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**Standards**  
*Chris Chinnock, Ken Werner and John DiLoreto*

**VESA Charts the Course for New Interface Standards at ADEAC**

The standards body VESA (Milpitas, CA; [www.vesa.org](http://www.vesa.org)) was a sponsor of the ADEAC conference held in Atlanta at the end of October. The venue provided an opportunity for the organization to provide a comprehensive update on the many activities its members are involved with. Some of the standards have just been approved and others are in various stages of discussion and approval. The full day of sessions provided an opportunity for attendees to hear about these activities and to become more involved if they desire. More details on all these activities can be obtained from VESA. Let’s review some of the highlights.

***EDID 1.4 – Updated to Support TVs and PC Displays***

The EDID (Extended Display Identification Data) standard allows you to plug a monitor into your PC and have the PC recognize the attributes of the monitor. It is the structure behind Plug and Play that allows the handshaking between the display and the host to occur. But the current 1.3 standard was last updated in 1999, before HDTVs became so popular and before other advances in colorimetry, TV-centric interfaces and other factors became as important as they are today.

As a result VESA has just ratified an updated E-EDID Standard (Release A, Revision 2, September 25, 2006). The new E-EDID Standard includes the EDID 1.4 (Version 1, Revision 4) data-structure definition, which should, proponents believe, provide room for growth for another 5 to 8 years.



This update is important both for IT- and CE-focused companies, as the displays for PCs and TVs have already begun to converge. EDID 1.4 will help this convergence progress more smoothly. The goal is to make it easy to connect a display so consumers are not frustrated.

One of the key revisions in 1.4 was the creation of a more generic data structure that is more flexible and will save costs on the manufacturing line. In the EDID 1.3 structure, the data fields were fixed and manufacturers had to put in the serial number and other product ID information for each display on the manufacturing line. With the generic data structure, the serial number is optional, with only a code for the entire display series needed. Each unit does not require individual programming, which obviously saves on manufacturing cost.

Other features of the data structure allow for the specification of either screen size or aspect ratio, the number of bits of color processing the display supports, the color-encoding scheme, the “best image quality” setting and the interface standards the display supports.

### ***DisplayID – The EDID Follow On***

The EDID 1.4 data structure described above is in some ways an interim solution on the way to a more comprehensive overhaul of the EDID specification to be called DisplayID.

For DisplayID, the fixed and somewhat rigid data structure of the EDID spec will give way to a more flexible structure that will consist of two parts. One will be the “base” section, which will contain the minimum display characteristics required for implementation. A second “extensions” section will have a more flexible format to handle the different and ever-changing needs of various displays. These will be maintained as independent data blocks, but will be structured enough so that any reader will be able to decode content in the two structures.

This new structure can extend down to LCD/PDP panels and modules before they are finished into final TV or monitor products. The DisplayID Task Group is also working to ensure compatibility with the new DisplayPort standard.

DisplayID is meant to offer an extensive set of data-block definitions that can grow with industry needs. Some of these blocks will be added by other organizations, particularly CEA. VESA will not necessarily authorize these block definitions, but will provide the “tag codes” to manage the blocks.

VESA is inviting industry participation to help shape this future DisplayID specification.

### ***MCCS 1.3 – Not Just for Monitors***

The VESA Monitor Command and Control Set (MCCS) was updated last August to go beyond support for conventional monitors and include a more generic class of displays. The MCCS standard is designed to help with the remote control of displays – mostly TVs and monitors, but extending to projectors and digital signage too. MCCS provides a set of control parameters that is commonly implemented using the DDC/CI (Display Data Channel/Command Interface) protocol, but it does not require DDC/CI because interfaces like USB can also support MCCS control.

Developers of the MSSC standard believe it can simplify and perhaps even standardize the remote user interface. When a user adjusts his TV’s parameters he would be using a UI that’s similar to the one he uses when adjusting his monitor – any monitor. (Of course, some manufacturers are likely to see the UI as an important area of product differentiation, but that’s another story.)

New in the 1.3 release is a section on compliance specific enough to avoid the misinterpretations that can cause interoperability issues. Another advance assures that adjustments made on the display itself and on the remote control will synchronize and remain consistent.

