

Seth McMurray

Picture perfect

The real story behind
Apple's Retina Display

96%



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The iPhone 4 was the first model to feature Apple's Retina Display, a revolutionary new screen that far surpassed the quality of any other smartphone on the market at the time. To compare, the standard pixel density for print quality is 300ppi (pixels per inch), and this new display was boasting 326ppi on a mobile phone! It was a huge step forward for the industry, and future Apple iPhone models continued with the Retina standard of display quality.

As stated by Apple:

'The pixel density of Retina displays is so high that your eyes can't detect individual pixels at a normal viewing distance. This gives content incredible detail and dramatically improves your viewing experience.'

However, it seems that not all Retina displays are created equal, even with the name.

Although Apple coined the term to define a particular viewing experience, different devices made with the same Retina standard have since used a variety of

different screen resolutions and pixel densities.

For example, the screen on a 13-inch Macbook Pro is physically much larger than that of the 3.5-inch iPhone 4S, and while they both sport retina displays, the Macbook Pro (227ppi) has a much lower pixel density than the iPhone 4S (326ppi). These differences in pixel density (while still retaining the Retina label) are largely to do with the size of the screen, and consequently, the intended viewing distance of the display.

To put it simply, the bigger the screen, the further away the optimal (or normal) viewing distance is. This means that you can achieve the same 'Retina' effect (where the eye can't distinguish individual pixels) with less pixel density, because the screen is intended to be viewed from further away.

However, when Apple first defined the optimal viewing distance for screens, they did it rather casually and it didn't seem very scientific. There is some controversy about the official standard of viewing





distance for mobile devices, as there is no formal governing body for this particular specification, and it is largely left up to individual professional opinions which differ significantly in most cases. Steve Jobs stated this definition in the original introductory Keynote for the Retina Display:

'It turns out that there's a magic number right around 300ppi that when you hold something around 10 or 12in away from your eyes, that is the limit of the human retina to differentiate the pixels ...text looks like you've seen it in a fine-printed book, unlike you've ever seen on an electronic display before.'

This is the standard that Apple has been going from the whole time throughout the evolution of their iPhones, and they have not put forward any formal quantitative definition of this, although critics and reviewers seem to agree on the whole that it was a reasonable standard to set.

Since the original Retina definition, Apple has gone beyond it even further with its newer models.

When the iPhone 6 and 6 Plus were introduced, they each had improvements made to their screen resolution, with the 6 fitting in just above the 720p HD standard, and the 6 Plus going all the way to 1080p HD and 401ppi. As such, Apple dubbed both these versions as 'Retina HD', which does sound a little bit cooler, but the only actual improvement to pixel density was in the 6 Plus.

Then when the upcoming iPhone X was announced this year, it's new OLED screen premiered as 'Super Retina HD', boasting a massive 458ppi.

All in all, Apple's Retina Display is a wonderful thing, regardless of its apparent overuse in their marketing and vague definition. It was and still is a massive improvement from their original screen technology, and will likely be pushed even further in the future.

