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## About HDMI Cables

This month we attempt to tackle some of the confusion surrounding HDMI. HDMI stands for High Definition Multimedia Interface. A relatively new technology, HDMI was developed to transfer uncompressed digital signals for the consumer home theater and computer markets. One of the benefits of HDMI is its ability to transfer audio and video all in one cable. This saves space and helps alleviate the mess found behind some home theater setups. [HDMI cables](#) also treat PC's and home theater components the same, so there is never a need for a converter box to make these devices work well together. HDMI also allows much greater resolutions than previous cables; upwards of 1440p.



**HDMI Cable**

HDMI was created in 2002 by a group of electronics companies including Hitachi, Sony and Toshiba. Today, HDMI Licensing, LLC is the licensing agent tasked with administering licensing of the HDMI specification as well as promoting and revising the HDMI standard. Since the HDMI specification was first released, the founders have made several revisions and improvements to the HDMI standard. These revisions have brought more capabilities to home theater and computer devices, but they have also brought much confusion. To the right is a table outlining the different versions of HDMI implemented over the years. As you can see, Version 1.3 brought about the biggest changes, but it is also the revision that seems to confuse everybody. We will now go over some of the changes and additions found in the version 1.3 standard and try to alleviate some of the confusion.

### Deep Color:

Previous versions of HDMI supported 8-bits of color per channel (there are 3 color channels: red, green, blue), while version 1.3 features support for up to 16-bit color per channel. What does this mean? It means a much larger color spectrum for the video to draw from. 8-bit color is equivalent to 17 million colors, while 16-bit color is equivalent to around 280 trillion colors! This helps eliminate banding in images on the screen. The more colors available, the smoother and more life like the fading from a light part to a dark part of a picture will be. While there is support for this built into the cable, it may be a long time before any device takes full advantage of this feature.

### Audio

All versions of HDMI support 8 channels of PCM audio at 192kHz, 24 bits per sample. PCM stands for Pulse Code Modulation and is a compressed audio format capable of decoding the new Dolby True HD, Dolby Digital Plus and DTS-HD Master Audio formats. These are the same formats used in your local movie theaters. HDMI version 1.3 adds "Lossless" audio to this feature. When you compress audio, you inherently lose bits of data here and there. With the advancement of Lossless audio, the compressed audio loses absolutely nothing, which produces the most pure sound possible.

In addition to Lossless audio, the new Lip Sync feature added in version 1.3 helps keep the audio and video in sync during playback. The more complicated a video signal becomes, the more the audio track drifts away from the video. Lip Sync completely solves this problem.

### Remote Control Control (CEC)

HDMI Versions	
<b>Version 1.0</b>	Original specification created in 2002.
<b>Version 1.1</b>	<i>Released May 2004</i> Support for DVD audio was implemented.
<b>Version 1.2</b>	<i>Released August 2005</i> Added better support for HDMI use in PCs with HDMI outputs. Also added support for video cards that use low-voltage such as PCI-express cards.
<b>Version 1.2a</b>	<i>Released December 2005</i> Though this revision added several new features, none of them really affected the consumer. Most of the changes were made to testing and certification requirements.
<b>Version 1.3</b>	<i>Released June 2006</i> This version contained the biggest changes that affect the consumer. The speed of the cable was the biggest of these changes. Previous versions were capable of 4.95Gbps. Version 1.3 jumped this up to 10.2Gbps. What this essentially does is allow for a greater amount of information to pass through the cable at one time. This lets the cable support the other features added to

Think of this as the ability to use one video component like a universal remote control for the rest of your home theater. This is a powerful capability that has just begun to be incorporated by device manufacturers. For example, if you have a blu-ray player, HD receiver and an HDTV that all have CEC capabilities, then you could press play on the blu-ray and it would turn on the receiver and the TV, set them to the proper inputs/outputs and set the max resolution and audio. All in one button push. You could even access the blu-ray menu with you TV remote or vice versa. Devices in the future will surely begin taking advantage of this feature.

