



5G IMPACT ON MOBILE SOLUTIONS

4G technology has enhanced mobile experience a lot by enabling fast internet browsing, HD video streaming, relatively reliable video conferencing, online gaming etc. It allowed mobile apps to exchange data with servers in much lesser time, thus improving the mobile experience.

Having said that, the scope of improvement here is great, especially in areas like:

- Network performance in densely packed areas with increased number of devices connecting to mobile network
- High bandwidth requirements to enable fast data transfer, especially with exponential increase in IOT devices
- Reliable, consistent and low latency communication

Mobile network operators globally are busy deploying 5G network, which is seen as a solution to the above-mentioned problems.





What exactly is 5G?

5G refers to the fifth generation of cellular mobile communications. Strictly speaking, the industry standard is called 5G NR (New Radio). 5G divides frequencies into two groups: FR1 (450 MHz - 6 GHz) and FR2 (24 GHz - 52 GHz). While 4G technology averages at 20 Mbps, 5G could run at 10-50 Gbps.

5G is different from 4G standards like LTE or WiMAX, and cannot be delivered to existing phones, tablets, or wireless modems by means of tower upgrades or software updates. It requires additional small cells covering smaller area serving much higher frequency to offer high data transfer.

5G offers features like:

- greater bandwidth for improved download and upload speeds
- increased connection density to allow huge devices to connect in dense area
- Ultra-Reliable Low-Latency Communications for extremely latency sensitive or mission-critical use cases
- Massive Machine Type Communications (MMTC) for sensing, metering, and monitoring use cases

Impact on mobile solutions

Here are some of the key areas related to mobile solutions that would experience direct impact of 5G technology.

App Installs

"A majority of users (51%) still don't download any apps in a month"

[Source: techcrunch.com]

There are multiple reasons for decline in app installs including device storage limit, network speed/cost. Big app size and

slow networks are common barriers to download and install new apps. With 5G's increased network speed and reduced cost, we should definitely expect increase in App installs irrespective of App size.

Page load time

"As page load time goes from one second to 10 seconds, the probability of a mobile site visitor bouncing increases 123%"

[Source: thinkwithgoogle.com]

Be it a mobile app (native/hybrid) or a responsive web site, optimal page load time during various interactions is the key for user experience and retention. Page load duration is dependent upon multiple factors e.g. fetching content/assets/files from server or local storage, computation of business logic etc. Majority of the times, fetching content from server is often the main culprit for overly long page load. With 5G pitching in, content download time would reduce significantly thus bringing a 'Wow' user experience!



AR/VR Solutions

Augmented Reality and Virtual Reality have already picked up in various domains like gaming and training. 5G should enable a dramatic increase in adoption of these technologies in years to come. The most important aspect of a VR solution is immersion (Immersion into virtual reality is

a perception of being physically present in a non-physical world [Source: wiki])

A good example for Immersive Experience of Tennis match in a stadium includes:

- feel of watching in stadium as if you're there surrounded by friends
- teleport and watch from multiple

viewpoints – even premium spots

- more control than stadium- watch replays, match statistics
- more control than TV – select highlights to watch, custom statistics



The perception is created by surrounding the user of the VR system in images, sound or other stimuli that provide an engrossing total environment.

We cannot always bundle these images into apps as it not only increases the app size but also makes it impossible to change these images on the fly. Hence, the

ideal solution is to maintain the content in cloud to make apps lightweight and configurable. All this requires fast network as it would otherwise break immersion causing bad user experience due to slow and unresponsive apps.

AR based games like Jurassic World Alive have seen great adoption and success. With

Facebook taking over Oculus Rift in 2014, there is a lot that has been developed in VR space; we are yet to see the widespread adoption. Online Gaming, Entertainment, VR Stores are some of the areas that should largely benefit with 5G, both in terms of speed and QoS with fast streaming network as a backbone.

Machine Learning

Machine learning solutions involve high computation work which can't be performed on device due to device limitations (CPU, memory, battery) and hence such operations are usually performed server side. For instance, image processing for complex use case is performed on server side using TensorFlow library running on TPUs (Google's Tensor Processing Unit processor for ML) in cloud. Although a lite version of TensorFlow lib with basic feature set is available for mobile, but advanced uses cases are executed on server side only.

