1. The Processor :

The processor is the central hub of your smartphone. It receives and executes every command, performing billions of calculations per second. The effectiveness of the processor directly affects every application you run, whether it's the camera, the music player, or just a simple email program. Pick the wrong one and you could experience sluggish, stuttering apps and limited network performance, regardless of carrier, manufacturer, or operating system.

When you swipe your way down a web page, you are commanding the processor to make billions of simultaneous and instantaneous interactions. When you do something more complex, like playing an online multiplayer game with 3D –intensive graphics or capturing 1080p video, the load put on a processor can be quite immense. The ability of the processor to coordinate efficient communication between the wireless data, graphics, and memory is essential to smooth operation.

The CPU, GPU, audio and video engine, connectivity features (GPS, WiFi, FM), and 3G/4G modem are the major components of a processor that control the operation of your smartphone. Let us take a look at what they do, and how they work together with the processor to make every action so seamless.

2. THE CPU (Central Processing Unit):

This is the brain of your smartphone. The CPU receives commands, makes instant calculations, and sends signals throughout your device. There are multiple ways to gauge the performance of a CPU, including checking the Gigahertz (GHz) speed under the processor specs. This tells you how many instructions the chip can complete in one second. A 1 GHz processor can process roughly 1 billion cycles-per-second. In the past, the CPU handled the visuals that were sent to the screen in addition to its other duties, but the demands of high quality graphics led to the development of another component to lighten its load— the GPU.

3. THE GPU(Graphics Processing Unit):

The GPU is assisted by the CPU to handle graphical work like Gaming on smartphone is extremely dependent for good Gpu to handle high graphic

Intensive games like PUBG , Ashphalt 9 , Fifa , Fortnight etc. games. Also if you want to Remember that you also should have to learn which CPU and GPU are matched Properly. your phone does a much better job handling a multitude of graphics-related chores than the CPU could alone. You'll notice the difference when you watch a movie or play a graphics-intensive game. Video won't stutter, photo-edits appear more quickly, and fast-moving objects won't appear pixilated with an integrated GPU. What's more, the GPU frees up the CPU, allowing it to conserve or redirect its resources

TOP BEST MIDRANGER SMARTPHONE PROCESSOR:

1.Snapdragon 450

2.Snapdragon 625

3.Snapdragon 636

4.Snapdragon 660

5.Snapdragon 710

6. Kirin 659 by Huawei

7.Kirin 710 by Huawei

8.Exynos 7 octa (7580)

9.Exynos 7 octa (7870)

10.Exynos octa 7 (7880) etc.

These are organized as the best midrange Processor the best one here is are given is Descending order from worse to best. These things are very important while buying you smartphones.

HIGH-END PROCESSORS:

1. Snapdragon 835

2.Snapdragon 845

3.Snapdragon 855

These are best for high-end task capable processors from Snapdragon by Qualcomm.

THE best Processor From Samsung Exynos are :

1 .Exynos 9 Series (8895)

2. Exynos 9 Series (9810)

3. Exynos 9 Series (9820)

The Best From Huawei are:

1. Kirin 970

2. Kirin 710 also (High-Midrange)

3. Kirin 980

Overview Of Kirin 710 :

Overview:

Kirin 710 offers high performance and great power efficiency, brings smoother running and greater gaming experience. It supports AI-powered scene recognition for photography, making it easy to get great photos. Kirin 710 supports dual SIM dual VoLTE for stable high-speed connections, coupled with TEE and inSE technologies, provide reliable security protection for mobile users.

Main Specification:

Process: 12nm

CPU: 4×A73 2.2GHz+4×A53 1.7GHz

GPU: Mali G51

Modem: LTE Cat.12/13 600Mbps DL/150Mbps UL

Dual SIM Dual VoLTE

ISP: AI-powered scene recognition, night scene shooting

Security solutions: inSE and TEE

Highlights:

Kirin 710 can provides smartphone users with ultra-responsive experience with super computing power.

Overview Of Kirin 970 :

Overview:

Kirin 970 is built through the most advanced TSMC 10 nm process technology, which integrates 5.5 billion transistors in an area roughly the size of a fingernail. Kirin 970 combines an octa-core CPU, a 12-core GPU, dual ISP, a 1.2 Gbps high-speed Cat.18 LTE modem, and an innovative HiAI mobile computing architecture. Kirin 970 features ultra-fast connection, intelligent computing

capability, HD audio-visual effects, and long battery life.

