LCD TV Association

Inform • Promote • Improve • Connect

“LCD TV Matters”

Volume 2, Issue 3

"A Great TV in Every Room"

Contents

Chairman's Corner: Blue skies on the horizon…

by Bruce Berkoff

Well, last Spring we talked about the "Tsunami" coming into our LCD TV market, and the normal cyclicality of LCDs, which would eventually drive prices down a bit… but little did we expect the speed of that fall or the depth of the "frozen" credit markets that would sweep the world this winter. There is, as usual, some "light" on the LCD horizon, however, with the first glimmer being seen before CES, when NPD polled over 100 consumer categories for year-over-year unit growth in the US for the month of Dec'08, and only three showed increases, with two of them being important to the TFT LCD industry: one was LCD notebooks and the other of course was LCD TVs. We have already heard of some brands in certain LCD TV sizes facing some shortages in Q1 going into the Super Bowl and lunar holiday selling season; thus a ray of light and some "blue sky" in the middle of an otherwise frozen wasteland (*see Figure 1*) of our current economy outlooks.

Figure 1 shows the effects of Oregon's worst snowstorm in more than 40 years, which closed schools and roads, but thawed into a beautiful season. Note the blue sky…

Actually, most forecasters in the LCD space already noted how thin all inventories were so that any increase in demand goes directly to increased fab utilization rates, and indeed areal increase will continue for the next many years in the LCD space, driven often by the LCD TV category as we have often noted (people will continue to buy for the digital transition and many rooms in the US and beyond, and many will add a TV in developing world households long before they add indoor plumbing!) Indeed, with "Green" technologies enabled by ever more creative LCD energies and programs like the DOE's Energy Star and our Green TV logo program, LCD TVs are ever more attractive from many viewpoints: from the thinner designs and thus higher "WAF" of new LED lit panels to the lower power that they enable through regional dimming, much like can be seen in *Figure 2* (and note that sub-one inch sets should lead to sub three inch packaging and whole new savings in logistics and cool new in-store box displays).

Figure 2 is LG Display's 47-inch LCD TV with modular LED lighting, debuted at CES '09, featuring an 8.9mm ultra-thin depth.

And just like all the concern over Y2K being both justified and overblown at the same time, the digital transition in the US on Feb 17th has both come and gone (and also been postponed as an option by Congress – *see Alfred Poor's article o page 44*) but other than getting folks out shopping for LCD TVs, which now they will do all year, it has

indeed not been a real major "event". Yet that is the point, a new Full HDTV LCD TV with any of the various "feeds and speeds" or "specsmanship" of 120Hz to 240Hz, and 178 degree viewing angle, etc. are all just ways to get folks to get a great new LCD TV in their house (and in the States, that will soon be every room in their house!).

If I sound a little relentlessly optimistic, it is because I am. We have had better than expected unit growth during even the toughest economic downturn in our lives, and I expect the LCD TV industry will actually help lead the economy onward and upward faster than most people think. Not to minimize the huge problems with housing, equity, and credit markets, which will take a while in any case, but the American consumer will surely keep buying LCD TVs and indeed globally the LCD TV industry will recover faster than most people think (see Norm Hairston's optimistic article in this issue about the unit rebound effect (*see page 36*), which I think will actually prove conservative over time. He does correctly note trends toward functionality like IPTV will enable as well as applications like RallyPoint's (see last issue of *LCD TV Matters*). There is also the trend toward newer lower power technologies, like Agoura's but also note Unipixel's TMOS capability for cell phone screens from last Spring's issue too). We have even seen better than initially expected results in energy saving efforts to date as well. Note *Figures 3a and 3b*, which were 2005 estimates of future energy growth in the US for TV alone, if we did not do anything, but we did.

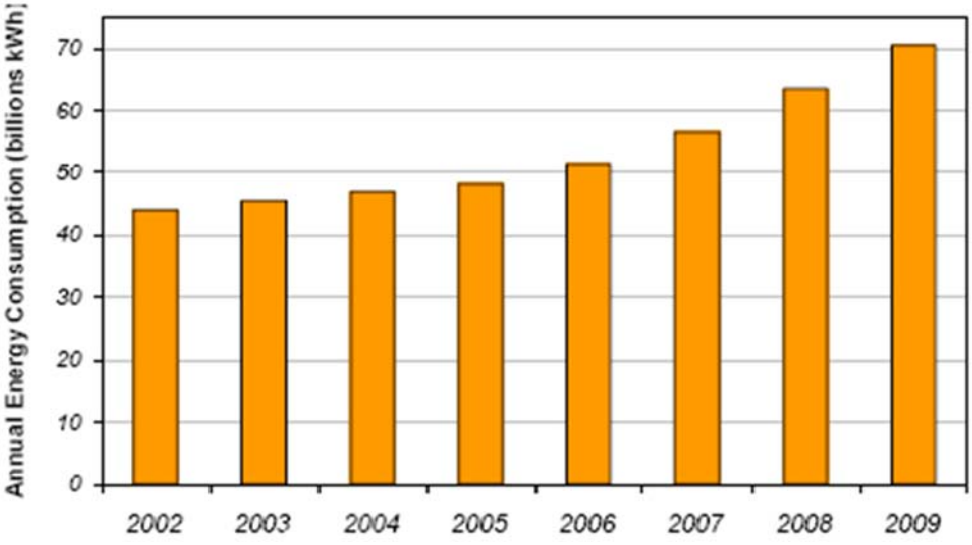
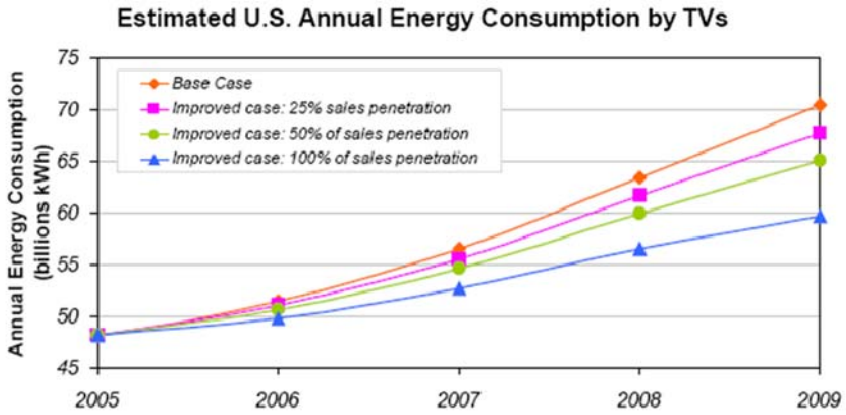


Figure 3a: Estimated US TV energy consumption
53 Terawatt Hours!=53 Billion KWh @ about $0.1 per kWh is over $5 billion in retail power in USA alone!
Source: National Resources Defense Council, (this is before programs like Energy Star or our Green TV logo program)

Programs like Energy Star and the LCD TV Association's new Green TV logo program, have helped make the lowest range predictions be the most accurate, even as average screen size keeps growing, and LCD TV engineers are hard at work to reduce consumption even further. When I think about the addition of wireless connectivity and some good software in the mix, I get excited about the future of LCD TVs.

Are we in a tough economic downturn now? You bet! Are LCD TV products getting continuously better and more popular, you bet! It if through the hard work of panel and system engineers (see *Figure 4a*) that major advances keep coming, like the unbelievable march up the size and quality curve, as we see in *Figure 4b*, which shows a 42-inch LCD next to a 100-inch panel demo from LGD (which is almost as unbelievable and the scene seems to contain Michael Phelps setting another gold medal swimming record in Beijing!).



Market Penetration	Nationwide Energy Savings by 2009 (billion kWh)	Nationwide Utility Cost Savings by 2009 (billions USD)	Nationwide Offset CO_2 by 2009 (million tons)
100%	21.5	2.2	14.4
50%	10.7	1.1	7.2
25%	5.4	0.5	3.6

Fig 3b: Energy savings from 1W standby and active power mode reduction

Figure 4a: LCD engineers continue to ramp up performance while bringing down costs. Figure 4b shows a 100-inch prototype LCD from LG Display next to a 42-inch solution…

Do I remain relentlessly optimistic about our entire LCD industry and the 10-20% areal growth I see coming for each of the next few years? YOU BET! And as for image quality and integrated electronics and great set designs and lower power consumption, well, you've barely seen anything yet! (No wonder so many companies have stopped selling anything but LCD TVs, like you'll see in the news section about Vizio and others.)

Mr. Berkoff is the chairman of the LCD TV Association, a global not-for-profit marketing trade association dedicated to "informing, promoting, improving and connecting" the entire LCD TV supply chain and their related companies, to help promote "a great LCD TV in every room in the house!" For over six years, residing in Seoul, Korea, Mr. Berkoff was also the executive vice president of marketing and chief marketing officer (CMO) for LG.Philips LCD. He has also been the CEO of a fabless semi start-up in the video processing space and general manager of Philips Flat Display Systems software and electronics business unit. Prior executive positions also include UMAX Computer Corporation, Radius, SuperMac Technologies and ZD Labs. Mr. Berkoff is a visionary speaker and author in the display and electronics industry. He has display related patents both granted and pending in the USA and China. He holds an undergraduate degree in physics from Princeton and a graduate degree in biophysics from the University of California Berkeley. Mr. Berkoff has sat on the boards of at least five publicly traded companies, and currently sits on the BOD of LG Display (LPL), and Unipixel (UNXL).

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Past Editions of "LCD TV Matters"




You can download prior editions of "LCD TV Matters" from: http://www.veritasetvisus.com/lcdtva.htm,

LCD TV News

compiled by Veritas et Visus

Vizio shifts to LCD-only HDTV line-up

In mid-February, Vizio announced a decision to drop PDP TVs from its product lineup. The company didn't show any new plasma models at CES this year, and plans to focus solely on LCD for its TVs. Following so closely on the heels of Pioneer's announced exit from the TV market altogether, this leaves the field primarily to Panasonic. Samsung and LG do have plasma products, but they are more committed to the LCD side of their product line. Consumer preference has been steadily shifting to LCD's favor, and it appears that the trend is going to continue. The news is grim enough to cause Panasonic to announce at least a six-month delay in the opening of their new, giant plasma panel factory. http://www.vizio.com

Plasma TVs face being banned in Europe

The EU is contemplating a plan to kill off plasma televisions across Europe because they burn too much power. According to reports in the Italian press, the EU might make a ruling on the technology in the spring. Commissioners are about to release new guidelines on the consumption of television screens. While LCD screens scrape through the new requirements, the plasma screens use too much energy. A 42-inch plasma TV consumes 822 watts of electricity in comparison with 350 watts of a flat screen LCD and 322 watts of a cathode ray tube. Among the plans is to put a system of labels on televisions so that punters will know how much they are going to consume. This has been done for some time with fridges and other appliances, but not for TVs.

Samsung shows off 55-inch LCD TV at 240Hz

Samsung's LUXIA LN55B8000 is a 55-inch LCD TV at 1920x1080 pixels that sports an LED backlight. The LED backlight is located on the edges and therefore cannot be used in conjunction with local dimming – a technology that can significantly boost contrast. The edge-lit LED backlight however makes the LN55B8000 extremely thin, just about an inch thick. The new LCD TV features a 240Hz frequency to make sure that motion blur and juddering are things of the past. An "Ultra Clear" anti-reflective LCD reduces reflections and improves contrast. The system comes with a built-in Ethernet connection. http://www.samsung.com

Vizio to introduce 240Hz solution

Vizio announced its VF551XVT LCD TV, a 55-inch system at 1920x1080 pixels that features an LED backlight, backlight scanning and a 240Hz frequency. The LED backlight helps boost the display to a 1,000,000:1 dynamic contrast ratio using the company's Mega Dynamic Contrast technology. The scanning backlight also helps to eliminate motion blur and when couple with 240Hz frequency, blur is a non-issue. The system comes with 5 HDMI ports. The VF551XVT will be available this summer for $1999. http://www.vizio.com

Samsung and Vizio both introduced 55-inch LCD TVs featuring LED backlighting at a 240Hz frequency

Obama signs bill delaying switch to digital TV

President Obama made the digital TV delay official earlier February, signing legislation to put off the switch until June 12. He and Congress hope to give millions of unprepared viewers four more months to upgrade their equipment so they don't lose over-the-air programming. Although the major TV stations in Los Angeles won't turn off their analog signals until the new deadline, the law allows stations to apply to switch on the original date (February 19) or any time before June 12. More than a quarter of the nation's 1,749 full-power stations have applied for permission to turn off their analog signals on the original date. They include Fox, CBS and ABC affiliates in San Diego; NBC, ABC, CBS and Telemundo affiliates in Santa Barbara; and KJLA and KHIZ, independent stations in Los Angeles. But there is a requirement that at least one station in the market continue analog broadcasts of local news and public affairs programming, as well as emergency and digital TV transition information for at least 60 days.

VIZIO expands flagship XVT series of HDTVs

VIZIO unveiled several new models to the XVT Series expanding the performance line with five new models. The most dramatic technology introduction is the use of LED panels featuring 240Hz with scanning backlight and VIZIO's "Smooth Motion II" technology in their largest model, the 55-inch VF551XVT. LED backlight technology provides better picture quality with 1,000,000:1 Mega Dynamic Contrast with local dimming. They are also expanding their collection of 42-inch and 47-inch XVTs to include 240Hz with scanning backlight using Smooth Motion II technology and Mega Dynamic Contrast ratio of 50,000:1. The 42-inch SV421XVT and 47-inch SV471XVT are capable of outstanding realism and are close to eliminating motion blur. http://www.vizio.com

Toshiba teams with IBM to release Cell TV

Toshiba's new "Cell" TV will pair a Cell processor, co-developed with IBM and competitor Sony, with a top-end Regza monitor, The result is a TV capable of recording and playing back six simultaneous HD streams, as well as handling complex internet and picture contrast processing. The Cell processor was originally used mostly by Sony, who put it in its PS3 gaming console. While Sony and IBM mutually shouldered the initially high costs of production of the 90nm process Cell processor, two die shrinks, first to 65nm and then to 45nm, have helped lower the costs. Now IBM is looking to expand outside Sony. Over the course of the last year, it has been cultivating a relationship with Toshiba. The first fruits of that relationship came in June when Toshiba announced that two of its laptops, the Toshiba Qosmio G50 and F40, would feature a 4 SPE variant of the Cell processor as a coprocessor to the main Intel CPU. The Cell processor helped with high definition video processing on the laptops and other activities. Now a second joint product is on the way. Toshiba plans to release the new Cell TV during 2009. With the new Cell TV, Toshiba is not placing the processor within the TV itself. Rather it's putting it in a small set top box, which Toshiba pairs with one of its top-end Regza LCD monitors. The new cell processor will provide support to picture setting adjustments such as better dynamic dimming based on lighting conditions. The biggest feature it brings, though, is the ability to simultaneously record and playback up to six high definition video streams simultaneously. http://www.toshiba.com

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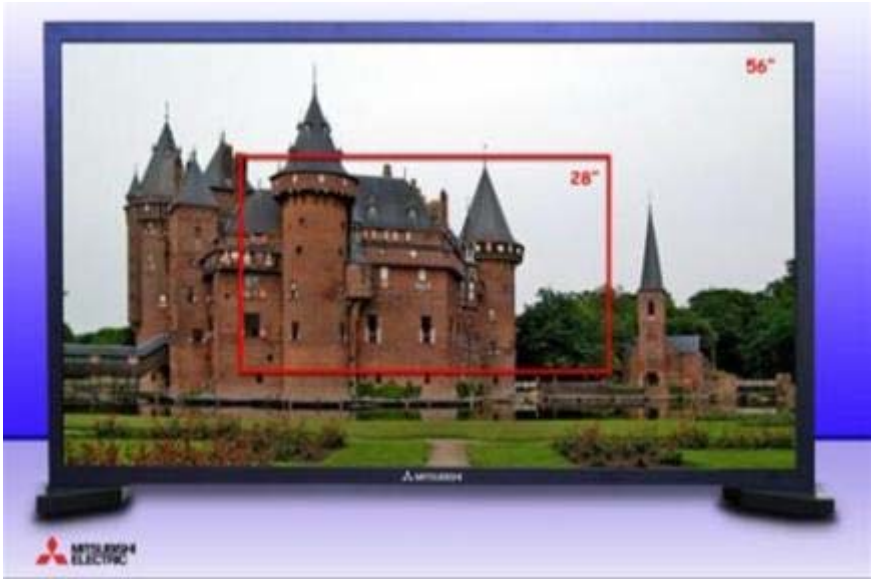
Toshiba 56-inch Quad Full HD LCD TV Prototype with Cell Processor

Toshiba showcased a prototype 56-inch LCD TV that sports a 3840x2160 (or Quad Full HD) pixel format. The prototype features a Cell processor to enable simultaneous playback of numerous shows. In addition, the company's Resolution+ technology up-converts 1080p HD video to 3840x2160. http://www.toshiba.com

Mitsubishi introduces QFHD monitor

An increasing number of data visualization applications require extremely high resolution displays to enable fine details to be displayed clearly. High-definition monitors are often used in such applications, but these are not always a convenient solution where a number of observers need to be able to view high-resolution images simultaneously. The Quad Full High Definition (QFHD) display from Mitsubishi Electric was developed for just such a scenario, allowing large format images to be displayed in native high-resolution. The QFHD screen delivers four times higher resolution than a comparable sized HD display. The ultra high-resolution screen crams a staggering 8.3 million pixels into its 56-inch display. The microscopic pixel pitch – barely 0.1mm horizontally – means that individual pixels are not visible to the naked eye, even at extremely close viewing distances. This makes the QFHD perfect for applications requiring exceptionally sharp image rendering, such as mapping, surveillance, CAD, image analysis, medical photography and many others. The large display size allows several observers to work collaboratively around a single screen without having to struggle to see the fine details. In control room applications, the QFHD can be used to give a supervisor a detailed, high-resolution overview of an entire display-wall system without crucial fine details being lost in the scaling process.



On the left is Toshiba's new 56-inch QFHD prototype. Mitsubishi also recently showcased a 56-inch QFD system.

Sony introduces 52-inch Eco LCD TV

Sony's KDL-52VE5 is the largest of three Eco LCD TV models that were introduced during CES 2009. The KDL-52VE5 sports a 52-inch PVA TFT LCD, a 1920 x 1080 pixel format and has a doubled-up frequency of 120Hz to reduce motion blur. Video is processed by the company's BRAVIA Engine 2. Sony is touting the "eco" features of the KDL-52VE5 with the main one being zero power consumption when in standby mode, a world's first according to Sony. Flip the Energy Saving Switch and the KDL-52VE5 falls into a zero-watt standby state. The HCFL backlight reduces power consumption of the KDL-52VE5 by about 40% compared to a 52-inch LCD TV with a CCFL backlight. The KDL-52VE5 also has what is called Sony's Presence Sensor by automatically turning off the TV when no one is present around the TV after a user-set timeframe. When the Presence Sensor detects motion the TV turns itself back on instantly. An ambient light sensor is integrated to automatically adjust the backlight de pending on the brightness of the room and can save energy and improve contrast. http://www.sonystyle.com

Philips Cinema 21:9 TV to ship in June

Philips introduced the Cinema 21:9, a unique LCD TV with its ultra-wide aspect ratio of 21:9, designed especially for viewing Hollywood widescreen titles in the full director's cut. The 56-inch model Complimentary three-sided Ambilight Spectra combines with the on-screen action to completely immerse you in the movie and deliver the ultimate home cinematic viewing experience. According to Philips:

> *"Traditional LCD televisions compromise on this experience by distorting the picture to fill the screen – losing the full scope of the original shot – or by displaying the picture in letterbox format with black bars at the top and bottom. Cinema 21:9 solves these issues to give the viewer an uncompromised and absorbing cinematic viewing experience, never before available in the home. This Cinematic Viewing Experience is extremely difficult to replicate at home. Even the largest conventional TV screen cannot provide the total immersion that we enjoy at a cinema because when it comes to watching a film, the viewing experience isn't determined by screen size. Films fill a cinema screen. The images reach right out to the very limits of the screen and of our peripheral vision, enveloping us so completely in the action that we actively 'feel' along with the characters in front of us. This cannot be achieved on a conventional 16:9 widescreen TV at home without moving to a 'letterbox' view or losing the full scope of the original shot. With an aspect ratio of 21:9, the Cinema 21:9 is the world's first cinema-proportioned LCD TV. In combination with Philips' Ambilight technology - accurately matching on-screen content to extend the picture beyond the confines of the screen - Cinema 21:9 delivers the most completely immersive home viewing experience possible".*

Note that 16:9 titles will avoid the letterbox effect – but will instead see a window-box effect; and 4:3 images will see a very substantial reduction of screen real estate. Product release is not expected before June 2009 and is initially limited to just Europe. http://www.digitalnewsroom.philips.com/products/21x9/

The Philips 21:9 solution enables full-screen Hollywood formats. The Ambilight technology, (shown on the right) helps to match on-screen content to extend the picture beyond the confines of the screen.

