

Black Box Explains...HDMI.

The High-Definition Multimedia Interface[®] (HDMI) is the first digital interface to combine uncompressed high-definition video, up to eight channels of uncompressed digital audio, and intelligent format and command data in a single cable. It is now the defacto standard for consumer electronics and high-definition video and is gaining ground in the PC world.

HDMI supports standard, enhanced, and high-definition video. It can carry video signals at resolutions up to and beyond 1080p at 60 Hz (and higher).

HDMI offers an easy, standardized way to set up home theatres and AV equipment over one cable. Use it to connect audio/video equipment, such as DVD players, a set-top box, and A/V receivers with an audio and/or video equipment, such as a digital TV, PCs, cameras, and camcorders. It also supports multiple audio formats from standard stereo to multi-channel surround sound. Plus it provides two-way communications between the video source and the digital TV, enabling simple, remote, point-and-click configurations.

Note: HDMI also supports HDCP (High-bandwidth Digital Content Protection), which prevents the copying of digital audio and video content transmitted over HDMI cable. If you have a device between the source and the display that supports HDMI but not HDCP, your transmission won't work, even over an HDMI cable.

HDMI offers significant benefits over older analogue A/V connections. It's backward compatible with DVI equipment, such as PCs, TVs, and other electronic devices using the DVI standard. A DVI-to-HDMI adapter can be used without a loss of video quality. Because DVI only supports video signals, not audio, the DVI device simply ignores the extra audio data.

HDMI standards

The HDMI standard was introduced in December 2002. Since then, there have been a number of versions with increasing bandwidth and/or transmission capabilities.

HDMI 1.0 has a maximum TMDS bandwidth of 4.9 Gbps. It supports up to 3.96 Gbps of video bandwidth (1080p/60 Hz or UXGA) and 8-channel LPCM/192-kHz/24-bit audio.

HDMI 1.1 (May 2004) added support for full-definition DVD audio.

HDMI 1.2 (August 2005) added support for one-bit audio for SACD (Super Audio CD).

HDMI 1.2a (December 2005) added Consumer Electronics Controls (CEC) capabilities, such as command sets for controlling multiple devices with a single remote.

HDMI 1.3 (June 2006), more than doubled the bandwidth from 4.95 Gbps to 10.2 Gbps (340 MHz). It offers support for 16-bit colour, increased refresh rates, and added support for 1440p WQXGA. It also added support for xvYCC colour space and Dolby True HD and DTS-HD Master Audio standards. Plus it added features to automatically correct audio video synchronization. Finally, it added a mini connector.

HDMI 1.3a (November 2006), HDMI 1.3b (March 2007), HDMI 1.3b1 (November 2007), and 1.3c (August 2008) added termination recommendations, control commands, and other specification for testing, etc.

HDMI 1.4 (May 2009) increased the maximum resolution to 4Kx 2K (3840 x 2160 p/24/25/30 Hz and 4096 x 2160/24 Hz). It added an HDMI Ethernet channel for a 100-Mbps connection between two HDMI devices. Other advancements include: an Audio Return Channel, stereoscopic 3D over HDMI (HDMI 1.3 devices will only support this for 1080i), an automotive connection system, and the micro HDMI connector.

HDMI 1.4a (March 2010) adds two additional 3D formats for broadcast content.

HDMI connectors

There are four HDMI connector types. Type A and Type B are defined in the HDMI 1.0 specification. Type C is defined in HDMI 1.3, and Type D is defined in HDMI 1.4.

Type A: 19 pins. It supports all SDTV, EDTV, and HDTV modes. It is electrically compatible with single-link DVI-D.

Type B: 29 pins. Offers double the video bandwidth of Type A. Use for very high-resolution displays such as WQUXGA. It's electrically compatible with dual-link DVI-D.

Type C Mini: 19 pins. This mini connector is intended for portable devices. It is smaller than Type A but has the same pin configuration and can be connected to Type A cable via an adapter or adapter cable.

Type D Micro: 19 pins. This also has the 19-pin configuration of Type A but is about the size of a micro-USB connector.

HDMI cable

Recently, HDMI Licensing, LLC announced that cables would be tested as Standard or High-Speed cables.

Standard HDMI cable is designed for use with digital broadcast TV, cable TV, satellite TV, Blu-ray and upscale DVD players to reliably transmit up to 1080i or 720p video (or the equivalent of 75 MHz or up to 2.25 Gbps).

High-Speed HDMI reliably transmits video resolutions of 1080p and beyond, including advanced display technologies such as 4K, 3D, and Deep Colour. High-Speed cables can also accommodate WQXGA cinema monitors (resolution of 2560 x 1600). High-Speed HDMI is the recommended cable for 1080p video. It will perform at speeds of 340 MHz or up to 10.2 Gbps, the highest bandwidth currently available over an HDMI cable.

Additional resources and licensing information is available at HDMI.org.