### ***Display Port***

The DisplayPort 1.0 standard was published by VESA in May. At ADEAC, Bruce Montag provided an update to this standard, which is meant to replace the DVI connector for PC monitors and the LVDS interface for flat panels, as well as the analog VGA connector. It is also intended for use in TVs and projectors.

The analog VGA PC connector is running out of steam. It has served the industry well, Montag said, but it is time to implement a new digital interface able to accommodate current and future needs. Sound familiar? It should. This was the type of language proponents of the Digital Flat Panel (DFP) standard and the Digital Video Interface (DVI) standard used to promote their chosen interfaces years ago.

Neither DFP nor DVI became the widespread replacement connector many had hoped for. Now, developers of the DisplayPort digital interface standard say they have improved on some of the shortcomings of DFP and DVI, and can finally implement the promise of a ubiquitous digital connector in PC-related products. Given the arguments laid out in Montag's paper, we think DisplayPort is indeed promising. Since it has the support of some key PC players, including HP and Dell, the connector now seems likely to receive widespread adoption.

### ***Why DisplayPort?***

Previous attempts at a standard digital interface were not successful. One problem that slowed widespread adoption of DVI was its poor scalability at the silicon level. DVI requires a DC-coupled, relatively high-voltage architecture, but this is not compatible with smaller design rules and decreasing operating voltages. This incompatibility makes it hard to integrate DVI with other silicon modules, a significant issue for integrated platforms such as notebook PCs.

DFP's implementation was also flawed, says Bob Myers, Distinguished Technologist at Hewlett-Packard's Display Technology Center, and a leading proponent of the DisplayPort standard. "DFP tried to

### **Speeds and Feeds**

DisplayPort incorporates a Main Link, a high-bandwidth, low-latency, unidirectional connection supporting isochronous stream transport. One uncompressed video stream with associated audio is included in Version 1.0. DisplayPort is seamlessly extensible, enabling support of multiple video and/or audio streams. Version 1.0 also includes an Auxiliary Channel to provide consistent-bandwidth, low-latency, bi-directional connectivity with Main Link management, and device control based on VESA's EDID and MCCS standards. The Link configuration enables true "Plug-and-Play."

The Main Link bandwidth of up to 10.8Gbit/s, equivalent to a data transfer rate of 1080 Mbytes/second, uses four lanes; the auxiliary channel features minimal delay, with maximum transaction periods less than 500 microseconds.

Data is transmitted across the DisplayPort interface using a micro-packetized format which provides both high performance and the flexibility to handle the evolving requirements of a high-performance display interface. –CC



replace the functionality of the VGA connector in the digital domain without really taking advantage of what digital can offer. As a result, there was no strong motivation to move away from VGA.”

The DisplayPort 1.0 standard is designed to unify the desktop and notebook PC markets with a common high-bandwidth display interface. But it can also facilitate connection with TVs and projectors. DisplayPort is not being positioned to compete with HDMI, but rather to complement it for PC and PC-based products.

Specifically, it addresses the need for separate high-definition audio and video paths, but it does so on a single cable. There’s an optional digital audio capability and an optional content-protection capability to support viewing high-definition television and other types of protected content.

With standards like DVI – and all of the TMDS-based interfaces – there is a physically separate clock signal that must be recovered and then used to clock in the data signals. This can lead to skewing between the data and clock signals, especially over long distances – which can degrade signal integrity. It also requires additional conductors just to carry the clock signal.

DisplayPort is a packetized protocol, and carries its own clock within the data stream. This eliminates the skew issues and requires fewer wires – a cost savings. Packetized data protocols are also more robust in dealing with different types of video, data and audio signals. In such systems, each signal type is merely a packet of data, which is identified by the header on the packet. This makes more efficient use of the available bandwidth, says Myers.