Main Specification:

HiAI Architecture: CPU/GPU/NPU/ISP/DSP

CPU: 4x A73 +4x A53

GPU: Mali-G72 MP12

Dedicated NPU

Coprocessor: i7 sensor coprocessor

ISP: Dual ISP with face and motion detection, 4-Hybrid Focus Low-light and Motion Shooting

Memory: LPDDR 4X

Modem: LTE Cat18/13 1.2Gbps DL / 150 Mbps UL

Voice solutions: Dual SIM, Dual VoLTE

Audio: 32bit@384 KHz HD audio, AI noise reduction

Video: 4K video, HDR 10

Security solutions: inSE 2.0

Process: 10nm

Highlights:

Kirin 970 is the first mobile AI computing platform of Huawei. With new HiAI mobile computing architecture which integrated a dedicated neural-network processing unit (NPU), Kirin 970 delivers about 25x the performance with 50x greater efficiency and greatly improves the capabilities in image recognition, voice interaction, and intelligent photography.

Overview Of Kirin 980 :

Overview:

The Kirin 980 is the world's first commercial mobile phone SoC chipset made with TSMC's 7 nm process, integrating 6.9 billion transistors to improve both performance and energy efficiency. It is the first of its kind developed based on ARM Cortex-A76, Mali-G76 GPU, a 1.4 Gbps high-speed Cat. 21 in the world. The Kirin 980 supports the world's fastest LPDDR4X with the rate up to 2133MHz, the world's fastest mobile phone Wi-Fi chipset, to support 160 MHz bandwidth. The theoretical peak download rate of this partnership is 1.7 Gbit/s.

Main Specification:

HiAI Architecture: CPU/GPU/NPU/ISP/DSP

CPU: 2+2+4 flex-scheduling mechanism, 2xA76 2.6GHz+ 2xA76 1.92Ghz + 4xA55 1.8Ghz

GPU: Mali-G76 MP10

Dual NPU

Coprocessor: i8 sensor coprocessor

ISP: Huawei-developed ISP 4.0、multi-pass and multi-noise reduction technology,HDR color reproduction

Memory:LPDDR4X @2133MHz

Modem: DL 3CC+4*4MIMO+256 QAM, Cat.21, Download 1.4Gbps

Security solutions: inSE; EMVCo

Process: 7nm

Highlights:

The Kirin 980 is the fastest, highest performing, most energy efficient, and most intelligent chipset on the market. These outstanding features allow the chipset to provide more powerful, rich, and smart experiences to mobile users.

OVERVIEW FOR QUALCOMM SNAPDRAGON PROCESSOR:

1. Snapdragon 835:

Overview:

With an advanced 10-nanometer design, the Qualcomm® Snapdragon™ 835 mobile platform can support phenomenal mobile performance. It is 35% smaller and uses 25% less power than previous designs, and is engineered to deliver exceptionally long battery life, lifelike VR and AR experiences, cutting-edge camera capabilities and Gigabit Class download speeds.

Main Specification:

CPU: 8x Qualcomm Kryo 280 CPUup to 2.45 GHz

CPU-Architect : 64 bit

GPU: Adreno 540

Process: 10 nm

Camera: Upto 16MP dual camera, 32 MP single camera

Charging: Quick Charge Supported

Memory : 1888Mhz, Dual Channel, LPDDR4X

Display: 4k supported.

Highlights:

Snapdragon 835 is now become the quite old for new gen smartphones . Still its very capable cpu than can handle any graphics intensive work and 4k recording and high resolution camera support. But I suggest to buy newer gen processor with time pass by .

1. Snapdragon 845:

Overview:

They say the best is yet to come. We say, with the Qualcomm Snapdragon 845 mobile platform, it's here. Every forward-looking feature—including immersive XR experiences, an intelligent personal assistant and advanced vault-like security—is enabled by the Snapdragon 845 mobile platform. It also delivers up to 1.2 Gbps peak download speeds across a broader spectrum—our platform is smarter and faster than ever before. It has more than what we need for our daily uses that previous s835 lacks. So here you have more recent version of snapdragon processor that gets all the job done with modern era

Of computations.

Main Specification:

AI: Full AI supported CPU enhances camera, gaming etc.

