses Ethernet to distribute audio and DVD video control.

A couple of audio features are worth noting. The system is such that music storage can be distributed and mirrored. Music in one unit's hard drive can be automatically sent and stored on the hard drive of another unit. This feature can be a lifesaver for people with large music collections.

How large a music collection? One of the ReQuest products can hold 1.2 Terabytes of music in uncompressed (WAV or FLAC) format. That's 2,000 CDs.

The other noteworthy feature is their ability to synchronize the music collection securely over the Internet. So, if you own a vacation home in Vail, you can duplicate your complete collection there.

Figure 23 - ReQuest audio distribution via Ethernet

ReQuest also handles DVD playing. Unlike Kaleidescape, ReQuest does not store the DVDs onto a hard drive. Instead, they use a DVD changer and manage the collection via menus displayed on the television, complete with poster art, etc.

3.4.5 NetStreams

Netstreams takes multimedia distribution via Cat-5 to a new level. They pride themselves on the distribution of uncompressed audio with their current products, and now they are about to launch into video.

Most people that talk about video over Ethernet cables worry about how they will reliably get 19 Mbps of HDTV video to pass without any glitches. Now try to do this with uncompressed video where you need something between 1 and 2 Gbps.

To perform this trick, NetStreams requires the use of two Cat-5e or Cat-6 cables, dedicated to the transport of video. The cabling must be home-runned to their rack.

Video can then be sent from the rack to the remote room where a NetStreams box takes the stream and converts it into an HDMI video signal for the television monitor.

Their video product is not yet available, but they are promising to show it at CES in 2006.

Figure 24 - NetStreams rack

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I hope you enjoyed this free report. DIGDIA provides strategic consulting and market analysis for digital living markets. DIGDIA looks at both the business *and* technology side of the strategy, not just one or the other. DIGDIA also looks at the complete Value Chain, from Digital Cinema, Digital Postproduction, Digital Distribution, and Digital product and services for the Consumer. Only by understanding the complete ecosystem can one formulate more robust strategies and business plans.

Please see DIGDIA's other reports on Digital Cable Ready, Digital Cinema, Digital Hollywood, and the Digital Home.

Gary Sasaki - President