DisplayPort vs. HDMI: Which is best for your audio-video project?

When it comes to display interfaces, not all are created equal. Although both DisplayPort and HDMI are capable of sending high-definition video and audio with HDCP from a source device to a display, there are differences worth noting. Below, we'll discuss the key considerations to help you choose between the two interfaces for your next commercial or residential custom installation.

What's DisplayPort?

Developed in 2007 by VESA, DisplayPort was created to be a universal replacement for separate PC display interfaces including LVDS, DVI and VGA. Used primarily to connect a computer to a monitor, the interface is also capable of audio and data transmission. Unlike HDMI, because of its computing roots DisplayPort has been less common in professional audio-video and consumer electronics devices. This is rapidly changing, however, as we see more and more high-end audio-video products shipping with DisplayPort ports.

What about HDMI?

First introduced in 2003, HDMI is the most widespread display connector in the world, with billions of installed ports growing by billions every year as new devices ship. It's become the *de facto* standard for connecting HD equipment — from HDTVs and PCs to cameras, camcorders, tablets, Blu-ray players, gaming consoles, smart phones, media players and all other devices capable of sending or receiving an HD signal. In the ProAV world, it has all but completely replaced its predecessor, DVI.

	DisplayPort	HDMI
Description	An external digital interface primarily used to connect a video source to a display device such as a computer monitor.	A compact audio/video interface for transferring uncompressed digital audio/video/data from an HDMI-compliant device to a compatible digital audio device, computer monitor or video projector.
Use	Most often used by those who demand ultra-high definition, zero-latency video, such as PC gaming, augmented/virtual reality and CAVE simulators. Becoming more common in high-end commercial and residential custom install applications. Note that you can connect up to 3 displays in a daisy-chain to a single DisplayPort source port.	The most ubiquitous audio-video interface. The standard for connecting personal computing and consumer electronics devices. While not very important in commercial AV applications, HDMI's support for ARC is sometimes a desirable feature in residential custom install projects as it eliminates the need for separate cable to transmit audio from the display to a receiver.
Video Resolution	Version 1.2 supports 17.28Gbps and is the most common DisplayPort interface for 4K video at 60Hz with 4:4:4 chroma sampling. Version 1.3 can handle 32.4Gbps (up to 8192 x 4320 or 8K resolution, or two simultaneous 4K streams). Newer version 1.4 retains the same data rate, but adds additional features that improve picture and audio quality.	HDMI version 1.4 is the most common and supports 10Gbps, or 4K at 30Hz with 4:4:4 chroma sampling (only 4:2:0 at 60Hz). HDMI 2.0 is more recent and doubles the refresh rate to 60Hz/4:4:4 because the bandwidth increases from 10.2 to 18Gbps. It is gradually displacing HDMI 1.4 in all but legacy, low-bandwidth applications. The brand new HDMI 2.1 specification makes a jump to 10K video (48Gbps), but it will be some time before content and hardware are widely available to exploit its capabilities.
Interoperability	In our experience, we see fewer issues with DisplayPort than HDMI interconnects, perhaps because there seems to be less variability in the way different device and cable manufacturers have implemented the standards. On rare occasions, we have encountered problems with "link training", or establishing the communication channel between source and sink devices, especially over longer-distance connections with several devices in the chain. We have found that setting the AUX channel to standard instead of fast mode for every device along the transmission chain generally resolves the problem.	Similar to our experience with DisplayPort, the most common interoperability problems we have seen with HDMI involve the "handshake" between devices, in this case so that content protection can be established. Again, this seems to be more frequent when the connection chain involves longer distances and multiple links (e.g., source devices, cables, switches and displays). Finding the right combination and configuration to ensure a working system can be a challenge with no single silver bullet solution in all cases, but once you develop a portfolio of compatible equipment you will use it again and again whenever possible.

Before HDMI 2.0 products became available, DisplayPort 1.2 and its 17.28Gbps data transmission capable of true 4K video at 60Hz with 4:4:4 chroma sampling made it an easy choice if that was the most important consideration, all other factors being equal. HDMI 1.4 at 10Gbps just did not have the bandwidth to do the job. Now with HDMI 2.0 at 18Gbps, it's a more even contest, and the choice of one interface over the other will depend on factors such as the types of port that are available on the source and sink devices in an installation, whether ARC is a requirement, and cabling options for the link distances. While more options may make design, equipment and configuration decisions more complicated, the good news is that installers have more tools in their toolkit than ever before. And with technology in a constant state of change, newer versions of both HDMI and DisplayPort are in the works, geared at increasing data transmission rates and taking video resolution to new heights. Data rates that are common in the data center will transition ever more rapidly into commercial and residential audio-video and consumer electronics applications.

Acronym Glossary

ARC: Audio Return Channel
AUX Channel: DisplayPort auxiliary channel that carries device management and control data
AV: Audio Video
CAVE: Cave Automatic Virtual Environment
DVI: Digital Video Interface
Gbps: Gigabits per second
HD: High-Definition
HDCP: High-bandwidth Digital Content Protection
HDMI: High-Definition Multimedia Interface
HDTV: High-Definition Television
Hz: Hertz
LVDS: Low-Voltage Differential Signaling
PC: Personal Computer
ProAV: Professional Audio-Video
VESA: Video Electronics Standards Association
VGA: Video Graphics Array

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