Sharp 52-inch AQUOS integrates Blu-ray

Sharp's AQUOS LC-52BD80U is a 52-inch 1080p LCD TV that sports a built-in Blu-ray player. The system uses the company's new ASV (Advanced Super View) Superlucent 10-bit TFT LCD that has an ultra-smooth finish to minimize gloss and reflections while improving brightness and contrast. The 120Hz Fine Motion Enhanced helps minimize motion coming out of the built-in Blu-ray player. The 10-bit ASV LCD panel also provides more than a billion colors and is Deep Color compatible. The new set also has de-judder technology that makes images appear more film-like. http://www.sharpusa.com

Valens Semiconductor's HDBaseT enables in-home high definition connectivity

Valens Semiconductor introducing its HDBaseT technology, enabling a single LAN cable to replace multiple cables and connectors. HDBaseT is optimized for video application and can connect all the entertainment devices at home by providing the 5Play convergence of 8Gbps of uncompressed full HD digital video, audio, 100BaseT Ethernet, power over cable and various control signals. In addition to reducing the number of cables required, HDBaseT uses low-cost single standard Cat-5e/6 cable. HDBaseT also connects equipment that is up to 100m/328ft apart and uses the existing RJ-45 connector that is widely available. Valens' HDBaseT is the first technology to enable 5Play convergence that consists of full HD uncompressed video, audio, 100BaseT Ethernet, Power Over Cable, and various control signals. At the center of every multimedia distribution system, from basic point-to-point connectivity to a multi-source/display system, is the ability to send control signals. Different types of control signals have different purposes, starting from CEC that operates basic functionality such as power-on, power-off and play/stop with a press of a button, to RS232/USB and IR that operate remote equipment even when it is located in a different room. http://www.valens-semi.com

Silicon Image introduces LiquidHD technology

Silicon Image introduced LiquidHD, a new personal entertainment technology designed to quickly and easily connect TVs, consumer electronics (CE) devices, personal computers (PCs), portable media devices (PMDs) and home theaters into a seamless network where consumers can enjoy digital content from any source device on any LiquidHD-enabled display in the home. Today, consumers can only enjoy their multi-media content on the TV to which the digital video recorder (DVR), set-top box (STB), DVD/Blu-ray Disc player or game console is directly connected. With LiquidHD technology consumers can flexibly enjoy their content throughout their home by pausing a movie, television program or video game on the TV in the living room and then resume it on a different TV or laptop with a single press of a button on the remote control. LiquidHD technology is a suite of protocols that runs over commodity IP networks such as Ethernet, Coax like MoCA, powerline like HomePlug and wireless like WiFi (802.11n). http://www.siliconimage.com

Silicon Image introduces industry's first silicon 40nm HDMI 1.3 transmitter analog IP core

Silicon Image announced that it has begun testing the industry's first 40-nm HDMI version 1.3 transmitter analog silicon targeting ultra low-power and performance driven system-on-chip (SoC) applications. The new solution offers dual-mode functionality by supporting both HDMI technology and MHL, a high-definition (HD) video and audio connectivity solution introduced by Silicon Image that specifically focuses on the requirements of mobile devices. Silicon Image demonstrated the delivery of HD digital content from a mobile phone to a large-screen digital TV using MHL. According to Brian O'Rourke, principal analyst at market research firm In-Stat, the installed base of HDMI-enabled devices exceeded 600 million at the end of 2008, and should exceed 1.5 billion by the end of 2010. Silicon Image is the leading supplier of HDMI semiconductors and IP cores having helped establish this market. As mobile device developers begin incorporating HD video and audio capabilities into phones, cameras, digital camcorders and portable multi-media players, digital TV interconnect standards such as the HDMI and MHL technologies are expected to play significant roles. Silicon Image's 40nm designs are ideally suited to meet the needs of this growing HD-enabled mobile market. http://www.siliconimage.com

HDMI announces new version for first half 2009

HDMI Licensing announced an overview of the capabilities and features of the next version of the HDMI specification, which will be launched in the first half of 2009. "HDMI has reached an installed base of more than 600 million devices and now touches almost every consumer device that plays HD content. We want to give the industry a preview of where the HDMI specification is headed as we continue to innovate and meet the needs of this dynamic marketplace," said Steve Venuti, president of HDMI Licensing. The goal is to address five key industry trends in the coming spec: networking; consolidation of HD video; HD audio and now high-speed data with the addition of Ethernet in the HDMI cable; audio return channel; elimination of a S/PDIF cable by allowing a TV to send audio streams upstream to an A/V receiver for processing and playback over the HDMI cable. 4kx2k and 3D are high performance features to be met by increasing the upper limit of the HDMI link including HD in a car. http://www.hdmi.org

Celeno and Cavium Networks collaborate to offer whole-home 1080p HDMI connectivity over Wi-Fi

Celeno Communications announced a collaboration with Cavium Networks. The joint reference design meets the demand for in-room HDMI cable replacement applications as well as whole-home full-HD video content sharing, using standards-based Wi-Fi networking technology. The solution enables consumer electronics manufacturers to develop products that support various digital home connectivity use cases. Examples include: eliminating the need for unattractive audio/video HDMI cables to connect thin full-HD TV panels; watching DVR recordings anywhere in the home; and using gaming applications in any room regardless of the console's location. The combination of Celeno's OptimizAIR Wi-Fi HD home networking technology with Cavium's Super Low Latency H.264 codec technology meets the demanding capacity, reach and latency requirements for whole-home full-HD uncompressed video content streaming. In contrast to proprietary short distance wireless solutions, the joint standards-based solution enables easy interoperability between any digital media server device and any digital media player device, helping to create a seamless DLNA-connected home environment. The joint reference design is based on the Cavium PureVu Video Processor CNW3602 and the Celeno CL1300 HD-grade Wi-Fi System-on-Chip (SoC). http://www.celeno.com

PPC announces its first locking HDMI cable for HDTV

PPC announced that it debuted the first HDMI locking cable available on the market, the PPC Locking HDMI Cable. The PPC Locking HDMI Cable is an industry-supported, uncompressed, all-digital audio/video interface, providing a connection between any audio/video source (set-top box, DVD player, A/V receiver, DTV, etc.) over a single cable. The PPC locking HDMI cable features exclusive patented technology to hold it onto a port with a strength that is three times greater than found in conventional connectors. The PPC cable minimizes loosening and fall-out, thereby providing the most reliable, highest quality, pure HDTV video resolution and digital audio quality, the company says. With Category 2 cable status, PPC's locking HDMI cable delivers 1080p. Priced start at $48.99. http://www.connect2ppc.com

DiiVA Consortium demonstrates interface technology

The Digital Interactive Interface for Video & Audio (DiiVA) Consortium demonstrated its new interface technology, which enables a new home-networking infrastructure that can carry uncompressed video, bi-directional audio and high-speed data through standard cables such as CAT6. Consortium officials report that its DiiVA standard is poised to deliver HD content and data throughout the home, allowing CE devices to be networked in a way that is simple to set up and easy to use. Specifically, by merging multimedia and data communications into a single cost-effective interface, DiiVA is a solution for bridging CE, personal computers, and mobile devices within a single home network. With a maximum bandwidth of 13.5Gbps link speed for video, uncompressed video can be sent through the network from any DiiVA-enabled source to any DiiVA-enabled display. The bi-directional data channel is capable of simultaneously sending multiple protocols such as high-definition audio, USB, and Gigabit Ethernet. The DiiVA specification includes error correction mechanisms for the data channels – ensuring that data packets are reliably transferred. Consumers can benefit from the simultaneous transmissions of multimedia and data on their digital TVs by running myriad applications. DiiVA will be deployed using cost-effective transmitters on source devices such as DVD players, PCs and mobile phones. Display devices will incorporate DiiVA receivers. DiiVA switches can be integrated into AV receivers or source devices to enable DiiVA to work in a daisy chain configuration. With its bi-directional data channel, DiiVA is a complementary technology to emerging wireless video/data standards such as Wireless High Definition Interface (WHDI) which the DiiVA promoters plan to collaborate with in order to bring consumers seamless interoperability between the standards. http://www.diiva.org

LCD TV component demand exceeding supply, say IC distributors

LCD TV panel makers have placed a significant level of new orders with IC distributors in January because demand during the year-end holiday season was better than expected, according to IC distributors. Both upstream and downstream companies in the whole electronics industry were clearing inventories in the fourth quarter of 2008 in response to the economic crisis, but some companies may have controlled too far, said the IC distributors. Since LCD TV makers cut orders in December, related driver IC companies saw an at least 30-40% sales decline for the month. However, demand has been stronger than market expectations, and so LCD TV makers are now aggressively rebuilding their inventories, while IC distributors are hurrying to place orders with component makers.

Vizio passes Sony in flat panel TVs reports iSuppli

LCD TV brand Vizio overtook Sony during the fourth quarter to become the second-best selling flat panel TV brand in the United States after stepping up its marketing efforts, research firm iSuppli said. Vizio, whose TVs are made by Taiwan's Amtran Technology, took 14.3 percent of all flat panel TV shipments in the October-December period as consumers' appetite for more expensive brands fell amid the global financial crisis. Fourth-placed Panasonic was the only brand to outpace Vizio's growth, with its market share growing 3.12 percentage points to 10.7 percent compared to Vizio's 3.11 percentage point increase. Samsung retained its place as the top-selling brand, with a 20.2 percent share in the fourth quarter, down from 20.8 percent in the third. Sony fell to No. 3 with a 13.5 percent share, down from 13.9 percent in the third quarter. According to iSuppli, many tech companies have been struggling in the current downturn, but LCD makers such as AU Optronics and Chi Mei that supply panels used to make LCD TVs have recently had to ramp up production to meet rush orders. http://www.isuppli.com

DisplaySearch reports Q4'08 North America TV results

As the US economy deteriorated in Q4'08, shipments of TV sets in North America fell 7% to 10.7M units according to preliminary results from DisplaySearch. Retailers were careful to avoid an inventory hangover, so they reduced orders to manufacturers in anticipation of weaker demand. As expected, shipments of LCD TVs, the most popular TV technology, fell on a Y/Y basis for the first time ever, from 8.9M units in Q4'07 to 8.7M in Q4'08. In contrast, shipments of plasma TVs, which are typically cheaper than similarly-sized LCD TVs, increased by 28% Q/Q and 10% Y/Y. The PDP shipment total of 1.3M units was a shipment record. http://www.displaysearch.com

Rank	Brand	Q3'08 Unit Share	Q4'08 Unit Share	Q/Q Growth	Y/Y Growth
1	Samsung	19.3%	20.4%	17%	38%
2	Sony	11.1%	14.2%	29%	22%
3	Vizio	9.0%	12.3%	53%	19%
4	LGE	6.7%	8.1%	35%	26%
5	Toshiba	7.2%	7.9%	21%	98%
	Other	45.4%	37.2%	-9%	-39%
	Total	**100.0%**	**100.0%**	**11%**	**-7%**

Table 1: Preliminary Q3'08-Q4'08 NA flat panel TV unit share and growth

Rank	Brand	Q3'08 Unit Share	Q4'08 Unit Share	Q/Q Growth	Y/Y Growth
1	Samsung	18.8%	19.2%	12%	50%
2	Sony	13.9%	16.3%	29%	22%
3	Vizio	8.4%	12.8%	67%	14%
4	LGE	7.6%	9.4%	35%	33%
5	Toshiba	8.2%	9.1%	21%	98%
	Other	43.1%	33.2%	-16%	-37%
	Total	**100.0%**	**100.0%**	**9%**	**-2%**

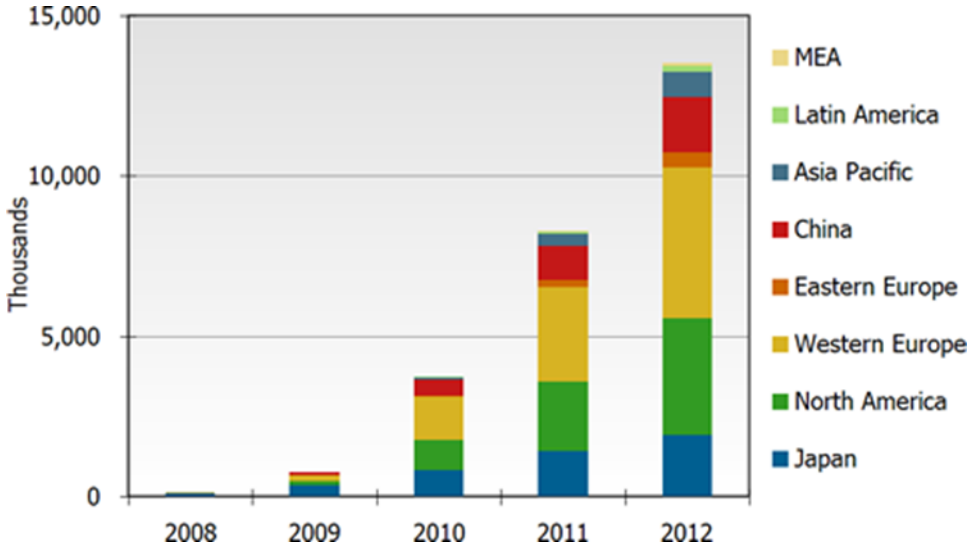
Table 2: Preliminary Q3'08-Q4'08 NA LCD TV unit share and growth

Rank	Brand	Q3'08 Unit Share	Q4'08 Unit Share	Q/Q Growth	Y/Y Growth
1	Panasonic	39.0%	46.9%	54%	34%
2	Samsung	24.0%	27.8%	49%	50%
3	Vizio	13.4%	9.1%	-13%	76%
4	LGE	11.2%	7.0%	-20%	-43%
5	Pioneer	3.5%	2.6%	-4%	-9%
	Other	8.8%	6.4%	-6%	-62%
	Total	**100.0%**	**100.0%**	**28%**	**10%**

Table 3: Preliminary Q3'08-Q4'08 NA plasma TV unit share and growth

DisplaySearch says ultra-slim TVs the key to differentiation and continued FPD TV revenues

Recent findings from DisplaySearch indicate that ultra-slim TV designs will be one of the most important factors in the continued growth of LCD and plasma TVs. Ultra-slim TVs are TVs with a set depth that is less than 40mm. DisplaySearch believes that the worldwide demand for the ultra-slim LCD TV segment will reach 14 million units in 2012, an impressive 219% compound annual growth rate for 2008-2012. These results and other key Ultra Slim TV results are included in a new topical report called "Ultra Slim Flat Panel TV Market Outlook: The Next Big Trend in TV".



Ultra-slim LCD TV shipment forecast by region

DisplaySearch forecasts that worldwide penetration of Ultra Slim TVs will reach 10% in 2012, while developed regions such as North America, Japan and Western Europe will have the highest ultra-slim TV market penetration at 18% for the same period. "Despite the excellent outlook, wireless links, and designs for panels, chassis and remote controls, technologies still need to improve for ultra-slim TVs. Significant investment for these technologies will also be critical to our achieve the forecasted growth," noted Paul Gray, DisplaySearch Director of European TV Market Research. "Consumers will not accept ultra-slim sets if their viewing experience or ease-of-use is compromised." http://www.displaysearch.com

ITU starts work on 3D TV transmission standard

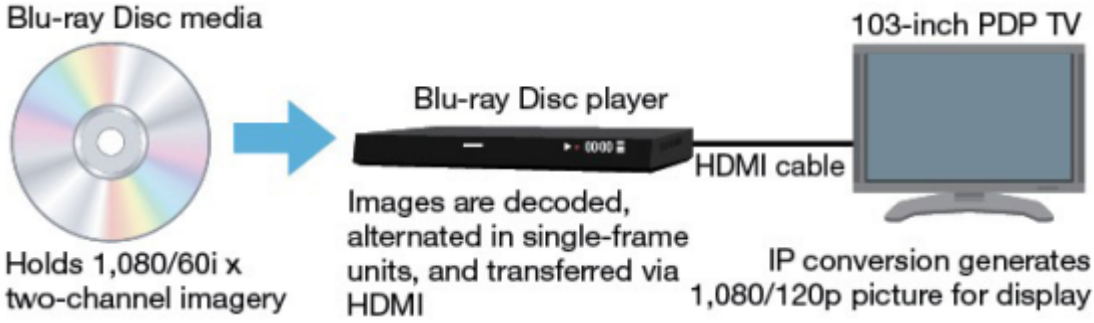
The International Telecommunications Union has started work on standards for the transmission of 3D TV, as well as Ultra-High-Definition TV. The ITU is thinking ahead, with the Russian Federation pushing hard for standards to be established regarding minimal image and sound requirements, as well as ways in which 3D might be broadcast using existing bandwidth allocations or not. Also in the pipeline is Ultra-HD, offering resolutions of around 7680x4320. The ITU doesn't concern itself with how the image might be displayed, but has started considering how to ensure that first-generation 3D based on stereoscopic displays don't cause the eye fatigue that limits the use of existing 3D systems. Squeezing a 3D image into the existing terrestrial bandwidth is also under discussion. Given the similarity between a pair of stereoscopic images there is plenty of room for compression, and the ITU plans to make the system compatible with existing digital broadcasts. Existing TVs will simply display one of the images. The ITU isn't expected to finish its research until 2012. http://www.itu.int

Yahoo! brings out advances to Internet-connected television

Yahoo!'s Connected TV group unveiled the next generation of technology and services for Internet-connected televisions. The company has forged partnerships with top CE manufacturers to launch a widget-based user experience for TV that brings the best of the Web to a broad range of living room devices. Powered by the Yahoo! Widget Engine, these devices will enable the discovery and enjoyment of the Cinematic Internet via a new class of interactive applications called TV Widgets. TV Widgets enable popular Internet services and online media to reach viewers with applications specifically tailored to the needs of the television watcher. In August, Yahoo! and Intel announced the Widget Channel, their joint initiative to foster innovation in the connected TV space. Building on that initiative, Yahoo! is announcing partnerships with top consumer electronics manufacturers including Samsung, Sony, LG Electronics and VIZIO. Products produced by these partnerships will enable the industry to bring an innovative Internet and TV experience to millions of consumers globally, starting as early as the spring of 2009. Reinforcing Yahoo!'s open strategy, the company, in partnership with Intel, released the Widget Development Kit (WDK). This will enable developers to create TV Widgets and effectively reach millions of consumers. http://connectedtv.yahoo.com/developer

Panasonic proposes Blu-ray disc and HDMI standards for 3D imagery

Panasonic Corp of Japan has disclosed the submission of a proposal to the Blu-ray Disc Association (BDA), for a Blu-ray disc standard to store 3D imagery formed of left/right-eye two-channel full-High Definition (HD) images (1,920x1,080 pixels). It is also considering submitting a proposal for a High-Definition Multimedia Interface (HDMI) standard capable of transmitting 3D imagery. The BDA hopes to begin formal discussion on the standard proposal before the end of 2008, with commercial adoption probably in 2010. There are two reasons why Panasonic moved to propose a standard ahead of other firms: to avoid the same sort of futile standards war that occurred with next-generation digital video discs (DVD), and to prevent patent conflict related to 3D imagery standards. The technologies proposed by Panasonic for 3D imagery storage, transfer, etc, all utilize existing standard technology. Image encoding uses the two-channel encoding function implemented in Moving Picture Coding Experts Group Phase 4 Advanced Video Coding (MPEG-4 AVC) H.264. The second channel stores only the data different from channel one, holding the increase in data volume to about 1.5 times. The HDMI standard is used to transfer data from the player to the television, with left and right-eye images alternated in single-field (single-frame) units. Panasonic is not planning to standardize the techniques for displaying 3D imagery. At CEATEC Japan 2008, the company exhibited a 103-inch plasma display panel television displaying 3D pictures (*see photo and graphic*). It featured dual drive integrated circuits to achieve a 120 frames/s, and modified phosphors to shorten plasma emission rise/fall times. http://panasonic.co.jp



NFL demos live 3D broadcasts

The National Football League broadcast live in 3D a game between the San Diego Chargers and the Oakland Raiders to theaters in Los Angeles, New York, and Boston. The event, held December 4, is a demonstration to show how the technology can be used to provide a more realistic experience in a theater or in the home. The NFL has invited representatives from consumer electronics companies to view the event in an effort to drum up support. In addition to showing the game on a big 3D screen, the demonstration included television displays to show what could be possible in people's homes. Some consumer electronics makers have already begun making 3D television sets, mostly to accommodate DVDs that are available in 3D. But the industry is still working on standards for 3D. Just as live sports entertainment has pushed the adoption of high-definition TVs; it could also help drive standards efforts and adoption of 3D TVs. Burbank-based 3ality Digital shot the game with special 3D cameras and transmitted the game via satellite service to the three theaters. Real D 3D provided the displays in the theaters and oversaw production and transmission of the 3D broadcast. Although other live events like operas and circuses have been broadcast live in 3D to theaters around the country, this event was the first time that the NFL has broadcast a game live using the technology.

