At first sight, 4K display technology—also sometimes referred to as Ultra High Definition (UHD)—takes one’s breath away. Brought to life with the premium performance of the latest Intel® desktop processors, every video, photograph, game, and desktop app renders more vividly and beautifully than imaginable. Simply put, everybody who sees it will want it.

Intel, long committed to taking creativity, entertainment, and production to new heights on desktops all over the world, has for many years been helping to fuel significant improvements in desktop technologies. Now, working with key collaborators, Intel is bringing 4K to the mainstream so that millions of desktop users can enjoy its outstanding benefits.
4K + desktop computing: A perfect match

It is no exaggeration to say that 4K is revolutionary. With 8.3 million pixels on the screen, every video of the kids playing football, every holiday photograph, and every heart-pounding move in a game is brought to life. And while 4K televisions are beginning to find their way into more homes, the benefits 4K brings to TV are optimized on screens that are 70 inches or more at a viewing distance of 9 feet—not ideal for most households. Meanwhile, desktop computers actually provide the optimal combination of larger screen size plus the close distance interaction viewers need to best experience the technology. At 18 to 36 inches away from a desktop display with 4K—a typical distance range for desktop users—one can see incredible detail, great sharpness, greater contrast, and reduced banding. Lines are smooth, and close-up images seem clearer, more realistic, and less pixelated.

Desksops deliver maximum benefit of 4K vs. 1080p display

At typical viewing distances, desktop computer users experience the most benefit from 4K technology.

"Percentage of benefit: 4K vs. 1080P" calculated as the ratio of additional pixels in a 4K screen visually discernable versus the pixels of a 1080P screen when viewed with perfect (or corrected) human vision at the following distances: Phone: 10"; Tablet: 11"; Clamshell Laptop: 17"; Desktop/AIO: 19"; 50" TV: 9ft; 85" TV: 10ft. When viewed from distances closer than those used in the calculation, the benefit of 4K will increase further.
Desktop users throughout the spectrum of use cases will be rewarded with rich, immersive experiences. From photography to games to everyday office work, developers are more committed than ever to making software that supports and leverages the technology and provides users with the best 4K experience possible. Already, content creators and gamers are reaping the benefits:

### Stunning photography

When creating, editing, or viewing a photograph using a 4K display, the gap between real and digital narrows—colors pop, lines are super smooth, every detail is crisp. Over the past several years, developers have been busy updating photo editing apps such as versions of Adobe PhotoShop* and Lightroom*, and CyberLink PhotoDirector*, to scale for 4K. That means photographers, publishers, and other content creators can take full advantage of the super-high pixel technology in their DSLR cameras to produce, edit, and view large, crystal-clear photos.

### Immersive gaming

The newest generation of PC games are mind-blowing packages of creative wizardry, original storytelling, compelling characters, and huge-budget production quality. Now quadruple that. Major game manufacturers seeking to heighten the gaming experience began releasing more immersive games that could span three monitors in the last decade. Expansive 4K display technology is a natural progression, and all new games support 4K. Note that high-end gamers looking to upgrade to 4K will have to make sure their system has a supporting discrete graphics card.

### Lifelike video

The little dimples on the football as it spirals through the air. The glistening beads of water dripping from the leaves during a morning hike. The twisting, disappearing smoke rising from three red candles atop a chocolate birthday cake. With 4K technology, video comes to life. From professionals to home studio mavens, 4K inspires and delights with the sharpest video ever. To help bring 4K video into the mainstream, hardware and software developers have built a wide array of supporting tools, including select GoPro models (some of which are waterproof to 40 meters), as well as many camcorders, tablets, and smartphones. Video editors that support 4K include versions of Adobe Premiere Pro* and CyberLink PowerDirector*, among others.

### Productivity that’s easy on the eyes

When we’re not using them to create and view content or immerse ourselves in the latest and greatest games, we use desktop computers to simply get stuff done. We create presentations, correspond with colleagues and friends, build and manage budgets—and with 4K displays, work gets easier and even more efficient. With sharper text and graphics, 4K helps reduce eye strain, rendering sharp and crisp text that makes reading, writing, and working more pleasant. Windows* 8.1 and Office 2013* applications scale for 4K, as do versions of all major Internet browsers. Moreover, a number of video-sharing websites, including YouTube*, now support 4K.

