



Advanced Audio/Video Interfaces for Consumer Devices

There was a time when audio/video enthusiasts could get by with RCA-connectorized composite video and audio cables, or perhaps an S-Video cable, but since the era of high definition digital TV, those days are long gone. As the capabilities and complexity of home entertainment components has increased, so too has the need for better and more capable interface standards. While most current equipment relies upon the popular High Definition Multimedia Interface (HDMI), there are a number of advanced A/V interfaces currently available and vying for consumer acceptance and adoption. Four of those technologies, including the latest version of HDMI, HDMI 1.4, are described below (with some technical highlights summarized in the table).

HDBaseT 1.0 – just last month, the HDBaseT Alliance, a cross-industry alliance formed to promote and standardize the HDBaseT technology for whole-home distribution of uncompressed high definition (HD) multimedia content, announced its formal incorporation and the finalization of the HDBaseT 1.0 base specification. Perhaps the most distinguishing characteristic of HDBaseT is that it utilizes the widely available (and inexpensive) Cat 5e/6 cables and RJ-45 connectors, in contrast with, for example, specialized HDMI cables which are significantly more costly.

HDBaseT is based upon a technology developed by the Israeli firm Valens Semiconductor (www.valens-semi.com/) called *5Play* that converges full uncompressed HD video, audio, 100BaseT Ethernet, high power over cable and various control signals through a single CAT5e/6 LAN cable. HDBaseT has the bandwidth to support video resolutions from full HD 1080p to 3D TV formats and 4K x 2K formats. Using the HDBaseT interface, a single-connector TV can receive power (up to 100 W), video/audio, Internet and control signals from the same cable.

HDBaseT enables a network of sources – such as digital video recorders (DVR), Blu-ray disc players, game consoles, PCs and mobile devices – to be connected directly to displays in multiple locations. For instance, a DVR can be connected to several TVs throughout the home, allowing users an independent yet fully compatible experience. HDBaseT LAN based technology makes it possible to cut out the assortment of cables for audio, video, connecting CE devices and even the power source. This form of networking, whether it is done by daisy chaining devices or through star topology, can be applied in both the consumer home and for industrial applications such as digital signage networking.



PARAMETER	HDMI 1.4	DiiVA 1.0	DisplayPort 1.2	HDBaseT 1.0
CAPACITY (Gbps)	10.2	13.5	Up to 21.6 (17 Gbytes data)	Up to 10.2 (scalable up to 20 Gbps)
MAXIMUM CABLE LENGTH (m)	5 - 15	16	15 (5 Gbps) 3 (up to 21.6 Gbps)	Up to 100
CABLE	HDMI	Cat 6 (Standard DiiVA)	DisplayPort	Cat5e/6 LAN cable
CONNECTOR	HDMI	DiiVA	DisplayPort	Standard RJ-45
CHARGING POWER (max)	None	5 W	None	100 W
ETHERNET	100 Mbps	Gigabit	720 Mbps	100 Mbps, scalable to Gigabit
RELEASED	June 2009	April 2009	January 2010	June 2010
WEBSITE	www.hdmi.org	www.diiVA-interface.org	www.displayport.org	www.hdbaset.org

The HDBaseT Alliance anticipates products with embedded HDBaseT technology to be available in the second half of 2010, with the majority of adoption taking place in 2011. The specification will also be available for licensing within the second half of 2010. Development and preparation for an HDBaseT Alliance Compliance Program is currently underway. The Alliance plans to formulate a logo usage and licensing program to ensure consistency and consumers' ability to recognize interoperable HDBaseT devices in the market.

HDMI 1.4 – HDMI first appeared in the marketplace in late 2003 and is currently the most widespread interface technology in home use for HDTV devices. HDMI version 1.4 was announced in June of 2009 and offers the following enhanced functionalities compared to previous versions:

- *HDMI Ethernet channel* – HDMI 1.4 adds a data channel and enables high-speed bi-directional communication. Connected devices that include this feature will be able to send and receive data via 100 Mbps Ethernet, providing support for IP-based applications. Also, the HDMI Ethernet channel will allow an Internet-enabled HDMI device to share its Internet connection with other HDMI devices without the need for a separate Ethernet cable, and will provide the connection platform to allow HDMI-enabled devices to share content between devices;
- *Audio return channel* – an audio return channel is supported that will reduce the number of cables required to deliver audio “upstream” for processing and playback. In cases where HDTVs are directly receiving audio and video content, this new audio return channel allows the HDTV to send the audio stream to the A/V receiver over the HDMI cable, eliminating the need for an extra cable;
- *Higher resolution* – HDMI 1.4 devices can support HD resolutions four times beyond the resolution of 1080p. Support for 4K x 2K will allow the HDMI interface to transmit content at the same resolution as many digital theaters. Formats supported include 3840x2160 at 24/25/30 Hz and 4096x2160 at 24 Hz. Also, the common 3D formats and resolutions are defined for HDMI-enabled devices. The specification will standardize the input/output portion of the home 3D system and will specify up to dual-stream 1080p resolution;
- *Expanded support for color spaces* – expanded color spaces designed specifically for digital still cameras are supported. By supporting sYCC601, Adobe RGB and AdobeYCC601, HDMI-enabled display devices will be capable of reproducing more accurate life-like colors when connected to a digital still camera;
- *Micro HDMI connector* – the Micro HDMI connector is a significantly smaller 19-pin connector that supports up to 1080p resolutions for portable devices. This new connector is approximately 50% smaller than the size of the existing HDMI Mini connector;
- *Automotive connection system* – the automotive connection system is a cabling specification designed to be used as the basis for in-vehicle HD content distribution. Using the automotive connection system, automobile manufacturers will now have a viable solution for distributing HD content within the car.