Sony, Fox Sports, 3ality Digital and Cinedigm Digital Cinema broadcast 3D football

Sony, Fox Sports, 3ality Digital and Cinedigm Digital Cinema teamed up to bring the FedEx BCS National Championship Game between the University of Florida and the University of Oklahoma to theatres in 35 states on its proprietary CineLive satellite network. While private tests and select-theatre showings of live, 3D sporting events have been conducted previously, the BCS game on January 8th was the first time that fans could purchase tickets to see live, 3D sporting events at hundreds of screens in neighborhood multiplexes in 35 states. The game was screened at the Mann Chinese Six and the Krikorian Monrovia Cinema 12 in Los Angeles, California, as well as to the 80 theatres across the country. Many of the 80-plus theatres reported ticket sell-outs. The BCS Championship in 3D grossed more than four times higher than the best per screen movie gross for the same evening. Florida defeated Oklahoma 24-1. http://www.cinedigm.com

Sky moves towards 3D broadcasts

Sky TV in the UK says it has made a significant step towards bringing 3D television to British viewers. The satellite broadcaster says it has successfully tested the delivery of 3D programming to a domestic television, via a high-definition set-top box. Such broadcasts would require the use of 3D televisions, not yet available in UK stores, and viewers would need to wear 3D polarizing glasses. Earlier this year BBC engineers broadcast a Six Nations rugby union international in 3D to an audience at a theatre in London. Sky says it has gone further by showing that 3D could be delivered into homes, straight to its Sky+HD set-top box, without much difficulty. At a demonstration at its West London headquarters, the company showed clips from program it had filmed in 3D, including a Ricky Hatton boxing match, a rugby union international and an episode of Gladiators. The move to 3D would not be anything like as expensive as the investment the industry had made in high-definition television, Sky says.

Sky has filmed several sporting events using the new technology

Dolby makes push to bring 3D to the home

Dolby Laboratories is now targeting bringing digital 3D entertainment to the home. Dolby says it is currently talking with content providers about encoding its digital 3D technology into Blu-ray movies. The company is also working on getting its technology used in 3D video games. Meanwhile, the entertainment and consumer electronics industries are working to avoid any 3D format war like the one that erupted between Blu-ray and HD-DVD. Dolby's home 3D technology is designed so viewers would not be required to buy additional hardware, said Guido Voltolino, the company's director of business development. It would work on any 3D enabled TV – currently available from companies including Mitsubishi and Samsung – with a standard Blu-ray player. Most 3D entertainment requires the use of glasses, from simple polarized lens to costly pairs with extremely fast-moving shutters. Dolby said its technology would support whichever glasses the TV manufacturer specifies. When 3D movies are released on DVD and Blu-ray, the only choice is to see them in an older technology – the more low-tech blue-and-red lens colored glasses. The progress of digital home 3D has been slowed by the lack of a unifying technology standard. Groups including the Society of Motion Picture and Television Engineers (SMPTE), the Blu-ray Disc Association (BDA) and the Consumer Electronics Association (CEA) are working on ways to help standardize 3D home entertainment. Dolby said it presented its technology to the SMPTE group in September and "received some very positive feedback". Dolby added that its approach to 3D is completely backwards compatible, and will not disrupt any standards currently being used. http://www.dolby.com

Panasonic details six new Viera LCD TV models

Panasonic reaffirmed its commitment to LCD TVs by unveiling six new Viera LCD models. This year's Viera LCDs boast 800 lines of moving picture resolution thanks to Panasonic's 100Hz "Intelligent Frame Creation" technology. This feature detects and analyses on-screen movements, and as a result promises "sharp motion-image playback with minimal blurring". The 2009 range will all also feature an IPS Alpha panel with large aperture ratio, for clearer pictures, 50,000:1 dynamic contrast, and wide color viewing angle. The models also include "Viera Cast", a new service in Europe that will allow users to access the Internet through their TV, Viera "Image Viewer", for viewing pictures and movies from a digital camera or camcorder, "Viera Link", and DLNA connection for viewing media content from a networked PC. http://www.panasonic.com

VUDU first to sell on-demand movies in HD

VUDU, Inc. announced it has become the first on-demand service to offer high definition movies for download to own on its 1080p Internet Movie Player. HD movies are available for purchase now to all VUDU owners. VUDU unveiled a collection of over 50 HD movies from top independent studios that are available for both rental and download to own. Movies offered in this collection will be available for purchase in both instant HD and VUDU's industry-leading HDX format at the same price. Movie prices range from $13.99 to $23.99. http://www.vudu.com

Honeywell enters HDTV market with 82-inch LCD TV

Soyo has recently announced it will sell its 82-inch Altura LE LCD HDTV under its Honeywell brand when it enters the US market in late April. The rather large TV will be part of a line-up that begins with 19-inch TVs in various lines, and sports 1080p resolution. It has a 120,000:1 contrast ratio along with a brightness rating of 600cd/m2. Along with the 300lb 82-incher, Honeywell's flagship LE line will include a 47-, 57-, 65- and 70-inch HDTV. All will sport 120Hz panels and 178-degree viewing angles. Each will have three HDMI inputs, two component video inputs, and one each of VGA, composite and S-video connections. Picture-in-picture functionality will be integrated, and there are two 10W speakers built into the glossy black bezel. Pricing and availability for the flagship LE models has not yet been announced. http://www.honeywellce.com

SiBEAM delivers high-performance WirelessHD chipsets in production

SiBEAM announced that its line of WirelessHD chipsets has entered volume production. SiBEAM has provided sample wireless chipsets to select customers since the first quarter of 2008 and is now preparing to broadly expand partners' product development activity. Previous technology demonstrations of SiBEAM's chipsets have focused exclusively on wireless video area networks (WVANs) and audio/video transmission for home entertainment centers. SiBEAM highlighted the viability of applying the technology for CE applications as well as PC virtual docking applications in the future. SiBEAM's chipsets with OmniLink60 technology operate in the 60GHz band and represent the world's first 60 GHz chipsets to be developed and produced in CMOS. The SB9120 WirelessHD HRTX Transmit Network Processor and SB9121 WirelessHD HRRX Receive Network Processor have recently entered mass production and support uncompressed and lossless wireless delivery of 1080p/60 Full HD deep color video and audio. The chips' designs enable them to be efficiently embedded into flat panel televisions, set-top boxes, Blu-ray DVD players, personal computers, laptops, home media gateways and more. http://www.sibeam.com

WirelessHD Consortium completes compliance test specification

The WirelessHD Consortium announced that the WirelessHD Compliance Test Specification (CTS) version 1.0 is now available to WirelessHD adopters and evaluators. In addition, Compliance Certification Services (CCS) has been named the first WirelessHD Authorized Test Center (ATC). First WirelessHD testing will commence in Q1'09. The WirelessHD Compliance Test Specification (CTS) 1.0 details the tests, procedures and equipment specifications established by the WirelessHD promoters to assist adopters in verifying WirelessHD product compliance. Mandated by the WirelessHD adopter's agreement, compliance testing also promotes interoperability among WirelessHD devices and is required for a product to bear the WiHD logo or to claim conformance to the WirelessHD specification. Since the announcement of the WirelessHD 1.0 specification during the 2008 International Consumer Electronics Show, the WirelessHD Consortium has experienced growth and momentum including new adopter interest and the addition of Broadcom as a new promoter. This growth and momentum is expected to accelerate with the announcement of the availability of the WirelessHD CTS 1.0. The WirelessHD CTS includes three standalone test specifications. These include an RF test specification, a protocol test specification, and an interoperability test specification. In order for adopters to ship product into the market with the WiHD logo, products shall be required to pass all three specifications at a WirelessHD ATC. http://www.WirelessHD.org

LG shows super-slim LCD with 2,000,000:1 contrast ratio

LG's LH9500 is just 24.8mm thick yet still boasts 1080p and a 2,000,000:1 contrast ratio. Its 240Hz TrueMotion Drive Technology is also 40Hz faster than the frame rate available on Sony's Z4500 TV. It also features a pair of "invisible" speakers that are claimed to provide stunning sound without adding unnecessary bulk to the body. http://www.lgphilips-lcd.com

Samsung and Uni-Pixel enter into TMOS joint development agreement

Uni-Pixel, the developer of color display technology called Time Multiplexed Optical Shutter (TMOS) and the Opcuity family of performance engineered films, announced the signing of a joint development agreement with Samsung Electronics of Korea. Under terms of the agreement, Unipixel and Samsung will collaborate on advancing the development efforts around Unipixel TMOS display technology. Unipixel TMOS display technology is targeted at leveraging a subset of the current LCD manufacturing process, offering the potential of lowering the bill of materials manufacturing costs by as much as 60% in some cases, while improving performance characteristics including lowering power consumption and increasing brightness over existing LCD and OLED flat panel display technologies. http://www.unipixel.com

Screen Dreams to stream images to Aquos

Screen Dreams' art and photography collections will soon be streaming to Sharp Aquos Net-connected HDTVs. Screen Dreams has had its DVD set of "Living" series on the market for a while now and announced it will start streaming to such TVs in April, beginning with its "Living Earth" collection of forests, lakes, mountains, and other nature scenes in full 1080p. When not in use as a TV, the screen serves as a digital picture frame, hosting fine art and photography of the highest quality. http://www.screendreamsdvd.com

SageTV releases HD theater for Full HD playback of home video, music and photos

SageTV released SageTV HD Theater, a $199.95 Full HD capable networked media player that lets you enjoy virtually any home video, music or photo from your home network in Full HD on your HDTV. Internet video from YouTube and many other popular online video services can be browsed, searched and played on the SageTV HD Theater. The SageTV HD Theater can also work as a whole home HDTV DVR solution by running SageTV Media Center software on any PC, Mac or Linux computer with a HDTV Tuner on the home network. With SageTV Media Center the SageTV HD Theater works as a high performance HD Media Extender providing a rich, animated whole home DVR and Media Center experience. All video, music and photos as well as TV tuners and Internet video from the SageTV Media Center system are available when SageTV HD Theater is used as a HD Media Extender. http://www.sagetv.com

Cypress and Legend Silicon debut world's first USB TV dongle reference design

Cypress Semiconductor and Legend Silicon introduced a reference design for a DTMB (Digital Terrestrial Multimedia Broadcast – a DTV standard) USB dongle. The Legend MoBLTV reference design includes the resources to quickly develop a high-performance DTMB dongle that brings television signals to PCs and laptops. It leverages Cypress's EZ-USB FX2LP high-speed USB controller to drive Legend Silicon's LGS-8GL5/LGS-8G75 demodulator. The DTMB standard covers both fixed and mobile terminals and is targeted to eventually serve more than half of the television viewers in the People's Republic of China. The RF tuner of the Legend MoBLTV DTMB dongle selects the appropriate frequency to pass along television signals to the LGS-8GL5/LGS-8G75 demodulator, which converts the signals to an MPEG2-TS transport stream. The EZ-USB FX2LP device controls the demodulator and tuner via an I2C bus, and carries an MPEG2-TS stream to the PC or laptop for viewing. The Legend MoBLTV reference design includes hardware schematics, Gerber files, firmware, Broadcast Driver Architecture (BDA) driver, demo software, and Microsoft certification. http://www.legendsilicon.com http://www.cypress.com

LCD TV Association

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"A Great TV in Every Room"

The LCD TV market hits 100 million units

But Q4'08 signals a slowdown…

by Paul Semenza

Paul Semenza is senior vice president of North America & Europe, responsible for managing the North American and European analyst teams at DisplaySearch. Previously Paul served as vice president of display research for iSuppli Corporation from 2000-2008 and for Stanford Resources, Inc. from 1997-2000. Prior to Stanford Resources, Paul was a program officer at the Computer Science and Telecommunications Board of the National Research Council, where he directed studies on IT policy, and was an analyst for the US Congress Office of Technology Assessment (OTA), covering emerging technologies such as flat panel displays. Paul received his Bachelor's degree in Electrical Engineering and Master's degree in Electro-optics from Tufts University. In 1994, he received a Master's degree in Public Policy from the John F. Kennedy School of Government at Harvard University.

2008 was a banner year for the television business: not only did the total market pass the 200 million unit mark, but shipments of LCD TVs reached 105 million units, growing 33% on the year and passing CRT TVs to reach just over half of TVs shipped worldwide. However, driven by the ongoing global economic crisis, the market showed signs of weakness in the fourth quarter, and DisplaySearch expects that the overall TV market will contract in 2009.

The LCD TV momentum continued in Q4, with LCD TV shipments far outpacing all other technologies, accounting for 58% of units and more than 75% of revenues. PDP shipments accounted for 7% of units and 13% of revenues, more of a niche market at larger, smaller volume screen sizes.

Despite concerns about consumer spending during the holidays, demand for larger screen sizes grew during the 4th quarter of 2008. The share of LCD TVs shipped at 40-inch+ screen sizes reached an all-time high of 28%, up from 27% in Q3'08 and 25% in Q4'07. This was largely the result of significant discounts by manufacturers and retailers, both hoping to avoid excessive inventory after the holidays. The volume weighted average price for 40-inch+ TV's fell 19% Y/Y during Q4'08, while pricing for screen sizes below 40-inch was down 14% from a year ago, mostly due to steep declines in 32-inch prices.

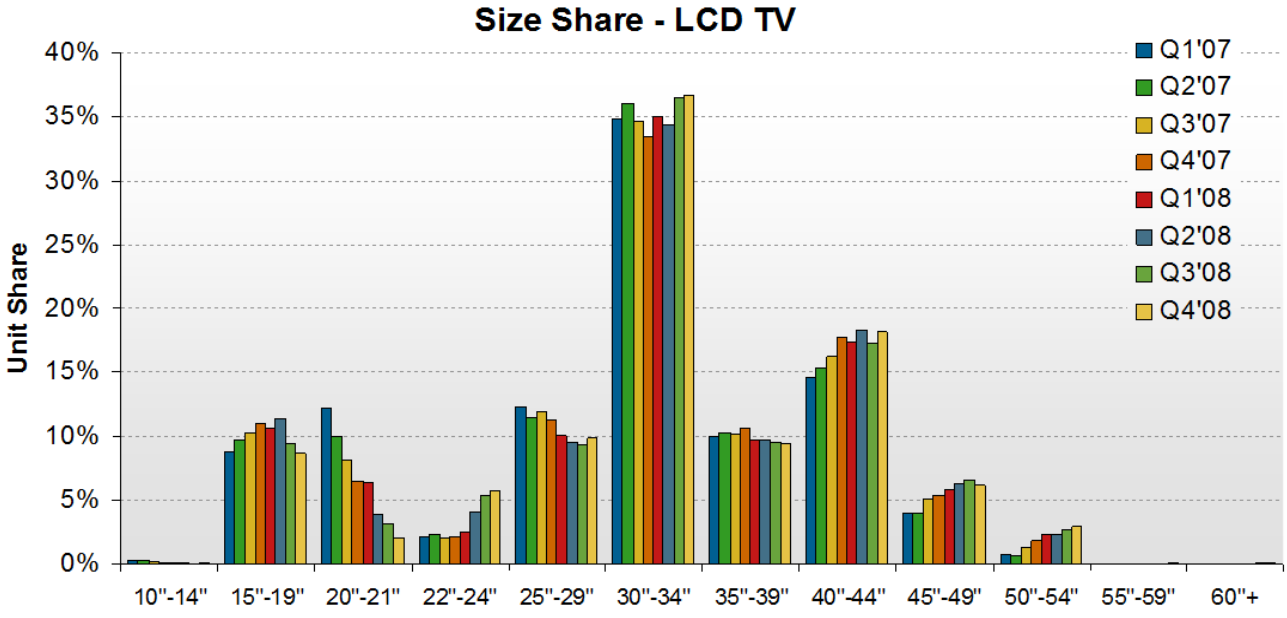

Figure 1: LCD TV screen size mix

Source: DisplaySearch Q4'08 Quarterly Advanced Global TV Shipment and Forecast Report

The mainstay 32-inch LCD TV continued to build share into Q4'08, rising to a record level of 36.7% of LCD TV shipments. With prices at retail below $500 and a good compromise between size and price, even in developing countries, it's not hard to understand why. The 40-44-inch share remains somewhat stagnant, although a small increase was seen from Q3 to Q4. This size category has some of the most intense competition, not only from the multitude of brands, but also from 42 and 50-inch HD PDP models. The 20-21-inch share is rapidly shifting to 22-24-inch as new 21.5 and 21.6-inch sizes enter the market, marketed as low priced 22-inch models. Both 26 and 37-inch sizes are steadily losing share as the relative value of 32 and 40-inch+ models increases.

In terms of format, 1080p accounted for 21% of all TV units shipped in Q4, jumping to 66% in the 40-inch+ segment. 120Hz shipments, only available in LCD TVs, accounted for 11% of global LCD TV units and 23% of revenues in the first quarter of tracking for DisplaySearch.

In North America, a battered economy and plummeting consumer confidence had a significant impact on demand during the 2008 holiday season. Especially strong shipments in Q3 that predated the financial crisis led to excessive inventory early in Q4 as retailers cut back orders. As a result, total unit shipments declined 7% Y/Y, despite a particularly weak Q4'07. Total TV revenues fell even more sharply, down 18% Y/Y, as the lack of strong size growth and limited share growth from flat panel technologies allowed ASP declines to impact revenues.

For LCD TVs, North America shipments fell 2%, the first time quarterly shipments in any region have declined Y/Y. Shipment growth in both Japan and Western Europe fell below 10% Y/Y in Q4, after hovering between 10% and 20% Y/Y growth throughout 2008.

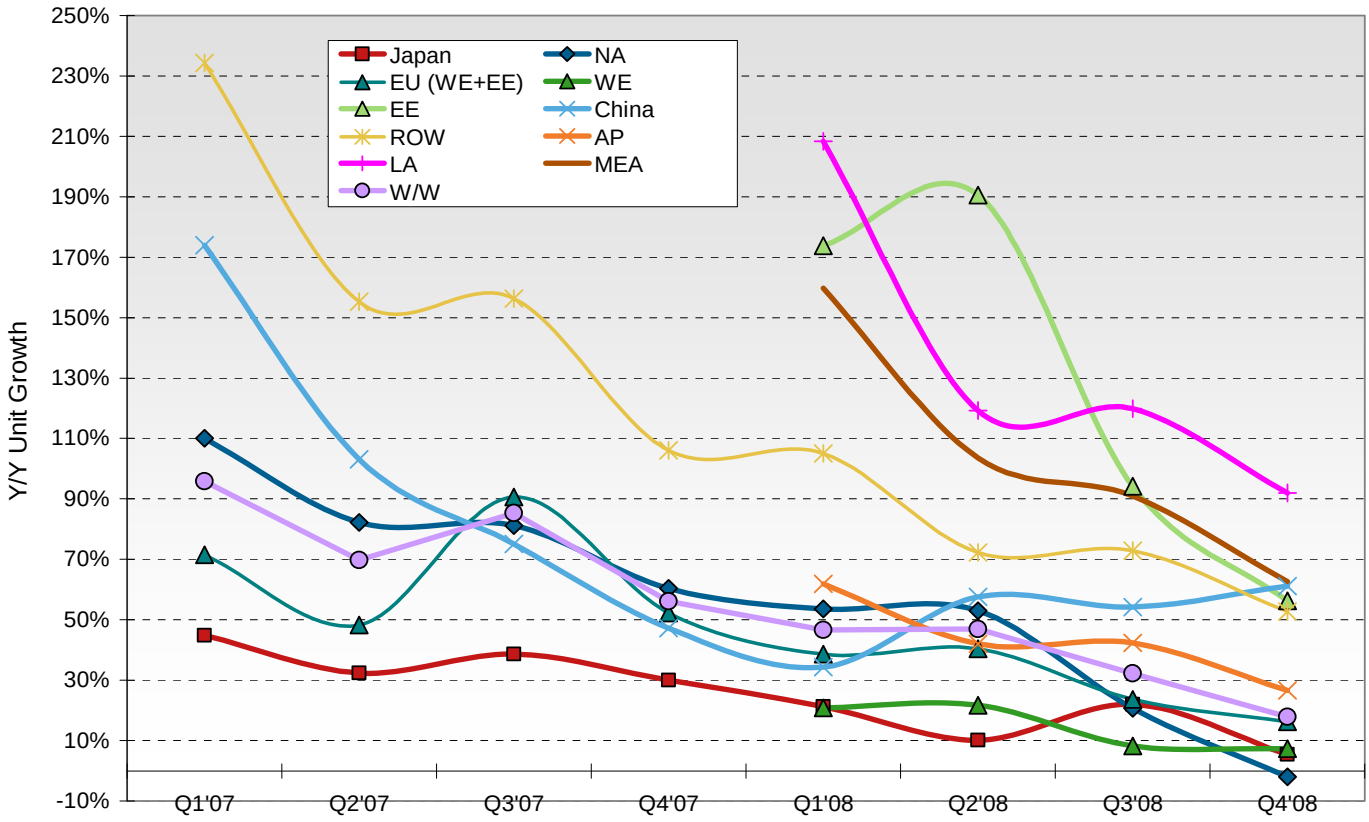

Figure 2: Year-on-year LCD TV shipment growth by region
Source: DisplaySearch Q4'08 Quarterly Advanced Global TV Shipment and Forecast Report

In the US, retail sales in December and January produced some surprising results. According to The NPD Group's Retail Tracking Service, LCD TV sell-through grew 35% Y/Y in December, and 37% in January; channel checks with brands and retailers indicated that inventories have been very low over the past few months. However, at least part of this growth is attributable to aggressive price declines, with LCD TV ASPs falling 17% Y/Y in

December and 28% in January. Retailers report passing along considerable manufacturer incentives to consumers to keep sales volume high and inventory levels low.

It is apparent that many retailers had reduced expectations a little too much and are running short on product as a result, but manufacturers should use caution when interpreting this as a resumption of normal demand. As long as discounts remain deep, demand will be good but at the expense of profits and revenues. According to the NPD data, US sell-through revenues for LCD TVs were flat Y/Y in October and November, spiked at 12% in December, and then fell back to zero in January.

