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The Study of 5G Technology in Metaverse

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Abstract: ***5G can provide lower latency, greater capacity, and higher speed, than 4G LTE Networks. It is one of the most robust technologies and the fastest the world has ever seen. It means much lower lag, quicker downloads, and a significant effect on how we live, play, and work. The speed of 5G and other connectivity benefits are expected to make businesses more efficient and give end users to access more information faster than ever before. Smart stadiums, Connected cars, and advanced gaming all will depend on 5G networks. In 1992, Neal Stephenson coined metaverse in his novel Snow Crash. It remained buried deep under the snow for several decades, until Facebook announced a virtual reality-powered metaverse to be the next big thing. The connectivity ecosystems and internet devices have been in hysteria ever since the 5g relationship was explained. Nowadays, it is hard to avoid the term. But the truth is, to reach it is full potential the 5G metaverse relationship will be critical. We explore how 5G can enable to be exciting uses like metaverse VR, and metaverse XR and help make Web 3. 0 reality. It is a phenomenon that will give wireless operators the chance to their 5G investments. Facebook is the best example of a metaverse. Before a few months, the Facebook name was changed to Meta. Meta verse means Virtual reality world. In the future Metaverse, the next level of the network going to be used all over the world. It is the 3D version of the virtual world. Nowadays we are using a 4G network for data usage because it is enough for android. In the future people start to use Metaverse for social media usage at that time 4G speed is not enough. It will need a 5G Or 6G data speed connection. So, we have to go to implement that metaverse using in 5G network.***

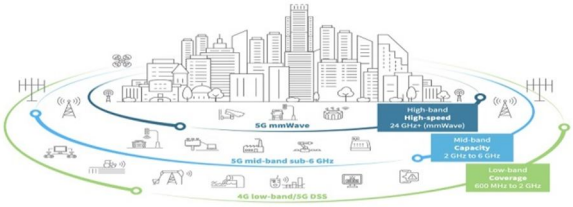
Keywords: Metaverse, 5G Speed network

I. INTRODUCTION

The “Metaverse” is arguably the telecom and hyper scalar buzzword du jour. In broad strokes, the metaverse is described as a new way of interacting online, mixing cloud data with the real world - 3D virtual worlds which we will experience using the latest devices, each with wealthy social connections and communication weaved in. With super-fast 5G - and later 6G - people will be able to participate in the metaverse by using augmented reality headsets or glasses. In the future, the metaverse may include immersive experiences via hologram. Facebook started to implement the metaverse and create a virtual world in social media. Instagram and Whatsapp are also under the metaverse. In later both will also work under the metaverse. Now Facebook is going to officially work under the Meta Verse. It is like a 3D version format. Facebook is ready to create one app under the virtual world its name Horizon. On social media, as usual, we create a profile and invite our friends to play different kinds of games. 5G enables the metaverse to connect the metaverse from anywhere, Compare to other generations of networks, 5G works at high speed to transfer data. It is also clear why the 5G industry is so interested in the metaverse. After all, Fixed Wireless Access (FWA) is so far the only existent creative service to emerge from the introduction of 5G in the US – and the economics of FWA is questionable at best. This is the reason that the metaverse today is kind of like a treasure, at the end of the 5G mysterious island. But to support the metaverse, the 5G industry will need to move a lot faster than in its past.

II. 5G ARCHITECTURE

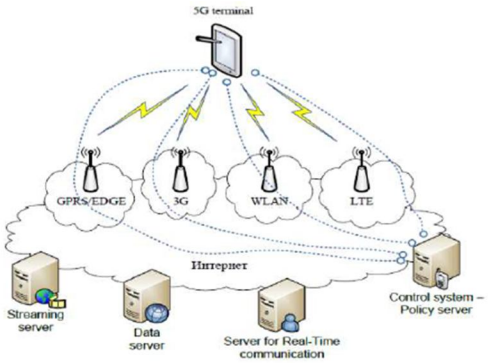
The fifth-generation mobile system model is an all-IP-based model for wireless and mobile network interoperability. All IP Network (AIPN) is capable to fulfill the increasing demands of the cellular communications market. It is a regular platform for all radio access technologies. fig(a) is an example of a 5G Network Architecture model with a different level of frequency.



