

DVI, HDMI and HDCP Defined

DVI, launched in 1999, is a purely digital interface that transmits visual data from a source device to a display. With DVI, there is no digital-to-analogue or analogue-to-digital conversion that needs to take place before, during or after transmission. This streamlined, straightforward process makes DVI superior to other interface connectors, such as analogue.

Inferior Analogue

With due respect to the common analogue transmission technologies (VGA, XGA, SVGA, UXGA), DVI is generally considered to be the better transmitter primarily because analogue is sensitive to the phase changes of cable. Simply stated, the analogue picture cannot be reproduced as accurately as the digital one, particularly at distances. The same goes for component video, another analogue format that is limited to a bandwidth that transmits resolutions up to 480P. Analogue cables are also generally more intolerant to environmental conditions and can add "noise" among other anomalies.

USB and FireWire

There are two other data transmission interfaces that are competing with DVI's preferred status: IEEE 1394 FireWire and USB (universal serial bus) 2.0. Yet both of these use some form of compression. When a signal is compressed, transmitted and then uncompressed, it has more potential for difficulty than one that is sent uncompressed, like DVI. Although both FireWire and USB are often used to connect cameras and other DTV (digital television) devices, neither is the format of choice for large panel high definition displays.

DVI's Reign

DVI emerged as the preferred connector because it's purely digital. This means the integrity of the video signal remains true through any transmission, even long distances. You may have heard that DVI is limited to 5-meters in distance, according to the DVI 1.0 specifications. But with solid soldering techniques, using low capacitance, thicker DVI cables and fibre optic interface technologies, the distance of DVI transmission is not limited and can extend as far as 500-meters from the source to the display.

HDCP: No More Piracy

With the advent of DVI, however, came HDCP (High-bandwidth Digital Content Protection), a standard "key" encoded into the DVI signal to prevent video data from being pirated. HDCP was strongly endorsed by the entertainment industry. If a source device is HDCP coded and is connected to a HDTV display or projector via DVI without the proper HDCP decoding mechanism, the picture is relegated to "snow" or in some cases, a very low (480P) resolution. In order to see HDTV with HDCP compliance, both the source and display devices must be equipped with DVI connections that can enable HDCP using "software key" decoding.

The New HDMI

Now enters HDMI (high definition multimedia interface), a new connector that bases itself on the DVI-HDCP model. HDMI with HDCP addresses the concerns of the Hollywood film community while providing consumers the ability to view high quality content on all HDTV displays and projectors. It also offers several features that make it perfectly suited for the consumer electronics market:

- Supports uncompressed high definition video plus multi-channel audio in a single cable using a smaller connector that eliminates the need for multiple cables in home entertainment systems, simplifying installation and eliminating cross technology confusion.
- Transmits uncompressed digital video so that the picture maintains a high quality of colour depth, brightness and contrast.

- Supports Consumer Electronics Control (CEC) based on the AV.link protocol so it can be controlled with a universal remote that is used with multiple HDMI sources such as DVD players or satellite set-top boxes.

- Supports bi-directional communication between devices, allowing the DTV to communicate its preferred audio/video formats to the set-top box, and the set-top box to communicate what video format it is providing to the display. This enables the DTV to make intelligent decisions on how to render any given image in the format designated by the original film providers.

- Supports every uncompressed standard, enhanced and high definition video format ranging from 480I to 480P, 720P, 1080I and 1080P as well as existing PAL formats. - Has the bandwidth to support compressed audio formats such as Dolby Digital, Dolby Digital EX, DTS, DTS EX and uncompressed formats (PCM audio) up to eight channels, up to 192 kHz, up to 24-bits.

- Supports most standard PC monitor formats, such as VGA, XGA and SXGA—all in a single HDMI cable.

- Extends as far as 500-meters using proper cabling techniques. In most commercial and home theatre installations, the consumer electronics components are installed in a closet or basement far from the actual displays. This makes cable length an important feature for consumers and installers.

Because of these advantages, HDMI is expected to become the standard digital interface for consumer home theatre devices, computers systems and DTVs. Already, HDMI is being featured on Silicon Image's new Panel Link Cinema chipset providing HDMI with HDCP for a high definition content-ready solution, and consumers will likely see HDMI connectors on new electronics devices for many years to come.