With LCD panel price declines slowing, such discounting can hardly be expected to continue as strongly. Sell-through trends will have to be carefully monitored, particularly as economic recovery seems less certain in 2009. With many retailers in the US and overseas filing for bankruptcy, notably Circuit City completely liquidating under chapter 7, the lower level of retail competition will mean less pressure on prices and greater pressure on manufacturers on pricing negotiations. Combined with a more stable panel pricing environment, prices should stabilize at retail as well, which could have a further cooling effect on demand in such a price-sensitive consumer environment.

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LCD TV Association

INFORM · PROMOTE · IMPROVE · CONNECT

INFORM the public on the many benefits of LCD technology (vs. CRT and projection, PDP and the coming set of laser RPTV players). The LCD TV Association will debate the claims of competing technologies, as well as sponsor, post and distribute white papers on industry research and relevant topics - as determined by LCD TV Association Advisory Board.

PROMOTE the industry and technology via speeches, debates, interviews, PR and publicly available white papers on topics that promote these goals. The founder's history with the industry ensures many lively and engaging interviews on the industry's strategies and will put a human face on this huge and influential industry. The press is constantly seeking validation from neutral, yet knowledgeable industry experts such as those at the LCD TV Association.

IMPROVE the products and functions of LCD TV products by inventing and promoting new specifications that benefit the whole industry, such as an industry-wide 'Green TV' program. There are many activities that will benefit our members from early compliance and the associated PR. The emphasis is on perceived value for little or no cost, and use this to promote the industry via positive reviews and branding. The founder's experience ensures that these programs will not add cost, but rather help to relieve the relentless pressures on margin for the manufacturer.

CONNECT the industry supply chain with face-to-face meetings and regular communications, via white papers, presentations, quarterly newsletters for members. The Advisory Board members has quarterly meetings – telecon or in person – to facilitate win/win relationships for the industry partners. With better communication we can speed time to market with better features and functions, particularly for members and their customers, with the ultimate goal of creating more value for the TV vendors and their suppliers, while making TVs more attractive to consumers.

Retail price survey of LCD TVs in Q4'08

Panel price falls and sales promotion spur larger LCD TV retail price declines in Q4'08

by Tom Lo

Tom Lo is a senior analyst at WitsView. His main research focuses on the LCD TV and LCD monitor industries. Before joining WitsView, Tom worked at *DigiTimes*, where he conducted DTV (digital TV) research. WitsView is a subsidiary brand of DRAMeXchange, which provides prompt and credible market insights covering the quantitative pricing trend for both TFT panels and finished goods, industry updates and market intelligence. http://www.witsview.com

Based on WitsView's Q4'08 survey, due to the panel price plunge since Q3'08 and various sales promotions during the traditional high season, the Q/Q LCD TV retail price changes were notable. In Q4'08, the average retail price fall among the various sizes dropped by an average of 10%. By contrast, the Q/Q drop in Q3'08 was only 5%. In Q4'08, the 32-inch category sold at less than $700, while the 42-inch category neared the $1,000 level. Only the 46-inch and larger TVs were still priced at higher levels, where there was a more than $500 gap with the 40/42-inch category. In order for the 46-inch and larger category to enjoy a higher market penetration rate, prices will need to drop further.

19 and 22-inch sizes for the bedroom displace 20-inch category: Looking back at Q4'07, the 20-inch LCD TV only witnessed a 10% Y/Y drop, the smallest decline among the various sizes. The main reason stemmed from the fact that the 20 and 26-inch and larger TVs belonged to a different market segment. Meanwhile, sizes that shared the same market segment with the 20-inch were too small. As this allowed the 20-inch to be the dominant size, its price changes have been small. In H2'08, Tier 1 brand vendors started to add 19 and 22-inch units to their small-sized TV product line. Due to their competitive panel prices, they started to challenge the market position of the 20-inch. In Q4'08, the Y/Y decline of the 20-inch was more than 20%, even higher than the 32 and 40-inch categories.

The 19-inch units were priced near $300. The price gap with the 20-inch units reached $68. Meanwhile, the 22-inch units, which owned a 2-inch size advantage, was only $10 more expensive than the 20-inch units. Market-wise, the 20-inch sets seen on the product shelves now are mostly older models, priced mostly between $300~$400. As for the 19 and 22-inch sets, given the different adoption speed by the Tier 1 players, prices varied a great deal between each market segment. In Taiwan and Korea, the 19-inch units were priced only slightly higher than $200, as most of the models are supplied by the Tier 2 players. By contrast, in the US, the inclusion of Samsung, Sony, Toshiba and Sharp led to prices exceeding $300. In Japan, they entailed a more than $500 price tag. The same price trend was seen for the 22-inch units as well. In China, the 22-inch units are all supplied by the local brands. But in the US and UK, the Tier 1 vendors are included. Thus, in China the average 22-inch unit price was $324, while in the US and UK, they retailed respectively at $389 and $396.

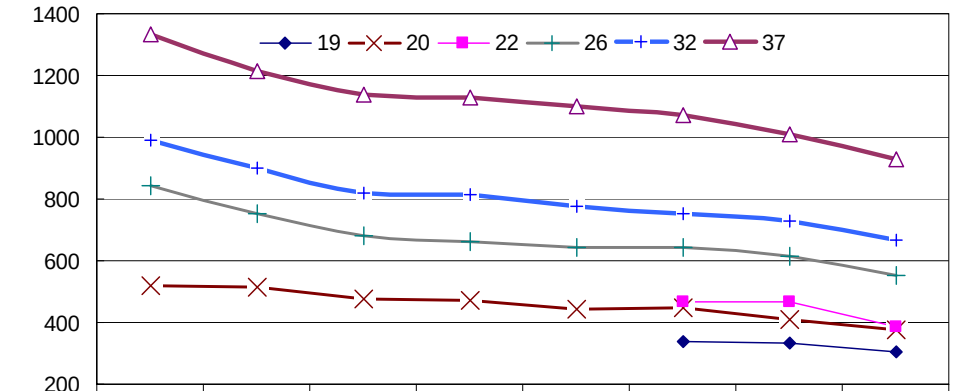
26~37-inch: Living room TVs lower than $1,000: The market position of the 26-inch category was once considered unclear. It was too small for the living room, but too big for the bedroom. But in the wake of the financial crisis in H2'08, it instead boosted the market position of the 26-inch category. In some advanced countries, it is not easy to find 25~30-inch CRT TVs sold by retailers. Thus, for lower income households, the 26-inch LCD TV becomes an attractive choice. But as the larger-sized 32-inch is even more eye-catching, the 26-inch must maintain a certain price gap. In Q4'08, the 26-inch was priced at $551, down by 10.4% Q/Q. The 32-inch fell by 8% Q/Q to $669, resulting in a $118 price gap with the 26-inch. For the first time, the 37-inch slipped below $1,000, down by 7.8% Q/Q, roughly the same as the 32-inch. It was worthy to note that in Q4'07, the 37-inch was retailed at $1,127, 1.39 times the price of the 32-inch, the same as in Q4'08.

Market-wise, the 26-inch fell to $500 in the US, down by 4.2% Q/Q. Meanwhile, the 32 and 37-inch sets fell respectively by 6.0% Q/Q to $631 and 4.4% Q/Q to $788 in Q4'08. In Japan, the 26~37-inch category grew more expensive over Q3'08, partially due to the appreciation of the Yen. Coupled by the launch of new models in

September and October, it further pushed prices up in Japan. In China, heavy discounting was seen in Q4'08, where the 26-inch units was down by 8.6% Q/Q to $448. Meanwhile, the 32/37-inch fell respectively to $620 and $826, down by 5.8% and 6.8% Q/Q. This can be attributed to the National Day holidays in October, where big sales promotions were conducted. In addition, the earlier arrival of the Chinese Lunar New Year holidays in January instead of the usual February resulted in China's brand vendors moving up their sales promotions to December.

Unit:USD

Worldwide LCD TV Street Price Q1'07~Q4'08 (< 40in.)

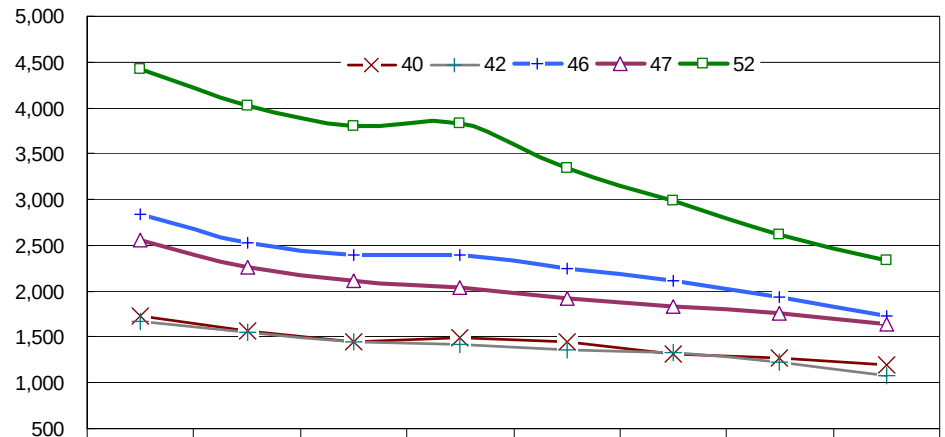


	Q1-07	Q2-07	Q3	Q4	Q1-08	Q2	Q3	Q4
19						336	333	306
20	519	513	477	472	442	446	411	374
22						468	465	384
26	842	750	679	660	641	643	615	551
32	992	898	818	813	774	751	726	669
37	1,333	1,216	1,139	1,127	1,102	1,073	1,008	929

40~52-inch segment: Little market expectations for 46-inch and larger: The 40-inch category entailed a price tag of $1,189, down by 6.6% Q/Q. In Q4'06 and Q4'07, it was priced respectively at $1.853 and $1,485. For the past three years, the annual drop has been exactly 20%. Market-wise, the 40-inch category was sold under $1,000 in the UK ($992) and China ($997). The quarterly drop in the UK was 14.7%, higher than the US, where it fell by 8.2% to $1,048. In Japan, prices rose by 5.7% Q/Q to $1,669. Compared to last year's $1,658 price tag, prices instead went up in 2008. Separately, the 42-inch category slipped by 11.2% Q/Q to $1,083, increasing the price gap with the 40-inch to $106. In China, prices fell 6.6% Q/Q to $1,014. Although the rate of decline was bigger than the 4.8% seen in the US ($969), prices were still more expensive. Among the surveyed markets, only in China was the 42-inch was more expensive than the 40-inch category.

Unit:USD

Worldwide LCD TV Street Price Q1'07~Q4'08 (=/>40in.)



	Q1-07	Q2-07	Q3	Q4	Q1-08	Q2	Q3	Q4
40	1,723	1,572	1,443	1,485	1,441	1,319	1,273	1,189
42	1,675	1,549	1,453	1,423	1,358	1,327	1,220	1,083
46	2,836	2,526	2,402	2,390	2,241	2,110	1,937	1,732
47	2,562	2,260	2,118	2,033	1,924	1,826	1,756	1,642
52	4426	4,017	3,798	3,834	3,340	2,985	2,618	2,342

The 46/47-inch category was priced respectively at $1,732 and $1,642, down by 10.6% Q/Q and 6.5% Q/Q. Based on the 6.6%-11.2% quarterly drop of the 26~42-inch category, the rate of decline of the 46/47-inch category was not big. One of the reasons may be attributed to the macroeconomic woes, where TV brand vendors likely believe further price drops will have little effect on stimulating the demand. In Q4'08, the price gap between the 46/47-iinch and 40/42-inch was $559. In Q4'07, it was $610, an indication of the difficulty in augmenting the demand of the 46/47-inch. As for the 52-inch, the global average was $2,342, down 10.5% Q/Q and 39% Y/Y. By contrast, as the annual drop was 24.5% in Q4'07, it can be seen that the decline in 2008 was quite large for the 52-inch units. Despite the few Tier 2 suppliers of the 52-inch units, as the Tier 1 makers began to offer low to mid-level 52-inch models in 2008, such as Sony's S and V series and LG's LG50, it sharply pushed down the retail price.

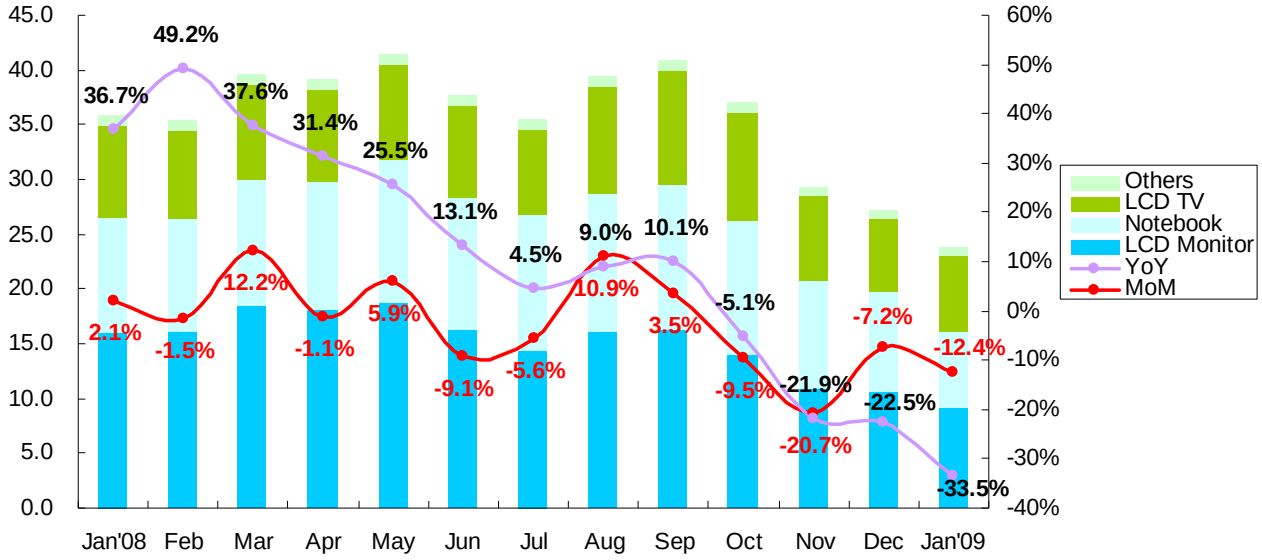
TV-use panel shipments are on the rise

by Ricky Park

Ricky Park is a senior analyst at Displaybank. He graduated from Hanyang University in Seoul, Korea. He then joined Displaybank in 2001 to conduct research in various fields and stationed in Taiwan for a year in 2007. His area of research is focused on the large-area TFT-LCD panel market as well as LCD TVs. He also serves as council member of Gerson Lehrman Group (GLG) and Society of Industry Leaders (SIL). Some titles of his study include TFT-LCD Module FAB and C/F Supply Chain Analysis, Display Industry Trend and Europe TV Market Forecast.

The large-area TFT-LCD panel shipments for January 2009 recorded the lowest volume since February 2007 due to a continuing depression in the LCD market. According to "Monthly Large-Area TFT-LCD Panel Shipment Data" published by Displaybank, the large-size TFT-LCD panel shipment result showed 23.8 million units in January 2009, which was a 12.4% decrease M/M. This was the lowest shipment since February 2009 and decreased by 33.5% compared to January 2008. The revenue based amount was $2.5 billion which was also the lowest since February 2005 despite stabilizing panel prices. It decreased by 10.7% M/M and by 63.3% Y/Y.

Monthly Large-Area TFT-LCD Panel Shipment Result (Jan'08~Jan'09)



Source: Displaybank, "Monthly Large-Area TFT-LCD Panel Shipment Data"

The LCD TV panel market recorded an increase of 220,000 units, which accounted for 3.4%, compared to December 2008 despite decreased overall shipments. This was mainly due to an increase in China's domestic market demand and sales that showed beyond expectations in advanced markets such as the US and Europe.

In terms of revenue, Samsung Electronics recorded the largest market share and accounted for 27.9%. It was closely followed by LG Display, which accounted for 27.8% as the company's TV panel shipments increased. These two companies accounted for 55.7% market share, which increased by more than 10% from 2008 with 43.7%. Based on units, LG Display accounted for 26.4% market share and took the first place. Samsung Electronics accounted for 26.0% market share and took the second place. On the other hand, Taiwan based CMO recorded about 9% increase M/M and accounted for the third largest market with 13.8%.

The Taiwanese and Chinese panel makers had to have limited production capacity in January 2009 due to Chinese New Year holidays and most panel makers' inventories were in good condition through the year-end inventory adjustments. Accordingly, the market underwent supply shortages in some models. Panel orders for

February have been rapidly increasing and panel makers have been gradually increasing utilization. Park added that the shipments in February and March 2009 are forecasted to increase by 10% respectively M/M.

Large-Size TFT-LCD panel shipment result (million pieces)

	Jan'08	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan'09
LCD Monitor	15.9	16.1	18.4	18.0	18.8	16.3	14.3	16.1	16.4	14.0	10.9	10.7	9.1
Notebook	10.6	10.3	11.6	11.7	13.1	12.2	12.4	12.7	13.1	12.2	9.8	9.0	7.0
LCD TV	8.3	8.0	8.6	8.4	8.6	8.4	7.9	9.7	10.4	9.8	7.8	6.6	6.9
Others	1.0	0.9	1.0	1.0	1.1	1.0	1.0	1.0	1.0	1.0	0.9	0.8	0.8
Total	35.8	35.3	39.6	39.2	41.5	37.7	35.6	39.5	40.9	37.0	29.3	27.2	23.8
M/M	2.1%	-1.5%	12.2%	-1.1%	5.9%	-9.1%	-5.6%	10.9%	3.5%	-9.5%	-20.7%	-7.2%	-12.4%
Y/Y	36.7%	49.2%	37.6%	31.4%	25.5%	13.1%	4.5%	9.0%	10.1%	-5.1%	-21.9%	-22.5%	-33.5%

Large-size TFT-LCD panel shipment result (billion $)

	Jan'08	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan'09
LCD Monitor	2.2	2.2	2.4	2.4	2.5	2.2	1.7	1.6	1.4	1.1	0.8	0.7	0.6
Notebook	1.1	1.1	1.2	1.2	1.4	1.2	1.2	1.1	1.0	0.9	0.6	0.5	0.4
LCD TV	3.4	3.3	3.5	3.4	3.4	3.3	3.1	3.5	3.6	3.2	2.3	1.6	1.5
Others	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Total	6.9	6.7	7.3	7.1	7.5	6.8	6.0	6.3	6.2	5.3	3.8	2.9	2.5
M/M	-2.1%	-3.7%	8.8%	-2.1%	5.3%	-9.4%	-11.2%	4.5%	-2.3%	-14.2%	-28.3%	-24.7%	-10.7%
Y/Y	55.4%	68.7%	57.5%	43.4%	31.4%	17.0%	-2.8%	-6.9%	-14.8%	-32.5%	-51.2%	-59.7%	-63.3%

Large-size TFT-LCD panel shipment result by region (sales based)

	Jan'08	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan'09
Korea	44%	43%	41%	41%	44%	44%	46%	45%	48%	54%	58%	56%	56%
Taiwan	42%	42%	43%	43%	42%	41%	40%	40%	38%	33%	28%	32%	32%
Japan	10%	11%	11%	12%	11%	11%	11%	12%	12%	12%	12%	10%	11%
China	4%	4%	4%	4%	4%	3%	3%	3%	2%	2%	2%	2%	1%

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About the LCD TV Association

The LCD TV Association is a global, non-for-profit marketing trade association, formed to help the entire LCD supply chain and retail channel through to the end consumer via various communication tools, including speeches, interviews, sponsored research, as well as industry newsletters, meetings and standards settings – resulting in better information and distribution of this information, as well as better understanding of the rapidly changing world of flat TVs and HDTVs for all related parties. Participating at the many industry trade and consumer shows around the world to help promote members' interests, as well as create better LCD TV products for everyone, our goal is to serve both the industry needs and promote the consumers best interests. We encourage and engage in discussions to promote the industry overall, as well as helping foster healthy competition and create better products with higher value propositions for consumers and retailers alike. The LCD TV Association can help fight the growing "specsmanship" in trade publications and refocus conversations on true image quality and understanding for consumers, and help the whole LCD TV ecosystem to improve and thrive. For more information on the LCD TV Association, it's membership, or to join at one of the various levels available, please visit us on the web at http://www.LCDTVAssociation.org.

LCD TV in Europe – Update

by Bob Raikes

Bob started his working career in the steel tube industry, where there's a new product every 20 years, whether the market is ready or not! He has been working in the Display Industry since the early 1980s, when he joined a distributor of monitors and printers in a sales and marketing function. Becoming more involved in the product management side, he was a founder member of two subsidiaries for Japanese companies that wanted to develop in the UK market. He was, for five years, managing director of Eizo UK Ltd. In 1994, Eizo sold the subsidiary and Bob started Meko Ltd – intending it to be a "solo consultancy". However, customer demands for more data and services led the business to expand and it now specializes in the European market for TVs, desktop monitors and digital signage. It supplies country-by-country market research, consultancy and publishes the *Display Monitor* newsletter. In the odd moments away from work, Bob has become, in recent years, a keen (although not very good) cyclist and plans to compete again in the "Etape de la Tour de France" in July of 2009.