Fig(a)

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Packet switching which is used in AIPN and its continuous growth provides enhanced performance and cost. In the fifth generation, Network Architecture consists of a user terminal (which has a crucial role in the new architecture) and a number of independent, autonomous radio access technologies (RAT). In 5G Network Architecture, through Cloud Computing Resources (CCR) all IP-based mobile applications and services such as Mobile banking, Mobile commerce, Mobile health care, Mobile portals, Mobile government, and others are offered.



Fig(b)

Cloud computing is a model for opportune postulation network access to configurable computing resources (e.g., networks, servers, storage, applications, and services) fig(b) shows a clear view of cloud computing with 5g. Cloud computing permit consumers to access applications without installation and acquire their personal data at any computer with internet access. CCR links the Reconfigurable Multi-Technology Core (RMTC) with remoter configuration data from RRD attached to Reconfiguration Data models (RDM). The main task for an RMTC is to deal with increasing distinct radio access technologies. The core is a convergence of nanotechnology, cloud computing, and radio, and is based on the all IP platform. Core changes its communication functions hanging on the status of the network and/or user desire. RMTC is connected to different radio access technologies ranging from 2G/GERAN to 3G/UTRAN and 4G/EUTRAN, in addition, to802.11x WLAN and 802.16x WMAN. Other standards are also enabled such as IS/95, EV- DO, CDMA200.etc…, Interoperability process criteria and mechanisms enable both terminal and RMTC to select from heterogeneous access systems.

III. DEMANDS IN THE METAVERSE

In 2021, it was estimated that the overall metaverse market size rose to $39 billion, and in 2022, this is expected to rise to $47 billion, before rushing to $679 billion by 2030. The metaverse is coming together largely from two main concepts. Accessed through augmented reality (AR) tools and VR headsets, web 3 is ushering in a new level of experience where websites and apps will be able to process information in a smart, human-like way in real-time using machine learning. The essential sensing, processing, and display technologies are presently being developed, and companies like Meta, Google, Microsoft, Snap, HTC, and Apple all have an interest in building the required devices to make the metaverse accessible. HTC's VIVE VR system is one of the examples of required technology. Meta's Oculus Quest gaming headset is another. But VR is not only meant for gaming and entertainment.



Fig(c)

To advance the digital customer experiences, the digital economy allows for innovative and imaginative demands which have shown in fig(c). To begin, this new age of evolution has created a demand for 5G growth and integrations throughout enterprise business models. As there is an expansion in the metaverse market, a lot of opportunities will appear as enterprises scout exciting potentials in new verticals from entertainment to real estate. fig(d) shows that the customer experiences the virtual house blueprint so that the real estate business has taken it to the next level.

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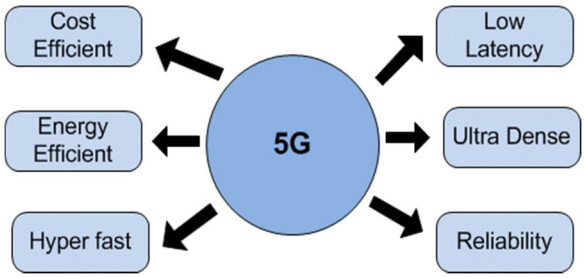


Fig(d)

5G will also play a vital role in maintaining and producing an outstanding customer experience in both the real and digital world. Concurrently, it will lure customers to expect an efficient yet impeccable journey, including vigorous connectivity. In the metaverse, once they can provide groundbreaking customer exposure with the fastest possible connection speeds and low latency, the Enterprises will be truly successful. Delayed time and disconnections will be a quick path to miserable customers and entirely unsuitable to metaverse participants. At the end of the day, 5G will be to the metaverse what 4G was for social media and the uplift of mobile apps. Simply put, the metaverse and hence enterprises' digital strategies can't attain their full ability without 5G.

IV. WHY WE NEED 5G FOR METAVERSE:

The metaverse is the virtual world to connect all the Users in that world. It generates a lot of data connections from the user. To analyze and transfer the data from the user to the cloud from that it needs high-speed transfer data. The last network generation like 3G, 2G, and 4G is not suitable for this data speed and is not stable too because it takes more time and complexity. There will be a lot of data consumption. Meta verse needs more data and increases the level of data speed. So 5G network is the best way to implement the metaverse. Social media like Facebook, Instagram, and Twitter also consume some limited data depending on people usage, and 4G Or 3G Network speed is enough for this type of social media. But for Metaverse, it is complicated for social media and consumes certain unlimited data. So, a 5G speed network is better for the metaverse. Below Fig(e) represents the importance of 5G in the metaverse for our future.