The standard offers cost savings across company product lines that span notebooks, desktop PCs and monitors because it offers one protocol that can be used for both internal and external connections. Externally, it can replace the VGA or DVI port to connect a PC to a monitor, projector or TV, or enable the connection between a DVD player and the TV. Internally, DisplayPort can act as a “panel interface” to an LCD or PDP module, replacing the current TTL- or LVDS-based standards. This also creates the opportunity to produce “direct-drive” monitors that eliminate the need for front-end scalers and controllers located in the monitor.

### ***Net2Display™ – Designed to Simplify Networks***

VESA has a working group focused on a developing a standard that only industry insiders know about so far. It’s called the Net2Display™ standard, and the idea is to make the display an IP-addressable device with accessories plugging in using the USB protocol. It is essentially the next generation of the server/thin client architecture, and from what we have seen so far, it is the kind of solution that many will want to embrace.

In the Net2Display™ future, workers can eliminate the PC that’s now on their desks and instead have a Net2Display™ client. This can be as simple as a monitor with a network jack and several USB ports. The keyboard and mouse can connect directly to the display, as can any other local peripheral, such as a printer. The server runs all the applications sending data to the remote display over the network using TCP/IP. The big business advantage is that the company does not need to buy dozens of PC workstations – only dozens of Net2Display™ displays.

According to Ken Ocheltree, a researcher at the IBM T.J. Watson Research Center and the Chair of VESA Net2Display™ Task Group, “Studies have shown that the main cost of an enterprise computing system is the maintenance of it. That is, the cost of upgrading applications and the OS, keeping revisions



at the same level and maintaining virus protection. The Net2Display™ concept centralizes all this and should significantly reduce the costs of computing.”

In fact, Ocheltree sees the Net2Display™ concept enabling new computing services in the future. “Imagine,” says Ocheltree, “if your ISP offered your business or home a service whereby it hosted all of your data, video, music and images on its servers. All the customer would need was a broadband connection and as many Net2Display™ displays as they wanted. With the features we are proposing for this standard, serving up all of this content from a remote location without significant latency should be possible.” In the commercial space, Net2Display™ could be a big help in digital signage.

Currently, the Net2Display™ standard is available in draft form only. The working group hopes to have it completed by the end of 2007.

### ***What’s DPVL?***

Takashi Matusi (Eizo Nanao Corp., Ishikawa, Japan) and Kai Schleupen and Steve Millman (IBM Systems & Technology Group, Yorktown, NY) presented an invited paper, “VESA Digital Packet Video Link (DPVL) Standard and its Application.” In part, the paper was an attempt to explain why DPVL has found no commercial applications in the two years since its release as a VESA standard.

The main objective of DPVL was to define a scheme for selectively updating the image on a monitor by requiring the host to embed metadata in the video stream. The monitor uses the metadata to reconstruct the entire image. Such a scheme can dramatically reduce the amount of data that must be sent from the host to the display device. DPVL is built on top of the existing standards DVI 1.0 and USB 2.0/USB HID/USB MonCtrl so, the authors said, it is easy to implement.

Originally, it was thought that such a scheme would be valuable for driving very-high-resolution monitors such as IBM’s 9.2Mpixel “Big Bertha,” but such monitors remain niche products that are adequately driven by existing brute-force methods.

The authors speculate that multi-monitor remote computing paradigms, as described in the Net2Display section above, could provide a new *raison d’etre* for DPVL, because they would generate a significant increase in network traffic that DPVL could reduce. HP’s Bob Meyers has been saying for years that selective updating on a network is the kind of technology it takes to justify digital interfaces in general.

### ***VGA: Running Out of Steam – Finally***

In “Future Trends in Display Interfaces and Standards,” Hewlett-Packard’s Bob Myers explained the durability of the analog VGA standard.

“Digital interfaces have been trying to become established in the PC industry for a decade, and to date none have achieved the goal of actually replacing the analog VGA system as the true standard – the interface which can be counted on as being available on each and every PC system,” Myers said in the written version of his presentation. This was because the earlier digital interface specifications didn’t actually provide an advantage over the analog system they were intended to replace. “While these previous standards could claim to be ‘digital,’ that alone is not truly an advantage.... These interfaces essentially duplicated the VGA’s functionality in digital form, often without even matching the VGA’s performance capabilities.

