4K | A NEW ERA IN VIDEO CONTENT

A Parks Associates Whitepaper

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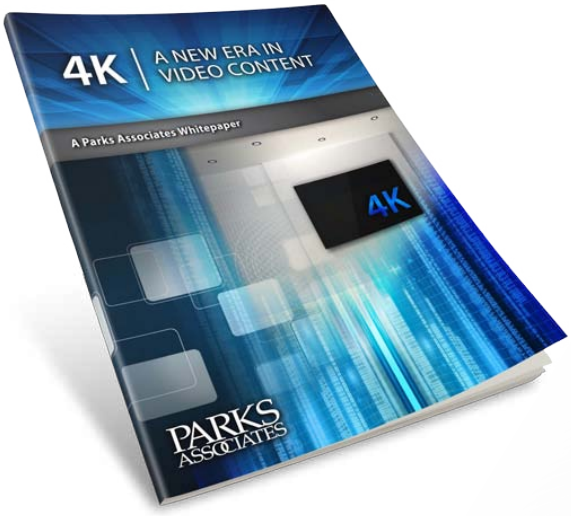
4K is in its infancy on all fronts, from hardware to content production and video services.

There is considerable industry interest in the potential for 4K to speed up the next replacement cycle among CE shoppers, which is not unprecedented.

Flat-panel HDTVs have a shorter replacement cycle than traditional CRTs. While the latter had a 9-10 year replacement cycle, flat-panel TVs have a 6-8 year replacement cycle.

However, Parks Associates research **CLEARLY SHOWS** that consumers are unfamiliar with the concept of 4K, which is a significant barrier to its uptake.



CURRENTLY LESS THAN 15% OF U.S. BROADBAND HOUSEHOLDS ARE FAMILIAR WITH 4K.

As a result, the prospect of acquiring a TV with 4K capabilities is not inspiring consumers to replace their current flat-screen TV. About 45% of consumers who plan to buy a flat-panel TV in the next 12 months say they are likely to buy a set with 4K capabilities. That would equate to roughly 8% of all U.S. broadband households.

However, since the survey did not emphasize cost differences among different features, actual adoption of 4K will likely be much lower once consumers see the price tag. With 4K televisions ranging anywhere from $1,500 to a jaw-dropping $150,000 for a 110-inch panel, consumers will have to weigh the costs and benefits between a new 4K television and a new 1080p HD television for under $1,000.

The First Hurdle

Convincing consumers to spend more money on a CE requires a clear explanation of the benefits.

Making the case for 4K is difficult at the outset because the terminology itself can be confusing. The term "4K video" is derived from the number of pixels across one horizontal line of resolution. Consumer 4K UHD video has nearly 4,000 pixels per horizontal line in a 16:9 aspect ratio, giving a widescreen resolution of 3,840 by 2,160 pixels, which is approximately 8.3 million pixels overall. In comparison, 1080p High Definition (HD) video has a 16:9 aspect ratio widescreen resolution of 1,920 pixels by 1,080 pixels, or approximately 2.07 million pixels, making 4K video four times the resolution of 1080p HD. The more pixels in a given resolution, the finer the detail of a picture can be, giving 4K UHD video a sharper appearance than 1080p HD.

The benefits of 4K extend beyond the simple maxim of "bigger is better."

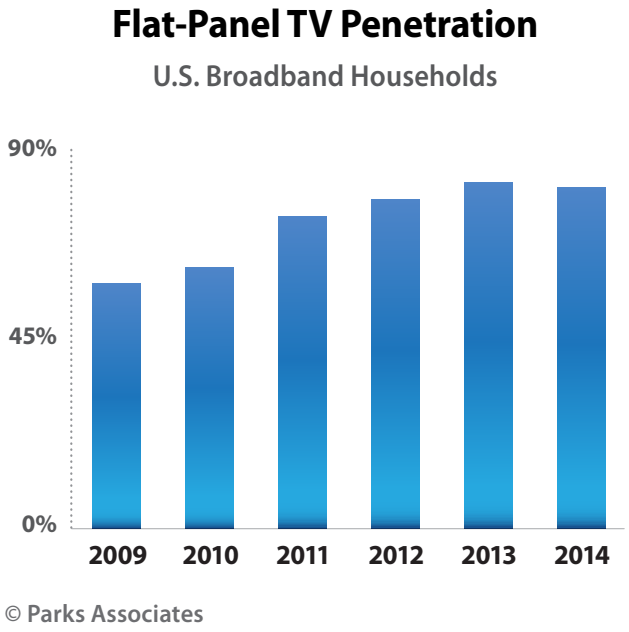
Retailers and manufacturers have to shift their message to more experiential benefits and expand the message to more than just feature-film content. While a higher number of pixels is a quantitative benefit, 4K shows its value in qualitative measures. Fortunately, the content industry has been delivering high-quality programming that inspires consumers to seek a better viewing experience outside the feature-film space. Popular and highly acclaimed episodic programming like *House of Cards* (Netflix), *Breaking Bad* (AMC), and *Game of Thrones* (HBO) have given big-screen productions a run for their money in quality and artistic merit.