Fig(e)

Metaverse could potentially use virtual reality and also Now, we know how to immerse users in an alternate world. Technically is still being developed, but some companies said Meta is used to building and improving devices. Metaverse going to provide new techniques and valuable ways to look after our health. Virtual reality counseling is already available in Medical Health care fields, and physio-therapists are using needles to provide a variety of therapy to patients, so they can experience situations that can keep them safe, controlled environment. Requirements that simplify in 5G network architecture must have Extreme flexibility in which it must be able to design networks to satisfy users such as latency, capacity, throughput, network connections also functions, and apart from services at any part along to the encrypted communication considering.

The above fig(e) shows the information about 5G network speed first it is accessing for users and there is a communication between two users to connect to the metaverse whenever they like to use it. And also new users will be more likely to explore more and more in the virtual world. Secondly, it compares the real world and virtual world, their location and objects can be replicated virtually in perfect detail by using 5G and linking the metaverse with the physical real world. At last, it is supported by increasing the global data usage it is more efficient than comparing other generations of networks. So it will be high energy consumption as the world invests more time in the digital and virtual environment.

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Metaverse depends on the development of edge computing and also for storage sources. That is because at least as it stands now producing the social media content to create a metaverse experience will require very low latency and very high bandwidth connectivity. Experiences like this belong to limited now by how far they can push VR and AR requirements. They need the fastest networks with lower latency that can allow huge amounts of data to zip between cloud servers and their device connections, whether those are VR headsets or AI-powered cables. 5th Generation networks, especially 5G using spectrum, will start up to open new possibilities like VR requirements that include the sense of touch, and also AR like that let visitors have in-depth conversations with AI hosts. Constructing fully interactive 3-Dimensional Metaverses, replete with textured social media from video and immersive audio relies on heavy digital files far denser than file types required for video or other content. Finally, upload and download speeds are simultaneously faster than the 4th and 5th Generation networks can handle these bigger files. Growing access to 5G can support the ongoing development of the Metaverse by providing the speed and power that make it possible for digital worlds to function it. 5G-ready devices that are being developed by mobile hardware companies are capable of running software beyond that which we have now devices that can support the metaverse.

V. GAMING -A STEP CLOSER

There are many new-age tech companies and 5G applications are available nowadays. Some ultra-low latency of 5G networks opens up many possibilities, particularly for augmented reality (AR). Metaverse will also gain network speed from 5G networks, fig(f) and fig(g) are AR tools used in gaming. The energy between 5G and Metaverse is expected to contribute to the growth and scale of both technologies." High-speed connectivity bandwidth and Low latency are highly recommended for producing social media content across experiential technologies like Metaverse, virtual reality, and augmented reality. Thus, 5G plays a major role in bolstering the seamless creation of new types of content," said Soudharya Agarwal, co-founder of Palm, who is building a Metaverse network for India. It will also be so critical in facilitating edge computing, the interplay with Website applications, and storage, thus laying a foundation for an integrated metaverse experience.



Fig(f)

5th Generation networks will pay the way for superior collaboration opportunities in the virtual mode world. It will also support the systems to process by increasing volumes of data in real-time and with improved mobility then ensuring a high-quality 3-Dimensional experience. The metaverse needs 5G, and maybe the other ways are around too. The public metaverse is away from being practically developed. So, it will take some fundamental changes to 5G and hyper-scale infrastructure. But metaverse technology — the integration and overlay of physical and digital both exist today and it is used to solve practical problems, like how to cover a city optimally with 5G coverage capable of supporting public metaverse infrastructures, in the first place. Being able to flawlessly and digitally recreate a real network is also driving innovations in distributed cloud architectures for Communication Service Providers.

The Metaverse is arbitrarily for the telecommunications and hyper-scale to measure the speed of broadcast networks. In broad strokes, the metaverse is used to describe new ways of interacting online, mixing storage of cloud data with the real world — 3-Dimensional virtual worlds which we all experience by using new devices. Some social media connections and interactions weaved in.

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The headsets may have gotten sleeker and the software system is improved. But superficially, this metaverse thing sounds too jaded to older ears like a retread of the same "cyber security space" Virtual Reality concepts we have heard about since the 1990s. Indeed, the metaverse off is already almost cache among the torrent of press releases from tech startups and established giants alike looking to cash in or atleast get some visibility from the metaverse hype. What "metaverse" ultimately means is entirely up to who is talking about it. If you listen to meta it is their metaverse.