CPU: 8x Qualcomm Kryo 385 CPU up to 2.8 GHz

CPU-Architect : 64 bit

GPU: Adreno 630

Process: 10 nm (2^{nd} Gen)

Camera: Upto 16MP dual camera, 32 MP single camera

Charging: Quick Charge 4 Supported

Memory : 1866 MHz, Dual Channel, LPDDR4X

Display: 4k supported ,recoding at 60fps 4k

Highlights:

Snapdragon is the latest processor for 2018 but now its become 2019 so its yet not the latest one . But this CPU has a tons of ability like AI (Artificial Intelligence) that can enhance camera features and the camera ability to take better and proper image. Video capability increase drastically as well as its Adreno 630 GPU is so powerful to handle any high quality games like butter so for gamers and high end users it's a must to have plus its very power efficient too.

SAMSUNG PROCESSORS OVERVIEW:

1. Samsung Exynos 9820:

Overview:

The Exynos 9820 pushes the limit of mobile intelligence with and integrated Neural Processing Unit (NPU), this NPU is specializes when processing AI tasks

And AI related functions faster than its predecessors . It has advanced AR features and high computational power to operate high intensive tasks.

AI **:** Full AI Supported CPU (NPU)

CPU: Dual-Core(Custom CPU)+

Dual-core(Cortex A-75)+

Quad-core(Cortex A-55)

CPU-Architect : 64 bit

GPU : ARM Mali – G76 MP12

Process : 8 nm

Camera : Dual 16MP+16MP, Rear 22MP, Front 22MP

Charging : Quick Charge 4 Supported

Memory : LPDDR4X

Display : 4k UHD

Video : 8K 30fps or 4K UHD 150fps

Highlights:

This is definitely the latest and greatest from Samsung processors exynos 9 series. It has a tons of improvements over all its predecessors like integration of NPU to calculate AI task more efficiently and powerfully . its great for all kinds of task like games , 8k recording , 4k display Support , newer architecture of processor etc.

1. Samsung Exynos 7 series 9610:

Overview:

For more enriched photo-taking and filming experiences, the Exynos 9610 processor features a vision image processing unit based on a deep-learning technology. The unit consists of a DSP (Digital Signal Processor) that efficiently converts analog streams of images and video into a digital signal and a neural-network engine that analyzes the faces, objects and the surroundings. Through a deep-learning based algorithm, it enables mobile devices to offer AI related features for enhanced photography and filming.

CPU: Up to 2.3GHz Quad-core (Cortex – A73)+

Up to 1.7GHz Quad-core (Cortex – A53)

CPU-Architect : 64 bit

GPU : Mali- G72 MP3

Process : 10 nm

Camera : Dual Camera (16+16)MP , Rear 24MP,Front 24MP

Memory : LPDDR4X

Display : 2k QHD(2560 X 1600)

Video : 4K UHD 120fps support

Highlights:

This is definitely one of the best midrange from Samsung processors exynos 7 series. It is specially made for budget customers who cannot buys higher end smartphones that comes with exynos 9 series but this processor is not that bad as low end . it can do your daily task quite well . But If you are gamer forget it and if you want high resolution video and high quality Processing you will not like this for sure.

Final Verdict For Processor

1. See what you budget first

2.Undersatnd about processor

3.Try to compare all processor brand

4.See what it can do

5.See CPU, GPU , Architecture, Camera support

6.See Memory , Clock Speed, Cores

7. See Video and recording Support

RAM TECHNOLOGY: (SMART-PHONE)

1. What is ram?

Ram (Random Access Memory).It is called random access memory because it can be read and written at any point without needing to wait in the queue of process is the ultimate part of any compute capable machine that helps to load and execute task

and specially, when you use a tons of apps in smartphone you get to know that how important it is for loading your apps. So, the knowledge about Ram is so much important when buying your smartphone.

2.Why is ram so important?

Ram is the to help processor load and execute task and for doing multiple task you need ram if you ran out of ram your smartphone will lag a lot you will find it not so smooth rather your task will hang a lot when you have less amount ram on your device.

3. Why we need more ram?

As the Modern world the technology is increasing and our daily necessary also getting more demanding like playing very high quality games, Shooting 4k videos, 4G, 5G, WIFI internet browsing, using multiple apps same time etc. need a lot of processing power and ram to access then and load them properly. So, day by day the importance of implementing more ram on smartphone is so vital.

