

Summary of knowledge about screen resolutions on smartphones: HD, Full HD, QHD, 4K

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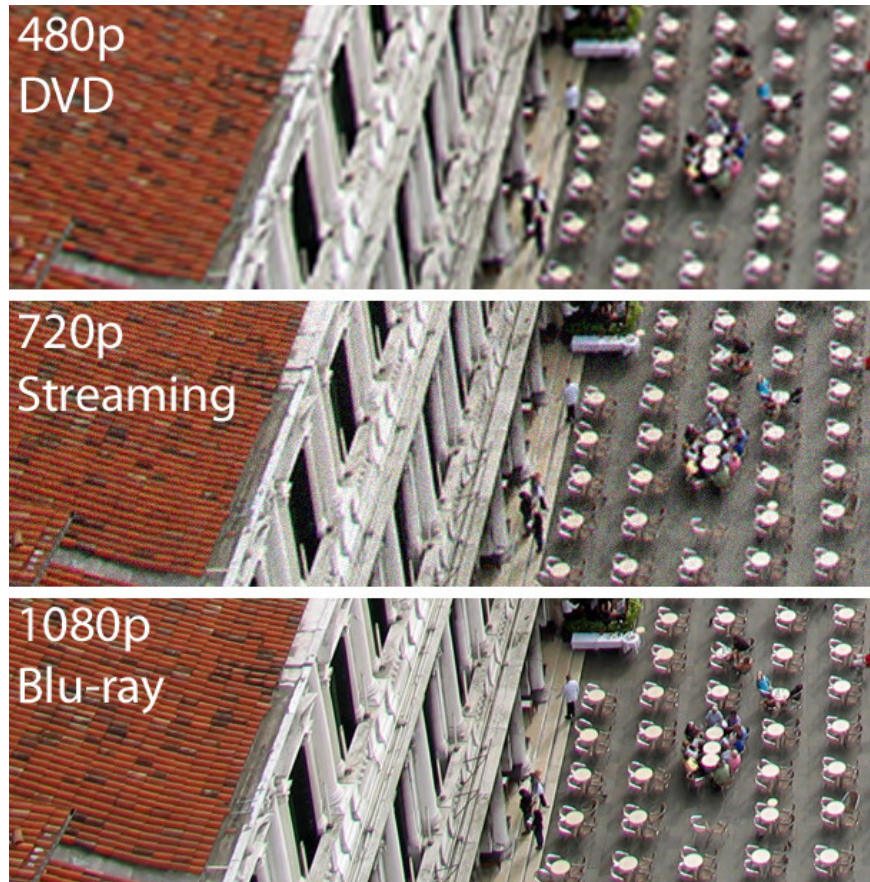
When it comes to the screen on the smartphone, it refers to **four important factors** , including: Display type, screen diagonal (inch), sharpness (HD, Full HD, etc.) and pixel density (ppi - pixels per inch). The last two things have a very close relationship.

You can define the display screen by simply looking at the number of pixels vertically and horizontally, creating the screen. It is often cited as width x height, with units in pixels instead of estimated by inch size; For example, 1,024 × 768 means the width is 1,024 pixels and the height is 768 pixels. To know exactly how much of your device is using the screen size, resolution and pixel density, check with the CPU-Z application.

CPU-Z Device	
Model	Asus Zenfone 6 (ASUS_T00G)
Brand	asus
Board	clovertrail
Hardware	redhookbay
Screen Size	6,00 inches
Screen Resolution	1280 x 720 pixels
Screen Density	244 dpi
Dimensions	166,9 x 84,3 x 9,9 mm
Weight	196 g
Total RAM	1992 MB
Available RAM	887 MB (44%)

Remember when Apple launched the iPhone 4, Steve Jobs once claimed that the human eye can only see pixels at the highest threshold of 300 ppi with a distance of 10 inches, equivalent to 25cm. This parameter sounds reasonable because most glossy paper magazines are also printed at a density of 300 ppi and no one complains that the word in the magazine is pitted.

Some others, including some analysts, say that the human eye can still recognize individual pixels at 480 ppi or even more. However, this requires users to keep their eyes on the screen (an unnatural use), eyesight must be as good as young people. Most of our visible thresholds range from 300 to 480 ppi, depending on eyesight and age.



There is another important factor to consider when we talk about a sharp and clear display, but often overlooked, which is **the observation distance** . Even on the sharpest models of TVs or phones, it starts to fade when you look at it at a distance. So the question we will answer today is: **From what distance do we see the benefits of high-resolution screens ?**

To measure the ideal distance between your eyes and the smartphone screen, suppose that you are one of the very few people with perfect vision, ie 20/20 vision. A person who reaches this level of vision is someone who can see everything with a 1 minute angle (equal to 1/60 degree).

Most people have lower vision than this, for example, people with 20/40 vision can only see clearly for 2 minutes, while for a few people (such as pilots) with eyesight October 20 can see clearly with an angle of 0.5 minutes. The true limit of the human eye is about 20/8, so once again we assume we have perfect vision 20/20.

With that hypothesis, try to think about how close it is to see the pixels on a 720p, 1080p and 1440p screen? Here, invite you to consult the most ideal distance to see how much:



1. 480p Smartphone (4 inch screen like Samsung Galaxy V Plus); The eye starts to see the image clearly from a distance of 37.4 cm.
2. 720p smartphone (4.7 inch screen like Nokia Lumia 730); The eye starts to see the image clearly from a distance of 28 cm.
3. Smartphone 1.080p (5 inch screen like that of Lenovo Vibe Shot); The eye starts to see the image clearly from a distance of 19.8 cm.
4. Phablet 1.440p (5.5 inch screen like LG G4 Leather); The eye starts to see the image clearly from a distance of 16.4 cm.



