CORPORATE BACKGROUNDER

VESA®

Working on Standards Today that will Shape the Technology of Tomorrow

Visit VESA's Webpage -- www.vesa.org

VESA MEMBERS: 1,052 member contacts 338 member companies

I. THE ORGANIZATION

The Association: VESA®, the Video Electronics Standards Association

Headquarters: 2150 N. First St., Suite 440, San Jose, California, 95131

Organization: VESA is an international non-profit corporation led by a Board of Directors which represents a voting membership of more than 340 corporate members worldwide.

Key Dates: February 1989: Founded as a non-profit organization.

August 1989: First standard issued.

Strategy: VESA is an organization that supports and sets industry-wide interface standards for the PC, workstation, and computing environments. VESA promotes and develops timely, relevant, open standards for the video electronics industry, ensuring interoperability and encouraging innovation and market growth.

Membership: VESA's members are hardware, software, PC, display and component manufacturers, cable and telephone companies, and service providers. Members join VESA to receive the benefits of:

- Voting on and voicing opinions about proposed standards.
- Sending up to three representatives per committee to standards development committee meetings.
- Obtaining all VESA standards, guidelines, and proposals.
- Accessing to our "Members Only" FTP site and reading e-mail reflectors about state-of-the-art technical issues.
- Participating in on-line forums and networking at special events.
- Maintaining a competitive edge by gaining knowledge of new technology standards initiatives for products and services.
- Helping to establish the future direction of the electronics industry by being an integral member of committees that influence important industry directions and trends.

II. THE INDUSTRY

In the past decade, the personal computer industry has evolved from the monochrome display of the first personal computer introduced by IBM, through VGA, 640 x 480 16-color to the 1280 x 1024 and higher pixel graphics systems with color depths up to 24 bits per pixel or 16.8 million colors. The phenomenal growth of graphics capabilities for personal computers and the resulting proliferation of non-compatible products led to the formation of VESA in 1989. The first standard delivered by VESA in 1989 was the Mode 6AH 800 x 600 BIOS Interface Standard, which allowed users to take full advantage of the advanced graphics capabilities offered at that time.

In August of 1992, VESA passed a standard - the VESA Local Bus (VL-Bus) Standard 1.0. This standard had a significant impact on the industry because it was the first local bus standard to be developed which provided a uniform hardware interface for local bus peripherals. The creation of this standard ensured compatibility among a wide variety of graphics boards, monitors, and systems software. Today, several hundred companies are producing systems and peripherals based on the VL-Bus specification, and more than two million VL-Bus products are shipped each month worldwide.

Since then, VESA has continued to be a formative influence in the PC industry and a major contributor to the enhancement of Flat Panel Display, Monitor, Graphics, Software and Unified Memory Architecture technologies. VESA's latest release of standards are described in more detail in the following sections.

III. THE VESA STANDARDS INITIATIVES

As one of the leading standards organizations in the electronics industry, VESA is committed to developing and promoting standards for three key focus areas: (A) Display, (B) Interactive Multimedia, and (C) Systems. All VESA standards are created by its technical committees which consist of hardware and software professionals drawn from high technology companies around the world. Each committee is structured into technical Workgroups whose goals are to focus on specific technical requirements for developing a standards proposal. The proposals are reviewed and, when approved, are submitted to the general membership for ratification. Each VESA parent member is given one vote. VESA's technical committees are described below.

A. DISPLAY

1. VESA Flat Panel Display Interface Committee

The VESA Flat Panel Display Interface (FPDI) Committee was formed in February 1994 to develop a standardized interface between graphics controllers and flat panel displays used in integrated environments such as portable PCs. The VESA FPDI Committee Goals are:

- Establish standards for both color and monochrome active and passive matrix displays.
- Establish complete mechanical, electrical, and timing specifications for the proposed interface.
- Develop a glossary of terms commonly used in describing the interface and display quality.
- Develop a basic compatibility criteria for measuring compliance with the proposed standard.

To achieve these goals, the VESA FPDI Committee attempts to maintain compatibility with existing connector standards; leverage off proven pre-existing designs, develop a proposed standard that establishes a base level of functional compliance; allow for product differentiation; address emerging technologies; and extend resolutions as required by market demands.

The FPDI-1.0 Standard, ratified in October 1995, established the electrical, logical, and connector interface between flat panel displays and display controllers in an integrated environment. Since then, the FPDI-1B Standard was approved and the FPDI Workgroups have been working on the approval of FPDI-2 and FPDI-Connector.