I was asked to contribute a piece for this issue of the LCD TV Association Newsletter and a wait for a flight in the salubrious surroundings of Gatwick's North Terminal on the way to Amsterdam has given me a chance.

So, what's happening in Europe? Well, as usual with Europe, it depends on what part of the continent you are talking about.

The Germans have never bought into the US/UK idea of living on credit. It is still possible to find restaurants in major German cities that will sell you a $100 dinner, but don't take credit cards! I have seen data from 2006 that suggests that 65% of all retail transactions are in cash and only around a quarter of the German population has a credit card at all. As a result, the credit crunch has not had the impact that it has had in other regions. Switzerland, the land of banks, has had its own trouble and for Austria, the close relationship with Hungary may have repercussions, as we shall see.

The UK has definitely been hit by the difficult financial situation and UK retailers in particular have been very badly affected. Numerous retail chains, including the venerable Woolworths, have gone into bankruptcy and the company that dominates electrical and electronic sales in the UK, DSGi, which owns the Dixons and Currys chains, is under significant financial pressure. Some analysts estimate that more than 10% of all UK retailers could be bankrupt in Q1 2009. Meanwhile, Carphone Warehouse and Best Buy are planning their attack on the DSGi market share (could this be the trigger for Vizio to attack Europe?) in the TV market.

Despite the hard times, the British love their TVs, and satellite broadcaster Sky, which has around 9 million subscribers in the UK, has the best HD package available in Europe with 30 channels of HD including features, sport and movies. All the local soccer that Sky shows is in HD. The firm has recently cut the cost of its HD PVR to boost HD subscriptions and is doing well. So despite the financial gloom, the market for set sales has been good in volumes, although profits are difficult as the £ struggles against the $ and the ¥. The rate against the yen makes it especially hard for makers such as Panasonic, which makes its own panels in Japan.

Southern Europe – Italy, Spain, and the other Mediterranean countries – is also struggling economically, but the real problems outside the UK are in Central Europe. There is concern that the Ukraine may default on its IMF obligations and Latvia is in a mess, but is a small country. Hungary is a concern and Western banks have lent a lot of money in that country, especially the Bank of Austria and defaults could add to banking problems further West.

Meanwhile, Russia has been hit not only by the financial crisis, but also the dramatic drop in oil prices. The country has also seen huge difficulties in imports, with systemic problems of trust between banks that have lead to almost a breakdown of the letter of credit system. We have heard reports of large numbers of TVs stuck in customs in the Region and it's those with strong local and political connections that are doing best.

The Turkish makers seem to be producing a lot of TVs, but profitability is still a major problem for them. There is a story in the Turkish press that Beko's parent company has given the management a year to turn the TV business around or it will give up. Beko owns the Grundig brand in Europe.

The consolidation in TV brands has been huge across the continent and the difficulties in Taiwan have forced many of the pioneers of that country that were hoping to establish themselves and their brands in Europe to simply give up.

So, doom and gloom for most of the continent. However, despite this, the TV market is fairly positive at the sell-out level – that is to say that retailers are selling their inventory. The simple fact is that TVs are not regarded as luxuries, they are seen as essentials and most of the market is basically a replacement market. If the TV breaks, it is simply replaced. The second reality is that TV sets are no longer expensive. At my local Sainsbury supermarket at Christmas, I could have bought a 32-inch Sony Bravia LCD TV for $420, including 15% VAT. So, while consumers have stopped buying houses and are looking to cut down on holidays, the TV market will broadly continue, without the growth of the last couple of years, but that in any case has been something of a historical aberration.

Another interesting development recently is the launch of free to air (FTA) HD broadcasts in France. Just before Christmas, the French authorities started the transmission of five channels of HD using MPEG-4 in a number of cities and that looks as though it will help to drive more interest in HD in that country. The government has also banned the labeling of TV sets as "HD" unless the sets carry MPEG-4 decoders and can receive the new HD broadcasts. In our quick survey of some stores in Paris in December, the regulation has had a good take up with major chains implementing the regulation.

An event that may affect the supply chain for TVs has recently taken place – just last week, in fact. I'm referring to a recent decision by the European Court of Justice to find against the European Commission (the bureaucracy that administers the EU) in its treatment of computer monitors for duty purposes. I won't bore you with the details, but, briefly, TVs carry 14% duty on import to the EU, while monitors should carry 0%. However, there has been a battle between the Commission and importers over the last three years over how you draw a line between one and the other – it has not been at all clear.

Now the court has decided that the EU's basic premise that LCDs are video monitors unless they are "square" format, under 19-inch and with VGA only connections, is wrong. As a result, a new line will have to be drawn up. We hope that this will be based broadly on the suggestions proposed by EICTA. Since the beginning of this dispute, Meko has promoted the idea that dot pitch and other aspects are important in deciding the issue.

A side effect of the duty regime over the last few years has been to make it more economical to make larger monitors in Central Europe (the area we call 'just outside Germany') to avoid having to pay duty and that has helped LCD makers to assemble modules there. Without the duty, monitor makers and brands are much more likely to simply import sets from China or elsewhere which may undermine the overall cost efficiency of having TV set and module assembly locally.

So, Europe remains a good market for TV volumes, but also a difficult place to make TV profits. Some would say that this means 'business as usual' and they may well be right!

Interview with Chad Tarkany of NOVA Chemicals

Chad Tarkany is director of marketing & sales for the ARCEL Advanced Foam Resin Business for North America, Latin America & Europe. Chad has over 14 years experience in marketing and sales, and prior to his current position, Chad held various leadership positions at Constar International, Inc. and Avery Dennison Corporation. He earned an MBA from Case Western Reserve University and a B.S. in Business Administration & Marketing from Ohio State University.

Please give us some background about NOVA Chemicals. NOVA Chemicals develops and manufactures chemicals, plastic resins and end-products that make everyday life safer, easier and more energy efficient. Its employees work to ensure health, safety, security and environmental stewardship through a commitment to Responsible Care. NOVA Chemicals is traded as NCX on the Toronto and New York Stock exchanges.

What is ARCEL foam resin? ARCEL resin is a sustainable foam packaging solution for damage-sensitive goods such as flat-screen televisions, printers, computers, cabinets, recreation, refrigerators and other household appliances. ARCEL resin allows for the use of less packaging while providing optimal protection for goods from the manufacturers' facilities to the consumers' home or office. ARCEL Advanced Foam Resin is recyclable under SPI resin identification code #6.

What are some of the latest trends in television? The trends in television are constantly changing. Consumers constantly want "faster", "clearer", "better" televisions. But the one trend that is emerging and that will always be an issue is *sustainability.* Sustainability in televisions comes in many shapes and sizes, but, ultimately, sustainability equals source reduction, reduced energy consumption and cost savings. Sustainability can be achieved in several different ways, but protective packaging is the biggest factor when finding a sustainable solution – as protective packaging can be the biggest avenue for material source reduction.

Trends toward sustainability certainly fit well with your product placement with ARCEL resins – what sorts of things are you doing to enhance the transition to more sustainable solutions? Sustainability has moved from being just a trend in the consumer electronics industry to being a standard for many organizations. ARCEL resin helps manufacturers meet those sustainability objectives by reducing the amount of packaging needed per television, computer, etc. – while providing superior damage protection typically found with larger, traditional packaging. Downsizing packaging reduces the amount of material needed to protect a product, triggering a positive domino effect of material source reduction throughout the entire supply chain. For example, one recent design study we performed on an OEM conversion suggests that eliminating 40% of packaging on its 40/42-inch flat panel TV could take 595 trucks off the road, reduce fuel consumption by 97,971 gallons of diesel fuel, and save 544 trees from harvest. ARCEL resin sustainable packaging designs deliver strong, light weight, thin, protective cushion combinations that reduce total packaging size and distribution costs.

	Traditional Foam	ARCEL Resin	Reduction
Units per 48 ft Trailer	112	336	224
Truckloads / 100,000 units	893	298	more/load
			595
Gallons of Diesel	146,956	48,985	97,971
Barrels of Oil	23,286	7,762	15,524
Hydrocarbon Emissions (kg)	1,536	512	1,024
CO Emissions (kg)	2,652	884	1,768
NOx Emissions (kg)	9,946	3,315	6,631

Environmental impact calculated per 100,000 units with fixed ratio of "Units per 48ft. Trailer"

40-/42-inch LCD TV – environmental Impact analysis

How does ARCEL resin and your team's capabilities support the LCD TV Associations' GreenTV? We have paid particular attention to the LCD TV Association's launch of the GreenTV initiative which promotes a lighter "carbon footprint" on the Earth by having the most recyclable parts and highest possible energy efficiencies when it comes to televisions. ARCEL resin facilitates a foam solution which delivers lighter "carbon footprint"

television solutions by minimizing the amount of required packaging material - reducing trucks on the road, lowering GHG omissions and lowering fuel consumption by up to 40%, as described in the design study above. In addition, ARCEL resin lightweights your total packaging mix – enabling the reduction and sometimes the removal of secondary packaging requirements such as plastic wrap, corrugate, fabricated parts and adhesive tape.

What is material source reduction? In what ways does ARCEL resin enable source reductions? Source reduction is often defined as altering the design, manufacture, or use of products and materials to reduce the amount and toxicity of what gets thrown away. By nature, our ARCEL resin provides packaging solutions, such as optimized packaging parts, which lead to less foam being used and lower GHG omissions throughout the product's supply chain cycle.

You have mentioned the term "solutions" multiple times. Can you elaborate on that message? At NOVA Chemicals, we define the ARCEL resin team as a packaging solutions provider, not just a resin supplier. We have numerous engineers in America, Europe and Asia that help support major global brand owners. Our design engineering team is able to work with brand owners and provide ideas or support assistant in optimizing packaging solutions or ideas to minimize material requirements. We also have global manufacturing in North America and Asia, and we offer technical and field engineering support to brand owners, contract manufacturers, and molders throughout the world. In fact, recently we have been working on design ideas around television stands, when combined with an ARCEL resin solution will facilitate the ability to minimize the width of final television boxes. In many market segments, we have been successful in developing packaging solutions, which remove packaging parts, reduce connective tissue amounts, and reduce material translating in source reduction outcomes.

Please provide us with some analysis that explains how ARCEL foam resin is environmentally friendly in the following four areas:

- **Reduced energy consumption in the production of packaging materials:** When compared to traditional foams, parts fabricated from ARCEL resin will be smaller. A smaller part requires fewer raw materials and can be molded into its final shape using fewer utilities. When compared to other high performance foams, ARCEL resin also requires fewer utilities in the molding process, thus reducing energy consumption.
- **Reduced wastage of packaging materials:** Smaller cushion parts will lead to less corrugate and less overall foam utilization. Overall there will be less packaging waste associated with the unit.
- **Reduced fuel consumption and emissions in the supply chain**: In a recent design study where ARCEL resin reduced 42-inch LCD TV packaging by 40%, the number of units per 48 ft. trailer increased from 112 units to 336 units. This results in fewer trucks on the road, reducing fuel consumption and hydrocarbon, CO2 and NOx emissions.
- **Fully recyclable**: ARCEL resin is recyclable under SPI resin identification code #6. Members of the Alliance of Foam Packaging recyclers are currently recycling ARCEL resin to create new products.

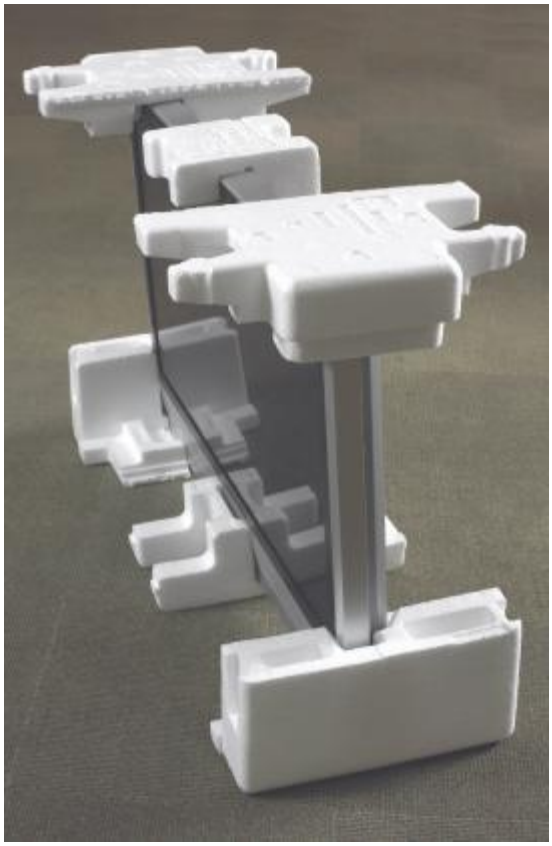
Tell us about some of the successes you've enjoyed using ARCEL resin in the packaging of electronic products. We've been able to reduce package size of electronic products, saving our customers money, and helping them achieve their environmental goals. We've been able to increase the brand identity of products, as they arrive safely without damage – and without the perception of damage.

Are you finding that the weak economy is hindering growth of your ARCEL resin solutions into the electronics market, or are companies now actually more interested in finding ways to improve the logistics costs? We see this as an opportunity to get our message out – that packaging made with ARCEL resin can save money through material source reduction and improved cube utilization. It's an opportunity to work with brand owners to develop better packaging solutions to meet economic, sustainable and brand image objectives.

It seems somewhat intuitive that many consumers will assume that a bigger box translates to better packaging. What kind of feedback have you received from your customers and brand owners? Research suggests that consumers are looking for a positive out of the box experience. Cracked, flaking foam gives the perception of damage regardless of true damage – resulting in the return of product. ARCEL resin helps alleviate

this costly issue by providing resilient foam that reduces breaking, flaking and cracking. Customers and brand owners find that their products that utilize packaging fabricated from ARCEL resin are delivered intact with neat, clean packaging – and without the perception of damage. When it comes to televisions, units packaged with ARCEL advance foam resin can resonate with the thin LED brand image trend.

Tell me more about the strength of the foam and how the protective properties can translate into additional savings for TV manufacturers? ARCEL resin has the resilience to withstand multiple drops as well as withstand cracking, breaking and flaking. Not only does ARCEL resin help protect and reinforce many major OEM's brand image, but its unique inter-polymer blend helps reduce waste through damage protection. Let me give you an example. One of the largest Chinese television manufacturers packaged its 32 and 42-inch flat panel televisions with packaging fabricated from polyethylene (XPE). With XPE packaging, the company was enduring a damage rate of 1.5% on 42-inch televisions and a 3% damage rate on the 32-inch models. This company recently specified ARCEL resin as its protective packaging solution for both models. On the new 42-inch model, ARCEL resin reduced the damage rate to 0.15%, saving $10.25 per unit. On the 32-inch model, ARCEL resin reduced the damage rate by 0.3%, saving $10.70 per unit. Given the 90% reduction in damage impact, the brand owner has already begun to switch all XPE packaged televisions to ARCEL resin. Based on their annual shipments, ARCEL resin can save them $4,000,000.

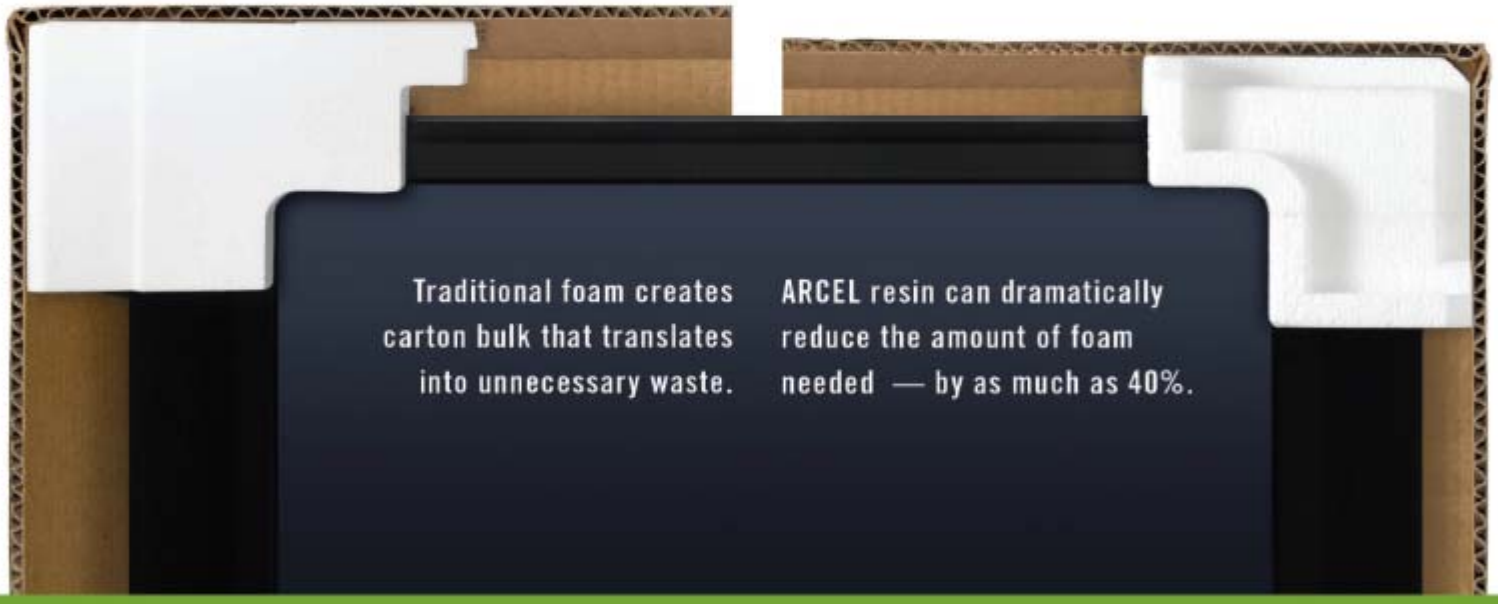


In addition to sustainability and performance, why else would brand owners want to specify ARCEL resin for their products? ARCEL resin completes the ideal consumer experience. As alluded to earlier in this interview, another trend which was evident at the 2009 CES Show in Las Vegas is the LED backlit thin TV panels. Packaging utilizing ARCEL resin can help ensure that the "thin TV" product image is protected by helping deliver thin and sleek final packaging solutions for these exciting televisions. It is important for consumers to have the ultimate "out of box" experience when purchasing, opening and using a flat-panel television. Every year, television technologies and trends are changing and improving. TV's are continually becoming sleeker, faster and better. And the packaging should mirror the televisions' qualities as it is the first thing the consumer sees when they open the box. In addition to cubing down, ARCEL resin enables goods to arrive in packaging that is neat, clean and intact – creating the optimal consumer experience. Our packaging engineers work to design the sleekest, smallest designs for televisions that maintain the must-needed protective properties.

Can you print directly onto ARCEL resin foam? If so, do you foresee a day when the outer cardboard box might be eliminated altogether? Yes, you can print on ARCEL resin foam. Other industries are doing something similar. The appliance industry is beginning to remove the outer corrugate and use what is called "clear view". Foam cushions are used on the top, bottom and corners, and the unit is then wrapped in a polyethylene bag. The outer wrap can be printed with anything that the box could be printed with.

In today's TV supply chain, the LCD array is typically made in one location, module assembly is done in another location, and system integration supply chain distribution happens in another location. Is NOVA Chemicals looking to reduce packaging/logistics costs between each of these steps? More importantly is there any work going on to enable packaging from one stage to be reused in the next stage of the supply chain? ARCEL resin packaging solutions have value in all areas of the TV value chain. TV components can be shipped from the manufacturing location to the assembly location in reusable trays made from ARCEL resin in similar ways that ARCEL resin is used in dunnage automotive applications. The trays provide a sustainability advantage by ensuring reusable life cycles that can actually outlast the production models.

What is the upside to downsizing your protective packaging?



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Interview with Rey Roque of Westinghouse

As Westinghouse Digital's vice president of marketing, Rey Roque is responsible for managing brand and channel marketing initiatives, strategic business development and public relations, as well as expanding the company's customer base for LCD TVs, monitors, accessories and peripheral products. From 2001-2005, Roque was the vice president of marketing for Samsung Electronics America, Inc., where he assisted in assembling a new marketing team to facilitate the merger of the branded display, office automation and storage business units into the current Irvine, Calif. facility as a single division. Prior to this, Roque worked at Princeton Graphic Systems where he launched a line of HDTV displays and receivers, PC/TV presentation displays, plasma displays and LCD TVs. Roque also worked for Mitsubishi Electronics America, Inc. where he was responsible for all marketing activities for Mitsubishi brand computer display products as well as product and channel marketing. Roque holds a bachelor's degree in Engineering Sciences and Economics from Dartmouth College.

Please give us some background about Westinghouse and how you came to be involved in the LCD TV market. It is difficult to believe that less than six years ago, LCD TVs were not common and limited to very small form factors with some “performance” limitations relative to the prevailing CRT standard. The company principals saw the opportunity presented by the inflection point created by the government mandated DTV transition to capitalize on porting rapidly evolving IT-based supply chain systems over into the CE arena which at the time was characterized by relatively inefficient vertically integrated systems.

The major brand players all insist that huge investments, (at least many tens of millions of dollars), are required to establish a major consumer electronics brand presence. Given your experiences in bringing the Westinghouse name to market, is this a fair claim? I suppose it is a fair claim. However, Westinghouse Digital either directly or through our retail partners has spent far more than that amount to drive sell through on the shelf through promotions and circular placements and inserts generating 1.5 to 2 billion media impressions annually. There have also been multi-year, multi-DMA television campaigns in CBS owned and operated stations. The last CBS campaign alone promoting a variety of Westinghouse branded products was over $5 million in placement value.

