



A Survey on Smartphone Screen Resolution

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ABSTRACT

Continued advances in display hardware and computing power and rendering algorithms have all converged dramatically improve large high resolution displays on human performance and other aspects are important as we look towards future advances in display technology. This study primarily focuses on the general characteristics and features of various kinds of screen resolution such as HD, full HD, qHD, Quad HD and ultra HD 4k.

Keywords:— *Smartphone, High Definition, Quad, ultra, pixel, density.*

I. INTRODUCTION

Watching movies is a whole new experience by using a Smartphone. A Smartphone screen is made up of thousands of dots called pixels which are the elements of a picture so the resolution of the screen is the

number of the pixels from left to right and top to bottom. But our viewing experience is not the amount of pixel but the pixel density. If the relation of phone screen and resolution is about Pixels per inch it gives you the best resolution. The left to right is the “x axis” and bottom to top is the ‘y axis’. Let us say a Smartphone screen size in pixel is 720 pixel from left to right and 1080 pixels from top to bottom, and then we say that the pixel resolution of this Smartphone is 720*1080 pixels. In 2011, we saw a number of high end devices with a vfour display with a resolution of 540*960pixels.

II. HD PHONE SCREEN RESOLUTIONS

He following are the different types of high density resolutions that are becoming common in high end smart phones.

HD (1280*720)

HD is an older standard of High Density screens. According to Apple, human eye

cannot differentiate the pixels density after 330ppi which is the sweet spot. HTC one X, Samsung, Motorola atrix and galaxy nexus are some of the examples of HD phones.

EX-One X, Motorola Atrix HD, Samsung Galaxy Nexus

Full HD(1920*1080)

HD stands for High Definition with a resolution of 1920*1080 and in the wide angle ratio of 16:9.

HTC and LG were the first companies to launch. Examples include Samsung with galaxy S4, HTC with its one model and Sony Xperia Z. With Full HD we can view 1920*1080 without worrying about scaling issues. The pictures are crisper and brighter and much better picture quality of HD. Disadvantages lies in the fact it eats up battery. It probably requires a 6 inch screen for better viewing. Not much useful for average users but

for daily YouTube users and e-book readers it is worth it.

Quad HD (1440*2560)

Quad HD has four times the total number of pixels than ‘HD Ready’. With greater number of pixel picture are clearer and sharper, with improved contrast and color vividness.

It has the ability to view full desktop versions of web pages without image distortion.

One of the major drawbacks of having quad HD display on mobile display is its higher cost. Power consumption for the backlight may not change but there will be increase in the amount of work the CPU and GPU will have to deal with.

The first manufacturer to install quad HD was Oppo find 7. The new flagship LG G3 was the major play. Starting with the 2014 Galaxy S% LTE- A, the list in 2015 grew to include

Table 1 : Comparison of Resolution, Range, PPI and Advantages and Disadvantages of Mobile Brands

RESOLUTION	RANGE	PPI	ADVANTAGES	DISADVANTAGES	Brands
HD	1280*720	330	Ultra sharp visual	More battery usage	One x, Motorola, Acer, Asus, Huawei
FULL HD	1920*1080	440 to 400 on	Crisper brighter and better picture quality	Eats up Battery, requires big screen	HTC, LG, Samsung, Lenovo, Micromax
QHD	1440*2560	538 on 5.5 inch	Improved contrast, colour vividness, no image distortion	Increases the amount of work for CPU and GPU, higher cost	Oppo find 7, LG, Samsung, Microsoft, Philips
qHD	960*540	300 approx	More websites can be accessed simultane-		Sony, HTC.
Ultra HD	3860*2160	806	Colour depth 12 colour bits, obviously best quality upto here	Recorded content is limited, transfer of 4k video requires 25mbps, bandwidth	Sony (Xperia z5 premium)

the likes of the Galaxy S6 edge, the rugged Galaxy S6, Xiaomi, HTC are more companies who launched this resolution.

qHD(960*540)

Quarter high definition HD became common on higher end smart phones as well as the play station vita in 2011. Specified as 960*540 pixels at a 16:9 aspect ratio. qHD is one-quarter full high definition or 1080p's 1920*1080 resolutions. qHD is a lower resolution but size of mobile screen makes its pixel density to 300ppi. With qHD we can see more websites at once when we browse interwebs. Phones such as the Sony Xperia P, HTC Amaze 4G, HTC Sensation, HTC Evo 3D etc comprise of a qHD screen. Moreover Sony's portable handheld gaming device, the Play station Vita also features a qHD display in it.

Ultra HD 4K (3840*2160)

Ultra high definition has pixel density of 3840*2160 which is almost 4000 pixels thus K represents a 1000. Sony Z5 premium has launched ultra HD on 5.5 inch screen with a pixel density of 806ppi. More is yet to come.

III. CONCLUSION

Smartphone size and its screen resolution are getting bigger day by day. The pixel densities increased too: from 342 to 538ppi and now we are looking at 806ppi. Image reality has improved dramatically because rapidly increasing pixel densities are appearing on screens that aren't significantly larger. But there should be a balancing point between screen and pixel density as the battery demands. For many, this point is a 5.5 inch screen with Full HD. With the advent of 4K resolution it is going to cost more. However with resolution you might not get a performance boost. Although we would like to have 4K resolution but manufacturers should

work on other features like battery life performance and design.

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