DisplayPort 1.2 – DisplayPort is an open (and royalty-free) display interface standard developed and managed by the Video Electronics Standards Association (VESA, www.vesa.org) organization. It was introduced in 2006 and is designed primarily for the PC industry as a main display interface to replace DVI, LVDS and VGA. DisplayPort Version 1.2 is a comprehensive extension to the original DisplayPort standard offering new benefits including:

- *Higher data rate* – the maximum data transfer rate has been doubled from 10.8 to 21.6 Gbps, greatly increasing display resolution, color depths, refresh rates and multiple display capabilities;
- *Multi-streaming* – the updated interface supports the ability to transport multiple independent uncompressed display and audio streams over a single cable, supporting protected content and high performance applications such as 3D gaming. This enables the use of multiple monitors connected by cable in a daisy chain or hub configuration. Whereas the v1.1 DisplayPort standard could support one 2560 x 1600 monitor at 60Hz, DisplayPort v1.2 can support two such monitors with one cable, or four 1920 x 1200 monitors. Many other combinations are possible, including multiple video sources, multiple displays (even at different resolutions) and multiple audio speakers;
- *Bi-directional transfer* – another new feature is the ability to support high-speed, bi-directional data transfer, allowing USB 2.0 or Ethernet data to be carried within a standard DisplayPort cable. For DisplayPort v1.2, the maximum data rate of this “AUX” channel has been increased from 1 to 720 Mbps, providing suitable bandwidth for USB 2.0. The DisplayPort cable can therefore support USB data to/from the display to support Display USB functions, in addition to sending the video and audio information. Standard Ethernet can also be transported in the DisplayPort cable;

- *Support for 3D* – DisplayPort v1.2 includes improved support for Full HD 3D Stereoscopic displays, using up to 240 frames-per-second in full HD, providing 120 frames-per-second for each eye. 3D transmission formats supported include field sequential, side by side, pixel interleaved, dual interface and stacked.

DiiVA 1.0 – the Digital Interactive Interface for Video and Audio (DiiVA) specification was developed by a consortium led by Chinese consumer electronics manufacturers Changhong, Haier, Hisense, Konka, Panda, Skyworth, SVA, TCL and chip developer Synerchip (www.synerchip.com). This consortium is also supported by Chinese national, regional and local governments. One of the distinguishing features of DiiVA technology is that, like HDBaseT, it utilizes Cat 6 cable, however DiiVA uses a custom (and not an RJ-45) connector. Some of the features and capabilities of DiiVA include:

- *Data capacity* – DiiVA supports a 13.5 Gbps data rate dedicated to video and over 2 Gbps aggregate data rate in the hybrid channel for bi-directional data and audio. Data types that are simultaneously streamed include uncompressed high-definition video and audio formats, USB, Ethernet and device control commands. The DiiVA specification includes transport and network layers that enable video streams, audio and data packets to be securely routed from any source to any display on the DiiVA home network;
- *Gaming* – Video games can be played from any DiiVA-equipped TV because the USB controllers for the game can be connected directly to the USB port on the TV, instead of to the game console;
- *Power features* – Mobile devices can be charged through the DiiVA connection while outputting HD audio and video and synchronizing data to any source on the DiiVA network. Unused devices on the network can be intelligently powered down automatically enabling power savings;
- *Content access* – Applications on PCs can be launched from TVs; HD and 3D movies on a DiiVA-equipped Blu-ray player can be accessed from any DiiVA-equipped TV in the house.

Mark your Calendars!

The 60th Annual IEEE Broadcast Symposium

Westin Hotel • Alexandria, Va.

October 20-22, 2010



The 60th Annual IEEE Broadcast Symposium will feature a full and varied technical program with a day of tutorials dealing with ATSC Mobile and IBOC issues along with presentations from around the world on important and significant new developments in radio engineering, ATSC Systems and DTV Transmission issues. A panel on spectrum issues related to the FCC's Broadband Plan will feature experts from the broadcast industry and government.

Luncheon keynote speakers include Jim Martin, Director ISR Programs, Office of the Deputy Under Secretary of Defense and James E. O'Neal, broadcast historian and technology editor for New Bay Media's *TV Technology*. The Welcome and Manufacturer's Receptions provide an excellent opportunity for attendees to meet, mix, and discuss contemporary broadcast engineering issues.

The symposium will be attended by broadcast engineers, consultants, equipment manufacturers, government regulators, and educators. The Broadcast Symposium offers Continuing Education Units (CEU) for attending technical sessions. Registration and Technical Program information for the IEEE Broadcast Symposium can be found at: <http://www.ieee.org/organizations/society/bt/>.

The Advanced Television Systems Committee (ATSC) is holding their 1st Symposium on Next Generation Broadcast Television one day prior (October 19) to the IEEE Symposium at the same location. Additional information on the ATSC Symposium may be found at <http://www.atsc.org/cms/>.

2010 NAB Satellite Uplink Operators Training Seminar

Instructor:
Sidney Skjei, Skjei Telecom

October 4-7, 2010
Washington, D.C.



REGISTER NOW