Whereas there was once a chasm between big-screen cinema and small-screen TV in terms of visual and artistic quality, that gap has narrowed considerably, and there is a growing expectation that all professionally created content will display in high quality. Episodic programming needs to make use of the screen's real estate for consumers to feel they are getting their money's worth, which in turn could give CE shoppers a reason to upgrade.

Smart & 3D in the TV Upgrade Cycle

The penetration of flat-panel televisions has exceeded 80% of U.S. broadband households, up from only 58% in 2009.

After that year, virtually all flat panels were HD, giving consumers dual incentives to upgrade. The improved visual experience was one driver, but the new, slimmed-down look of TVs and the ability to mount the TV on a wall also created demand. Finally, the decline in prices to mass-market levels really pushed growth into overdrive.



With flat-panel TVs reaching mass-market levels, retailers and manufacturers started looking for new innovations—in particular, smart TVs and 3D—that would accelerate consumers' TV upgrade cycle.

Like 4K at CES 2014, 3D TVs were prominent during CES in 2010. However, only about 13% of U.S. broadband households have a TV with 3D capabilities today. The need for uncomfortable and expensive headgear was a key hurdle as was the lack of 3D content. Most available 3D content consists of movies and sports, but ESPN and other content producers have discontinued 3D offerings. The viewership is not there to justify the cost of content development, and with limited viewership, monetizing 3D programming is difficult.

Consumer awareness of 3D capabilities in TVs remains stubbornly low—in early 2014, only 22% of U.S. broadband households are "very familiar" with 3D TVs.

For smart TVs, consumer response has been stronger. Roughly one-third of U.S. broadband households have a smart TV, and over 70% of those sets are actually connected to the Internet. Furthermore, over 70% of consumers who plan to buy a TV in the next 12 months plan to select a smart TV, so purchases are increasing as a percentage of flat-panel TV purchases. However, a growing number of inexpensive devices such as the Roku streaming player, Amazon's Fire TV, and Google's Chromecast can offer a measure of "smart" functionality for a much lower price, thus eliminating a potential reason to replace the entire TV set sooner rather than later.

Making the Case for 4K

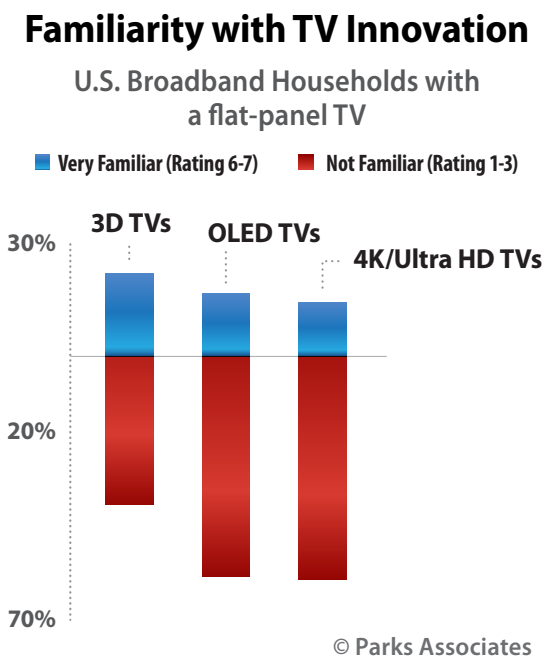
Sales of 4K TVs are in the early-adopter stages, due in large part to the high cost of the sets.

CEDIA dealers expect to install approximately 15,000 homes with 4K home theater units in the next 12 months, and the majority of these dealers believe that 4K sales will account for 5-10% of all their sales in the next year.