Fig(g)

VI. CONCLUSION

Here we discussed the 5G generation technology in the Metaverse version. And we concluded about the 5G architecture, why we need 5G for Metaverse, and Demand in the Metaverse. It is a fifth-generation network technology that is going to be implemented in the Metaverse by Gaming. It is a virtual world gaming it needs a lot of networks to connect the Game. Latency is low when compared to the other generation of networks also it is easy to connect, so we started to use a 5G speed network. It is playing a major role in the Metaverse version. Hence, we proved that Metaverse needs a 5G technology Network.

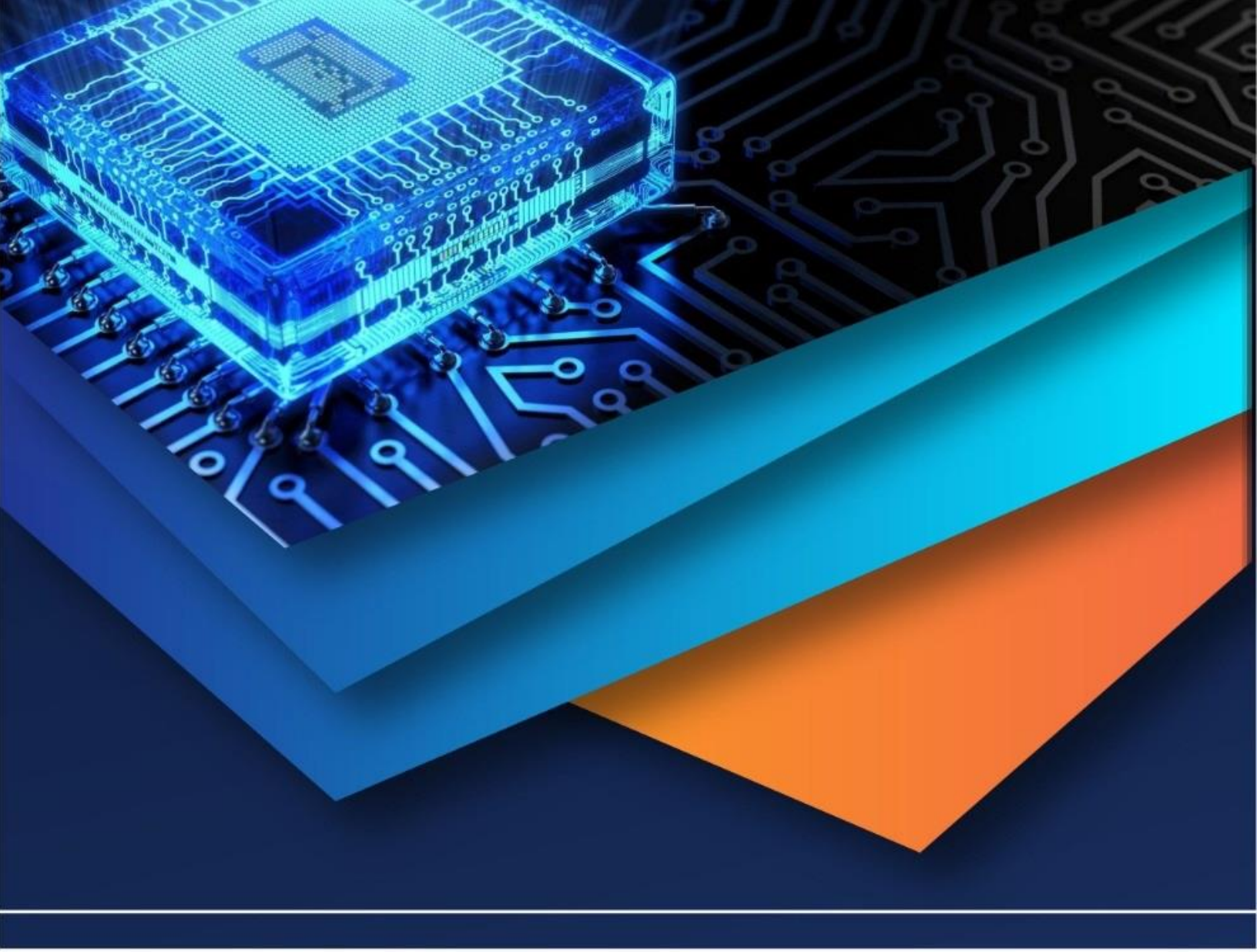
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