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Note: Comparison images are simulations only; circular pull-outs are 300% zooms that further help show the difference.
The path to 4K + desktop computing

Although Intel does not make display technology, its leaders understand that screen quality plays a significant role in desktop computing. Therefore, to ensure that the silicon inside contributes to the most amazing and immersive experiences outside, Intel began collaborating with display manufacturers to improve the visual experience for PC users.

Beginning in 2012 with key investments, research, and a dedicated team, Intel has helped pave the path toward bringing 4K displays to more desktop computer users. This timeline shows the progress and success:

2012: Intel Capital invests in Portrait Displays, a company that among other things develops and licenses software to enhance computer display performance.

April 2013: Intel and leading monitor manufacturers meet to develop a baseline standard specification for 4K display technology.

Q1–Q3 2014: Intel works with scalar silicon vendors to help accelerate plans to build the scalar silicon necessary for monitors to use the Samsung 4K panel. Samsung completes engineering samples of the new 4K panels.

September 2014 – Intel Developer Forum (IDF): MiTAC announces the launch of a 4K All-in-One model. Wibtek soon follows with its own All-in-One.

January 2015 – Consumer Electronics Show (CES):
- ViewSonic unveils the first monitor using the new Samsung panel. Both the ViewSonic model and one from Acer will be in U.S. retail in April; models from both AOC and BenQ are expected later this year.
- MSI releases the first 4K Gaming AIO using the Samsung panel and discrete graphics.
Why did Intel get involved with advancing 4K technology?
Intel is in the business of delivering high performance computing for the most amazing experiences. PC displays are essential to those experiences, and with sales of 4K TVs exploding, it’s clear that people really want this level of screen quality.

Why did you partner with Samsung?
Samsung is a leading manufacturer of PC screen-size LCDs; we were able to work with them to develop a low cost, high-quality 4K panel. The result is that our ecosystem partners can build and deliver high-quality 4K monitors and all-in-one systems at prices that let more consumers experience this amazing technology.

Why the emphasis on 4K?
It’s just an absolutely wonderful experience when you first see a 4K screen—the text is beautifully crisp and sharp, just like printed text. Photographs and videos have a level of sharpness and detail that you’ve never seen before, and games become even more realistic.

Beyond the screen, what’s required for a true 4K experience?
Processor speed is certainly key. For the best experience with photo editing, you need an Intel® Core™ i5 processor-based system at least, and for video editing and gaming you absolutely need to be running an Intel® Core™ i7 processor along with a discrete video card. And of course, to get the most out of 4K displays, you need software that supports the technology. We also worked with a number of software developers, like Microsoft, Adobe, and DivX, to help prepare the applications that will deliver 4K content on these new systems, which helps ensure that mainstream users will be able to enjoy 4K as it becomes available.

What’s next?
We put our initial emphasis on making 4K more affordable for the enthusiast audiences—specifically content creators and gamers. Intel®-based platforms launching later this year with Windows® 10 will include more of the technologies needed to watch movies and television shows on 4K displays, particularly protected content. It’s clear that 4K is moving ever closer to being a mainstream technology, and Intel is happy to have been part of that.
8.3 million reasons to get a new desktop

There’s no going back. After seeing how a 4K display with its 8.3 million pixels dramatically boosts the desktop experience—from videos to photography to gaming to everyday computing—adopting the technology at home and at work becomes the obvious next step for desktop users. Intel is dedicated to making the adoption smooth, affordable, and fun.

Bringing 4K displays to life requires the premium performance of the latest Intel® desktop processors, and Intel has incorporated support for 4K technology and graphics into several new Intel® processor families, including Intel® Core™ i5 and i7 desktop processors (equipped with Intel® HD Graphics 4600 or 4400) and Intel® Core™ M mobile processors (featuring the Intel® Iris™ Pro Graphics 5000 series.) Intel also plans support for newer video codecs in upcoming processor products, including the High Efficiency Video Coding (HEVC, also called H.265), which enables improved video compression. These next-generation processors—and Intel®-based platforms launching later this year with Windows* 10—will provide improved support for protected content like movies and TV shows.

With continued investment in and collaboration with solution providers who are committed to bringing 4K monitors to the desktop market, Intel is helping transform the computing experience for millions of users.

Learn more about 4K for desktop computing at intel.com/desktops.