Consumers will start to see mass-market pricing for 4K TV sets near the end of 2015. Manufacturers expect, from that point, mass-market adoption over the following five years, with approximately 80% household penetration of 4K TVs in 10 years.

To reach this point, TV makers and the industry overall must increase efforts in educating consumers. Retail will still drive the educational process, as it did when HDTV emerged, but the retail market faces significant challenges today. The online marketplace has supplanted a portion of the brick-and-mortar retail space, so consumers are not as likely to visit retail store displays, which are key to demonstrating 4K's superior quality. A 4K demonstration online is not feasible because consumers would need to have a 4K display to see the difference.

Lower retail influence may require TV manufacturers to be more creative when exposing consumers to the technology. A side-by-side comparison to showcase the difference that 4K video offers compared to current HD televisions will be critical. Connecting the technology with key events, such as the World Cup, the Super Bowl, or even the season premier of a popular show like *The Walking Dead* could increase 4K's profile among consumers. However, until consumers begin clamoring for 4K, the movement toward 4K will be an industry-driven initiative.



Content Use Cases for 4K Video

To optimize video for 4K viewing, the content must either be produced using 4K cameras and equipment or converted to 4K resolution in post-production.

However, not all video is produced and delivered in the same way. Premium video content can be grouped into three major categories, each of which benefits from 4K in unique ways:

- Live content
- Made-for-television/video content
- Filmed entertainment

LIVE CONTENT

Live content includes sports, news programming, and live events produced for television viewing. 4K video provides a more realistic visual representation of the content, giving the viewer a more immersive experience.

The greater clarity of 4K video provides a look and feel that gives the viewer a closer sense of being at an event. The higher quality video of 4K coupled with higher frame rates reduces picture distortion—particularly important for fast-moving events such as live sports—and gives the user a more realistic view of motion. Many sports content owners are now eager to enable multiscreen experiences to further increase the level of immersion of the experience, including features that allow viewers to choose camera angles. Thus, in the near future, viewers will be able to have a uniquely custom experience while viewing a sporting event made more lifelike through the higher quality of 4K UHD video.

MADE-FOR-TELEVISION/VIDEO CONTENT

Content made for television or video includes episodic television programs, television specials, made-for-television movies, and made-for-video programming. Episodic television has yet to see widespread 4K production. Most television networks do not yet see 4K video as a viable production and distribution format due to low consumer penetration of 4K technology and the costs associated with upgrading to 4K technology.

OTT providers, however, are eager to exploit 4K technology to remain ahead of competitors and substitutes in the video technology landscape. Netflix plans to produce its popular and award-winning series *House of Cards* in 4K in 2014 and will partner with Walt Disney and Marvel Entertainment to produce four original episodic series in 4K. Amazon also plans to produce all of its original content with 4K equipment, which will include episodic comedy, drama, and children's program series. According to press releases from Amazon, studios, including Sony Pictures, Warner Bros., Lionsgate, and 20th Century Fox, are open to supplying distributors with 4K movies. Today, however, most of the 4K content from major studios is actually 2K video that has been re-mastered in 4K through additional post-production work, the cost of which may be shared between the studio and the service provider.

Much of the 4K content currently available on Amazon includes nature documentaries, historically a common category for showcasing high-quality video. Nature documentaries typically combine wide landscape shots with extremely close detail shots. This pairing shows contrast between broader and finer detail on the screen, giving the viewer a sense of the capabilities of the video technology. In addition, documentary directors often rely on shooting at high frame rates to capture intricate animal action, and playback requires smoother on-screen motion that only high-resolution video displays with high frame rates can provide. BBC and Discovery Networks established a high standard for nature documentaries in 2007 with their documentary miniseries *Planet Earth*. At that time, the miniseries served to showcase the capabilities of HD television in a consumer setting, and today, similar content is emerging in 4K.

FILMED ENTERTAINMENT

While filmed entertainment has experienced successful integration in the home video market, home video technology has yet to approach the user experience of viewing a movie at the cinema. One of the issues confronting 4K video in filmed entertainment is the fact that video and film are fundamentally different motion-capture processes. While film consists of light captured through a lens on physical celluloid photographic film, video consists of electronic data that is encoded and decoded to form a visual representation of the motion that is captured. While the media are closer visually than they have ever been in the past, the look and feel of video has yet to match that of filmed motion pictures.

