4K UHDTV IS COMING!

What is it? How does it work? And what do you need to make sure your home is ready to enjoy next-generation video for years to come?

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There have been a few major milestones in the developmental history of television. In 1934, Philo Farnsworth gave the world's first public demonstration of an all-electronic TV, and at the 1939 New York World's Fair a black and white TV was on display. Fifteen years later, on January 1, 1954, the Tournament of Roses was the first color TV broadcast. In 1993 the Grand Alliance was formed at the FCC's directive, tasked with developing the next-generation American digital TV specification, and in 1996 the first HDTV broadcast aired. High-definition, 1080p Blu-ray discs debuted in 2006 and 2008 was the year that 3DTV tried to break into the home.

If you have been TV shopping recently, then you are likely aware that we are currently in the dawn of the next great evolution of television technology, Ultra High Definition Television (UHDTV). And if you are shopping for a TV today, buying a non-UHDTV set could be analogous to picking up an old Philco black-and-white model when all the neighbors were getting ready to start enjoying TV "in living color."

Among other things, UHDTVs feature four-times the resolution of current 1080p sets, providing both twice the vertical and horizontal resolution of current sets. Together these 3840 horizontal and 2160 vertical pixels deliver more than eight million pixels on screen! (These new sets are frequently referred to as 4K, as they have horizontal resolutions of nearly 4,000 pixels. However, according to the Digital Cinema Initiatives, 4K resolution is defined as 4096 x 2160. For simplicity sake, this piece will treat UHDTV resolution as 4K.)

All of this extra resolution adds up to a stunning, lifelike image that is sharper and clearer than looking out any window. You'll

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notice little, micro details like never before such as the stitching and scuffs on a baseball, the dimples on a golf ball, and the scratches and pebbled texture on a football.

Keeping Pirates at Bay

But beyond just a gorgeous picture UHDTV brings with it a few new wrinkles, and one of the biggest hurdles consumers will soon encounter is something called HDCP 2.2. And, if your video distribution infrastructure isn't prepared for it your brand new TV will end up with eight millions pixels of disappointing nothing.

HDCP stands for High-bandwidth Digital Content Protection and it has actually been around since 2000. Content creators—like Hollywood filmmakers—have always been concerned with piracy, but these concerns ramped exponentially when they started releasing material in pristine high definition formats. In digital versions that could be endlessly replicated with absolutely zero loss in quality.

While it was difficult to prevent piracy in the analog age, digital signals brought new tools and technologies to help thwart video bootleggers, and HDCP was developed by Intel to prevent people from copying protected digital content. Originally released as HDMI 1.0, the specifications have continued to develop and evolve as new technologies have been introduced and hackers have worked to break HDMI's code. Picture Benedict Cumberbatch in The Imitation Game, but instead of trying to crack the Enigma to stop WWII, he's trying to hack HDCP's unique set of 40 56-bit keys so he can illegally pirate copies of Star Wars.

HDCP essentially works by having the transmitting, source device—like a cable box, Blu-ray player, or media player –initiate a digital "handshake" that passes through all of the devices it is connected to. This creates a secure, theoretically unbreakable signal chain. Each "repeater" device the signal passes through decrypts the signal, then re-encrypts it and retransmits it along, confirming it is secure and that it is authorized to pass on the signal. The display, or TV, at the end of the chain is known as the "sink" and ultimately responds with an "OK to send" handshake telling the source everything is on the up-and-up. When it all works, you get a pristine image on the screen. When it doesn't, you get nothing.

HDCP 2.2

With UHDTV, a brand new, even more robust version of HDCP has been developed, 2.2. And for UHDTVs to display a true 4K image, every link in the digital chain must be HDCP 2.2 compliant. Unfortunately, it is possible that some early adopters may have purchased TVs that offer 4K resolution but that aren't HDCP 2.2 compliant, meaning they will be unable to enjoy true 4K content. (HDCP 2.2 only concerns itself with protecting UHDTV content,

so if you are only concerned with viewing traditional 1080p material like current Blu-ray discs or cable/satellite programming, then you won't have an issue, even when viewing it on a new 4K TV.)

If you have a basic setup consisting of just a 4K source and a 4K TV, you can simply connect a quality, high-speed rated HDMI cable directly to the TV and be set. However, if you are planning on designing a system that utilizes remotely located components, or plan on using a video distribution system to route multiple sources to multiple TVs around a home, then you will need to pay strict attention to make sure that all of the components in the signal chain path—audio/video receiver, video switch, or video transmitter/receiver—are HDCP 2.2 compliant or miss out on enjoying the splendor of true 4K video and instead get a black screen or an "unable to play video" message.

Enter the Matrix

Many modern whole-house audio/video distribution systems rely on a centrally located rack of electronics to send signals throughout the entire home. At the heart of these systems is a controller, like a Control4 HC250 or HC800, telling the system what to do and a device known as a matrix.

An HDMI audio/video matrix takes multiple HDMI sources in and routes them to multiple displays. Usually a matrix is described in terms like 4x4 or 8x8, with the first number referring to the number of source inputs and the second number describing the number of outputs. So a 6x4 matrix could route six separate sources—Blu-ray, cable box, AppleTV, etc.—to four different TVs.