In April 1995, the VESA FPDI Committee established an initiative to develop voluntary standards for the measurement of flat panel displays and formed the Flat Panel Display Measurement (FPDM) Workgroup. The Workgroup's purpose is to:

- Ensure consistent, relevant display measurements.
- Foster display improvements and new developments.
- Aid in display system design and procurement.

The VESA FPDM Workgroup is working to define a standard for the optical and physical characterizations of direct-view panel displays including LC, EL, Plasma, and Field-Emission. Their long-term goal is to expand the scope of the standard to include projection systems with flat panel image sources, head-mounted displays, head-up displays, as well as CRTs-a generic display standard.

2. VESA Monitor Committee

The VESA Monitor Committee was formed in 1989 with a charter to create standards related to computer displays and graphics controller hardware, including standards for display timing, interfaces, display specifications, and all forms of display control and identification. This committee is responsible for setting all standards regarding display interfacing. Currently, there are four technical Workgroups functioning under the umbrella of the VESA Monitor Committee. These are Display Data Channel/Extended Data Information Display, Electromagnetic Compatibility, Generalized Timing Formula/Discrete Monitor Timing and Monitor Command Set.

The Display Data Channel (DDC) 2.0 Standard, ratified in March 1996, provides a new communication standard to allow monitors to support "plug and play" capabilities as outlined by Microsoft for Windows™95. The Enhanced Video Connector (EVC) Standard, ratified in March 1995, establishes a standard video output connector for personal computers, workstations, and similar products. This standard also provides the ability to support high frequency video signals, including multimedia and other signals predicted to be required for future computer displays.

3. VESA Plug & Display Committee

The VESA Plug & Display (VP&D) Committee, formed in April 1996, was established for the development of a display interface standard for monitors (direct view or projection) incorporating digital display devices. The VP&D Committee's initial goal is to define a standard for an efficient digital interface for a stand-alone fixed pixel format video display. The long-term goal is to define a standard for an efficient multi-purpose digital interface for video displays.

The VP&D Committee has formed into four Workgroups: EDID/DDC, Future Technology, P&D Connector/Cable, and Technology. Each are working together to develop standards within an architectural framework which ensures near and long-term compatibility.

B. INTERACTIVE MULTIMEDIA

4. VESA Home Network Committee

The VESA Home Network Committee was founded in 1995 with a charter to develop hardware and software standards which support consumer digital services for the home network. These services will be initially for video devices, and later for other peripherals such as telephone devices, printers, energy management devices, and Local Area Networks (LANs). Devices may be purchased an installed by the consumer to access multiple external service providers and internal home equipment. The VESA standard will be flexible enough to allow support for all existing uses and have the capability to support unforeseen future services while still being compatible with the network infrastructure.

The Committee is actively bringing in key companies in the areas of cable, telephone, semi-conductor, and hardware and software suppliers, in addition to forming alliances with other standards organizations such as DAVIC, EIA, and ITA, to support its standards efforts.

Active in the committee are seven Workgroups: Applications, Connector, DAVIC Liaison, Internetworking, Physical Layer, Proof of Concept Production, and Wiring. Together they are directing activities toward developing standards and creating an open architecture to be used by devices for the Home Network market.

C. SYSTEMS

5. VESA Software Standards Committee

The VESA Software Standards Committee (SSC), formed in 1989, creates software interface standards and coordinates the development of software standards within all other VESA committees. It also assists with test software and software application notes that accompany standards from other VESA committees. VESA's software standards are developed to aid system software developers, chip vendors, board designers, application and game developers produce products that work optimally on end users' systems.

The SSC has created many popular standards including SVGA Mode 6A, the VESA BIOS Extension Core (VBE) 1.0, 1.1, 1.2 and 2.0, the VBE/Audio Interface Standard (VBE/AI) 1.0, and the VBE/Accelerator Functions (VBE/AF) 1.0. The Software Standards Committee has several active workgroups including: Accelerator Functions Workgroup, Core Functions Workgroup, Flat Panel Workgroup, and Stereoscopic Visualization Workgroup which are currently developing the VBE/AF 2.0, VBE Core 3.0, and VBE/Flat Panel Standard (VBE/FP) 1.0 standards.