Who are your primary LCD suppliers? We have procured or continue to procure panels from all the top four fabs.

Considering that major players in the LCD TV industry (Samsung, Sharp, Sony, in particular) all have invested into LCD manufacturing facilities, are there any thoughts about Westinghouse investing in LCD production capacity? They also multi-source; they are not beholden to fabs that they have invested in. The reality is that there are four or five major fabs and a handful of chip set players and a few recently consolidating EMS/system integrators. And most players, including tier one, source from all the primary suppliers. We invest in the art of the best firmware/software that define discernibly superior usability, tooling for classic cosmetic IDs that meet the test of time rather than what may look fashionable at some point in time, circuitry that provides the best performance possible at defined price points and systems that ensure long term reliable operation.

In addition to TVs for the consumer market, Westinghouse has focused on supporting the commercial market with LCDs for digital signage applications. Are these consumer and commercial devices fundamentally different solutions or is there a high degree of crossover in terms of performance and design? Our commercial products are designed with both the business segment end user and channel partner in mind. For instance, commercial displays have RS-232C serial control systems, panel lock outs, rugged metal enclosures depending on model type and modular side case packs for input connector variability and media player options and are also portrait/landscape capable. We are on track to install over 10,000 screens on pump-tops in 1000 gas stations in the top ten DMAs. These screens are sunlight readable with optically bonded AR protector

and ruggedized for weather extremes and have built-in thermal management controllers. For custom projects, we are able to integrate panels for 24/7 operation that are designed for less susceptibility to image retention.

In terms of unit volumes, is the digital signage market fairly well matured, or is it still in its infancy? We still see it as being in its infancy. We believe given the level of interest in our neonSource and neonNow digital signage systems and the increasing number of RFPs that once we are over this difficult economic environment that the market will be very bullish. We believe our digital signage systems are especially appealing to small and medium-sized businesses because of the extreme ease-of-use and low threshold for implementation. We've used all the elements of what has been most successful from our pump-top digital signage system, which is the largest OOH (out-of-home) network of its kind and implemented into the neon line.

The Westinghouse pump-top digital signage system is the largest out-of-home network of its kind

Over the past couple of years, you've showcased a 56-inch solution at 3840x2160 pixels. You recently launched the product formally, (D56QX1 LCD Quad Monitor). What's been the response so far? It's really a niche product designed for users who need desktop computer monitor like resolution in a very big size. So there is interest in military/aerospace, GIS mapping, oil/gas exploration, high end photography, some medical imaging, etc.

Why are you calling the D56QX1 a "monitor" rather than a "TV"? We deliberately did not install ATSC/NTSC/clear QAM tuner into the device.

With 4K video capture coming on rapidly, do you foresee a day when 2160p displaces 1080p in the home? Not in the near future. I think content and bandwidth still have a few years to catch up for the mainstream. Also, my own kids are more preoccupied with content ubiquity and content mobility rather than limited, time-based delivery of content that is in the highest possible resolution.

What were your biggest technical hurdles related to bringing out the D56QX1? Mostly in the drivers from the graphic card adapters and ensuring compatibility.

For the D56QX1, why did you choose dual-link DVI rather than HDMI 1.3? This was dictated more by the video cards being used in the workstations at the prospective customers. We don't necessarily rule out HDMI 1.3 for future iterations or versions.

You've also shown 1440p solutions at various tradeshows in the past – do you foresee this will be a stepping stone between 1080p and 2160p? We believe that in the cost/performance curve that there is room for 1440p.

Today there is very little video content at 1440p and 2160p levels. But with continued enhancements to digital still camera technologies, sensors are common and inexpensive at 10-megapixels and beyond. Does 2160p enable a superior visual experience for these multi-megapixel still images? We certainly believe so. High megapixel still images are still the biggest draws at the symposia and trade shows in which we've exhibited the 1440p and 2160p displays.

With more and more homes putting 1920x1080 devices into their living rooms, the typical TV monitor now enables more information to be displayed on the screen than the typical desktop monitor. Do you think this phenomenon will hasten the convergence between CE and PC devices? Yes, we already see that. Since we are also players in the IT/computer monitor space, we see a lot of convergent applications of our 24-inch and 26-inch 1920x1200 monitors. We actually were the first in consumer to introduce 1080p in retail with our 37-inch monitor. We saw a lot of consumers hooking up PCs and not just set-top boxes to those displays.

Your D56QX1 is priced at $50,000, which will clearly limit its volumes. Why is it so expensive? I think that bringing project volume to as few as a dozen units will rapidly bring the price down. At this level of performance, everything is bid based.

Westinghouse recently announced plans to ship wireless HDMI HDTVs for commercial applications. Please tell us more. We had a fully functioning sample with an integrated receiver at our CES venue this last January. We are considering wireless only for custom commercial projects at this time.

Do you expect to see wireless HDTV solutions in the consumer market as well? We plan to iron out the kinks in the commercial arena before deploying any solutions for the home.

Are you planning to include build-in the wireless receiver into your TVs, or will this be an external option? For the commercial version, the receiver is built-in.

The Westinghouse D56QX1 is 56-inch display at 3840x2160 pixels is compatible with a wide variety of dual-link DVI video cards

"Green electronics" is certainly gaining traction in consumer electronics. What sort of things is Westinghouse doing to assure the recycling and disposal of older CRT products that your new flat panels are replacing? We have one recycling provider signed up and are in discussions with a few more and are taking proactive steps to stay ahead with all pending legislation at the state level. We do not have a legacy CRT business.

What sorts of things is Westinghouse doing to help reduce the power consumption of your LCD TVs? All current models are EPA Energy Star 3.0 compliant. We are launching "super eco" models in 26, 32 and 42 inches that will greatly exceed Energy Star 3.0. We expect to have these sometime in the back half of this year.

Most market analysts have consistently under-forecasted the long-term growth of the LCD TV market, (particularly with regard to larger panel sizes). What's your view of market growth over the next couple of years? I believe the total number of TVs in the US market and annual growth rates are fairly stable and what we've seen were rapid shifts between technology types. The LCD eco-system was really the best equipped to dominate the CRT replacement and enable the DTV transition in terms of variations in sizes, ability to get to price points for mass adoption and continue to improve performance for consumer acceptance. We continue to be very bullish on LCD market growth prospects.

Technology-wise, what is the area that needs the most attention to further improve the viewing experience, and what is Westinghouse doing in these areas? The trends are fairly common across the industry: 120/240Hz, scanning backlights, LED BLU, color gamut, etc. I think our differentiation is that we will be bringing many of these technologies to the mainstream at value price points and not at a premium to consumers.

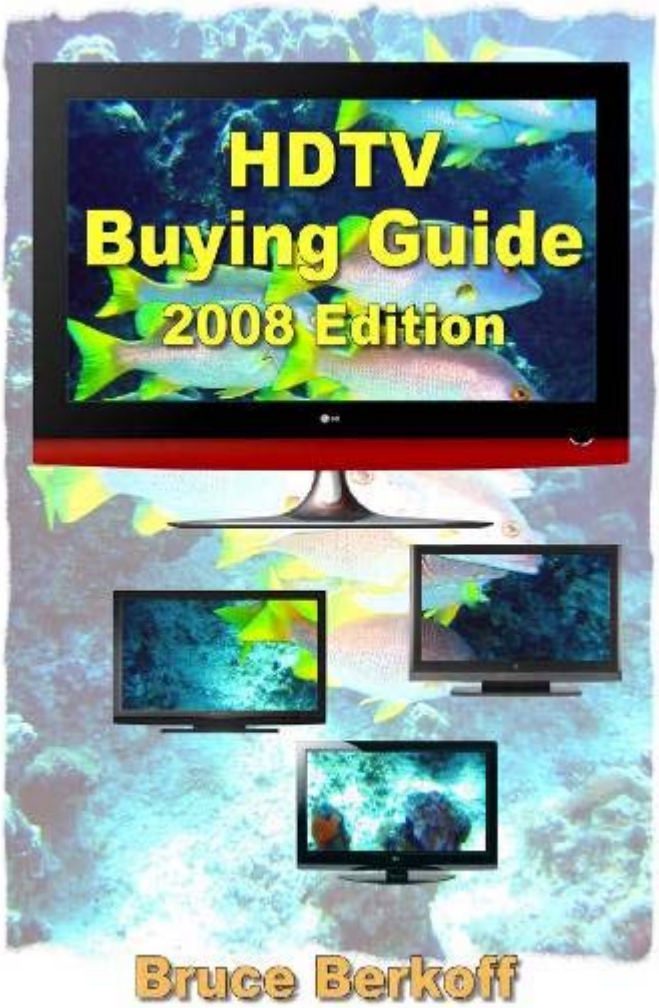
Please tell us a little about the most exciting area that Westinghouse is working on for the next generation of LCD TVs. We have been experimenting in our labs with user interfaces and front of screen content management such that when IPTV comes about, Westinghouse will present a very unique experience.

2008 HDTV Buying Guide released

Authored by Bruce Berkoff and edited by Alfred Poor, the 2008 edition of the HDTV Buying Guide is newly available. The 68-page paperback book can be ordered at Amazon for $13.45, qualifies for free shipping status, and is available immediately: http://www.amazon.com/HDTV-Buying-Guide-Bruce-Berkoff/dp/0965197530

"After an easy 2-hour read, I was off again to the electronics store to compare the seemingly endless choices of HDTV's. This time I knew the proper size and features of the LCD I wanted to buy for my living room and had a list of meaningful questions to ask the salesperson regarding price guarantee, warranty, and extras (cables and external speakers). The money saved on cables alone offset the cost of the book many times over. I especially found the "myth busting" boxes and "what to look for" paragraphs informative. The title of the book says it all...HDTV Buying Guide".

-- P. Molisani



HDTV Buying Guide

If you're ready to buy an HDTV, this book is all you need to understand the various choices and choose the right one.

This book covers all the bases, but is so easy to understand that I'd give it to anyone in my family who wants to buy an HDTV. It will make holiday gift buying easy.

Alfred Poor, HDTV Almanac

Bruce Berkoff knows just how to explain HDTV so you can put your new understanding to work right away. I think my Mom can benefit from this book, too.

Ross Young, Founder, DisplaySearch

Print edition ISBN 978-0-9651975-3-3: $14.95
E-book edition ISBN 978-0-9651975-4-0: $7.95

Sometimes you think you may know something but then someone explains it in terms you can understand you all of a sudden say, "oh, I get it now." This is the case with Bruce Berkoff's book about HDTV. Bruce obviously has a command of the subject matter and a talent for explaining it. He tells you what's important and what not to bother with like manufacturers' specs on contrast ratios which are measured under so many different conditions they become a meaningless comparison. I enjoyed this book and learned a few things about HDTV, I'd recommend it to anyone shopping for HDTV or just wanting to enhance their knowledge of this subject.

-- Andrew Eisner

Retrevo helps solve the DTV coupon shortage problem and predicts TV sales

Good Neighbor Coupon Exchange Program

by Andrew Eisner

Andrew Eisner is a former test manager for Ziff Davis Labs and is currently director of content for Retrevo.com a website specializing in consumer electronics. Retrevo has reviews, manuals, and buying information for all popular gear and gadgets.

Adding to the turmoil surrounding the DVT transition was the fact that the government ran out of funds to provide $40 coupons for DTV converter boxes. Despite the fact that the mandatory transition was delayed, it was reported that over 400 stations turned off their analog signals on February 17th making the need for converter boxes and coupons all the more urgent.

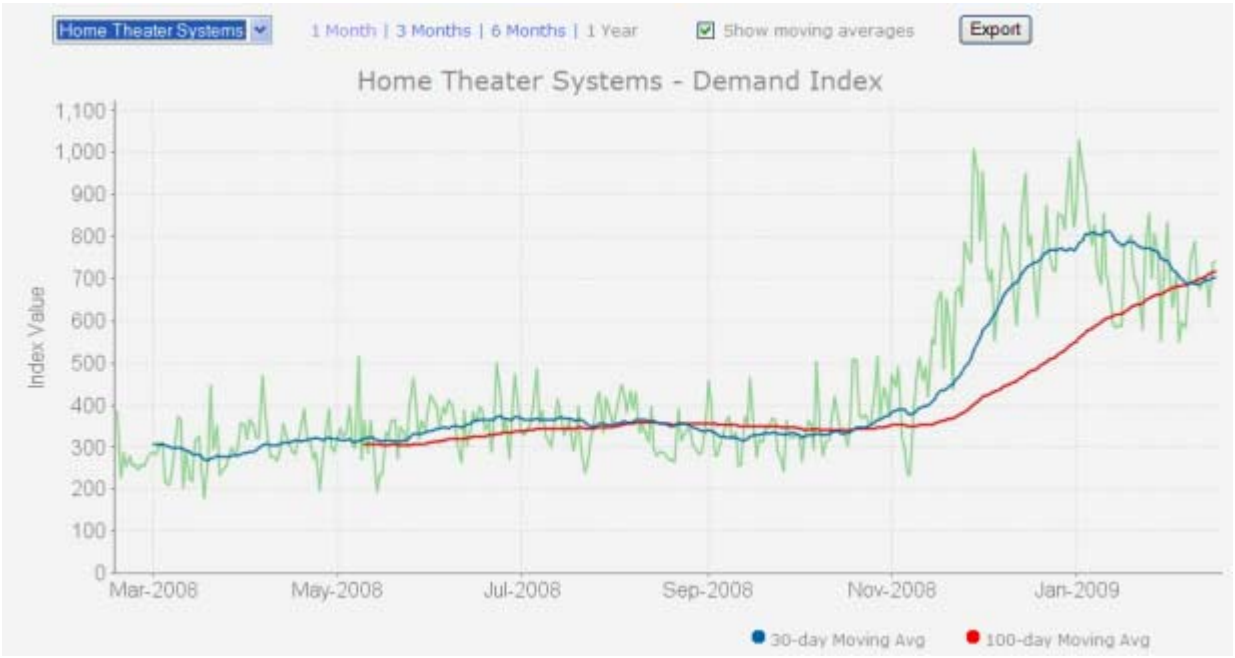
Retrevo rose to the occasion and set up the Good Neighbor Coupon Exchange Program where people with an extra coupon can get matched with people who need one. More funds have been made available and coupons will be sent to those on the waiting list, however, Retrevo estimates there are many thousands of coupons that will expire that could be put to good use providing, in many cases, elderly and low-income households. The exchange can be found at: http://www.retrevo.com/dtv,

Transition Survival Guide: The DTV transition has caused a lot of confusion among consumers. To help educate TV owners about the transition including how to know if they are affected along with buying advice for converter boxes and replacement TVs, Retrevo is offering a free PDF document available for download here: http://www.retrevo.com/content/dtv.

The image on the left shows Retrevo's Good Neighbor Coupon Exchange Program – enacted to help relieve pressures related to the converter box coupon program. On the right is a new educational brochure about how to survive the digital TV transition.

Retrevo Pulse predicts the future: Millions of consumers visit Retrevo every month looking for information on consumer electronics products. Retrevo analyzes what users are looking at and factors in data like pricing information. This data is used to create indices that illustrate price and demand trends. This tool is called the Retrevo Pulse and recent analysis shows some interesting trends for home entertainment products including DVD players and TVs.

The Pulse analysis indicates demand for home entertainment products in general, slowed down after the holiday season though the drop wasn't as pronounced as in some other categories. LCD TVs continue to perform well. Prices appear to have stabilized and in fact, ASPs for actively selling products showed an upward movement of 10%+ in February, possibly due the clearing of excess inventory in the channel, and merchants running their business more cautiously.



Demand for Blu-ray players and home theater systems appear to have stabilized in February. Home Theater Systems in particular showed good resilience post-holiday, partly driven by the lagging effect of consumers buying high definition TVs and partly because these systems have become very affordable that is, right in the sweet spot for mass market adoption. Pulse data for all popular consumer electronics products can be found here: http://www.retrevo.com/pulse/ce-pulse

The other side of the recession

The coming boom in TV set sales and the opportunities

by Norman Hairston

This is the first recession where TV has meant LCD and not CRT. Norman Hairston is a third generation TV professional in that many of the people that he worked with early in his career had worked with the inventors of color TV set technology. He has held technical, commercial and strategic planning positions in the display industry and has worked with a variety of technologies including CRT, LCD, laser based displays, Telaria and CRT projection. He began his display career at Corning developing their early strategic plans for the LCD substrate business. He has since held display positions at Honeywell, Gemfire, Intel, and as a consultant. He holds both Chemical Engineering and Materials Science degrees from MIT and an MBA from Stanford.

At the present time, many industry forecasters are rushing to revise their LCD TV forecast sales numbers downward for 2009, with some forecasting a gradual recovery taking place over 2-3 years. Though the times are unprecedented in the lives of most of us and the near future is certain to see deeply depressed sales, there is significant reason for optimism whenever the world emerges from its current financial crisis. It is the opinion of the author (who has seen several recessions… but not a depression) that the recovery, when it comes, will be quite rapid and result in widespread shortages. This has been typical of the LCD industry throughout its history; either feast or famine. Periods of low sales beget low investment in production capacity. When sales turn around, demand has grown and there are shortages. DisplaySearch, a prominent consulting company for the industry refers to this as “The Crystal Cycle”.

My opinion is based on the history of the TV market. In the discussion below, I refer to some specific numbers from my 20 years in the display industry. The documentation for these numbers, in some cases no longer exist, but I have confirmed my historical perceptions with others, some of which have a decade or two longer experience. I have also discussed this topic with a number of people that are currently connected with the LCD TV industry who contributed their comments to this article.

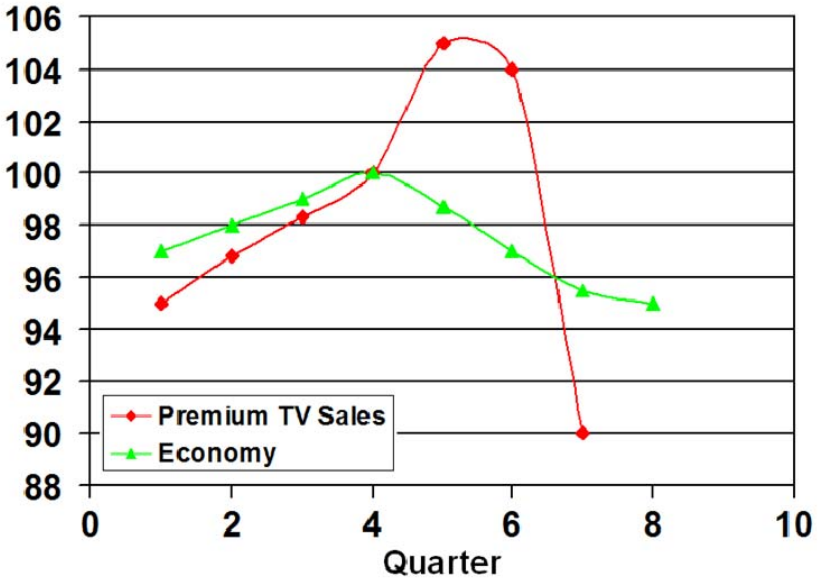
US color TV set sales history: In the early 1990s, a colleague from Corning (Duane Welch) and I visited RCA, Indianapolis to discuss TV set sales forecasting. RCA had a model of US TV set sales that Duane had read about and our visit was to get further detail. Though I would love to attribute the model to a specific individual or individuals, I don’t recall if I ever knew who developed the model. A former RCA employee has identified some possible candidates; but at this point I do not know for sure the identity of the originator.

In any case the model had a number of interesting factors. It was tied directly to a number of econometric measures such as growth in the number of households and interest rates. It also accounted for exogenous events such as incremental sales in a year when the Olympics were held and very different consumer behavior at the front end of a recession (more about that later). TV set prices were not a factor because, until that time, TV set prices had not changed since the mid 1960s. In 1964, one of the earliest years of significant color TV set sales, the average price of a color TV set was $400 and the 85th percentile was $800. By the early 1990s the average price had declined to about $380 and the 85th percentile remained precisely at $800. Of course, in 1964 $400 bought a 25-inch round set, masked off to look 4:3 and of questionable reliability, and by 1995 $380 would be a low priced 27-inch with current features. This pricing continued through 2003 when it was disrupted by significant sales of flat panel TVs (LCD and plasma). Average pricing subsequently peaked in 2007, approaching the $800 mark that had been the entry level for the premium market.

Another significant factor that was not in the model was any deference to a saturation point. Since the early days of color TV, many in the industry expected that TV set sales would reach a plateau and then become a purely replacement market. The initial expectation was that the saturation point was one set per household. When that was passed, the expectation was that saturation would occur at one set per person per household. A survey taken by Corning in the early 1990s indicated that the one set per person mark had already passed.