4.How much ram is enough?

It depends upon your need and use and OS (Operating System) as If you use android OS then you need more ram than IOS based Iphones as the platform and optimization are factors too when thinking about how much ram is proper. So, Android users need at least 3GB of ram to do daily task properly like games, shooting videos, watching 4k content, internet using with multiple tabs and for multitasking. But do not expect butter smooth performance in 3GB of ram now-a-days as its for average users and budget smartphone users. But if you want better performance than go for 4gb variant of that smartphone or if you have higher budget use 6gb of ram that is quite enough for any android phone at my writing time of January 2019 but this may change in future. Here we also have 8GB variant of Samsung Note 9, OnePlus 6 and 6T with 8GB of ram etc. But they are expensive if you go for 8 GB one so for most of budget people 3 GB or 4GB is quite good and for higher end users and more smooth performance and intensive multitasking use 6GB one.

5.Multitasking and Ram:

Multitasking means doing multiple task same time that we do in smartphone quite often in our daily life like using music player app and browsing internet and doing chat same time is part of smartphones capability and for doing these thing s we need more ram like around 4GB to 6GB or more to do these heavy tasks at same time smoothly. This is 2019 so its not enough that you can do all the tasks and use heavy apps in just only 2GB ram. For budget people at least 3GB needed.

6.Ram on Android and IOS OS:

Ram behaves little differently in accordance with your OS and optimization. As in the previous section I told you guys that in android OS we need more ram but now let see why on IOS we do not need that much of ram on iphones, ipads etc. IOS has much better optimization than android so it does not require that much ram to operate smoothly. It can do all tasks and daily needs so smoothly in 2GB ram only that even 4GB ram android phones cannot give you. Like now Iphones are also using 4gb ram that compete with android 6GB and 8GB ram. IphoneX and Iphone Xs max do not have 8 GB of ram but it defeats all other 8GB android phones for its good apps and OS optimization.

7.What types of Ram Modern Phones use?

LPDDRs:

The LPDDR or Low Power DDR is also known as Mobile DDR or m-DDR. These are specially designed Double data rate Synchronous DRAM for the mobile smartphones and Tablet PCs. The essence of LPDDRs lies in the fact that they are design to consume low power at around 1.8 volts as compared to the 2.5 volts RAMs used in other devices.

LPDDR4:

The LPDDR4, as should be evident, is the fourth generation of LPDDR RAM technology. In essence, it can be considered to be the DDR4 alternative for the mobile devices. While DDR4 has already been used in high-end PCs and similar systems, their mobile equivalent the LPDDR4 finds a vital use in smartphones and tablets.

The LPDDR4 brings ahead faster functionality and lower power consumption. The fundamental difference between then DDR4

RAM used in PCS and the LPDDR4 lies in the fact that they come with smaller bit bus. This helps in lower power consumption.

The LPDDR4 improves the data rates by almost double when compared to the previous generations, the LPDDR3. You can get data rates as high as 3200Mb per sec with LPDDR4 as compared to the 1600 Mb per sec performance on the LPDDR3. The LPDDR3 had one channel, while the LPDDR4 opts for a two-channel design. It offers you 16 Bits per channel, thus providing you a total of 32 Bits. This can be helpful in lowering the power requirements of the core. The short data path ensures that the lower power consumption. This can be quite helpful in improving the operational speed and performance. The LPDDR4 offers a marginal improvement in the power consumption from 1.2 volts on LPDDR3 to 1.1 Volts on LPDDR4.

Another advantage associated with the LPDDR4 RAM is it can be manufactured on a smaller 20nm process. This helps in going for mass productions and can effectively reduce the price as well.

LPDDR4X:

LPDDR4X is another fourth-generation Low Power DDR RAM developed for the mobile computing devices. In fact, there is not much of a difference between the LPDDR4 and LPDDR4X as such.

In fact, the LPDDR4X has been planned as a small optional upgrade to the LPDDR4 modules. The only difference between the LPDDR4 and LPDDR4X lies in the lower power consumption – still lower than that on the former. As we have already found above, the power consumption levels on LPDDR4 have been reduced marginally from the LPDDR3. This is further reduced with LPDDR4X.