With 5G fast network, such resource intensive complex operations should return results almost instantly. This capability should prove a game changer.

IOT

"IoT communications remains the most popular target use case for 5G, with 59 percent of the organizations"

[Source: Gartner]

5G offers Massive Machine Type Communications (MMTC) and long battery life for IoT devices in areas like sensing, metering, and monitoring. MMTC standards like eMTC, NB-IoT when backed by 5G network, will offer Ultra-Reliable Low-Latency Communication (URLLC).

IoT is one of the technological foundation of Smart Factories and this industry is outpacing other industries on IOT investment. Smart factories shall reap 5G's benefit from multiple aspects. For instance, the data from IoT devices can be collected near real time to process and make quick decisions. This boom in IoT industry is considered as most promising segment for mobile Apps and solutions leveraging IoT platforms like ThingWorx, Google IoT, Azure IoT, IBM Watson etc.

Cloud Native Architecture

Cloud Native Architecture is an approach to build and run apps that leverage cloud computing deliver model blended with following core concepts – DevOps,

Continuous Delivery, Micro-services and Containers. This architecture provides organizations with enhanced resilience, agility and portability.

The time to market for mobile solutions has reduced significantly with Cloud Native Architecture and Agile development practices where software is shipped iteratively to production in batches. 5G's fast network should complement Cloud Native Architecture by reducing deployment/shipment time and micro services' response time.

All this enhances mobile solutions w.r.t. continuous deployment, publishing and run-time performance aspect. For example, we can expect improvement in following areas:

- CI/CD pipeline downloading the content from source repo (e.g. GitHub) for build
- publishing build to test devices in perfecto/TestLab
- execution time of tests with improved response time of micro services
- promote build to HockeyApp /TestFlight (iOS)/ Beta (Android)/Prod
- app download from PlayStore/AppStore
- app responsiveness/ page load

User Experience

5G should enhance user experience largely. Even now with 4G, the trend to download content especially music/video has shifted towards streaming because of reasonable fast network at times. 5G's consistent, fast and reliable network shall compliment content streaming and avoiding device storage consumption. The storage/SD card on devices may not be required anymore or limited with faster sync processes because of faster network availability.

Mobile App Marketing

Mobile marketers' goals (financials) are directly linked with mobile app promotion, downloads, user engagement and retention. With all above mentioned benefits of 5G, Mobile App Marketing industry should certainly see positive impact due to increase in downloads, immersive experiences and user satisfaction.



Challenges with 5G based Mobile Solution

Security Concerns

Recent reports indicate that several countries barred individual companies like Huawei to supply equipment for 5G network due to security reasons. There is a fear that the Chinese government could use Huawei as a proxy to spy rival nations. [Source: BBC News]

GSMA is setting up a task force of European mobile networks to identify ways to enhance equipment testing and uncover such aspects. All these concerns and applicable solutions could add delays in 5G deployment.

Health Concerns

A recent US government study indicated "clear evidence" of a link between exposure to mobile phone radiation and cancer. On similar lines, over 200 scientists and doctors signed petition mentioning 5G will "massively increase" the exposure to this radiation. [Source: BristolPost News]

Its utmost important that such concerns are addressed so technology advancement does not cost health.

5G ready Mobile Devices

The benefits of 5G network can be reaped only when the mobile device is 5G compliant and has decent h/w configuration to support high speed data transfer while managing CPU, RAM effectively and minimal battery drainage. Fast data transfer consumes more battery as the radio/processors will need more power to absorb or circulate the data.

Device/App Administration

Increase in connected devices shall require admin policies and controls to scale on same pace to address more frequent violations around vulnerability and security.

App Fragmentation

Since 5G adoption will happen in phases and a big set of users would still be on older networks (2G, 3G, 4G...). This would demand different app flavors targeted for network type. While it is easy to state, the real implementation is bit challenging, as no such option currently exists when publishing Apps on Play Store or AppStore. Updates on this front are awaited.

While 5G promises to enhance mobile solutions significantly, it is quite important that the concerns raised by domain experts (scientists) around security, health and other areas are addressed so it is considered as a blessing to humanity!



About the Author



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