“Today, this situation is changing. Not only is the industry now moving toward an all-digital future, using an interface standard (VESA’s DisplayPort) that truly provides advantages over its analog predecessor, but we are also seeing external pressure to replace analog interfaces in general. This is coming primarily from content providers who are concerned with the protection of their material, something which is much more readily achieved via a digital interface than with an analog connection.”

Myers thinks the analog VGA connector will run out of steam by about 2010. One clear driver is the push toward higher-resolution displays. The VGA connector can support UXGA, but its limitations are evident beyond that resolution. More and more of these higher-resolution displays are becoming mainstream so there’s need for a better solution.

Also, the content-creation community is concerned that although their high-definition and high-resolution content is protected with HDMI and other digital connectors, it can still be accessed through video analog connectors – the so-called “analog hole.” So there’s a big push to sunset the VGA connector, thus making way for other interfaces with digital rights management (DRM) protocols. –CC, KW

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## Intel to Soothe Digital Display Rift

Intel Corp. has committed to sort out competition between two digital display interfaces by the end of the year. An Intel executive in *EE Times* said the company hopes to find a road to a single high-bandwidth, low-cost interface by the end of the year that’s interoperable with the installed base of DVI and HDMI products.

Intel is still engaged with partner Silicon Image on the Unified Display Interface (UDI), a version of the High-Definition Multimedia Interface (HDMI) geared for cost- and space-conscious PCs. It competes with DisplayPort, defined by a group of PC and chipmakers including Dell and Hewlett-Packard.

Genesis Microchip and Analogix announced plans this summer for DisplayPort chips. The Analogix parts also will be compatible with HDMI but require a passive adapter. Meanwhile, UDI has only recently seen a version 1.0 of the spec.

DisplayPort has tried to gain support featuring state-of-the-art copy protection that is a cut above Intel’s HDCP technology used in HDMI and UDI. DisplayPort Copy Protection (DPCP) developed by Philips uses a 128-bit encryption key along with AES, rather than the 40-bit key used in HDCP. It also supports checking the proximity of the transmitter and receiver to ensure users aren’t sending content over the Internet.

The DVD Copy Control Association could approve DPCP this winter. But the technology has yet to be submitted to the Advanced Access Content System that is utilized in Blu-ray Disc and HD DVD. It will also be submitted to the Digital Transmission Licensing Administrator, which manages DTCP – a content protection scheme used on 1394 and many other buses.

Intel’s director of content protection, Stephen Balogh said DPCP “is a Fort Knox in the least likely place for people to try to steal content.” Moving to wireless and maintaining compatibility for wired interfaces is currently more important than upgrading security. Intel is having “lots of good discussions with lots of people, but nothing has gelled yet” for migrating HDCP to wireless, he said.

Disney and Warner Brothers have signed on to use HDCP, maintaining compatibility with existing technology, rather than increasing security. –JD

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## VESA to Offer HDCP on DisplayPort

As noted in the previous stories, one of the main hurdles with spreading adoption of the DisplayPort standard has been a content protection scheme that all can agree to. This is especially important, as PCs will continue to furnish more TV content to the living room where the HDMI connector and HDCP (High Bandwidth Digital Content Protection) copy protection standard are dominant. As we speculated above, VESA has now proposed an update to the DisplayPort standard, version 1.1, which will now include HDCP copy protection. This move is likely to gain rapid acceptance with ratification anticipated in January 2007.

The DisplayPort Task Group has formally been released new Version 1.1 standard to the VESA membership for comments and consideration. Task Group member companies proposing the new version include AMD, Dell, Genesis Microchip, HP, Intel, Lenovo, NVIDIA, and Samsung Electronics. AMD became part of the Task Group when it purchased ATI Technologies in October 2006.

DisplayPort 1.1 adds capabilities to support HDCP and includes technical enhancements that enable PCI-Express design compatibility in DisplayPort devices. These changes improve DisplayPort's integration capability within graphics processors and chipsets and improve interoperability with earlier digital interfaces.