The task is achieved using reduction in the I/O voltage to 0.6 Volts from 1.1 Volts as observed on LPDDR4. Other additional improvements on the LPDDR4X, as opposed to LPDDR4, are a single channel application, newer MCP, PoP and IoT packages.

In essence, the LPDDR4X reduces the output driver power to achieve this. You will be able to reach around a 20 percent reduction in the power consumption for the memory system.

MediaTek processors introduced the LPDDR4X for Samsung and other manufacturers on its Helio P20 processors. The LPDDR4X technology can also be found on the X30, P30, P25 and P23 processors. In fact, we would indeed expect the new technology on almost all the future generations of the processors from virtually all major chipset manufacturers.

Final Verdict:

Well, the significant difference between the LPDDR4 and LPDDR4X lies in the fact that the latter reduces the power consumption requirements by almost 55 percent, bringing it down to 0.6 Volts. Of course, there are a few minor differentiations apart from that, but in most aspects, the two siblings remain almost identical and offer similar functionalities. Moreover, these RAM modules can be manufactured on smaller systems and thus help you in reducing the associated costs. We expect the LPDDR4X to be available on almost all future generations of processors.

ROM TECHNOLOGY: (STORAGE)

1. What is Rom ?

ROM is Read Only Memory. As the name suggest you cannot write on this type of memory. But the data can be read and processed. The most Natural example of ROM is your smartphones internal storage that you get by default on a smartphone to store your media and files which is a portion of you ROM.

2. Why we see less ROM than Expected ?

You might have noticed that out of 16 GB of a smartphone internal storage memory only 11 or 12 GB is available for you guys to use. That's because the remaining amount of space is serves as ROM here. Your android OS and some preinstalled apps reside there.

3. Why we need more ROM ?

As you can see from the previous question we talked about some portion of ROM is used for your smartphones OS and preinstalled apps and services. So, you cannot expect to get full storage out of a smartphone. For 16GB ROM you get around

11GB, for 32GB ROM you get around 22GB so if you go for higher ROM capacity for smartphone you get more storage as internal storage for your phone. That will help you to store more photos, videos, songs, files and documents for you. It will also help you run your smartphone the more smoother and fluid as compared to less ROM phones. As you know that if you run out of storage you will feel sluggishness in using it.

4. How much Rom is enough ?

It also depends on your use of smartphone. If you use it for like playing lots of HD games watch 1080P or 1440p movies you definitely need more ROM. Now if you are a basic user then you can go for at least 32GB of ROM as you can also have to check if your smartphone supports external SD card that you can add Storage for your media easily and cheaply. Now in 2019 you can get even 512GB ROM, 256GB and 128GB ROM smartphone that are really expensive but you may think its huge amount but simply not that case because if you shoot 4k videos, play HD games, taking thousands of high quality photos than definitely you need to have those high capacity of ROM smartphone. But I think in budget segment you will find tons of smartphones that has 64GB of ROM as default so if you are on budget you can have it. Before that Always check if there is SD card slot or not.

Final Verdict :

As you guys can now understand the importance of having More ROM as a default on your smartphone that holds all your apps, media, files etc. and for more greater performance you need more storage on your internal memory to run smooth and lag free. But if you want to cheaply increase your storage then check if it has SD card slot then if there is no SD card slot just buy at least 32GB or as my recommendation buy 64GB of ROM smartphone to maintain better performance of your smartphone. If you do not care for it you will get slower and shitty performance in your smartphone. If you have good budget always check 128GB, 256GB ROM phones.

Camera: (Smartphone)

Basics :

Every Smartphone has a camera and it is one of the most important selling point of many smartphones. Even some smartphone users buy it only seeing the features of camera department. But sometime they do not know the proper basic things that should be concerned with when buying it for only camera reason. It is all about good quality hardware used in camera and the sensor used in it and how large the sensor is and how good it is in HDR and how good is it in low light scene and how good the video quality and how many FPS it can shoot video etc.

1. Sensor Size :

The bigger the sensor, the more it can see and the better the photos it should take. The size of a typical smartphone sensor is around one-third of an inch, but, in some phones, the sensor can be as big as an inch. The bigger the sensor the bigger the pixels, so in theory at least if you have two phones with the same megapixel count but one has a bigger sensor, that one will produce the better shots. If you have 12 MP camera with smaller sensor and 10 MP with bigger sensor size than 10 MP will give much better photos.