The Corning survey indicated a number of other interesting things, two items in particular. First was that while it was believed at that time that roughly half of TV set sales were replacement, by the mid 1990s, TV sets were not actually wearing out or otherwise failing while in use. What was thought to be replacement sales were actually people upgrading their TV sets for a larger size or additional features. The usual practice for a US household was to buy a new, larger, TV set for the living room and to move the living room set to another room in the house. In that sense, a large portion of the presumed replacement sales was not actually replacements but a market expansion to other rooms. For that reason, it was expected that saturation would not be one set per household or even one set per person but one set per room (with the possible exception of the bathroom, certainly not a particularly good place for a large volume/high voltage CRT). Consistent with the foregoing, the other salient point from the Corning survey was that people did not actually know how many TV sets they owned. No doubt this was facilitated by the constant decline in the inflation-adjusted price of a TV set.

Returning to the RCA model, the model was generally extremely accurate in predicting TV set market growth. (Predicting unit sales was actually a very trivial exercise as unit sales followed a very linear series.) However, there were significant deviations. The first was the introduction of VCRs. The VCR provided a new means of content delivery and spurred a significant amount of incremental sales over the eight-year period when the VCR was in its growth phase.



Generic expectations of premium set sales during a recession

The other deviation was that premium TV set sales underwent a significant sales spurt at the front end of a recession. The reason for this can be partly attributed to the econometric measures, such as falling interest rates; however, there was a significant difference in consumer psychology at the front in of a recession. During the first part of a recession, those getting laid off receive larger severance packages than average. Typically, they are optimistic about finding new employment quickly, and hence they have unexpected money. Being Americans, they commonly spend some of this money on consumer electronics such as televisions. Later on, when the recession takes hold and consumer confidence starts to decline, two to three quarters into the recession, premium set sales plummet. Indeed, as severe as it is, the current recession seems to have followed true to the Beer Can theory with articles in the industry press calling out "TV Sales Surge Despite Economy" http://www.twice.com/article/CA6592914.html?talk_back_header_id=6553424#talkback Awareness of previous recession would have lead to expecting a surge rather than being surprised by it. The pattern is roughly represented below:

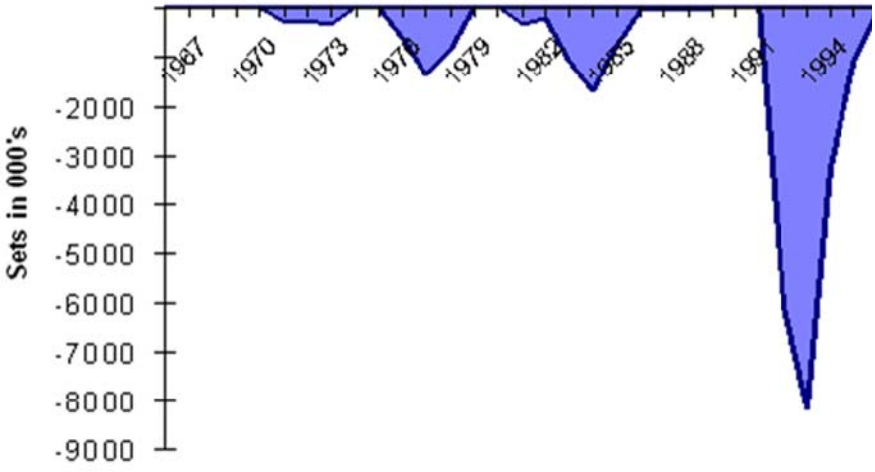
Reasons for optimism regarding the near future: The point of this note is that the recovery could actually be quite rapid. Turning to other events in recent display history, display markets have actually turned on a dime on a few occasions. In notebooks, the transition from 20% color to 80% monochrome LCDs to the reverse took place in about one year. More recently, the transition from 4:3 to 16:10 aspect ratio in notebooks took place over a couple of years while most industry forecasts had a much more gradual and incomplete change over. In the TV market we have seen equally dramatic moves to larger sizes, to features such as black matrix, 36% transmission glass, etc. These technology changes have the effect of having very recent product look dated and have been a consistent spur to sales. Indeed, the transition from CRTs to LCD TV was in and of itself a large spur to market growth. So, it was not such a strange coincidence that sales of flat panel TVs really started to come on strong in Q4 of 2003 as the industry was coming out of the recession caused by the tech bubble burst.

There are multiple reasons for thinking that the recovery could be robust. First, I think current forecasts are colored by the general economic despair. The factors that contribute to new TV set sales do not go away during a recession. At the end of a recession, there will be pent up demand to be satisfied. Though the RCA model does not give much guidance in particular about the recovery path out of a recession, the "Delayed Replacements" model developed by Jeff Johnson when he was at Philips does. Basically the model says, "Total television set sales come from three sources: increase in households, change in sets/household, and replacement sets." Replacements are calculated based on a 17-year total life cycle. During the times analyzed with this model, actual replacements were lower than (delayed from) the model expectations several times: 1968-69; 1974-75; 1979; 1981-82; 1990-91. Each time, the data show replacements eventually "caught up" through higher than normal sales in later years: 1972; 1976-77; 1980; 1983-84; 1992-94.

Second, if you look at the econometric measures that go into the model there is good news for the market. Though credit is currently very tight, interest rates are as low as they have ever been. Further, the reason for the recession is an overbuilt/over-valued housing stock. Many houses are in foreclosure or are otherwise vacant. No doubt, as the nation works through its difficulties; this excess housing will ultimately get filled with new household creation. The excess housing will not be torn down; it will be filled with either renters or buyers at lower prices.

Third, normal behavior for the display industry is to offer more for less during a recession. In this case, more for less will equate to offering larger sizes for the same or a lower price than was previously available. If you look at LCD TV sales until this point, the unit volume has been dominated by undersized sets (less than 29 inches). From a purely human factors standpoint, to get full benefit of HDTV, the TV screen has to either be more than twice as tall as an NTSC TV or the viewer has to sit at half the distance to the set as their previous NTSC set. When HD sets first became available, consumers primarily purchased large sized projection TVs as LCD TVs were too small and expensive. Projection TV sales peaked at 2.5M units in the early 2000s and declined as larger size LCD and plasma sets became available. However, because of the expense until now, in general, consumers have been buying LCD TV sets that are, at best, no bigger than the NTSC sets they have been replacing and using them as a drop-ins in their living rooms, often into the same cabinets, without any rearrangement of the viewing conditions. The LCD TV sets that have been sold so far will make excellent sets for bedrooms but are undersized to be a living room set. Per the usual buying behavior, when larger size LCD TV sets become available at popular prices, there should be a wave of replacement/upgrade sales accompanied by a willingness to replace the old enclosure housing that TV. Because LCD manufacturing capacity is fixed in terms of screen area produced per month, large screens equate to a proportionate increase in volume (the equivalent of more sets).

Fourth, we have a very large exogenous event happening. Though few sets are connected to receive broadcast signals, these sets tend to be the displaced living room sets in a spare bedroom or other location in the household. Further, with the complete transition of broadcasters to 16:9 HDTV format, the amount of 4:3 content or even 4:3 friendly content (by that I mean directors not putting critical action on the fringes of a 16:9 frame) will tend to decline precipitously. Even when making movies for the cinema, producers commonly have an eye to the value of the TV rights and keep the action in the middle of the screen where it can be captured on a 4:3 set. One of the more notable exceptions to this is the central scene in the movie "The Graduate" where Anne Bancroft is undressing in front of Dustin Hoffman. The Dustin Hoffman character is at one extreme end of the frame and Anne Bancroft at the other. The scene can't be viewed with its original impact in a 4:3 format. A significant



Delayed replacements (set sales deficits due to recession). Delayed replacements are made up within 2-3 years after the bottom of a recession. Data courtesy of Jeff Johnson

problem with 4:3 TVs going forward is that there will be more “Graduate” staging forcing consumers to either view letterbox, which most consumers really hate (resulting in a 25% reduction in the height of the image they see) or get a new TV. The usefulness of the spare sets will decline, so the consumer is faced with losing a room with a useful TV set or getting converter boxes or buying a new living room set and moving their undersized living room LCD TV to the bedroom. As reported in the *New York Times*, Nielson Media research estimates that as late as January 2009, 6.5M households needed converters for one or more of their TVs for the June 2009 transition.

The transition to HDTV has other implications. While copying content from one media to another is easy with NTSC content, HD brings along High Definition Content Protection (HDCP). Copying is much more restricted and displaying the content at full resolution requires a TV that has a High Definition Media Interconnect (HDMI) connector. On the downside of this, higher fees for HD connectivity through the cable box may lead the consumer to reduce the number of rooms where they watch TV.

Fifth, while through most of the history that I have recited, TVs were generally maintenance-free; this is not generally true of the first round of flat panel TVs. Early plasma TVs suffer from burn-in problems and the early LCD TVs were lit by fluorescent lamps that can lose half of their brightness within two years of use, and worse yet a non-uniform loss that is worst at the ends of the bulbs. If you add to that the issue that many of the early LCD TVs were less than the full 1080p format and suffered from significant motion-blur, the LCD TV market was actually in a very primitive stage. There are significant technological improvements (including LED backlights to improve contrast, observable as black levels) that will drive early replacement of the first round of LCD TVs that were sold… Similar to what happened in the 25-inch round era of CRT.

But what about the recession? Economically, things are as bad as they have been since the 1930s. So, it is quite possible that emergence from the current financial difficulties will be long and slow (emergence from the Great Depression took ten years and a World War to restore economic vigor). Consequently, it is possible that current difficulties could result in significant household consolidation and a fundamental change in the consumerist behavior that has marked Western life. Additionally, there are any numbers of other consumer gadgets (laptops, cell phones, etc.) competing for the consumers’ discretionary income and the decline in consumers’ personal credit ratings that may inhibit purchases.

Regarding household consolidation and the housing stock, if foreclosed housing is left vacant for long periods of time then this will certainly result in a reduction in the number of households in the US and a decrease in the available market for LCD TVs. If such is not the case, if the housing is sold or rented at competitive rates, then the overbuilt housing stock becomes a boon to household creation. Further, the reduction in housing costs becomes a spur to discretionary incomes… for those that still have jobs.

If the current crisis brings about a fundamental change in consumer behavior, such as a closer family unit (extended family moving back in), this may also depress LCD TV sales, even after the recession is over. However, this is a change that could cut both ways. In the RCA model, the consumer behavior during the early part of a recession was referred to as the “Beer Can” theory. The name, in part, refers to a perception that buying a case of beer and a new TV is one of the first things a laid-off worker will do. This may sound disparaging but in reality, on a per hour basis, a TV is about as cheap a form of entertainment as there is without being absolutely free. Spending a lot on a TV is not necessarily a bad financial decision especially if you are going to be spending a lot of time in front of it.

Similarly, other consumer gadgets could compete with LCD TV for discretionary income or it could spur spending on new display hardware. Viewing video or other Internet entertainment content on a laptop or TV on a connected device such as a cell phone will become more common as these devices continue their encroachment into entertainment applications. However, many of these devices are “convergence” devices. Text is much more readable on an LCD than it is on an NTSC CRT. As these devices, especially gaming consoles that are designed to be connected to a TV, gain Internet connectivity, the text issue drives the need for an improved set. The faster graphics and the relatively slow response time of first generation LCD TVs gives cause to replace even these relatively new sets. Many of these devices will have HDMI interfaces and will need to plug into an HDMI receptacle. As with computer monitors HDCP can in and of itself require users to upgrade. Further, the result for

the laptop platform in particular may be a complete convergence for part of that market with speculated development of “All in Ones”, super-sized transportable laptops with 20-inch screens, or larger, purpose built to serve as both a small sized TV and a mobile computer. Regarding cell phones, with higher resolution cameras becoming standard, one prominent industry executive noted, “HDTV provides a much better way to show off the photos to friends and families, replacing the projection screens of yesteryear.” In most cases, as it has been in the past, the sale of other electronic devices feed the demand for TVs, not compete with it. The introduction of Blu-Ray disc with HDCP is probably the next example. Previously one such example was the introduction of the “Home Theater” concept, which took off at the beginning of a mild recession in the 1980s. Stereo makers added video ports to their systems boosting sales of both new stereos and new TVs.

There is a concern about costs, and the industry’s ability to further reduce pricing. If the efforts of the US to end the recession ignite an inflationary round and the dollar devalues significantly relative to the Asian currencies where LCDs are produced, then the ability of the industry to further reduce (or even maintain) current dollar pricing is impaired. This is accentuated by the fact that the industry may already be selling at cost. Any increase in demand spurred by the ending of the recession may be an opportunity to restore previous pricing. So, continually falling prices is not the given that it usually is in consumer electronics. However, consumers do have the option of opting for a smaller TV than they had planned. This would contribute to an increase in unit volume for the LCD makers, but not necessarily an increase in demands upon manufacturing capacity.

Of course, the lowest cost alternative for a consumer is to not buy a new TV at all but just buy a converter box. These are available for $49 and a replenished government subsidization program may net this cost to zero. Many don’t have it in their DNA to throw away something that still works. However, a combination of disappearing 4:3 content, declining CRT image quality, and some environmental issues may force the deal. After 50 years of engineering, CRTs have become incredibly reliable… but have developed an interesting new failure mechanism, the glass wears out. After so many years of being bombarded by electrons, the glass in the interior of the CRT tube starts to metalize and builds up an optical layer. The blues in the image start to disappear and the image turns brown. The phenomenon is known as browning. Although it generally does not affect the reds and the all-important facial tones, it does give an old CRT image a sepia tinged washed out look. The newer LCDs are using LEDs as the light source, which gives more saturated colors than standard NTSC CRT TVs even when new. In addition, CRT viewer is missing out on a more colorful image independent of the higher definition.

What if the recession drags on? Announcements of new large layoffs are still common and consumer confidence is still headed down. Per an economist friend of mine, “TV is probably a little more recession-proof than the general economy because it is a cheaper form of entertainment than most other alternatives, and most people seem to regard it as almost a necessity rather than a luxury.” Even with two of my kids getting the child’s discount, taking my family of five to the cinema is about $80 or more than 1/10th the average price of an LCD TV at its peak in 2007. Again, given the amount of time devoted to TV viewing, TV pricing, even for luxury sets, is not so expensive. Staying home is cheaper than going out. Even if the recession drags on, there is some reason for optimism. Usual recessions only last about a year, and the current one was a year old before it was officially declared. The available history does not tell us how long consumers will delay a delayed replacement purchase but if the recession lasts to be 2-3 years significant numbers of the delayed purchased could begin even before the recession ends. If they continue to accumulate, then that implies an even more dramatic turn around when the recession does end.

The opportunities: With or without the end of the recession, there will be opportunities to increase sales. Specific technological improvements will increase the utility of TV sets and increase the demand for larger screens. Increased connectivity to the Internet and to other devices within the home may turn the living room set into a household command center. Companies such as Toprover Systems have created systems that combine the full functionality of a PC with security, household lighting and utilities control, and household device communications. The multiple “picture in picture” screens and the heavy text content need a large HD screen to be used easily. Wireless connectivity will offer increased options for home theater and optical versions of HDMI cables will allow remoting of the TV screens beyond the current 10-foot limitation of HDMI cables.

Concerning the environmental issues, presently LCDs are less energy efficient than CRTs. (Per the California Energy Commission, LCDs use 0.27 Watts per square inch of screen vs. 0.23 for a CRT and 0.36 for a plasma). However, the LCDs could become significantly more efficient. Where CRT generates light that is the image, an LCD starts off with white light from another source and throws away light in successive layers in the device, until the desired image is generated. Less than 6% of the light that goes into an LCD comes out as part of the image. Various companies are working on ways to increase the optical efficiency. In particular, one of the first things that happen in the optical path of an LCD is that the light passes through a polarizer that throws away half the light. Agoura Technologies is developing a polarizer that recycles most of this light instead of throwing it away. The highly secretive Holox Technologies is working on a technique that does away with one of the layers entirely. The biggest issue for both Agoura and Holox is that in addition to the downturn causing a suspension in new factory capacity, it is also causing a downturn in venture capital funding of new technology. The Agoura, Holox, and many other developing technologies are not likely to be mature enough to be applied to consumer TV sets by the time the market turns around.

Additionally, CRTs contain a lot of lead. While some in the EPA freely admitted that lead bound up in a glass is "there for millennia", standard hazardous waste disposal rules require that the product be ground up and mixed with cement, making it much more bio-available. Many communities charge a special disposal fee for CRTs and these fees will only grow as time passes. Given the Green climate, if the industry were to develop a comprehensive system to collect and dispose of CRTs with the purchase of a new LCD TV, this would be an attractive package for the consumer rather than having to pay a higher cost at some future date to have the CRT put in a hazardous waste landfill. (Some corporations have already disposed of their CRT monitors for just this reason.) The expense of such a program would depend on what is done with the CRTs. According to EPA's 2008 Electronics Waste Management in the United States Report, in 2007, "An estimated 99 million televisions had accumulated in storage, piling up in people's closets, basements, and garages… In 2007, Americans discarded nearly 27 million TVs, recycling approximately 18%."

One area that may be a possibility is renewable energy. Even in the best locations the duty cycle for wind and solar energy is only about 20%, so, almost by definition, the renewable energy market creates an expanded market for batteries. Until advanced fuel cell technology is ready having a lot more local power storage in the form of lead/acid batteries is not such a bad idea for the nation's shaky power grid. The batteries already have a very high recycle rate and if you can keep the lead out of a landfill, it minimizes both expense and future liability. Some years ago, Corning used to pay a battery maker to dispose of the lead bearing waste that accumulated in its CRT glass making furnaces. After the company implemented a recycling program, the same company offered to pay for the waste. Per the law at the time, selling a product as a raw material severed any future liability where some liability is retained if the material is transferred as a waste. So, the sale of the waste both saved the company money and severed any liability with respect to that waste stream. If a market is created for the lead-bearing CRT waste and it can be sold rather than disposed of, this would generally benefit the industry. Interestingly, in the 1990s when the US CRT industry was offered a choice between a new glass composition that fixed the browning issue and one that made it easier to recycle old CRTs into new ones, they picked recycling. Later, the LCD glass was also modified to facilitate recycling; the Corning "Eagle" composition eliminated the arsenic in the glass.

A government lobbying effort which I subsequently lead, convinced the EPA of the need to make exceptions for CRT waste handling in order to facilitate recycling. A similar effort to require current lead users to pay fair market value for the lead content of CRT glass would further encourage recycling. For more information, see: (http://yosemite.epa.gov/opa/admpress.nsf/b1ab9f485b098972852562e7004dc686/6be0e9642cdeac198525662f0066b993?OpenDocument)

Regarding both environmental issues, state governments are taking some action. Maine's "Shared Responsibility" legislation organizes the collection and recycling of old CRTs. California's Energy Efficient TV Incentive Program encourages the sale of the more energy efficient LCD models. Both programs act through the retailers rather than other places in the supply chain. Additionally and independently, a major retailer is asking manufacturers to increase the energy efficiency of TV sets by 30% for 2010. This is the same retailer that demanded the industry fix the response time issue on the early LCD TVs.

Conclusion: While buying a big TV after you have been laid off may be an American trait, Americans generally have accounted for the vast majority of super-sized TV sets. Until current times, this has been mostly projection TV, but I expect that having a pre-existing taste for super-sized sets (and the space… and the need given viewing distances in American homes) will mean that the US will lead the way in adopting the next round of very large sized LCDs.

If you account for the excursions resulting from the introduction of the VCR or the occasional recession, the growth/penetration of TV set sales have been very predictable since the inception of the market. Other than the economy being in shambles and credit being tight, conditions could not be better for TV set sales. Regarding the loss of available credit, this is an area where the industry can help itself with factory financed credit programs. If the factory is full, then there is no point. However, it is an option for consideration until that point is reached. However, interest rates are low, pricing is low, household growth is expected to be abnormally high driven by an overbuilt housing stock, and every day of the recession that passes, pent up sales continue to grow. Further, the transition to HDTV means that a whole class of TV set is being rapidly becoming obsolete; CRTs were still almost half of US TV set sales through 2006 and there are about 250 million CRT TVs still in American homes. All of this means that when the economy turns around, LCD TV set sales are likely to boom. My expectation is that if the economy turns around by Q4 of 09, by Q4 2010, the industry will be out of capacity as has been the case in the past with the "Crystal Cycle". This opinion is generally shared but there is some feeling that the industry does have the capacity to handle the upturn. What remains though, is the probability that an abnormally large number of LCD TVs will get sold in the next few years and an abnormally large number of CRTs will find their way into disuse. The new LCD TVs are likely to be with us for most of the next two decades. If the investment is made now in improved energy efficiency technology, these new sets can contribute to decreasing our collective carbon footprint. Similarly, the CRTs that are obsolete can be collected and recycled in an organized manner or they can find their way into landfills. Deciding what to do is a shared responsibility.