1. **RECENT NEW COMMITTEE ADDITIONS**
2. **VESA Video Interface Port (VIP) Committee**

The VESA Video Interface Port (VIP) Committee was formed early 1997 to develop a standard that offers an open video architecture which meets the performance requirement of today and tomorrow. VIP will standardize the interface between video devices and the graphics chip. The specification is currently undergoing the approval process and is expected to be ratified before COMDEX '97. The recently released PC'98 guidelines from Microsoft acknowledge the work of the committee -the VESA VIP standard is "strongly recommended" at present and it will become a requirement in the future.

1. **VESA PC Theatre Committee**

The VESA PC Theatre Committee began in August, 1997 for the express purpose of developing a PC Theatre Interconnectivity standard that allows PC and CE manufacturers to produce PC Theatre computer and display products that are compatible, work together as a single system, are easy to use, and support automatic configuration. The PC Theatre Interconnectivity standard will be created using existing VESA, USB, and 1394 standards as building blocks to support identification of the display by the PC, and transportation of audio and video between the display and PC.

The VESA PC Theatre Committee will also serve as a focal point to work with other standards bodies.

The goals of this new committee include:

-To develop a standard that will enable PC and display manufacturers to build PC Theatre compatible products that work together as a single system.

-To use existing VESA and USB standards as building blocks in the overall PC Theatre standard.

-To release the first version of the standard by 1Q'98 that is based on today's technology, followed by a second version 1Q'99 that includes future technology.

IV. THE FUTURE OUTLOOK

VESA is looking forward to an expanding base of new products designed to VESA's market-driven standards. As in the past, VESA's technical committee and working group structure will continue to bring relevant standards to the marketplace in a timely manner. VESA's established track record of creating and supporting standards for today's video and electronics industry has provided the consumer with the confidence necessary to continue to explore new technology standards which will benefit the industry in the future.

The outlook for VESA is one of success. As more hardware, software, and systems manufacturers become VESA members and have a say in standardization initiatives, more end-users will have the ability to take advantage of easy-to-use advanced hardware and software. Software applications will be able to run at higher resolutions without confusion or difficulty, manufacturers will be able to reduce development costs, and vendors will enjoy increased sales. For years to come, VESA will be one of the foremost standards organization emphasizing excellence and ensuring the maintenance and enhancement of video electronics industry standards.

Appendix A - VESA® STANDARDS MILESTONES

June 1996 VESA Plug and Display Standard 1.0: The purpose of this standard is to provide a digital interface and, optionally, an analog interface for video data allowing a wide range of display devices to be attached to a single video port on the host system which may be a personal computer (PC), workstation or other device. The standard only defines the interface at the connector on the host system and provides additional recommendations regarding system implementation.

December 1996 VESA Discrete Monitor Timings (DMT) Standard 1.0, Rev. 0.7: The revised DMT standard presents a set of timing standards for display monitors and covers resolutions all the way from 640 x 350 up to 1600 x 1200 and from 60 Hz up to 85 Hz.

December 1996 VESA Generalized Timing Formula (GTF) Standard 1.0: The VESA GTF standard defines a method for generating general purpose display timing, while bringing standardization, without restricting the market to fixed, pre-defined formats or refresh rates and thus allowing for differentiation within a standardized environment.

August 1996 VESA BIOS Extension/Accelerator Functions (VBE/AF) Standard 1.0: The VBE/AF standard defines the interface of a new operating system portable, 32-bit loadable device driver architecture that provides access to accelerated graphics hardware.

August 1996 Flat Panel Display Interface Standard (FPDI-1B, Rev. 2.0): This document describes the electrical, logical, and connector interface between flat panel displays and display controllers in an integrated environment.

March 1996 The Display Data Channel (DDC) Standard 2.0, with The Extended Display Identification Data Standard (EDID) 2.0: This standard defines a communication channel between a computer display and the host system. It includes the VESA BIOS Extension/Display Data Channel (VBE/DDC) specification and the Extended Display Identification Data (EDID) Standard.

March 1996 The Discrete Monitor Timings (DMT) Standard 1.0: This standard presents a set of timing standards for display monitors and covers resolutions all the way from 640 x 350 up to 1280 x 1024 and from 60 Hz up to 85 Hz.

March 1996 The VESA Unified Memory Architecture (VUMA) Standard 1.0: This standard establishes the electrical and logical interface between system controller (core logic) and an external VUMA device enabling them to share physical system memory (DRAM).

November 1995 The Enhanced Video Connector (EVC) Pinout and Signal Standard 1.0: This standard establishes a standard video output connector for personal computers, workstations, and similar products with the ability to support high frequency video signals.