High-resolution video looks sharp and crisp, but it lacks the cinematic look that comes from capturing individual pictures through a shutter. The experience becomes more like watching a live performance as opposed to a movie, which may or may not detract from the experience.

Some filmmakers, like Quentin Tarantino, have vehemently opposed digital cinema as it attempts to portray a realistic presentation of action rather than an illusion of motion through individual photographic captures.

However, many of Tarantino's peers, notably Robert Rodriquez, have wholly embraced digital filmmaking, and studios have pushed toward digital film production due to its lower production costs and practicality. Film stock is expensive to purchase and is highly susceptible to environmental issues. Heat can degrade film stock, and undeveloped film stock cannot be exposed to light or radiation, including x-rays. All these factors enhance the challenges of storing and transporting film stock.

Transporting digital film via hard drive or through a network has none of these problems. With large studios striving to control the rising cost of content production, digital film production enables one method of cost reduction while presenting the opportunity to market high-quality 4K cinema content to consumers. Whether filmmakers embrace digital production or not, large studios are expected to transition to 4K consumer video in the near future, in effect forcing the transition onto filmmakers.

Near Future of 4K

Consumers were relatively quick to familiarize themselves with TV-related terms like HD and LED, so 4K and UltraHD could easily follow.

CE manufacturers are aggressively promoting 4K as the future for televisions, so as 4K televisions become more affordable, consumers will adopt these new sets and start to demand content to exploit their newly acquired technology.

However, given historical patterns, Parks Associates does not see 4K as having an appreciable impact on the TV upgrade cycle, at least not in the near term. 4K will be a secondary, rather than primary, purchase factor for new TVs, as picture improvements can be very subjective, especially based on viewing distance. Instead, the early market for 4K will be delivered via OTT. 4K content does require significantly more bandwidth than other content to deliver. A 4K content stream is the equivalent of two 3D streams, four HD streams, or 16 SD streams, but providers have the incentive to be first to market with this benefit. Broadband providers could benefit through the sale of higher tier broadband speeds and higher data caps.

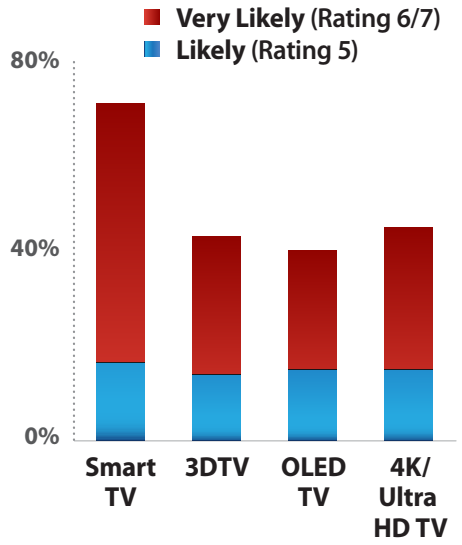
Video content production will see a shift toward 4K, and eventually 8K, as video cameras become available and affordable. Much of the tech-savvy creative staff in video production will be eager to exploit the new technology, though this change will not occur until the industry has established the viability of 4K video in the consumer market. Content companies will be especially wary, considering the recent failure of 3D television.

Unlike 3D, 4K video is more an enhancement of existing technology than it is a completely unique experience. Thus, 4K is more akin to HD rather than 3D, which is good news for the industry.

Currently, 4K is at roughly the same level as 3D for purchase intentions among flat-panel shoppers, whereas smart TVs are the most popular enhancements. As the industry grows consumer awareness and ties the technology to significant video events, 4K has the potential over time to reach the purchase intentions of smart technologies. By that point, there will be enough 4K content on the market that consumers will be able to see the benefits.

Purchase Intention for Flat-panel TV Capabilities

U.S. Broadband Households likely to buy Flat-panel TV in Next 12 Months



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About The Author

Glenn Hower, *Research Analyst,* **Parks Associates**

Glenn Hower currently studies entertainment content and delivery services. Glenn is experienced in entertainment content production and distribution systems with a particular emphasis on radio, television, and film content.

Glenn earned his BA in music with a focus on the music business and industry from the University of Texas at Austin. He earned his MS and MBA from Texas Woman's University in Denton, Texas.

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The company's expertise includes new media, digital entertainment and gaming, home networks, Internet and television services, digital health, mobile applications and services, consumer electronics, energy management, and home control systems and security.

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