DisplayPort is designed to be a long-term replacement for DVI, LVDS and eventually VGA in PCs. Compatibility with HDMI and DVI is also possible with DisplayPort products. An Interoperability Guideline providing recommendations for products supporting all three specifications is currently in development.

The VESA DisplayPort Task Group is also working to complete a compliance and interoperability program for DisplayPort connectors, cables and devices to ensure functional compatibility between DisplayPort products.

HDCP version 1.3 for DisplayPort will be provided by the DCP LLC. This version, expected to be final in early 2007, allows products supporting DVI or HDMI and DisplayPort to share a common key set. -CC

## Small Electronics

*Chris Chinnock*

## Huge Need for Video Expertise in Industrial Markets

The SID-sponsored ADEAC in Atlanta last month was the site for an evening panel discussion that focused on the impact of the HDTV industry on the professional, industrial, and military markets. This panel attracted a lot of attention among the show attendees. The discussion, moderated by Insight Media's CEO, Chris Chinnock, included the following panelists:

- Brad Gleeson, VP Business Development, Planar Systems
- Tim Frahm, Dir. Adv. Product Development, Commercial Products, LG Electronics

- Scott Makbouljian, Director Product Technology, Jaco Electronics
- Dave Eccles, Sr. Consultant, Eccles Engineering

The discussion was wide ranging, but several themes developed. In particular, there is a big need for companies that can develop the electronics needed to take a commercial flat panel and integrate it into a commercial, industrial, or military application. Several complained that they could buy a panel, but then there is no support on the electronics – representing an opportunity for industry players.

Another concern of this part of the display industry is the need to support products for long service lives – sometime 15 to 20 years. Clearly, flat panels made today are not likely to be in production in 15 or 20 years, so managing this panel obsolescence is difficult. In fact, when panel become obsolete, this can trigger a redesign cycle as the replacement may have different mounting and/or electronic drive requirements. In essence, the supplier has to redo the job to continue to supply the customer

“What would really help is more notification from the panel suppliers when products are going to end of life,” stated Makbouljian. When asked what the best strategy in today’s environment is, his response was to “buy inventory.”

“The industry’s focus on HDTV can also create shortages,” continued Makbouljian. “Right now we are in short supply of 15 to 19” LCDs, which drives the price up.”

LG’s Timothy Frahm explained that government mandates requiring digital tuners in all TVs by March 1, 2007 accelerates the deployment of digital HDTVs in the lodging industry particularly. Frahm noted two industry trends: first, the importance of HDTV technologies for the lodging and commercial market as the DTV conversion grows near, and second, the role of secured content transmission in the evolving digitally-converged world.

“There are 4M hotel rooms that are going digital soon,” said Frahm, “and they will almost all get HDTVs with content protection technology like our PRO:Idiom. But this expansion in the lodging market would not have happened without a DRM in place, so we stepped up and developed one. These are the kinds of value-adds that this and many other professional markets require.”

Frahm noted that while most hotel rooms are getting HDTV sets, he said it is really overkill. When asked if perhaps it might be easier and more profitable to use lower resolution panels, and if the industry should move in this direction, he was unequivocal – No. He also said good opportunities remain for vendors who are trained to install this type of service, who can do the cabling and even the mounting of the flat TVs.

Dave Eccles focused on the need to create remote control devices that are simple to use and highlighted opportunities to integrate flat panels in to surveillance and security system. He also highlighted the need to better educate consumers on the various display technologies and called on the industry to do a better job of creating specifications that have more meaning and are measured based upon accepted standards.

Planar’s Brad Gleeson noted that the digital signage market has benefited from the availability of large flat panels – whether SD or HD resolution. But in this segment, the need for a total solution is paramount. “The display makers found out they could drive this market. It needs a solution with an IT component, an advertising component, and a content component.” -CC

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## About VESA

VESA is an international non-profit corporation led by a Board of Directors, which represents a voting membership of more than 140 corporate members worldwide. VESA supports and sets industry-wide interface standards for the PC, workstation, and consumer electronics industries. VESA promotes and develops timely, relevant, open standards for the display and display interface industry, ensuring interoperability and encouraging innovation and market growth.

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