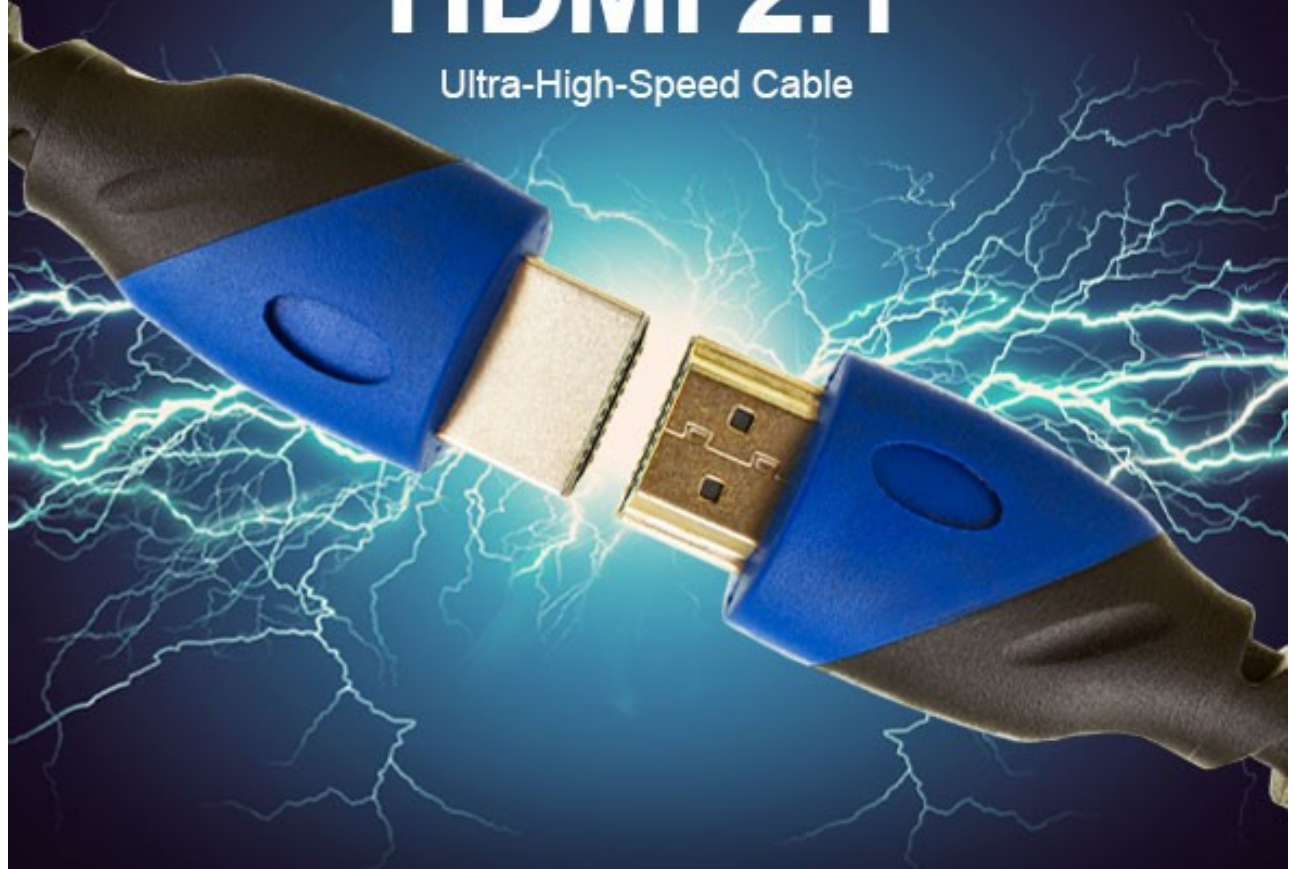Introducing

HDMI 2.1

Ultra-High-Speed Cable

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Last week, CableWholesale sent out an email introducing the HDMI 2.1 cables now being available. That email, and the product have generated a lot of interest with our customers. Much of that interest resulted in a lot of questions being fielded by the tech team. Gregory, the newest member of our technical team, wrote a nice article highlighting some of the basic technical info about this latest version of HDMI cables. Click here to read Gregory's article on the CableWholesale website or continue scrolling to read it now.

Introducing HDMI 2.1 Cable

Gregory Taylor
HDMI 2.1 Article
CableWholesale

CableWholesale is now carrying next generation HDMI cables designed to support the HDMI 2.1 Hardware Performance Standard. Although officially announced and released by the HDMI Consortium in 2017, adoption and utilization of the standard is only now ramping up, in part thanks to recent releases of both Sony's PlayStation 5 and Microsoft's new Xbox. There's a lot to love about this new technology, and this article will present the new, and honestly, pretty awesome features.

