

How HDMI versions affect selection of HDMI cables

When buying HDMI cable many of you might focus on the HDMI version your cable supports. Questions like: Is it the latest HDMI version? Will it support all the features of the devices it's hooked to? Most of the fears and doubts associated with this question are unfounded, as new rules make the buying decision of HDMI cables a lot simpler as we will explain below.

In the past cables were labelled according to the HDMI version they were supposed to adhere to. However since November 2010 labelling of HDMI cables became simpler.

For regular, non-automotive HDMI cables, there are now four categories of cable. A cable may be labelled "**Standard Speed**" or "**High Speed**", and it may be labelled "**with Ethernet**" or not. In practice a cable will be labelled as one of the following:

1. STANDARD SPEED
2. HIGH SPEED
3. HIGH SPEED with Ethernet

The basic characteristics of standard HDMI cables have not changed from one HDMI version to another. They have the same conductors, in the same configuration, wired to the connector in the same manner (except for Ethernet compliant cables, explained below).

Cable speed

HDMI cables submitted for compliance testing, to the above cable categories, is subjected to two separate testing regimens, and if it passes either, it is deemed compliant even if it fails the other.

- An "eye-pattern" test, where an HDMI signal representing a "worst-case" source device output is fed through the cable and the output at the other end of the cable is measured graphically on an oscilloscope.
- A series of "parametric" tests where various attributes of the cable are measured, such as skew, crosstalk and attenuation.

When a manufacturer submits an HDMI cable of a certain length for testing, they must specify the bandwidth it should be tested under, "Category 1" or "Category 2".

- Under Category 1, the cable must either pass the eye-pattern test at 74.25MHz (742.5Mbps) or the parametric tests
- Under Category 2, the cable must pass either the eye-pattern tests at 165MHz (1.65Gbps) and 340MHz (3.4Gbps) or a stricter set of parametric tests.

Ethernet Channel and Audio Return Channel

These two channels we introduced with HDMI 1.4. This change requires some alteration to the HDMI cable design; hence a cable must be certified for Ethernet. The HDMI connectors remain the same, and the pins still map as they did before, but two conductors have been given new additional tasks to perform; because the bitrate to run through these conductors is rather high, the specification requires that they are run as a **100-ohm twisted pair**. Prior cable designs did not run these conductors as a twisted pair, and so the impedance of the pair in a non-Ethernet cable could be almost anything, most likely unsuited for high-speed data.

As the Ethernet and Audio Return Channel are optional HDMI cable features, not all manufacturers choose to certify their cables for Ethernet.

Except for cable speed and the Ethernet and Audio Return Channel, are there any other HDMI features that some compliant cables cannot support?

The short answer is no. *All other HDMI version specifications, as listed below, are supported by all HDMI **compliant** cables (please note the word **compliant**).* Newer HDMI versions/features primarily affect equipment, not cables, although even equipment with the aid of firmware updates could support newer HDMI versions/features up to a certain extent.

1. HDCP (*there is no such thing as HDCP compliant cable*)
2. 4K resolutions (*only requirement is high speed cable to support the high data rates*)
3. Deep Colour (*only requirement is high speed cable to support the high data rates*)
4. 3D (*only requirement is high speed cable to support the high data rates*)

The HDMI Licensing authority does not authorize release of the Compliance Test Specification to the general public, although it allows free access to anyone interested in the HDMI specification.

HDMI Version Specification	HDMI Compliance Testing Specification
1.1	1.1
1.2 1.2a	1.2a
1.3 1.3a	1.3a 1.3b 1.3b1 1.3c
1.4 1.4a	1.4

For the technically minded here is what an "eye-pattern" test means.

It begins with a test signal being fed into one end of the cable, and the result is read at the other end of the cable with a high-frequency oscilloscope which samples the waveform as it comes out of the cable. Note that the quality and amplitude of the signal coming out of the cable is dependent on the quality and amplitude of the signal that goes into the cable. The "swing" voltage of the test signal is 400mv (millivolts), meaning a "1" is signalled by a voltage of +200mv, and a "0" is signalled by a voltage of -200mv. It is expected that the amplitude of the signal that goes into the cable comes out at the other end of the cable.