November 1995 The Enhanced Video Connector (EVC) Physical Connector Standard 1.0: This standard establishes a standard video output connector physical description for the EVC.

October 1995 The VESA Flat Panel Display Interface (FPDI) Standard 1.0: This standard establishes the electrical, logical, and connector interface between flat panel displays and display controllers in an integrated environment.

November 1994 The VESA BIOS (VBE) Standard 2.0: Standardizes a modular software interface for display and audio devices.

October 1994 The VESA Display Specifications and Test Procedures Standard 1.0: Provides standard definitions and test conditions for computer display specifications so that specifications across different models and manufacturers can be compared.

September 1994 VESA Media Channel (VMC) Software Standard 1.0: Provides an open software interface for transferring pixel data between two or more devices on the VMC.

August 1994 The Display Data Channel (DDC) Standard 1.0: This new communications standard allows monitors to support "plug and play" capabilities as outlined by Microsoft for Windows95™.

March 1994 The VESA Advanced Feature Connector (VAFC) Standard 1.0: Designed to standardize an open hardware interface for a high bandwidth point-to-point connection system for transferring pixel data between graphics and video systems.

February 1994 The VESA BIOS Extension Display Data Channel (VBE/DDC) Standard 1.0: Provides the system services for reading the Display Identity via the Display Data Channel.

February 1994 VESA Audio Interface (VBE-AI) Standard 1.0: Provides a single low-level API (Application Program Interface) for sound technologies.

February 1994 VESA BIOS Extension Power Management (VBE/PM) Standard 1.0: Establishes a standard set of hardware independent system services for controlling the power management features of the VESA DPMS (Display Power Management Signaling) compliant display devices.

December 1993 VESA Media Channel (VMC) Hardware Standard 1.0: Standardizes an interface for desktop multimedia systems. The VM Channel enables the real time flow of uncompressed multimedia pixels in a bi-directional fashion between multiple video adapters.

November 1993 VESA Local Bus Standard, VL-Bus 2.0: The standard describes a uniform hardware interface, architecture, timing, electrical and physical specification of peripherals to a high-speed bus, and compatibility among a wide variety of products.

November 1993 VL Bus Plug and Play Addendum (included with VL-Bus 2.0): Describes the method to allow VL-Bus cards to participate in the ISA Plug and Play Standard. The method described adheres to the VL-Bus goal of software transparency.

November 1993 VESA Advanced Feature Connector (VAFC) Standard 1.0: Provides an open hardware interface for a high bandwidth (150mb/sec) point-to-point connection system for transferring pixel data between graphics and video systems.

October 1993 VESA Monitor Timing Standard for 800 x 600 with 72Hz and 1024 x 768 with 70Hz Refresh Rate. Establishes refresh rates for 800 x 600 Super VGA running on CRTs 17" and smaller, measured diagonally. These ergonomic standards eliminates almost all flicker and works on existing multi-frequency, high-resolution monitors.

October 1993 VESA Monitor Timing Manufacturing Guideline for 1024 x 768 with 60Hz, 800 x 600 with 60Hz, 800 x 600 with 56Hz Refresh Rate. Documents the most common timing parameters in current monitor and board products running at the above resolutions. All products manufactured to VESA's timing guidelines work together.

August 1993 VESA Image Area Definition (VIAD) Standard 1.0: Provides an industry standard method of defining the usable image area for CRT displays and enables consumers to compare products more easily.

August 1993 VESA Display Information File (VDIF) Standard 1.0: Provides a uniform display specification to enable video controllers from various manufacturers to provide correct monitor timing and video signals to any connected compliant display, without prior knowledge about the display's timing requirements.

August 1993 Display Power Management Signaling (DPMS) Standard 1.0: Provides communication between the display controller and the display, and standardizes a common definition and methodology in which the display controller sends a signal to the display enabling various power management states.

August 1992 VESA Local Bus (VL-Bus) Standard 1.0: Provides a uniform interface for local bus peripherals that ensures interoperability and compatibility between different manufacturers products while providing the highest levels of performance.

October 1991 The VESA BIOS Extension (VBE) Standard 1.2: Provides for a common software interface to Super VGA video adapters, which gives simplified software application access to advanced VGA products.

October 1991 VESA BIOS Extension (VBE) Standard 1.2: (includes version 1.0 and 1.1): This standard enables software to query the graphics board on its capabilities and then set the desired mode. Serves as a common software interface to Super VGA video adapters. VS911022 is version 1.2 of the VBE and has added support for direct color modes up to 8 bits per color per pixel.