The nice thing about a matrix is that it can simultaneously route any source input to any display output, and let multiple displays view the same input at once. For example, in a large home an equipment rack could hold multiple cable boxes, Blu-ray players, and media servers and every room in the home could have access to all the entertainment content without needing anything but a television in each room. This makes for an incredibly clean, efficient, and flexible installation.

Leaf was an industry leader in HDMI matrix technology, and its products were designed to integrate with Control4 systems. To gain an even stronger foothold in the A/V entertainment category and become a leader in video distribution, Control4 purchased Leaf in 2015, ensuring perfect and seamless integration of the entire product line with their control and entertainment systems.

Since the acquisition, the Leaf product-development and Control4 engineering teams have been working closely together, sharing expertise to develop new and innovative products to help push the boundaries of the connected home. One of the

first products to be borne from this new relationship is a brand new range of HDCP 2.2 compliant, UHDTV capable matrixes. This new line-up will initially include four matrixes, ranging from the LU642NAP 6x6 to the flagship LU1082 10x10. (Large homes not requiring Ultra HD distribution can be served by the LT2020E, capable of routing 20 sources to 20 displays!)

Bells and Whistles

The new line of Control4 4K/Ultra HD matrixes are packed with a ton of industry leading technology, all designed to ensure that you not only get every last pixel of entertainment on your new 4K TV, but also to make sure the entire system remains as easy to use as pressing a button!

When connected to your home's network via a standard Ethernet cable, the matrix becomes a fully-functional part of a Control4 system, reporting its status and being controlled via ultra-fast and reliable Internet Protocol (IP) drivers. Beyond that, by employing an internal Gigabit-speed Ethernet switch, the matrix can route Ethernet signals to make sure that all of your new smart, Ultra HD TVs have the fastest, most dependable Internet connection, so you can enjoy ultra-reliable, two-way IP control of many modern TVs. This also eliminates the need for an additional network switch and extra Ethernet cabling in the rack.

The matrixes also feature some very important user-friendly features such as advanced EDID (Extended Display Identification Data) management and Zone Lock. By managing all of the connected devices' EDID information, and authenticating the digital handshake's "OK to send" information required for HDCP's digital handshake to send the signal, you will enjoy lightning-fast source switching times as you switch from one HDMI input to the next. This means no waiting or watching a blinking or black screen as the system tries to re-negotiate HDCP source, repeater and display (sink) devices any time you decide to watch something else.

Zone Lock lets you "lock" any source to any zone, meaning that if you are watching something, another viewer somewhere else in the home won't be able to go in an accidentally—or purposefully!—change the channel or stop the movie. Genius! Of course, with Control4's advanced programming configuration, you can permanently keep certain sources from being viewable in certain rooms or keep any source permanently locked to a specific TV.

Beyond the ready-made integration drivers, these new matrixes offer an installer friendly "EZ Calibration" feature that has the matrix automatically reach out and "interrogate" all of the devices to automagically get all the EDID and HDCP handshaking

and key exchange information. This means the installer spends a lot less time on the job, saving you money on the installation. This also makes it a breeze to add new sources or TVs as you change or update your system, making sure the matrix is also up-to-date with your system's capabilities, and insuring you always get the best picture and sound in every room!

Beyond awesome 4K HDMI routing, the new matrixes also feature coaxial digital audio inputs and analog audio outputs to integrate with the home's audio distribution system. With the audio routing, you won't ever have to miss out on the audio when you run into the kitchen to get a snack or take a bathroom break again.

Finally, the matrix can also route both infrared (IR) and bi-directional RS-232 control commands to each zone. Not only does this save on extra wiring, it makes sure all of your TVs—4K and otherwise—remain in perfect sync with the system.

All On A Single Cable

Beyond being fully HDCP 2.2 compliant, the Control4 matrix line-up incorporates industry leading HDBaseT technology. This amazing and proven tech reliably delivers full 4K video, along with high-resolution, multi-channel lossless audio, Ethernet, power, and infra-red or bi-directional RS-232 control signals up to 100-meters using a single, low-cost Category-rated cable! Just. One. Cable.

All of this is made possible via the new LU1E receiver, designed to be the perfect companion to the Ultra HD matrix line-up. The LU1E proves that big things do come in small packages as it is the world's slimmest, lightest and most compact Power-over-HDBaseT Class A receiver. Its micro-size—weighting a mere 3.6-ounces and roughly the size of a deck of playing cards—means this miracle device slips discreetly behind your TV (or audio system).

The device receives all signals and power from the single Cat cable, and provides outputs to connect HDMI, IR, RS-232 and Ethernet, ensuring your TV or audio system will have every feature and connection necessary.

For local displays and/or rack-mounted Audio/Video receivers the matrix offers two HDMI connections for quick and simple plug-and-play operation.

With Control4's new Ultra HD matrixes, your smart home will be ready to enjoy the best video of today, tomorrow and into the future!