**Versions 1.3a/1.3b**

the other features added to version 1.3 including deep color, lip sync, Lossless audio, as well as higher screen refresh rates. In addition to all of these features, version 1.3 introduced the mini-HDMI connector implemented on some new digital cameras and camcorders.

These minor revisions related to manufacturing or testing issues and did not affect the consumer directly.



**HDMI Standard and Mini Connectors**

**Category 1 vs Category 2**

To make things more confusing there are now two main categories for HDMI cables:

Category 1 (standard cable): Capable of speeds up to 4.95Gbps and resolutions of up to 1080i.

Category 2 (high-speed cable): Capable of speeds up to 10.2Gbps. These speeds are able to accommodate higher resolutions such as 1080p as well as the deep color and faster refresh rates.

The best way to understand the two categories of HDMI cable is to think of "Version 1.3" as a breakthrough in technology. The new version *allows* a cable to be built to support all the fancy features and high speeds brought about by version 1.3. It doesn't mean every "1.3" cable takes advantage of these features, rather the technology and specifications are now there if they are needed. This is an important reason why the HDMI Founders recommend that, when looking for an HDMI cable, the consumer look at the available features of the particular cable rather than looking for an arbitrary "1.2" or "1.3" mark on the cable. In other words, having a "Version 1.3" cable does not guarantee that all of the fancy 1.3 features will be on board.

**Which version do I need?**

Marketing confusion has given way to the statement: "You need a version 1.3c category 2 cable or you won't be getting the best home theater experience." While this can be true, it's not as cut and dry as that.

The great thing about HDMI is that each revision has taken into account the possibilities of the future of home theater components. In most cases, any version of a HDMI cable will be more than suitable. That said, HDMI technology stays well ahead of the current technologies for a reason. Let's say you are putting a cable inside a wall of your house. If you put a lesser cable in there, and down the road you purchase devices that support the great 1.3 features, you would have to tear the cable back out and reinstall a new one. Installing the most current version with all possible features now may save you time and money down the road.

Marketing has also convinced consumers that the very expensive brand-name HDMI cables are the only way to go when it comes to their home theater experience. This is simply false. The truth is that, in most cases, the specifications of overpriced cables versus the less expensive ones are often very similar. An HDMI cable is a relatively inexpensive thing to make. The prices of the more expensive cables on the market are usually marked up a great deal and include fancy packaging. Combine this with aggressive marketing campaigns and one could easily see how a consumer could be misled into believing that purchasing an HDMI cable at a more reasonable price will do them harm. The HDMI cables selling at a more reasonable price still have to go through the same testing and certification processes as the overpriced cables. Don't be fooled into thinking that low price equals poor quality; in most cases you're only gonna end up wasting money.

**Limitations**

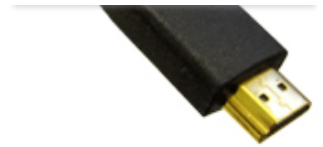
Manufacturers of HDMI never intended for the cable to be used to run long distances. Many companies have found ways around this, but none are without limitations. Many extenders, repeaters, thicker-gauge wire and boosters are on the market, as well as some CAT5E/CAT6 options, but the limitation with most of these devices is that you lose some of the



capabilities of the cable. Remember that a long HDMI cable (25 feet and up) can still be called version 1.3, even though it may not have the high speeds of the shorter cables.

If you have a system that will take full advantage of Deep Color, Lossless audio, CEC control or other benefits and you are positive that all components of the system support the same, then you should get a v1.3 cable that is less than 25 foot. This is the only way to be sure you're getting your money's worth from your home theater components.

Another common limitation lies not in the cable itself, but in the number of HDMI inputs and outputs a device may have. Most source devices contain only one HDMI output and many HDTV's contain only one HDMI input. Luckily, many high quality switches, splitters and distribution devices are on the market to help with this roadblock.



*Flat HDMI Cable*

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