Of course, with new technology often comes new cables, and HDMI cables that support features from the 2.1 specification are no exception. Officially referred to as "Ultra High Speed HDMI cables" (HDMI, LLC does not allow version numbers to be used in marketing HDMI cables), these cables feature a certification sticker with accompanying QR code (see image below). (Note that cables advertised as HDMI 2.1 cables produced between 2018-19 did not feature this official certification and their performance can be questionable. CableWholesale does not carry these non-certified products.)

Now, let's dive in to those new features! HDMI 2.1 now includes the following:

- Support for the full range of next-gen resolutions and refresh rates for visual displays (incl 8k and 10k) utilized by current top-tier televisions
- Massive bandwidth increase to 48 Gbps
- Lower EMI emissions
- New display feature support including Dynamic HDR, VRR, QMS, QFT, and ALLM used in upcoming video and gaming applications
- State of the art audio capabilities centered around eARC technology, supporting "Dolby True HD" and "DTS Master Audio"
- Complete backwards compatibility with all existing HDMI devices and cables

Resolutions:

HDMI 2.1 supports higher frame rates (Hz) for existing 4k devices as well as 5k,

8k, and 10k resolutions:

4K@50/60Hz (possible with current cables)
4K@100/220Hz
5K@50/60Hz
5K@100/120Hz
8K@30Hz (possible with current cables)
8K@50/60Hz
8K@100/120Hz
10k@50/60Hz
10k@100/120Hz (maximum supported format)

Bandwidth:

The HDMI 2.1 standard increases bandwidth from the current standard of 18 Gbps to 48 Gbps. This increase comes from two factors, increasing bit-rate per channel and total number of channels. HDMI 2.1's Ultra High Speed cables have four fully functioning data channels with double the bit-rate, which gives it a total bandwidth of 48Gbps. Its Clock-time meta data is now transmitted directly in the data packets themselves.

These large increases in total bandwidth allow the cable to transmit nearly 3 times as much data per second. This is what makes next-gen resolutions and frame rates possible.

HDMI 1.4
10.2 Gbps

HDMI 2.0
18 Gbps

HDMI 2.1
48 Gbps

EMI:

Electromagnetic interference, also known as EMI, is reduced by the design of the Ultra High Speed Cables utilized in the HDMI 2.1 Standard. To be clear, this is a reduction to the amount of EMI emitted by the cable, not necessarily to the cable's capacity to ignore EMI itself.

This EMI reduction makes HDMI 2.1 safer to run alongside sensitive devices and

cabling. This can save money by decreasing the need to purchase shielded varieties of network or audio cables.

Special Display Features:

HDMI 2.1 enables several performance enhancement features which will see increasing implementation over time. Note: These features are not granted by the new HDMI standard alone; the content source and device(s) involved must have these features implemented. But, when implemented, they will be inaccessible without Ultra High Speed HDMI cabling.

Dynamic HDR: This technology uses metadata on a scene-by-scene (potentially frame-by -frame) basis to inform display cells what contrast and color levels are appropriate for a particular scene. Current Static HDR (HDR-10) only gives a generalized setting for any video as a whole. HDR-10 provides no difference in contrast or color settings between scenes, even in drastically different scenes (day vs night, indoor vs outdoor). The level of fine tuning possible with dynamic HDR can drastically improve the presentation of movies, television series, and games. The technology is being implemented in Nvidia and AMD graphics cards.


SDR Static HDR Dynamic HDR

VRR: Variable Refresh Rate allows a display device to auto-adjust its frame rate according to the data being sent from its current source. This is particularly useful for gaming applications. Television and films are displayed in consistent, pre-set frame rates (24fps for films, up to 60fps for television shows). The frame rates of games, however, constantly change depending on how much processing is going on in the source system. Sudden changes to computing requirements rapidly change the fps that a display will receive. This manifests as phenomena like stutter and tearing on current displays, because their refresh rate is static. (Xbox Series X and S + PS5 will both implement VRR)