October 1991 VESA Video Cursor Interface (VCI) Standard 1.0: Provides an easy interface between Super VGA and pointing devices (e.g., a mouse), handling initialization, cursor drawing, and standard cursor handling. The VCI enables mouse users to work in higher resolutions than otherwise possible without customized drivers.

October 1991 VESA Super VGA Protected Mode Interface (SVPMI) Standard 1.0: This standard provides a protected mode applications mode setting capability for Super VGAs without requiring them to leave protected mode. It is the protected mode equivalent of the VBE.

August 1991 VESA Monitor Timing Standard for 1024 x 768 with 70Hz Refresh Rate: VS910801: Establishes a 70Hz refresh rate for 1024 x 768 Super VGA running on CRTs 17" and smaller, measured diagonally. This ergonomic standard eliminates almost all flicker and works on existing multi-frequency, high-resolution monitors

November 1990 VESA Monitor Timing Manufacturing Guideline for 1024 x 768 with 60Hz Refresh Rate: VG901101: Documents the most common timing parameters in current monitor and board products running 1024 x 768 Super VGA at 60Hz. All products manufactured to VESA's 1024 x 768 / 60Hz guideline work together.

June 1990 VESA Monitor Timing Standard for 800 x 600 with 72Hz Refresh Rate: VS900603: Establishes a 72Hz refresh rate for 800 x 600 Super VGA. This ergonomic standard eliminates almost all flicker and works on existing multi-frequency, high-resolution monitors.

June 1990 VESA Standard 8514/A Register Bit Fields: VS900601: Defines standard 8514/A register bit fields and mnemonics. This and VS890804 allow software developers to develop high-performance portable 8514/A graphics applications.

June 1990 VESA Monitor Timing Manufacturing Guideline for 800 x 600 with 60Hz Refresh Rate: VG900602: Does the same for 800 x 600 at 60Hz.

June 1990 VESA Monitor Timing Manufacturing Guideline for 800 x 600 with 56Hz refresh rate: VG900601: Does the same for 800 x 600 at 56Hz.

August 1989 VESA Standard 8514/A Registers: VS890804: Defines 8514/A register names, mnemonics and addresses.

August 1989 VESA Standard VGA Pass-Through Connector: VS890803: Standardizes a VGA pass-through connector for VGA and 8514/A boards running on an ISA or EISA machine. Allows VGA graphics implemented on the motherboard to be used with higher-end boards using a standard connector.

August 1989 VESA Standard 8514/A ROM addresses: VS890802: Defines standard memory addresses for 8514/A products.

August 1989 VESA Mode 6AH Graphics Standard: Defines consistent initialization numbers for 800 x 600, 16-color Super VGA, which allows programs to set this graphics mode on all Super VGA boards.

VESA EMERITUS COMMITTEES

VESA Common Architecture Committee - The VESA Common Architecture (VCA) Committee was established in 1996 to respond to the industry's need to simplify the interconnection of PC components and the PCI bus. Initial efforts of the Committee centered on advancing the desktop PC/AT architectures to accommodate expected improvements in processing, multimedia, and connectivity functionality.

VESA Advanced Video Interface Committee - In 1993, the VESA Advanced Video Interface (VAVI) Committee was formed to standardize high bandwidth interfaces between multimedia peripherals such as graphics cards and video decoders. Two standards were approved; the VESA Advanced Feature Connector (VAFC), and the VESA Media Channel (VMC). The committee also worked on software interface standards that complemented the hardware standards, providing driver APIs for easy configuration of both VAFC and VMC connections in the Windows™ environment.

VESA Unified Memory Architecture Committee - The VESA Unified Memory Architecture (VUMA) Committee was formed in June 1995 to standardize an interface that allows graphics controllers to use a portion of system memory as their frame buffer. The VUMA Standard, ratified in March of 1996, established the electrical and logical interface between system controller (core logic) and an external VUMA device enabling them to share physical system memory (DRAM).

VESA Local Bus Committee - In December 1991, the VESA Local Bus (VL-Bus) Committee was formed to develop a standard which provided a uniform hardware interface for local bus products. The Committee passed the VL-Bus Standard 1.0 which standardized the local bus timings and modular connector, to allow end users a choice in high performance graphics products. The VL-Bus 2.0 Standard, released in November 1994, added 64-bit capability, common timings, and electrical and physical characteristics for the hardware designer.