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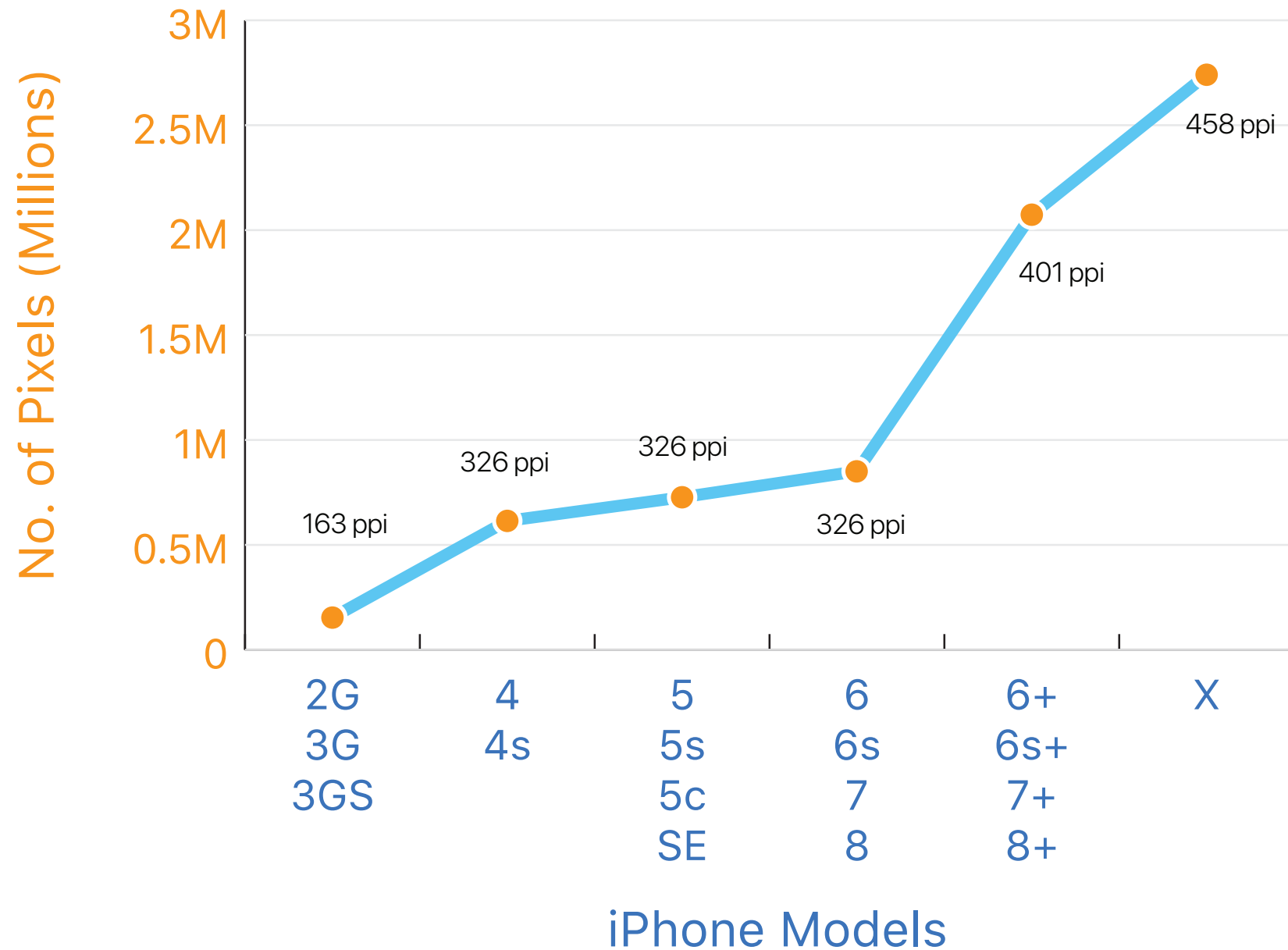
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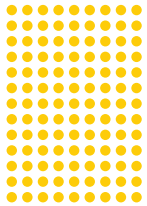
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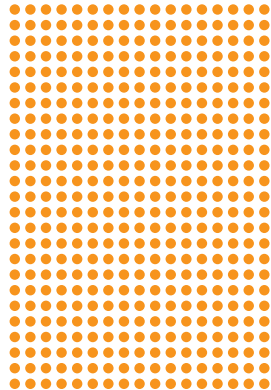
Number of Pixels in iPhones



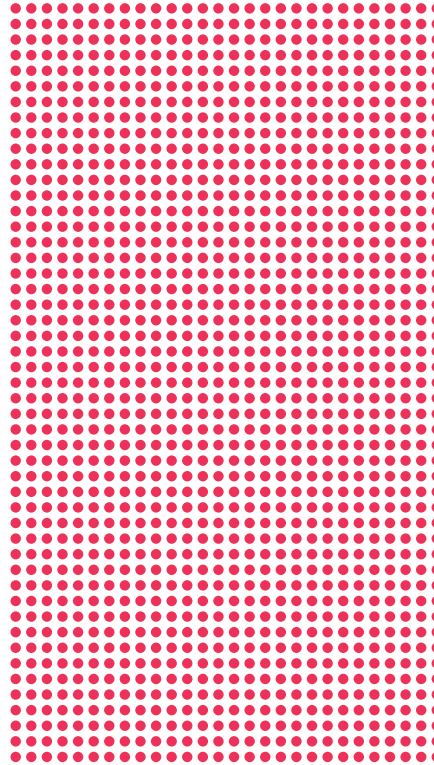
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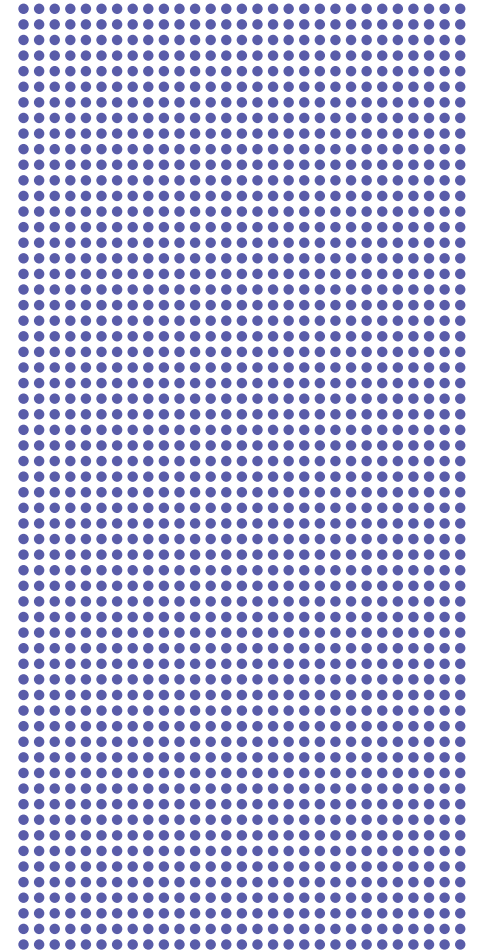
Original
Display



Retina
Display



Retina HD
(Full HD)



Super Retina HD

1 dot = 40px