QMS: This feature is related to and made possible by VRR. Quick Media Switching allows users to change between content sources, of the same resolution, without any black out or delay. Because only the frame rate is changing, these transitions are smooth and seamless. This would make switching from a streaming service to a game console, movie trailer, or broadcast sporting event visually smooth and without the black transitions we are accustomed to.
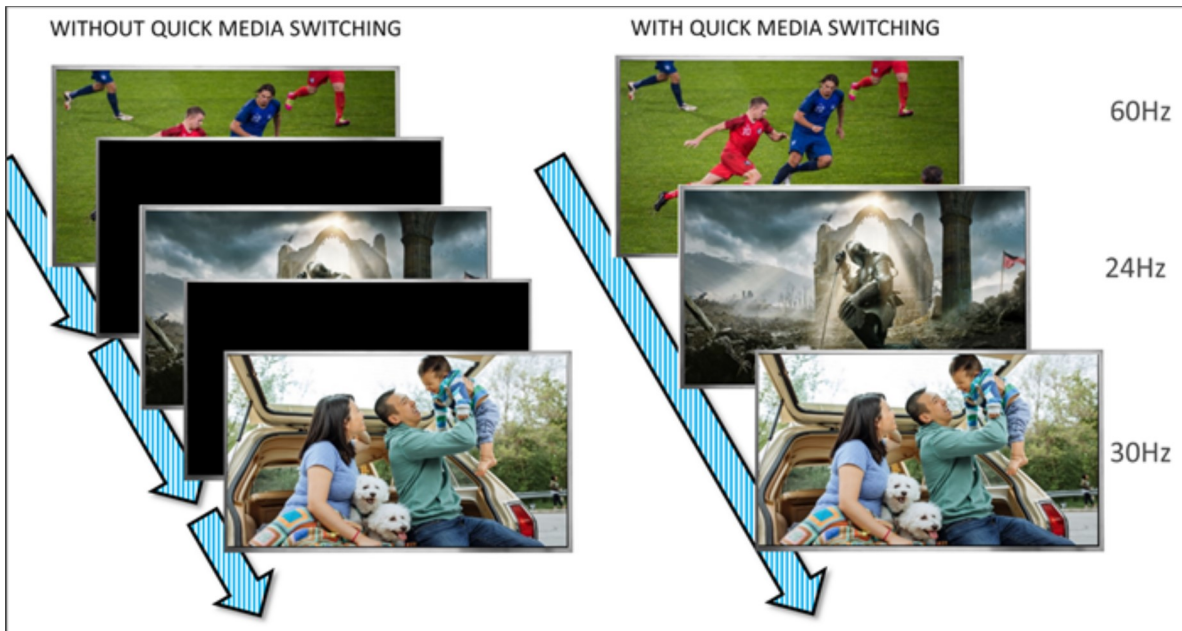
QFT: Quick Frame Transport (not Quantum Field Theory ;)) is a feature which reduces latency in visual displays. It addresses one of a handful of factors that contribute to overall input lag: transfer time between source and display. HDMI 2.1 can send frames much more rapidly then previous HDMI standards, minimizing that input lag equation. HDMI cables cannot affect the processing speed of the data they deliver, but nonetheless will reduce latency on gaming and future VR applications.

ALLM: Auto Low Latency Mode allows displays to automatically detect if a source will have an inconsistent refresh rate (i.e. a game) and automatically switch the setting to its "low latency mode". This has been a feature in Samsung televisions since 2018.

Audio:

It has already been possible to transmit audio signals through HDMI for some time. The Audio Return Channel feature implemented in 1.4 has allowed two way communication but with low quality limits on audio.

Your display can send audio data to a receiver or sound bar through an HDMI output. (Note: Televisions have been slower to implement this capability than might be ideal; see the linked list of "pass through" capable televisions below). Audio quality was fairly limited under this paradigm, until now.

eARC (Enhanced Audio Return Channel) eliminates that quality barrier. It increases audio bandwidth to 37 Mbps which is capable of transmitting the uncompressed, large data packets required for top quality audio formats [Audio pass through enabled televisions](#).

Backwards Compatibility:

HDMI 2.1 compliant cables use Standard HDMI Type A connectors and are therefore completely backwards compatible with all HDMI ports and devices. 2.0 compliant HDMI cables can also be used in 2.1 devices, however the extra

features and higher resolutions will not be possible.

Current Use Cases/Conclusion:

When 2.1 was unveiled in 2017, the number of use cases was very low. This has begun to change, most significantly in the gaming world and in televisions.

- Sony PS5
- Xbox Series X
- Samsung Q950TS 8k QLED
- All Samsung 4k QLED (2020+)
- LG CX OLED
- LG ZX OLED
- Apple TV (requires eARC capability for Atmos audio quality)
- Here is a link to a managed list of 40+ HDMI 2.1 Enabled Televisions

While the new cable standard is still not a requirement for every household or A/V installation, it is becoming relevant in high ticket home video/audio setups, gaming environments, and future proof designs. CableWholesale has begun carrying our own line of certified Ultra High Speed HDMI cables in anticipation of demand via the new Sony and Xbox game consoles. Moving into the future, the new cable design standard will be required to access all the exciting planned applications of next-gen audio/visual technology. We plan to be ready to meet our customer's demand for those experiences, whether that be for today or tomorrow.

View our Ultra High Speed HDMI Cables - Great for the home theater between close devices and displays.

View our Active Optical (AOC) Ultra High Speed HDMI Cables - Great for any long distance application from large scale digital signage to different rooms in your house.

Sincerely yours,
-- *Your CableWholesale Sales Team*

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