2. Aperture :

Aperture is how much light a lens lets in, and it's expressed in f-stops: f/2.0, f/2.8 and so on. The smaller the number the bigger the aperture and the more light gets in, so if you want really great low-light performance without a flash, for example, you want the lowest aperture you can. Smaller aperture numbers also indicate that you will get interesting depth of field effects, also known as bokeh effect where the foreground is clear but the background is blurry.

3. Image Stabilization :

Image Stabilization is a great technology to have in smartphone camera arena as It helps to take shake free image and make it more cleaner looking image. Specially in low light photography when take image it comes out blurry so in that case image stabilization helps a lot taking better photos in low light.

There are basically 2 types of image stabilization one is Digital image stabilization that uses software to compensate for slight shakes and to keep the image stable and the other one is optical image stabilization which uses mechanical means to keep the lens

still.

Optical is usually better than digital stabilization, especially in low light. Unless the software is really, really good and it often it cannot compete with the shake-free footage you get from a lens that moves when the camera does.

4. HDR (High Dynamic Range):

HDR stands for High Dynamic Range and it is used in modern smartphones a lot like iphones, Samsung S and Note Series and many other smartphones to capture good quality photos in critical situation like even in sunlight you take rich photos with it than you could not do before it was introduced. But you have to know the basics how it works and when to use it.

HDR, as its name implies, is a method that aims to add more dynamic range to photographs, where dynamic range is the ratio of light to dark in a photograph. Instead of just taking one photo, HDR uses three photos, taken at different exposures. You can then use image editing software to put those three images together and highlight the best parts of each photo. In the case of HDR on smartphones, your phone does all the work for you just snap your picture and it will spit out one regular photo and one HDR photo. The result is something that should look more like what your eyes see rather than what your camera sees.

5. ISO and Shutter speed:

Shutter speed is how long the camera keeps the lens open to take a picture, and ISO is how sensitive your camera is to the available light. Many camera apps allow you to adjust both of these things.

The bigger the ISO number the more sensitive your camera is to light, so for example, if you are shooting at ISO 100 the camera needs one second to capture the image, while at ISO 800 it only needs 0.125 seconds. That extra sensitivity comes at a cost, though, and that is noise, if you are shooting at really high ISOs you will see a lot of noise, which manifests itself as a grainy effect.

6.Video Segment:

a) 4K Recording :

Now with the advancement of smartphone processor now in first segment of 2019 almost all midrange and high range smartphone support 4k recording in rear camera so before you buy must check if it has that feature or not but I can tell you this feature is present in almost any phones now. 4K is just a resolution than is 4 time than 1080p that in 1920 by 1080 pixels and 4k is 3840 by 2160 pixels. It captures very high quality videos and you can watch it in 4k Tv even and they will look crisp in bigger TVs as well. So, this is a must feature to have now. If you buy higher end devices you get the smoother 4k 60 FPS video option which is so smooth. So, if you need it must check if the phone has it or not.

b) EIS (Electronic Image Stabilization):

This is an called as EIS because it helps to stabilize videos that looks good to our eyes and for vlogging and making taking good videos it is a must have features to have. EIS down this by using software that handles the shakiness and adjust videos with the video movement. But this is not the best solution there is OIS there which is better than this.

c) OIS (Optical Image Stabilization):

OIS is the better Video Stabilization technique that has a mechanism to move sensor with the camera movement so in higher end devices you will see this like Pixel 3XL, Galaxy Note N9, iphone XS max etc. all have these types of IOS in video mode to make video more shake free and smoother.

d) Slow-motion:

Most of the phone already have it but the difference is in FPS (Frames Per Seconds) . As the higher the frame rate is the more fluid your slow-motion will be and it will look more immersive to watch. As this is a nice feature almost all midrange phones have like 720p 120 fps slow-motion facility and some have even 1080p 120 or 240 fps slow-motion. Some higher end have 1080p 480 fps which is rare to find and some have 720p 980fps ultra slow-motion feature. But for those you have to spent a lot of money. So just see and differentiate what you need and how good quality you want in it. Always remember the good quality processor can handle high FPS videos like over 240FPS slow-motion or better such as 480 FPS etc.

Final Verdict:

I have talked about the most important things to consider before buying the smartphone for camera department and all those features I talked here is so vital for knowing about smartphone camera like IOS, EIS, Sensors, Aperture, Mega Pixel, image processing, good quality sensors are so important to know before buying any smartphones.