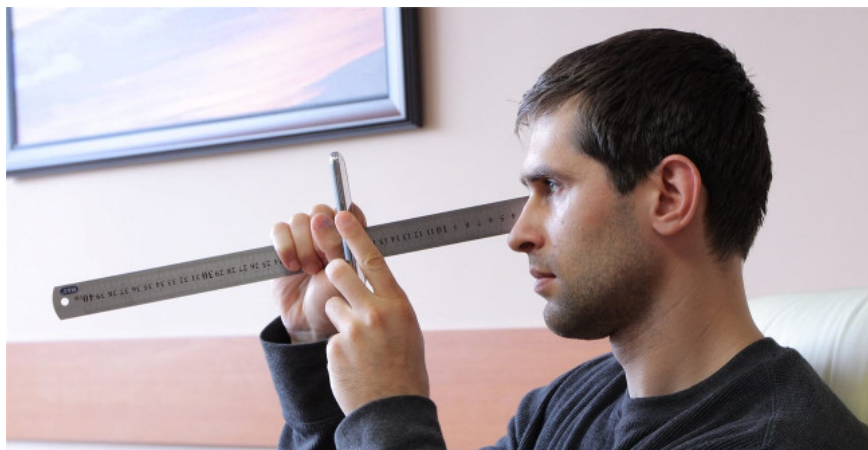
480p Smartphone (4 inch screen like Samsung Galaxy V Plus); The eye starts to see the image clearly from a distance of 37.4 cm.



With 720p resolution, the average user starts seeing pixels at a distance of 28 cm on a 4.7-inch phone



With a resolution of 1.080p, ordinary users start seeing pixels at a distance of 19.8 cm on a 5-inch phone



With a resolution of 1.440p, ordinary users start seeing pixels at a distance of 16.4 cm on a 5.5-inch phone
Before getting down to the detailed study of the quartet of HD 720p, Full HD 1080p, Quad HD 1.440p and 4K Ultra HD, I will quickly answer questions of some readers recently about these 4 standards. *Someone* asked: "Why did you say 1,280 x 720 pixels is HD, but now also calling 1,280 x 768/800 pixels is HD?" Or you ask: "1,280 x 800 pixels are HD standards called WXGA?", . Full HD, Quad HD and Ultra HD standards have similar questions.

In short and easy to understand, you just look at the screen size of mobile devices currently available in the market; About 5 inches or less is a smartphone, from 5.5 inches or more is phablet and over 7 inches is a tablet. Accordingly, the resolution is no exception, HD standards include: 1,280x720 pixels and 1,280x800 pixels. Because 800p is only slightly higher than 720p, people also call this standard HD, but actually it is at WXGA (1,366 x 768, 1,360 x 768, 1,280 x 800). In summary, because of the different sizes, ratios and technologies of different display manufacturers, this difference is possible (maybe 2 smartphones are the same size, but different resolutions and pixels, .).

HD standard

720p (referred to as HD), number 720 represents 720 horizontal scan lines of the image display resolution (also called 720 pixels of vertical resolution), while the letter p represents continuous scan. When playing at 60 frames per second, 720p has the highest resolution (motion) under ATSC and DVB standards. **This term assumes a 16:9 screen resolution** , thus corresponding to $1,280 \times 720$ pixel resolution.



Full HD Standard

Full HD is the next development of the HD standard and is currently very popular on smartphones, although 2K (QHD) has begun to show signs of strong growth, since the mobile market has appeared. OPPO Find 7 and LG G3, the first commercial phablet duo own QHD screen.

1080p is also called Full HD or FHD and BT,709. The term often appears on a 16:9 screen, corresponding to a resolution of $1,920 \times 1,080$ pixels, which is often advertised as Full HD.



Standard QHD, Quad HD or 2K

QHD is Quad HD's short name, commonly referred to as 2K , which is 4 times clearer than HD standard, corresponding to a resolution of 2,560 x 1,440 pixels, making the smartphone screen sharper and more vivid than Full HD .



Ultra HD or 4K standard

Ultra HD is also referred to as 4K . However, if you understand more correctly, Ultra HD corresponds to a resolution of 3,860 x 2,160 pixels and 4K is 4,096 x 2,160 pixels. Both of these definitions are often shortened to 2.160p and the pixel difference is relatively low, so most people call it 4K. As in the case of Sony Xperia Z5 Premium, it has a 5.5-inch screen with a resolution of 3,840 x 2,160 pixels, a pixel density of 806 ppi, but since its launch, the advertising and word of mouth information All technology is only referring to the 4K standard for this phablet.

However, the 4K screen of Xperia Z5 Premium is based on the SID standard, so it only allows all videos and images to display at this resolution, and other content will be displayed in Full HD 1080p resolution. or lower to optimize performance, as well as save battery.

Which resolution is best for you?

From consumers to critics and tech followers began to wonder why . Why manufacturers feel the need to continue to increase the resolution when they have not mastered white balance, color gamut , the ability to display " *quadrangle* " or outdoors in the sun on the current screen? Can the eyes even differentiate between the 5.5-inch QHD screen and the same size at 1080p?

Since then, it has also raised concerns about the device's power consumption such as: Screen backlight is brighter and requires CPUs and GPUs to be "more enthusiastic" to promote additional pixels. .



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