Pros and cons of a prolonged recession:

Positives	**Negatives**
Pent up demand	Conservative consumer behavior
New household creation	Household consolidation
Convergence/increased text	Competition for discretionary income
Complete transition to HD	Converter boxes
Price reductions	Costs
Early replacement/improved product	Tight credit

Post-script reference: Dr. Brian Oblivion (fictional character from the movie "Videodrome") –

> *"The battle for the mind of North America will be fought in the video arena, the videodrome. The television screen is the retina of the mind's eye. Therefore the television screen is part of the physical structure of the brain, therefore whatever appears on the television screen emerges as raw experience for those who watch it, therefore television is reality, and reality is less than television."*

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The truth about contrast ratios

by Jin Kim

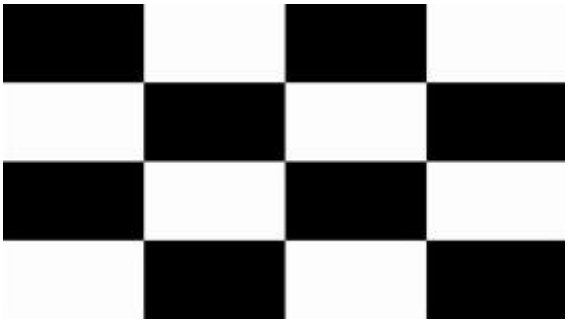
Jin Kim is the founder and president at DisplayBlog, bringing together news, information and analysis from the high-tech display industry to help, educate and entertain. By combining the experiences and knowledge gained serving as senior marketing manager at LG Display and as director of TFT LCD Market Research at DisplaySearch, Kim brings a fresh look at the display industry and products such as LCD TVs, LCD monitors and notebook PCs. Kim received a BA at UC Berkeley and an MBA at from Claremont Graduate University.

What is contrast ratio? It is the ratio of the b right level to the black level. Pretty simple – but it really isn't. Wikipedia defines contrast ratio as: "the ratio of the luminance of the brightest color (white) to that of the darkest color (black) that the system is capable of producing." According to an article by David Katzmaier at *crave*, the contrast ratio specification is "probably the most misused, inflated, and ultimately misleading specification used to describe HDTVs today." Let's see what's up.

In general, a higher contrast ratio means better quality images on your TV. A higher contrast ratio can be achieved by doing one of three things: make blacks darker, make whites brighter, or do both. For years and prior to Pioneer's KURO technology, FPD (flat panel display) manufacturers have tried to improve contrast ratio by making it brighter. This is pretty easy to do: shove in more CCFLs and you get brighter screens. What Pioneer did with its KURO technology was to make blacks really dark. Tests, testimonials, reviews, previews, etc. have all shown that the KURO technology is the one to beat. Pioneer doesn't even state a contrast ratio specification because the company says it is impossible to measure.

Speaking of measuring contrast ratio there is no standard method. Companies are left to their own devices to measure contrast ratio:

- Full-white screen versus a full-black screen.
- Focus all wattage to a single pixel to measure white.
- Turn the display completely off to measure black.
- Pull something out of your butt.



But there is one method that could become the standard way of measuring contrast ratio: ANSI contrast ratio measurement. The ANSI method uses a checkerboard of eight white and eight black rectangles and averages the brightness of the white and black rectangles. The ratio between the two averages become the contrast ratio: nice and simple. So why don't the TV folks use the ANSI method of determining contrast ratio? Probably – because the numbers will be so miniscule. Miniscule = not good for marketing. Marketing wants MILLION to one or TWO million to one. Not small; BIG.

I say TV manufacturers be strongly urged by the US government to use a standard method of measuring contrast ratio (e.g. ANSI). Consumers are confused by these numbers and are in some cases duped into thinking that one TV is better than another because of the specification. Although I will continue to put contrast ratio specifications make sure to remember that those numbers don't mean as much as you think.

There are many articles on contrast ratio and here are some that you might enjoy:

- The Contrast Ratio Game: Playing with Numbers: http://www.practical-home-theater-guide.com/contrast-ratio.html
- What Does Contrast Ratio Really Mean?: http://tech.yahoo.com/blogs/null/29651
- Contrast Ratio: Should Manufacturers Agree?: http://www.twice.com/blog/730000673/post/1470037747.html
- Spec Wars: Contrast Ratio Shoot-Out (Everyone Loses): http://gizmodo.com/gadgets/spec-wars/contrast-ratio-shoot+out-everyone%20-loses-259495.php
- Contrast Ratio: Are Manufacturer's Specs Important?: http://www.lcdtvbuyingguide.com/lcdtv/lcd-tv-contrast-ratio.html

Waiting for the DTV transition…

by Alfred Poor

Alfred Poor is the editor and publisher of "HDTV Almanac", a free daily service of news and commentary on the HDTV, digital television, and home entertainment electronics markets: http://hdtvprofessor.com/HDTVAlmanac. **This article comprises three recent entries about current events in the HDTV industry.**

DTV transition delayed: The deed is done, the die is cast. On February 4, the US House of Representatives approved the delay of the cutoff date for analog television broadcasts. The date was moved out another four months to June 12, 2009. The bill went to the White House, where President Obama's repeated calls for a delay were signed into law as the "DTV Delay Act" on February 11.

The delay is ostensibly to give more time to the some 6.5 million people who reportedly are not prepared for the end of analog broadcasts. Congress wanted to give more time (and money) to the converter box rebate program, to help people make their analog sets ready to receive the digital signals (that are already available). This motive apparently trumped the millions of dollars that this delay will cost taxpayers, broadcasters, and the companies that paid $19 billion for the right to use the radio spectrum frequencies that will be made available by this change. And there is little evidence that indicates that we still won't have at least 5 million people not ready by June. So all that money will be wasted for small gains.

One provision of the bill allows broadcasters to cease their analog broadcasts any time they want between February 17th and June 12th. If any take advantage of this in order to maintain the terms of their service contracts with other companies and to avoid the expense of running two transmitters (analog and digital) for four months, this will simply add to the confusion as some stations disappear from the analog channels. But changing early won't be an option for many stations, as many markets have a game of "musical chairs" set up for the transition. Before one station can take on its assigned frequency, another station that is currently using it will have to vacate it. But this second station may not be able to make the change unless another station switches to its new frequency as well.

I believe that the President and Congress got this wrong. Come June 13th, we'll have just as big a mess to deal with as we would have on February 18th, but collectively we'll have lost a lot of money as a result of the delay. But let's make the most of it. Do what you can locally – as individuals or as part of a group — to see that those most likely to be unprepared for the transition are ready.

No "Big Bang" on digital TV transition: February 17 was supposed to be the day that all full-power TV stations were to end their analog broadcasts. Congress delayed that switch until June 12, but allowed stations to switch on February 17 as planned if they wanted to, and if the FCC approved their application. As a result, 421 stations pulled the plug on their analog broadcasts on the night of February 17. Now comes the news that the FCC was surprised to find that they had fewer phone calls at their toll free hotline yesterday than they had expected: about 28,000.

I can't say that I see this as a huge success. First, do you know the FCC hotline phone number? I didn't think so. (It's 888-CALL-FCC.) If you lose a TV station and you open up the phone book, you're not going to find that number. Instead, you're more likely to call your local station to find out what the heck has happened to your TV. According to the National Association of Broadcasters (NAB), local TV stations averaged between 50 and 200 calls for help or information in the first 12 hours after the analog broadcasts stopped. So if every station received 100 calls, that would be a total of 42,100 more calls, bringing the total to about 60,000. That doesn't sound too good. And note that the NAB statistics were for the first 12 hours after the change. Presumably that covers midnight to noon local time for the various markets. Huh? I don't think that there is a lot of television watching going on then.

And there's one more cloud around this silver lining. The FCC discouraged a number of stations from switching on Tuesday, because the FCC wanted at least one "top four network affiliate station" – ABC, CBS, Fox, or NBC – broadcasting analog in every market. So for the vast majority of viewers, they did not lose access to analog broadcasts of the most popular programming.

So from where I sit, the 421 stations that stopped broadcasting in analog on Tuesday night do not represent the nation as a whole, and the "lack of problems" is not a reliable indicator of what we're going to encounter in June. I'd love to be wrong, but I still think we're headed for a train wreck this summer.

Fix digital TV signal problems: When it comes to the transition to digital broadcasts of television programming, the elephant in the room has been the fact that many people who can receive analog transmissions just fine may not get digital transmissions. As I've discussed many times, a weak analog signal produces a snowy image, but a weak digital signal results in a blank screen. The problem is that not enough people are aware of this, or what they can do about it. The FCC has addressed this issue with some new online resources. Some might say that it's a little bit late for this information – especially if the original transition date of yesterday had been upheld – but we'll be generous and file this under the Better Late than Never category.

Go to http://www.dtv.gov/fixreception.html. There, you'll find two publications (available as web pages or PDF downloads) that discuss how to fix reception problems. Some of the tips are excellent, such as the fact that you can move a rabbit-ear antenna just inches and it can make a huge difference in your reception. I live in an area of moderate to weak signals, so I tried playing with some rabbit ears that I have connected to a secondary TV set. They work OK for analog reception, but when I tried them with a converter box, I only got two stations and the signal was too weak to watch because the picture kept breaking up.

I tried moving the antenna about two feet away, and scanned again. This time I got a dozen stations, and most of them were strong enough to watch. I set the converter box control to show the signal strength, and then I tried tweaking the settings. The result was a noticeable improvement. So it's worth spending some time making adjustments to the location and angle of your antenna. Remember that the change in the signal strength meter is not instantaneous, so make a small change, then wait a few seconds to see if it is better or worse before you make the next small change.

The other major improvement is that the FCC has added a site that predicts your signal strength based on the FCC database of information about the broadcast stations and terrain: http://www.fcc.gov/mb/engineering/maps/. Enter your address, and it will show your location and list the stations you should receive in order of signal strength. It's not perfect, because it's based on theoretical calculations, but it's a good start. Like http://www.antennaweb.org, it gives you the compass heading from your location to the transmitter, which can help you aim a directional antenna. (Some antennas are omni-directional, which means they work in all directions, so you don't need to aim them). Cavell Mertz & Associates, a Virginia based engineering consulting firm, mashed up the FCC broadcast database with Google Earth. By selecting different categories, you can see the transmitter locations for AM or FM radio, analog or digital television, microwave, and more. You can get to this easily by going to www.fccinfo.com/fccinfo_google_earth.php, and follow the instructions that you'll find there.

Here's an example of what you can find if you go looking for the Philadelphia area antenna farm in the Roxborough section of the city.

This new information would have been good to have a year ago, but now that we have it, we may be able to find a way to make that elephant in the room a little smaller.

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Display Industry Calendar of Events – 2009

A detailed calendar with active URLs is maintained by Veritas et Visus. Please notify mark@veritasetvisus.com to have your future events included in the listing. http://www.veritasetvisus.com/industry_calendar_2009.htm.

January 2009			
January 3-5	Integrated Systems Europe 09	Amsterdam, Netherlands	
January 5-9	MacWorld Expo	San Francisco, California	
January 6-7	Storage Visions Conference	Las Vegas, Nevada	
January 7-10	Digital Hollywood at CES	Las Vegas, Nevada	
January 8-12	2009 International CES	Las Vegas, Nevada	
January 9	TFT and Materials	Shenzhen, China	
January 13-14	Metalization	Stansted, England	
January 16	3D Technology Update for Display Professionals	Costa Mesa, California	
January 18-22	Electronic Imaging 2009	San Jose, California	
January 19-21	Stereoscopic Displays and Applications	San Jose, California	
January 20	Wales and West Displays & Lighting Forum	Bath, England	
January 20-22	Semicon Korea	Seoul, Korea	
January 24-29	Photonics West 2009	San Jose, California	
January 27-29	ATEI 2009	London, England	
January 28-29	Japan Forum	Tokyo, Japan	
January 28-30	NEPCON World Japan	Tokyo, Japan	
February 2009			
February 2-5	Flexible Electronics and Displays Conference	Phoenix, Arizona	
February 4-5	It's Not Easy Being Green	San Jose, California	
February 7-12	Medical Imaging	Orlando, Florida	
February 17-19	Broadcast Video Expo	London, England	

February 17-20	Displays for Industrial, Household, and Auto Applications	Pforzheim, Germany	
February 20-22	Sound & Vision 2009	Bristol, England	
February 22-25	Focus on Imaging	Birmingham, England	
February 24-25	Transistors on Plastics	Cambridge, England	
February 24-25	EBU Display Seminar	Geneva, Switzerland	
February 25-27	PV Expo 2009	Tokyo, Japan	
February 27	Green Gadgets	New York, New York	
February 27 - March 1	Symposium on Interactive 3D Graphics and Games	Boston, Massachusetts	
February 28 - March 3	LED China 2009	Guangzhou, China	
March 2009			
March 2	Kinetica Art Fair and Technologies Workshop	London, England	
March 2-4	US FPD Conference	San Diego, California	
March 3-8	CeBIT 2009	Hanover, Germany	
March 4-5	Electronic Displays Conference 2009	Nuremberg, Germany	
March 4-5	HD Expo	Beverly Hills, California	
March 5-6	ITC'09 / SID Mid Europe Spring Conference	Paris, France	
March 9-11	Photonics in Surveillance and Biometrics	Washington, D.C.	
March 9-12	DVB World 2009	Berlin, Germany	
March 9-12	O'Reilly Emerging Technology Conference	San Diego, California	
March 10	Integrating Plastic Electronics	Oxford, England	
March 10-11	TV of Tomorrow Show	San Francisco, California	
March 10-12	Smart Fabrics 2009	Rome, Italy	
March 11-13	FPD China	Shanghai, China	
March 11-14	EHX Spring	Orlando, Florida	
March 14-15	Symposium on 3D User Interfaces	Lafayette, Louisiana	
March 14-19	Virtual Reality 2009	Lafayette, Louisiana	

March 17-19	Air Traffic Control	Amsterdam, Netherlands	
March 17-19	Semicon China	Shanghai, China	
March 17-19	electronica & ProductronicaChina 2009	Shanghai, China	
March 17-19	Laser World of Photonics China	Shanghai, China	
March 17-21	Emissive and Organic Emissive Displays	Nottingham, England	
March 18-20	Symposium on Haptic Interfaces and Virtual Environments	Salt Lake City, Utah	
March 23-27	2009 Measurement Science Conference	Anaheim, California	
March 24-26	Image Sensors Europe 2009	London, England	
March 24-26	Phosphor Global Summit 2009	Miami, Florida	
March 24-26	Future of Television	Los Angeles, California	
March 30 - April 2	Showest 2009	Las Vegas, Nevada	
March 30 - April 3	MIPTV	Cannes, France	
March 31 - April 2	LEDs Asia	Hong Kong, China	
March 31 - April 2	Display 2009	Paris, France	
March 31 - April 3	Active Matrix Displays	Dundee, Scotland	
April 2009			
April 4-9	CHI 2009	Boston, Massachusetts	
April 6-9	Miniature and Near-to-Eye Displays	Edinburgh, Scotland	
April 7-8	Printed Electronics Europe	Dresden, Germany	
April 7-8	Photovoltaics: Beyond Conventional Silicon	Dresden, Germany	
April 7-8	Screen Expo Europe	London, England	
April 9-10	2009 Taiwan FPD Conference	Taipei, Taiwan	
April 15-17	Touch Panel Japan	Tokyo, Japan	
April 15-17	FineTech Japan & Display 2009	Tokyo, Japan	
April 15-17	LED/OLED Lighting Technology Expo	Tokyo, Japan	
April 15-18	International Sign Expo	Las Vegas, Nevada	

April 18-23	NAB 2009	Las Vegas, Nevada	
April 19-24	European Conference on Liquid Crystals	Colmar, France	
April 22-23	Interactive Displays 2009	San Jose, California	
April 26-30	Digital Holography and Three Dimensional Imaging	Vancouver, British Columbia	
April 27-29	Organic Photovoltaics	Philadelphia, Pennsylvania	
April 27-30	IDMC/3DSA/Asia Display 2009	Taipei, Taiwan	
April 28-30	Sign UK/Digital Signage Showcase	Birmingham, England	
April 30	Emerging Display Technology	Cambridge, England	
May 2009			
May 4-9	3DTV-CON 2009	Potsdam, Germany	
May 5-7	Digital Signage Expo 2009	Essen, Germany	
May 5-8	International Conference on Animation, Effects, Games, and Digital Media	Stuttgart, Germany	
May 6-7	Digital Signage Show 2009	Las Vegas, Nevada	
May 12-13	HDTV Conference China	Shenzhen, China	
May 12-15	Orbit-iEX	Zurich, Switzerland	
May 13	Laser Processing for Plastic Electronics	Abingdon, England	
May 20-22	SEMICON Singapore	Singapore	
May 20-23	International FPD Korea	Seoul, Korea	
May 31 - Jun 5	SID International Symposium	San Antonio, Texas	
June 2009			
June 1-2	SID Business Conference 2009	San Antonio, Texas	
June 2	Dynamic Digital Facades	London, England	
June 2-4	SEMICON Russia 2009	Moscow, Russia	
June 2-4	Dimension3 Expo	Seine-Saint-Denis, France	
June 2-4	Digital Living Room Conference	Santa Clara, California	

June 2-6	Computex 2009	Taipei, Taiwan	
June 3-4	HD Expo	Chicago, Illinois	
June 4-9	SIIM 2009	Charlotte, North Carolina	
June 11-13	Photonics Festival: OPTO Taiwan , SOLAR, LED Lighting, Optics	Taipei, Taiwan	
June 9-10	RFID Smart Labels	San Francisco, California	
June 9-11	Plastic Electronics Asia	Taipei, Taiwan	
June 15-16	Projection Summit	Orlando, Florida	
June 15-18	Laser World of Photonics	Munich, Germany	
June 16-17	Web3D 2009 Symposium	Darmstadt, Germany	
June 16-17	Photovoltaics USA	Denver, Colorado	
June 16-18	National Electronics Week	London, England	
June 16-19	Display Metrology Short Course	Boulder, Colorado	
June 17-19	InfoComm '08	Orlando, Florida	
June 22-25	Cinema Expo	Amsterdam, Netherlands	
June 22-25	CEDIA Expo Europe	London, England	
June 23-25	LOPE-C -- Large Area, Organic and Printed Electronics Convention	Frankfurt, Germany	
June 25-26	Korea Display Conference 2008	Seoul, Korea	
July 2009			
July 8-10	China International Flat Panel Display Exhibition	Shanghai, China	
July 8-10	China International Touch Screen Exhibition & Seminar	Shanghai, China	
July 8-13	National Stereoscopic Association Convention	Mesa, Arizona	
July 10-13	SINOCES	Qingdao, China	
July 13-17	International Symposium on Display Holography	Shenzhen, China	
July 15416	Semicon West 2009	San Francisco, California	
July 15-17	E3 Media and Business Summit	Los Angeles, California	
July 16	2009 Small-Medium Display Forum	Taipei, Taiwan	

July 19-24	International Conference on Human-Computer Interaction	San Diego, California	
July 29-30	Japan Forum	Tokyo, Japan	
August 2009			
August 2-7	Chemistry for Electro-optic Displays Symposium	Glasgow, Scotland	
August 3-7	SIGGRAPH 2009	New Orleans, Louisiana	
September 2009			
September 1	Digital Signage 2009	San Jose, California	
September 2	TV Conference 2009	San Jose, California	
September 3	Touch Conference 2009/Emerging Technology Showcase 2009	San Jose, California	
September 3-4	China FPD	Shanghai, China	
September 4-9	IFA 2009	Berlin, Germany	
September 9-13	CEDIA Expo 2009	Atlanta, Georgia	
September 11-15	IBC 2009	Amsterdam, Netherlands	
September 13-16	PLASA '09	London, England	
September 14-17	Eurodisplay	Rome, Italy	
September 15-16	Photovoltaics US	Denver, Colorado	
September 20-25	International Conference on Digital Printing Technologies	Louisville, Kentucky	
September 20-25	Digital Fabrication 2009	Louisville, Kentucky	
September 29 - October 4	CEATAC Japan 2009	Tokyo, Japan	
September 30 - October 2	Semicon Taiwan 2009	Taipei, Taiwan	
October 2009			
October 4-7	Symposium on User Interface Software and Technology	Victoria, British Columbia	
October 6-8	Semicon Europa 2009	Dresden, Germany	
October 6-11	CeBIT Bilisim EurAsia	Istanbul, Turkey	
October 7-8	Displays Technology South	Reading, England	
October 7-10	ASID'09	Guangzhou, China	

October 12-16	International Meeting on Information Display	Seoul, Korea	iMiD 2009
October 19-22	SATIS 2008	Paris, France	SATIS
October 21-23	Integrated Systems Russia	Moscow, Russia	infoComm
October 26-29	Plastic Electronics 2009	Dresden, Germany	Plastic Electronics
October 26-29	Showeast	Orlando, Florida	
October 27	Smart Textiles 2009	Dresden, Germany	INTERTECH pira
October 27	Printed Silicon and Hybrids 2009	Dresden, Germany	INTERTECH pira
October 28-29	Plastic Electronics 2009	Dresden, Germany	Plastic Electronics
October 28-30	FPD International	Yokohama, Japan	FPD International
November 2009			
November 4-5	HD Expo	Burbank California	HD
November 5-7	Viscom	Milan, Italy	viscom
November 9-13	Color Imaging Conference 2009	Albuquerque, New Mexico	SID IS&T
November 13	Taiwan TV Supply Chain Conference	Taipei, Taiwan	DisplaySearch
November 26-28	China International Touch Screen Exhibition & Seminar	Shenzhen, China	
November 30 - December 2	International Symposium on Visual Computing	Las Vegas, Nevada	ISVC09
December 2009			
December 2-3	Forum 'be-flexible'	Munich, Germany	IZM Reel to Reel
December 2-3	Printed Electronics US	San Jose, California	IDTechEx
December 2-4	SEMICON Japan	Tokyo, Japan	semi
December 8-10	CineAsia	Macau, China	CINE ASIA
December 9-11	International Display Workshops	Miyazaki, Japan	SID
December 16-19	SIGGRAPH Asia	Yokohama, Japan	SIGGRAPH

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