Battery (Smartphone)

Battery:

Battery is one of the most important factors for many people in case of buying any smartphone. As a smartphone user you might be using for long time so keeping the battery juice is so much important before buying and electronics product. Here I will give you some basic idea about battery and types and which is good and which one you should look for buying.

1.Types of cellphone batteries:

a. Nickel-cadmium (NiCd).

b. NiMH (NiMH)

c. Lithium-ion (Li-ion)

d. Lithium Polymer (Li-Pol)

But now the Ni-Cd and NiMH batteries are not used anymore in smartphones as more advanced Li-Ion is here to fit into mobile industry. And the latest one is here is Lithium-polymer battery which also being used in some recent devices.

2. Battery Capacity:

A battery capacity is a measure that indicates how much electricity this battery can give for some time. It is measured in milliampere-hours (MAh).

A larger one will provide you more battery capacity and it will last longer but It will take more time to recharge itself. Always you should choose the battery capacity based on your uses and how intense work you do on it. If you want to use it for much longer than you have to go for more MAh battery.

The more the feature the more you will use it and we use our smartphone for so many reason like taking videos, photos, browsing internet, playing online games etc. suck up tons of juice from battery.

3. Battery and Processor :

There is a relationship between good battery like and good quality and power efficient processor and how much well the processor is like more recent version is always has better architecture and it has like 14nm process or better like 7 nm or 12 nm based on its price and specification, 7 nm is not very common to find only the best smartphones comes with it and it is very power efficient and more optimized for longer uses. 14 nm is mostly available in the market that you will find but do not buy that has 28 nm process which is bad in 2019. Go for at least 14nm or close to 7 nm based on your budget. This will give you better performance as well as good battery life.

4. Battery Recommendation:

My recommendation for buying smartphone for optimal performance is first check the processor used in it. Normally I have seen Qualcomm Snapdragon 600 series and 800 series has very good quality battery efficiency and also the latest Samsung exynos has good battery life but in recent version like 7 and 9 series exynos are good, you will also find Huawei kirin processor that come with latest 7 nm process and midrange have 14nm process too. But I used a lot of Snapdragon based phones so my choice will be that brand. Now check for Battery capacity That is which one has more of it like 4000 MAh and 5000 MAh are quite good for lasting all day with heavy uses. Just do not go for less than 3000 MAh in recent times. Also remember the processor used in it and then check battery. The less the Nano-meter(np) the better and more the capacity the better.

Display (Smartphone)

Basic :

When using any smartphone, you will first notice the display and this display quality defines a lot about the smartphone brands, price, display panel used, resolution used in it and so on. So, knowing about the display of a smartphone is so vital is buying any phone.

1. Resolution:

There are mainly 4 types of display resolution in smartphone arena like 720p HD that is 1280 by 720 pixels, Full HD 1080P which is 1920 by 1080 pixels, QHD 1440p (Quad HD) that is 2560 by 1440 pixels and finally 4K which is UHD (Ultra HD) 2160P display resolution is 3840 by 2160 pixels and now most of the smartphone is 2018 and 2019 are with at least 720p and 1080p for budget segment and premium smartphone comes with normally 1440p display but 4k display phone is rarely found, one of them is Sony Xperia ZV premium .

4K is 4 times of 1080p full HD, 2K is 2 time of 1080p Full HD, so you can imagine how many pixels are there in 1 inch of display nearly 500 PPI (pixels per inch) per inch and that makes a smartphone display so crisp and clear to look. Movies, Games, reading text files are joy in those high-resolution display.

Now for lower end segment like 720P and 1080p are come with nearly come with PPI of around 200 pixels per inch and 400 pixels per inch. Also, this depends on Screen Size of smartphone too. Smaller display with 1080p resolution means more crisper and sharper display than bigger display 1080p display. Always check which one is best for you now as I told you all the basics of different display resolution used in it. And it also depends on your budget and need too.

2. Resolution and Processor Optimization:

As you all know by now the more the resolution the more pixels are in it and the sharper and crisper the content will look on your smartphone. But Some time lots of brands use higher resolution display which is good but they give low quality processor that cannot handle the GPU and that high resolution display so performance drops dramatically , which we do not want specially you want a decent phone you must not want poor performance and slow user interface so keep in mind that with processor the display resolution should also be matched properly like if you have 1440P display suppose and the processor is midrange like Snapdragon 450 or 625 then you will not get the optimal performance from it. Because those CPU are not designed to be used in so much higher resolution display. If the display is 720P or at most 1080p then it is fine. For high resolution display you need high quality processor to give juice that much.

3. Panel Types:

Display Panels are one of the important things to consider when choosing the best phone for you guys. I will first talk a little bit about different types of panel then my recommendation will be done. There are basically 4 types of display is smartphones:

a. TFT-LCD

b. IPS

c. OLED(AMOLED)

d. Retina

TFT-LCD:

LCD (Liquid Crystal Display): An LCD is a flat-panel display that is based on the light-modulating properties of liquid crystals. Although LCDs are very thin, they are composed of several layers. Those layers include two polarized panels with a liquid crystal solution between them light is projected through the layer of liquid crystals and is colorized, which produces the visible image.

The important thing to note is that the liquid crystals do not emit light themselves, so LCDs require a backlight. They are thin, light and generally inexpensive to produce, and the most mature display technology used in smartphones.

Some of the advantages of LCDs include high brightness, consistent color fidelity at different viewing angles, better color sharpness thanks to the use of an RGB matrix, and longevity (LCDs are not susceptible to burn in, though they can suffer temporary image retention). They also tend to exhibit lower contrast and inferior response times compared to some AMOLED equivalents.

IPS (In-Plane Switching):

In-plane switching involves arranging and switching the orientation of molecules of the liquid crystal layer between the glass substrates of the display. Simply put, it's a technology that is used to improve viewing angles and color reproduction on TFT displays, and that is intended as a replacement for TN (Twisted Nematic) displays. It is used on LCDs to get up to 178 degree horizontal and vertical viewing angles. So, if you need good quality display at great 178 degree viewing angles you must select an IPS panel display. TFT LCD is not used in even mid ranged devices in 2019 and late 2018. IPS becomes the most affordable and better display.

OLED (Organic Light Emitting Diode):

OLED, unlike LCD, does not require a backlight, because the pixels contain light-emitting diodes that power on and switch off on an individual basis. The advantages of OLED displays include a theoretically infinite contrast ratio, and also a wider native color gamut, a lesser shift in brightness at different viewing angles, and better power efficiency with low APLs. The downsides include color shifting at different viewing angles, burn-in, and lower power efficiency in high APL applications.

Retina Display:

Retina display is made by apple and they call it retina as it has around 326 or above PPI (pixels per inch) which is not possible for human to detect a single pixel easily. It means I will be sharp and crisp to look and they optimize it so perfectly that the color reproduction is also so good as well as viewing angles are quite decent. But recently there are more sharper displays are coming from different brands with over 500 PPI which is crazy sharp to look at.

HDR Support:

HDR, or high dynamic range, is a display feature in some newer devices and future flagships that promises a more lifelike media-viewing experience. Here's the simple explanation: HDR-capable displays have a high peak brightness, giving scenes more detailed shadows without sacrificing detail in highlights. On top of that, they can display wider color ranges and richer color depths, leading to a higher number of colors with more steps in each color gradient.

This is because HDR displays support wide color gamuts (DCI-P3 is currently the most widely supported wide color gamut), and also support 10-bit color.This theoretically allows HDR-enabled smartphones to display over 1 billion colors. As of now, flagship smartphones are starting to support the HDR10 and Dolby Vision standards.

Contrast Ratio:

This is the ratio of a display is peak brightness to its black level. OLED displays have a theoretically infinite contrast ratio because the pixels can be completely switched off, though in practice, ambient light prevents this from being realized except in a completely dark room. Thus, OLED panels can improve their contrast ratio by reducing screen reflectance.

Recommendation:

Based on your choice for you budget you should get at least and IPS display with 1080p display that is quite decent for almost every task like movie watching, gaming, reading pdf and documents and browsing internet with crisp text is not an issue but remind that processor should also be decent like Snapdragon 636,660,710,exynos 7 series and 9 series with octa core, kirin 970, 710 etc. and for higher end go for 1440p with Snapdragon 845,855, Kirin 980,exynos 9 latest series etc. are best one to support 1440p display. And for Viewing angles just IPS is good enough and if you want better color and contrast you can go for higher end OLED display that is simply the best choice.